1 INTRODUCTION

1.1 PLATEWORK - Purpose

PLATEWORK is an interactive computer program with the main purpose of code checking stiffened plate structures against rules and regulations issued by the following authorities:

- API - American Petroleum Institute
- DnV - Det norske Veritas
- NPD - Norwegian Petroleum Directorate

The code check features are mainly buckling checks, with some yield check facilities, see PLATEWORK Theoretical Manual /1/. PLATEWORK is based on the Capacity Model concept, and the following Capacity Model types are included:

- Simple, unstiffened plate (API, DnV, NPD)
- Stiffener (API, DnV, NPD)
- Girder (API, DnV, NPD)
- Uniaxially stiffened panel (API)
- Orthogonally stiffened panel (API)

The program has features for manual input of code check data, and extensive automatic features for extraction of such data from Finite Element (FE) analyses. This allows PLATEWORK to be used in a stand-alone mode or as a postprocessor to a FE-analysis.

Included are several features for graphics interaction and presentation. The code check results can be presented as print/plot to a file or to the screen. The result print utilities include very flexible and user-controllable options for results sorting and filtering. This enables the user to tailor the program output for easy inclusion of code-check results in an analysis report.

PLATEWORK is part of the SESAM suite of programs and operates on a local database file. When using the program as a postprocessor to a FE-analysis, it also reads FE-results from the SESAM Interface File /3/. The SESAM Interface File may have been created by the SESAM analysis program SESTRA /8/, the SESAM utility program PREPOST /4/ or by any other program.

1.2 PLATEWORK in the SESAM system

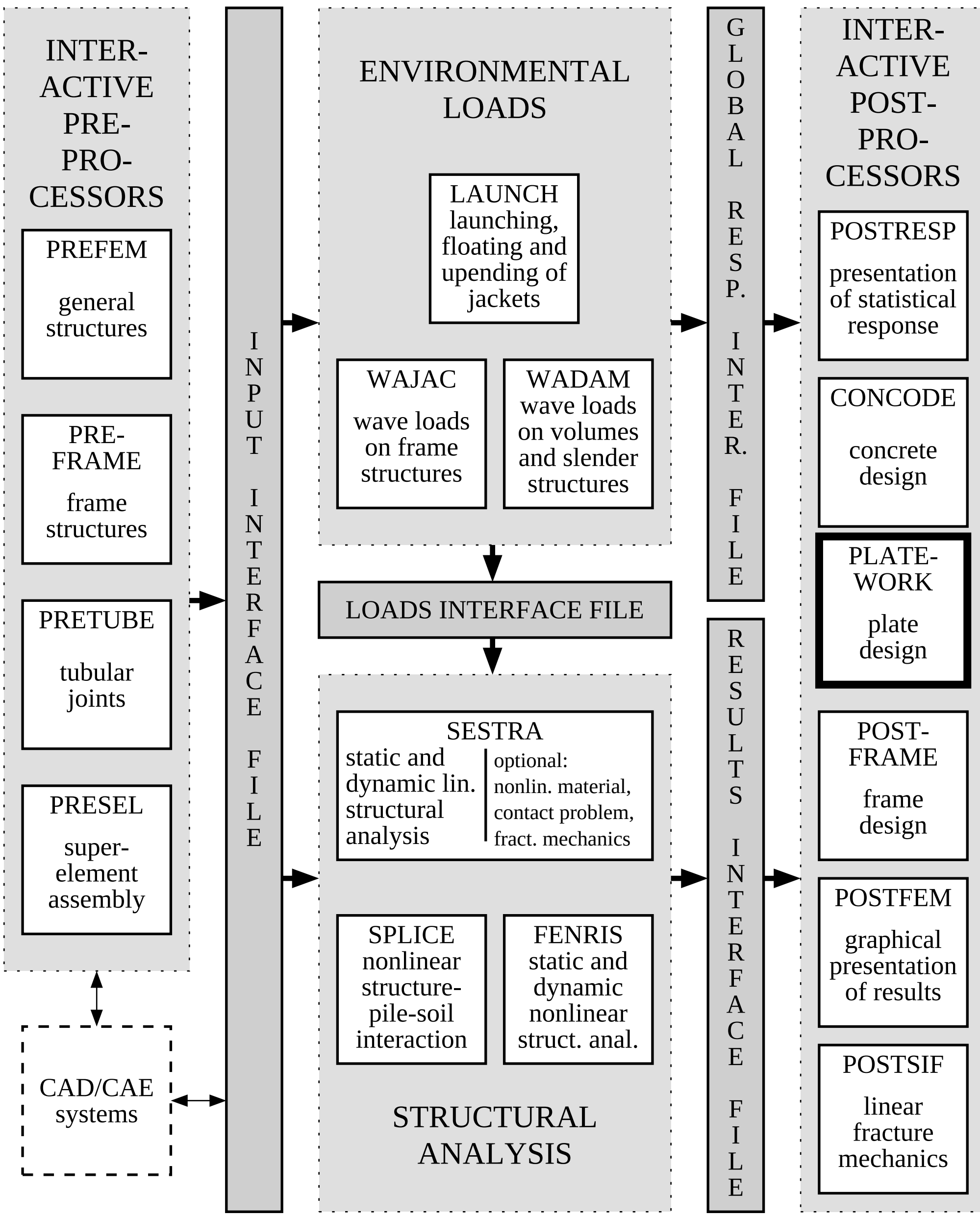

Figure 1-1 PLATEWORK in the SESAM system

1.3 PLATEWORK environment

Below is shown the local PLATEWORK file environment. Note that it may be necessary to use the SESAM utility program PREPOST /4/ to establish the SESAM results file in direct access

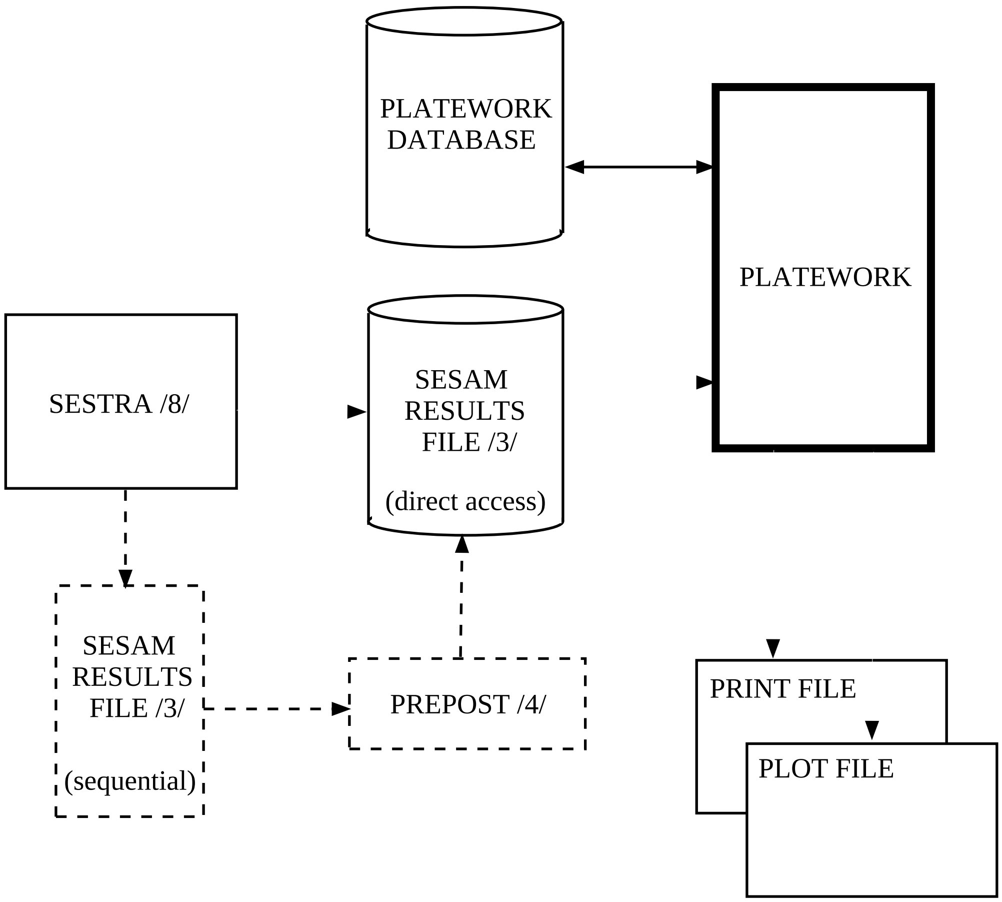

Figure 1-2 Local PLATEWORK file environment

1.4 How to read this manual

Chapter 2 contains descriptions of important concepts employed in the program. A novice user should read this chapter first.

Chapter 3 is a quick user’s guide and contains small concrete examples on how to use the concepts explained in chapter 2.

Chapter 4 contains practical information on how to start the program, important files and program requirements and limitations.

Chapter 5 provides a description of all program commands and associated input data.

Appendix A contains complete tutorial examples.

PLATEWORK Theoretical Manual

The basic theory behind the code checks are described in a separate manual, the PLATEWORK Theoretical Manual /1/. This manual is an important reference document for any PLATEWORK user. References to API, DnV and NPD code documents will be found here.

PLATEWORK Status List

The latest information about minor program modifications, error corrections or amendments to the PLATEWORK documentation is available in the PLATEWORK Status List. The Status List will also state the latest revision numbers of the PLATEWORK documentation.

This document is issued regularly by Veritas SESAM Systems A.S to every PLATEWORK installation. The local SESAM installation responsible will be able to provide the latest copy.

PLATEWORK Maintenance Manual

The internal implementation aspects, programming tools and internal datastructures are described in a separate manual, the PLATEWORK Maintenance Manual /2/. The manual is not generally available for PLATEWORK users, but used by PLATEWORK maintenance responsible personnell.

1 FEATURES OF PLATEWORK

1.1 Introduction

This chapter contains a broad description of important concepts employed and features available in PLATEWORK. It serves as a first introduction to the program principles for the novice user, and as a reference document for the more experienced user.

1.2 The Code Checks

The main purpose of PLATEWORK is, as mentioned briefly in the preceding chapter, to perform code checks on stiffened plate structures. The current version supports the following checks, see also the Theoretical Manual /1/:

Table 1.1 Code checks

Type of checks		**Code of Practice**	
	API	**DnV**	**NPD**
Plate yield and buckling checks	X	X	X
Stiffener yield and buckling checks	X	X	X
Girder yield and buckling checks	X	X	X
Uniaxially stiffened panel buckling checks	X		
Orthogonally stiffened panel buckling checks	X		

The table shown above identifies certain structural parts that have been addressed by the different design codes. These structural parts are in PLATEWORK called "Basic Capacity Models" or simply "Capacity Models", and they are treated as separate entities independent of for example the elements in a Finite Element mesh.

The Basic Capacity Models are described in the following section.

1.3 The Basic Capacity Model

In order to handle code checks in a simple, efficient and versatile way, a new entity called a Capacity Model is introduced. Some important aspects characterizing the Capacity Model are:

1 **Capacity Model types**
There are 5 Capacity Model types :

a Plate Capacity Models, denoted PLT.

b Stiffener Capacity Models, denoted STF.

c Girder Capacity Models, denoted GIR.

d Uniaxially Stiffened Panel Capacity Models, denoted USP.

e Orthogonally Stiffened Panel Capacity Models, denoted OSP.

2 **Capacity Models are separate, named objects**
The Capacity Models are stored as separate objects in the PLATEWORK database, no code checks can be performed without the explicit creation of Capacity Models. Each Capacity Model is identified by a unique name.

3 **Capacity Models are origin-independent**
The Capacity Model objects are to a large extent independent of the way in which they were created. This makes it possible to create Capacity Models either "manually" (i.e. by entering all data directly via the PLATEWORK commands), or "automatically" by reference to a Finite Element Model (i.e. most of the Capacity Model input data is inferred from analysis of the Finite Element Model geometry). The Code Check module does not distinguish between two Capacity Models that were created in one or the other way.

4 **Capacity Models may be assigned to specific locations within a larger structure**
A structure may for example have several plates with identical dimensions, plate thicknesses, material etc. These plates will be defined as separate Capacity Models, because the stresses in the plates (which form the basis for calculation of Capacity Model loads) will be different in the general case.

1.3.1 The plate Capacity Model (PLT)

The plate is the geometrically simplest of the Capacity Models in PLATEWORK. It is used for checking individual plates between stiffeners and girders within a stiffened panel. Its geometry is described by the following paramers:

lx	Length of plate, x direction
ly	Length of plate, y direction
t	Plate thickness

For a complete description of all plate Capacity Model parameters, see the Theoretical Manual.

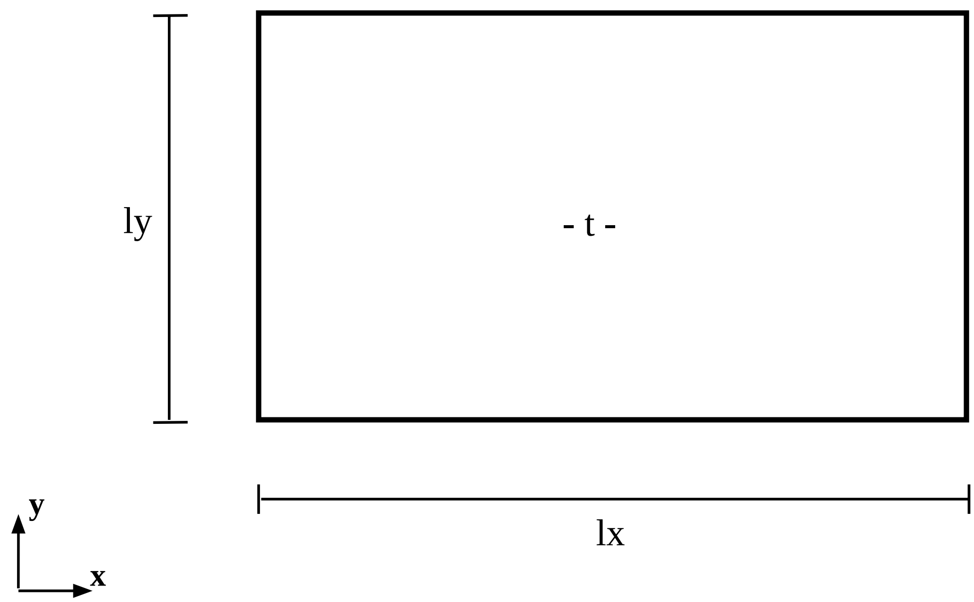

Figure 1-1 The plate Capacity Model

1.3.2 The stiffener Capacity Model (STF)

The stiffener Capacity Model is used for checking individual stiffeners within a stiffened panel. Its main geometry is described by the following parameters:

lx	length of stiffener, x direction
ly1	Stiffener spacing BEFORE stiffener
ly2	Stiffener spacing AFTER stiffener
t1	Plate thickness BEFORE stiffener
t2	Plate thickness AFTER stiffener

In addition to the main geometry parameters, the stiffener is also described by the stiffener section parameters

hws	Stiffener web height
tws	Stiffener web thickness
bfs	Stiffener flange width
tfs	Stiffener flange thickness
afs	Distance between webs (=0.0 if one web)
efs	Flange eccentricity

For a complete description of all stiffener Capacity Model parameters, see the Theoretical Manual.

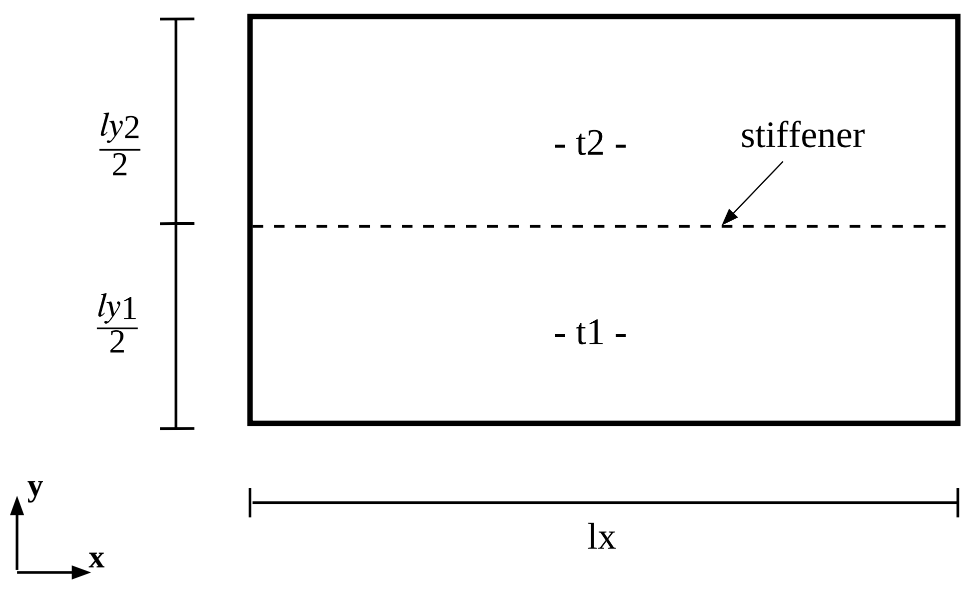

Figure 1-2 The stiffener Capacity Model

1.3.3 The girder Capacity Model (GIR)

The girder Capacity Model is used for checking individual girders within a stiffened panel. Its main geometry is described by the following parameters:

Ly	Length of girder, y direction
lx1	Girder spacing BEFORE girder
lx2	Girder spacing AFTER girder
t1	Plate thickness BEFORE girder
t2	Plate thickness AFTER girder
lya	Average stiffener spacing, y direction

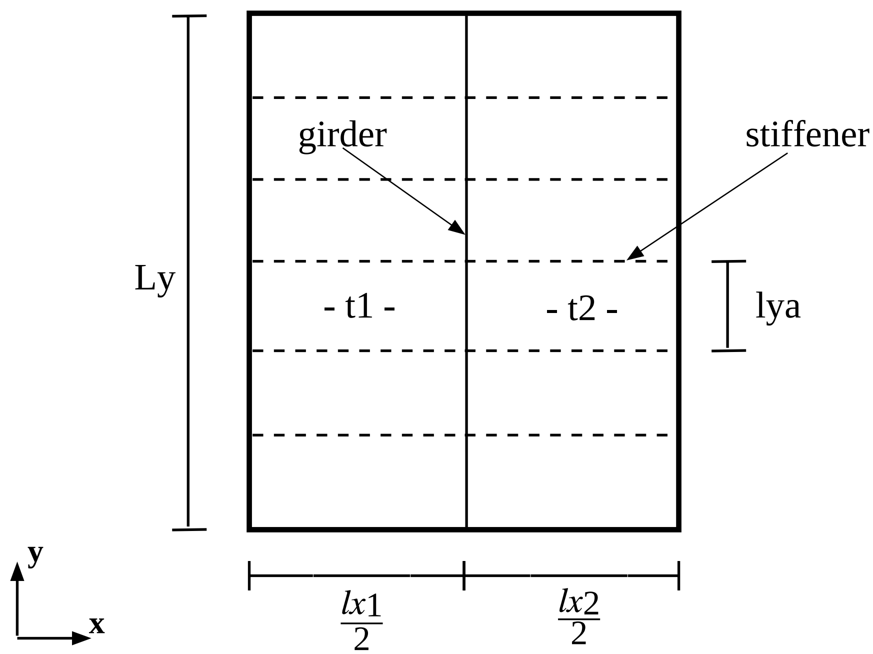

Figure 1-3 The girder Capacity Model

In addition to the main geometry parameters, the girder is also described by the girder and stiffener section parameters:

Girder section

hwg	Girder web height
twg	Girder web thickness
bfg	Girder flange width
tfg	Girder flange thickness
afg	Distance between webs (=0.0 if one web)
efg	Flange eccentricity

Stiffener section

hws	Stiffener web height
tws	Stiffener web thickness
bfs	Stiffener flange width
tfs	Stiffener flange thickness
afs	Distance between webs (=0.0 if one web)
efs	Flange eccentricity

For a complete description of all girder Capacity Model parameters, see the Theoretical Manual.

1.3.4 The uniaxially stiffened panel Capacity Model (USP)

The uniaxially Capacity Model is used for checking the entire uniaxially stiffened panel in an API Code Check. Its main geometry is described by the following parameters:

Lx	Length of panel, x direction
Ly	Length of panel, y direction
lya	Average stiffener spacing, y direction
t	Plate thickness

In addition to the main geometry parameters, the uniaxially stiffened panel is also described by the stiffener section parameters

hws	Stiffener web height
tws	Stiffener web thickness
bfs	Stiffener flange width
tfs	Stiffener flange thickness

For a complete description of all uniaxially stiffened panel Capacity Model parameters, see the Theoretical Manual.

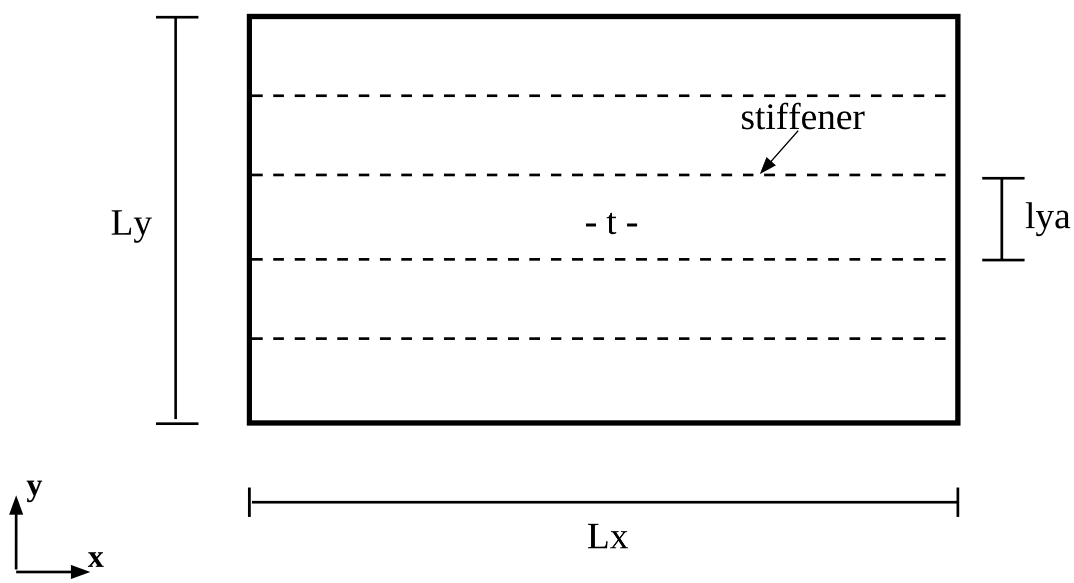

Figure 1-4 The uniaxially stiffened panel Capacity Model

1.3.5 The orthogonally stiffened panel Capacity Model (OSP)

The orthogonally stiffened panel Capacity Model is used for checking the entire orthogonally stiffened panel in an API Code Check. Its main geometry is described by the following parameters:

Lx	Length of panel, x direction
Ly	Length of panel, y direction
lxa	Average girder spacing, x direction
lya	Average stiffener spacing, y direction
t	Plate thickness

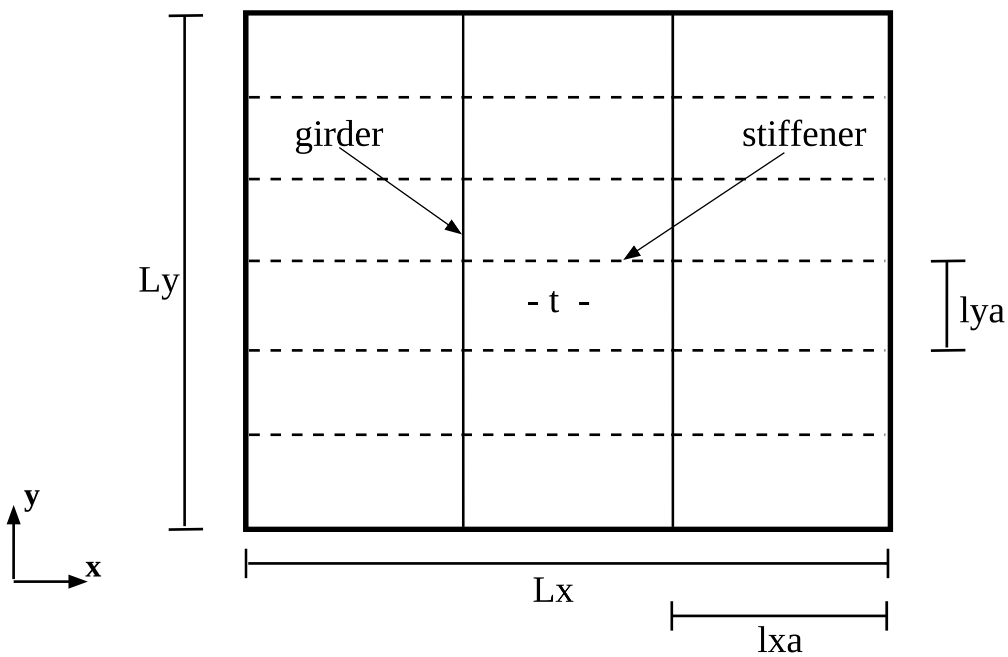

Figure 1-5 The orthogonally stiffened panel Capacity Model

In addition to the main geometry parameters, the orthogonally stiffened panel is also described by the girder and stiffener section parameters:

Girder section

hwg	Girder web height
twg	Girder web thickness
bfg	Girder flange width
tfg	Girder flange thickness

Stiffener section

hws	Stiffener web height
tws	Stiffener web thickness
bfs	Stiffener flange width
tfs	Stiffener flange thickness

For a complete description of all orthogonally stiffened panel parameters, see the Theoretical Manual.

1.4 The Capacity Model Assembly

The Capacity Models described in the previous section are basic entities that represent only small parts of a total structure. In order to code check a complete structure, many Capacity Models will have to be defined.

If the Capacity Models were to be created one by one, in separate operations, it would require extensive user input. One would also ignore the fact that Capacity Models within a certain area usually have a lot in common, for example:

- Common material
- Common plate thickness between adjacent stiffener and plate Capacity Models
- Girder spacings define stiffener lengths and vice versa.
- Stiffener cross sections are the same in adjacent stiffener and girder Capacity Models
- etc.

In realizing the above, the concept of the Capacity Model Assemby is introduced. A Capacity Model Assembly represents not just a simple plate, stiffener or girder, but a complete stiffened panel with Basic Capacity Models that are logically and geometrically connected.

The stiffened panel defined through a Capacity Model Assembly is a flat, rectangular area with main girders running parallel to two of the sides in the rectangle. The stiffeners run in the direction defined by the two remaining sides in the rectangle (i.e. at right angles wrt. the girders). The plates occupy the areas between the stiffeners and girders. The API-specific Capacity Models (Uniaxially & Orthogonally Stiffened Panels) occupy the whole Capacity Model Assembly area, but their geometry descriptions are simpler than the general description of the Capacity Model Assembly. For an example of a Capacity Model Assembly, see figure 1-6, page 1-10..

Note that the girder Capacity Models cover the whole span of the Capacity Model Assembly, while the stiffener Capacity Models only cover the area between two adjacent girders.

Note also the definition of the local coordinate system within a Capacity Model Assembly. This local coodinate system is shared by all Basic Capacity Models within the Assembly, except when the assembly area shape is distorted (not 100% rectangular):

- The Assembly area is defined by four corners, numbered as shown on figure 1-6..
- The local x-axis goes from corner 1 to corner 2. The local y-axis goes from corner 1 to corner 4.
- Girders are always oriented in the local y-direction.
- Stiffeners are always oriented in the local x-direction.

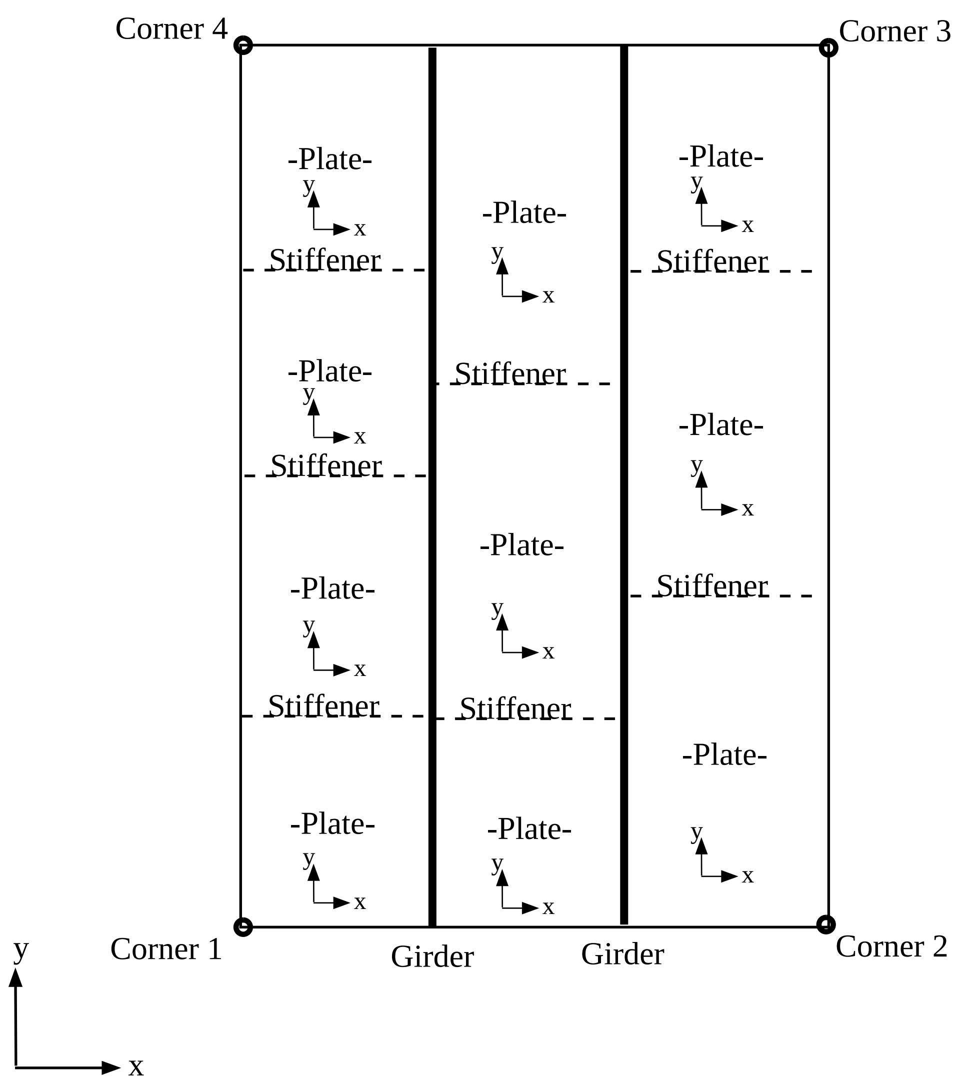

Figure 1-6 The Capacity Model Assembly

The Capacity Model Assembly is, as the Basic Capacity Models are, stored as a separate object in the PLATE-WORK database. Its main purpose is to organize the description of the stiffened panel, such that Basic Capacity Models can be created efficiently, i.e. it should be seen as a means of organizing input data to the process that creates the Basic Capacity Models.

1.4.1 Creation of Capacity Models through an Assembly

The process that creates the Basic Capacity Models, is split into two main operations:

1 **Creation of the Capacity Model Assembly**
This is done on the basis of direct user input, optionally also by reading Finite Element geometry data. The product of this process is a Capacity Model Assembly object, which is stored in the database.

2 **Creation of the Basic Capacity Models**
This is done solely on the basis of the Assembly. The products of this process are several Basic Capacity Models, which are stored in the database.

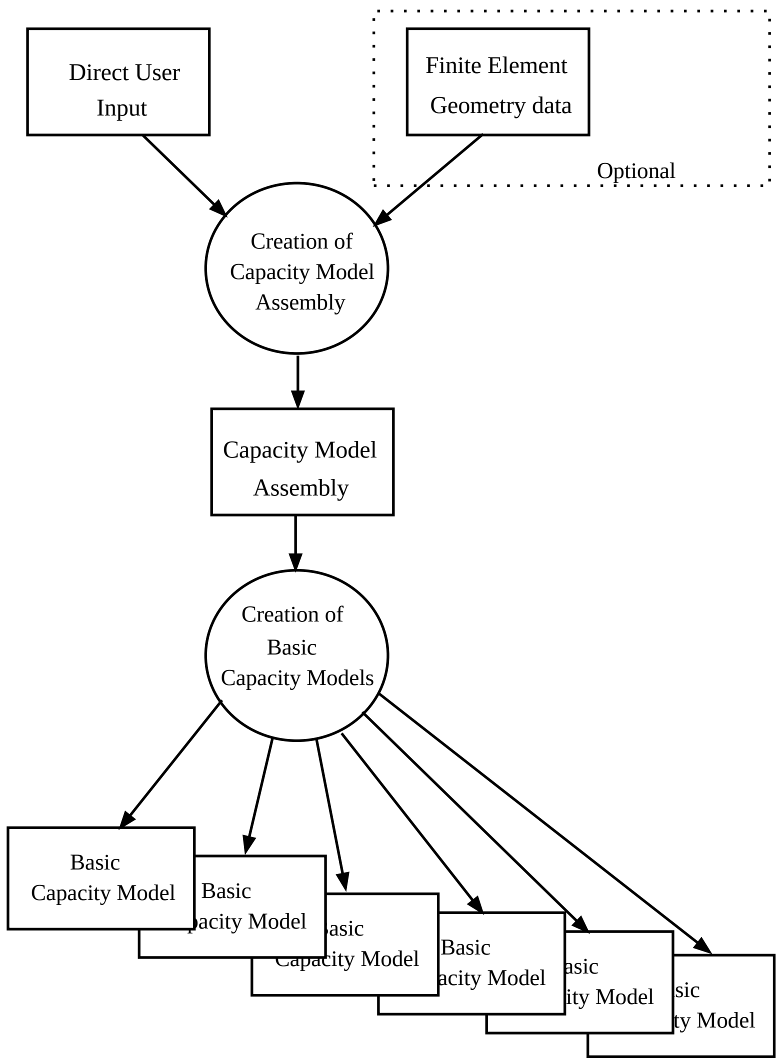

Figure 1-7 Principles of Capacity Model creation

1.4.2 Creation of Capacity Model Assemblies through a Finite Element mesh

The figure below shows part of a Finite Element Model that represent a stiffened panel as described earlier. PLATEWORK contains features for locating the Capacity Model Assembly (by means of the 4 corners) by referencing nodes in the FE-model (for example by pointing in the mesh display).

If, for example the girders and stiffeners have been modelled with beam elements and the plates have been modelled with shell or membrane elements, the user can then instruct PLATEWORK to automatically identify the girders, stiffeners, plate thicknesses, materials, cross sections etc., that together constitute a complete Capacity Model Assembly description, independent of the Finite Element mesh refinement. In the figure below, this would lead to an assembly with one girder, two stiffeners and four plates.

The Basic Capacity Models are created solely on the basis of the Assembly, as described in the previous section. From this it follows that Capacity Models can be efficiently created on the basis of a FE-model.

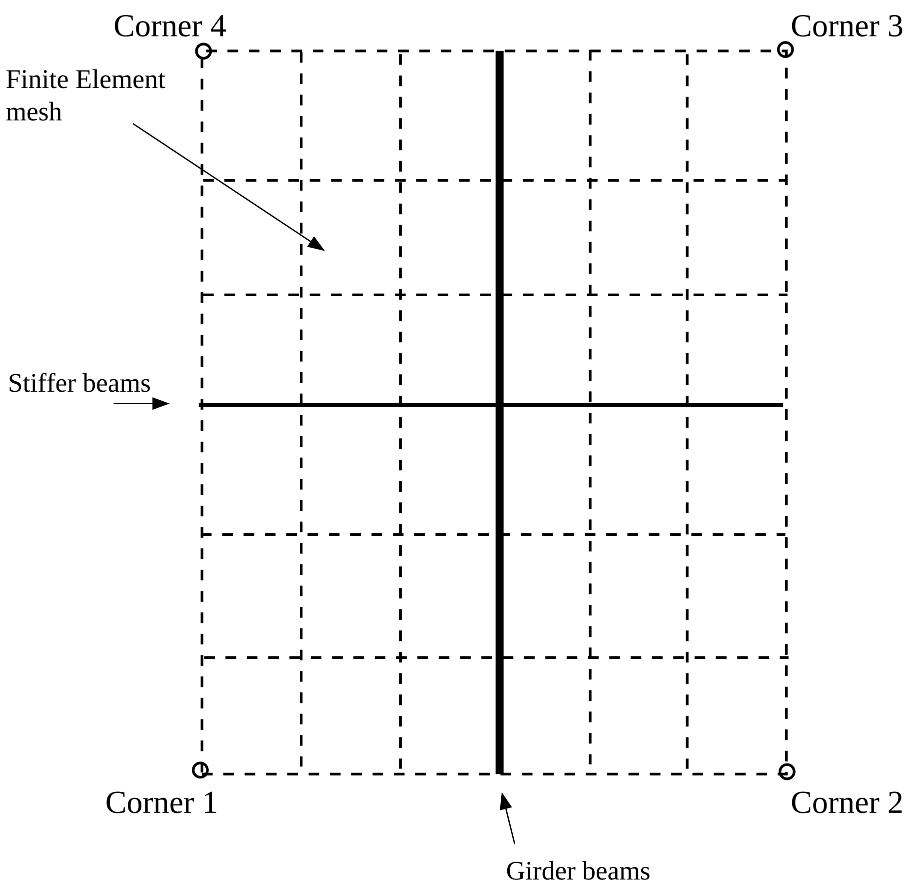

Figure 1-8 Creating Capacity Models through a FE-model

1.4.3 Non-rectangular assemblies

The preceding sections have described the normal situation, where the general shape of the assembly (and therefore also the shape of the basic Capacity Models) comply with the assumptions made by the Codes of Practice, namely that the assembly shape is rectangular (parallel sides & 90 degree corner angles).

In some cases, real structures do not fully comply with these requirements. To allow for such structures to be code checked, non-rectangular assemblies may be modelled in PLATEWORK, see figure 1-9. It must be noted, however, that it is the responsibility of the user to judge whether the distorted assembly shape is not too extreme.

The best way to understand how this feature works, is to assume that the whole assembly is made of rubber, and then stretched to fit the area described by the 4 corners. From this it follows that the local axis systems will be stretched also, i.e. adjacent Capacity Models will no longer have parallel local x- and y-axes. The Capacity Model loads will be calculated according to the real structure geometry.

In the Code Checks, an idealised shape will be assumed. The Theoretical Manual descibes the shape idealisations in more detail.

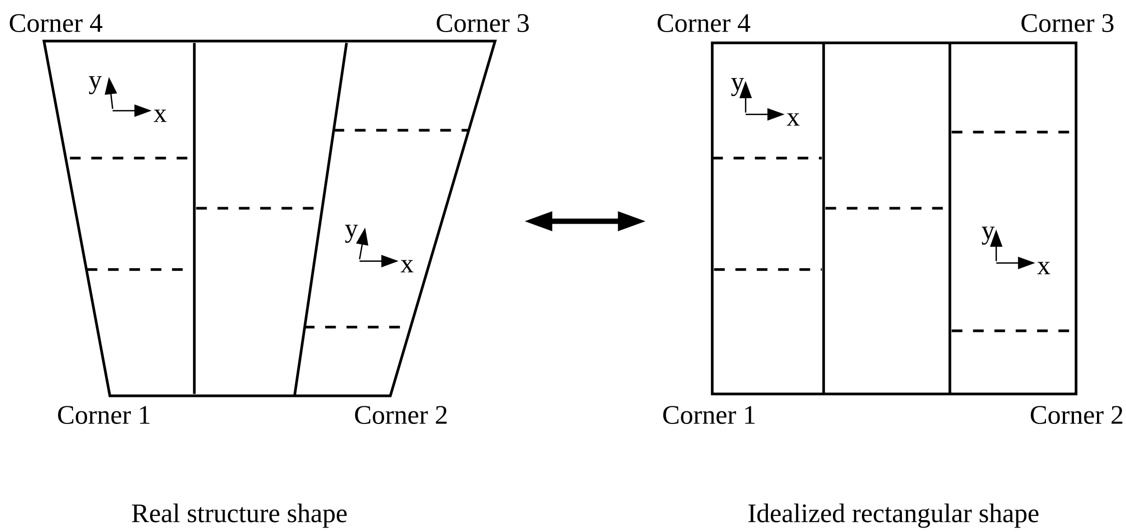

Figure 1-9 A "stretched" Capacity Model Assembly

1.5 The element Scope

The scope facility is used to limit the part of the FE-model that can be accessed, in order to

- Reduce CPU-time used and increase program response
- Improve overview of the model, for example in the mesh display
- Guide the program in finding correct solutions, for example when creating Capacity Models on the basis of the element mesh, as described in section 1.4.2.

1.5.1 Superelement analyses and the element Scope

The superelement technique is an inherent feature of most SESAM programs. This technique is extremely efficient during the pre-processing phase, when repeated identical parts of the whole structure only have to be modelled once. This feature is also very important in the analysis phase, since each superelement stiffness matrix only has to be computed once, and then re-used several times. The multi-level superelement technique thus provides the user with a tool able to solve problems of almost unlimited size.

On the post-processing side, however, the situation is slightly less favourable. Repeated superelements have typically the same geometric properties, but they invariably have different loads and results, making it necessary to post-process each superelement repetition individually. Also, the convenient subdivision into superelements may turn out to be an obstacle on the post-processing side.

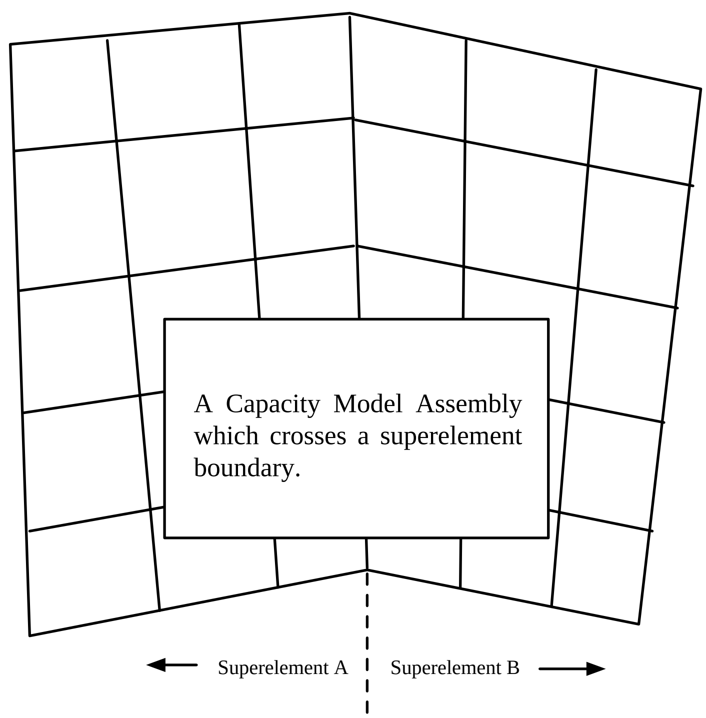

Figure 1-10 Capacity Model Assembly crossing superelement boundaries

Parts of the structure that are geometrically close neighbours may, due to the superelement subdivision, not have any obvious relation in the Finite Element datastructure. This situation could cause problems if for instance Capacity Models Assemblies were defined to cross superelement boundaries, see figure 1-10.

To solve these problems, PLATEWORK does not operate on a superelement by superelement basis, but operates on the structure as a whole. This means that all graphics display, coordinates entered by the user etc., are always relative to the top level coordinate sytem, which also happens to be the "true" coordinate system of the real structure.

It may seem inefficient to have to deal with all superelements at the same time. That is where the element scope concept becomes useful.

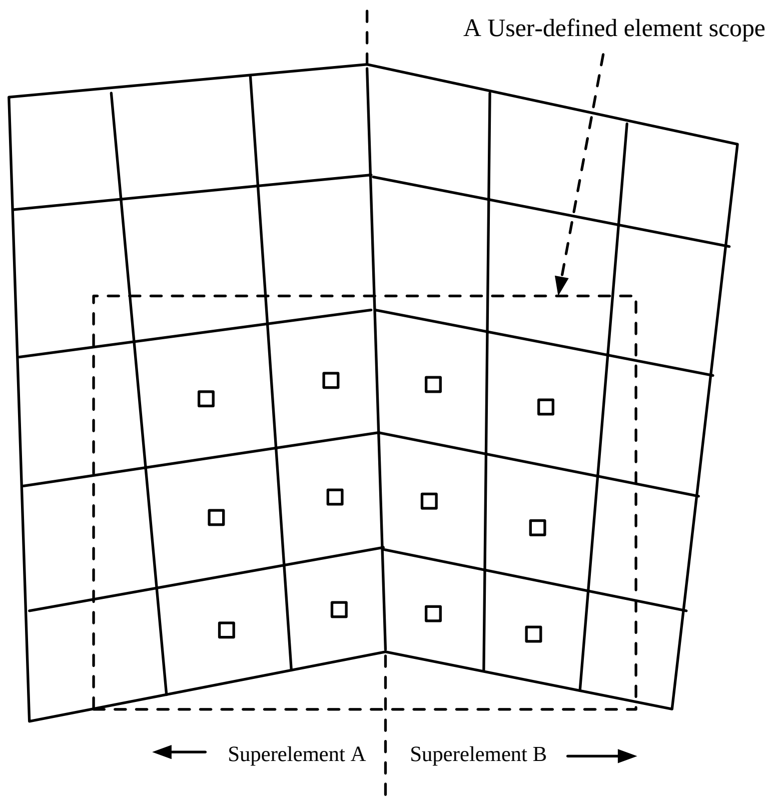

Figure 1-11 A user-defined element scope

Typically, at a given time, one focuses ones interest to a small part of the structure. This part may contain Finite Elements from one or several superelements. Such parts may be defined in PLATEWORK using the element scope facility, see figure 1-11. Here, specified elements can be put into named scopes that are later investigated, disregarding all other elements, see figure 1-12.

Different techniques for defining scopes exist. One may put all elements from one or several superelements into the scope. More useful in PLATEWORK is perhaps the facility to define a plane using 3 nodes and specify that all elements lying in that plane shall be put into a scope. There is also a similar feature where all elements within a trapezoid can be put in a scope. Elements that have common geometric or logical properties (for example common element type) may in this way be grouped together, even if the elements come from different superelements.

The element scope facility thus enables the user to limit his current area of interest, but does not pose the limitations that a postprocessor operating on a superelement by superelement basis would.

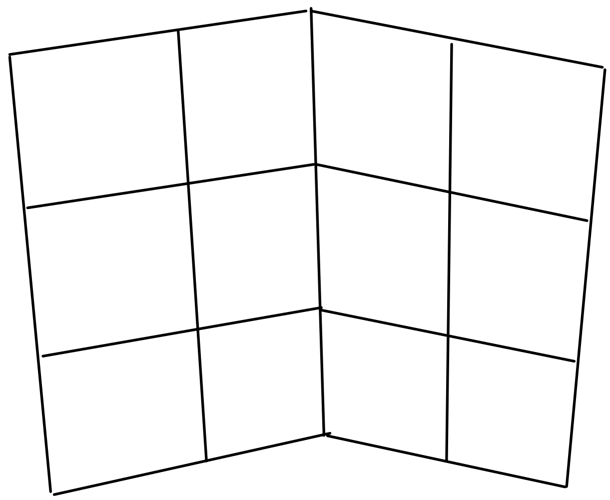

Figure 1-12 Working with a user-defined element scope

1.6 The Resultcase

In order to execute a Code Check, one must not only have Capacity Models but also loads on the Capacity Models. In order to efficiently organize Capacity Model loads (and subsequently Code Check results), the concept of a Resultcase is introduced.

The Resultcase is typically used to identify Capacity Model loads (or code check results) of different Capacity Models that physically belong to the same external structural load. Resultcases are also used to control the combination of basic results into combination resultcases.

Resultcases are represented as separate entities in the PLATEWORK database, and also used for controlling access to Capacity Model loads and Code Check results.

Some important aspects characterizing resultcases are:

- **Resultcases are separate, named objects in the database**
  No code checks can be performed without either explicit creation of resultcases, or through inheritance of resultcases from an FE-analysis.

- **Resultcases are either BASIC or COMBINATION resultcases**
  A basic resultcase may typically be inherited from a Finite Element Analysis, in which case FE-stresses exist and may be converted into Capacity Model loads.
  A basic resultcase can also be created manually in PLATEWORK. The Capacity Model loads must in this case also be defined manually.
  A combination resultcase is typically defined in PLATEWORK, by referring to basic resultcases and applying factors and phase shift angles.

- **Resultcases are either of the STATIC, COMPLEX or SCAN types**
  A static resultcase will refer to Capacity Model loads that have only static load components. A complex resultcase will refer to Capacity Model loads that have complex load components, i.e. real and imaginary terms. A scan resultcase will refer to Capacity Model loads that have scan load components, i.e. both static, real and imaginary terms.

- **Resultcases have limit-state kinds assigned**
  During execution of the code checks, different limit-states will apply for different loads, due to the nature of the load, or the safety level required (examples are the NORMAL and STORM conditions in the API code checks). The resultcases have therefore assigned limit-state kinds, so that the relevant limit-state factors can be fetched as the loads within the different resultcases are checked.

- **Resultcases & Capacity Models provide a convenient system for referencing loads and results**
  The Resultcase and Capacity Model names are the main keys through which the Capacity Model loads and the corresponding code check results are referenced by the user.

1.6.1 Combination resultcases & combination formulae

As mentioned above, resultcases can be either basic or combinations of basic resultcases. Combination resultcases are defined using the following procedure:

1 **Create the basic resultcases**
This is done either by reading in a SESAM Results Interface File (direct access format, the so-called SIN-file) in which case basic resultcases will be automatically inherited from the FE-analysis. Alternatively, basic resultcases can also be created manually in PLATEWORK by use of the CREATE RESULTCASE command (BASIC option).

2 **Create the combination resultcases**
Once the basic resultcases have been created, the CREATE RESULTCASE command (COMBINATION option) should be used to define the combination resultcases. In addition to simple descriptive data, the following information will be required:

a Destination resultcase kind
The combination must be specified as either STATIC, COMPLEX or SCAN, independent of the basic resultcases input to the combination.

b Source resultcase names
Names of the source resultcases (i.e. basic or previously defined combination resultcases) must be entered.

c Source resultcase factor
A scale factor (F in table 1.2) for each source resultcase must be entered.

d Source resultcase phase shift angle.
A phase shift angle (θ in table 1.2) must be entered for each source resultcase.

Table 1.2
Result combination formulae

Source kind		**Combination formula**	**Destination kind**	
STATIC	[S]	F*[Scosθ]	STATIC	[S]
COMPLEX	[R,I]	F*[Rcosθ-Isinθ]	STATIC	[S]
STATIC	[S]	F*[Scosθ, Ssinθ]	COMPLEX	[R,I]
COMPLEX	[R,I]	F*[Rcosθ-Isinθ, Icosθ+Rsinθ]	COMPLEX	[R,I]
STATIC	[S]	F*[Scosθ]	SCAN (STATIC part)	[**S**,R,I]
COMPLEX	[R,I]	F*[Rcosθ-Isinθ, Icosθ+Rsinθ]	SCAN (COMPLEX part)	[S,**R**,**I**]

Combination is performed on unreduced Capacity Model loads

Note that the combination is performed on the basis of the unreduced Capacity Model loads (see section 1.7, The Capacity Model Load), i.e. NOT when the CREATE RESULTCASE command is entered, but when the CREATE LOAD-ON-CAPACITY-MODEL AUTOMATIC command is entered.

1.7 The Capacity Model Load

1.7.1 Creation of Capacity Model loads from Finite Element stresses

After creating a Finite Element Model, and running the analysis, stress and force results exist on the SESAM Interface File as shown schematically in the figure below. After creating the Capacity Models as described in section 1.4.2, the Finite Element stresses must be converted and processed to form Capacity Model loads.

What is logically one Capacity Model (e.g. the upper right quarter of the figure, which forms a plate Capacity Model) may consist of several finite elements (in this case 3x3=9 elements). The stress functions along the CM boundaries are typically piecewise non-continous linear functions. The Capacity Models require constant or linear load functions along their boundaries, see Theoretical Manual. The stress functions must therefore be simplified before they can be used.

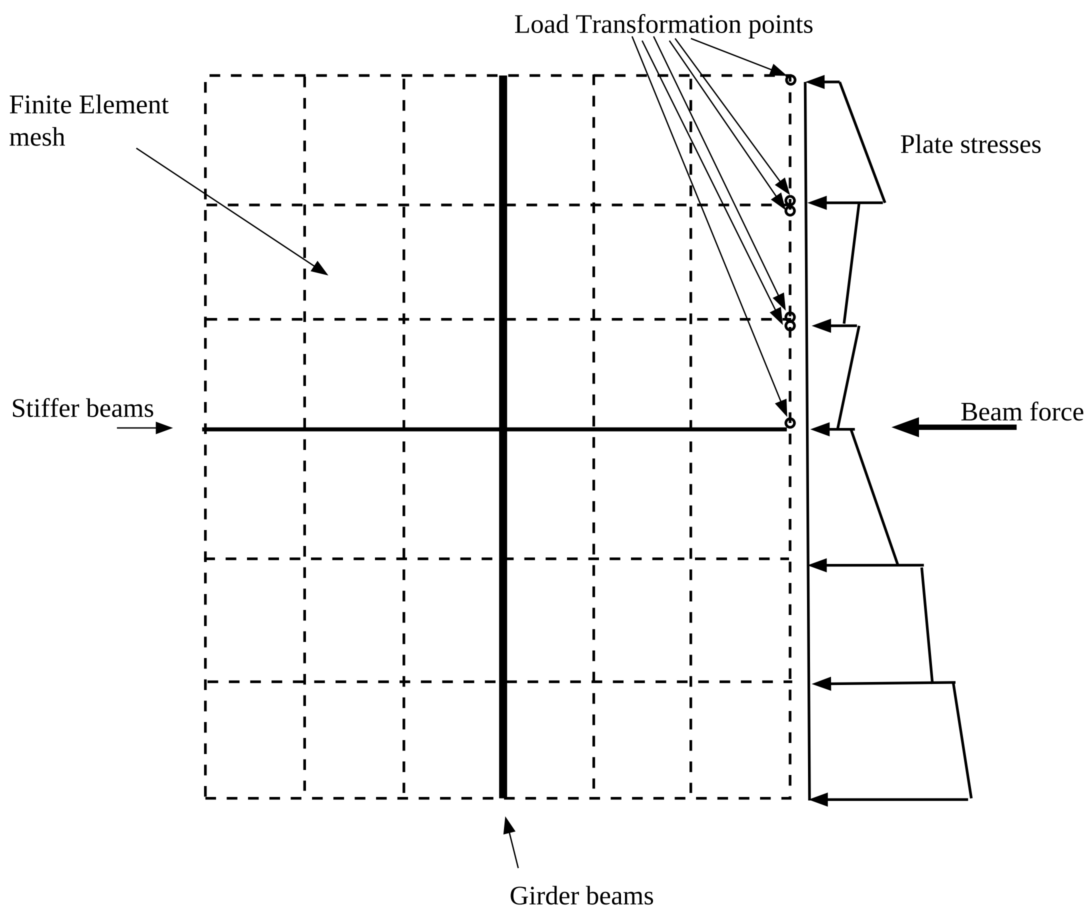

Figure 1-13 Stresses and forces from a Finite Element Analysis

In order to transform the rather complicated stress functions into simple, linear load functions, the following procedure is used (see also figure 1-15):

1 **Creation of load transformation points**
After creating the Capacity Models (by indicating the location of the Capacity Model Assembly wrt. the Finite Element Model), the so-called "load transformation points" can be found for each edge of all Capacity Models. There will be 2 times as many points per CM edge as there are Finite Elemens along that edge, in order to properly represent the piecewise non-continous stress function. Each load transformation point contains information about which Finite Element it "belongs" to, and the necessary extrapolation and coordinate system transformation information.

2 **Creation of "unreduced" Capacity Model loads**
After all the load transformation points have been established, the program uses them during the processing of stresses. The stresses are estimated in each point for all resultcases and Capacity Models. The result of this process is called "unreduced" Capacity Model loads, because of the arbitrary shape of the function. The unreduced Capacity Model loads are stored in the database, and may be displayed graphically.

3 **Reduction of Capacity Model loads**
After establishing the unreduced loads, the penultimate step in estimating the final Capacity Model loads consists of a simple integration (trapezoid method), where the total edge force and in-plane edge moment are established. By assuming a linear distribution along the CM edges of these total forces, the unaveraged Capacity Model loads are obtained (i.e. one linear function per edge of the Capacity Model).

4 **Averaging of Capacity Model loads**
The final step consists of averaging loads on opposite CM edges. This process is described in the Theoretical Manual. Note that the loads stored are force per unit edge length.

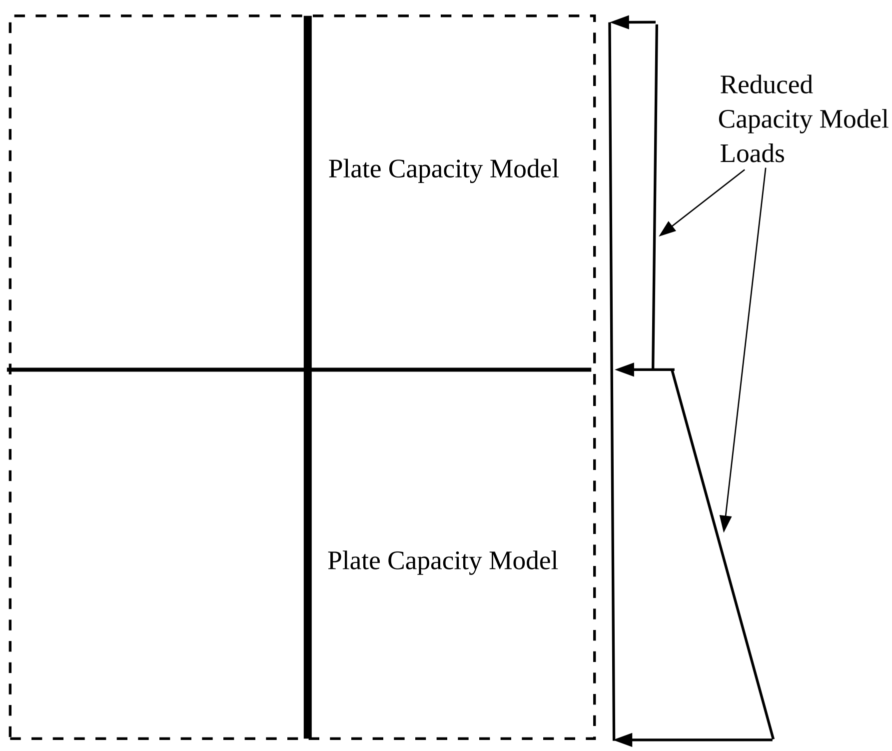

Figure 1-14 Reduced Capacity Model Loads

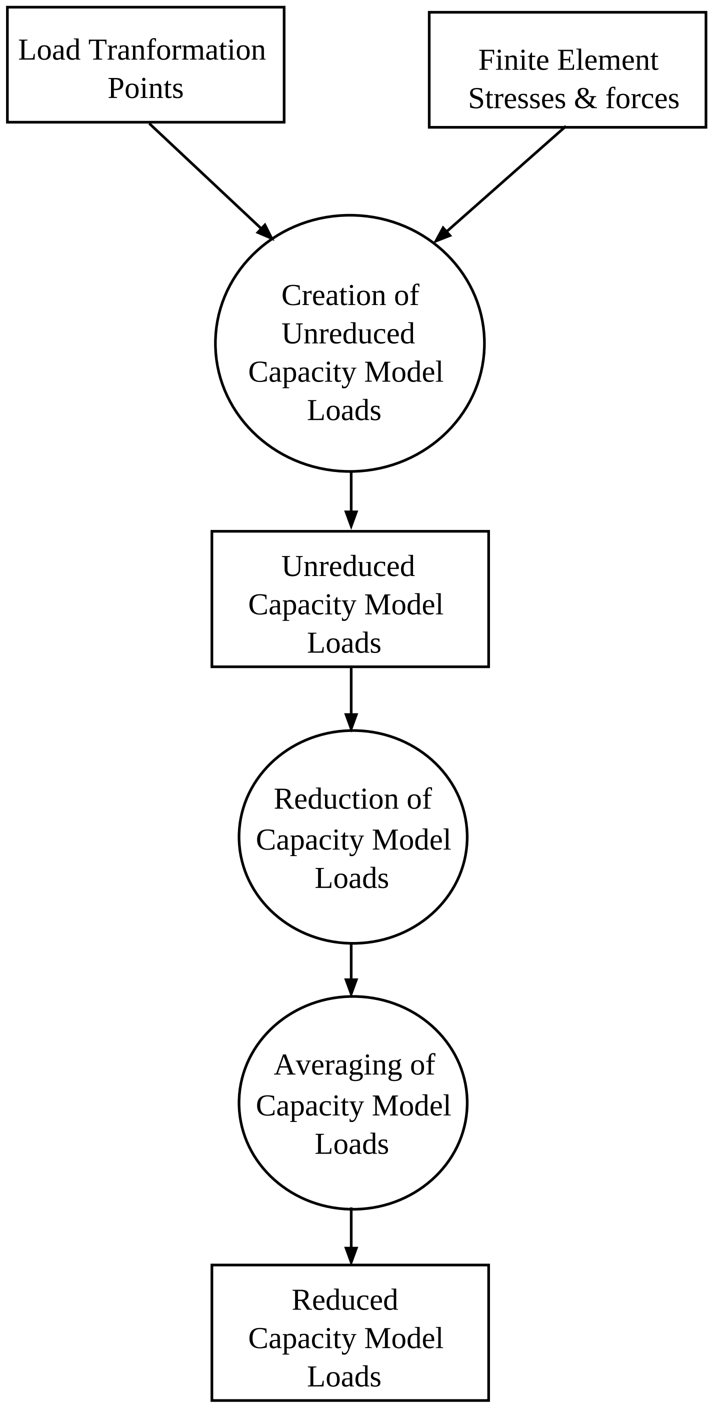

Figure 1-15 Principles of Capacity Model load calculation from FE stresses & forces

1.7.2 Manual creation of Capacity Model loads

The previous section described the process of transforming Finite Element stresses and forces into unreduced and reduced Capacity Model loads, a convenient method when an FE-model is available.

In some cases, especially when the program is used in the stand-alone mode, this may not be possible or desireable. Therefore an option exists where the user can enter the reduced Capacity Model loads manually through PLATEWORK commands, i.e. the user enters the final reduced & averaged Capacity Model loads directly.

It was earlier described how the Basic Capacity Models were independent of the way in which they were created. This principle applies also for the reduced Capacity Model loads. The part of the program which performs the code checks does not distinguish between Capacity Model loads entered manually, and the loads created on the basis of Finite Element stresses.

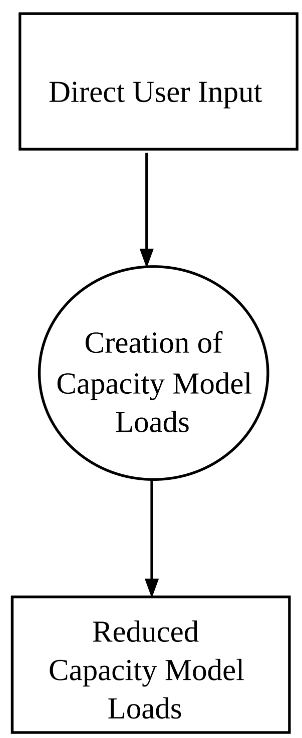

Figure 1-16 Manual creation of Capacity Model loads

1.8 The Code Check analysis

After creation of Capacity Models and Capacity Model loads, the Code Checks can in principle be executed, as indicated in the figure below:

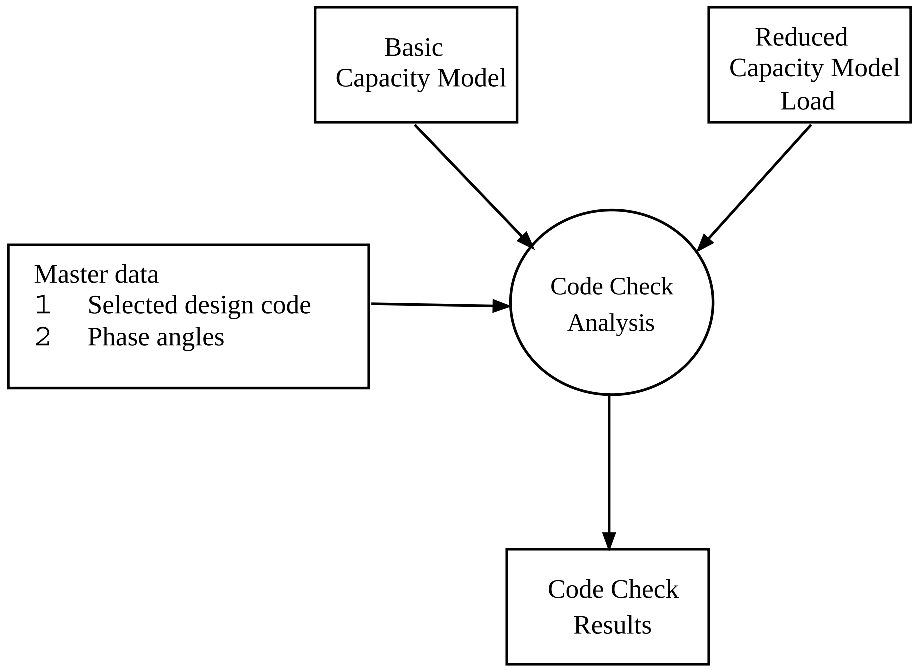

Figure 1-17 Principles of a Code Check analysis

Which part of the Code Check is executed is dependent on the currently selected Code of Practice and the type of Capacity Model. The Code Check is executed for those Capacity Model loads that refer to a selected Capacity Model and a selected Resultcase.

The Code Check results are stored in the PLATEWORK database, and may be investigated through use of print or display facilities.

On the following pages follow a summary of the Code Check results calculated for the different Codes of Practice and Capacity Models.

1.9 The Code Check Results

The Code Checks are described in the PLATEWORK Theoretical Manual. On the following pages follow a summary of the Code Check result parameters as calculated for the different Codes of Practice and Capacity Models.

1.9.1 API Code Check results

API Code Check results, Girder Capacity Model

```
Parameter  (GIR) API Code Check Results, Parameter description
---------------------------------------------------------------------------
UCmax      Maximum of all Unity Criterion factors
UCcbU      Unity Criterion for column buckling
UCbcbU     Unity Criterion for beam-column buckling
UCtfbU     Unity Criterion for torsional/flexural buckling
UCpbU      Unity Criterion for plastic bending
UCpdtw     Unity criterion, web plastic bending requirement
UCcdtw     Unity criterion, web compact section requirement
UCpbftf    Unity criterion, flange plastic bending requirement
UCcbftf    Unity criterion, flange compact section requirement
UClasup    Unity criterion, laterally unsupportet length, compr. flange
FSSLS      Factor of safety, SLS
FSULS      Factor of safety, ULS
sigx1      Normal stress in x direction
sigx2      Normal stress in y direction, edge 1
sigy       Normal stress in y direction, edge 2
tauxy      Shear stress
beta1      Plate slenderness; side1
beta2      Plate slenderness; side2
Cy1        Correction coefficient, y direction, side1
Cy2        Correction coefficient, y direction, side2
Le1        Effective plate flange, side 1
Le2        Effective plate flange, side 2
Ae         Effective cross section
zs         Distance from neutral axis to center of girder flange
zp         Distance from neutral axis to midplane of plate
Iez        Effective moment of inertia about z axis
re         Effective radius of gyration
Wep        Effective sectional modulus, plate side
Wes        Effective sectional modulus, flange side
Wpl        Plastic sectional modulus
J          Torsion constant
Cw         Warping constant
Is         Polar moment of inertia about shear center
Ic         Polar moment of inertia about centroid
P          Effective axial force
Ftw        Compressive force in the girder
```

```
Fwi        Assumed compressive force to be carried in the girder
Mbend      Bending moment
lambda     Column slenderness
PEe        Elastic buckling force (Euler)
PFu        Ultimate column buckling resistance
Mu         Bending moment capacity
B1         Bending amplification factor
PTe        Elastic torsional buckling force
PTFe       Elastic torsional/flexural buckling force
PTFu       Ultimate torsional/flexural buckling resistance
Mup        Ultimate plastic bending moment capacity
Rdtw       Web, height to thickness, bending ratio
etapdtw    Web, height to thickness, plastic bending ratio requirement
etacdtw    Web, height to thickness, compact section ratio requirement
Rbftf      Flange, height to thickness, bending ratio
etapbft    Flange, height to thickness, plastic bending ratio requirement
etacbft    Flange, height to thickness, compact seqtion ratio requirement
RLb        Laterally unsupported length of compression flange
etaL1L2    Laterally unsupported length of compression flange requirement
```

API Code Check results, Stiffener Capacity Model

```
Parameter  (STF) API Code Check Results, Parameter description
--------------------------------------------------------------------------
UCmax      Maximum of all Unity Criterion factors
UCcbU      Unity Criterion for column buckling
UCbcbU     Unity Criterion for beam-column buckling
UCtfbU     Unity Criterion for torsional/flexural buckling
UCpbU      Unity Criterion for plastic bending
UCpdtw     Unity criterion, web plastic bending requirement
UCcdtw     Unity criterion, web compact section requirement
UCpbftf    Unity criterion, flange plastic bending requirement
UCcbftf    Unity criterion, flange compact section requirement
UClasup    Unity criterion, laterally unsupported length, compr. flange
UCsreq     Unity criterion, moment of inertia, stiffener on panels, shear
UCsreql    Unity criterion, moment of inertia, stiffener cross sec., long
FSSLS      Factor of safety, SLS
FSULS      Factor of safety, ULS
sigx       Normal stress in x direction
sigy1      Normal stress in y direction, edge 1
sigy2      Normal stress in y direction, edge 2
tauxy      Shear stress
beta1      Plate slenderness; side1
beta2      Plate slenderness; side2
Cx1        Correction coefficient, x direction, side1
Cx2        Correction coefficient, x direction, side2
be1        Effective plate flange, side 1
be2        Effective plate flange, side 2
Ae         Effective cross section
zs         Distance from neutral axis to center of stiffener flange
```

```
zp         Distance from neutral axis to midplane of plate
Iez        Effective moment of inertia about z axis
re         Effective radius of gyration
Wep        Effective sectional modulus, plate side
Wes        Effective sectional modulus, stiffener side
Wpl        Plastic sectional modulus
J          Torsion constant
Cw         Warping constant
Is         Polar moment of inertia about shear center
Ic         Polar moment of inertia about centroid
P          Effective axial force
Ftw        Compressive force in the stiffener
Fwi        Assumed compressive force to be carried in the stiffener
Mbend      Bending moment
ms         Bending moment factor
lambda     Column slenderness
ks         Buckling length factor
PEe        Elastic buckling force (Euler)
PFu        Ultimate column buckling resistance
Mu         Bending moment capacity
B1         Bending amplification factor
PTe        Elastic torsional buckling force
PTFe       Elastic torsional/flexural buckling force
PTFu       Ultimate torsional/flexural buckling resistance
Mup        Ultimate plastic bending moment capacity
Fxyu       Ultimate shear buckling resistance
Rdtw       Web, height to thickness, bending ratio
etapdtw    Web, height to thickness, plastic bending ratio requirement
etacdtw    Web, height to thickness, compact section ratio requirement
Rbftf      Flange, height to thickness, bending ratio
etapbft    Flange, height to thickness, plastic bending ratio requirement
etacbft    Flange, height to thickness, compact seqtion ratio requirement
RLb        Laterally unsupported length of compression flange
etaL1L2    Laterally unsupported length of compression flange requirement
RIs        Moment of inertia for stiffeners, in-plane shear
RIl        Moment of inertia for longitudinal stiffeners
etaIe      Requiremnt to moment of inertia for stiffeners
```

API Code Check results, Plate Capacity Model

```
Parameter  (PLT) API Code Check Results, Parameter description
---------------------------------------------------------------------------
UCmax      Maximum of all Unity Criterion factors
UCinplS    Unity Criterion for in-plane loads, SLS
UCinplU    Unity Criterion for in-plane loads, ULS
UCWeWa     Unity Criterion for elastic deflection
UCstrsS    Unity Criterion for stress due to lateral load, SLS
UCplatU    Unity Criterion for lateral load, ULS
FSSLS      Factor of safety, SLS
FSULS      Factor of safety, ULS
```

```
sigx1      Normal stress in x direction, edge 1
sigx2      Normal stress in x direction, edge 2
sigy1      Normal stress in y direction, edge 1
sigy2      Normal stress in y direction, edge 2
tauxy      Shear stress
fxe        Elastic buckling stress, x direction
fye        Elastic buckling stress, y direction
taue       Elastic buckling stress, shear
kx         Buckling coefficient for normal stress, x direction
ky         Buckling coefficient for normal stress, y direction
ktau       Buckling coefficient for pure shear stress
feqb       Equivalent elastic buckling stress
fxs        Buckling resistance, x direction, SLS
fys        Buckling resistance, y direction, SLS
fxys       Buckling resistance, shear, SLS
beta       Plate slenderness
fxu        Buckling resistance, x direction ULS
fyu        Buckling resistance, y direction ULS
fxyu       Buckling resistance, shear ULS
We         Elastic deflection
Wa         Maximum allowable elastic deflection
fxb        Maximum plate bending stress, x direcection
fyb        Maximum plate bending stress, y direcection
feqt       Equivalent stress at center of plate, tension side, SLS
feqc       Equivalent stress at center of plate, compression side, SLS
platu      Ultimate uniform lateral pressure
Wp         Allowable permanent plastic deformation
```

API Code Check results, Uniaxially Stiffened Panel Capacity Model

```
Parameter  (USP) API Code Check Results, Parameter description
--------------------------------------------------------------------------
UCmax      Maximum of all Unity Criterion factors
UCubucU    Unity Criterion for uniaxially stiffened panel buckling
FSSLS      Factor of safety, SLS
FSULS      Factor of safety, ULS
sigx       Average normal stress in x direction
lambda     Modified uniaxially stiffened panel slenderness
fu         Ultimate panel buckling resistance
```

API Code Check results, Orthogonally Stiffened Panel Capacity Model

```
Parameter  (OSP) API Code Check Results, Parameter description
---------------------------------------------------------------------------
UCmax      Maximum of all Unity Criterion factors
UCinplS    Unity Criterion for in-plane loads, SLS
UCWeWa     Unity Criterion for elastic deflection
UCpstrS    Unity Criterion, service limit state stress, plate side
UCsstrS    Unity Criterion, service limit state stress, stiffener flange
UCgstrS    Unity Criterion, service limit state stress, girder flange
UCulatU    Unity Criterion, ultimate lateral load
FSSLS      Factor of safety, SLS
FSULS      Factor of safety, ULS
sigx       Average normal stress in x direction
sigy       Average normal stress in y direction
tauxy      Shear stress
fxse       Elastic buckling stress, x direction
fyse       Elastic buckling stress, y direction
Kx         Buckling coefficient, x direction
Ky         Buckling coefficient, y direction
eta        Torsional coefficient
betax      Plate slenderness, x side
betay      Plate slenderness, y side
Sxe        Effective plating acting with the stiffener, x direction
Sye        Effective plating acting with the stiffener, y direction
tx         Effective thickness acting with the stiffener, x direction
ty         Effective thickness acting with the stiffener, y direction
Ix         Moment of inertia of stiffener, effective plating, x direction
Iy         Moment of inertia of stiffener, effective plating, y direction
Ipx        Moment of inertia of effective plating alone, x direction
Ipy        Moment of inertia of effective plating alone, y direction
feqb       Equivalent elastic buckling stress
fxs        Buckling resistance in x direction
fys        Buckling resistance in y direction
We         Elastic deflection
Wa         Maximum allowable elastic deflection
delta      Deflection coefficient
fxbp       Panel bending stress, plate side, x direction
fybp       Panel bending stress, plate side, y direction
fxbs       Panel bending stress, stiffener side, x direction
fybs       Panel bending stress, stiffener side, y direction
Platu      Ultimate uniform pressure
Rc         Parameter for interaction forces, long./trans. stiffener
pc         Parameter of dimension load/length
```

1.9.2 DnV Code Check results

DnV Code Check results, Girder Capacity Model

```
Parameter  (GIR) DNV Code Check Results, Parameter description
--------------------------------------------------------------------------
UCmax      Maximum of all Unity Criterion factors
UCcomp     Unity Criterion for girder buckling, compression side
UCtens     Unity Criterion for girder buckling, tension side
UCweb      Unity criterion, web heigth to web thickness ratio
UCffla     Unity criterion, free flange of girder
UCbfla     Unity criterion, box section flange
eta0       Basic usage factor
etap       Maximum allowable usage factor
sigx1      Normal stress in x direction, edge 1
sigx2      Normal stress in x direction, edge 2
sigy       Normal stress in y direction
tauxy      Shear stress
le1        Effective plate flange, side 1
le2        Effective plate flange, side 2
beta       Plate slenderness
Cx         Correction parameter for compression in x direction
Ae         Effective cross section
zp         Distance from neutral axis to midplane of plate
zf         Distance from neutral axis to top of flange
Iez        Effective moment of inertia about z axis
Iz         Moment of inertia about z axis
ie         Effective radius of gyration
wep        Effective sectional modulus, plate side
wef        Effective sectional modulus, flange side
P0         Equivalent lateral load due to longitudional stress
Pe         Effective lateral load
siga       Effective axial stress
sigbp      Effective bending stress, plate side
sigbf      Effective bending stress, flange side
Mbend      Bending moment
sigE       Elastic buckling resistance
sigET      Elastic torsional buckling stress
sigT       Torsional buckling resistance
lambda     Reduced slenderness
sigk       Characteristic material strength
sigacr     Characteristic buckling resistance
etac       Usage factor, girder stability check, compression side
etat       Usage factor, girder stability check, tension side
Rhwtw      Web height to web thickness ratio
etaweb     Web height to web thickness ratio requirement
Rfftf      Free flange to thickness of flange ratio
etaffla    Free flange to thickness of flange ratio requirement
Rbaftf     Box section flange to thickness of flange ratio
etabfla    Box section flange to thickness of flange ratio requirement
```

DnV Code Check results, Stiffener Capacity Model

```
Parameter  (STF) DNV Code Check Results, Parameter description
---------------------------------------------------------------------------
UCmax      Maximum of all Unity Criterion factors
UCcomp     Unity Criterion for stiffener buckling, compression side
UCtens     Unity Criterion for stiffener buckling, tension side
UCweb      Unity criterion, web heigth to web thickness ratio
UCffla     Unity criterion, free flange of stiffener
UCbfla     Unity criterion, box section flange
eta0       Basic usage factor
etap       Maximum allowable usage factor
sigx       Normal stress in x direction
sigy1      Normal stress in y direction, edge 1
sigy2      Normal stress in y direction, edge 2
tauxy      Shear stress
beta1      Plate slenderness; side1
beta2      Plate slenderness; side2
Cx1        Correction for compression, x-dir, side1
Cx2        Correction for compression, x-dir, side2
Cy1        Correction for compression, y-dir, side1
Cy2        Correction for compression, y-dir, side2
Ctau       Correction for shear
se1        Effective plate flange, side 1
se2        Effective plate flange, side 2
Ae         Effective cross section
zs         Distance from neutral axis to top of stiffener
zp         Distance from neutral axis to midplane of plate
Iez        Effective moment of inertia about z axis
Iz         Moment of inertia about z axis
ie         Effective radius of gyration
Wep        Effective sectional modulus, plate side
Wes        Effective sectional modulus, stiffener side
sigE       Elastic buckling resistance
ks         Buckling length factor
Ctors      Torsional buckling coefficient
sigET      Elastic torsional buckling stress
lambdaT    Reduced slenderness wrt. torsional buckling
sigT       Torsional buckling resistance
sigk       Characteristic material strength
lambda     Reduced slenderness
sigacr     Characteristic buckling resistance
taucrg     Characteristic buckling shear resistance, global
taucrl     Characteristic buckling shear resistance, local
Nx         Effective axial force
p0         Equivalent lateral load
pe         Effective lateral load
siga       Effective axial stress used in stiffener buckling check
sigbp      Effective bending stress, plate side
sigbs      Effective bending stress, stiffener side
```

```
Mbend      Bending moment
ms         Bending moment factor
etac       Usage factor, girder stability check, compression side
etat       Usage factor, girder stability check, tension side
Rhwtw      Web height to web thickness ratio
etaweb     Web height to web thickness ratio requirement
Rfftf      Free flange to thickness of flange ratio
etaffla    Free flange to thickness of flange ratio requirement
Rbaftf     Box section flange to thickness of flange ratio
etabfla    Box section flange to thickness of flange ratio requirement
```

DnV Code Check results, Plate Capacity Model

```
Parameter  (PLT) DNV Code Check Results, Parameter description
--------------------------------------------------------------------------
UCmax      Maximum of all Unity Criterion factors
UCpbs      Unity Criterion for plate buckling, serviceability
UCpbu      Unity Criterion for plate buckling, ultimate
UCplat     Unity Criterion for lateral pressure
eta0       Basic usage factor
etap       Maximum allowable usage factor
sigx1      Normal stress in x direction, edge 1
sigx2      Normal stress in x direction, edge 2
sigy1      Normal stress in y direction, edge 1
sigy2      Normal stress in y direction, edge 2
tauxy      Shear stress
sigex      Elastic buckling stress, x direction
sigey      Elastic buckling stress, y direction
taue       Elastic buckling stress, shear
Cx         Buckling coefficient, x direction
Cy         Buckling coefficient, y direction
Ctau       Buckling coefficient, shear
VonMise    Equivalent stress (Von Mises)
lambda     Equivalent reduced slenderness
sigescr    Characteristic buckling resistance, serviceability
sigeucr    Characteristic buckling resistance, ultimate
etas       Usage Factor for plate elements, serviceability criterion
etau       Usage Factor for plate elements, ultimate criterion
platu      Ultimate lateral pressure
```

1.9.3 NPD Code Check results

NPD Code Check results, Girder Capacity Model

```
Parameter  (GIR) NPD Code Check Results, Parameter description
--------------------------------------------------------------------------
UCmax      Maximum of all Unity Criterion factors
UCcomp     Unity Criterion for girder buckling, compression side
UCtens     Unity Criterion for girder buckling, tension side
UCweb      Unity criterion, web heigth to web thickness ratio
UCffla     Unity criterion, free flange of girder
UCbfla     Unity criterion, box section flange
gammam     Material coefficient
sigx1      Normal stress in x direction, edge 1
sigx2      Normal stress in x direction, edge 2
sigy       Normal stress in y direction
tauxy      Shear stress
ae1        Effective plate flange, side 1
ae2        Effective plate flange, side 2
beta       Plate slenderness
Cx         Correction parameter for compression in x direction
Ae         Effective cross section
zp         Distance from neutral axis to midplane of plate
zf         Distance from neutral axis to top of flange
Iez        Effective moment of inertia about z axis
Iz         Moment of inertia about z axis
ie         Effective radius of gyration
wep        Effective sectional modulus, plate side
wef        Effective sectional modulus, flange side
P0         Equivalent lateral load due to longitudional stress
Pe         Effective lateral load
siga       Effective axial stress
sigbp      Effective bending stress, plate side
sigbf      Effective bending stress, flange side
Mbend      Bending moment
fe         Elastic buckling resistance
lambda     Reduced slenderness
fTi        Elastic torsional buckling stress
lambdaT    Reduced slenderness wrt. torional buckling
fkT        Torsional buckling resistance
fk         Characteristic buckling resistance
Rhwtw      Web height to web thickness ratio
etaweb     Web height to web thickness ratio requirement
Rfftf      Free flange to thickness of flange ratio
etaffla    Free flange to thickness of flange ratio requirement
Rbaftf     Box section flange to thickness of flange ratio
etabfla    Box section flange to thickness of flange ratio requirement
```

NPD Code Check results, Stiffener Capacity Model

```
Parameter  (STF) NPD Code Check Results, Parameter description
---------------------------------------------------------------------------
UCmax      Maximum of all Unity Criterion factors
UCcomp     Unity Criterion for stiffener buckling, compression side
UCtens     Unity Criterion for stiffener buckling, tension side
UCweb      Unity criterion, web heigth to web thickness ratio
UCffla     Unity criterion, free flange of stiffener
UCbfla     Unity criterion, box section flange
gammam     Material coefficient
sigx       Normal stress in x direction
sigy1      Normal stress in y direction, edge 1
sigy2      Normal stress in y direction, edge 2
tauxy      Shear stress
beta1      Plate slenderness; side1
beta2      Plate slenderness; side2
Cx1        Correction for compression, x-dir, side1
Cx2        Correction for compression, x-dir, side2
Cy1        Correction for compression, y-dir, side1
Cy2        Correction for compression, y-dir, side2
Ctau       Correction for shear
be1        Effective plate flange, side 1
be2        Effective plate flange, side 2
Ae         Effective cross section
zs         Distance from neutral axis to top of stiffener
zp         Distance from neutral axis to midplane of plate
Iez        Effective moment of inertia about z axis
Iz         Moment of inertia about z axis
ie         Effective radius of gyration
Wep        Effective sectional modulus, plate side
Wes        Effective sectional modulus, stiffener side
fe         Elastic buckling resistance
ks         Buckling length factor
fTi        Elastic torsional buckling stress
lambdaT    Reduced slenderness wrt. torsional buckling
fkT        Torsional buckling resistance
lambda     Reduced slenderness
fk         Characteristic buckling resistance
sigg       Elastic global buckling stress with stiffeners removed
taucrg     Characteristic buckling shear resistance, global
taucrl     Characteristic buckling shear resistance, local
Nx         Effective axial force
siga       Effective axial stress used in stiffener buckling check
sigbp      Effective bending stress, plate side
sigbs      Effective bending stress, stiffener side
Mbend      Bending moment
ms         Bending moment factor
Rhwtw      Web height to web thickness ratio
etaweb     Web height to web thickness ratio requirement
```

```
Rfftf      Free flange to thickness of flange ratio
etaffla    Free flange to thickness of flange ratio requirement
Rbaftf     Box section flange to thickness of flange ratio
etabfla    Box section flange to thickness of flange ratio requirement
```

NPD Code Check results, Plate Capacity Model

```
Parameter  (PLT) NPD Code Check Results, Parameter description
--------------------------------------------------------------------------
UCmax      Maximum of all Unity Criterion factors
UCpbs      Unity Criterion for plate buckling, serviceability
UCpbu      Unity Criterion for plate buckling, ultimate
UCplat     Unity Criterion for lateral pressure
gammam     Material coefficient
sigx1      Normal stress in x direction, edge 1
sigx2      Normal stress in x direction, edge 2
sigy1      Normal stress in y direction, edge 1
sigy2      Normal stress in y direction, edge 2
tauxy      Shear stress
sigex      Elastic buckling stress, x direction
sigey      Elastic buckling stress, y direction
taue       Elastic buckling stress, shear
kx         Buckling coefficient, x direction
ky         Buckling coefficient, y direction
ktau       Buckling coefficient, shear
VonMise    Equivalent stress (Von Mises)
lambda     Equivalent reduced slenderness
sigke      Characteristic buckling resistance, elastic
sigku      Characteristic buckling resistance, ultimate
sigked     Design buckling resistance, elastic
sigkud     Design buckling resistance, ultimate
platd      Ultimate lateral pressure
```

1.10 The results presentation

The previous sections described how the Code Check analyses were performed on the basis of the currently selected Capacity Models and Resultcases, and how the Code Check results were stored in the database.

In order for the user to view these results, one of the results presentation commands must be used, i.e PRINT or DISPLAY. The last display can also be saved on a plot file by use of the PLOT command.

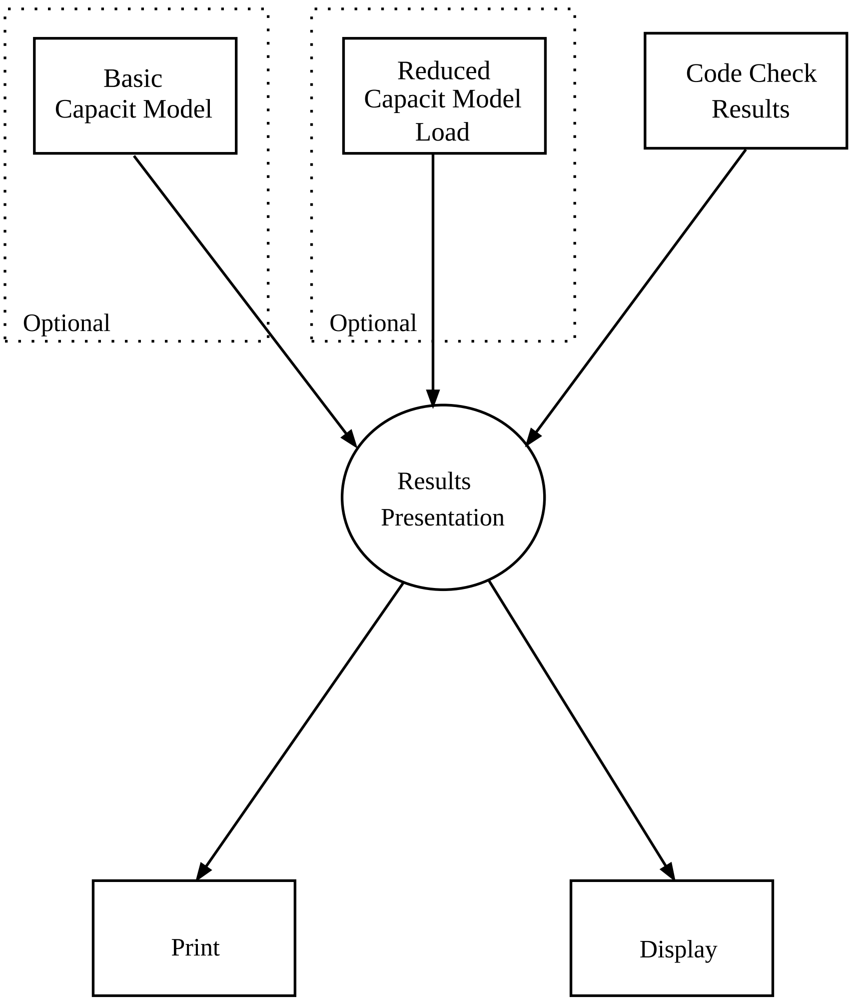

Figure 1-18 Principles of result presentation

1.10.1 Printing Code Check results

The Code Check results can in PLATEWORK be directed to either the screen or to a print file, by use of the SET PRINT DESTINATION command, see Chapter 5.

Print levels

When printing Code Check results, several "print levels" are available:

Table 1.3
Code Check print levels

Print level	Description
SUMMARY	Quick summary of all stored Code Check results
BRIEF	Brief listing of results, Capacity Model by Capacity Model
INTERMEDIATE	Intermediate Code Check results
MEDIUM	Capacity Model geometry, loads and UC-factors
FULL	= MEDIUM + INTERMEDIATE

When printing Code Check results, the print level is selected in the PRINT command (e.g. PRINT CODE-CHECK-RESULTS SUMMARY).

Results sorting and filtering

The Code Check results can be sorted on the basis of any Code Check result parameter, by use of the DEFINE SORTING PARAMETER command. If not specified, the default sorting parameter UCmax will be used.

Similarly, the user may define upper and lower limits to the value of the current sorting parameter, meaning that those Capacity Models where the sorting parameter value is above maximum or below minimum will not be printed. This is controlled by use of the DEFINE SORTING MIN-VALUE and DEFINE SORTING MAX-VALUE.

Also, the user can control the order in which the sorting shall be performed, namely increasing or decreasing order. This is controlled by the DEFINE SORTING ORDER command.

Finally, the printout can be limited by defining a maximum number of entries in a results print table, by use of the DEFINE SORTING MAX-ENTRIES command.

The DEFINE SORTING command can be used both before or after running the Code Check analysis, the results will automatically be sorted whenever necessary.

Current selections

Results print can also be limited by use of the SELECT CAPACITY-MODEL and SELECT RESULTCASE commands. Only those results which refer to a selected Capacity Model and a selected Resultcase will be printed.

1.10.2 Summary print.

Below is shown an example of a summary print. Note the box where the current sorting definitions are shown.

```
06-MAY-1991 13:38 PROGRAM: SESAM    PLATEWORK D1.0-02 11-APR-1991  PAGE: 1


                  API Code Check Results
                  Summary Table                                 SUB PAGE: 1



NOMENCLATURE:

Status            Check status
UCmax             Maximum of all Unity Criterion factors
Res-Name          Resultcase name
L-stat            Resultcase Limit-state
Phas              Phase angle
Capacity-Model    Basic Capacity Model name
Type              Basic Capacity Model type

+--------------------------------------------------------------+
! Sorting Parameter: UCMAX        ! Max Entries: UNLIMITED    !
! Sorting Order    : DECREASING   ! Max Value  : UNLIMITED    !
!                                 ! Min Value  : UNLIMITED    !
+--------------------------------------------------------------+

Status   UCmax      Res-Name L-stat Phas     Capacity-Model   Type
-----------------------------------------------------------------
**-PB      5.18     2        STORM           XMANP2.2         PLT
**-PB      3.45     2        STORM           XMANP1.2         PLT
**-LB      3.05     3        STORM           XMANS2.2         STF
**-LB      3.05     4        STORM           XMANS2.2         STF
**-LB      3.05     1        STORM           XMANS2.1         STF
**-LB      3.05     2        STORM           XMANS2.1         STF
**-LB      3.05     3        STORM           XMANS2.1         STF
**-LB      3.05     4        STORM           XMANS2.1         STF
**-LB      3.05     1        STORM           XMANS2.2         STF
**-LB      3.05     2        STORM           XMANS2.2         STF
**-PB      2.84     4        STORM           XMANP2.2         PLT
**-LB      2.03     3        STORM           XMANS1.1         STF
**-LB      2.03     4        STORM           XMANS1.1         STF
**-LB      2.03     1        STORM           XMANS1.2         STF
**-LB      2.03     2        STORM           XMANS1.2         STF
**-LB      2.03     3        STORM           XMANS1.2         STF
**-LB      2.03     4        STORM           XMANS1.2         STF
**-LB      2.03     2        STORM           XMANS1.1         STF
**-LB      2.03     1        STORM           XMANS1.1         STF
**-PB      2.02     3        STORM           XMANP1.2         PLT
```

```
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                  API Code Check Results
                  Summary Table                                SUB PAGE: 2

Status   UCmax      Res-Name L-stat Phas     Capacity-Model   Type
------------------------------------------------------------------
**-PB      1.77     4        STORM           XMANP1.2         PLT
**-PB      1.69     1        STORM           XMANP2.2         PLT
**-LB      1.52     3        STORM           XMANG1           GIR
**-LB      1.52     1        STORM           XMANG1           GIR
**-LB      1.52     2        STORM           XMANG1           GIR
**-LB      1.52     4        STORM           XMANG1           GIR
**-PY      1.49     3        STORM           XMANP2.2         PLT
**-PB      1.07     2        STORM           XMANP2.1         PLT
OK-PB      0.92     4        STORM           XMANP2.1         PLT
OK-PB      0.58     3        STORM           XMANP2.1         PLT
OK-PB      0.56     2        STORM           XMANP1.1         PLT
OK-PB      0.55     1        STORM           XMANP1.2         PLT
OK-PB      0.52     2        STORM           XMANP1.3         PLT
OK-PB      0.47     3        STORM           XMANP1.3         PLT
OK-PB      0.46     2        STORM           XMANP2.3         PLT
OK-PB      0.41     1        STORM           XMANP2.3         PLT
OK-PB      0.39     3        STORM           XMANP1.1         PLT
OK-PB      0.34     4        STORM           XMANP1.1         PLT
OK-PY      0.31     4        STORM           XMANP2.3         PLT
OK-OPBE    0.28     2        STORM           XMANO            OSP
OK-PB      0.27     4        STORM           XMANP1.3         PLT
OK-PY      0.24     3        STORM           XMANP2.3         PLT
OK-PB      0.22     1        STORM           XMANP1.3         PLT
OK-PB      0.21     1        STORM           XMANP1.1         PLT
OK-OPBE    0.21     4        STORM           XMANO            OSP
OK-OPBE    0.18     3        STORM           XMANO            OSP
OK-PY      0.17     1        STORM           XMANP2.1         PLT
OK-OPBE    0.13     1        STORM           XMANO            OSP
```

Minimum sorting parameter value applied

Below is shown the same summary printout, except that a sorting parameter minimum value=1.0 has been defined, i.e. the table ignores all results that did not cause a failure. At the end of the table it is reported how many instances were ignored,

```
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                  API Code Check Results
                  Summary Table                                SUB PAGE: 1


NOMENCLATURE:

Status            Check status
UCmax             Maximum of all Unity Criterion factors
Res-Name          Resultcase name
L-stat            Resultcase Limit-state
Phas              Phase angle
Capacity-Model    Basic Capacity Model name
Type              Basic Capacity Model type

+-------------------------------------------------------------+
! Sorting Parameter: UCMAX        ! Max Entries: UNLIMITED    !
! Sorting Order    : DECREASING   ! Max Value  : UNLIMITED    !
!                                 ! Min Value  :  1.000E+00   !
+-------------------------------------------------------------+

Status   UCmax      Res-Name L-stat Phas     Capacity-Model   Type
-------------------------------------------------------------------
**-PB      5.18     2        STORM           XMANP2.2         PLT
**-PB      3.45     2        STORM           XMANP1.2         PLT
**-LB      3.05     3        STORM           XMANS2.2         STF
**-LB      3.05     4        STORM           XMANS2.2         STF
**-LB      3.05     1        STORM           XMANS2.1         STF
**-LB      3.05     2        STORM           XMANS2.1         STF
**-LB      3.05     3        STORM           XMANS2.1         STF
**-LB      3.05     4        STORM           XMANS2.1         STF
**-LB      3.05     1        STORM           XMANS2.2         STF
**-LB      3.05     2        STORM           XMANS2.2         STF
**-PB      2.84     4        STORM           XMANP2.2         PLT
**-LB      2.03     3        STORM           XMANS1.1         STF
**-LB      2.03     4        STORM           XMANS1.1         STF
**-LB      2.03     1        STORM           XMANS1.2         STF
**-LB      2.03     2        STORM           XMANS1.2         STF
**-LB      2.03     3        STORM           XMANS1.2         STF
**-LB      2.03     4        STORM           XMANS1.2         STF
**-LB      2.03     2        STORM           XMANS1.1         STF
**-LB      2.03     1        STORM           XMANS1.1         STF
```

```
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                  API Code Check Results
                  Summary Table                                SUB PAGE: 2

Status   UCmax      Res-Name L-stat Phas     Capacity-Model   Type
------------------------------------------------------------------
**-PB      2.02     3        STORM           XMANP1.2         PLT
**-PB      1.77     4        STORM           XMANP1.2         PLT
**-PB      1.69     1        STORM           XMANP2.2         PLT
**-LB      1.52     3        STORM           XMANG1           GIR
**-LB      1.52     1        STORM           XMANG1           GIR
**-LB      1.52     2        STORM           XMANG1           GIR
**-LB      1.52     4        STORM           XMANG1           GIR
**-PY      1.49     3        STORM           XMANP2.2         PLT
**-PB      1.07     2        STORM           XMANP2.1         PLT

      Ignored:     20 Instances had sort parameter VALUE BELOW MIN
```

Sorting parameter redefined

Below is shown a summary table based on another sorting parameter (UCbcbU, beam column buckling, see box). Note that it is reported that some Capacity Models did not contain this parameter (in this case the plate Capacity Models).

```
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                  API Code Check Results

NOMENCLATURE:

Status                Check status
UCbcbU                Unity Criterion for beam-column buckling
Res-Name              Resultcase name
L-stat                Resultcase Limit-state
Phas                  Phase angle
Capacity-Model        Basic Capacity Model name
Type                  Basic Capacity Model type

+--------------------------------------------------------------+
! Sorting Parameter: UCbcbU       ! Max Entries: UNLIMITED    !
! Sorting Order    : DECREASING   ! Max Value  : UNLIMITED    !
!                                 ! Min Value  : UNLIMITED    !
+--------------------------------------------------------------+

Status   UCbcbU     Res-Name L-stat Phas     Capacity-Model   Type
------------------------------------------------------------------
**-LB      0.46     2        STORM           XMANS1.2         STF
**-LB      0.43     4        STORM           XMANS2.1         STF
**-LB      0.40     2        STORM           XMANS1.1         STF
**-LB      0.40     4        STORM           XMANS1.1         STF
**-LB      0.38     2        STORM           XMANS2.1         STF
**-LB      0.37     2        STORM           XMANS2.2         STF
**-LB      0.37     3        STORM           XMANS2.1         STF
**-LB      0.33     3        STORM           XMANS1.1         STF
**-LB      0.31     3        STORM           XMANS1.2         STF
**-LB      0.31     4        STORM           XMANS1.2         STF
**-LB      0.28     2        STORM           XMANG1           GIR
**-LB      0.24     1        STORM           XMANS2.2         STF
**-LB      0.23     1        STORM           XMANS2.1         STF
**-LB      0.20     4        STORM           XMANS2.2         STF
**-LB      0.20     3        STORM           XMANS2.2         STF
**-LB      0.19     1        STORM           XMANS1.1         STF
**-LB      0.16     1        STORM           XMANG1           GIR
**-LB      0.16     4        STORM           XMANG1           GIR
**-LB      0.15     3        STORM           XMANG1           GIR
**-LB      0.12     1        STORM           XMANS1.2         STF

       Ignored:     28 Instances did not contain the SORT PARAMETER
```

1.10.3 Brief print

On the following pages , examples of the BRIEF printout is shown. Note that here, the results are sorted on the basis of both the Capacity Models and the current sorting parameter.

```
                               API Code Check
                               Brief Table                                             SUB PAGE:
NOMENCLATURE:

Status      Check status
UC*         Unity Criterion Factors
Res-Name    Resultcase name
Phas        Phase angle

+---------------------------------------------------------------+
! Sorting Parameter: UCmax        ! Max Entries: UNLIMITED    !
! Sorting Order    : DECREASING   ! Max Value  : UNLIMITED    !
!                                 ! Min Value  :  1.000E+00   !
+---------------------------------------------------------------+
```

Capacity Model: XMANG1
Type : GIR

Status	Res-Name	Phas	UCmax	UCcbU	UCbcbU	UCtfbU	UCpbU	UCpdtw	UCcdtw	UCpbftf	UCcbftf	UClasup
**-LB	1		1.52	0.15	0.16	0.45	0.01	0.66	0.62	0.98	0.73	1.52
**-LB	2		1.52	0.26	0.28	0.77	0.01	0.76	0.90	0.98	0.73	1.52
**-LB	3		1.52	0.13	0.15	0.38	0.02	0.65	0.56	0.98	0.73	1.52
**-LB	4		1.52	0.13	0.16	0.39	0.02	0.65	0.57	0.98	0.73	1.52

Capacity Model: XMANS1.1
Type : STF

Status	Res-Name	Phas	UCmax	UCcbU	UCbcbU	UCtfbU	UCpbU	UCpdtw	UCcdtw	UCpbftf	UCcbftf	UClasup	UCsreq	UCsreql
**-LB	1		2.03	0.18	0.19	0.24	0.00	0.26	0.26	0.54	0.40	2.03	0.00	0.00
**-LB	2		2.03	0.38	0.40	0.51	0.01	0.34	0.34	0.54	0.40	2.03	0.01	0.00
**-LB	3		2.03	0.32	0.33	0.43	0.00	0.31	0.34	0.54	0.40	2.03	0.02	0.00
**-LB	4		2.03	0.37	0.40	0.50	0.02	0.33	0.34	0.54	0.40	2.03	0.01	0.00

```
Capacity Model: XMANS1.2
Type          : STF

Status   Res-Name Phas UCmax  UCcbU  UCbcbU UCtfbU UCpbU  UCpdtw UCcdtw UCpbftf UCcbftf UClasup UCsreq UCsreql
---------------------------------------------------------------------------------------------------------------
**-LB    1              2.03   0.12   0.12   0.16   0.00   0.24   0.20   0.54    0.40    2.03    0.01   0.00
**-LB    2              2.03   0.43   0.46   0.58   0.02   0.34   0.34   0.54    0.40    2.03    0.01   0.00
**-LB    3              2.03   0.31   0.31   0.41   0.00   0.30   0.34   0.54    0.40    2.03    0.01   0.00

**-LB    4              2.03   0.28   0.31   0.38   0.02   0.29   0.34   0.54    0.40    2.03    0.00   0.00
Capacity Model: XMANS2.1
Type          : STF

Status   Res-Name Phas UCmax  UCcbU  UCbcbU UCtfbU UCpbU  UCpdtw UCcdtw UCpbftf UCcbftf UClasup UCsreq UCsreql
---------------------------------------------------------------------------------------------------------------
**-LB    1              3.05   0.23   0.23   0.30   0.00   0.27   0.32   0.54    0.40    3.05    0.08   0.00
**-LB    2              3.05   0.35   0.38   0.45   0.02   0.31   0.34   0.54    0.40    3.05    0.08   0.00
**-LB    3              3.05   0.35   0.37   0.46   0.01   0.31   0.34   0.54    0.40    3.05    0.01   0.00
**-LB    4              3.05   0.37   0.43   0.48   0.04   0.32   0.34   0.54    0.40    3.05    0.02   0.00


Capacity Model: XMANS2.2
Type          : STF

Status   Res-Name Phas UCmax  UCcbU  UCbcbU UCtfbU UCpbU  UCpdtw UCcdtw UCpbftf UCcbftf UClasup UCsreq UCsreql
---------------------------------------------------------------------------------------------------------------
**-LB    1              3.05   0.24   0.24   0.31   0.00   0.27   0.33   0.54    0.40    3.05    0.16   0.00
**-LB    2              3.05   0.34   0.37   0.44   0.02   0.30   0.34   0.54    0.40    3.05    0.18   0.00
**-LB    3              3.05   0.16   0.20   0.20   0.02   0.24   0.22   0.54    0.40    3.05    0.09   0.00
**-LB    4              3.05   0.15   0.20   0.19   0.03   0.24   0.21   0.54    0.40    3.05    0.12   0.00
```

```
Capacity Model: XMANP1.1
Type          : PLT

Status   Res-Name Phas UCmax  UCinplS UCinplU UCWeWa UCstrsS UCplatU
--------------------------------------------------------------------

      Ignored:      4 Instances had sort parameter VALUE BELOW MIN


Capacity Model: XMANP1.2
Type          : PLT

Status   Res-Name Phas UCmax  UCinplS UCinplU UCWeWa UCstrsS UCplatU
--------------------------------------------------------------------
**-PB    2              3.45   3.45    0.80    0.37   0.37    0.02
**-PB    3              2.02   2.02    0.47    0.79   0.37    0.04
**-PB    4              1.77   1.77    0.40    0.79   0.36    0.04

      Ignored:      1 Instances had sort parameter VALUE BELOW MIN


Capacity Model: XMANP1.3
Type          : PLT

Status   Res-Name Phas UCmax  UCinplS UCinplU UCWeWa UCstrsS UCplatU
--------------------------------------------------------------------


      Ignored:      4 Instances had sort parameter VALUE BELOW MIN


Capacity Model: XMANP2.1
Type          : PLT

Status   Res-Name Phas UCmax  UCinplS UCinplU UCWeWa UCstrsS UCplatU
--------------------------------------------------------------------
**-PB    2              1.07   1.07    0.54    0.08   0.37    0.01

      Ignored:      3 Instances had sort parameter VALUE BELOW MIN
```

```
Capacity Model: XMANP2.2
Type          : PLT

Status   Res-Name Phas UCmax  UCinplS UCinplU UCWeWa UCstrsS UCplatU
--------------------------------------------------------------------
**-PB    2               5.18   5.18    0.87    0.70   0.39    0.02
**-PB    4               2.84   2.84    0.48    1.49   0.42    0.05
**-PB    1               1.69   1.69    0.30    0.40   0.26    0.01
**-PY    3               1.49   1.37    0.26    1.49   0.39    0.05


Capacity Model: XMANP2.3
Type          : PLT

Status   Res-Name Phas UCmax  UCinplS UCinplU UCWeWa UCstrsS UCplatU
--------------------------------------------------------------------

      Ignored:      4 Instances had sort parameter VALUE BELOW MIN


Capacity Model: XMANO
Type          : OSP

Status   Res-Name Phas UCmax  UCinplS UCWeWa UCpstrS UCsstrS UCgstrS UCulatU
----------------------------------------------------------------------------

      Ignored:      4 Instances had sort parameter VALUE BELOW MIN
```

1.10.4 Full print

On the following pages , examples of the FULL printout is shown. Note that here, each result entity (a combination of a Capacity Model and a Resultcase) will normally fill a whole page.

Note also that here, it has been requested that the length of the print table shall be limited to 5 result entries (Max Entries = 5, see box).

```
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                  API Code Check Results
                  Full Table                                   SUB PAGE: 1



NOMENCLATURE:

Girder        Girder parameter name
section       Geometric dimension value
Material      Capacity Model material parameter
Mat-Value     Material parameter value
CM-Load       Capacity Model load
Load-Value    Load value
UC-Factor     Unity Criterion factor
UC-Val        Unity Criterion factor value

+---------------------------------------------------------------+
! Sorting Parameter: UCmax        ! Max Entries:          5   !
! Sorting Order    : DECREASING   ! Max Value  : UNLIMITED    !
!                                 ! Min Value  : UNLIMITED    !
+---------------------------------------------------------------+
```

```
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2

                  API Code Check Results

+---------------------------------------------------------------+
! Capacity Model   : XMANG1            ! Type       : GIR      !
! Resultcase Name  : 1                 ! Limit-State: STORM    !
! Code Check Status: **-LB             !                       !
+---------------------------------------------------------------+

Girder     section   Material  Mat-Value  CM-Load   Load-Value UC-Factor
UC-Val
---------------------------------------------------------------------------
-----
    hwg =  3.980E+02      fy =  3.400E+02     fx1 = -7.278E+02   UCmax =
1.52
    twg =  1.200E+01      fp =  2.040E+02     fx2 = -5.541E+02   UCcbU =
0.15
    bfg =  3.000E+02       E =  2.100E+05     fy1 = -5.818E+02  UCbcbU =
0.16
    tfg =  2.200E+01      ny =  3.000E-01     fxy =  2.111E+02  UCtfbU =
0.45
    afg =  0.000E+00                         plat = -4.000E-03   UCpbU =
0.01
    efg =  0.000E+00 Stiffener section      Mbend = -4.946E+06  UCpdtw =
0.66
                         hws =  1.480E+02                       UCcdtw =
0.62
    Plate dimension      tws =  1.200E+01    Girder parameter  UCpbftf =
0.98
     Ly =  5.000E+03     bfs =  9.000E+01     Lty =  5.000E+03 UCcbftf =
0.73
    lx1 =  2.000E+03     tfs =  1.200E+01      kg =  1.000E+00 UClasup =
1.52
    lx2 =  3.000E+03     afs =  0.000E+00      mg =  8.000E+00
     t1 =  2.500E+01     efs =  3.900E+01    GTYP =  0
     t2 =  2.500E+01                         GSTF =  0
    lya =  1.667E+03

INTERMEDIATE CODE CHECK RESULTS:

Parameter   Value    Parameter   Value    Parameter   Value
--------------------------------------------------------------
  UCmax =  1.524E+00   UCcbU =  1.530E-01  UCbcbU =  1.595E-01
 UCtfbU =  4.495E-01   UCpbU =  5.527E-03  UCpdtw =  6.643E-01
 UCcdtw =  6.181E-01 UCpbftf =  9.798E-01 UCcbftf =  7.316E-01
UClasup =  1.524E+00   FSSLS =  1.250E+00   FSULS =  1.500E+00
  sigx1 = -2.784E+01   sigx2 = -2.120E+01    sigy = -1.969E+01
  tauxy =  8.446E+00   beta1 =  3.219E+00   beta2 =  4.828E+00
```

```
    Cy1 =  5.248E-01     Cy2 =  3.713E-01     Le1 =  1.050E+03
    Le2 =  1.114E+03      Ae =  3.842E+04      zs =  3.228E+02
     zp =  9.870E+01     Iez =  1.077E+09      re =  1.674E+02
    Wep =  1.091E+07     Wes =  3.335E+06     Wpl =  4.170E+06
      J =  1.294E+06      Cw =  5.023E+09      Is =  1.298E+09
     Ic =  1.852E+08       P = -1.454E+06     Ftw =  5.278E+05
    Fwi =  5.036E+05   Mbend = -4.946E+06  lambda =  3.826E-01
    PEe =  8.926E+07     PFu =  1.426E+07      Mu =  1.134E+09
     B1 =  1.000E+00     PTe =  5.242E+06    PTFe =  4.989E+06
   PTFu =  4.854E+06     Mup =  1.342E+09    Rdtw =  3.317E+01
etapdtw =  4.993E+01 etacdtw =  5.366E+01   Rbftf =  1.364E+01
etapbft =  1.392E+01 etacbft =  1.864E+01     RLb =  5.000E+03
etaL1L2 =  3.281E+03
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                  API Code Check Results

+---------------------------------------------------------------+
! Capacity Model   : XMANG1             ! Type       : GIR     !
! Resultcase Name  : 2                  ! Limit-State: STORM   !
! Code Check Status: **-LB              !                      !
+---------------------------------------------------------------+

Girder     section   Material  Mat-Value  CM-Load   Load-Value UC-Factor
UC-Val
--------------------------------------------------------------------------
-----
    hwg =  3.980E+02      fy =  3.400E+02     fx1 = -1.317E+03   UCmax =
1.52
    twg =  1.200E+01      fp =  2.040E+02     fx2 = -1.282E+03   UCcbU =
0.26
    bfg =  3.000E+02       E =  2.100E+05     fy1 = -9.943E+02  UCbcbU =
0.28
    tfg =  2.200E+01      ny =  3.000E-01     fxy = -2.097E+02  UCtfbU =
0.77
    afg =  0.000E+00                         plat =  7.000E-03   UCpbU =
0.01
    efg =  0.000E+00 Stiffener section      Mbend =  1.108E+07  UCpdtw =
0.76
                         hws =  1.480E+02                       UCcdtw =
0.90
    Plate dimension      tws =  1.200E+01    Girder parameter  UCpbftf =
0.98
     Ly =  5.000E+03     bfs =  9.000E+01     Lty =  5.000E+03 UCcbftf =
0.73
    lx1 =  2.000E+03     tfs =  1.200E+01      kg =  1.000E+00 UClasup =
1.52
    lx2 =  3.000E+03     afs =  0.000E+00      mg =  8.000E+00
     t1 =  2.500E+01     efs =  3.900E+01    GTYP =  0
     t2 =  2.500E+01                         GSTF =  0
```

```
    lya =  1.667E+03

INTERMEDIATE CODE CHECK RESULTS:

Parameter   Value    Parameter   Value    Parameter   Value
--------------------------------------------------------------
  UCmax =  1.524E+00   UCcbU =  2.615E-01  UCbcbU =  2.762E-01
 UCtfbU =  7.682E-01   UCpbU =  1.358E-02  UCpdtw =  7.644E-01
 UCcdtw =  9.017E-01 UCpbftf =  9.798E-01 UCcbftf =  7.316E-01
UClasup =  1.524E+00   FSSLS =  1.250E+00   FSULS =  1.500E+00
  sigx1 = -5.036E+01   sigx2 = -4.902E+01    sigy = -3.365E+01
  tauxy = -8.387E+00   beta1 =  3.219E+00   beta2 =  4.828E+00
    Cy1 =  5.248E-01     Cy2 =  3.713E-01     Le1 =  1.050E+03
    Le2 =  1.114E+03      Ae =  3.842E+04      zs =  3.228E+02
     zp =  9.870E+01     Iez =  1.077E+09      re =  1.674E+02
    Wep =  1.091E+07     Wes =  3.335E+06     Wpl =  4.170E+06
      J =  1.294E+06      Cw =  5.023E+09      Is =  1.298E+09
     Ic =  1.852E+08       P = -2.486E+06     Ftw =  5.241E+05
    Fwi =  8.392E+05   Mbend =  1.108E+07  lambda =  3.826E-01
    PEe =  8.926E+07     PFu =  1.426E+07      Mu =  1.134E+09
     B1 =  1.000E+00     PTe =  5.242E+06    PTFe =  4.989E+06
   PTFu =  4.854E+06     Mup =  1.224E+09    Rdtw =  3.317E+01
etapdtw =  4.339E+01 etacdtw =  3.678E+01   Rbftf =  1.364E+01
etapbft =  1.392E+01 etacbft =  1.864E+01     RLb =  5.000E+03
etaL1L2 =  3.281E+03
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                  API Code Check Results

+------------------------------------------------------------+
! Capacity Model   : XMANG1            ! Type       : GIR     !
! Resultcase Name  : 3                 ! Limit-State: STORM   !
! Code Check Status: **-LB             !                      !
+------------------------------------------------------------+

Girder     section   Material  Mat-Value  CM-Load   Load-Value UC-Factor
UC-Val
--------------------------------------------------------------------------
-----
    hwg =  3.980E+02      fy =  3.400E+02     fx1 = -1.582E+03   UCmax =
1.52
    twg =  1.200E+01      fp =  2.040E+02     fx2 = -4.173E+02   UCcbU =
0.13
    bfg =  3.000E+02       E =  2.100E+05     fy1 = -4.932E+02  UCbcbU =
0.15
    tfg =  2.200E+01      ny =  3.000E-01     fxy = -7.190E+01  UCtfbU =
0.38
    afg =  0.000E+00                         plat = -1.500E-02   UCpbU =
0.02
```

```
    efg =  0.000E+00 Stiffener section      Mbend = -1.478E+07  UCpdtw =
0.65
                          hws =  1.480E+02                      UCcdtw =
0.56
    Plate dimension       tws =  1.200E+01    Girder parameter  UCpbftf =
0.98
     Ly =  5.000E+03      bfs =  9.000E+01     Lty =  5.000E+03 UCcbftf =
0.73
    lx1 =  2.000E+03      tfs =  1.200E+01      kg =  1.000E+00 UClasup =
1.52
    lx2 =  3.000E+03      afs =  0.000E+00      mg =  8.000E+00
     t1 =  2.500E+01      efs =  3.900E+01    GTYP =  0
     t2 =  2.500E+01                          GSTF =  0
    lya =  1.667E+03

INTERMEDIATE CODE CHECK RESULTS:

Parameter   Value    Parameter   Value    Parameter   Value
--------------------------------------------------------------
  UCmax =  1.524E+00   UCcbU =  1.297E-01  UCbcbU =  1.493E-01
 UCtfbU =  3.810E-01   UCpbU =  1.626E-02  UCpdtw =  6.461E-01
 UCcdtw =  5.575E-01 UCpbftf =  9.798E-01 UCcbftf =  7.316E-01
UClasup =  1.524E+00   FSSLS =  1.250E+00   FSULS =  1.500E+00
  sigx1 = -6.051E+01   sigx2 = -1.596E+01    sigy = -1.669E+01
  tauxy = -2.876E+00   beta1 =  3.219E+00   beta2 =  4.828E+00
    Cy1 =  5.248E-01     Cy2 =  3.713E-01     Le1 =  1.050E+03
    Le2 =  1.114E+03      Ae =  3.842E+04      zs =  3.228E+02
     zp =  9.870E+01     Iez =  1.077E+09      re =  1.674E+02
    Wep =  1.091E+07     Wes =  3.335E+06     Wpl =  4.170E+06
      J =  1.294E+06      Cw =  5.023E+09      Is =  1.298E+09
     Ic =  1.852E+08       P = -1.233E+06     Ftw =  1.797E+05
    Fwi =  7.872E+05   Mbend = -1.478E+07  lambda =  3.826E-01
    PEe =  8.926E+07     PFu =  1.426E+07      Mu =  1.134E+09
     B1 =  1.000E+00     PTe =  5.242E+06    PTFe =  4.989E+06
   PTFu =  4.854E+06     Mup =  1.364E+09    Rdtw =  3.317E+01
etapdtw =  5.133E+01 etacdtw =  5.949E+01   Rbftf =  1.364E+01
etapbft =  1.392E+01 etacbft =  1.864E+01     RLb =  5.000E+03
etaL1L2 =  3.281E+03
06-MAY-1991 13:57 PROGRAM: SESAM    PLATEWORK D1.0-02 11-APR-1991  PAGE:
5

                  API Code Check Results

+---------------------------------------------------------------+
! Capacity Model    : XMANG1              ! Type        : GIR     !
! Resultcase Name   : 4                   ! Limit-State: STORM    !
! Code Check Status: **-LB                !                       !
+---------------------------------------------------------------+
```

```
Girder     section   Material  Mat-Value  CM-Load   Load-Value UC-Factor
UC-Val
---------------------------------------------------------------------------
-----
    hwg =  3.980E+02      fy =  3.400E+02     fx1 = -1.783E+03   UCmax =
1.52
    twg =  1.200E+01      fp =  2.040E+02     fx2 = -2.161E+02   UCcbU =
0.13
    bfg =  3.000E+02       E =  2.100E+05     fy1 = -5.082E+02  UCbcbU =
0.16
    tfg =  2.200E+01      ny =  3.000E-01     fxy = -1.325E+02  UCtfbU =
0.39
    afg =  0.000E+00                         plat =  1.500E-02   UCpbU =
0.02
    efg =  0.000E+00 Stiffener section      Mbend =  1.931E+07  UCpdtw =
0.65
                         hws =  1.480E+02                       UCcdtw =
0.57
    Plate dimension      tws =  1.200E+01    Girder parameter  UCpbftf =
0.98
     Ly =  5.000E+03     bfs =  9.000E+01     Lty =  5.000E+03 UCcbftf =
0.73
    lx1 =  2.000E+03     tfs =  1.200E+01      kg =  1.000E+00 UClasup =
1.52
    lx2 =  3.000E+03     afs =  0.000E+00      mg =  8.000E+00
     t1 =  2.500E+01     efs =  3.900E+01    GTYP =  0
     t2 =  2.500E+01                         GSTF =  0
    lya =  1.667E+03

INTERMEDIATE CODE CHECK RESULTS:

Parameter   Value    Parameter   Value    Parameter   Value
-----------------------------------------------------------
  UCmax =  1.524E+00   UCcbU =  1.336E-01  UCbcbU =  1.592E-01
 UCtfbU =  3.926E-01   UCpbU =  2.130E-02  UCpdtw =  6.491E-01
 UCcdtw =  5.669E-01 UCpbftf =  9.798E-01 UCcbftf =  7.316E-01
UClasup =  1.524E+00   FSSLS =  1.250E+00   FSULS =  1.500E+00
  sigx1 = -6.819E+01   sigx2 = -8.268E+00    sigy = -1.720E+01
  tauxy = -5.298E+00   beta1 =  3.219E+00   beta2 =  4.828E+00
    Cy1 =  5.248E-01     Cy2 =  3.713E-01     Le1 =  1.050E+03
    Le2 =  1.114E+03      Ae =  3.842E+04      zs =  3.228E+02
     zp =  9.870E+01     Iez =  1.077E+09      re =  1.674E+02
    Wep =  1.091E+07     Wes =  3.335E+06     Wpl =  4.170E+06
      J =  1.294E+06      Cw =  5.023E+09      Is =  1.298E+09
     Ic =  1.852E+08       P = -1.271E+06     Ftw =  3.311E+05
    Fwi =  7.663E+05   Mbend =  1.931E+07  lambda =  3.826E-01
    PEe =  8.926E+07     PFu =  1.426E+07      Mu =  1.134E+09
     B1 =  1.000E+00     PTe =  5.242E+06    PTFe =  4.989E+06
   PTFu =  4.854E+06     Mup =  1.360E+09    Rdtw =  3.317E+01
etapdtw =  5.109E+01 etacdtw =  5.850E+01   Rbftf =  1.364E+01
```

```
etapbft =  1.392E+01 etacbft =  1.864E+01     RLb =  5.000E+03
etaL1L2 =  3.281E+03
06-MAY-1991 13:57 PROGRAM: SESAM    PLATEWORK D1.0-02 11-APR-1991  PAGE:
6

                  API Code Check Results

+----------------------------------------------------------------+
! Capacity Model   : XMANS1.1           ! Type       : STF     !
! Resultcase Name  : 1                  ! Limit-State: STORM   !
! Code Check Status: **-LB              !                      !
+----------------------------------------------------------------+

Stiffener  section   Material  Mat-Value  CM-Load   Load-Value UC-Factor
UC-Val
--------------------------------------------------------------------------
-----
    hws =  1.480E+02      fy =  3.400E+02     fx1 = -6.762E+02   UCmax =
2.03
    tws =  1.200E+01      fp =  2.040E+02     fy1 = -3.498E+02   UCcbU =
0.18
    bfs =  9.000E+01       E =  2.100E+05     fy2 = -4.289E+02  UCbcbU =
0.19
    tfs =  1.200E+01      ny =  3.000E-01     fxy =  4.643E+00  UCtfbU =
0.24
    afs =  0.000E+00                         plat = -4.000E-03   UCpbU =
0.00
    efs =  3.900E+01 Stiffener parameter    Mbend =  4.627E+05  UCpdtw =
0.26
                          Ly =  5.000E+03                       UCcdtw =
0.26
    Plate dimension      Ltx =  2.000E+03                      UCpbftf =
0.54
     lx =  2.000E+03     ks0 =  1.000E+00                      UCcbftf =
0.40
    ly1 =  1.250E+03     ms0 =  8.000E+00                      UClasup =
2.03
    ly2 =  2.500E+03     ksp =  6.000E-01                       UCsreq =
0.00
     t1 =  2.500E+01     msp =  1.600E+01                      UCsreql =
0.00
     t2 =  2.500E+01    SEND =  Continous
                        STYP =  0
                        SSTF =  0
```

```
INTERMEDIATE CODE CHECK RESULTS:

Parameter   Value     Parameter   Value     Parameter   Value
--------------------------------------------------------------
  UCmax =  2.032E+00   UCcbU =  1.818E-01  UCbcbU =  1.890E-01
 UCtfbU =  2.442E-01   UCpbU =  3.643E-03  UCpdtw =  2.558E-01
 UCcdtw =  2.649E-01 UCpbftf =  5.389E-01 UCcbftf =  4.024E-01
UClasup =  2.032E+00  UCsreq =  6.394E-04 UCsreql =  0.000E+00
  FSSLS =  1.250E+00   FSULS =  1.500E+00    sigx = -2.549E+01
  sigy1 = -1.399E+01   sigy2 = -1.716E+01   tauxy =  1.857E-01
  beta1 =  2.012E+00   beta2 =  3.219E+00     Cx1 =  7.470E-01
    Cx2 =  4.391E-01     be1 =  9.338E+02     be2 =  1.098E+03
     Ae =  2.825E+04      zs =  1.547E+02      zp =  1.180E+01
    Iez =  4.387E+07      re =  3.941E+01     Wep =  3.717E+06
    Wes =  2.836E+05     Wpl =  6.253E+05       J =  1.371E+05
     Cw =  1.644E+08      Is =  3.662E+07      Ic =  7.540E+06
      P = -1.268E+06     Ftw =  8.655E+03     Fwi =  1.228E+05
  Mbend =  4.627E+05      ms =  1.600E+01  lambda =  3.900E-01
     ks =  6.000E-01     PEe =  6.314E+07     PFu =  1.046E+07
     Mu =  9.642E+07      B1 =  1.000E+00     PTe =  1.450E+07
   PTFe =  1.219E+07    PTFu =  7.788E+06     Mup =  1.905E+08
   Fxyu =  1.941E+02    Rdtw =  1.233E+01 etapdtw =  4.822E+01
etacdtw =  4.656E+01   Rbftf =  7.500E+00 etapbft =  1.392E+01
etacbft =  1.864E+01     RLb =  2.000E+03 etaL1L2 =  9.842E+02
    RIs =  2.805E+04     RIl =  0.000E+00   etaIe =  4.387E+07
```

1.10.5 Displaying Code Check results

An alternative to printing the results, is to display them. Code Check results can be labelled on top of a Capacity Model display. The user has the option of selecting a resultcase and a Code Check parameter.

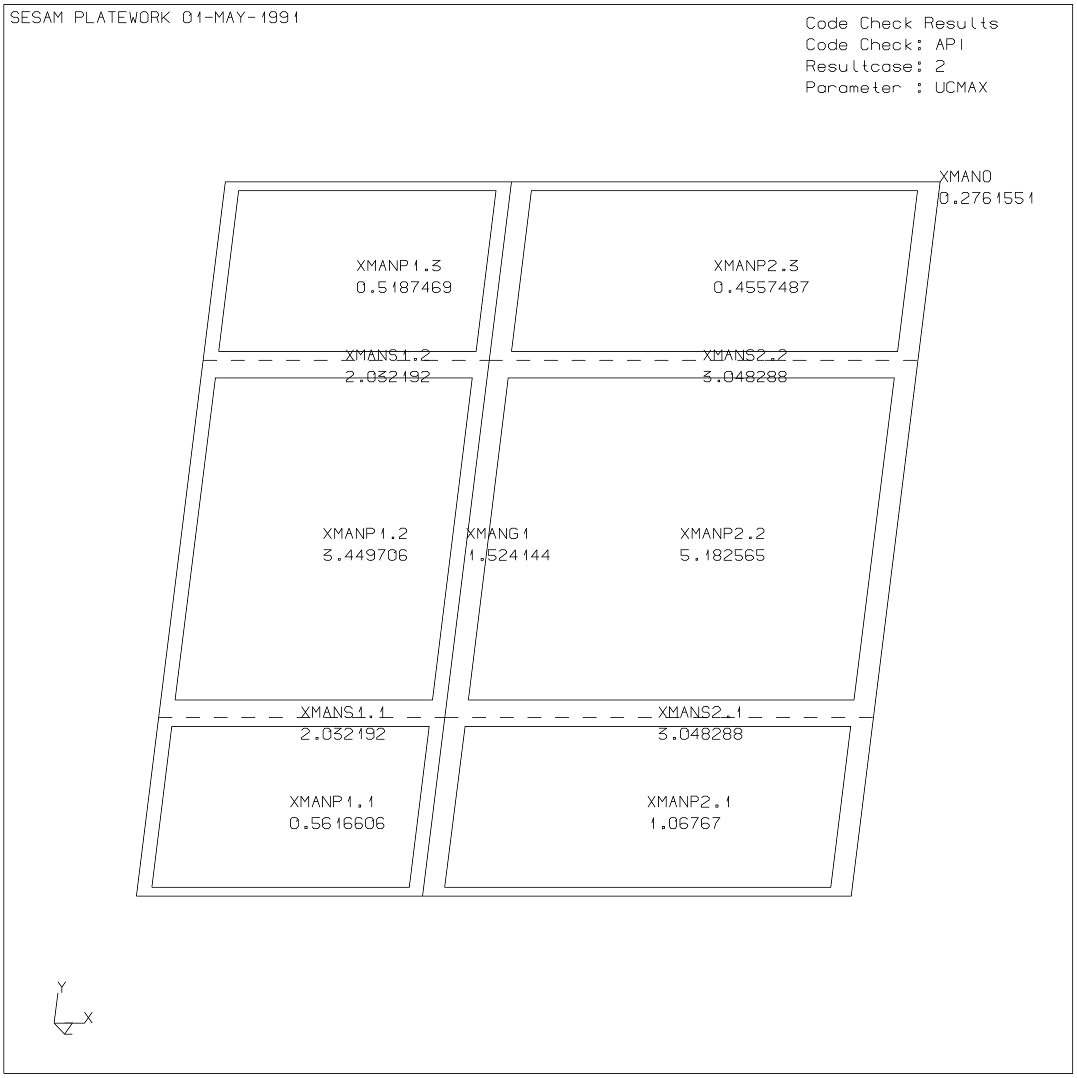


Figure 1-19 Displaying Code Check results

1.11 The data files

The two main datafiles in PLATEWORK are:

- PLATEWORK database file
- SESAM direct access results file (SIN-file)

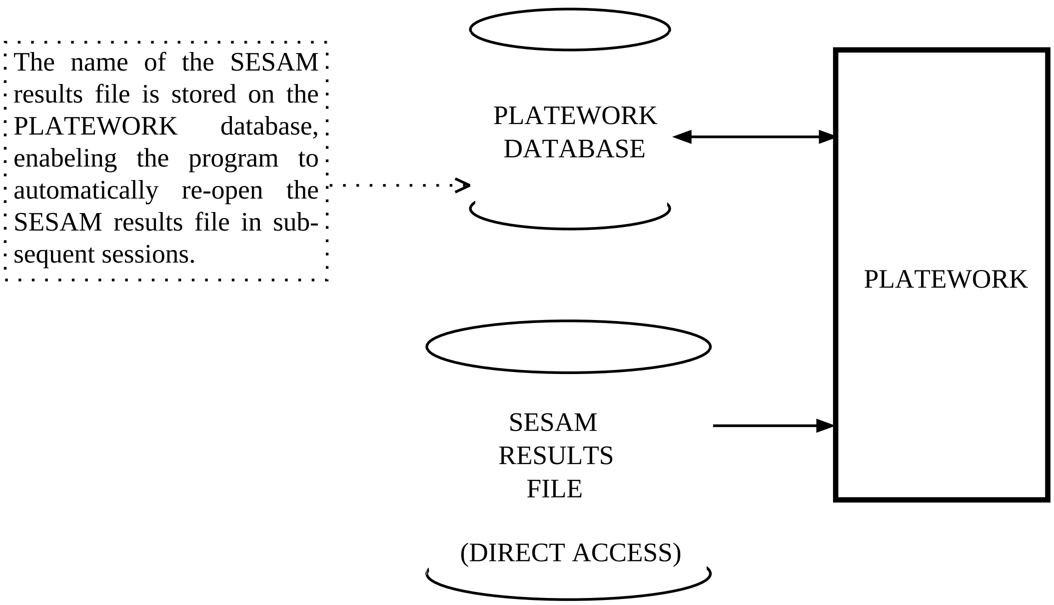


Figure 1-20 Link to SESAM direct access results file from PLATEWORK database

1.11.1 Database file

This file is opened by the program at the beginning of each session, either as a new file or as an old file (i.e. created in a previous PLATEWORK session). The file is used in both READ & WRITE mode, and contains all information necessary to perform a code check, for example :

a Capacity Model geometry data

b Capacity Model load data

c Finite Element to Capacity Model transformation data

d Code check results

1.11.2 SESAM results file (SIN-file)

This file is only used when a FE-model is referenced. The file is used in READ mode only, i.e. PLATEWORK does not create, modifiy or delete any information in the SIN-file. The file is opened by PLATEWORK in the following cases:

1 **At the user's request (READ command).**
In this case the program will open the SIN-file and transfer vital information about the FEM model to the PLATEWORK database file:

a The full name of the SIN-file (to be used in subsequent sessions).

b A list of superelements

c A list of basic finite elements

d A list of basic nodes

e A list of beam cross sections

f A list of materials

g A list of resultcases

2 **Automatically at the beginning of the session.**
This requires that an old PLATEWORK database file is opened, and that the SIN-file was opened at the user's request in one of the previous sessions.

1 USER’S GUIDE TO PLATEWORK

1.1 Introduction

This Chapter serves as a practical guide in using PLATEWORK, by providing a series of small command examples. The examples illustrate the concepts and principles discussed in the preceding Chapter, and the novice user is therefore advised to read Chapters 1 and 2 first.

This Chapter does not explain practical aspects around program operation, as that is covered by Chapter 4.

1.2 Selecting Code of Practice

The current version supports API, DnV and NPD code checks, see the preceding chapters and the Theoretical Manual. When opening a new database, the default Code of Practice will be DnV. If API or NPD is required, this should be selected before other commands are used:

```
#SELECT CODE API
      Selected design code changed:
          From : DNV
          To   : API
```

This selection will be saved on the database, i.e. the current Code of Practice will remain API for all subsequent PLATEWORK sessions that references this database, unless the SELECT CODE command is entered again.

When later running a Code Check analysis (RUN CODE-CHECK-ANALYSIS) or printing results (PRINT CODE-CHECK-RESULTS...), these commands will implicitely operate towards the currently selected Code of Practice.

1.3 Creating Capacity Models and loads manually

When creating Capacity Models manually, the following must have been created first:

1 Materials

2 Cross Sections

1.3.1 Creating Materials

When creating materials manually in PLATEWORK, the program will require parameters describing a limited elastic material, see figure 1-1.

```
#CREATE MATERIAL  GIR-MAT
          LIMITED-ELASTIC 2.1E+05  0.3 420.0  207.
#CREATE MATERIAL  STF-MAT
          LIMITED-ELASTIC 2.1E+05  0.3 345.0  207.
#CREATE MATERIAL  PLT-MAT
          LIMITED-ELASTIC 2.1E+05  0.3 345.0  207.
```

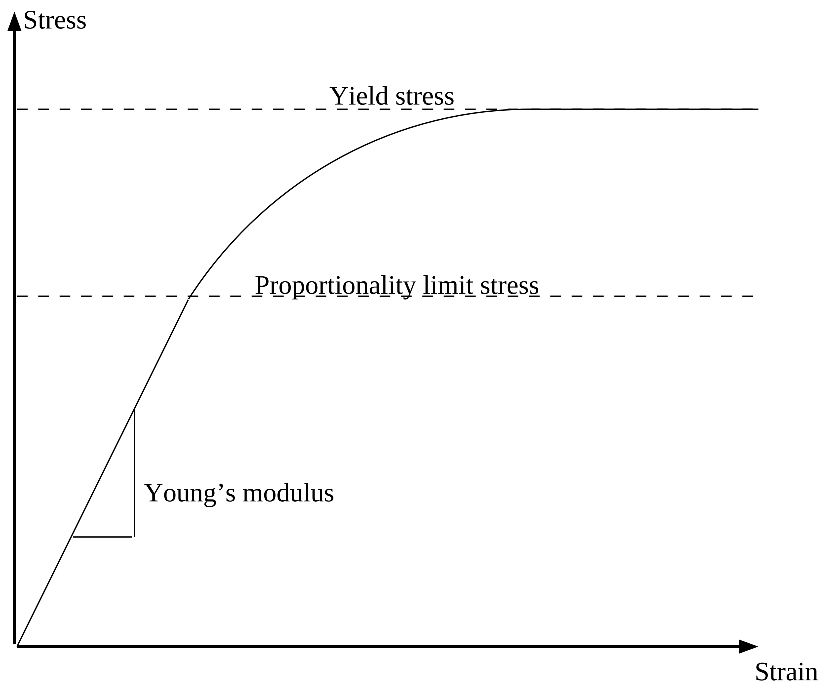


Figure 1-1 Limited elastic material

The materials can be printed:

```
#PRINT MATERIAL ALL


Name      Type                Parameter                    Value
-------------------------------------------------------------------
GIR-MAT LIMITED-ELASTIC      Young's modulus, E           2.100E+05
                             Poisson's ratio, ny          3.000E-01
                             Yield strength, fy           4.200E+02
                             Pr. limit stress fp          2.070E+02

STF-MAT LIMITED-ELASTIC      Young's modulus, E           2.100E+05
                             Poisson's ratio, ny          3.000E-01
                             Yield strength, fy           3.450E+02
                             Pr. limit stress fp          2.070E+02

PLT-MAT LIMITED-ELASTIC      Young's modulus, E           2.100E+05
                             Poisson's ratio, ny          3.000E-01
                             Yield strength, fy           3.450E+02
                             Pr. limit stress fp          2.070E+02
```

1.3.2 Creating Cross Sections

The user will have the opportunity to choose between several cross section types:

I-section:

```
#CREATE SECTION I-GIR
         I 400.0 10.0 962.8 16.0 300.0 20.0
```

L-section:

```
#CREATE SECTION L-STF
         L 160.0 10.0 90.0 10.0
```

For figures, and details on the mapping of cross sections onto Capacity Models, see Chapter 5.

```
#PRINT SECTION ALL

Name     Type                 Parameter Value    Parameter Value
 ------------------------------------------------------------------
I-GIR    I         Section Dimensions
                              HZ = 4.000E+02      TY =  1.000E+01
                              BT = 9.628E+02      TT =  1.600E+01
                              BB = 3.000E+02      TB =  2.000E+01

                   General section data
                         -void- = 0.000E+00   AREA =  2.504E+04
                             IX = 2.907E+06     IY =  6.922E+08
                             IZ = 1.235E+09    IYZ =  0.000E+00
                          WXMIN = 1.453E+05  WYMIN =  2.537E+06
                          WZMIN = 2.565E+06  SHARY =  2.134E+04
                          SHARZ = 3.649E+03 SHCENY =  0.000E+00
                         SHCENZ = 1.052E+02     SY =  1.897E+06
                             SZ = 2.084E+06

 L-STF   L         Section Dimensions
                              HZ = 1.600E+02      TY =  1.000E+01
                              BY = 9.000E+01      TZ =  1.000E+01

                   General section data
                         -void- = 0.000E+00   AREA =  2.400E+03
                             IX = 7.817E+04     IY =  6.420E+06
                             IZ = 1.520E+06    IYZ = -1.800E+06
                          WXMIN = 6.672E+03  WYMIN =  6.114E+04
                          WZMIN = 2.171E+04 SHARY  =  6.204E+02
                          SHARZ = 1.165E+03 SHCENY = -1.500E+01
                         SHCENZ = -5.000E+01    SY =  5.513E+04
                             SZ = 2.450E+04
```

1.3.3 Creating Capacity Models

After having created materials and cross sections, the assembly can be created:

```
#CREATE ASSEMBLY-OF-CAPACITY-MODELS  XCMA
    ARBITRARY
        -3000.0 -800.0 0.0
         3000.0 -800.0 0.0
         3000.0  800.0 0.0
        -3000.0  800.0 0.0
    GIRDERS MANUAL
        1 EVEN
        I-GIR
    STIFFENERS MANUAL
        1 EVEN
        1 EVEN
        L-STF
        L-STF
    PLATES MANUAL
        20.0 20.0
        20.0 20.0
    MATERIALS MANUAL
        GIR-MAT
        STF-MAT  STF-MAT
        PLT-MAT  PLT-MAT
        PLT-MAT  PLT-MAT

    Creation of Basic Capacity Models
    =================================
    Created : XCMAG1      (type GIR)
    Created : XCMAS1.1    (type STF)
    Created : XCMAS2.1    (type STF)
    Created : XCMAP1.1    (type PLT)
    Created : XCMAP1.2    (type PLT)
    Created : XCMAP2.1    (type PLT)
    Created : XCMAP2.2    (type PLT)
```

```
#DISPLAY CAPACITY-MODEL
```

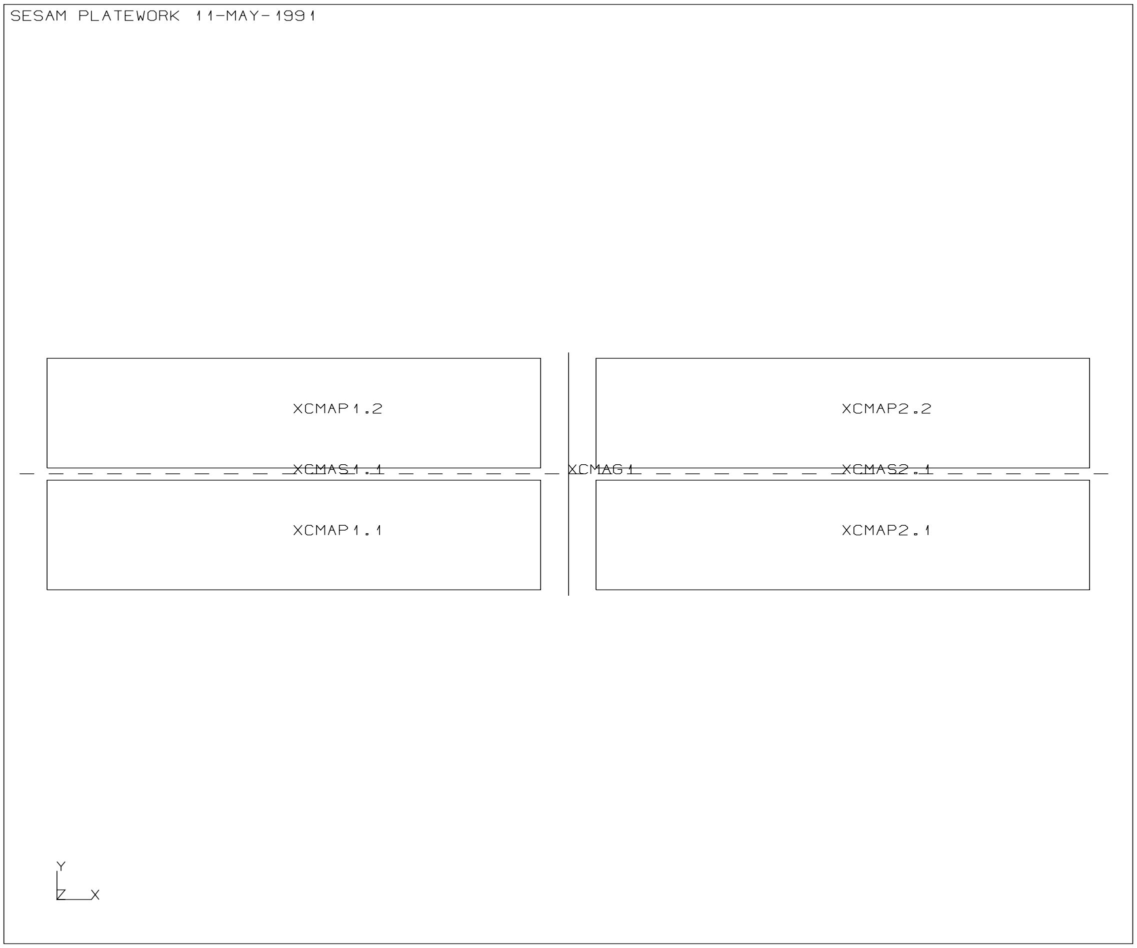


Figure 1-2 A manually defined Capacity Model Assembly

```
#PRINT ASSEMBLY-OF-CAPACITY-MODELS XCMA


Capacity Model Assembly: XCMA
-----------------------------

Corner coordinates :  X1 = -3.000E+03   Y1 = -8.000E+02   Z2 = 0.000E+00
                      X2 =  3.000E+03   Y2 = -8.000E+02   Z2 = 0.000E+00
                      X3 =  3.000E+03   Y3 =  8.000E+02   Z3 = 0.000E+00
                      X4 = -3.000E+03   Y4 =  8.000E+02   Z4 = 0.000E+00

CMA dimensions     :  LX =  6.000E+03   LY = 1.600E+03
```

```
Number of girders:                    Ngir = 1
Girder Spacing 1 :          3.000E+03 Nstf = 1
Girder Spacing 2 :          3.000E+03 Nstf = 1

Girder Spacing 1 :

     Stiffener spacings:
                    s1.1 = 8.000E+02 s1.2 = 8.000E+02

Girder Spacing 2 :

     Stiffener spacings:
                    s2.1 = 8.000E+02 s2.2 = 8.000E+02



#PRINT CAPACITY-MODEL XCMAP1.1


Capacity Model    : XCMAP1.1
Type              : PLT
----------------------------

Corner coordinates
     X1 = -3.000E+03   Y1 = -8.000E+02   Z1 = 0.000E+00
     X2 =  0.000E+00   Y2 = -8.000E+02   Z2 = 0.000E+00
     X3 =  0.000E+00   Y3 =  0.000E+00   Z3 = 0.000E+00
     X4 = -3.000E+03   Y4 =  0.000E+00   Z4 = 0.000E+00

Material parameters
     fy = 3.450E+02    fp = 2.070E+02     E = 2.100E+05
     ny = 3.000E-01

Plate geometry
     lx = 3.000E+03    ly = 8.000E+02     t = 2.000E+01

Plate parameters
     PTYP = 0         PSTF = 0          PDEF = 0
     wa   = -1.000E+00 wp = -1.000E+00
```

1.3.4 Creating Resultcases

```
#CREATE RESULTCASE R1
    'Manual example' STATIC E-ULS BASIC
```

1.3.5 Creating Capacity Model loads

```
#CREATE LOAD-ON-CAPACITY-MODEL MANUAL XCMAP1.1 R1
fx1 -1800.0
fx2 -4000.0
fy1 -1200.0
fy2   600.0
fxy   600.0
plat    0.15
END

#CREATE LOAD-ON-CAPACITY-MODEL MANUAL XCMAS1.1 R1
fx1 -932.0
fy1  -76.0
fy2  -76.0
fxy  600.0
plat   0.04
END


#PRINT LOAD-ON-CAPACITY-MODEL ALL ALL

Capacity Model: XCMAP1.1
Type          : PLT


Res-Name Type    fx1        fy1        fxy        plat       pdfl      pbst
                 fx2        fy2
--------------------------------------------------------------------------
R1       S    -1.800E+03 -1.200E+03  6.000E+02  1.500E-01    ----      ----
               4.000E+02  6.000E+02


Capacity Model: XCMAS1.1
Type          : STF

Res-Name Type    fx1        fy1        fxy        plat      Mbend
                            fy2
--------------------------------------------------------------------
R1       S    -9.320E+02 -7.600E+01  6.000E+02  4.000E-02    ----
                         -7.600E+01
```

```
#DISPLAY LOAD-ON-CAPACITY-MODEL XCMAP1.1 R1 NORMAL
```

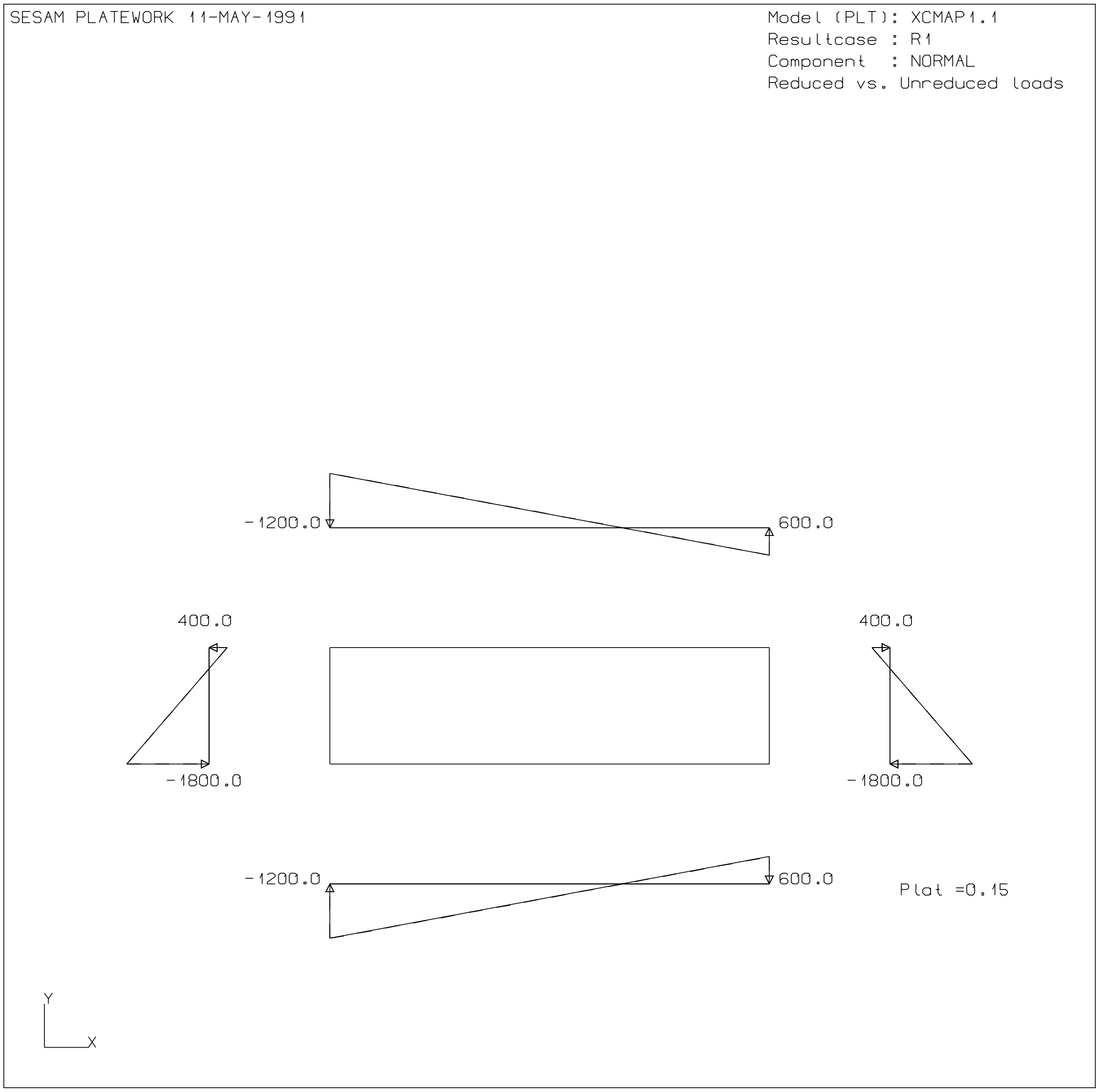


Figure 1-3 A manually defined Capacity Model load

1.4 Creating Capacity Models and loads automatically from FEM-data

This section explains normal operations used when running PLATEWORK in the "postprocessor mode", i.e. when the program can be viewed as a postprocessor to a Finite Element analysis.

1.4.1 Reading a SESAM Results Interface File (SIN-file)

In order to establish the link between the PLATEWORK database and the SESAM direct access results file, the READ command is used. The program will read information about superelements, basic elements and nodes.

```
#READ SIN XMAN R10
      Commenced reading SESAM results file
      Reading superelement hierarchy
    * NOTE: 1 new superelement index was imposed for s.el. type: 10
      Reading element definitions
      Reading node definitions
      Calculating display window
      Transferred 4 resultcase(s)
      Transferred 2 beam cross section(s)
      Transferred 1 material(s)
      Completed reading SESAM results file
```

The name and prefix of the SIN-file (XMAN R10) will then be stored on the PLATEWORK database. In later sessions referencing the same database, the SIN-file will be opened automatically before the main command prompt # is made available to the user.

When using the READ command, the PLATEWORK database file will also inherit resultcases, cross sections and materials from the SIN-file, thereby eliminating the need to use the commands CREATE RESULTCASE, CREATE SECTION and CREATE MATERIAL as described in section 1.3.

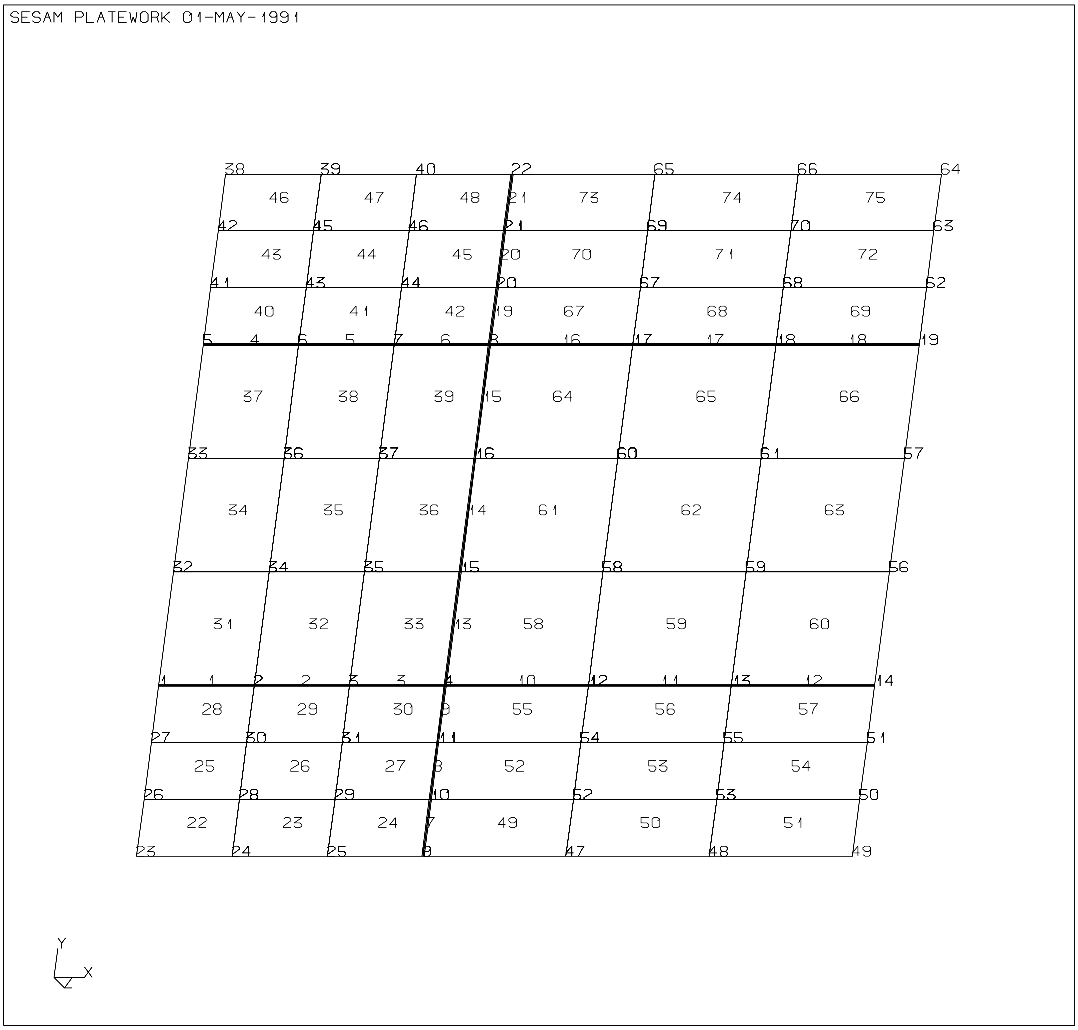
The resultcases, cross sections and materials created in this way will be given default names:

Resultcase names	:	1, 2, 3, 4 ...
Cross section names	:	SEC-1, SEC-2, SEC-3 ...
Material names	:	MAT-1, MAT-2, MAT-3 ...

1.4.2 Displaying Finite Element Mesh

After successfully reading in the SIN-file, the Finite Element mesh can be displayed. In case of a multi-superelement model, all superelements will be displayed in the top level coordinate system:

```
#DISPLAY MESH
#LABEL ELEMENT-NUMBERS ON
```



Note that if beam elements exist in the model, they will be drawn with a slightly thicker line. This enables the user to see where the beam elements are, and in most cases it is possible to recognise the stiffeners and girders immediately.

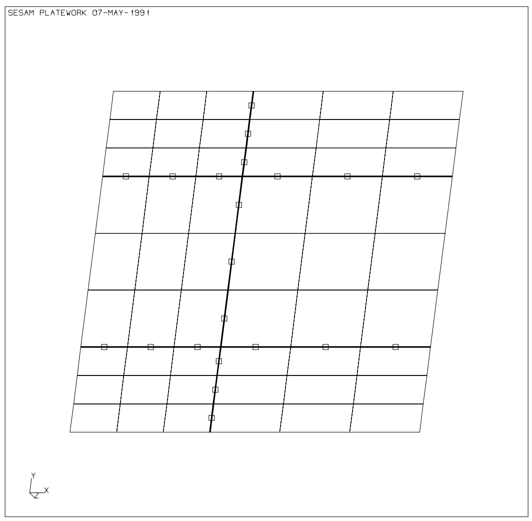
1.4.3 Using the SCOPE facilities

The Scope facility is used to limit the part of the Finite Element model which can be accessed. There are several options available to define Scopes, see Chapter 5 (SCOPE ELEMENT commands) for details.

An example may be that the user wants to see only the beams, in order to get a clear overview over the girders and stiffeners within the model:

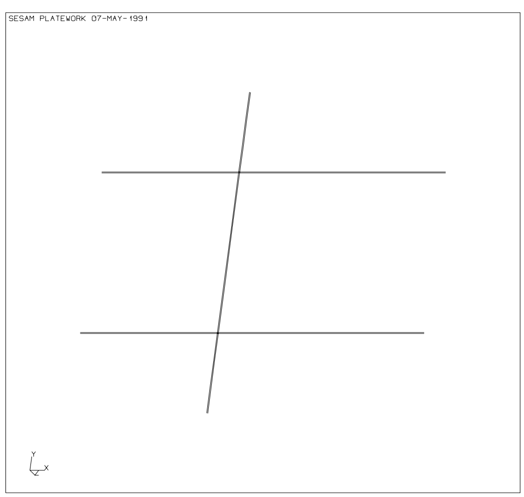
```
#SCOPE ELEMENT INCLUDE TYPE BEAM-2NODES
```

The included elements will be marked with small squares:



To confirm the scope and to see it displayed, enter the following:

```
#SCOPE ELEMENT CONFIRM DEFINED
#DISPLAY MESH
```



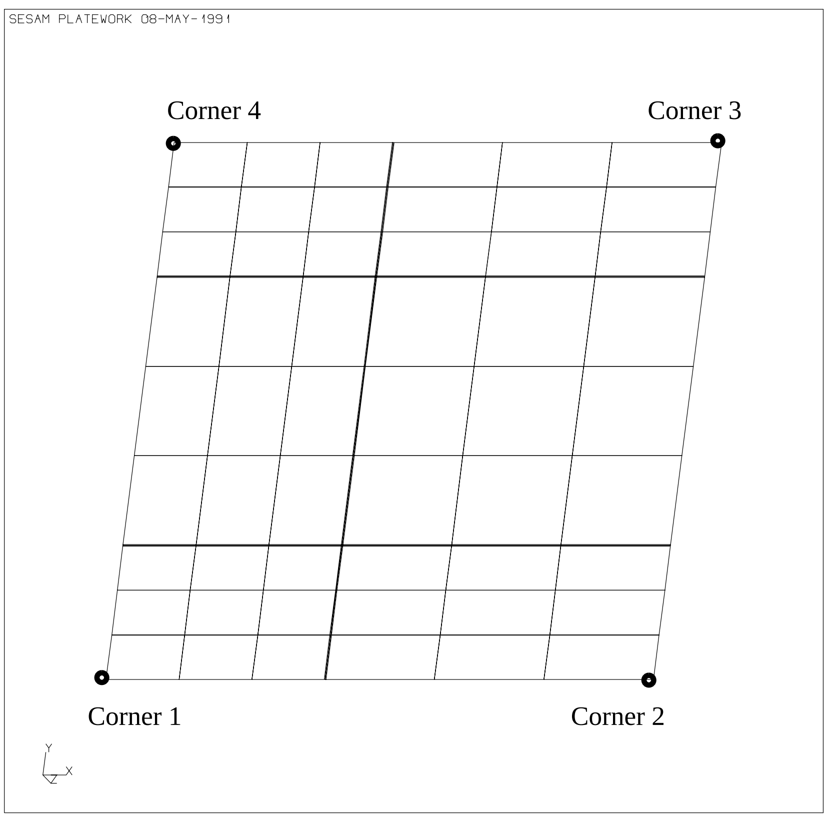
1.4.4 Creating Capacity Models

After selecting the code, reading in the SIN-file, and optionally limiting the part of the FE-model that can be accessed by use of the Scope facility, the Capacity Models can be created.

The most convenient way to do this is by pointing at nodes with the mouse or crosshair in the mesh display, in order to define the Capacity Model Assembly corners (the corner nodes can also be identified by giving the node numbers, see Chapter 5).

Below is shown the command to create a Capacity Model Assembly named "XMAN", which has its corners defined by 4 nodes that are picked graphically from the FE-model.

```
#CREATE ASSEMBLY-OF-CAPACILTY-MODELS XMAN NODES PICK ...
     PICK node 1 of 4
     PICK node 2 of 4
     PICK node 3 of 4
     PICK node 4 of 4
```



At this stage, the Capacity Mode Assembly area has been defined, as well as the local coordinate system within the assembly (x from Corner 1 to Corner 2, y from Corner 1 to Corner 4).

The next step is to define the Girders within the assembly. In this case, beam elements exist in the FE-model, so the AUTOMATIC option should be used:

```
... GIRDERS AUTOMATIC ...
```

The program reports how many girders were found, and the girder spacings:

```
    Number of girders                  = 1
    Girder spacing scale factor        = 5000.
    Girder spacing 1                   = 2000.
    Girder spacing 2                   = 3000.
```

After defining the Girders, the Stiffeners in the two girder spacings must be defined. Again, beam elements representing the stiffeners exist, so the AUTOMATIC option is the most convenient:

```
... STIFFENERS AUTOMATIC ...
```

The program reports how many stiffeners were found, and stiffener spacings. This is done for each girder spacing:

```
    --------- GIRDER SPACING 1 -------------
    Number of stiffeners               = 2
    Stiffener spacing scale factor     = 5000.
    Stiffener spacing 1                = 1250.
    Stiffener spacing 2                = 2500.
    Stiffener spacing 3                = 1250.
    --------- GIRDER SPACING 2 -------------
    Number of stiffeners               = 2
    Stiffener spacing scale factor     = 5000.
    Stiffener spacing 1                = 1250.
    Stiffener spacing 2                = 2500.
    Stiffener spacing 3                = 1250.
```

The next step is to define the plate thicknesses. This can be picked up from the shell elements by use of the AUTOMATIC option:

```
... PLATES AUTOMATIC ...
```

The program will search in the FE-model and report the plate thicknesses found:

```
    GIR spacing 1, STF spacing 1, Plate Thickness : 25.00
    GIR spacing 1, STF spacing 2, Plate Thickness : 25.00
    GIR spacing 1, STF spacing 3, Plate Thickness : 25.00
    GIR spacing 2, STF spacing 1, Plate Thickness : 25.00
    GIR spacing 2, STF spacing 2, Plate Thickness : 25.00
    GIR spacing 2, STF spacing 3, Plate Thickness : 25.00
```

Finally, materials must be assigned to the Girders, Stiffeners and Plates. Again, the AUTOMATIC option will be the most convenient:

```
... MATERIALS AUTOMATIC

    --------- MATERIALS ---------------------
    Girder     1, using material MAT-1
    Stiffener  1, using material MAT-1
    Stiffener  2, using material MAT-1
    Stiffener  3, using material MAT-1
    Stiffener  4, using material MAT-1
    Plate      1, using material MAT-1
    Plate      2, using material MAT-1
    Plate      3, using material MAT-1
    Plate      4, using material MAT-1
    Plate      5, using material MAT-1
    Plate      6, using material MAT-1
```

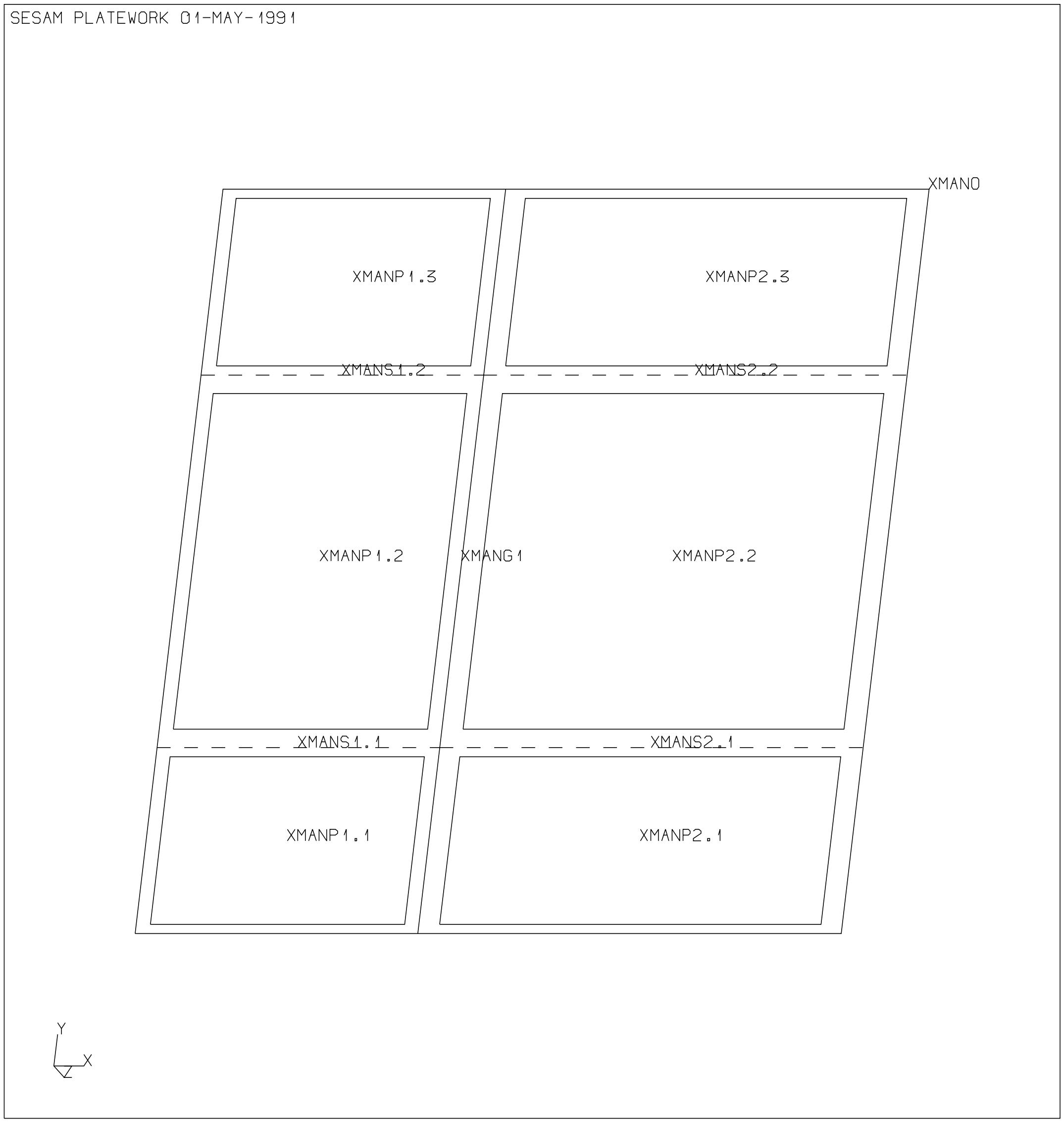
Now, the program has received all necessary information, and it will proceed automatically to create the Basic Capacity Models:

```
    Creation of Basic Capacity Models
    =================================
    Created : XMANG1      (type GIR)
    Created : XMANS1.1    (type STF)
    Created : XMANS1.2    (type STF)
    Created : XMANS2.1    (type STF)
    Created : XMANS2.2    (type STF)
    Created : XMANP1.1    (type PLT)
    Created : XMANP1.2    (type PLT)
    Created : XMANP1.3    (type PLT)
    Created : XMANP2.1    (type PLT)
    Created : XMANP2.2    (type PLT)
    Created : XMANP2.3    (type PLT)
    Created : XMANO       (type OSP)
```

Now, the program returns with the main command prompt "#", and the user is free to enter other commands, see the following pages.

1.4.5 Displaying Capacity Models

```
#DISPLAY CAPACITY-MODELS
```



It is also possible now to get more details about the Capacity Models created by printing the Capacity Model gaometry data. On the next page is shown the command to print the geometry data of the girder Capacity Model XMANG1 shown above.

1.4.6 Printing Capacity Models

```
#PRINT CAPACITY-MODEL XMANG1


Capacity Model : XMANG1
Type           : GIR
----------------------

Corner coordinates
      X1 = 2.000E+03    Y1 = 0.000E+00   Z1 = 0.000E+00
      X2 = 2.000E+03    Y2 = 5.000E+03   Z2 = 0.000E+00

Material parameters
      fy = 3.400E+02    fp = 2.040E+02    E = 2.100E+05
      ny = 3.000E-01

Plate geometry
      Ly = 5.000E+03   lx1 = 2.000E+03  lx2 = 3.000E+03
      t1 = 2.500E+01    t2 = 2.500E+01  lya = 1.667E+03

Stiffener section
     hws = 1.480E+02   tws = 1.200E+01  bfs = 9.000E+01
     tfs = 1.200E+01   afs = 0.000E+00  efs = 3.900E+01

Girder section
     hwg = 3.980E+02   twg = 1.200E+01  bfg = 3.000E+02
     tfg = 2.200E+01   afg = 0.000E+00  efg = 0.000E+00

Girder parameters
     Lty = 5.000E+03    kg = 1.000E+00   mg = 8.000E+00
    GTYP = 0          GSTF = 0
```

Note that the stiffener and girder section data shown here are mapped cross sections, i.e. there might be flanges that are skipped. For details on cross section mappings, see the CREATE SECTION command in Chapter 5.

To get a detailed description of all the parameters printed in the table above, simply ask for a nomenclature printout:

```
#PRINT NOMENCLATURE CAPACITY-MODEL
```

Extract from the output from this command is shown on the next page:

```
Parameter (GIR) Capacity Model, Parameter description
--------------------------------------------------------------------------

Material
    fy    Yield stress
    fp    Proportionality limit stress
    E     Young’s modulus
    ny    Poisson’s ratio

Plate geometry
    Ly    Length of girder, y direction
    lx1   Girder spacing BEFORE girder
    lx2   Girder spacing AFTER girder
    t1    Plate thickness BEFORE girder
    t2    Plate thickness AFTER girder
    lya   Average stiffener spacing, y direction

Stiffener section
    hws   Stiffener web height
    tws   Stiffener web thickness
    bfs   Stiffener flange width
    tfs   Stiffener flange thickness
    afs   Distance between webs (=0.0 if one web)
    efs   Flange eccentricity

Girder section
    hwg   Girder web height
    twg   Girder web thickness
    bfg   Girder flange width
    tfg   Girder flange thickness
    afg   Distance between webs (=0.0 if one web)
    efg   Flange eccentricity

Girder parameters
    Lty   Distance between lateral supports
    kg    Buckling length factor
    mg    Bending moment factor
    GTYP  Girder Type GSTF Stiffener Failure parameter
```

1.4.7 Creating Capacity Model loads

In Chapter 2, the principles employed for creating Capacity Model loads on the basis of FE stresses and forces are described. Below is shown the command that must be entered in order to activate this feature, and also the following screen output produced by the program..

As described in Chapter 2, the process involves several operations, of which the 2 first are most important:

1 Creation of load transformation points

2 Creation of CM loads on the basis of load transformation points and FE stresses and forces.

Note that the creation of load transformation points involves extensive automatic searching in the FE model, and it is usually this part of a PLATEWORK session that will require most computer resources. The user can optimize this process (and save a considerable amount of computing and elapsed time) by actively using the SCOPE command such that elements outside the assembly area are not included in the current element scope. It may also be adviseable to submit PLATEWORK in a batch queue to perform this operation.

Note also that SELECT RESULTCASE can be used to limit the creation of Capacity Model loads to only specified resultcases.

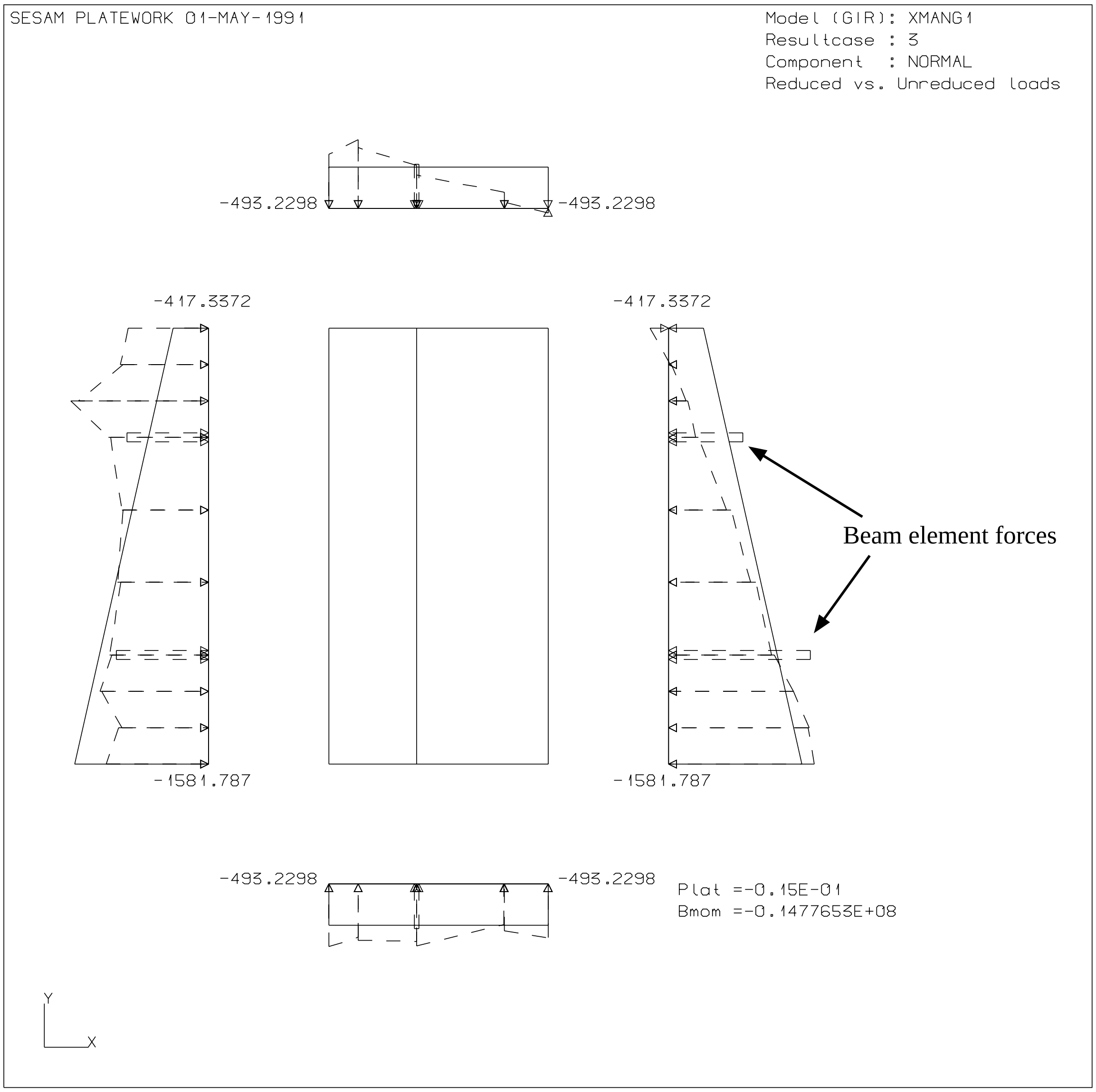
```
#CREATE LOAD-ON-CAPACITY-MODEL AUTOMATIC ASSEMBLY XMAN

    Transformations from FE stresses to CM loads, i.e.
    intersection points between mesh & Capacity Models
    ==================================================
    Creating CM load points for : XMANG1     (type GIR)
    Creating CM load points for : XMANS1.1   (type STF)
    Creating CM load points for : XMANS1.2   (type STF)
    Creating CM load points for : XMANS2.1   (type STF)
    Creating CM load points for : XMANS2.2   (type STF)
    Creating CM load points for : XMANP1.1   (type PLT)
    Creating CM load points for : XMANP1.2   (type PLT)
    Creating CM load points for : XMANP1.3   (type PLT)
    Creating CM load points for : XMANP2.1   (type PLT)
    Creating CM load points for : XMANP2.2   (type PLT)
    Creating CM load points for : XMANP2.3   (type PLT)
    Creating CM load points for : XMANO      (type OSP)

    Creating Capacity Model loads
    =============================
    CM: XMANG1   , Resultcase 1 , New loads created
    CM: XMANS1.1 , Resultcase 1 , New loads created
    CM: XMANS1.2 , Resultcase 1 , New loads created
    CM: XMANS2.1 , Resultcase 1 , New loads created
    CM: XMANS2.2 , Resultcase 1 , New loads created
    CM: XMANP1.1 , Resultcase 1 , New loads created
    CM: XMANP1.2 , Resultcase 1 , New loads created
    CM: XMANP1.3 , Resultcase 1 , New loads created
    CM: XMANP2.1 , Resultcase 1 , New loads created
```

```
CM: XMANP2.2 , Resultcase 1 , New loads created
CM: XMANP2.3 , Resultcase 1 , New loads created
CM: XMANO    , Resultcase 1 , New loads created
CM: XMANG1   , Resultcase 2 , New loads created
CM: XMANS1.1 , Resultcase 2 , New loads created
CM: XMANS1.2 , Resultcase 2 , New loads created
CM: XMANS2.1 , Resultcase 2 , New loads created
CM: XMANS2.2 , Resultcase 2 , New loads created
CM: XMANP1.1 , Resultcase 2 , New loads created
CM: XMANP1.2 , Resultcase 2 , New loads created
CM: XMANP1.3 , Resultcase 2 , New loads created
CM: XMANP2.1 , Resultcase 2 , New loads created
CM: XMANP2.2 , Resultcase 2 , New loads created
CM: XMANP2.3 , Resultcase 2 , New loads created
CM: XMANO    , Resultcase 2 , New loads created
CM: XMANG1   , Resultcase 3 , New loads created
CM: XMANS1.1 , Resultcase 3 , New loads created
CM: XMANS1.2 , Resultcase 3 , New loads created
CM: XMANS2.1 , Resultcase 3 , New loads created
CM: XMANS2.2 , Resultcase 3 , New loads created
CM: XMANP1.1 , Resultcase 3 , New loads created
CM: XMANP1.2 , Resultcase 3 , New loads created
CM: XMANP1.3 , Resultcase 3 , New loads created
CM: XMANP2.1 , Resultcase 3 , New loads created
CM: XMANP2.2 , Resultcase 3 , New loads created
CM: XMANP2.3 , Resultcase 3 , New loads created
CM: XMANO    , Resultcase 3 , New loads created
CM: XMANG1   , Resultcase 4 , New loads created
CM: XMANS1.1 , Resultcase 4 , New loads created
CM: XMANS1.2 , Resultcase 4 , New loads created
CM: XMANS2.1 , Resultcase 4 , New loads created
CM: XMANS2.2 , Resultcase 4 , New loads created
CM: XMANP1.1 , Resultcase 4 , New loads created
CM: XMANP1.2 , Resultcase 4 , New loads created
CM: XMANP1.3 , Resultcase 4 , New loads created
CM: XMANP2.1 , Resultcase 4 , New loads created
CM: XMANP2.2 , Resultcase 4 , New loads created
CM: XMANP2.3 , Resultcase 4 , New loads created
CM: XMANO    , Resultcase 4 , New loads created
```

1.4.8 Displaying Capacity Model loads

Any of the loads created in the preceding section can now be displayed, for example the membrane normal loads on the girder XMANG1 in Resultcase 3:

```
#DISPLAY LOAD-ON-CAPACITY-MODEL XMANG1 3 NORMAL
```



Note the dashed curves, showing the unreduced CM loads as described by the stresses and forces in the shell or membrane elements within FE-model. It is also possible to recognize the beam element axial forces that are included in the unreduced Capacity Model loads. The straight solid lines show the reduced Capacity Model loads that are used in the Code Checks. The real numbers indicated at the start and end of each edge are the start and end values of the reduced load on that edge.

1.4.9 Printing Capacity Model loads

An alternative way of presenting the Capacity Model loads, is to print them. Below is shown how to print all the reduced Capacity Model loads for the girder XMANG1. Compare the printout for resultcase 3 with the plot shown in the preceding section.

```
#PRINT LOAD-ON-CAPACITY-MODEL XMANG1 ALL

NOMENCLATURE:

Res-Name  Resultcase name
Type      Static or real/imaginary load component
fx1       Normal stress*plate thickness (x direction)
fx2       Normal stress*plate thickness (x direction)
fy1       Normal stress*plate thickness (y direction)
fy2       Normal stress*plate thickness (y direction)
fxy       In-plane shear stress*plate thickness
plat      Lateral plate load
Mbend     Beam bending moment
pdfl      Lateral plate deflection


Capacity Model: XMANG1
Type          : GIR

Res-Name Type    fx1        fy1        fxy        plat      Mbend
                 fx2
--------------------------------------------------------------------
1        S    -7.278E+02 -5.818E+02  2.111E+02 -4.000E-03 -4.946E+06
              -5.541E+02
2        S    -1.317E+03 -9.943E+02 -2.097E+02  7.000E-03  1.108E+07
              -1.282E+03
3        S    -1.582E+03 -4.932E+02 -7.190E+01 -1.500E-02 -1.478E+07
              -4.173E+02
4        S    -1.783E+03 -5.082E+02 -1.325E+02  1.500E-02  1.931E+07
              -2.161E+02
```

1.5 Using the VIEW facility

The VIEW command contains a collection of operations for manipulating the graphics display:

1.5.1 Panning

Shifting the display in the plane of the screen:

```
#VIEW PAN <pick1> <pick2>
```

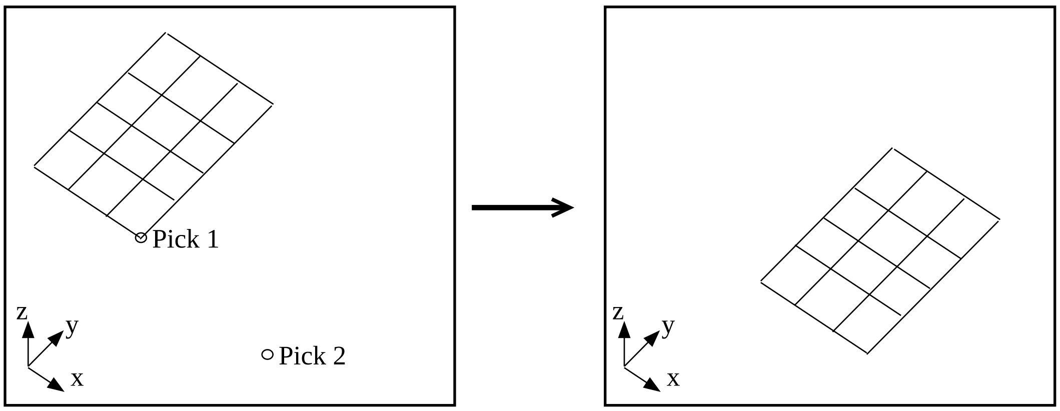


Figure 1-4 Using the VIEW PAN feature

1.5.2 Positioning

Implicit defininition of viewing direction by choosing an eye-point position in space. Viewing direction is implicitely defined as being a vector starting at the eye-point and pointing towards the origin of the model coordinate system. The vector is shifted in the plane of the screen such that the centre of the model roughly coincides with the centre of the screen.

```
#VIEW POSITION 0.0 0.0 1.0
```

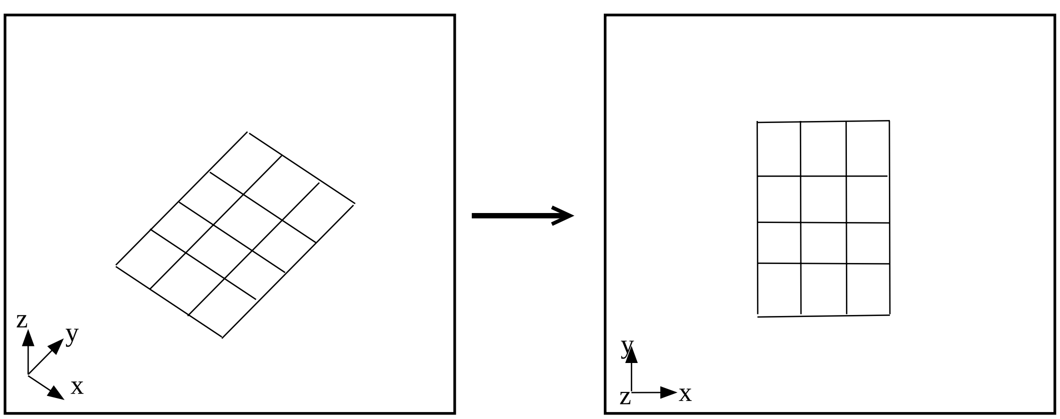


Figure 1-5 Using the VIEW POSITION feature

1.5.3 Rotating

Absolute or relative rotations around model or screen axes.

```
#VIEW ROTATE X-AXIS 30.
```

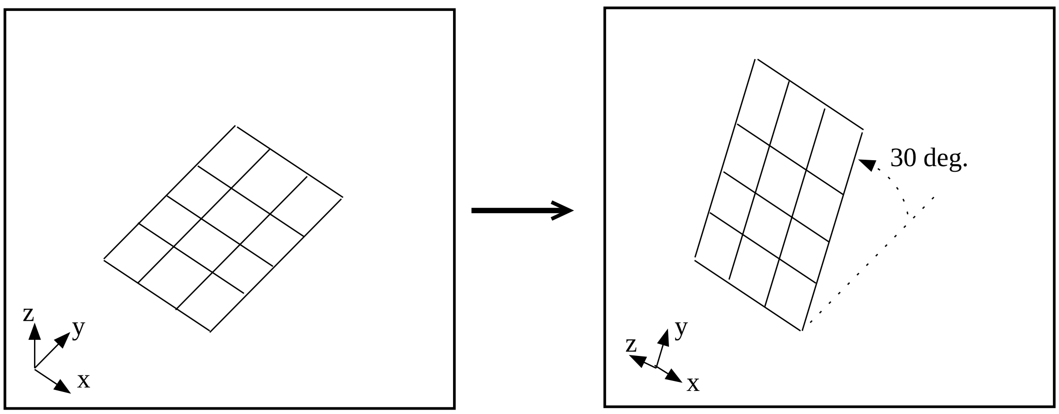


Figure 1-6 Using the VIEW ROTATE X-AXIS feature

```
#VIEW ROTATE DOWN 30.
```

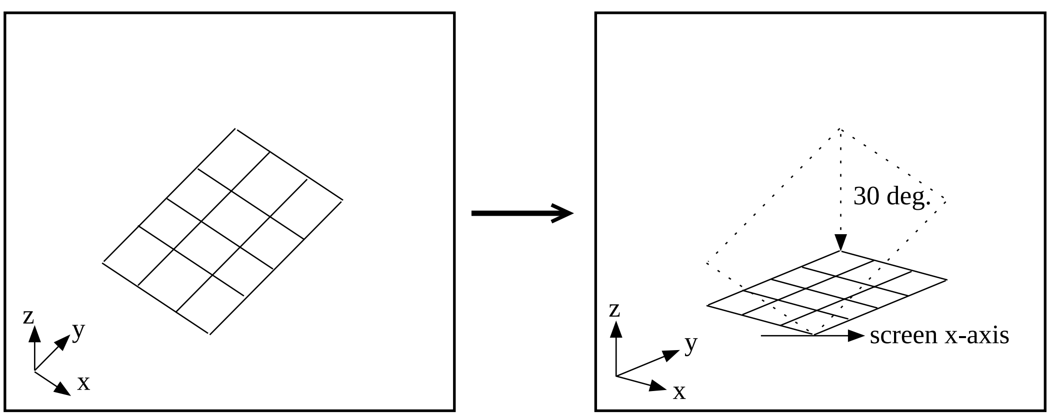


Figure 1-7 Using the VIEW ROTATE DOWN feature

1.5.4 Zooming

Move closer to or further away from the model.

`#VIEW ZOOM IN <pick1> <pick2>`

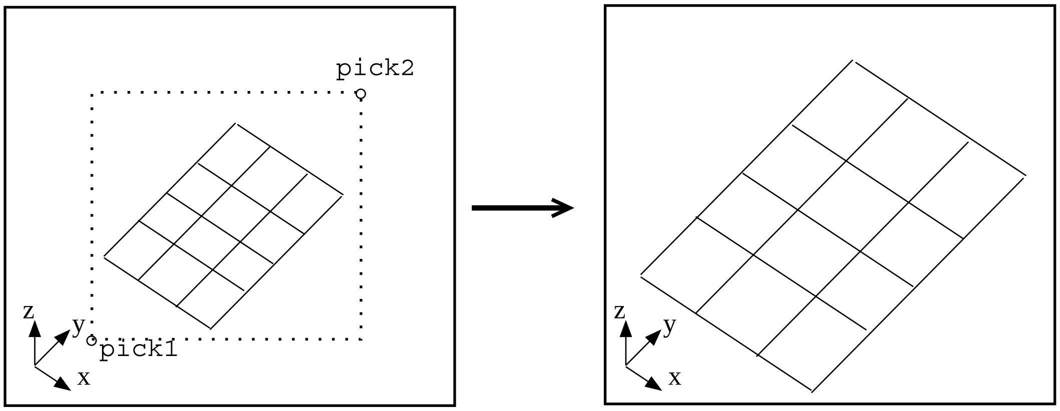


Figure 1-8 Using the VIEW ZOOM IN feature

`#VIEW ZOOM OUT <pick1> <pick2>`

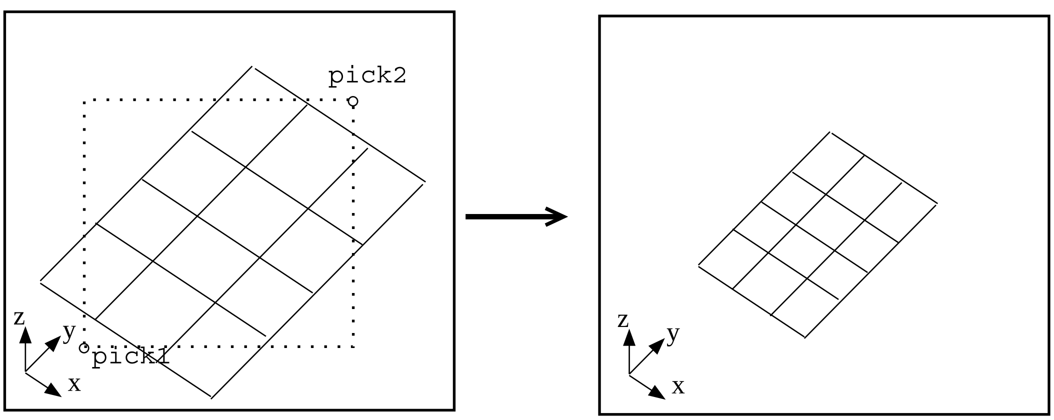


Figure 1-9 Using the VIEW ZOOM OUT feature

1.6 Selecting Capacity Models and Resultcases

The current selection of Capacity Models and Resultcases is controlled through the use of the SELECT CAPACITY-MODEL and SELECT RESULTCASE commands:

1.6.1 Selecting Capacity Models

```
#SELECT CAPACITY-MODEL ALL OFF
         ALL ( 11 ) CM(s) selected OFF
#SELECT CAPACITY-MODEL XMANG1 ON
         CM XMANG1 selected ON
         Currently selected : 1 of 11 CM(s)
#SELECT CAPACITY-MODEL XMANP1.1 ON
         CM XMANP1.1 selected ON
         Currently selected : 2 of 11 CM(s)
```

1.6.2 Selecting Resultcases

```
#SELECT RESULTCASE ALL OFF
         ALL ( 4 ) Resultcase(s) selected OFF
#SELECT RESULTCASE 2 ON
         Resultcase 2 selected ON
         Currently selected : 1 of 4 resultcase(s)
#SELECT RESULTCASE 4 ON
         Resultcase 4 selected ON
         Currently selected : 2 of 4 resultcase(s)
```

1.7 Performing a Code Check

1.7.1 Defining Limit State Factors

It is possible to modify the default limit state factors that are provided by the program, by use of the DEFINE LIMIT-STATE-FACTOR command.

For example, the command to modify the basic usage factor $\eta 0$ in the Ultimate Limit State (environmental load) for the DnV Code Check is:

```
#DEFINE LIMIT-STATE-FACTOR DNV E-ULS 0.6
```

This factor will then be used in the DnV Code Check for all resultcases that have the E-ULS limit state kind assigned.

1.7.2 Defining phase angle stepping for complex CM loads

When loads are complex, the following procedure will be used in the Code Checks:

- The Code Check will be executed for all phase angles specified
- The results will be stored for the phase angle that corresponded to the highest value of UCmax, the maximum Unity Criterion factor.

The user decides which phase angles shall be used, either by:

1 **Constant phase angle stepping**
The user defines start angle, stop angle and angle step.
```
#DEFINE PHASE-ANGLE-STEPPING CONSTANT 0.0 350.0 10.0
```

2 **Arbitrary phase angle stepping**
The user defines all phase angles explicitely.
```
#DEFINE PHASE-ANGLE-STEPPING ARBITRARY 30.0 48.0 55.0 73.0 END
```

1.7.3 Running the Code Check Analysis

After possibly using SELECT RESULTCASE and/or SELECT CAPACITY-MODEL, the command to perform the Code Check is:

```
#RUN CODE-CHECK-ANALYSIS
```

The Checks will be performed according to Code of Practice selected by previous use of the SELECT CODE command.

1.8 Printing Code Check results

1.8.1 Defining sorting parameter and sorting order

The user has complete control over which Code Check results parameter the results shall be sorted after, and also the sorting order, by using the DEFINE SORTING commands.

The commands below show how to select the Code Check results parameter UCmax as the sorting parameter. The results shall be sorted and printed in decreasing order according to the UCmax values.

```
#DEFINE SORTING PARAMETER UCmax
#DEFINE SORTING ORDER DECREASING
```

These two commands correspond to the default sorting definitions in PLATEWORK.

1.8.2 Defining print filters

In addition to defining the sorting parameter and sorting order, the user can define print filters to the results, and thereby limit the amount of data printed to include only selected parts of the results.

A very useful filtering facility is the possibility to define upper and lower limits to the current sorting parameter (defined by using DEFINE SORTING PARAMETER), causing results that correspond to a sorting parameter value outside the selected range to be suppressed in the Code Check result print tables.

The commands below show how to limit the printout to include only failures, i.e. UCmax $\geq$ 1.0. Note that if another sorting parameter is defined, the filters will be applied to that parameter.

```
#DEFINE SORTING MIN-VALUE 1.0
#DEFINE SORTING MAX-VALUE UNLIMITED
```

The user can, in addition to the above, define the maximum number of entries in the Code Check results print table by use of the following command:

```
#DEFINE SORTING MAX-ENTRIES 10
```

This will then ensure that only the 10 "worst" failures will be printed (since the sorting order is defined to be DECREASING).

1.8.3 Printing Code Check nomenclature

To see a complete list of Code Check result parameters, and their descriptions, the following command should be used (nomenclature output examples are shown in Chapter 2):

```
#PRINT NOMENCLATURE CODE-CHECK-RESULTS
```

1.8.4 Code Check status codes

For each result instance printed (i.e. combination of Capacity Model and Resultcase) there will be a "Status" code included, indicating the status of the Code Check. The general layout of this "Status" will be:

**-<status-code>	(when Code Check resulted in failure)
OK-<status-code>	(when Code Check did not result in failure)

For an example on the use of status codes, see section 1.8.5.

The <status-code> is a short alphanumeric code indicating which check failed or which check was closest to failure. The following three tables describe which status codes are relevant for the different Capacity Models / Codes of Practice. The tables also describe the meaning of the alphanumeric codes.

Table 1.1 API Code Check status codes

Capacity Model Type	Status Code	Description
PLT	PB	Plate buckling
	PY	Plate bending/yielding
STF	LB	Local buckling
	CB	Column buckling
	BCB	Beam-column buckling
	TFB	Torsional/flexural buckling
	PLB	Plastic bending
GIR	LB	Local buckling
	CB	Column buckling
	BCB	Beam-column buckling
	TFB	Torsional/flexural buckling
	PLB	Plastic bending
USP	OPBU	Overall panel buckling
OSP	OPBU	Overall panel buckling
	OPBE	Overall panel bending

Table 1.2 DnV Code Check status codes

Capacity Model Type	Status Code	Description
PLT	PB	Plate buckling
	PY	Plate bending/yielding
STF	PIF1	Plate induced failure (check1)
	PIF2	Plate induced failure (check2)
	SIF1	Stiffener induced failure (check1)
	SIF2	Stiffener induced failure (check2)
	LB1P	Local buckling (PIF1 check performed)
	LB1S	Local buckling (SIF1 check performed)
	LB2P	Local buckling (PIF2 check performed)
	LB2S	Local buckling (SIF2 check performed)
GIR	PIF1	Plate induced failure (check1)
	PIF2	Plate induced failure (check2)
	FIF1	Flange induced failure (check1)
	FIF2	Flange induced failure (check2)
	LB1P	Local buckling (PIF1 check performed)
	LB1F	Local buckling (FIF1 check performed)
	LB2P	Local buckling (PIF2 check performed)
	LB2F	Local buckling (FIF2 check performed)

Table 1.3 NPD Code Check status codes

Capacity Model Type	Status Code	Description
PLT	PB	Plate buckling
	PY	Plate bending/yielding
STF	PIF1	Plate induced failure (check1)
	PIF2	Plate induced failure (check2)
	SIF1	Stiffener induced failure (check1)
	SIF2	Stiffener induced failure (check2)
	LB1P	Local buckling (PIF1 check performed)
	LB1S	Local buckling (SIF1 check performed)
	LB2P	Local buckling (PIF2 check performed)
	LB2S	Local buckling (SIF2 check performed)
GIR	PIF1	Plate induced failure (check1)
	PIF2	Plate induced failure (check2)
	FIF1	Flange induced failure (check1)
	FIF2	Flange induced failure (check2)
	LB1P	Local buckling (PIF1 check performed)
	LB1F	Local buckling (FIF1 check performed)
	LB2P	Local buckling (PIF2 check performed)
	LB2F	Local buckling (FIF2 check performed)

1.8.5 Printing a results summary

Assuming the sorting definitions from the preceding sections, a first short overview over the Code Check results may be obtained by entering the following command:

```
#PRINT CODE-CHECK-RESULTS SUMMARY
```

To get a permanent copy of this print table stored on a file called ***xmansummary.lis***, the following command sequence should be used.

```
#SET PRINT DESTINATION FILE
#SET PRINT FILE xman summary
#PRINT CODE-CHECK-RESULTS SUMMARY
```

Below is shown the summary output:

```
                  API Code Check Results
                  Summary Table                                SUB PAGE: 1


NOMENCLATURE:

Status            Check status
UCmax             Maximum of all Unity Criterion factors
Res-Name          Resultcase name
L-stat            Resultcase Limit-state
Phas              Phase angle
Capacity-Model    Basic Capacity Model name
Type              Basic Capacity Model type

+--------------------------------------------------------------+
! Sorting Parameter: UCmax        ! Max Entries:         10    !
! Sorting Order    : DECREASING   ! Max Value  : UNLIMITED     !
!                                 ! Min Value  :  1.000E+00    !
+--------------------------------------------------------------+

Status   UCmax      Res-Name L-stat Phas     Capacity-Model   Type
------------------------------------------------------------------
**-PB      5.18     2        STORM           XMANP2.2         PLT
**-PB      3.45     2        STORM           XMANP1.2         PLT
**-LB      3.05     3        STORM           XMANS2.2         STF
**-LB      3.05     4        STORM           XMANS2.2         STF
**-LB      3.05     1        STORM           XMANS2.1         STF
**-LB      3.05     2        STORM           XMANS2.1         STF
**-LB      3.05     3        STORM           XMANS2.1         STF
**-LB      3.05     4        STORM           XMANS2.1         STF
**-LB      3.05     1        STORM           XMANS2.2         STF
**-LB      3.05     2        STORM           XMANS2.2         STF
```

1.8.6 Printing further result details

Further details about the Code Check analysis may be obtained by use of the BRIEF, INTERMEDIATE, MEDIUM and FULL options under PRINT CODE-CHECK-RESULTS.

Let us assume here that the summary print from the preceding section has been produced, and that the two worst failures should be investigated in every detail. This can be done by use of the following command sequence:

```
#SELECT RESULTCASE ALL OFF
#SELECT RESULTCASE 2 ON
#SELECT CAPACITY-MODEL ALL OFF
#SELECT CAPACITY-MODEL XMANP2.2 ON
#SELECT CAPACITY-MODEL XMANP1.2 ON
#SET PRINT DESTINATION FILE
#SET PRINT FILE XMAN WORST2
#PRINT CODE-CHECK-RESULTS FULL
```

This will then produce the following output on ***xmanworst2.lis***:

```
12-MAY-1991 13:01 PROGRAM: SESAM    PLATEWORK D1.0-02 11-APR-1991  PAGE: 1


                  API Code Check Results
                  Full Table                                     SUB PAGE: 1



NOMENCLATURE:

Plate         Plate parameter name
dimension     Geometric dimension value
Material      Capacity Model material parameter
Mat-Value     Material parameter value
CM-Load       Capacity Model load
Load-Value    Load value
UC-Factor     Unity Criterion factor
UC-Val        Unity Criterion factor value

+--------------------------------------------------------------+
! Sorting Parameter: UCmax        ! Max Entries:         10    !
! Sorting Order    : DECREASING   ! Max Value  : UNLIMITED     !
!                                 ! Min Value  :  1.000E+00    !
+--------------------------------------------------------------+
```

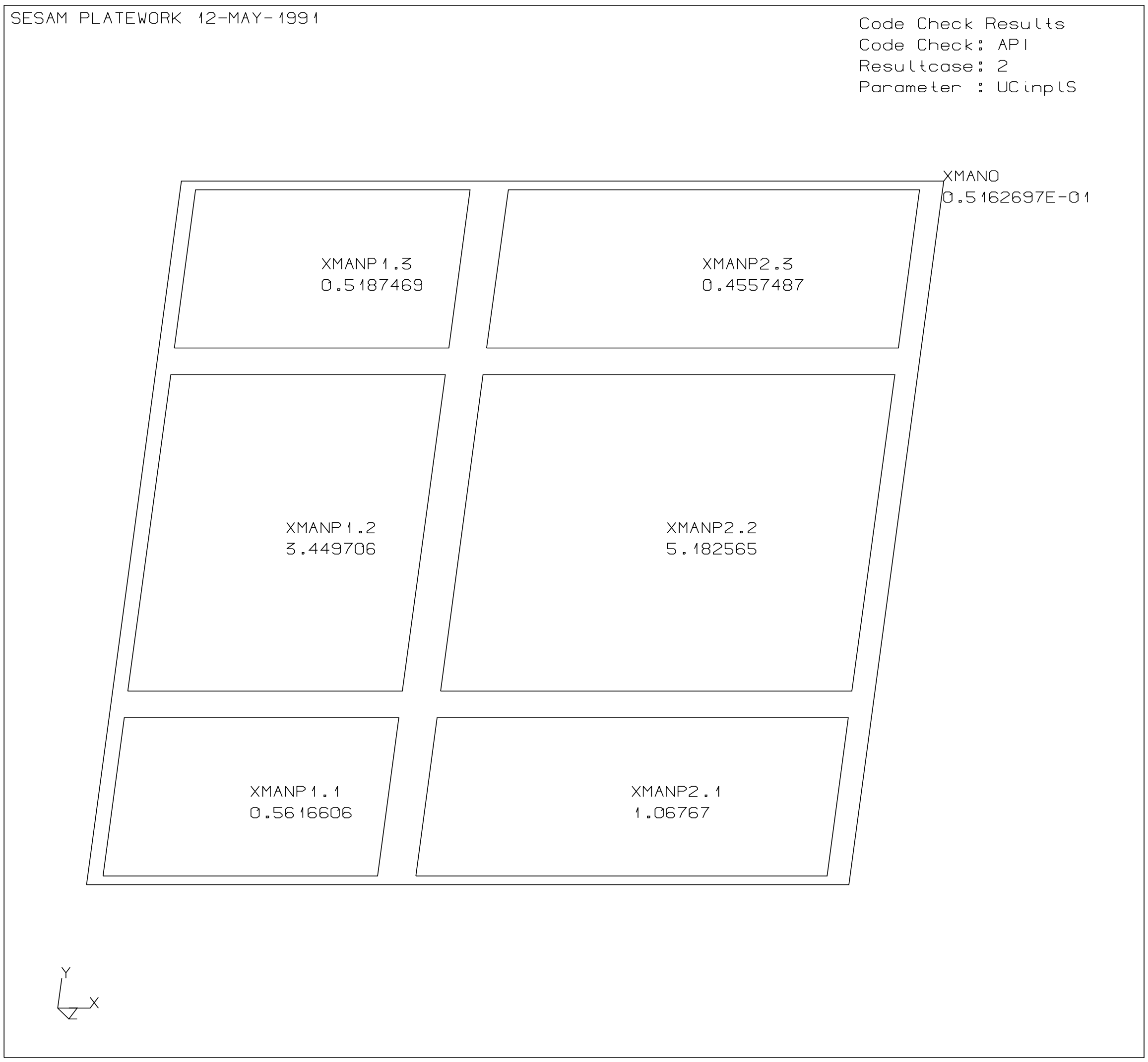
```
12-MAY-1991 13:01 PROGRAM: SESAM    PLATEWORK D1.0-02 11-APR-1991  PAGE:     2


                  API Code Check Results
                  Full Table                                     SUB PAGE:     2

+---------------------------------------------------------------+
! Capacity Model   : XMANP1.2          ! Type       : PLT     !
! Resultcase Name  : 2                 ! Limit-State: STORM   !
! Code Check Status: **-PB             !                      !
+---------------------------------------------------------------+

Plate     dimension  Material  Mat-Value  CM-Load   Load-Value UC-Factor UC-Val
-------------------------------------------------------------------------------
     lx =  2.000E+03      fy =  3.400E+02     fx1 = -1.290E+03   UCmax =   3.45
     ly =  2.500E+03      fp =  2.040E+02     fx2 = -1.518E+03 UCinplS =   3.45
      t =  2.500E+01       E =  2.100E+05     fy1 = -1.313E+03 UCinplU =   0.80
                          ny =  3.000E-01     fy2 = -8.471E+02  UCWeWa =   0.37
    Plate parameter                           fxy =  2.322E+01 UCstrsS =   0.37
   PTYP =  0                                 plat =  7.000E-03 UCplatU =   0.02
   PSTF =  0                                 pdfl =  ----
   PDEF =  0                                 pbst =  ----
     wa = -1.000E+00
     wp = -1.000E+00


INTERMEDIATE CODE CHECK RESULTS:

Parameter   Value    Parameter   Value    Parameter   Value
--------------------------------------------------------------
  UCmax =  3.450E+00 UCinplS =  3.450E+00 UCinplU =  8.005E-01
 UCWeWa =  3.665E-01 UCstrsS =  3.718E-01 UCplatU =  1.814E-02
  FSSLS =  1.250E+00   FSULS =  1.500E+00   sigx1 = -5.159E+01
  sigx2 = -6.073E+01   sigy1 = -5.251E+01   sigy2 = -3.388E+01
  tauxy =  9.288E-01     fxe =  7.976E+01     fye =  1.186E+02
   taue =  2.343E+02      kx =  2.690E+00      ky =  4.000E+00
   ktau =  7.900E+00    feqb =  4.847E+01     fxs =  5.345E+01
    fys =  4.111E+01    fxys =  1.680E+02    beta =  3.219E+00
    fxu =  1.493E+02     fyu =  1.784E+02    fxyu =  1.805E+02
     We =  2.545E+00      Wa =  6.944E+00     fxb =  9.313E+00
    fyb =  1.110E+01    feqt =  4.152E+01    feqc =  6.068E+01
  platu =  5.788E-01      Wp =  1.609E+01
```

```
12-MAY-1991 13:01 PROGRAM: SESAM    PLATEWORK D1.0-02 11-APR-1991  PAGE:     3


                  API Code Check Results
                  Full Table                                    SUB PAGE:     3

+---------------------------------------------------------------+
! Capacity Model   : XMANP2.2            ! Type       : PLT     !
! Resultcase Name  : 2                   ! Limit-State: STORM   !
! Code Check Status: **-PB               !                      !
+---------------------------------------------------------------+

Plate     dimension  Material  Mat-Value  CM-Load   Load-Value UC-Factor UC-Val
-------------------------------------------------------------------------------
     lx =  3.000E+03      fy =  3.400E+02     fx1 = -1.131E+03   UCmax =   5.18
     ly =  2.500E+03      fp =  2.040E+02     fx2 = -1.108E+03 UCinplS =   5.18
      t =  2.500E+01       E =  2.100E+05     fy1 = -9.237E+02 UCinplU =   0.87
                          ny =  3.000E-01     fy2 = -1.026E+03  UCWeWa =   0.70
    Plate parameter                           fxy = -3.213E+02 UCstrsS =   0.39
   PTYP =  0                                 plat =  7.000E-03 UCplatU =   0.02
   PSTF =  0                                 pdfl =  ----
   PDEF =  0                                 pbst =  ----
     wa = -1.000E+00
     wp = -1.000E+00


INTERMEDIATE CODE CHECK RESULTS:

Parameter   Value    Parameter   Value    Parameter   Value
-------------------------------------------------------------
  UCmax =  5.183E+00 UCinplS =  5.183E+00 UCinplU =  8.729E-01
 UCWeWa =  6.950E-01 UCstrsS =  3.875E-01 UCplatU =  2.408E-02
  FSSLS =  1.250E+00   FSULS =  1.500E+00   sigx1 = -4.526E+01
  sigx2 = -4.431E+01   sigy1 = -3.695E+01   sigy2 = -4.104E+01
  tauxy = -1.285E+01     fxe =  7.592E+01     fye =  5.449E+01
   taue =  1.541E+02      kx =  4.000E+00      ky =  2.871E+00
   ktau =  8.118E+00    feqb =  3.280E+01     fxs =  3.482E+01
    fys =  3.032E+01    fxys =  1.413E+02    beta =  4.024E+00
    fxu =  1.480E+02     fyu =  1.284E+02    fxyu =  1.662E+02
     We =  5.792E+00      Wa =  8.333E+00     fxb =  1.799E+01
    fyb =  1.580E+01    feqt =  3.361E+01    feqc =  6.324E+01
  platu =  4.360E-01      Wp =  2.012E+01


      Ignored:     40 Instances referenced INACTIVE CM's.
      Ignored:      6 Instances referenced INACTIVE RESULTCASES.
```

1.9 Displaying Code Check results

By investigation of the print tables produced in the preceding sections, we can conclude that the Code Check Unity Criterion parameter UCinplS (Unity Criterion for in-plane loads, SLS) in resultcase 2 was the critical one. This can be further illustrated through the use of graphics:

```
#SELECT CAPACITY-MODEL ALL
#DISPLAY CODE-CHECK-RESULTS 2 UCinplS
```



1.10 Changing Capacity Model geometry data

After investigating the Code Check results, the user might wish to increase the plate thickness of the plate XMANP2.2. This can be done as shown below:

```
#CHANGE CAPACITY-MODEL XMANP2.2 PLATE-GEOMETRY t 30.0
          Parameter t        changed for CM XMANP2.2
          Code Check Results deleted for this CM
```

The results must be re-calculated:

```
#RUN CODE-CHECK-ANALYSIS
          Running API Code Check
          Sorting PASS 1 of 3
          Sorting PASS 2 of 3
          Sorting PASS 3 of 3
```

A new summary print can be produced:

```
                  API Code Check Results
                  Summary Table                                  SUB PAGE: 1

NOMENCLATURE:

Status            Check status
UCmax             Maximum of all Unity Criterion factors
Res-Name          Resultcase name
L-stat            Resultcase Limit-state
Phas              Phase angle
Capacity-Model    Basic Capacity Model name
Type              Basic Capacity Model type

+-------------------------------------------------------------+
! Sorting Parameter: UCmax        ! Max Entries:         10    !
! Sorting Order    : DECREASING   ! Max Value  : UNLIMITED     !
!                                 ! Min Value  :  1.000E+00    !
+-------------------------------------------------------------+

Status   UCmax      Res-Name L-stat Phas     Capacity-Model   Type
------------------------------------------------------------------
**-PB      3.45     2        STORM           XMANP1.2         PLT
**-LB      3.05     2        STORM           XMANS2.1         STF
**-LB      3.05     2        STORM           XMANS2.2         STF
**-LB      2.03     2        STORM           XMANS1.2         STF
**-LB      2.03     2        STORM           XMANS1.1         STF
**-PB      1.74     2        STORM           XMANP2.2         PLT
**-LB      1.52     2        STORM           XMANG1           GIR
**-PB      1.07     2        STORM           XMANP2.1         PLT

      Ignored:     20 Instances had sort parameter VALUE BELOW MIN
      Ignored:     17 Instances referenced INACTIVE RESULTCASES.
```

1.11 Changing Capacity Model load data

The Code Check results were still not satisfactory after increasing the plate thickness. Another possibility is to modify the Capacity Model load:

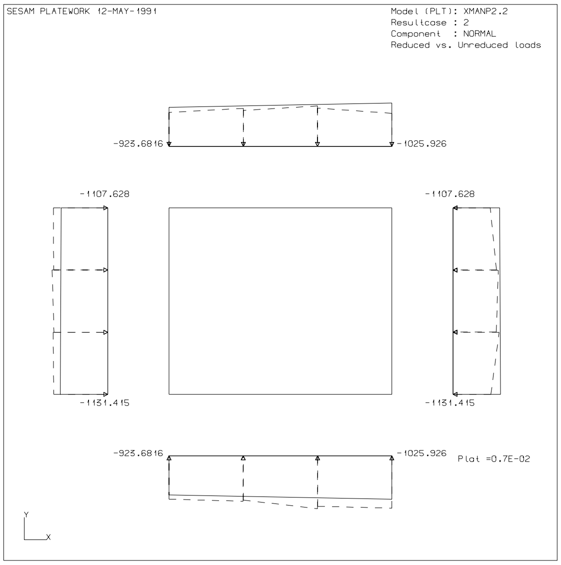


Figure 1-10 Original Capacity Model load

```
#CHANGE LOAD-ON-CAPACITY-MODEL MANUAL XMANP2.2 2
   fx1 -800
   fx2 -800
 END
 Results deleted for this CM and resultcase
 CM load values stored
```

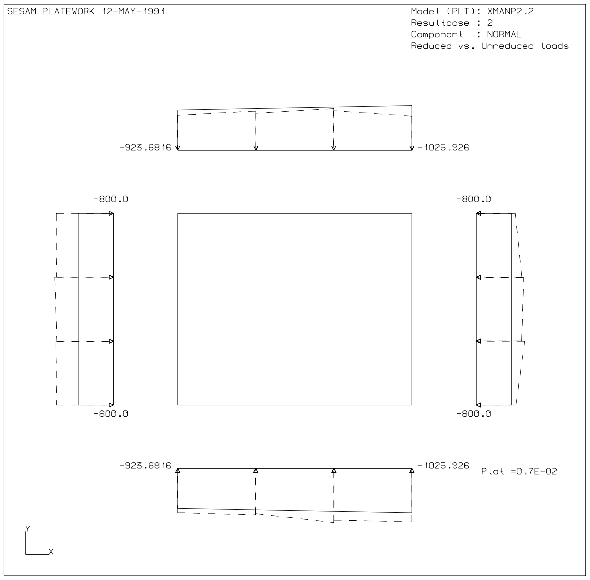


Figure 1-11 Modified Capacity Model load

Again, the Code Check results must be re-calulated

```
#RUN CODE-CHECK-ANALYSIS
         Running API Code Check
         Sorting PASS 1 of 3
         Sorting PASS 2 of 3
         Sorting PASS 3 of 3

#PRINT CODE-CHECK-RESULTS SUMMARY


                  API Code Check Results
                  Summary Table                             SUB PAGE: 1



NOMENCLATURE:

Status            Check status
UCmax             Maximum of all Unity Criterion factors
Res-Name          Resultcase name
L-stat            Resultcase Limit-state
Phas              Phase angle
Capacity-Model    Basic Capacity Model name
Type              Basic Capacity Model type

+-------------------------------------------------------------+
! Sorting Parameter: UCmax        ! Max Entries:         10   !
! Sorting Order    : DECREASING   ! Max Value  : UNLIMITED    !
!                                 ! Min Value  :  1.000E+00   !
+-------------------------------------------------------------+

Status   UCmax      Res-Name L-stat Phas     Capacity-Model   Type
-----------------------------------------------------------------
**-PB      3.45     2        STORM           XMANP1.2         PLT
**-LB      3.05     2        STORM           XMANS2.1         STF
**-LB      3.05     2        STORM           XMANS2.2         STF
**-LB      2.03     2        STORM           XMANS1.2         STF
**-LB      2.03     2        STORM           XMANS1.1         STF
**-LB      1.52     2        STORM           XMANG1           GIR
**-PB      1.33     2        STORM           XMANP2.2         PLT
**-PB      1.07     2        STORM           XMANP2.1         PLT

      Ignored:     20 Instances had sort parameter VALUE BELOW MIN
      Ignored:     17 Instances referenced INACTIVE RESULTCASES.
```

1.12 Creating Resultcase combinations

Assume that a combination equal to the sum of resultcases 3 and 4 is required. This can be accomplished by following this procedure:

Create the new resultcase:

```
#CREATE RESULTCASE C1 'Resultcase 3 + RESULTCASE 4' STATIC STORM
         COMBINATION
                  3 1.0 0.0
                  4 1.0 0.0
         END
```

Select the new resultcase:

```
#SELECT RESULTCASE ALL OFF
 ALL ( 5 ) Resultcase(s) selected OFF
#SELECT RESULTCASE C1 ON
 Resultcase C1 selected ON
 Currently selected : 1 of 5 resultcase(s)
```

Create the new loads:

```
#CREATE LOAD-ON-CAPACITY-MODEL AUTOMATIC ALL

 Creating Capacity Model loads
 =============================
 CM: XMANG1        , Resultcase C1 , New loads created
 CM: XMANS1.1      , Resultcase C1 , New loads created
 CM: XMANS1.2      , Resultcase C1 , New loads created
 CM: XMANS2.1      , Resultcase C1 , New loads created
 CM: XMANS2.2      , Resultcase C1 , New loads created
 CM: XMANP1.1      , Resultcase C1 , New loads created
 CM: XMANP1.2      , Resultcase C1 , New loads created
 CM: XMANP1.3      , Resultcase C1 , New loads created
 CM: XMANP2.1      , Resultcase C1 , New loads created
 CM: XMANP2.2      , Resultcase C1 , New loads created
 CM: XMANP2.3      , Resultcase C1 , New loads created
 CM: XMANO         , Resultcase C1 , New loads created
#
```

Below are shown plots illustrating the combinations that have been done on the basis of unreduced Capacity Model loads:

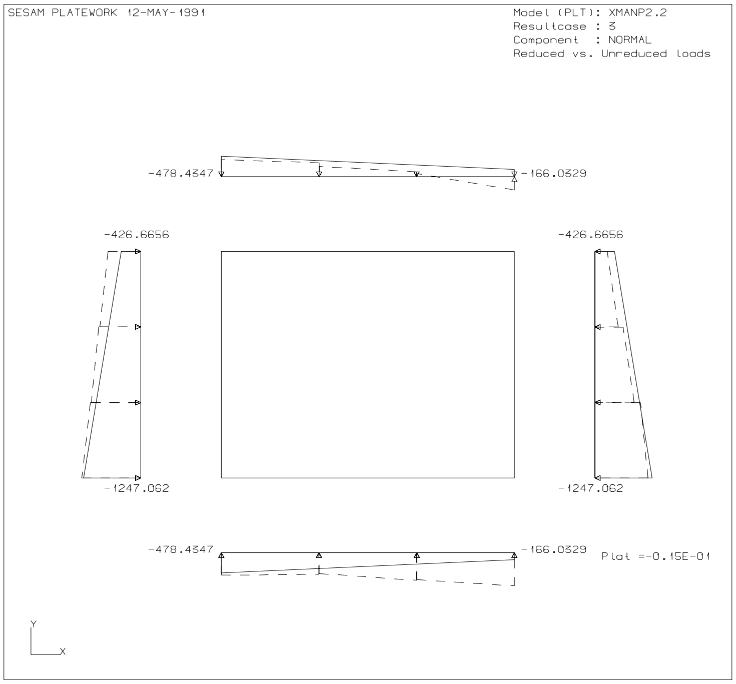


Figure 1-12 Basic CM load, Resultcase 3

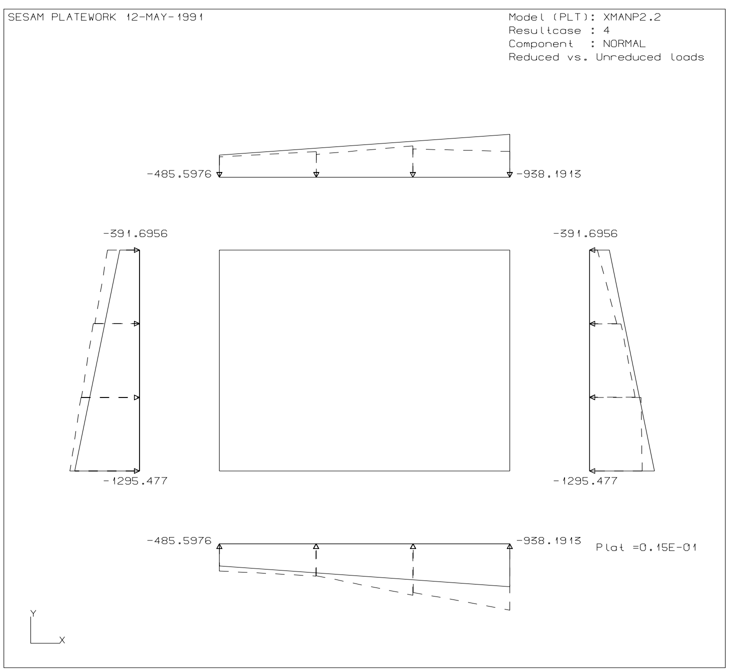


Figure 1-13 Basic CM load, Resultcase 4

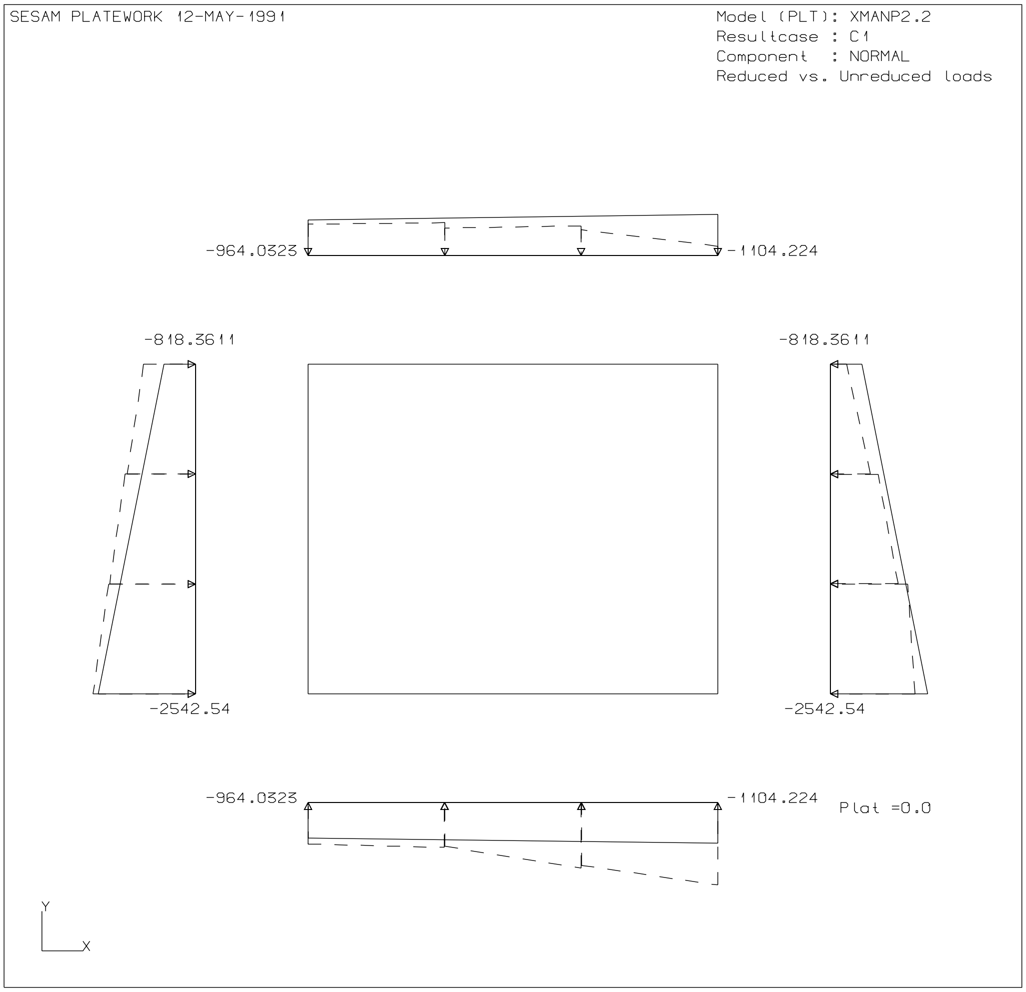


Figure 1-14 Combination CM load, Resultcase C1

```
#RUN CODE-CHECK-ANALYSIS
          Running API Code Check
          Sorting PASS 1 of 3
          Sorting PASS 2 of 3
          Sorting PASS 3 of 3

#PRINT CODE-CHECK-RESULTS SUMMARY
```

```
12-MAY-1991 14:57 PROGRAM: SESAM    PLATEWORK D1.0-02 11-APR-1991  PAGE: 1

                  API Code Check Results
                  Summary Table                                 SUB PAGE: 1


NOMENCLATURE:

Status            Check status
UCmax             Maximum of all Unity Criterion factors
Res-Name          Resultcase name
L-stat            Resultcase Limit-state
Phas              Phase angle
Capacity-Model    Basic Capacity Model name
Type              Basic Capacity Model type

+--------------------------------------------------------------+
! Sorting Parameter: UCmax        ! Max Entries:         10   !
! Sorting Order    : DECREASING   ! Max Value  : UNLIMITED    !
!                                 ! Min Value  :  1.000E+00   !
+--------------------------------------------------------------+

Status   UCmax     Res-Name L-stat Phas     Capacity-Model   Type
-----------------------------------------------------------------
**-PB      7.58     C1       STORM          XMANP1.2         PLT
**-LB      3.05     C1       STORM          XMANS2.1         STF
**-LB      3.05     C1       STORM          XMANS2.2         STF
**-PB      2.96     C1       STORM          XMANP2.1         PLT
**-PB      2.74     C1       STORM          XMANP2.2         PLT
**-LB      2.03     C1       STORM          XMANS1.1         STF
**-LB      2.03     C1       STORM          XMANS1.2         STF
**-LB      1.52     C1       STORM          XMANG1           GIR
**-PB      1.11     C1       STORM          XMANP1.3         PLT
**-PB      1.06     C1       STORM          XMANP1.1         PLT
      Ignored:     25 Instances referenced INACTIVE RESULTCASES.
```

1 EXECUTION OF PLATEWORK

1.1 Program Environment

1.1.1 Starting PLATEWORK

The command required to start the execution of PLATEWORK is dependent on operating system and installation. A typical command used for a VAX/VMS installation may look like:

```
$RUN SESAM:PLATEWORK
```

The program will now display the program heading on the screen, see figure 1-1, page 1-2. The program heading contains important information such as program version number and release date. When reporting program errors, the user should always refer to the program version number ("Program id") shown in the program heading:

The program will then invite the user to enter the prefix of the PLATEWORK database and journal files. The default prefix is dependent on operating system of the current installation. The default prefix "[]" shown below is used for a VAX/VMS installation.

```
Database & journal file prefix? /[]/ <Return>
```

When <Return> is pressed, the default prefix will be used by the progam.

The next step is to specify the name of the database and journal files. Again, the user can accept the default by pressing the <Return> key:

```
Database & journal file name? /PLATEWORK/ <Return>
```

```
    ******      ******       ******       ******      ** ***  ****
   ********    ********     ********     ********     *************
  **      **  **      **   **      **   **      **    **    **    **
  **          **      **   **                   **    **    **    **
   *******    **********    *******      *********    **    **    **
    *******   *********      *******    **********    **    **    **
          **  **                   **   **      **    **    **    **
  **      **  **      **   **      **   **      **    **    **    **
   ********    ********     ********     *********    **    **    **
    ******      ******       ******       ****** **   **    **    **


           *************************************************
           *                                               *
           *              P L A T E W O R K                *
           *                                               *
           *    Plate Structure Design & Code Checking     *
           *                                               *
           *************************************************

            Marketing and Support by Veritas Sesam Systems

Program id   : D1.0-02              Computer         : VAXstation 3100/
Release date : 11-APR-1991          Impl. update     : None
Access time  : 15-MAY-1991 10:03:34 Operating system : VMS V5.4
User id      : CA                   CPU id           : 0321622480
Account      : VSS11391             Installation     : VSS GARM

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Database & journal file prefix? /[]/ <return>
Database & journal file name? /PLATEWORK/ <return>
New or old database? /OLD/ NEW

      Commencing PLATEWORK initialization.

      Default graphics device : TX4014-15-16-54
      Default design code     : DNV

      Completed PLATEWORK initialization.

      NEW journal file opened.
#
```

Figure 1-1 Starting PLATEWORK

Finally, the user is requested to specify whether the PLATEWORK database already exists or if a new database shall be created:

```
New or old? /OLD/ NEW <Return>
```

At this stage, the program will initialize the database file. This may require the user to wait for a few seconds before the program prompt "#" appears, after which the commands described in Chapter 5 will be available.

1.1.2 Initial commands

Normally, the first command to enter when a new PLATEWORK database has been initialized is the SELECT CODE command, for example:

```
#SELECT CODE API
```

In some cases, defaults used by the program will be dependent of the current Code of Practice, and the initial use of SELECT CODE will ensure that valid defaults will be used. An example is when reasultcases are read from a SIN-file and automatically assigned limit-states.

If there exists an FE-model which shall be used when creating Capacity Models, the next command would normally be READ-SIN-DIRECT-ACCESS, for example (for further details, please refer to Chapters 2 and 3.):

```
#READ SIN-DIRECT-ACCESS SINDIR:SESTRA R100
```

1.1.3 Startup files

On some computers, it is possible to prepare a PLATEWORK startup file containing commands that are automatically executed each time PLATEWORK is started. The format of this file is the same as any other Command Input File. An example of commands in a startup file may be:

```
SET DISPLAY DEVICE X-WINDOWS
SET DISPLAY WORKSTATION-WINDOW 28 120 8 100
SET PRINT PAGE-ORIENTATION PORTRAIT
```

This example shows how to automatically select the display device (in this case a workstation running under the Xwindows system). A large display window is also defined. Finally, the PORTRAIT page orientation is selected as default for the print files.

How to define startup files

This will be slightly different between different operating systems. In genereal, however, a logical name or environment variable called PLATEWORK_STARTUP must point to a PLATEWORK journal file containing the startup commands. On VAX/VMS this is obtained by a command similar to:

```
$DEFINE PLATEWORK_STARTUP my_disk:[my_directory]PW_STARTUP.JNL
```

Please consult the PLATEWORK Status List (See Chapter 1 for information on how to get a copy) for other computers and operating systems.

1.1.4 Entering commands / obtaining help

PLATEWORK uses the standard SESAM command processor, i.e. the following general SESAM command features are available:

- **<Return> key**
  After typing in a command (optionally with subcommands) the <Return> key must be pressed in order to have the specified command executed. The <Return> key can be pressed at any stage in a command sequence, in which case the program will prompt the user for the next subcommand and display the default value of that subcommand.

- **Default values or alternatives**
  Often, the program offers a default value or a default alternative to the user. If a default is available, it will be presented between two slashes after the command prompt:

  ```
  This is the command prompt /This is the default/
  ```

  To accept the default, the user can simply press the <Return> key.

- **Question mark**
  At any stage, the question mark "?" can be entered to get help on the current alternatives available. If entered at the main command level, all main commands will be listed.

  ```
  #VIEW
  Select VIEW option? /ROTATE/ ?
       GIVE
           FRAME
           PAN
           POSITION
           ROTATE
           ZOOM
  Select VIEW option? /ROTATE/
  ```

- **Double dot**
  At any stage, two dots ".." can be entered to abort the current command. The program will return control to the main command level.

  ```
  #VIEW
  Select VIEW option? /ROTATE/ ? ..
  #
  ```

- **Semi-colon**
  If a semi-colon ";" is entered, the program will use the current default value presented and all default values for the following subcommands until there are no more subcommands with default values assigned. In some cases, the program may prompt for input even if there is a default value. A second semi-colon may then be entered to continue accepting the following default-values.

  #VIEW ROTATE TO 90. ;

- **Abbreviations**
  Commands can be abbreviated as long as they are unique. Names cannot be abbreviated.

1.2 Program Requirements

PLATEWORK can be used interactively or submitted in a batch queue. In principle, only an alphanumeric terminal is required, but if a graphics terminal or workstation is available, it is recommended to use the DISPLAY features.

If the PostScript plot file format is used, access to a PostScript plotter is required.

1.2.1 Execution time

This depends heavily on which commands are used. In general, however, the CREATE LOAD-ON-CAPACITY-MODEL AUTOMATIC command may require most time. Note the use of SCOPE ELEMENT in connection with this feature.

1.2.2 Storage Space

In general, PLATEWORK does not require a lot of disk space for the database file. The SESAM results Interface file (SIN-file) usually requires more disk space than the PLATEWORK database file.

1.3 Program Limitations

1.3.1 Name limitations

Max length of Capacity Model Assembly name	:	8	(characters)
Max length of Basic Capacity Model name	:	16	
Max length of all other names	:	8	

Names can not be abbreviated in the commands.
Names are stored in uppercase only.

1.3.2 Capacity Model size limitations

Max number of girders within an assembly	:	100
Max number of stiffeners within an assembly	:	200
Max number of plates within an assembly	:	200
Max number of elements along a CM edge	:	150

1.3.3 Code Check limitations

For limitations in the Code Checks, please refer to the Theoretical Manual.

1 COMMAND DESCRIPTION

The following notation is used in the description of the commands:

- Uppercase words signify reserved commands.

  Example: PRINT

- Lowercase words enclosed in angle brackets "<>" within the commands signify parameters where an al phanumeric or numerical value is expected.

  Example: PRINT RESULTCASE <RES-name>

- Big parentheses "()" indicate selection between alternatives

  Example: PRINT RESULTCASE (<RES-name> / ALL)

- Words enclosed in square brackets "[]" signify a parameter which is not always relevant.

  Example: DISPLAY LOAD-ON-CAPACITY-MODEL <BCM-name> ...

  ... <BCM-name> <RES-name> (NORMAL / SHEAR) [<angle>]

- Small parentheses "()" followed by multiplication sign indicate repeated input.

  Example: (<Typ> <Idx> <Nod>) *4

1.1 CHANGE

COMMAND:

```
CHANGE   ( CAPACITY-MODEL ...
         ( LOAD-ON-CAPACITY-MODEL ...
         ( RESULTCASE ...
         ( SIN-DIRECT-ACCESS ...
```

PURPOSE:

To modify objects in the PLATEWORK database, typically created by use of the CREATE command.

SUBCOMMANDS:

CAPACITY-MODEL	Change Capacity Model geometry, see "notes".
LOAD-ON-CAPACITY-MODEL	Change reduced Capacity Model load, see "notes".
RESULTCASE	Change Resultcase characteristics.
SIN-DIRECT-ACCESS	Change name of linked SIN-file.

NOTES:

1 **Automatic deletion of Code-Check results**
Whenever a Capacity Model or a Capacity Model Load is changed, any existing Code Check results will be deleted.

See also:

CREATE ASSEMBLY-OF-CAPACITY-MODELS
CREATE LOAD-ON-CAPACITY-MODEL
CREATE RESULTCASE
READ SIN-DIRECT-ACCESS

CHANGE CAPACITY-MODEL

SUBCOMMAND:

... CAPACITY-MODEL <BCM-name> <attribute> <name> [<value>]

PURPOSE:

To modify the overall geometry, material or cross section data in a basic Capacity Model previously created by use of the CREATE ASSEMBLY-OF-CAPACITY-MODELS command.

PARAMETERS:

Note that the parameters of this command are dependent of the type of Capacity Model specified implicitely through the Capacity Model name <BCM-name>, see note 1.

<BCM-name> Name of Basic Capacity Model.

<attribute> Type of data to be changed.

<attribute>	**Description**
MATERIAL	Material data
PLATE-GEOMETRY	Plate x & y lengths, plate thicknesses
PLATE-PARAMETER	Plate parameters
STIFFENER-SECTION	Stiffener cross section
STIFFENER-PARAMETER	Stiffener parameters
GIRDER-SECTION	Girder cross section
GIRDER-PARAMETER	Girder parameter

<name> Name of material, cross section or single CM component.

<value> Value of single CM component as described on the following pages.

NOTES:

1 **Each Capacity Model type is explained separately**
As the range of relevant attributes are different for each Capacity Model type, separate descriptions are found on the following pages.

2 **Results will be deleted**
Any previously calculated Code Check results for the named Capacity Model will be deleted.

See also:

CREATE ASSEMBLY-OF-CAPACITY-MODELS
CHANGE LOAD-ON-CAPACITY-MODEL

CHANGE CAPACITY-MODEL (PLT Capacity Models)

SUBCOMMAND:

... CAPACITY-MODEL <BCM-name> <attribute> <name> [<value>]

PURPOSE:

To modify the material, plate geometry or plate parameter data in a Capacity Model of type PLT (Plate).

PARAMETERS:

<BCM-name> Name of Basic Capacity Model

<attribute> Type of data to be changed, see below.

<name> Name of material, cross section or single CM parameter.

<value> Value of single CM parameter as described below.

<attribute>	**<name>**	**<value>**
MATERIAL	<MAT-name>	
PLATE-GEOMETRY	<PGEO-name>	<PGEO-value>
PLATE-PARAMETER	<PPAR-name>	<PPAR-value>

MATERIAL Modify the material data of the Capacity Model

<MAT-name> Name of material from which new material data shall be fetched

PLATE-GEOMETRY Modify the plate geometry data of the Capacity Model

<PGEO-name> Name of plate geometry component, see below

<PGEO-value> New value of plate geometry component

<PGEO-name>	**<PGEO-value>**
lx	Length of plate, x direction
ly	Length of plate, y direction
t	Plate thickness

PLATE-PARAMETER Modify the plate parameter data of the Capacity Model

<PPAR-name> Name of plate parameter component, see next page

<PPAR-value> New value of plate parameter component

<PPAR-name>	**<PPAR-value>**
PTYP	Plate type = 0: Simply supported along 4 edges
PSTF	Stiffener failure parameter = 0: Plate edge stress reach yield before the stiffeners fail = 1: Plate edge stress do not reach yield before the stiffeners fail.
PDEF	Deformation parameter = 0: Permanent deformation allowed = 1: Permanent deformation not allowed
wa	Max allowable elastic deformation < 0: Not specified, use formulae in Theoretical Manual > 0: Use specified value
wp	Max allowable plastic deformation < 0: Not specified, use formulae in Theoretical Manual > 0: Use specified value

NOTES:

1 **Results will be deleted**
Any previously calculated Code Check results for the referenced Capacity Model will be deleted on the successful completion of this command.

EXAMPLES:

```
1   CHANGE CAPACITY-MODEL XMANP1.1 PLATE-GEOMETRY t 30.0

2   CHANGE CAPACITY-MODEL XMANP1.1 MATERIAL MAT-1
```

CHANGE CAPACITY-MODEL (STF Capacity Models)

SUBCOMMAND:

... CAPACITY-MODEL <BCM-name> <attribute> <name> [<value>]

PURPOSE:

To modify the material, plate geometry, stiffener section or stiffener parameter data in a Capacity Model of type STF (Stiffener).

PARAMETERS:

<BCM-name>	Name of Basic Capacity Model
<attribute>	Type of data to be changed, see below.
<name>	Name of material, cross section or single CM component
<value>	Value of single CM component

<attribute>	**<name>**	**<value>**
MATERIAL	<MAT-name>	
PLATE-GEOMETRY	<PGEO-name>	<PGEO-value>
STIFFENER-SECTION	<SEC-name>	
STIFFENER-PARAMETER	<SPAR-name>	<SPAR-value>

MATERIAL	Modify the material data of the Capacity Model
<MAT-name>	Name of material from which new material data shall be fetched
PLATE-GEOMETRY	Modify the plate geometry data of the Capacity Model
<PGEO-name>	Name of plate geometry component to be changed
<PGEO-value>	New value of plate geometry component

<PGEO-name>	**<PGEO-value>**
lx	length of stiffener, x direction
ly1	Stiffener spacing BEFORE stiffener
ly2	Stiffener spacing AFTER stiffener
t1	Plate thickness BEFORE stiffener
t2	Plate thickness AFTER stiffener

STIFFENER-SECTION	Modify the stiffener section data of the Capacity Model
<SEC-name>	Name of section from which new section data shall be fetched
STIFFENER-PARAMETER	Modify the stiffener parameter data of the Capacity Model
<SPAR-name>	Name of stiffener parameter component to be changed
<SPAR-value>	New value of stiffener parameter component

<SPAR-name>	**<SPAR-value>**
Ly	Length of girder, y direction
Ltx	Distance between lateral supports
ks0	Buckling length factor, without lateral load
ms0	Bending moment factor , without lateral load
ksp	Buckling length factor, including lateral load
msp	Bending moment factor , including lateral load
SEND	End condition CONTINUOUS (clamped at ends) SNIPED
STYP	Stiffener Type = 0: Panel (normal) stiffener = 1: Transverse web stiffener type 1 = 2: Transverse web stiffener type 2 = 3: Longitudinal web stiffener
SSTF	Stiffener Failure parameter = 0: Plate edge stresses reach yield before the stiffeners fail = 1: Plate edge stresses do not reach yield before stiffeners fail

NOTES:

1 **Results will be deleted**
Any previously calculated Code Check results for the referenced Capacity Model will be deleted on the successful completion of this command.

EXAMPLES:

```
1   CHANGE CAPACITY-MODEL XMANS1.1 STIFFENER-PARAMETER ks0 1.0

2   CHANGE CAPACITY-MODEL XMANS1.1 MATERIAL MAT-1

3   CHANGE CAPACITY-MODEL XMANS1.1 STIFFENER-SECTION SEC-2
```

CHANGE CAPACITY-MODEL (GIR Capacity Models)

SUBCOMMAND:

... CAPACITY-MODEL <BCM-name> <attribute> <name> [<value>]

PURPOSE:

To modify the material, plate geometry, stiffener section, girder section or girder parameter data in a Capacity Model of type GIR (Girder).

PARAMETERS:

<BCM-name>	Name of Basic Capacity Model
<attribute>	Type of data to be changed, see below.
<name>	Name of material, cross section or single CM component
<value>	Value of single CM component

<attribute>	**<name>**	**<value>**
MATERIAL	<MAT-name>	
PLATE-GEOMETRY	<PGEO-name>	<PGEO-value>
STIFFENER-SECTION	<SEC-name>	
GIRDER-SECTION	<SEC-name>	
GIRDER-PARAMETER	<GPAR-name>	<GPAR-value>

MATERIAL	Modify the material data of the Capacity Model
<MAT-name>	Name of material from which new data shall be fetched

PLATE-GEOMETRY	Modify the plate geometry data of the Capacity Model
<PGEO-name>	Name of plate geometry component
<PGEO-value>	New value of plate geometry component

<PGEO-name>	**<PGEO-value>**
Ly	Length of girder, y direction
lx1	Girder spacing BEFORE girder
lx2	Girder spacing AFTER girder
t1	Plate thickness BEFORE girder
t2	Plate thickness AFTER girder
lya	Average stiffener spacing, y direction

STIFFENER-SECTION	Modify the stiffener section data of the Capacity Model
<SEC-name>	Name of section from which new data shall be fetched
GIRDER-SECTION	Modify the girder section data of the Capacity Model
<SEC-name>	Name of section from which new data shall be fetched
GIRDER-PARAMETER	Modify the girder parameter data of the Capacity Model
<GPAR-name>	Name of girder parameter component
<GPAR-value>	New value of girder parameter component

<GPAR-name>	**<GPAR-value>**
Lty	Distance between lateral supports
kg	Buckling length factor
mg	Bending moment factor
GTYP	Girder Type = 0 : Panel (normal) girder = 1 : Transverse web girder, type 1 = 2 : Transverse web girder, type 2
GSTF	Stiffener Failure parameter = 0: Plate edge stresses reach yield before the girders fail = 1: Plate edge stresses do not reach yield before the girders fail

NOTES:

1 **Results will be deleted**
Any previously calculated Code Check results for the referenced Capacity Model will be deleted on the successful completion of this command.

EXAMPLES:

1 `CHANGE CAPACITY-MODEL XMANG1 GIRDER-PARAMETER Lty 600.`

2 `CHANGE CAPACITY-MODEL XMANG1 PLATE-GEOMETRY t2 30.0`

3 `CHANGE CAPACITY-MODEL XMANG1 GIRDER-SECTION SEC-1`

4 `CHANGE CAPACITY-MODEL XMANG1 STIFFENER-SECTION SEC-2`

CHANGE CAPACITY-MODEL (USP Capacity Models)

SUBCOMMAND:

... CAPACITY-MODEL <BCM-name> <attribute> <name> [<value>]

PURPOSE:

To modify the material, plate geometry or stiffener section data in a Capacity Model of type USP (Uniaxially Stiffened Panesls), used in API Code Checks.

PARAMETERS:

<BCM-name> Name of Basic Capacity Model

<attribute> Type of data to be changed, see below.

<name> Name of material, cross section or single CM component

<value> Value of single CM component

<attribute>	**<name>**	**<value>**
MATERIAL	<MAT-name>	
PLATE-GEOMETRY	<PGEO-name>	<PGEO-value>
STIFFENER-SECTION	<SEC-name>	

MATERIAL Modify the material data of the Capacity Model

<MAT-name> Name of material from which new data shall be fetched

PLATE-GEOMETRY Modify the plate geometry data of the Capacity Model

<PGEO-name> Name of plate geometry component

<PGEO-value> New value of plate geometry component

<PGEO-name>	**<PGEO-value>**
Lx	Length of panel, x direction
Ly	Length of panel, y direction
lya	Average stiffener spacing, y direction
t	Plate thickness

STIFFENER-SECTION Modify the stiffener section data of the Capacity Model

<SEC-name> Name of section from which new data shall be fetched

NOTES:

1 Results will be deleted
Any previously calculated Code Check results for the referenced Capacity Model will be deleted on the successful completion of this command.

EXAMPLES:

```
1   CHANGE CAPACITY-MODEL XMANU PLATE-GEOMETRY lya 200.0

2   CHANGE CAPACITY-MODEL XMANU STIFFENER-SECTION SEC-2

3   CHANGE CAPACITY-MODEL XMANU MATERIAL MAT-1
```

CHANGE CAPACITY-MODEL (OSP Capacity Models)

SUBCOMMAND:

... CAPACITY-MODEL <BCM-name> <attribute> <name> [<value>]

PURPOSE:

To modify the material, plate geometry, stiffener section or girder section in a Capacity Model of type OSP (Orthogonally Stiffened Panel), used in API Code Checks.

PARAMETERS:

<BCM-name>	Name of Basic Capacity Model
<attribute>	Type of data to be changed, see below.
<name>	Name of material, cross section or single CM parameter.
<value>	Value of single CM parameter as described

<attribute>	**<name>**	**<value>**
MATERIAL	<MAT-name>	
PLATE-GEOMETRY	<PGEO-name>	<PGEO-value>
GIRDER-SECTION	<SEC-name>	
STIFFENER-SECTION	<SEC-name>	

MATERIAL	Modify the material data of the Capacity Model
<MAT-name>	Name of material from which new data shall be fetched

PLATE-GEOMETRY	Modify the plate geometry data of the Capacity Model
<PGEO-name>	Name of plate geometry component
<PGEO-value>	New Value of plate geometry component

<PGEO-name>	**<PGEO-value>**
Lx	Length of panel, x direction
Ly	Length of panel, y direction
lxa	Average girder spacing, x direction
lya	Average stiffener spacing, y direction
t	Plate thickness

STIFFENER-SECTION	Modify the stiffener section data of the Capacity Model
<SEC-name>	Name of section from which new data shall be fetched
GIRDER-SECTION	Modify the girder section data of the Capacity Model
<SEC-name>	Name of section from which new data shall be fetched

NOTES:

1 **Results will be deleted**
Any previously calculated Code Check results for the referenced Capacity Model will be deleted on the successful completion of this command.

EXAMPLES:

```
1   CHANGE CAPACITY-MODEL XMANO PLATE-GEOMETRY t 30.0

2   CHANGE CAPACITY-MODEL XMANO STIFFENER-SECTION SEC-4
```

CHANGE LOAD-ON-CAPACITY-MODEL

COMMAND:

CHANGE LOAD-ON-CAPACITY-MODEL (AUTOMATIC ...
MANUAL ...

PURPOSE:

To modify basic Capacity Model loads previously created by use of the CREATE LOAD-ON-CAPACITY-MODEL command.

SUBCOMMANDS:

AUTOMATIC	Automatic re-calculation of reduced Capacity Model loads from the unreduced loads
MANUAL	Manual re-definition of reduced Capacity Model loads.

NOTES:

1 **Results will be deleted**
Any previously calculated Code Check results for the referenced combination of Capacity Models and resultcases will be deleted on the successful completion of this command.

See also:

CREATE LOAD-ON-CAPACITY-MODEL
CREATE RESULTCASE
CHANGE RESULTCASE
READ SIN-DIRECT-ACCESS
CHANGE CAPACITY-MODEL

CHANGE LOAD-ON-CAPACITY-MODEL AUTOMATIC

SUBCOMMAND:

... AUTOMATIC (ASSEMBLY <CMA-name>
(ALL

PURPOSE:

To re-calculate the reduced Capacity Model loads from the unreduced loads, typically following previous manual re-definition of the loads, by use of CHANGE LOAD-ON-CAPACITY-MODEL MANUAL. See Chapter 2 for more details on calculation of Capacity Model loads.

PARAMETERS:

ASSEMBLY	Re-calculate the loads for the basic Capacity Models within the specified Capacity Model Assembly.
ALL	Re-calculate the loads for all basic Capacity Models.

NOTES:

1 **Loads must have been created using AUTOMATIC option**
When CM loads are created through the CREATE LOAD-ON-CAPACITY-MODEL AUTOMATIC command, both unreduced and reduced loads will be stored. When the CHANGE LOAD-ON-CAPACITY-MODEL MANUAL command is used, only the reduced loads will be changed. The CHANGE LOAD-ON-CAPACITY-MODEL AUTOMATIC command can then be used to re-calculate the original reduced loads on the basis of the original unreduced loads.

2 **Results will be deleted**
Any previously calculated Code Check results for the referenced combination of Capacity Models and re-sultcases will be deleted on the successful completion of this command.

EXAMPLES:

1 `CHANGE LOAD-ON-CAPACITY-MODEL AUTOMATIC ALL`

2 `CHANGE LOAD-ON-CAPACITY-MODEL AUTOMATIC ASSEMBLY XMAN`

3 See Chapter 3

CHANGE LOAD-ON-CAPACITY-MODEL MANUAL

SUBCOMMAND:

... MANUAL <BCM-name> <RES-name> (<component> <new_value>
END

PURPOSE:

To modify the reduced Capacity Model load of a basic Capacity Model previously created by use of CREATE LOAD-ON-CAPACITY-MODEL (MANUAL or AUTOMATIC options).

PARAMETERS:

<BCM-name> Name of Basic Capacity Model
<RES-name> Name of Resultcase

<component> Name of Capacity Model load component. Note that the range of Capacity Model load components available is dependent on the type of Capacity Model specified implicitely through the Capacity Model name (<BCM-name>).

Table 1.1
Load Components relevant for different CM types

<component>	PLT	STF	GIR	USP	OSP
fx1	x	x	x	x	x
fx2	x		x		
fy1	x	x	x		x
fy2	x	x			
fxy	x	x	x		
plat	x	x	x		x
Mbend		x	x		
pdfl	x				
pbst	x				

END End of component selection

Table 1.2
Description of load components

<component>	Description
fx1	Membrane normal load in local x-direction
fx2	Membrane normal load in local x-direction
fy1	Membrane normal load in local y-direction
fy2	Membrane normal load in local y-direction
fxy	Membrane shear load
plat	Lateral plate load
Mbend	Girder or Stiffener bending moment
pdfl	Local plate deflection
pbst	plate bending load

Table 1.3
Unit description for load components

<component>	Unit description
fx1	Force / Capacity Model edge length
fx2	Force / Capacity Model edge length
fy1	Force / Capacity Model edge length
fy2	Force / Capacity Model edge length
fxy	Force / Capacity Model edge length
plat	Force / Capacity Model plate area
Mbend	Force * length
pdfl	Length
pbst	Force / Capacity Model edge length

<new_value>

New value of Capacity Model load component.
Note that the new value of a Capacity Model load component is defined by one, two or three real numbers, dependent on the kind of Resultcase specified implicitely through the Resultcase name <RES-name>, i.e. whether the Resultcase is of the static, complex or scan kind.

Resultcase kind	Interpretation of <new_value>
Static	<new_value> = <nv_static>
Complex	<new_value> = <nv_real> <nv_imag>
Scan	<new_value> = <nv_static> <nv_real> <nv_imag>

where,

<nv_static>	New static load value
<nv_real>	New real load value
<nv_imag>	New imaginary load

Entering <nv_static>, <nv_real> and <nv_imag>:

The new values can be entered in the following 3 ways (assume in the following example that the current value of load component fx1 is 50., and that it shall be changed to 200., the examples show 3 different ways of achieving this):

- by typing in the new value:
  ... MANUAL <BCM-name> <RES-name> fx1 200. END

  <new_value> = 200.

- by adding to the existing value :
  ... MANUAL <BCM-name> <RES-name> fx1 ADD 150. END

  <new_value> = 50. + 150. = 200.

- by multiplication of the existing value :
  ... MANUAL <BCM-name> <RES-name> fx1 MULTIPLY 4.0 END

  <new_value> = 50. * 4.0 = 200.

NOTES:

1 **Only reduced loads are changed**
This command will not affect unreduced loads calculated through the use of CREATE LOAD-ON-CAPACITY-MODEL AUTOMATIC.

2 **Original reduced loads can be re-calculated**
The CHANGE LOAD-ON-CAPACITY-MODEL AUTOMATIC can be used to re-calculate reduced loads on the basis of the original unreduced loads.

3 **Results will be deleted**
Any previously calculated Code Check results for the referenced combination of Capacity Model and re-sultcase will be deleted on the successful completion of this command.

EXAMPLES:

1
```
CHANGE LOAD-ON-CAPACITY-MODEL MANUAL XMANP1.1 RES-1
fx1 -500. fx2 -300.
END
```

2
```
CHANGE LOAD-ON-CAPACITY-MODEL MANUAL XMANP1.1 RES-1
fx1 -500.
fx2 -300.
fy1 +300.
plat 0.015
END
```

CHANGE RESULTCASE

SUBCOMMAND:

... RESULTCASE <RES-name> <Description> <limit-state>

PURPOSE:

To modify a Resultcase description and/or limit-state.

PARAMETERS:

<RES-name>	Name of Resultcase to be modified
<Description>	New text description of the Resultcase.
<limit-state>	New Resultcase limit state kind. Note that the limit states available are dependent on the current Code of Practice.

Table 1.4
Code Check limit states

Code of Practice	Limit state name & description	
API	NORMAL	Normal condition
	STORM	Storm condition
DnV	E-ULS	Environmental load, Ultimate Limit State
	F-ULS	Functionality load, Ultimate Limit State
	PLS	Progressive Limit State
	SLS	Serviceability Limit State
NPD	ULS	Ultimate Limit State
	SLS	Serviceability Limit State
	PLS	Progressive collapse Limit State
	FLS	Fatigue Limit State

NOTES:

1 **Default limit-states**
If the current limit-state kind is not valid for the current Code of Practice, the following defaults will be offered:

API:	NORMAL
DnV:	E-ULS
NPD:	ULS

2 **Cannot change combination data**
The combination data in combination resultcases (see CREATE RESULTCASE) cannot be changed.

3 **Changing limit states of resultcases inherited from FEM-analyses**
This command can be used to change limit-states of resultcases which have been given default limi-states as described under READ-SIN-DIRECT-ACCESS.

EXAMPLES:

1 `CHANGE RESULTCASE 3 'New text' E-ULS`

2 `CHANGE RESULTCASE 3 ;`
If this resultcase has assigned a limit-state kind which is not legal, according to the last selection of Code of Practice (SELECT CODE), this command will assign the default limit-state kind corresponding to the current code of practice (see note 1). The resultcase descriptive text will not be changed.

3 `CHANGE RESULTCASE 3 'New text' ;`

See also:

CREATE RESULTCASE
READ SIN-DIRECT-ACCESS
SELECT CODE

CHANGE SIN-DIRECT-ACCESS

SUBCOMMAND:

... SIN-DIRECT-ACCESS <prefix> <name>

PURPOSE:

To modify the link from the PLATEWORK database file to the SESAM Interface File (Direct Access format), also called SIN-file.

Note that the link must have been created previously by use of the READ SIN-DIRECT-ACCESS command.

The command is typically used in cases where the SIN-file is moved from its previous physical location (e.g. from one disk to another). The command can in such cases be used to re-establish the link between the PLATEWORK database file and the SIN-file, stored in a new location.

PARAMETERS:

<prefix>	New file prefix of the SIN-file
<name>	New file name of the SIN-file

EXAMPLES:

```
1   CHANGE SIN-DIRECT-ACCESS SINDIR:SESTRA R100
```

See also:

READ SIN-DIRECT-ACCESS

1.2 CREATE

COMMAND:

```
CREATE ( ASSEMBLY-OF-CAPACITY-MODELS ...
       | LOAD-ON-CAPACITY-MODEL ...
       | MATERIAL ...
       | RESULTCASE ...
       ( SECTION ...
```

PURPOSE:

To create objects such as Capacity Models, Capacity Model loads, materials, Resultcases, cross sections etc. for direct or indirect use in code checks.

SUBCOMMANDS:

ASSEMBLY-OF-CAPACITY-MODELS	Create a Capacity Model Assembly and its child basic Capacity Models.
LOAD-ON-CAPACITY-MODEL	Create loads on basic Capacity Models.
MATERIAL	Create material instances.
RESULTCASE	Create Resultcase instances.
SECTION	Create cross section instances.

See also:

CHANGE CAPACITY-MODEL
CHANGE LOAD-ON-CAPACITY-MODEL
CHANGE RESULTCASE
READ SIN-DIRECT-ACCESS

CREATE ASSEMBLY-OF-CAPACITY-MODELS

SUBCOMMAND:

... ASSEMBLY-OF-CAPACITY-MODELS <CMA-name> <location> <specification>

PURPOSE:

To create a Capacity Model Assembly and the child basic Capacity Models, for later use in Code Checks.

PARAMETERS:

<CMA-name> Name of new Capacity Model Assembly. This name is also the name prefix for the child basic Capacity Models of this assembly, see below.

<location> Definition of Capacity Model Assembly location in space.

NODES	The location of the assembly is defined by 4 nodes in a Finite Element Model (FE-model). This option requires that a link to a FE-model has been established previously, by use of the command READ SIN-DIRECT-ACCESS.
ARBITRARY	The location of the assembly is defined by 4 arbitrary coordinate sets.
UNLOCATED	The assembly does not have a specific location, and is defined by its main x- and y-dimensions.

<specification> Definition of material, number of girders and stiffeners etc., i.e. a complete description of a stiffened panel. For details, see the following pages.

NOTES:

1 **Material and cross section data must have been created**
Before creating a Capacity Model Assembly, the materials and cross sections must have been created previously, either directly by use of the commands CREATE MATERIAL and CREATE SECTION, or indirectly via the SIN-file by use of the command READ SIN-DIRECT-ACCESS.

2 **Local axis systems and assembly corner definitions**
The 4 assembly corners define the local axis systems within the assembly, and also the naming order. See figure 1-1.

3 **Assembly shape may be distorted**
The assembly shape need not be 100% rectangular. See Chapter 2 and Theoretical Manual for details.

4 **API Capacity Models**
This command will create the necessary USP or OSP Capacity Model in addition to girders, stiffeners and plates, provided that the current Code of Practice has been set to API by use of SELECT CODE API.

5 **Names are automatically given to Basic Capacity Models**
The Basic Capacity Models are given names according to the conventions described in table 1.5 and figure 1-1. Note that the Capacity Model Assembly name (<CMA-name>) is used as name prefix for the Basic Capacity Models within the assembly.

Table 1.5
Name conventions for basic Capacity Model types

CM-type	Name convention
GIR	<CMA-name>G<ig>
STF	<CMA-name>S<igs>.<is>
PLT	<CMA-name>P<igs>.<iss>
USP	<CMA-name>U
OSP	<CMA-name>O

Where,

G	Girder identifier
S	Stiffener identifier
P	Plate identifier
U	Uniaxially Stiffened Panel identifier
O	Orthogonally Stiffened Panel identifier
<ig>	Girder number
<igs>	Girder spacing number
<is>	Stiffener number (within current girder spacing)
<iss>	Stiffener spacing number (within current girder spacing)

See also:

CREATE MATERIAL
CREATE SECTION
CHANGE CAPACITY-MODEL
CREATE LOAD-ON-CAPACITY-MODEL
CHANGE LOAD-ON-CAPACITY-MODEL
DELETE ASSEMBLY-OF-CAPACITY-MODELS
SELECT CODE
RUN CODE-CHECK-ANALYSIS

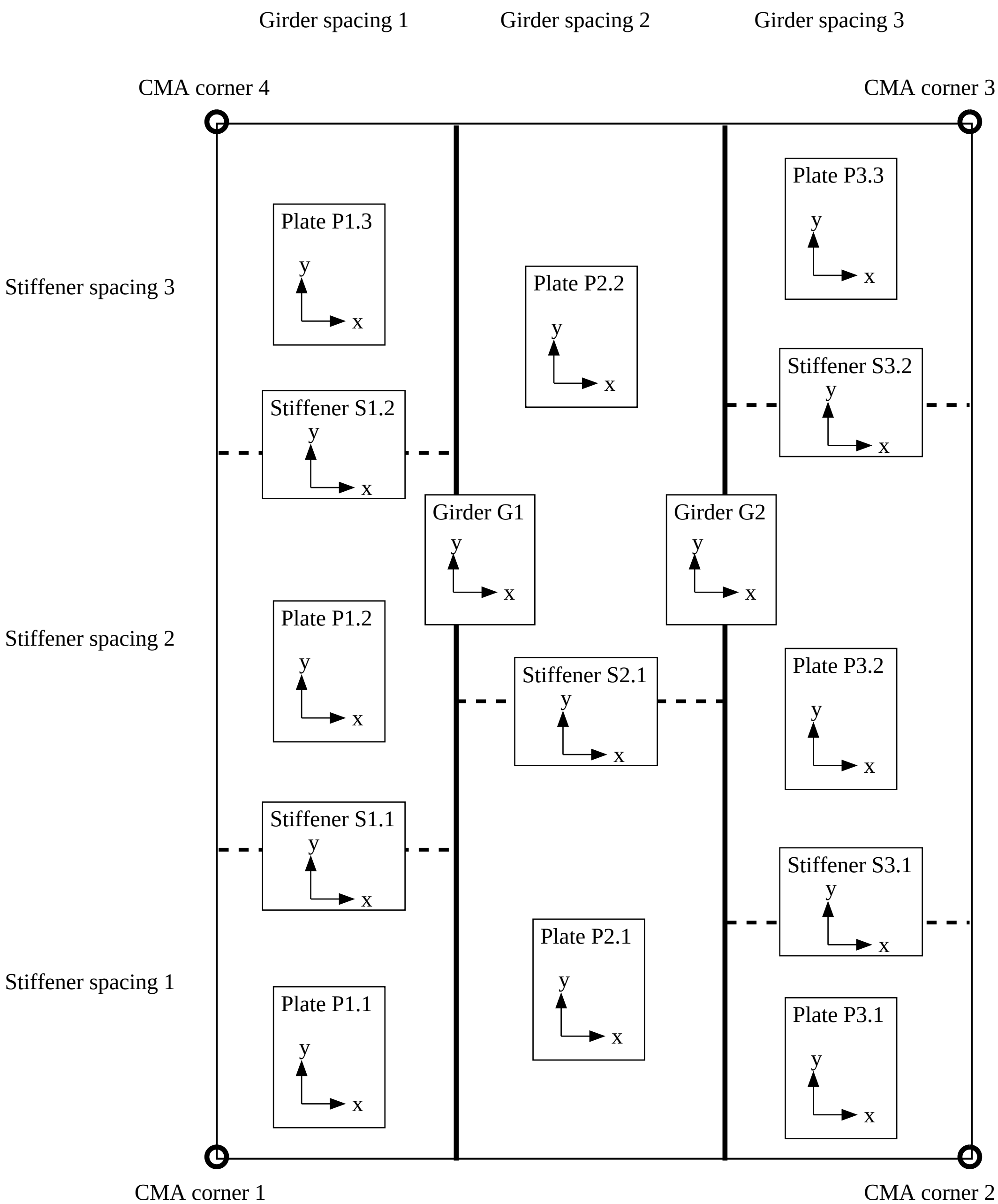

Figure 1-1 Capacity Model naming convention & local coordinate systems within an assembly

CREATE ASSEMBLY-OF-CAPACITY-MODELS <CMA-name> NODES

SUBCOMMAND:

... NODES ((<Typ><Idx><Nod>)*4 | PICK <pick-node>*4) <specification>

PURPOSE:

Define the location of a Capacity Model Assembly by use of 4 nodes in a Finite Element model (FE-model). The 4 nodes correspond to the CMA corners defined in figure 1-1, page 1-25.

PARAMETERS:

<Typ>	Superelement type no. of a FE-node.
<Idx>	Superelement index no. of the FE-node.
<Nod>	Node no. of the FE-node within the superelement.
PICK	Signifies that the nodes are identified graphically by use of a mouse or crosshair.
<pick-node>	Signifies a node identification in the graphics display by use of a mouse or crosshair.
<specification>	Definition of material, number of girders and stiffeners etc.,i.e. a complete description of a stiffened panel. For details, see the following pages.

NOTES:

1 **FE-model must exist**
This command requires that a link to a FE-model has been established previously, by use of the command READ SIN-DIRECT-ACCESS. If no such link exists, the location of the assembly can be defined directly by use of the ARBITRARY option.

2 **Using the PICK option**
This option requires that the mesh display is currently visible through recent use of the DISPLAY MESH command. Nodes are picked by use of a mouse (workstation devices), or a cross-hair (ordinary graphic terminals).

3 See further notes on page 1-23.

EXAMPLES:

```
1   CREATE ASSEMBLY XMAN NODES
    10 1 23
    10 1 49
    10 1 64
    10 1 38 ...

2   CREATE ASSEMBLY XMAN NODES PICK
    <PICK1>
    <PICK2>
    <PICK3>
    <PICK4> ...
```

CREATE ASSEMBLY-OF-CAPACITY-MODELS <CMA-name> ARBITRARY

SUBCOMMAND:

```
...  ARBITRARY ( (<x><y><z>)*4                                         ) <specification>
               ( PICK ( (<Typ><Idx><Nod>)*3 )  <pick-corner>*4         )
               (      ( PICK<pick-node>*3   )                          )
```

PURPOSE:

Define the location of a Capacity Model Assembly by use of 4 arbitrary points in space, either by entering 4 coordinate sets directly, or by use of guide nodes within a Finite Element model (FE-model).

PARAMETERS:

<x>	x-coordinate of a Capacity Model Assembly corner point.
<y>	y-coordinate of a Capacity Model Assembly corner point.
<z>	z-coordinate of a Capacity Model Assembly corner point.
<Typ>	Superelement type no. of an FE-node.
<Idx>	Superelement index no. of the FE-node.
<Nod>	Node no. of the FE-node within the superelement.
PICK	Signifies that the nodes are identified graphically by use of a mouse or crosshair. Note that this option requires that the mesh display is visible through recent use of the DISPLAY MESH command.
<pick-node>	Signifies a node identification in the graphics display by use of a mouse or crosshair.
<pick-corner>	Signifies a CMA corner identification in the graphics display by use of a mouse or crosshair. The point need not coincide with a node in the FE-model. For more details on the CMA corner definitions, see figure 1-1, page 1-25.
<specification>	Definition of material, number of girders and stiffeners etc., i.e. a complete description of a stiffened panel. For details, see the following pages.

NOTES:

1 **FE-model must exist if PICK option is used**
This command requires that a link to a FE-model has been established previously, by use of the command READ SIN-DIRECT-ACCESS.

2 **Using the PICK option**

This option requires that the mesh display is currently visible through recent use of the DISPLAY MESH command. Nodes are picked by use of a mouse (workstation devices), or a cross-hair (ordinary graphic terminals).

3 See further notes on page 1-23.

EXAMPLES:

1
```
CREATE ASSEMBLY XMAN ARBITRARY
-100. -100. 0.0
+100. -100. 0.0
+100. +100. 0.0
-100. +100. 0.0 ...
```

2
```
CREATE ASSEMBLY XMAN ARBITRARY PICK
<PICK-NODE1>
<PICK-NODE2>
<PICK-NODE3>
<PICK-POINT1>
<PICK-POINT2>
<PICK-POINT3>
<PICK-POINT4> ...
```

CREATE ASSEMBLY-OF-CAPACITY-MODELS <CMA-name> UNLOCATED

SUBCOMMAND:

... UNLOCATED <LX> <LY> <specification>

PURPOSE:

Define an unlocated Capacity Model Assembly, i.e. an assembly which is not assigned to a specific location in space or relative to a Finite Element Model, but only described through its main dimensions.

An unlocated Capacity Model Assembly may typically be used for design purposes, concept studies etc. where little or no coordinate data is available.

PARAMETERS:

<LX>	Overall panel length in x-direction. This value can also be interpreted as the sum of the girder spacings.
<LY>	Overall panel length in y-direction. This value can also be interpreted as girder lengths.
<specification>	Definition of material, number of girders and stiffeners etc., i.e. a complete description of a stiffened panel. For details, see the following pages.

NOTES:

1 **AUTOMATIC loads cannot be created.**
The UNLOCATED Capacity Models must be given loads using the CREATE LOAD-ON-CAPACITY-MODEL MANUAL command.

2 See further notes on page 1-23.

EXAMPLES:

```
1   CREATE ASSEMBLY XMAN UNLOCATED
    6000. 18000. ...
```

CREATE ASSEMBLY-OF-CAPACITY-MODELS <CMA-name> ... GIRDERS

SUBCOMMAND:

```
... GIRDERS ( AUTOMATIC      )  (more specification)
            ( MANUAL [1]...  )
            ( NONE           )
```

PURPOSE:

Define the number of girders, the girder spacings and the girder cross sections within the Capacity Model Assembly. The Girder section data entered will be used in the basic girder Capacity Models.

PARAMETERS:

AUTOMATIC — The number of girders and their relative positions are picked up automatically from an FE-model. This option requires that a link to a FE-model has been established previously, by use of the command READ SIN-DIRECT-ACCESS.

MANUAL — The number of girders and their relative positions are defined explicitely by the user in this command.

...[1]
Manual specification of girders is done by first entering the number of girders, and then the girder spacings:

```
<ngir> ( EVEN                )  <gsec_names>
       ( <gs1>,<gs2>...<gsn> )
```

<ngir>	Number of girders in the Capacity Model Assembly.
EVEN	The girders are evenly spaced.
<gs1>,<gs2>...	Girder spacing values for all girder spacings. Note that the number of girders spacings is <ngir>+1.
<gsec_names>	Cross section names for each girder.

NONE — Signifies that there are no girders in the Assembly.

EXAMPLES:

```
1   CREATE ASSEMBLY XMAN NODES PICK <PICK1> <PICK2> <PICK3> <PICK4>
    GIRDERS MANUAL 1 EVEN SEC-1
    STIFFENERS ...

2   CREATE ASSEMBLY XMAN NODES PICK <PICK1> <PICK2> <PICK3> <PICK4>
    GIRDERS AUTOMATIC
    STIFFENERS ...
```

CREATE ASSEMBLY-OF-CAPACITY-MODELS <CMA-name> ... STIFFENERS

SUBCOMMAND:

```
... STIFFENERS ( AUTOMATIC        ) (more specification)
               ( CONSTANT ... [1] )
               ( MANUAL ... [1]   )
               ( NONE             )
```

PURPOSE:

Define the number of stiffeners, the stiffener spacings and the stiffener cross sections within the Capacity Model Assembly. The stiffener section data will be used in the basic stiffener Capacity Models and in the adjacent girder Capacity Models.

PARAMETERS:

AUTOMATIC — The number of stiffeners and their relative positions are picked up automatically from an FE-model. This option requires that a link to a FE-model has been established previously, by use of the command READ SIN-DIRECT-ACCESS.

CONSTANT — This option is similar to the MANUAL option (see below) , except that stiffener data is entered for one girder spacing only, and the other girder spacings are thus assumed to have the same stiffener specifications.

MANUAL — The number of stiffeners and their relative positions are defined explicitely by the user in this command.

...[1]
For each girder spacing, the following is entered:

```
<nstf> ( EVEN                ) <ssec_names>
       ( <ss1>,<ss2>...<ssn> )
```

<nstf>	Number of stiffeners in the current girder spacing.
EVEN	The stiffeners are evenly spaced.
<ss1>,<ss2>...	Stiffener spacing values for all stiffener spacings in the current girder spacing. Note that the number of girders spacings is <ngir>+1 and that the number of stiffeners is <nstf>+1.
<ssec_names>	Cross section names for each girder.

NONE — Signifies that there are no girders in the Assembly.

EXAMPLES:

```
1   CREATE ASSEMBLY XMAN NODES PICK <PICK1> <PICK2> <PICK3> <PICK4>
    GIRDERS AUTOMATIC
    STIFFENERS MANUAL 1 EVEN 1 EVEN SEC-2 SEC-2
    PLATES ...

2   CREATE ASSEMBLY XMAN NODES PICK <PICK1> <PICK2> <PICK3> <PICK4>
    GIRDERS AUTOMATIC
    STIFFENERS AUTOMATIC
    PLATES ...
```

CREATE ASSEMBLY-OF-CAPACITY-MODELS <CMA-name> ... PLATES

SUBCOMMAND:

... PLATES (AUTOMATIC / MANUAL ... [1]) (more specification)

PURPOSE:

Define the plate thicknesses for all plates in the Capacity Model Assembly, i.e. the areas bounded by the girders and stiffeners. The plate thicknesses entered will be used in the basic plate Capacity Models and in adjacent basic girder and stiffener Capacity Models.

PARAMETERS:

AUTOMATIC	The plate thicknesses are picked up automatically from an FE-model. This option requires that a link to a FE-model has been established previously, by use of the command READ SIN-DIRECT-ACCESS.
MANUAL	The plate thicknesses are defined explicitely by the user in this command. ...[1] <plate thicknesses> The plate thicknesses are first entered for each plate in the first girder spacing, followed by the plate thicknesses for each plate in the other girder spacings., i.e. the same order as in the plate Capacity Model naming convention, see figure 1-1, page 1-25.

EXAMPLES:

```
1   CREATE ASSEMBLY XMAN NODES PICK <PICK1> <PICK2> <PICK3> <PICK4>
    GIRDERS AUTOMATIC
    STIFFENERS MANUAL 1 EVEN 1 EVEN SEC-2 SEC-2
    PLATES MANUAL 10.0 10.0 12.0 12.0
    MATERIAL ...

2   CREATE ASSEMBLY XMAN NODES PICK <PICK1> <PICK2> <PICK3> <PICK4>
    GIRDERS AUTOMATIC
    STIFFENERS AUTOMATIC
    PLATES AUTOMATIC
    MATERIAL ...
```

CREATE ASSEMBLY-OF-CAPACITY-MODELS <CMA-name> ... MATERIALS

SUBCOMMAND:

... MATERIALS (AUTOMATIC...
MANUAL ... [1]) (more specification)

PURPOSE:

Select materials for all girders, stiffeners and plates in the Capacity Model Assembly. The materials selected will be used in the basic Capacity Models corresponding to the girder beams, stiffener beams and plates.

PARAMETERS:

AUTOMATIC — The material references are picked up automatically from an FE-model. This option requires that a link to a FE-model has been established previously, by use of the command READ SIN-DIRECT-ACCESS.

MANUAL — The materials are selected explicitely by the user in this command.

...[1] <material names>
The material names are first entered for each girder in the Assembly.
Then, material names are entered for all stiffeners in the Assembly, starting with the stiffeners in the first girder spacing. Finally, material names are entered for all plates in the Assembly, starting with the plates in the first girder spacing, i.e. the same order as in the plate Capacity Model naming convention, see figure 1-1, page 1-25.

EXAMPLES:

```
1   CREATE ASSEMBLY XMAN NODES PICK <PICK1> <PICK2> <PICK3> <PICK4>
    GIRDERS AUTOMATIC
    STIFFENERS MANUAL 1 EVEN 1 EVEN SEC-2 SEC-2
    PLATES MANUAL 10.0 10.0 12.0 12.0
    MATERIAL MANUAL MAT-1 MAT-2 MAT-2 MAT-3 MAT-3 MAT3 MAT-3

2   CREATE ASSEMBLY XMAN NODES PICK <PICK1> <PICK2> <PICK3> <PICK4>
    GIRDERS AUTOMATIC
    STIFFENERS AUTOMATIC
    PLATES AUTOMATIC
    MATERIAL AUTOMATIC
```

CREATE LOAD-ON-CAPACITY-MODEL

SUBCOMMAND:

... LOAD-ON-CAPACITY-MODEL (AUTOMATIC ...
MANUAL ...

PURPOSE:

To create the basic Capacity Model loads that are used in the Code Check analyses, i.e. membrane loads, lateral plate load, bending moments etc.

Note that before basic Capacity Model loads can be created, the basic Capacity Models and Resultcases must exist. Capacity Models are created by use of the CREATE ASSEMBLY-OF-CAPACITY-MODELS command.

Resultcases can be created in two different ways:

- Directly, by use of the CREATE RESULTCASE command.
- Indirectly, through the use of the READ SIN-DIRECT-ACCESS command, where resultcases are inherited from the Finite Element analysisis.

PARAMETERS:

AUTOMATIC — Create basic Capacity Model loads automatically. This requires that

Either, — The Resultcases were created through the use of the READ SIN-DIRECT-ACCESS command, and the basic Capacity Models were given a location wrt. the FE-model which corresponds to a flat area modelled with membrane or shell elements, optionally with beams representing girders and stiffeners.

or, — The Resultcases were combination resultcases created by use of the CREATE RESULTCASE command.

MANUAL — Create basic Capacity Model loads manually. There are no restrictions to how the basic Capacity Models or the Resultcases were created.

See also:

READ SIN-DIRECT-ACCESS
CREATE ASSEMBLY-OF-CAPACITY-MODELS
CREATE RESULTCASE
CHANGE LOAD-ON-CAPACITY-MODEL

CREATE LOAD-ON-CAPACITY-MODEL AUTOMATIC

SUBCOMMAND:

... AUTOMATIC (ASSEMBLY <CMA-name>
ALL

PURPOSE:

To calculate and store the basic Capacity Model loads on the basis of results from a FE-analysis (shell stresses, beam forces etc.).

Note that use of the AUTOMATIC feature requires that

Either, The Resultcases were created through the use of the READ SIN-DIRECT-ACCESS command, and the basic Capacity Models were given a location wrt. the FE-model which corresponds to a flat area modelled with membrane or shell elements, optionally with beams representing girders and stiffeners.

or, The Resultcases were combination resultcases created by use of the CREATE RESULTCASE command.

PARAMETERS:

ASSEMBLY	Calculate Capacity Model loads for a specified Capacity Model Assembly.
<CMA-name>	Name of Capacity Model Assembly.
ALL	Calculate Capacity Model loads for all Capacity Model Assemblies.

NOTES:

1 **Command can be very time-consuming; use SCOPE ELEMENT**
The execution of this command involves extensive searching in the FE-model, which can be very time-consuming, depending on the refinement of both the FE-model and the Capacity Model Assemblies. It is therefore highly recommended to reduce the FE-model scope, by use of the SCOPE ELEMENT command, so that elements outside the assembly area is excluded in the search. It may also be adviseable to execute this command in a batch queue when the model is very large, and when more powerful computer resources are available nearby (for example in a local network system).

2 **Unreduced and reduced Capacity Model loads**
The FE-stresses are in the general case more complicated than the simple loads depicted in e.g. figure 1-2, page 1-41. Therefore, intermediate loads termed "unreduced" are first calculated on the basis of the FE-stresses. The simpler, "reduced" loads are thereafter calculated on the basis of the unreduced loads. The reduced loads correspond to the values entered in the CREATE LOAD-ON-CAPACITY-MODEL MANUAL command. For an example of unreduced and reduced loads, see figure 1-16, page 1-82. See also Chapter 2.

EXAMPLES:

1 `CREATE LOAD AUTOMATIC ALL`

2 `CREATE LOAD AUTOMATIC ASSEMBLY XMAN`

3 See Chapters 2 and 3

CREATE LOAD-ON-CAPACITY-MODEL MANUAL

SUBCOMMAND:

... MANUAL <BCM-name> <RES-name> (<component> <value>
END

PURPOSE:

To specify reduced Capacity Model loads directly, without reference to a FE-analysis.

PARAMETERS:

<BCM-name>	Name of Basic Capacity Model
<RES-name>	Name of Resultcase
<component>	Name of Capacity Model load component, see below.
END	End of component selection
<value>	Value of Capacity Model load component.

Table 1.6
Load Components relevant for different CM types

<component>	PLT	STF	GIR	USP	OSP
fx1	x	x	x	x	x
fx2	x		x		
fy1	x	x	x		x
fy2	x	x			
fxy	x	x	x		
plat	x	x	x		x
Mbend		x	x		
pdfl	x				
pbst	x				

END	End of component selection

Table 1.7
Description of load components

<component>	Description
fx1	Membrane normal load in local x-direction
fx2	Membrane normal load in local x-direction
fy1	Membrane normal load in local y-direction
fy2	Membrane normal load in local y-direction
fxy	Membrane shear load
plat	Lateral plate load
Mbend	Girder or Stiffener bending moment
pdfl	Local plate deflection
pbst	plate bending stress

Table 1.8
Unit description for load components

<component>	Unit description
fx1	Force / Capacity Model edge length
fx2	Force / Capacity Model edge length
fy1	Force / Capacity Model edge length
fy2	Force / Capacity Model edge length
fxy	Force / Capacity Model edge length
plat	Force / Capacity Model plate area
Mbend	Force * length
pdfl	Length
pbst	Force / Capacity Model edge length

EXAMPLES:

```
1   CREATE LOAD-ON-CAPACITY-MODEL MANUAL XMANP1.1 RES-1
    fx1 -500.
    fx2 -300.
    END

2   CREATE LOAD-ON-CAPACITY-MODEL MANUAL XMANP1.1 RES-1
    fx1 -500.
    fx2 -300.
    fy1 +300.
    plat 0.015
    END
```

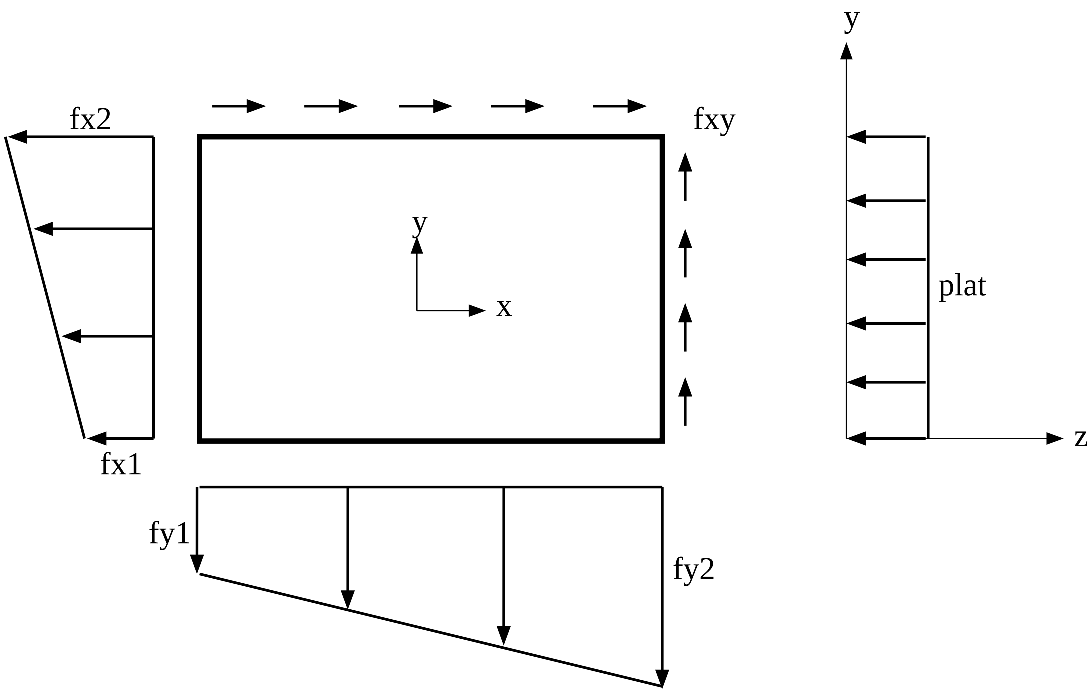

Figure 1-2 Loads on a plate (PLT) Capacity Model

Table 1.9 Loads on a plate (PLT) Capacity Model

fx1	Normal, in-plane force per unit edge length, x-direction
fx2	Normal, in-plane force per unit edge length, x-direction
fy1	Normal, in-plane force per unit edge length, y-direction
fy2	Normal, in-plane force per unit edge length, y-direction
fxy	Shear, in-plane force per unit edge length
plat	Lateral load, force per unit area

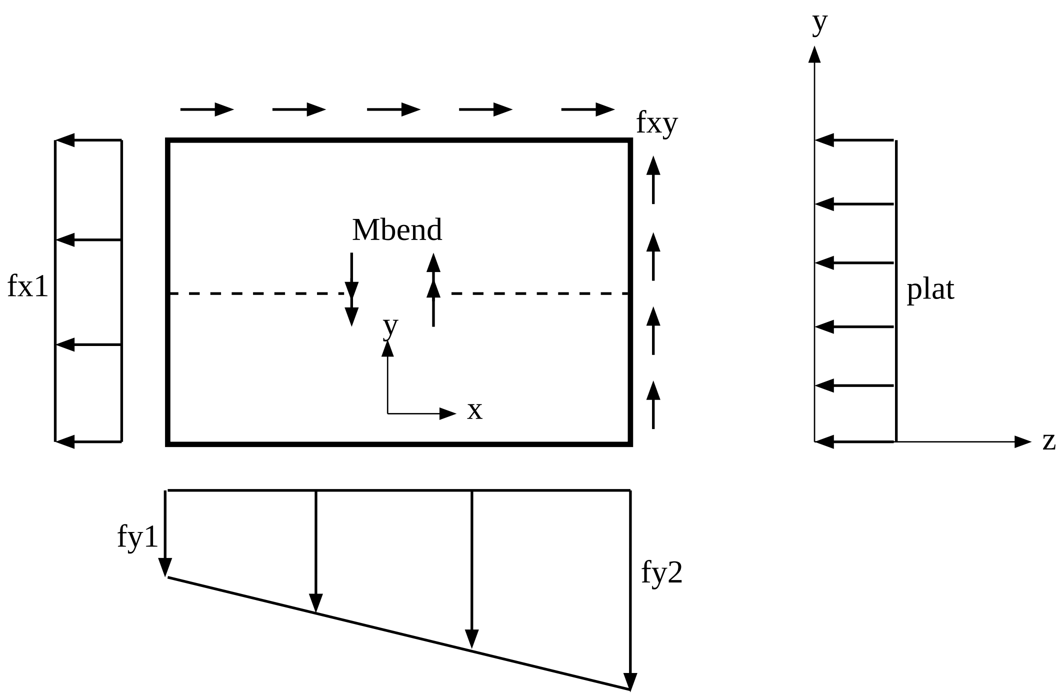

Figure 1-3 Loads on a stiffener (STF) Capacity Model

Table 1.10 Loads on a stiffener (STF) Capacity Model

fx1	Normal, in-plane force per unit edge length, x-direction
fy1	Normal, in-plane force per unit edge length, y-direction
fy2	Normal, in-plane force per unit edge length, y-direction
fxy	Shear, in-plane force per unit edge length
plat	Lateral load, force per unit area
Mbend	Bending moment, centre of stiffener

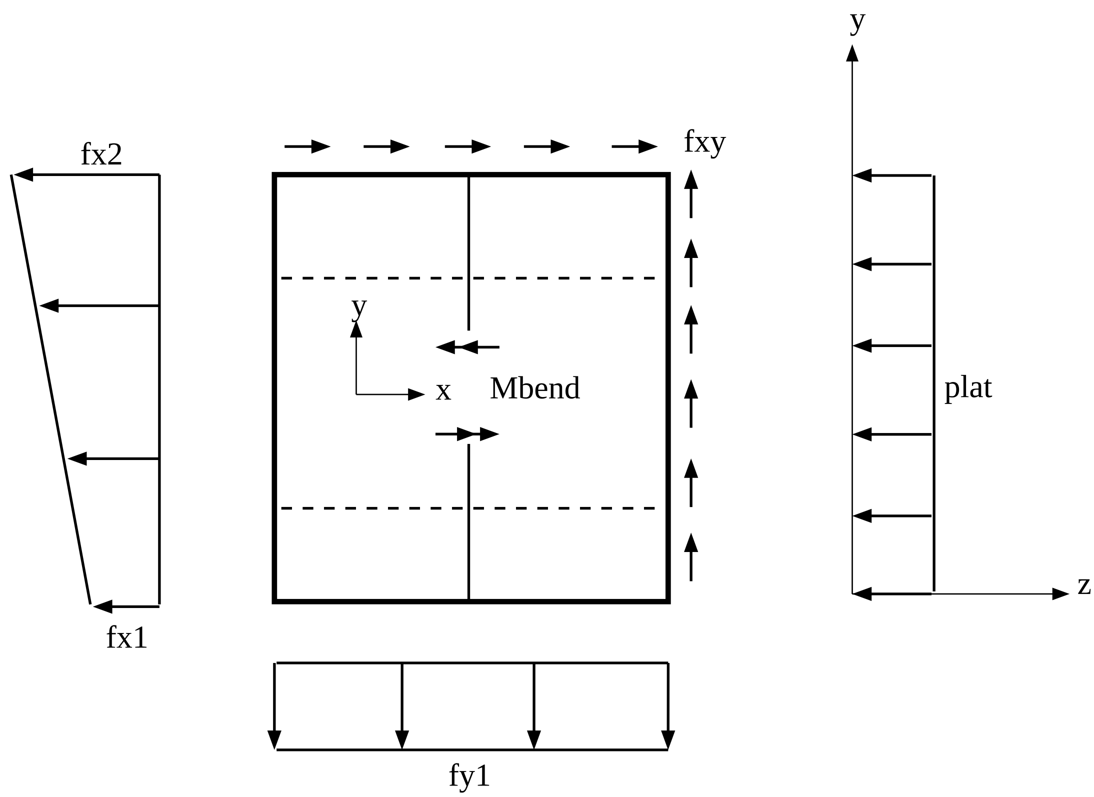

Figure 1-4 Loads on a girder (GIR) Capacity Model

Table 1.11 Loads on a girder (GIR) Capacity Model

fx1	Normal, in-plane force per unit edge length, x-direction
fx2	Normal, in-plane force per unit edge length, x-direction
fy1	Normal, in-plane force per unit edge length, y-direction
fxy	Shear, in-plane force per unit edge length
plat	Lateral load, force per unit area
Mbend	Bending moment, centre of girder

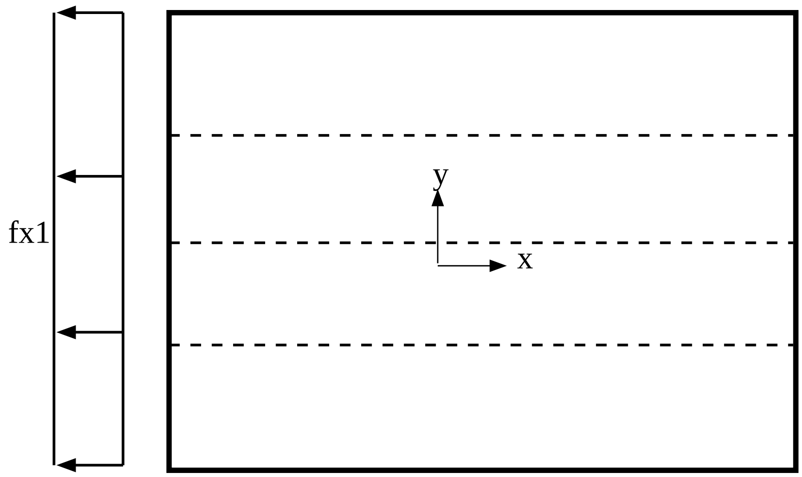

Figure 1-5 Loads on a uniaxially stiffened panel (USP) Capacity Model

Table 1.12 Loads on a Uniaxially Stiffened Panel (USP) Capacity Model

fx1	Normal, in-plane force per unit edge length, x-direction

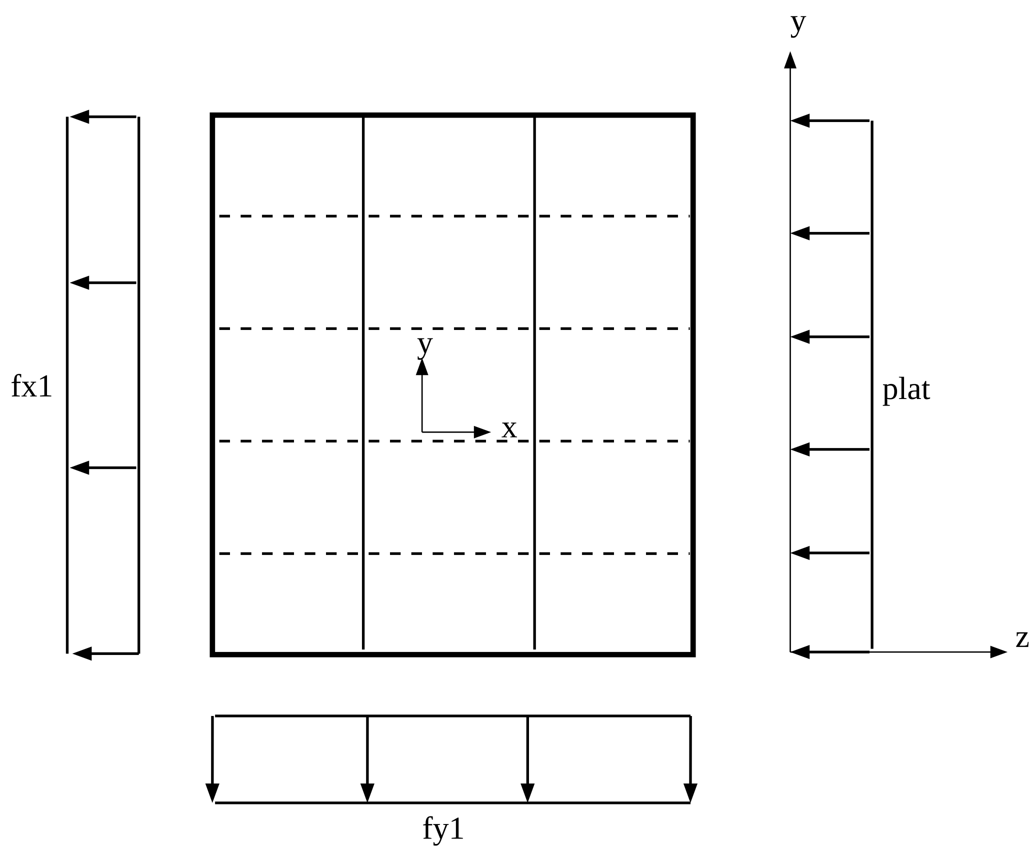

Figure 1-6 Loads on a orthogonally stiffened panel (OSP) Capacity Model

Table 1.13 Loads on a girder (GIR) Capacity Model

fx1	Normal, in-plane force per unit edge length, x-direction
fy1	Normal, in-plane force per unit edge length, y-direction
plat	Lateral load, force per unit area

CREATE MATERIAL

SUBCOMMAND:

... MATERIAL <MAT-name> LIMITED-ELASTIC <E> <ny> <fy> <fp>

PURPOSE:

Create a material for later reference in the CREATE ASSEMBLY-OF-CAPACITY-MODELS command. This command is most typically used when PLATEWORK is executed for design purposes, i.e. when the materials are not inherited from a FE-model.

PARAMETERS:

<MAT-name>	Material name
LIMITED-ELASTIC	Limited elastic material type, i.e. an elastic material which has a limited range of elasticity.
<E>	Young’s modulus
<ny>	Poisson’s ratio
<fy>	Yield stress
<fp>	Proportionality limit stress

NOTES:

1 **Proportionality limit stress, <fp>**
This parameter is only used in the API Code Checks, see Theoretical Manual.

EXAMPLES:

```
1   CREATE MATERIAL MAT-1 LIMITED-ELASTIC 2.1E5 0.3 420. 207.
```

See also:

CREATE ASSEMBLY-OF-CAPACITY-MODELS
CHANGE CAPACITY-MODEL
PRINT MATERIAL

CREATE RESULTCASE

SUBCOMMAND:

... RESULTCASE <RES-name> <Description> <Resultcase-kind> <limit-state> ...

```
... <limit-state>  ( BASIC
                   ( COMBINATION  ( <source-RES-name> <factor> <phase>
                                  ( END
```

PURPOSE:

Create Resultcases for use with Capacity Model loads and Code Check results. See Chapter 2 for details.

PARAMETERS:

<RES-name> Name of new Resultcase to be created

<Description> Text description of new Resultcase

<Resultcase-kind> Kind of Resultcase

STATIC	static values
COMPLEX	real & imaginary values
SCAN	static + real & imaginary values

<limit-state> Resultcase limit state kind. Note that the limit states available are dependent on the current Code of Practice, see below.

Table 1.14
Code Check limit states

Code of Practice	Limit state name & description	
API	NORMAL	Normal condition
	STORM	Storm condition
DnV	E-ULS	Environmental load, Ultimate Limit State
	F-ULS	Functionality load, Ultimate Limit State
	PLS	Progressive Limit State
	SLS	Serviceability Limit State
NPD	ULS	Ultimate Limit State
	SLS	Serviceability Limit State
	PLS	Progressive collapse Limit State
	FLS	Fatigue Limit State

BASIC	Resultcase is a basic Resultcase
COMBINATION	Resultcase is a combination Resultcase, defined through a number of factored source Resultcases.
<source-RES-name>	Name of a source Resultcase, contributing to the definition of a combination Resultcase.
<factor>	Weight factor to be applied to <source-RES-name>.
<phase>	Phase angle (in degrees) at which the <source-RES-name> is evaluated in the combination.
END	Signifies that no more source Resultcases contribute to a combination Resultcase.

NOTES:

1 **Default limit-states**
If the current limit-state kind is not valid for the current Code of Practice, the following defaults will be offered:

API:	NORMAL
DnV:	E-ULS
NPD:	ULS

2 **Calculation of CM loads in combination resultcases**
This is done by use of CREATE LOAD-ON-CAPACITY-MODEL AUTOMATIC. See Chapter 2 for combination formulae and more details on the procedure.

EXAMPLES:

1
```
CREATE RESULTCASE R1 'Big wave' COMPLEX STORM BASIC
```

2
```
CREATE RESULTCASE R2 'Gravity' STATIC NORMAL BASIC
```

3
```
CREATE RESULTCASE C1 'Gravity + Big wave' SCAN STORM
COMBINATION
R1 1.0 0.0
R2 1.0 0.0
END
```

See also:

CHANGE RESULTCASE
CREATE LOAD-ON-CAPACITY-MODEL
PRINT RESULTCASE

CREATE SECTION

SUBCOMMAND:

... SECTION <SEC-name> <section-type> <section-parameters>

PURPOSE:

Create a cross section for later reference in the CREATE ASSEMBLY-OF-CAPACITY-MODELS command. This command is most typically used when PLATEWORK is executed for design purposes, i.e. when the cross sections are not inherited directly from an FE-model.

PARAMETERS:

<SEC-name>	Cross section name	
<section-type>	SESAM Cross section type	
	GENERAL	General section
	BAR	Massive Bar section
	BOX	Box section
	I	I or H section
	L	L section
<section-parameters>	Cross section parameters, according to cross section type. See the detailed descriptions on the following pages.	

EXAMPLES:

1 See Chapter 3

See also:

CREATE ASSEMBLY-OF-CAPACITY-MODELS
CHANGE CAPACITY-MODEL
PRINT SECTION

GENERAL General section

Cross section parameters:

AREA	Cross section area **(used in mapping formula)**
IX	Torsional moment of inertia about shear centre
IY	Moment of inertia about Y-axis **(used in mapping formula)**
IZ	Moment of inertia about Z-axis
IYZ	Product of inertia about Y and Z axes
WXMIN	Min. torsional section modulus about shear centre
WYMIN	Min. section modulus about Y-axis
WZMIN	Min. section modulus about Z-axis
SHARY	Shear area in direction of Y-axis
SHARZ	Shear area in direction of Z-axis
SHCENY	Shear centre location from centroid, Y-component
SHCENZ	Shear centre location from centroid, Z-component
SY	Static area moment about Y-axis
SZ	Static area moment about Z-axis

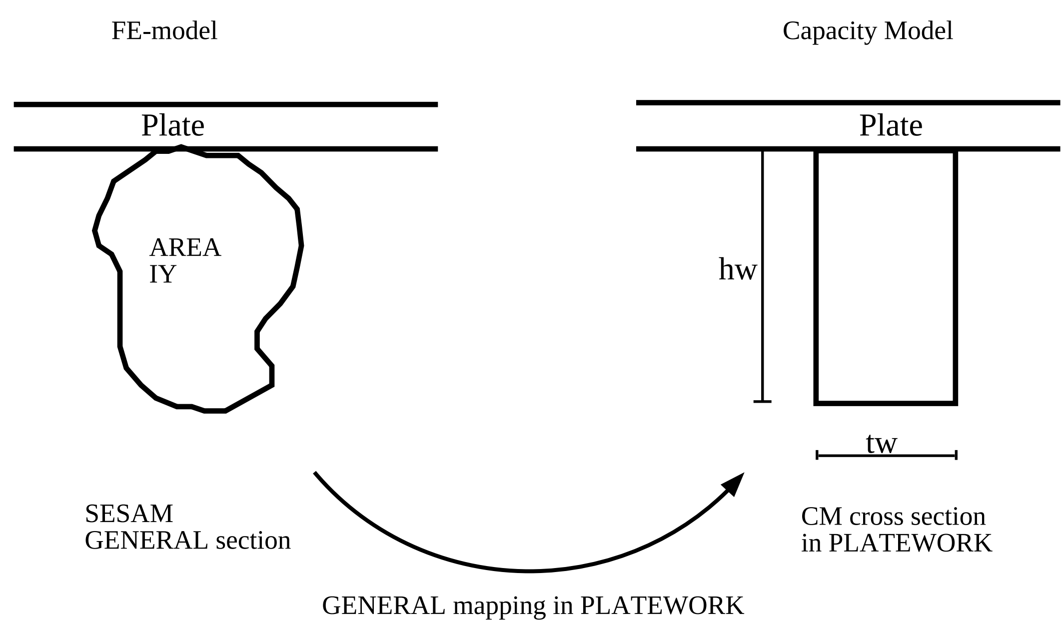

Figure 1-7 Mapping from GENERAL section to PLATEWORK CM cross section (stiffener or girder).

Mapping formulae used :

hw = SQRT(12 * IY / AREA)
tw = AREA / hw
bf = 0.0
tf = 0.0

af = 0.0
ef = 0.0

BAR Massive bar section

Cross section parameters:

HZ	Height of beam
BT	Width of bar at top
BB	Width of bar at bottom

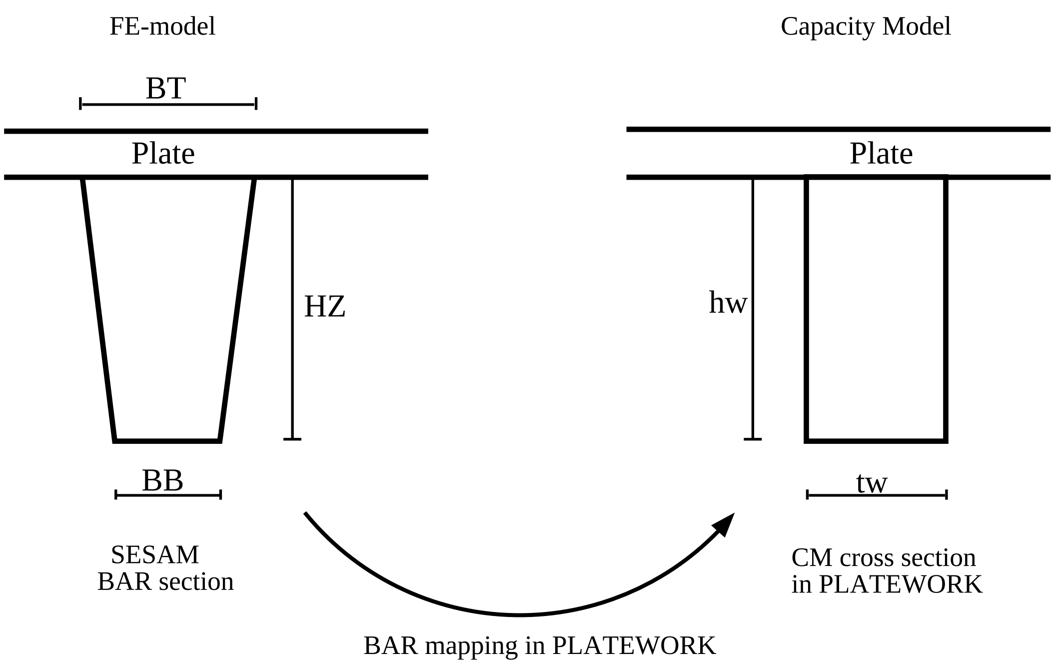

Figure 1-8 Mapping from BAR section to PLATEWORK CM cross section (stiffener or girder).

Mapping formulae used :

hw = HZ
tw = (BB+BT)/2
bf = 0.0
tf = 0.0
af = 0.0
ef = 0.0

BOX Box section

Cross section parameters:

HZ	Height of beam
TY	Thickness of webs
TB	Thickness of bottom flange
TT	Thickness of top flange
BY	Width of beam

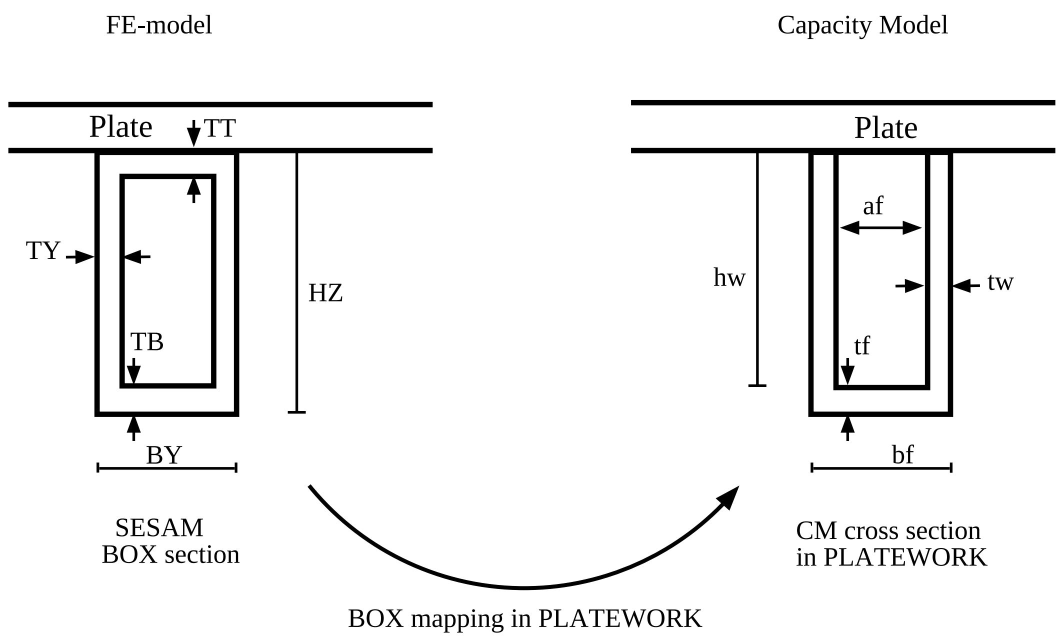

Figure 1-9 Mapping from BOX section to PLATEWORK CM cross section (stiffener or girder).

Mapping formulae used :

hw = HZ - TB
tw = TY
bf = BY
tf = TT
af = BY - 2*TY
ef = 0.0

I I or H section

Cross section parameters:

HZ	Height of beam
TY	Thickness of web
BT	Width of top flange
TT	Thickness of top flange
BB	Width of bottom flange
TB	Thickness of bottom flange

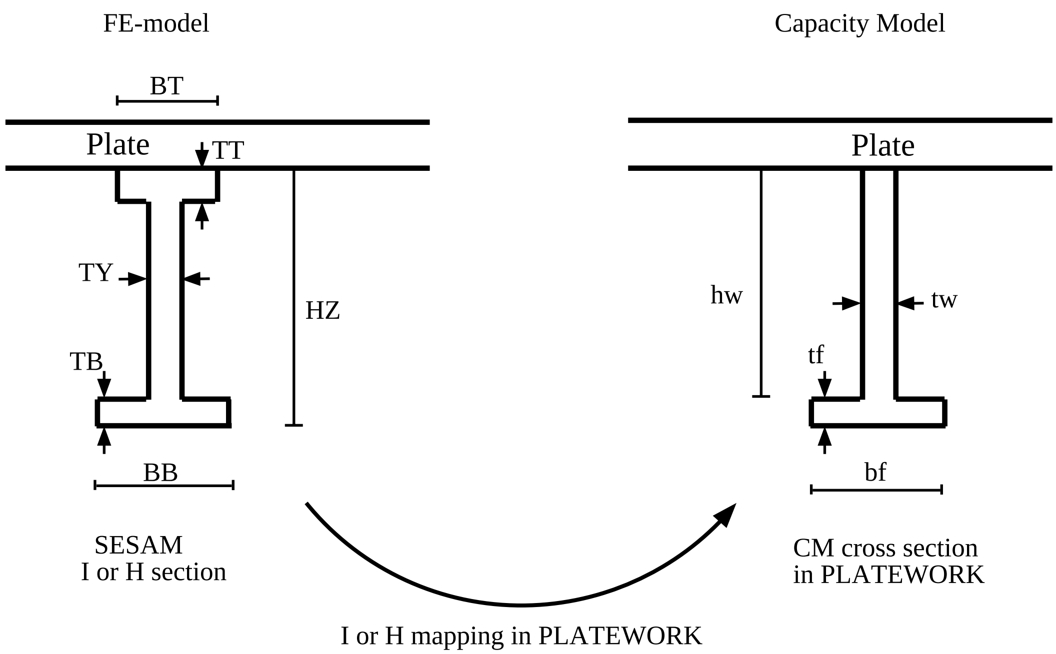

Figure 1-10 Mapping from I or H section to PLATEWORK CM cross section (stiffener or girder).

Mapping formulae used :

$hw = HZ - TB$
$tw = TY$
$bf = BB$
$tf = TB$
$af = 0.0$
$ef = 0.0$

L L section

Cross section parameters:

HZ	Height of beam
TY	Thickness of web
BY	Width of flange
TZ	Thickness of flange
K	Web orientation

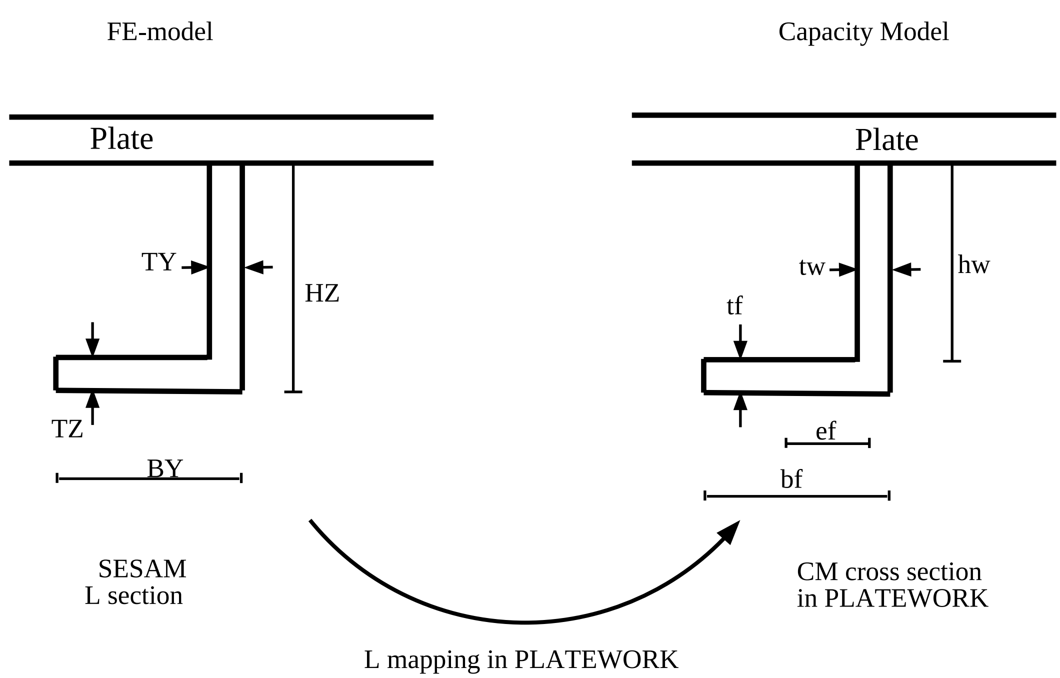

Figure 1-11 Mapping from L section to PLATEWORK CM cross section (stiffener or girder).

Mapping formulae used :

hw = HZ - TZ
tw = TY
bf = BY
tf = TY
af = 0.0
ef = (bf - tw) / 2.

1.3 DEFINE

COMMAND:

```
DEFINE  ( LIMIT-STATE-FACTOR ...
        | LOAD-DISPLAY-FACTOR ...
        | PHASE-ANGLE-STEPPING ...
        | SORTING ...
        ( TOLERANCE ...
```

PURPOSE:

To define or re-define global variables used in code checks, result presentations etc.

SUBCOMMANDS:

LIMIT-STATE-FACTOR	Define the limit state factor values associated with the different code check limit states.
LOAD-DISPLAY-FACTOR	Define a scale factor used in the display of Capacity Model loads.
PHASE-ANGLE-STEPPING	Define the phase angle(s) at which the code checks will be executed in case of complex Capacity Model loads.
SORTING	Define the Code Check results sorting parameter, sorting order and the sorting filters.
TOLERANCE	Define the coordinate, angle and parameter tolerances used during creation of Capacity Models and Capacity Model loads.

DEFINE LIMIT-STATE-FACTOR

SUBCOMMAND:

... LIMIT-STATE-FACTOR (API ...
DNV ...
NPD ...)

PURPOSE:

To define or re-define the values of the factors associated with the different limit-state kinds. Each Resultcase is associated with a limit-state (see for example CREATE RESULTCASE command). In the code check analysis, the program will use the limit-state factor which is associated with the limit-state kind of each Resultcase.

PARAMETERS:

API	Limit-state factors associated with API Code of Practice
DNV	Limit-state factors associated with DnV Code of Practice
NPD	Limit-state factors associated with DnV Code of Practice

See also:

CREATE RESULTCASE
CHANGE RESULTCASE
RUN CODE-CHECK-ANALYSIS
PRINT DEFINITIONS

DEFINE LIMIT-STATE-FACTOR API

SUBCOMMAND:

... API (	NORMAL	<FS-SLS>	<FS-ULS>
	STORM	<FS-SLS>	<FS-ULS>

PURPOSE:

To define or re-define the values of the API limit-state factors. The factors are used in API Code Checks for those resultcases that have assigned an API NORMAL or STORM condition.

PARAMETERS:

NORMAL	Normal condition
STORM	Storm condition
<FS-SLS>	Factor of safety, Serviceability limit state
<FS-ULS>	Factor of safety, Ultimate limit state

EXAMPLES:

```
1   DEFINE LIMIT-STATE-FACTOR API STORM 1.25 1.5
```

See also:

CREATE RESULTCASE
CHANGE RESULTCASE
RUN CODE-CHECK-ANALYSIS
PRINT DEFINITIONS

DEFINE LIMIT-STATE-FACTOR DNV

SUBCOMMAND:

```
... DNV ( E-ULS   <eta0>
        ( F-ULS   <eta0>
        ( PLS     <etap>
        ( SLS     <etap>
```

PURPOSE:

To define or re-define the values of the DnV limit-state factors. The factors are used in DnV Code Checks for those resultcases that have assigned a DnV limit-state (E-ULS, F-ULS, PLS or SLS).

PARAMETERS:

E-ULS	Environmental load, Ultimate Limit State
F-ULS	Functionality load, Ultimate Limit State
PLS	Progressive Limit State
SLS	Serviceability Limit State
<eta0>	Basic usage factor
<etap>	Usage factor

EXAMPLES:

```
1   DEFINE LIMIT-STATE-FACTOR DNV E-ULS 0.6
```

See also:
- CREATE RESULTCASE
- CHANGE RESULTCASE
- RUN CODE-CHECK-ANALYSIS
- PRINT DEFINITIONS

DEFINE LIMIT-STATE-FACTOR NPD

```
... NPD ( ULS   <gamma-m>
          SLS   <gamma-m>
          PLS   <gamma-m>
          FLS   <gamma-m>
```

PURPOSE:

To define or re-define the values of the NPD limit-state factors. The factors are used in NPD Code Checks for those resultcases that have assigned a NPD limit-state (ULS, SLS, PLS or FLS).

PARAMETERS:

ULS	Ultimate Limit State
SLS	Serviceability Limit State
PLS	Progressive collapse Limit State
FLS	Fatigue Limit State
<gamma-m>	Material coefficient

EXAMPLES:

```
1   DEFINE LIMIT-STATE-FACTOR NPD ULS 1.15
```

See also:
CREATE RESULTCASE
CHANGE RESULTCASE
RUN CODE-CHECK-ANALYSIS
PRINT DEFINITIONS

DEFINE LOAD-DISPLAY-FACTOR

SUBCOMMAND:

... LOAD-DISPLAY-FACTOR <factor>

PURPOSE:

To define or re-define the scale factor used during display of Capacity Model loads.

PARAMETERS:

<factor> Load display factor. Default value is <factor>=1.0.

EXAMPLES:

```
1   DEFINE LOAD-DISPLAY-FACTOR 1.5
```

See also:
DISPLAY LOAD-ON-CAPACITY-MODEL

DEFINE PHASE-ANGLE-STEPPING

SUBCOMMAND:

```
... PHASE-ANGLE-STEPPING  ( CONSTANT    <astart> <astop> <astep>
                          ( ARBITRARY  ( <angle>
                                       ( END
```

PURPOSE:

To define or re-define the phase angles at which the Code Checks will be executed in the case of complex Capacity Model loads.

For a given complex Capacity Model load, the program will step through all phase angles specified, and store the results corresponding to the phase angle that resulted in the largest maximum Unity Criterion factor, UC-max.

All phase angles shall be entered in degrees, ranging from 0 to 360 degrees.

PARAMETERS:

CONSTANT	The phase angles are defined with a constant phase angle step.
<astart>	The first angle where Code Check will be executed.
<astop>	The last angle where Code Check will be executed.
<astep>	The phase angle step between <astart> and <astop>.
ARBITRARY	The phase angles are defined with an arbitrary phase angle step.
<angle>	Next phase angle where Code Check will be executed.
END	Signifies end of phase angle specification.

EXAMPLES:

```
1   DEFINE PHASE-ANGLE-STEPPING CONSTANT 0.0 360.0 30.0

2   DEFINE PHASE-ANGLE-STEPPING ARBITRARY 10.0 45. 85. 95. 110. 140. END
```

See also:

CREATE RESULTCASE
CHANGE RESULTCASE
RUN CODE-CHECK-ANALYSIS
PRINT DEFINITIONS

DEFINE SORTING

SUBCOMMAND:

```
... SORTING ( MAX-ENTRIES ...
            | MAX-VALUE ...
            | MIN-VALUE ...
            | ORDER ...
            ( PARAMETER ...
```

PURPOSE:

To define or re-define the Code Check results sorting parameter, sorting order and the sorting filters, used during print of Code Check results.

PARAMETERS:

MAX-ENTRIES	Define max number of entries in a Code Check results print table.
MAX-VALUE	Define the upper limit of the current sorting parameter value. The results for a given Capacity Model and Resultcase will not be printed if the value of the sorting parameter exceeds the specified max value.
MIN-VALUE	Define the lower limit of the current sorting parameter value. The results for a given Capacity Model and Resultcase will not be printed if the value of the sorting parameter is less than the specified min value.
ORDER	Define the order in which the sorted Code Check results shall be printed.
PARAMETER	Define which Code Check results parameter shall be used as sorting parameter. Default sorting parameter is maximum Unity Criterion factor (UCmax). The range of parameters available depends on which Code of Practice (API,DnV or NPD) is selected. A complete list of parameter names and parameter descriptions can be obtained by entering the command PRINT NOMENCLATURE CODE-CHECK-RESULTS.

See also:

PRINT CODE-CHECK-RESULTS
PRINT DEFINITIONS
PRINT NOMENCLATURE CODE-CHECK-RESULTS

DEFINE SORTING MAX-ENTRIES

SUBCOMMAND:

... MAX-ENTRIES (<NumEnt>
UNLIMITED

PURPOSE:

Define max number of entries in a Code Check results print table.

PARAMETERS:

<NumEnt>	Number of entries.
UNLIMITED	Signifies that there is no upper limit to the number of entries.

EXAMPLES:

```
1   DEFINE SORTING MAX-ENTRIES UNLIMITED

2   DEFINE SORTING MAX-ENTRIES 10.
```

See also:

PRINT CODE-CHECK-RESULTS
PRINT DEFINITIONS

DEFINE SORTING MAX-VALUE

SUBCOMMAND:

... MAX-VALUE (<MaxVal>
UNLIMITED

PURPOSE:

Define the upper limit of the current sorting parameter value. The results for a given Capacity Model and Resultcase will not be printed if the value of the sorting parameter exceeds the specified max value.

PARAMETERS:

<MaxVal>	The actual max value.
UNLIMITED	Signifies that there is no upper limit to the max value.

EXAMPLES:

```
1   DEFINE SORTING MAX-VALUE UNLIMITED

2   DEFINE SORTING MAX-VALUE 100.
```

See also:

PRINT CODE-CHECK-RESULTS
PRINT DEFINITIONS

DEFINE SORTING MIN-VALUE

SUBCOMMAND:

... MIN-VALUE (<MinVal>
UNLIMITED

PURPOSE:

Define the lower limit of the current sorting parameter value. The results for a given Capacity Model and Resultcase will not be printed if the value of the sorting parameter is less than the specified min value.

PARAMETERS:

<MaxVal>	The actual min value.
UNLIMITED	Signifies that there is no upper limit to the min value.

EXAMPLES:

```
1   DEFINE SORTING MIN-VALUE UNLIMITED

2   DEFINE SORTING MIN-VALUE 1.0
```

See also:
PRINT CODE-CHECK-RESULTS
PRINT DEFINITIONS

DEFINE SORTING ORDER

SUBCOMMAND:

... ORDER (INCREASING
DECREASING

PURPOSE:

To define the order in which the Code Check results are printed.

PARAMETERS:

INCREASING	Print Code Check results in the order defined by an increasing value of the sorting parameter.
DECREASING	Print Code Check results in the order defined by a decreasing value of the sorting parameter.

EXAMPLES:

```
1   DEFINE SORTING ORDER DECREASING

2   DEFINE SORTING ORDER INCREASING
```

See also:

PRINT CODE-CHECK-RESULTS
PRINT DEFINITIONS

DEFINE SORTING PARAMETER

SUBCOMMAND:

... PARAMETER <ParNam>

PURPOSE:

To define which Code Check results parameter shall be used as sorting parameter.

PARAMETERS:

<ParNam> The actual name of the Code Check results parameter that the results shall be sorted after. Default sorting parameter is maximum Unity Criterion factor (UCmax). The range of parameters available depends on which Code of Practice (API,DnV or NPD) is selected. A complete list of parameter names and parameter descriptions can be obtained by entering the command PRINT NOMENCLATURE CODE-CHECK-RESULTS.

EXAMPLES:

```
1   DEFINE SORTING PARAMETER UCmax

2   DEFINE SORTING PARAMETER etaweb
```

See also:

PRINT CODE-CHECK-RESULTS
PRINT DEFINITIONS
PRINT NOMENCLATURE CODE-CHECK-RESULTS

DEFINE TOLERANCE

SUBCOMMAND:

```
... TOLERANCE  ( COORDINATE  <EpsPnt>
               ( ANGLE       <EpsAng>
               ( PARAMETER   <EpsPar>
```

PURPOSE:

To define tolerances typically used during creation of Capacity Models.

PARAMETERS:

COORDINATE	Define the coordinate tolerance. This value is for example used to compare the lo cation of a point wrt. a plane, as is the case in the command SCOPE ELEMENT INCLUDE PLANE.
<EpsPnt>	Value of the coordinate tolerance. When a FE-model is read, the default value of <EpsPnt> is DIAG*0.001, where DIAG is the diagonal in the smallest x,y,z box that encapsulates the FE-model.
ANGLE	Define the angle tolerance. This value is typically used to compare the orientation of beam elements in a FE-model with main Capacity Model assembly x- and y-directions, in order to determine whether the beam elements are candidates for girders or stiffeners.
<EpsAng>	Value of the angle tolerance in radians. Default is equivalent to about 0.25 degrees.
PARAMETER	Define the parameter tolerance. A straight line has a start point and a end point. The start point corresponds to parameter=0.0. The end point corresponds to parameter =1.0. The parameter tolerance is used internally in the program, for example in connection with calculation of straight line intersections.
<EpsPar>	Value of the parameter tolerance. Default is 0.001.

EXAMPLES:

```
1   DEFINE TOLERANCE ANGLE 0.004

2   DEFINE TOLERANCE PARAMETER 0.001
```

See also:

PRINT DEFINITIONS

1.4 DELETE

COMMAND:

```
DELETE ( ASSEMBLY-OF-CAPACITY-MODELS ...
       ( CODE-CHECK-RESULTS ...
```

PURPOSE:

To delete objects created in the CREATE command, or created by use of the RUN CODE-CHECK-ANALYSIS command.

SUBCOMMANDS:

ASSEMBLY-OF-CAPACITY-MODELS	Delete a Capacity Model Assembly
CODE-CHECK-RESULTS	Delete Code Check results.

See also:

CREATE ASSEMBLY-OF-CAPACITY-MODELS
RUN CODE-CHECK-ANALYSIS

DELETE ASSEMBLY-OF-CAPACITY-MODELS

SUBCOMMAND:

... ASSEMBLY-OF-CAPACITY-MODELS (<CMA-name>
ALL

PURPOSE:

To delete a Capacity Model assembly, all basic Capacity Models in the assembly, all basic Capacity Model loads and Code Check results associated with the basic Capacity Models.

PARAMETERS:

<CMA-name>	Name of the Capacity Model assembly to delete.
ALL	Signifies that all Capacity Model assemblies shall be deleted.

EXAMPLES:

```
1   DELETE ASSEMBLY ALL

2   DELETE ASSEMBLY-OF-CAPACITY-MODELS XMAN
```

See also:

CREATE ASSEMBLY-OF-CAPACITY-MODELS

DELETE CODE-CHECK-RESULTS

SUBCOMMAND:

... CODE-CHECK-RESULTS (<BCM-name> / ALL) (<RES-name> / ALL)

PURPOSE:

To delete Code Check results created by use of the RUN CODE-CHECK-ANALYSIS command. Note that only results associated with the current Code of Practice will be deleted.

PARAMETERS:

<BCM-name>	Name of a basic Capacity Model for which results shall be deleted.
ALL	Delete results for all basic Capacity Models.
<RES-name>	Name of a Resultcase for which results shall be deleted.
ALL	Delete results for all Resultcases.

EXAMPLES:

```
1   DELETE CODE-CHECK-RESULTS ALL ALL

2   DELETE CODE-CHECK-RESULTS XMANG1 ALL

3   DELETE CODE-CHECK-RESULTS ALL RES-2

4   DELETE CODE-CHECK-RESULTS XMANG1 RES-2
```

See also:

RUN CODE-CHECK-ANALYSIS

1.5 DISPLAY

COMMAND:

```
DISPLAY ( MESH
        | CAPACITY-MODELS
        | LOAD-ON-CAPACITY-MODEL ...
        | CODE-CHECK-RESULT ...
        ( OFF
```

PURPOSE:

To present models and associated data graphically.

SUBCOMMANDS:

MESH	Display the Finite Element mesh.
CAPACITY-MODELS	Display the Capacity Models.
LOAD-ON-CAPACITY-MODEL	Display the load on a basic Capacity Model.
CODE-CHECK-RESULT	Display a Code Check result on the basic Capacity Models.
OFF	Turn off automatic re-display.

DISPLAY MESH

PURPOSE:

To display the Finite Element mesh. Note that this requires that a link has been established previously from the PLATEWORK database file to the SESAM Interface File (the SIN-file), by use of the READ SIN-DIRECT-ACCESS command.

By default, all basic Finite Elements within all Superelements will be displayed. Use of the SCOPE ELEMENT command can, however, limit the display of the mesh to include only relevant areas, for example selected superelements or selected element types.

Figure 1-12 A mesh display

See also:

READ SIN-DIRECT-ACCESS
VIEW
LABEL
SCOPE ELEMENT

DISPLAY CAPACITY-MODELS

PURPOSE:

To display the Capacity Models.

By default, all basic Capacity Models will be displayed. Use of the SELECT CAPACITY-MODEL command can, however, limit the display to include only those Capacity Models that are currently relevant.

Figure 1-13 A Capacity Model display

See also:

CREATE ASSEMBLY-OF-CAPACITY-MODELS
SELECT CAPACITY-MODEL
VIEW

DISPLAY LOAD-ON-CAPACITY-MODEL

SUBCOMMAND:

... LOAD-ON-CAPACITY-MODEL <BCM-name> <RES-name> (NORMAL / SHEAR) [<angle>]

PURPOSE:

To display superimposed the unreduced and reduced basic Capacity Model loads for a specific basic Capacity Model and Resultcase.

PARAMETERS:

<BCM-name>	Name of Basic Capacity Model
<RES-name>	Name of Resultcase
NORMAL	Display the normal in-plane loads (fx and fy).
SHEAR	Display the shear in-plane load (fxy).
<angle>	Angle (in degrees) at which the loads shall be evaluated and displayed in case the Resultcase referenced contains complex values. <angle> is not entered if the Resultcase contains only static values.

See also:

CREATE LOAD-ON-CAPACITY-MODEL
CHANGE LOAD-ON-CAPACITY-MODEL
DEFINE LOAD-DISPLAY-FACTOR

Figure 1-14 Girder load display, reduced (solid) versus unreduced (dashed) loads

Figure 1-15 Stiffener load display, reduced (solid) versus unreduced (dashed) loads

Figure 1-16 Plate load display, reduced (solid) versus unreduced (dashed) loads

Figure 1-17 OSP load display, reduced (solid) versus unreduced (dashed) loads

DISPLAY CODE-CHECK-RESULT

SUBCOMMAND:

... CODE-CHECK-RESULT <RES-name> <ParNam>

PURPOSE:

Display a Code Check result on the basic Capacity Models. This command gives a display similar to the DISPLAY CAPACITY-MODELS command, except that the Capacity Models will have superimposed the numeric value of a Code Check results parameter for a specified Resultcase

PARAMETERS:

<RES-name>	Name of Resultcase
<ParNam>	Name of Code Check results parameter. The range of parameters available depends on which Code of Practice (API,DnV or NPD) is selected. A complete list of parameter names and parameter descriptions can be obtained by entering the command PRINT NOMENCLATURE CODE-CHECK-RESULTS. See also Chapter 2.

EXAMPLES:

1 `DISPLAY CODE-CHECK-RESULT 2 UCmax` (see next page)

2 See Chapter 3

See also:

CREATE ASSEMBLY-OF-CAPACITY-MODELS
SELECT CAPACITY-MODEL
VIEW
RUN CODE-CHECK-ANALYSIS
PRINT NOMENCLATURE CODE-CHECK-RESULTS

Figure 1-18 A Code Check results display

DISPLAY OFF

PURPOSE:

To turn off the automatic re-display in the VIEW or LABEL commands. This enables the user to perform several rotations without having to await a re-display between each rotation.

The automatic re-display is re-enabled by entering any of the other DISPLAY subcommands, for example DISPLAY MESH.

See also:

DISPLAY MESH
DISPLAY CAPACITY-MODELS
VIEW

1.6 LABEL

COMMAND:

```
LABEL ( ELEMENT-NUMBER ) ( ON  )
      ( ELEMENT-TYPE   ) ( OFF )
      ( NODE-NUMBER    )
```

PURPOSE:

To label the mesh with node numbers, element numbers etc. Note that when a label is turned ON, it will remain so until it is explicitely turned OFF.

Note that the labels are drawn immediately after the LABEL command is used, unless the DISPLAY OFF command has been used to suppress this.

PARAMETERS:

ELEMENT-NUMBER	Label the element numbers.
ELEMENT-TYPE	Label the element types.
NODE-NUMBER	Label the node numbers.
ON	Turn on a label. The label remains turned ON until it is turned OFF.
OFF	Turn off a label. The label remains turned OFF until it is turned ON.

See also:

DISPLAY OFF
DISPLAY MESH

1.7 PLOT

PURPOSE:

To send last display to plot file. This requires that a DISPLAY command has been used previously.

See also:

DISPLAY
SET PLOT FORMAT
SET PLOT FILE

1.8 PRINT

COMMAND:

```
PRINT ( ASSEMBLY-OF-CAPACITY-MODELS ...
        CAPACITY-MODEL ...
        CODE-CHECK-RESULTS ...
        DEFINITIONS ...
        LOAD-ON-CAPACITY-MODEL ...
        MATERIAL ...
        NOMENCLATURE ...
        RESULTCASE ...
        SCOPE ...
        SECTION ...
        SELECTION ...
        SUPERELEMENT ...
```

PURPOSE:

To print input or results data to the screen or to a print file.

PARAMETERS:

ASSEMBLY-OF-CAPACITY-MODELS	Print the main assembly data
CAPACITY-MODEL	Print the Capacity Model geometry data
CODE-CHECK-RESULTS	Print Code Check results
DEFINITIONS	Print global definitions
LOAD-ON-CAPACITY-MODEL	Print reduced Capacity Model loads
MATERIAL	Print material data
NOMENCLATURE	Print Code Check nomenclature tables
RESULTCASE	Print Resultcase definition data
SCOPE	Print scope data
SECTION	Print cross section data
SELECTION	Print Selections
SUPERELEMENT	Print superelement overview

PRINT ASSEMBLY-OF-CAPACITY-MODELS

SUBCOMMAND:

.. ASSEMBLY-OF-CAPACITY-MODELS (<CMA-name>
ALL

PURPOSE:

To print main Capacity Model assembly definition data, i.e. corner coordinates, number of girders, girder spacings, number of stiffeners, stiffener spacings etc.

PARAMETERS:

<CMA-name>	Name of the Capacity Model assembly to print.
ALL	Signifies that all Capacity Model assemblies shall be printed.

EXAMPLES:

1 See Chapter 3.

See also:

CREATE ASSEMBLY-OF-CAPACITY-MODELS
DISPLAY CAPACITY-MODELS
DELETE ASSEMBLY-OF-CAPACITY-MODELS

PRINT CAPACITY-MODEL

SUBCOMMAND:

... CAPACITY-MODEL (<BCM-name>
ALL

PURPOSE:

To print basic Capacity Model definition data, i.e. material data, plate dimensions, girder section, stiffener section etc.

PARAMETERS:

<BCM-name> Name of the basic Capacity Model to print.

ALL Signifies that all basic Capacity Models shall be printed.

See also:

CREATE ASSEMBLY-OF-CAPACITY-MODELS
DISPLAY CAPACITY-MODELS
DELETE ASSEMBLY-OF-CAPACITY-MODELS

PRINT CODE-CHECK-RESULTS

SUBCOMMAND:

```
... CODE-CHECK-RESULTS  ( SUMMARY
                        | BRIEF
                        | INTERMEDIATE
                        | MEDIUM
                        ( FULL
```

PURPOSE:

To print results from a Code Check analysis (see RUN CODE-CHECK-ANALYSIS). The results can be printed in several different ways, i.e. with different amounts of Code Check analysis input and output printed together. The type of printout is controlled by use of subcommands SUMMARY, BRIEF etc.

In addition to the above, the results can be ordered according to any of the Code Check result parameters, by use of the DEFINE SORTING PARAMETER command. The sorting order is controlled by use of DEFINE SORTING ORDER INCREASING or DEFINE SORTING ORDER DECREASING.

Filters can also be applied to the print presentation, by use of the commands DEFINE SORTING MAX-ENTRIES, DEFINE SORTING MAX-VALUE and DEFINE SORTING MIN-VALUE, effectively limiting the amount of printout to include only the results range which is currently of greatest interest.

PARAMETERS:

SUMMARY	Print a Code Check results summary. This command is normally used to obtain a first overview over which combinations of Capacity Models and Resultcases are most likely to fail. The value of the current sorting parameter is printed together with the failure status, Capacity Model and Resultcase names.
BRIEF	Print a brief overview of Code Check results. The difference from the SUMMARY table is that, in the brief table, results are sorted per Capacity Model. For each Capacity Model, the Resultcases are sorted on the basis of the sorting parameter defined. Also, in the brief table, all Unity Criterion factors are printed in addition to the sorting parameter.
INTERMEDIATE	Print all results, including the intermediate result parameters. This print table is a condensed, but complete list of intermediate and final code check results.
MEDIUM	Print all Code Check input and final results together. The input includes basic Capacity Model geometry (plate geometry, stiffener and girder sections, material etc.) and the basic Capacity Model loads (reduced loads). The final results include all the Unity Criterion factors.
FULL	Print all input and results together, i.e. the MEDIUM table followed immediately by the INTERMEDIATE table.

EXAMPLES:

1 See Chapter 3 and Appendix A.

See also:

CREATE ASSEMBLY-OF-CAPACITY-MODELS
RUN CODE-CHECK-ANALYSIS

PRINT CODE-CHECK-RESULTS SUMMARY

PURPOSE:

To print a Code Check results summary. This command is normally used to obtain a first overview over which combinations of Capacity Models and Resultcases are most likely to fail. The value of the current sorting parameter is printed together with the failure status, Capacity Model and Resultcase names.

Note that the length and sorting of this print table is controlled by the use of the DEFINE SORTING command.

NOTES:

1 **Command is sensitive to Code selection**
The results currently selected in the SELECT CODE COMMAND will be printed.

2 **Command is sensitive to Capacity Model selection**
The Capacity Models currently selected in the SELECT CAPACITY-MODELcommand will be printed

3 **Command is sensitive to Resultcase selection**
The Resultcases currently selected in the SELECT RESULTCASE command will be printed

4 **Command is sensitive to current sorting definitions**
The results will be sorted according to last definition entered in DEFINE SORTING PARAMETER and DEFINE SORTING ORDER.

5 **Command is sensitive to current sorting filters**
The results may be filtered by use of the DEFINE SORTING MAX-ENTRIES, DEFINE SORTING MAX-VALUE and DEFINE SORTING MIN-VALUE.

6 **Command is sensitive to current print destination setting**
The results will be directed to screen or file according to last SET PRINT DESTINATION setting.

EXAMPLES:

1 SELECT CODE API
PRINT CODE-CHECK-RESULTS SUMMARY

2 See Chapter 3 and Appendix 1.

PRINT CODE-CHECK-RESULTS BRIEF

PURPOSE:

To print a brief overview of Code Check results, normally after using the PRINT CODE-CHECK-RESULTS SUMMARY command for a first assessment of the results, followed by filter applications (for example DEFINE SORTING MIN-VALUE 1.0). Filters are applied to suppress results from those analyses that did not cause failure status (UCmax > 1.0).

The difference from the SUMMARY table is that, in the brief table, results are sorted per Capacity Model. For each Capacity Model, the Resultcases are sorted on the basis of the sorting parameter defined. Also, in the brief table, all Unity Criterion factors are printed in addition to the sorting parameter.

NOTES:

1 **Command is sensitive to Code selection**
The results currently selected in the SELECT CODE COMMAND will be printed.

2 **Command is sensitive to Capacity Model selection**
The Capacity Models currently selected in the SELECT CAPACITY-MODELcommand will be printed

3 **Command is sensitive to Resultcase selection**
The Resultcases currently selected in the SELECT RESULTCASE command will be printed

4 **Command is sensitive to current sorting definitions**
The results will be sorted according to last definition entered in DEFINE SORTING PARAMETER and DEFINE SORTING ORDER.

5 **Command is sensitive to current sorting filters**
The results may be filtered by use of the DEFINE SORTING MAX-ENTRIES, DEFINE SORTING MAX-VALUE and DEFINE SORTING MIN-VALUE.

6 **Command is sensitive to current print destination setting**
The results will be directed to screen or file according to last SET PRINT DESTINATION setting.

EXAMPLES:

1 See Chapter 3.

PRINT CODE-CHECK-RESULTS INTERMEDIATE

PURPOSE:

To print all results, including the intermediate result parameters. This print table is a condensed, and complete list of intermediate and final code check results.

The order of the INTERMEDIATE print is the same as in the SUMMARY table, and the order is controlled by the use of the DEFINE SORTING command.

NOTES:

1 **Command is sensitive to Code selection**
The results currently selected in the SELECT CODE COMMAND will be printed.

2 **Command is sensitive to Capacity Model selection**
The Capacity Models currently selected in the SELECT CAPACITY-MODELcommand will be printed

3 **Command is sensitive to Resultcase selection**
The Resultcases currently selected in the SELECT RESULTCASE command will be printed

4 **Command is sensitive to current sorting definitions**
The results will be sorted according to last definition entered in DEFINE SORTING PARAMETER and DEFINE SORTING ORDER.

5 **Command is sensitive to current sorting filters**
The results may be filtered by use of the DEFINE SORTING MAX-ENTRIES, DEFINE SORTING MAX-VALUE and DEFINE SORTING MIN-VALUE.

6 **Command is sensitive to current print destination setting**
The results will be directed to screen or file according to last SET PRINT DESTINATION setting.

EXAMPLES:

1 SELECT CODE API
PRINT CODE-CHECK-RESULTS INTERMEDIATE

2 See Appendix A, FULL print. The INTERMEDIATE data is included in the FULL print (=second half).

PRINT CODE-CHECK-RESULTS MEDIUM

PURPOSE:

To print all Code Check input and final results on one page. The input includes basic Capacity Model geometry (plate geometry, stiffener and girder sections, material etc.)and the basic Capacity Model loads (reduced loads). The final results include all the Unity Criterion factors.

The order of the MEDIUM print is the same as in the SUMMARY table, and the order is controlled by the use of the DEFINE SORTING command.

The contents of the print tables are similar to the FULL tables, except that INTERMEDIATE data are not included.

NOTES:

1 **Command is sensitive to Code selection**
The results currently selected in the SELECT CODE COMMAND will be printed.

2 **Command is sensitive to Capacity Model selection**
The Capacity Models currently selected in the SELECT CAPACITY-MODELcommand will be printed

3 **Command is sensitive to Resultcase selection**
The Resultcases currently selected in the SELECT RESULTCASE command will be printed

4 **Command is sensitive to current sorting definitions**
The results will be sorted according to last definition entered in DEFINE SORTING PARAMETER and DEFINE SORTING ORDER.

5 **Command is sensitive to current sorting filters**
The results may be filtered by use of the DEFINE SORTING MAX-ENTRIES, DEFINE SORTING MAX-VALUE and DEFINE SORTING MIN-VALUE.

6 **Command is sensitive to current print destination setting**
The results will be directed to screen or file according to last SET PRINT DESTINATION setting.

EXAMPLES:

1 SELECT CODE API
PRINT CODE-CHECK-RESULTS MEDIUM

2 See Appendix A, FULL print. The MEDIUM data is included in the FULL print (= first half).

PRINT CODE-CHECK-RESULTS FULL

PURPOSE:

To print all input and results together, i.e. the MEDIUM table followed immediately by the INTERMEDIATE table. The order of the FULL print is the same as in the SUMMARY tables, and the order is controlled by the use of the DEFINE SORTING command.

NOTES:

1 **Command is sensitive to Code selection**
The results currently selected in the SELECT CODE COMMAND will be printed.

2 **Command is sensitive to Capacity Model selection**
The Capacity Models currently selected in the SELECT CAPACITY-MODELcommand will be printed

3 **Command is sensitive to Resultcase selection**
The Resultcases currently selected in the SELECT RESULTCASE command will be printed

4 **Command is sensitive to current sorting definitions**
The results will be sorted according to last definition entered in DEFINE SORTING PARAMETER and DEFINE SORTING ORDER.

5 **Command is sensitive to current sorting filters**
The results may be filtered by use of the DEFINE SORTING MAX-ENTRIES, DEFINE SORTING MAX-VALUE and DEFINE SORTING MIN-VALUE.

6 **Command is sensitive to current print destination setting**
The results will be directed to screen or file according to last SET PRINT DESTINATION setting.

EXAMPLES:

1 SELECT CODE API
PRINT CODE-CHECK-RESULTS FULL

2 See Chapter 3 and Appendix A.

PRINT DEFINITIONS

PURPOSE:

To print the current global definitions, such as sorting definitions, limit state factors, tolerances and phase angle stepping.

EXAMPLES:

```
1   PRINT DEFINITIONS
```

Table 1.15 Print of definitions

```
Define option                      Value
---------------------------------------------------------------------------
Sorting              Parameter   UCMAX
                     Order       DECREASING
                     Max entries UNLIMITED
                     Max Value   UNLIMITED
                     Min Value   UNLIMITED

Limit State Factor   DNV           E-ULS =  6.000E-01    F-ULS =  8.000E-01
                                     PLS =  1.000E+00      SLS =  1.000E+00

Tolerance            Coordinate  5.436E+01
                     Angle       3.920E-03
                     Parameter   1.000E-03

Phase Angle Stepping             0.000E+00  4.500E+01  9.000E+01  1.350E+02
                                 1.800E+02  2.250E+02  2.700E+02  3.150E+02
```

PRINT LOAD-ON-CAPACITY-MODEL

SUBCOMMAND:

... LOAD-ON-CAPACITY-MODEL (<BCM-name> | ALL) (<RES-name> | ALL)

PURPOSE:

To print the reduced basic Capacity Model loads. For each Capacity Model, the loads from all resultcases will be printed.

PARAMETERS:

<BCM-name>	Name of Basic Capacity Model to print loads for
ALL	Print loads for all Basic Capacity Models
<RES-name>	Name of Resultcase to print loads for
ALL	Print loads for all Resultcases

EXAMPLES:

1 See Chapter 3.

PRINT MATERIAL

SUBCOMMAND:

... MATERIAL (<MAT-name>
ALL

PURPOSE:

To print the material data defined in the CREATE MATERIAL command, or inherited from the SIN-file by use of the READ SIN-DIRECT-ACCESS command.

PARAMETERS:

<MAT-name>	Name of material to be printed.
ALL	Print all materials.

EXAMPLES:

1 See Chapter 3.

PRINT NOMENCLATURE

SUBCOMMAND:

... NOMENCLATURE (CAPACITY-MODEL
(CODE-CHECK-RESULTS

PURPOSE:

To print parameter names and descriptions for the Capacity Model input and the Code Check results.

The PRINT CAPACITY-MODEL and PRINT CODE-CHECK-RESULTS commands does not include a complete description of of each parameter each time a print is produced, as it would in most cases require too much space, since these tables include a large number of parameters.

Therefore, separate print tables with parameter names and descriptions are made available.

PARAMETERS:

CAPACITY-MODEL	Print names and descriptions of the Basic Capacity Model input parameters.
CODE-CHECK-RESULTS	Print names and descriptions of the intermediate and final Code Check result parameters.

EXAMPLES:

1 See Chapters 2 and 3.

PRINT RESULTCASE

SUBCOMMAND:

... RESULTCASE (<RES-name>
ALL

PURPOSE:

To print an overview of Resultcases created either in the CREATE RESULTCASE command, or inherited from the SIN-file by use of the READ SIN-DIRECT-ACCESS command.

In the case of combined resultcases, the source Resultcase names, factors and phase angles will also be printed.

PARAMETERS:

<RES-name>	Name of Resultcase to be printed
ALL	Print all Resultcases.

EXAMPLES:

```
1   PRINT RESULTCASE ALL
```

Table 1.16 Print of resultcases

```
Res-Name Type L-stat Sel Description
---------------------------------------------------------------
1        Static E-ULS ON  LINEAR ANALYSIS (FE-resultcase)
2        Static E-ULS OFF LINEAR ANALYSIS (FE-resultcase)
3        Static E-ULS OFF LINEAR ANALYSIS (FE-resultcase)
4        Static E-ULS OFF LINEAR ANALYSIS (FE-resultcase)
5        Static E-ULS OFF LINEAR ANALYSIS (FE-resultcase)
6        Static E-ULS OFF LINEAR ANALYSIS (FE-resultcase)
7        Static E-ULS OFF LINEAR ANALYSIS (FE-resultcase)
8        Static E-ULS OFF LINEAR ANALYSIS (FE-resultcase)
9        Static E-ULS OFF LINEAR ANALYSIS (FE-resultcase)
10       Static E-ULS OFF LINEAR ANALYSIS (FE-resultcase)
```

PRINT SCOPE ELEMENT

SUBCOMMAND:

... ELEMENT (<scope-name>
ALL

PURPOSE:

To print the description, superelement identification(s), and Finite Element numbers of elements in a saved element scope.

PARAMETERS:

<scope-name> Name of element scope to be printed

ALL Print all element scopes.

EXAMPLES:

```
1   PRINT SCOPE ELEMENT SCOPE1
```

Table 1.17 Print of element scope

```
Name      Type      Index     Element number
---------------------------------------------------------------------------
SCOPE1                        Test of scope facility
          161       1         607 608 609 611 613 627 628 629
                              630 631 632 633 634 635 636 637
                              638 639 641 643 647 648 649 650
                              651 652 653 654 655 656 657 658
                              659 660 661 662 664 667 668 669
                              670 671 672 673 677 678 679 680
                              681 749 789 790 791 797 798 799
                              800 801 805 806 807 808 809 810
                              811 813 814 815 816 818 819 820
                              821 822 831 832 833 834 835 855
                              856 857 858 859 860
```

See also:

SCOPE ELEMENT INCLUDE
SCOPE ELEMENT CONFIRM
SCOPE ELEMENT SAVE

PRINT SECTION

SUBCOMMAND:

... SECTION (<SEC-name>
ALL

PURPOSE:

To print the cross section data defined in the CREATE SECTION command, or inherited from the SIN-file by use of the READ SIN-DIRECT-ACCESS command.

PARAMETERS:

<SEC-name>	Name of cross section to be printed.
ALL	Print all cross sections.

EXAMPLES:

1 See Chapter 3.

PRINT SELECTION

SUBCOMMAND:

... SELECTION (RESULTCASE
CAPACITY-MODEL
CODE

PURPOSE:

To print the selections done by use of the SELECT command, or the default selections.

PARAMETERS:

RESULTCASE	Print names of currently selected Resultcases
CAPACITY-MODEL	Print names of currently selected capacity Models
CODE	Print name and references of the currently selected Code of Practice.

EXAMPLES:

```
1   PRINT SELECTION CAPACITY-MODEL

2   PRINT SELECTION CODE
```

See tables on the next page.

Table 1.18 Currently selected Basic Capacity Models

NOMENCLATURE:

CM-Name Basic Capacity Model name

CM-Name	CM-Name	CM-Name	CM-Name
Girders:			
DAG1			
Stiffeners:			
DAS1.1	DAS1.2	DAS1.3	DAS1.4
DAS1.5	DAS2.1	DAS2.2	DAS2.3
DAS2.4	DAS2.5		
Plates:			
DAP1.1	DAP1.2	DAP1.3	DAP1.4
DAP1.5	DAP1.6	DAP2.1	DAP2.2
DAP2.3	DAP2.4	DAP2.5	DAP2.6

Table 1.19 Currently selected Code of Practice

NOMENCLATURE:

Code — Name of currently selected design code
Code References — Reference documentation

Code	Code References
DNV	Det norske Veritas a) Veritas Rules for Classification of Fixed Offshore Installations, July 1989. b) Veritas Rules for Classification of Mobile Offshore Units, July 1989. c) Veritas Rules for Classification of Mobile Offshore Units, Classification Note 30.1 July 1989.

PRINT SUPERELEMENT

SUBCOMMAND:

... SUPERELEMENT (<Typ> <Idx>
ALL

PURPOSE:

To print an overview of superelements inherited from the SIN-file by use of the READ SIN-DIRECT-ACCESS command.

PARAMETERS:

<Typ>	Superelement type number
<Idx>	Superelement index number
ALL	Print all superelements.

EXAMPLES:

1 PRINT SUPERELEMENT 161 1

```
NOMENCLATURE:

Type      Superelement Type
Index     Superelement Index


Type      Index     Description
-----------------------------------------------------------------
161       1         Elements: 887, Nodes: 608
```

1.9 READ

COMMAND:

READ SIN-DIRECT-ACCESS <prefix> <name>

PURPOSE:

To establish a link from the PLATEWORK database file to a direct access SESAM Results Interface file (SIN-file), containing Finite Element analysis results from one or several superelements.

Note that you may have to use PREPOST to convert the FE-analysis results into the direct access format, if the results were created in another format by the analysis program.

After executing this command, the PLATEWORK database will contain the prefix and name of the SIN-file, enabeling automatic re-opening of the SIN-file in subsequent PLATEWORK sessions.

PLATEWORK will also transfer vital reference information, such as overview over superelements, resultcases, cross sections, materials etc. This information is referenced later on the use of the CREATE ASSEMBLY-OF-CAPACITY-MODELS COMMAND.

PARAMETERS:

<prefix>	SIN-file prefix
<name>	SIN-file name

NOTES:

1 **Select Code of Practice first**
Before this command is entered, the user should use SELECT CODE. This will ensure that valid limit-state kinds will be assigned to the resultcases inherited from the FEM-analysis.

2 **Default limit-state kinds will be assigned to resultcases**
The resultcases will be given default limit-state kinds as described under CREATE RESULTCASE. If required, CHANGE RESULTCASE can be used to modify the limit-states assigned.

3 **Combination resultcases can be inherited from the SIN-file**
PREPOST /4/ has features for defining resultcase combinations. The combination definitions stored on the SIN-file by use of PREPOST, will be automatically inherited by PLATEWORK, provided that the definitions were stored on the SIN-file before the PLATEWORK READ-SIN-DIRECT-ACCESS command was entered.

4 **Multi-superelement FEM-analyses**

When the FE-model consists of several superelements, PLATEWORK will automatically read the superelement information for all superelements that have been retracked, i.e. superelement transformations and basic element and node data will be read.

5 **Cross sections**
Beam cross section data stored on the SIN-file will automatically be inherited by PLATEWORK, as if created by use of the CREATE SECTION command. Note that if several superelements have cross section data, a new PLATEWORK cross section will be created for each cross section in every superelement.

6 **Materials**
Material data stored on the SIN-file will automatically be inherited by PLATEWORK, as if created by use of the CREATE MATERIAL command. Note that if several superelements have material data, a new PLATEWORK material will be created for each material in every superelement.

EXAMPLES:

```
1   READ SIN-DIRECT-ACCESS SINDIR:SESTRA R100
```

See also:

SELECT CODE
CHANGE SIN-DIRECT-ACCESS
CREATE RESULTCASE

1.10 RUN

COMMAND:

RUN CODE-CHECK-ANALYSIS

PURPOSE:

To run an analysis. The analysis is executed for the currently selected basic Capacity Models and Resultcases,

SUBCOMMANDS:

CODE-CHECK-ANALYSIS	Run a Code Check analysis. The Code Check analysis is executed for the currently selected Code of Practice

See also:

SELECT CODE
SELECT CAPACITY-MODEL
SELECT RESULTCASE.

1.11 SCOPE ELEMENT

SUBCOMMAND:

```
... ELEMENT   ( INCLUDE  ...
              ( EXCLUDE ...
              ( CLEAR
              ( CONFIRM ...
              ( SAVE ...
```

PURPOSE:

To limit the part of the FE-model that can be accessed, in order to

- Reduce CPU-time used and increase program response.
- Improve overview of model (eg. in the DISPLAY MESH command).
- Guide the program in finding correct solutions (e.g. when using the AUTOMATIC options in the CREATE ASSEMBLY-OF-CAPACITY-MODELS command).

The scope limits all functions in the program that access the scope objects (i.e. the elements), and can therefore also be used to guide the program in finding a correct solution faster than if the program worked on the full model.

PARAMETERS:

INCLUDE	Include elements into a temporary scope
EXCLUDE	Exclude elements from a temporary scope
CLEAR	Clear the current temporary scope
CONFIRM	Confirm the current temporary scope
SAVE	Save the confirmed scope in the database

SCOPE ELEMENT INCLUDE

SUBCOMMAND:

```
... INCLUDE ( SAVED          <scope-name>
            | SUPERELEMENT   <Typ><Idx>
            | GROUP          <Typ><Idx> <start><stop><step>
            | PLANE          ( (<Typ><Idx><node>)*3
            |                ( PICK <pick>*3
            | TRAPEZOID      ( (<Typ><Idx><node>)*4
            |                ( PICK <pick>*4
            ( TYPE           <element-type>
```

PURPOSE:

To include elements into the current temporary scope. Note that the scope must be confirmed by use of SCOPE ELEMENT CONFIRM before the scope can be used. Note also that it is not possible to to include more elements into a confirmed scope, without turning off the confirmation first, by using SCOPE ELEMENT CONFIRM OFF.

PARAMETERS:

SAVED	Include all elements in a previously saved scope.
<scope-name>	Name of the saved scope.
SUPERELEMENT	Include all elements in a specific superelement.
<Typ>	Superelement type number
<Idx>	Superelement index number
GROUP	Include a group of elements in a specific superelement.
<Typ>	Superelement type number
<Idx>	Superelement index number
<start>	First element number in the group
<stop>	Last element number in the group

<step>	Step in element numbering
PLANE	Include all elements lying in a plane
<Typ>	Superelement type number
<Idx>	Superelement index number
<node>	Node number defining a point in the plane
PICK	Pick a node using mouse or graphics cursor
TRAPEZOID	Include all elements lying in the trapezoid plane and lying completely inside or touching the trapezoid border.
<Typ>	Superelement type number
<Idx>	Superelement index number
<node>	Node number defining one of the 4 trapezoid corners
PICK	Pick a node using mouse or graphics cursor
TYPE	Include all elements of a given element type
<element-type>	SESAM element type name, see table 1.20, page 1-115.

EXAMPLES:

```
1   SCOPE ELEMENT INCLUDE SUPERELEMENT 161 1

2   SCOPE ELEMENT INCLUDE GROUP 161 1 50 60 2

3   SCOPE ELEMENT INCLUDE TYPE BEAM-2NODES
```

Table 1.20
SESAM element type names

MEMBRANE-3NODES
MEMBRANE-8NODES
MEMBRANE-4NODES
TRUSS-2NODES
MASS-1NODE
MASS-2NODES
DAMPER-2NODES
BEAM-2NODES
AXIAL-SPRING-2NODES
AXIAL-DAMPER-2NODES
SPRING-TO-GROUND
DAMPER-TO-GROUND
SOLID-20NODES
SOLID-8NODES
BEAM-3NODES
SHELL-4NODES
SHELL-3NODES
SHELL-6NODES
SANDWICH-6NODES
SHELL-8NODES
SANDWICH-8NODES
SOLID-15NODES
SOLID-10NODES
SOLID-6NODES
SOLID-4NODES
TRANSITION-18NODES
TRANSITION-15NODES
TRANSITION-12NODES
SPRING-2NODES
AXISYMMETRIC-3NODES
AXISYMMETRIC-4NODES
AXISYMMETRIC-6NODES
AXISYMMETRIC-8NODES
PILE-SOIL-1NODE
CONTACT-1+1NODE
CONTACT-2+2NODES
AXISYMMETRIC-CONTACT-3+3NODES
CONTACT-4+4NODES
CONTACT-8+8NODES
CONTACT-9+9NODES
SHELL-9NODES
SOLID-21-T0-27-NODES

SCOPE ELEMENT EXCLUDE

SUBCOMMAND:

```
... EXCLUDE  ( SAVED          <scope-name>
             | SUPERELEMENT   <Typ><Idx>
             | GROUP          <Typ><Idx> <start><stop><step>
             | PLANE          ( (<Typ><Idx><node>)*3
             |                ( PICK <pick>*3
             | TRAPEZOID      ( (<Typ><Idx><node>)*4
             |                ( PICK <pick>*4
             ( TYPE           <element-type>
```

PURPOSE:

To exclude elements from the current temporary scope. Note that the scope must be confirmed by use of SCOPE ELEMENT CONFIRM before the scope can be used.

PARAMETERS:

SAVED	Exclude all elements in a previously saved scope.
<scope-name>	Name of the saved scope.
SUPERELEMENT	Exclude all elements in a specific superelement.
<Typ>	Superelement type number
<Idx>	Superelement index number
GROUP	Exclude a group of elements in a specific superelement.
<Typ>	Superelement type number
<Idx>	Superelement index number
<start>	First element number in the group
<stop>	Last element number in the group
<step>	Step in element numbering

PLANE	Exclude all elements lying in a plane
<Typ>	Superelement type number
<Idx>	Superelement index number
<node>	Node number defining a point in the plane
PICK	Pick a node using mouse or graphics cursor
TRAPEZOID	Exclude all elements lying in the trapezoid plane and lying completely inside or touching the trapezoid border.
<Typ>	Superelement type number
<Idx>	Superelement index number
<node>	Node number defining one of the 4 trapezoid corners
PICK	Pick a node using mouse or graphics cursor
TYPE	Exclude all elements of a given element type
<element-type>	SESAM element type name, see table 1.20, page 1-115.

SCOPE ELEMENT CANCEL

PURPOSE:

To cancel the current scope definition. The whole model becomes current. A new temporary scope may now be defined by using SCOPE ELEMENT INCLUDE.

SCOPE ELEMENT CONFIRM

SUBCOMMAND:

... CONFIRM (DEFINED
COMPLEMENT
OFF

PURPOSE:

To confirm the current temporary scope, and enable the scope for use.

PARAMETERS:

DEFINED	Confirm the elements in the current temporary scope, i.e. the elements referenced in previus SCOPE ELEMENT INCLUDE commands.
COMPLEMENT	Confirm the elements complement to the current tamporary scope, i.e. the comple ment set of elements to the elements referenced in previus SCOPE ELEMENT INCLUDE commands.
OFF	Turn off scope confirmation. The definition of the temporary scope is retained so it can be modified and re-confirmed for later use.

See also:

SCOPE ELEMENT INCLUDE
SCOPE ELEMENT EXCLUDE
SCOPE ELEMENT CANCEL
SCOPE ELEMENT SAVE

SCOPE ELEMENT SAVE

SUBCOMMAND:

... SAVE <scope-name> <Description>

PURPOSE:

Save the current confirmed element scope in the PLATEWORK database, for later reference in SCOPE ELEMENT INCLUDE or SCOPE ELEMENT EXCLUDE commands.

A saved element scope can also be printed, by use of the PRINT SCOPE ELEMENT command.

PARAMETERS:

<scope-name>	Name of the saved element scope
<Description>	Description of the saved element scope

See also:

SCOPE ELEMENT INCLUDE SAVED
PRINT SCOPE ELEMENT

1.12 SELECT

COMMAND:

```
SELECT ( RESULTCASE ...
       ( CAPACITY-MODEL ...
       ( CODE ...
```

PURPOSE:

To select Code of Practice, Resultcases and basic Capacity Models. The selection is significant in a Code Check analysis (only the selected Capacity Models and Resultcases are Code Checked). The selection is also significant for the PRINT and DISPLAY commands.

PARAMETERS:

RESULTCASE	Select Resultcases
CAPACITY-MODEL	Select basic Capacity Models
CODE	Select current Code of Practice

SELECT RESULTCASE

SUBCOMMAND:

... RESULTCASE (<RES-name> / ALL) (ON / OFF)

PURPOSE:

To select resultcases for different purposes, such as Code Check analysis or Code Check results print.

PARAMETERS:

<RES-name>	Name of Resultcase to be selected
ALL	All Resultcases are selected
ON	The specified Resultcase(s) is/are selected.
OFF	The specified Resultcase(s) is/are not selected.

EXAMPLES:

```
1   SELECT RESULTCASE ALL ON
```

See also:

RUN CODE-CHECK-ANALYSIS
PRINT CODE-CHECK-RESULTS
PRINT SELECTION RESULTCASE

SELECT CAPACITY-MODEL

SUBCOMMAND:

```
... CAPACITY-MODEL  ( <BCM-name>              ) ( ON  )
                    ( ASSEMBLY <CMA-name>     ) ( OFF )
                    ( ALL                     )
```

PURPOSE:

To select basic Capacity Models for different purposes, such as Code Check analysis or Code Check results print.

PARAMETERS:

<BCM-name>	Name of basic Capacity Model to be selected
ALL	All basic Capacity Models are selected
ON	The specified basic Capacity Model(s) is/are selected.
OFF	The specified basic Capacity Model(s) is/are not selected.

EXAMPLES:

```
1   SELECT CAPACITY-MODEL ALL OFF

2   SELECT CAPACITY-MODEL XMANG1 ON
```

See also:

RUN CODE-CHECK-ANALYSIS
PRINT SELECTION CAPACITY-MODEL

SELECT CODE

SUBCOMMAND:

... CODE (API | DNV | NPD)

PURPOSE:

To select the current Code of Practice. Note that the selection is saved on the database and need not be specified in later PLATEWORK sessions using the same database.

PARAMETERS:

API	Select American Petroleum Institute Code of Practice
DNV	Select Det norske Veritas Code of Practice
NPD	Select Norwegian Petroleum Directorate Code of Practice

See also:

RUN CODE-CHECK-ANALYSIS
PRINT SELECTION CODE

1.13 SET

COMMAND:

```
SET ( COMMAND-INPUT-FILE ...
    ( DISPLAY ...
    ( PLOT ...
    ( PRINT ...
```

PURPOSE:

Set or re-set global file/device environment characteristics.

PARAMETERS:

COMMAND-INPUT-FILE	Define the name of a command input file containing PLATEWORK commands to be executed later by use of "#"
DISPLAY	Set display characteristics.
PLOT	Set plot file characteristics.
PRINT	Set print characteristics.

SET COMMAND-INPUT-FILE

SUBCOMMAND:

... COMMAND-INPUT-FILE <prefix> <name>

PURPOSE:

To define the name of a command input file containing PLATEWORK commands to be executed later by use of the "#" command.

PARAMETERS:

<prefix>	Command input file prefix
<name>	Command input file name

EXAMPLES:

```
1   SET COMMAND-INPUT-FILE INDIR: PLATEWORK_IN
```

See also:
#

SET DISPLAY

SUBCOMMAND:

... DISPLAY (DESTINATION ...
DEVICE ...
WORKSTATION-WINDOW ...

PURPOSE:

To set display characteristics.

PARAMETERS:

DESTINATION	Set the destination of the graphics produced in the DISPLAY command.
DEVICE	Set the current screen display device type.
WORKSTATION-WINDOW	Set the size and position of the display window when using a workstation device.

SET DISPLAY DESTINATION

SUBCOMMAND:

... DESTINATION (FILE
SCREEN

PURPOSE:

To set the destination of the graphics produced in the DISPLAY command.

PARAMETERS:

FILE	Direct the graphics in the DISPLAY command to a plot file.
SCREEN	Direct the graphics in the DISPLAY command to the screen. This is the default.

SET DISPLAY DEVICE

SUBCOMMAND:

... DEVICE (<Device-number>
<Device-name>

PURPOSE:

To set the current screen display device type.

PARAMETERS:

<Device-number> GPGS-F device number.

<Device-name> SESAM device name, one of:

TX4014-15-16-54	(Tekronix b/w devices)
TX4105	(Tektronix 4105)
TX4107-09-13-15	(Tektronix colour devices)
VT125	(Digital VT 125 screen)
VT240	(Digital VT 240 screen)
VT340	(Digital VT 340 screen)
WESTWARD-3219	
WESTWARD-3220	
VAXSTATION-UIS	(VAXStation UIS window system)
X-WINDOW	(XWindows window system)

SET DISPLAY WORKSTATION-WINDOW

SUBCOMMAND:

... WORKSTATION-WINDOW <left> <right> <bottom> <top>

PURPOSE:

To pre-set the size and position of the graphics display window when using a workstation device.

PARAMETERS:

<left>	Position of left display window border
<right>	Position of right display window border
<bottom>	Position of bottom display window border
<top>	Position of top display window border

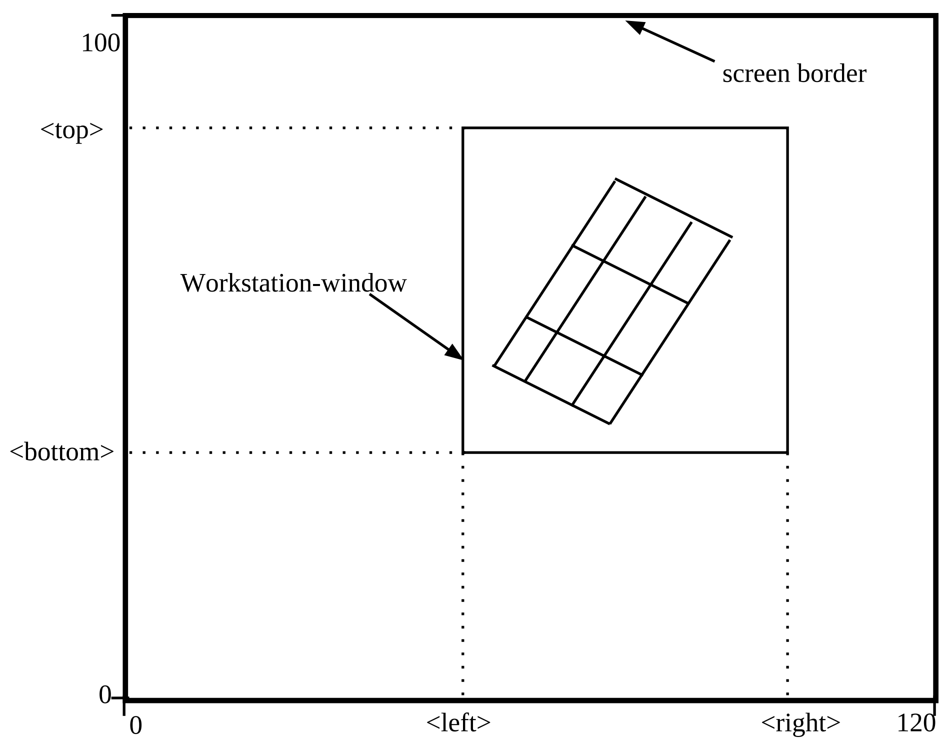

Figure 1-19 Setting a workstation-window

SET PLOT

SUBCOMMAND:

... PLOT (FORMAT
FILE

PURPOSE:

To set plot file characteristics.

PARAMETERS:

FORMAT	Set the type of plot file to be used
FILE	Set the prefix and name of the plot file.

SET PLOT FORMAT

SUBCOMMAND:

... FORMAT (SESAM-NEUTRAL
POSTSCRIPT

PURPOSE:

To set the type of plot file format to be used in subsequent PLOT commands.

PARAMETERS:

SESAM-NEUTRAL	SESAM Neutral format. This is the default format.
POSTSCRIPT	PostScript format (PostScript is a trademark of Adobe Systems Incorporated). Note that this requires access to a printer that accepts PostScript files.

SET PLOT FILE

SUBCOMMAND:

... FILE <prefix> <name>

PURPOSE:

To set the prefix and name of the plot file to be used in subsequent PLOT commands. Previous plot file (if any) will be closed

PARAMETERS:

<prefix> Plot file prefix.

<name> Plot file name.

SET PRINT

SUBCOMMAND:

```
... PRINT ( DESTINATION ...
          ( FILE  ...
          ( PAGE-ORIENTATION   ...
```

PURPOSE:

To set print characteristics.

PARAMETERS:

DESTINATION	Set the print destination to screen or print file.
FILE	Set the prefix and name of the print file.
PAGE-ORIENTATION	Set the page orientation for the print file.

SET PRINT DESTINATION

SUBCOMMAND:

... DESTINATION (SCREEN
FILE

PURPOSE:

To set the print destination to screen or print file.

PARAMETERS:

SCREEN	Direct print to the screen
FILE	Direct print to the print file.

SET PRINT FILE

SUBCOMMAND:

... FILE <prefix> <name>

PURPOSE:

To set the prefix and name of the print file.

PARAMETERS:

<prefix>	Print file prefix.
<name>	Print file name.

SET PRINT PAGE-ORIENTATION

SUBCOMMAND:

... PAGE-ORIENTATION (LANDSCAPE
PORTRAIT

PURPOSE:

To set the page orientation for the print file.

PARAMETERS:

LANDSCAPE	The print page is 132 characters wide
PORTRAIT	The print page is 80 characters wide

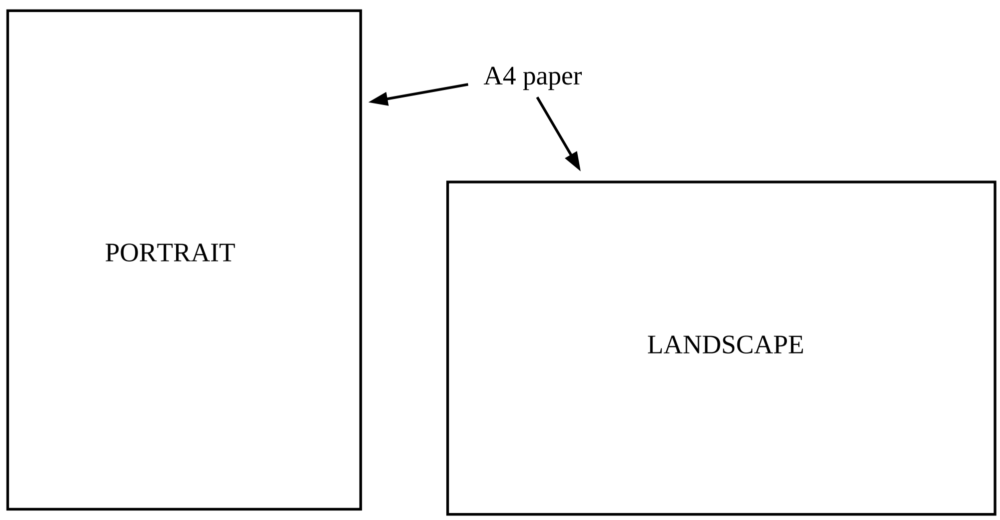

Figure 1-20 Setting PORTRAIT and LANDSCAPE print page orientations

1.14 VIEW

COMMAND:

```
VIEW ( FRAME
     ( PAN ...
     ( POSITION ...
     ( ROTATE ...
     ( ZOOM ...
```

PURPOSE:

To control the appearance of the view, by specification of view angles, zoom and pan.

Note that the current view is redrawn each time the VIEW command is used, unless the DISPLAY OFF command has been used to suppress this.

PARAMETERS:

FRAME	Perform an automatic zoom to fit the current view within the,frame of the display.
PAN	Pan (shift) the current view in the plane of the screen.
POSITION	Define the view angles by specifying a point in space which, together with the centre of the model's coordinate system, defines the direction of the user's observation.
ROTATE	Rotate view by specifying rotation angles.
ZOOM	Zoom in or out.

See also:

DISPLAY OFF
DISPLAY MESH
DISPLAY CAPACITY-MODELS

VIEW FRAME

PURPOSE:

Perform an automatic zoom to fit the current view within the frame of the display.

See also:

DISPLAY OFF
DISPLAY MESH
DISPLAY CAPACITY-MODELS
VIEW ZOOM
VIEW PAN

VIEW PAN

SUBCOMMAND:

... PAN <pick_from> <pick_to>

PURPOSE:

Pan (shift) the current view in the plane of the screen. The view is shifted by defining a vector in the plane of the screen. The vector is defined by picking the "from" and the "to" positions, see below.

PARAMETERS:

<pick_from>	Pick (using mouse or cross-hair) a point on the screen to define the "from" position.
<pick_to>	Pick (using mouse or cross-hair) a point on the screen to define the "to" position.

EXAMPLES:

1 See Chapter 3.

See also:

DISPLAY OFF
DISPLAY MESH
DISPLAY CAPACITY-MODELS
VIEW ZOOM
VIEW FRAME

VIEW POSITION

SUBCOMMAND:

... POSITION <x-model> <y-model> <z-model>

PURPOSE:

Define the view angles by specifying a point in space. The imaginary line from this point towards the origin of the model's coordinate system defines the direction of the user's observation.

Note that this command is independent of any previously entered rotations, and can therefore be used to "re-set" the viewing direction.

PARAMETERS:

<x-model>	x-coordinate in the model's coordinate system
<y-model>	y-coordinate in the model's coordinate system
<z-model>	y-coordinate in the model's coordinate system

EXAMPLES:

1 See Chapter 3.

See also:

DISPLAY OFF
DISPLAY MESH
DISPLAY CAPACITY-MODELS
VIEW ROTATE
VIEW FRAME

VIEW ROTATE

SUBCOMMANDS:

```
... ROTATE  ( TO          <angle-x> <angle-y> <angle-z>
            ( UP          <angle-x-screen>
            ( DOWN        <angle-x-screen>                 ( Screen mode)
            ( LEFT        <angle-y-screen>
            ( RIGHT       <angle-y-screen>
            ( CLOCKWISE   <angle-z-screen>

            ( X-AXIS      <angle-x-model>
            ( Y-AXIS      <angle-y-model>                  (Space mode)
            ( Z-AXIS      <angle-z-model>
```

PURPOSE:

Rotate view by specifying rotation angles. Note that this command operates in two basic modes, screen mode and space mode.

Screen mode (TO,UP,DOWN,LEFT,RIGHT & CLOCKWISE alternatives): Here, all angles are relative to the screen axes, which remains fixed, no matter how many rotations are entered. The angles should be interpreted such that it is the observer (the user) that revolves around a stationary model.

The origin of the screen axis system lies in the centre of the screen. The x-axis is horizontal and points from the origin towards the right hand side of the screen. The y-axis is vertical and points from the origin towards the top of the screen. The z-axis is horizontal and points from the origin and out of the screen (towards the user).

Space mode (X-AXIS,Y-AXIS & Z-AXIS alternatives). Here, all angles are relative to the model axes, which follow the rotations. The angles should be interpreted such that it is the model coordinate system that rotates relative to the observer.

PARAMETERS:

TO

<angle-x> <angle-y> <angle-z>
This alternative is independent of all previously entered rotations. At the execution of this command, the program first re-initializes the rotations, such that the model and screen axes overlap. Then, the x,y and z rotations specified by the user are applied, in the same order.

UP

<angle-x-screen>
Rotate the view position <angle-x-screen> degrees UP, relative to the screen x-axis, from the current position.

DOWN

<angle-x-screen>
Rotate the view position <angle-x-screen> degrees DOWN, relative to the screen x-axis, from the current position.

LEFT

<angle-y-screen>

	Rotate the view position <angle-y-screen> degrees LEFT, relative to the screen y-axis, from the current position.
RIGHT	<angle-y-screen> Rotate the view position <angle-y-screen> degrees RIGHT, relative to the screen y-axis, from the current position.
CLOCKWISE	<angle-z-screen> Rotate the view position <angle-z-screen> degrees CLOCKWISE, relative to the screen z-axis, from the current position.
X-AXIS	<angle-x-model> Rotate the model coordinate system <angle-x-model> around the model x-axis.
Y-AXIS	<angle-y-model> Rotate the model coordinate system <angle-x-model> around the model y-axis.
Z-AXIS	<angle-z-model> Rotate the model coordinate system <angle-x-model> around the model z-axis.

EXAMPLES:

1 See Chapter 3.

See also:

DISPLAY OFF
DISPLAY MESH
DISPLAY CAPACITY-MODELS
VIEW POSITION
VIEW FRAME

VIEW ZOOM

SUBCOMMAND:

... ZOOM (IN | OUT) <pick> <pick>

PURPOSE:

To zoom the current view in or out.

PARAMETERS:

IN — Zoom out by pointing to two diagonal corners in a square on the screen. The part of the view within the square will then be enlarged and fitted within the whole screen, causing an illusion of movement towards the model.

OUT — Zoom out by pointing to two diagonal corners in a square on the screen. The current view will then be compressed and fitted within the smaller square, causing an illusion of movement away from the model.

EXAMPLES:

1 See Chapter 3.

See also:

DISPLAY OFF
DISPLAY MESH
DISPLAY CAPACITY-MODELS
VIEW FRAME

1.15

COMMAND:

```
# ( <NumCom>
  ( ALL
```

PURPOSE:

To execute the PLATEWORK commands in a command input file previously set by use of the SET COMMAND-INPUT-FILE command.

PARAMETERS:

<NumCom>	Number of main PLATEWORK commands to be executed.
ALL	Execute all PLATEWORK commands in the command input file.

EXAMPLES:

```
1   # ALL
```

See also :
SET COMMAND-INPUT-FILE

1.16 EXIT

PURPOSE:

To close all files opened by the program, cancel display windows and terminate execution of PLATEWORK.

Appendix A Tutorial Examples

A 1 Simple, stiffened panel

This example describes a simple, stiffened panel modelled in PREFEM, optimized in BPOPT, equations solved in SESTRA and finally Code Checked in PLATEWORK.

A 1.1 The model

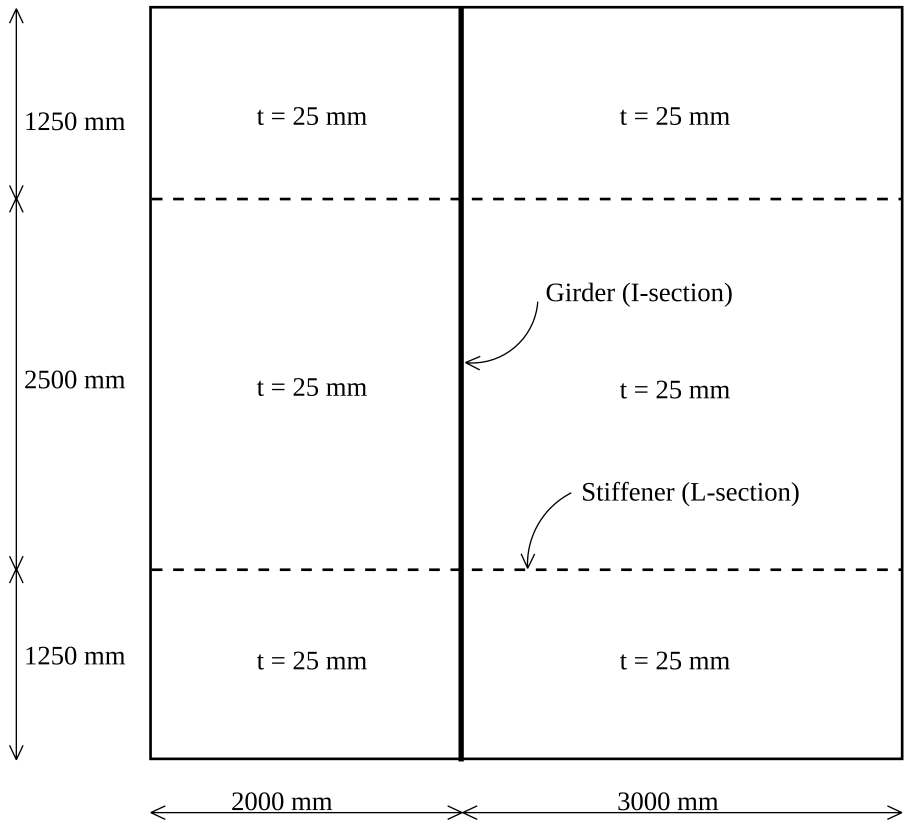

Figure A-1 Main model geometry

The model consists of a simple panel with 1 girder, 4 stiffeners, and 6 plates as shown in figure A-1. The girder is modelled with an I-section and the stiffeners are modelled with a L-section, see figure A-2.

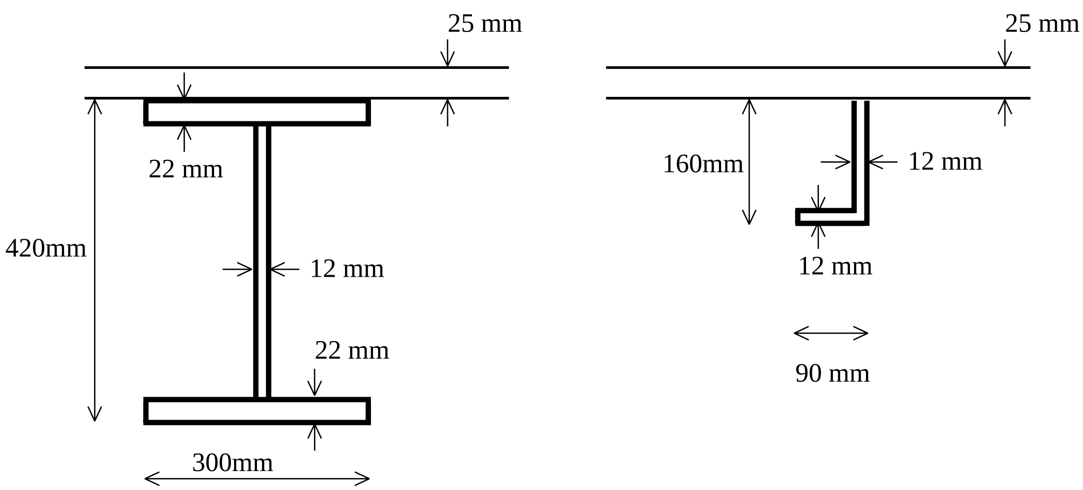

Figure A-2 Girder and stiffener cross sections

A 1.1.1 Boundary Conditions

The panel is simply supported along its outer boundaries. The in-plane boundary conditions are illustrated in figure A-3.

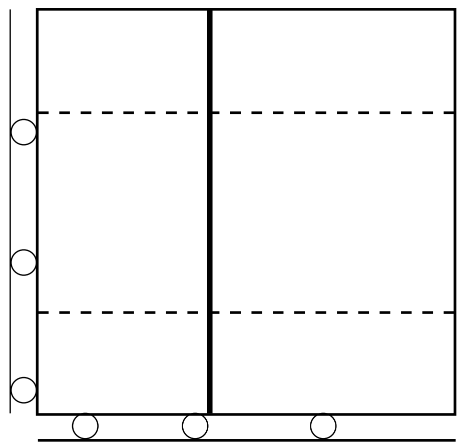

Figure A-3 In-plane boundary conditions

A 1.1.2 Loads

Four basic external loads are applied.

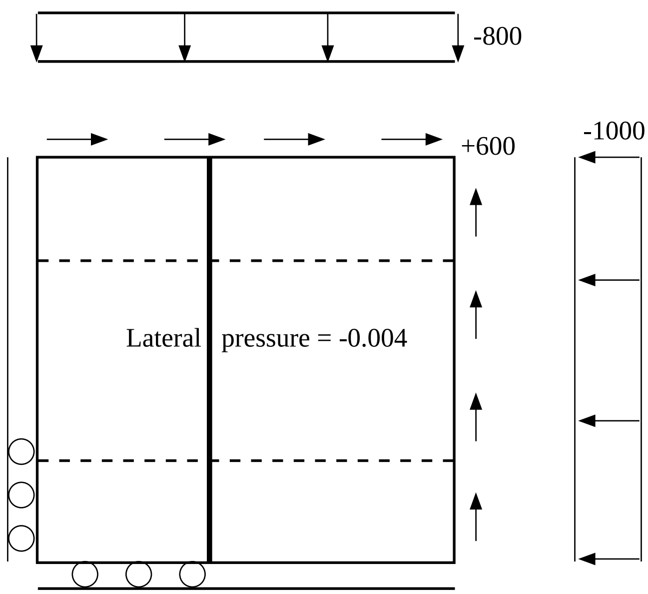

Figure A-4 Loadcase 1

.

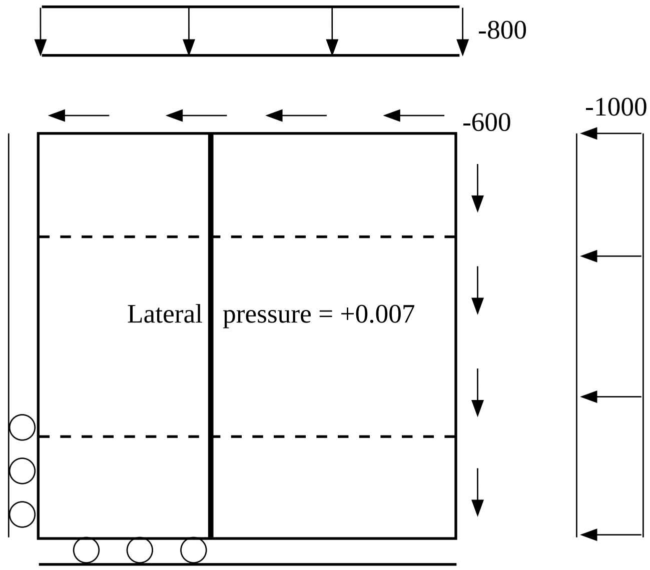

Figure A-5 Loadcase 2

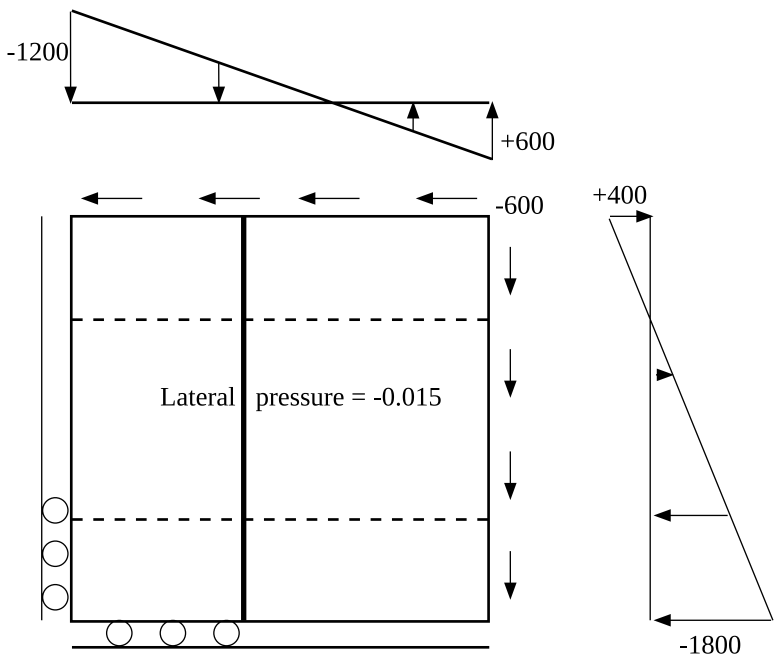

Figure A-6 Loadcase 3

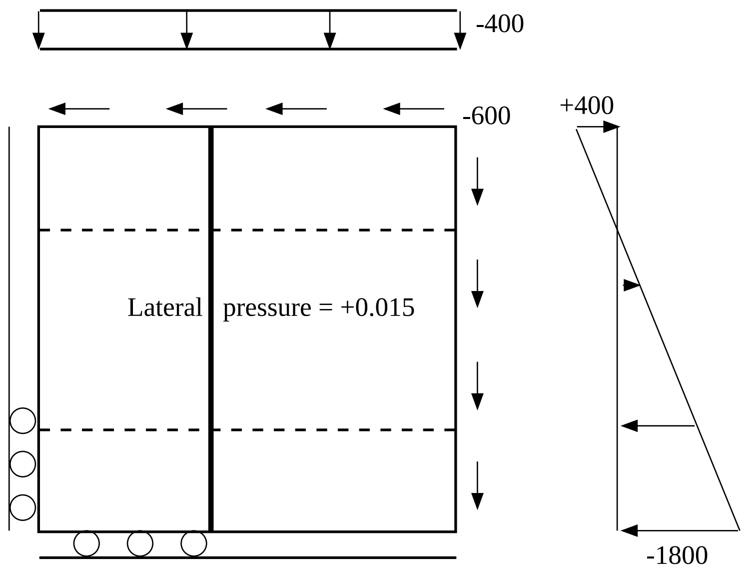

Figure A-7 Loadcase 4

A 1.1.3 Units

Length unit : mm
Load unit, edge loads : N/mm
Load unit, surface loads : N/mm^2
Stress unit : N/mm^2

A 1.1.4 Material

Linear elastic material

Young’s Modulus : $E=2.1*10^5$
Poisson’s ratio : $\nu=0.3$

A 1.2 Modelling in PREFEM

In this section, PREFEM /7/ commands for creating the model are shown:

```
%%
%% OPENED DATE: 18-MAY-1991  14:12:19
%%
%% PROGRAM:  SESAM PREFEM        VERSION:      5.5-01  8-JUN-1990
```

```
%% COMPUTER: VAXSERVER 3900 SVMS INSTALLATION: VSS LOKE
%% USER:     CA                 ACCOUNT:      VSS11391
%%
%%
 % ------------------------------------------------------
 % ! PREFEM COMMAND INPUT FILE                           !
 % ! CREATION OF A SIMPLE FE-MODEL FOR USE IN PLATEWORK. !
 % !                                                     !
 % ! STIFFENED PANEL:                                    !
 % !    LENGTH IN X-DIRECTION: 2000+3000      = 5000 MM  !
 % !    LENGTH IN Y-DIRECTION: 1250+2500+1250 = 5000 MM  !
 % !    1 GIRDER                                         !
 % !    2 STIFFENERS IN EACH GIRDER SPACING              !
 % !    4 LOADCASES                                      !
 % ------------------------------------------------------
 ,
 GENERATE SURFACE PAN 1 3 1 3 1 4 1 3 END
 CARTESIAN
 0.0 0.0 0.0
  2000.0    0.0  0.0
  3000.0    0.0  0.0 END
  0.0    1250.0  0.0
  0.0    2500.0  0.0
  0.0    1250.0  0.0 END
 ,
 SET NUMBEROF-ELEMENTS PANJ22 5 END
 END
 ,
 PROPERTY THICKNESS ALL-SURFACES-INCLUDED 25.0
 END
 END
 ,
 PROPERTY MATERIAL MAT1 ELASTIC 2.1E5 0.3 7850.0 0.0 0.0
 END
 END
 CONNECT MATERIAL MAT1 ( ALL-SURFACES-INCLUDED ALL-LINES-INCLUDED ) END
 PROPERTY SECTION
    GIR I 420.0 300.0 22.0 12.0 300.0 22.0 1.0 1.0
    STF L 160.0 12.0 90.0 12.0 1.0 1.0 POSITIVE
 END
 END
 ,
 CONNECT SECTION GIR PANJ* SECTION GIR END END
 CONNECT SECTION STF PANI* END
 PROPERTY ECCENTRICITY-BEAM ALL-LINES-INCLUDED
   CALCULATED-NEGATIVE-Z-OFFSET
 END
 END
 SET ELEMENT-TYPE SURFACE ALL-SURFACES-INCLUDED SHELL-4NODES END
 END
```

```
SET ELEMENT-TYPE LINE ( PANI&2 PANI&3 ) BEAM-2NODES END
END
SET ELEMENT-TYPE LINE ( PANJ2* ) BEAM-2NODES END
END
PROPERTY BOUNDARY-CONDITION PANJ1*
FIX FREE FIX FIX FIX FIX
GLOBAL
END
END
PROPERTY BOUNDARY-CONDITION PANJ3*
FREE FREE FIX FIX FIX FIX
GLOBAL
END
END
PROPERTY BOUNDARY-CONDITION PANI&1
FREE FIX FIX FIX FIX FIX
GLOBAL
END
END
PROPERTY BOUNDARY-CONDITION PANI&4
FREE FREE FIX FIX FIX FIX
GLOBAL
END
END
PROPERTY LOAD 1 LINE-LOAD PANJ3& GLOBAL -1000.0 600.0 0.0 END
MIDDLE-SURFACE-SHELL-ELEMENT
LINE-LOAD PANI&4 GLOBAL 600.0 -800.0 0.0 END
MIDDLE-SURFACE-SHELL-ELEMENT
NORMAL-PRESSURE ALL-SURFACES-INCLUDED -0.004 END MIDDLE-SURFACE
END
END
PROPERTY LOAD 2 LINE-LOAD PANJ3& GLOBAL -1000.0 -600.0 0.0 END
MIDDLE-SURFACE-SHELL-ELEMENT
LINE-LOAD PANI&4 GLOBAL -600.0 -800.0 0.0 END
MIDDLE-SURFACE-SHELL-ELEMENT
NORMAL-PRESSURE ALL-SURFACES-INCLUDED +0.007 END MIDDLE-SURFACE
END
END
PROPERTY LOAD 3 LINE-LOAD PANJ3& GLOBAL LINEAR-2POINTS-VARYING PANP31
 -1800.0 PANP34 400.0 -600.0 0.0 END
MIDDLE-SURFACE-SHELL-ELEMENT
LINE-LOAD PANI&4 GLOBAL -600.0 LINEAR-2POINTS-VARYING PANP14 -1200.0
 PANP34 600.0 0.0 END
MIDDLE-SURFACE-SHELL-ELEMENT
NORMAL-PRESSURE ALL-SURFACES-INCLUDED -0.015 END MIDDLE-SURFACE
END
END
PROPERTY LOAD 4 LINE-LOAD PANJ3& GLOBAL LINEAR-2POINTS-VARYING PANP31
 -1800.0 PANP34 400.0 -600.0 0.0 END
MIDDLE-SURFACE-SHELL-ELEMENT
```

```
 LINE-LOAD PANI&4 GLOBAL -600.0 -400.0 0.0 END
 MIDDLE-SURFACE-SHELL-ELEMENT
 NORMAL-PRESSURE ALL-SURFACES-INCLUDED +0.015 END MIDDLE-SURFACE
 END
 END
 MESH ALL
 WRITE 10
 ,
 SET GRAPHICS EYE-DIRECTION 0.0 0.0 1.0
 END
 END
 SET GRAPHICS PRESENTATION BEAM-ELEMENT OUTLINE-SECTION
 END
 END
 SET GRAPHICS SIZE-SYMBOLS SECTION-FACTOR 1.0
 END
 END
 END
 SET GRAPHICS SIZE-SYMBOLS BOUNDARY-CONDITION-SYMBOLS 4.0
 END
 END
 END
 ,
%%
%% CLOSED DATE: 18-MAY-1991  14:13:11
%%
```

A 1.3 Analysis in SESTRA

In this section, SESTRA /8/ direct input for static analysis of the model is shown:

```
INAM X82M
ITOP   10.
CMAS    0.        0.   0.                          1.00E-05
RETR    3.   1.
RSEL    1.                            1.
RNAM X82M         SIN
Z
```

A 1.4 Code Checking in PLATEWORK

In this section, PLATEWORK commands for post processing the model are shown:

```
%%
%% OPENED DATE: 19-MAY-1991  11:37:25
%%
%% PROGRAM:  SESAM PLATEWORK     VERSION:      D1.0-02 11-APR-1991
```

```
%% COMPUTER: VAXSERVER 3900 SVMS INSTALLATION: VSS LOKE
%% USER:     CA                   ACCOUNT:      VSS11391
%%
%-------------------------------------------------------------------------
% First set up some DISPLAY & PRINT characteristics
%-------------------------------------------------------------------------
 ,
 SET DISPLAY DEVICE X-WINDOW
 SET DISPLAY WORKSTATION-WINDOW 28 120 8 100
 SET PRINT PAGE-ORIENTATION PORTRAIT
 SET PRINT DESTINATION FILE
 ,
%-------------------------------------------------------------------------
% Read the SESAM direct access result file created by SESTRA
%-------------------------------------------------------------------------
 ,
 READ SIN-DIRECT-ACCESS X82M R10
 ,
%-------------------------------------------------------------------------
% Display the mesh and create a plot file
%-------------------------------------------------------------------------
 ,
 DISPLAY MESH
 LABEL NODE-NUMBERS ON
 SET PLOT FILE X82M MESH
 PLOT
 ,
```

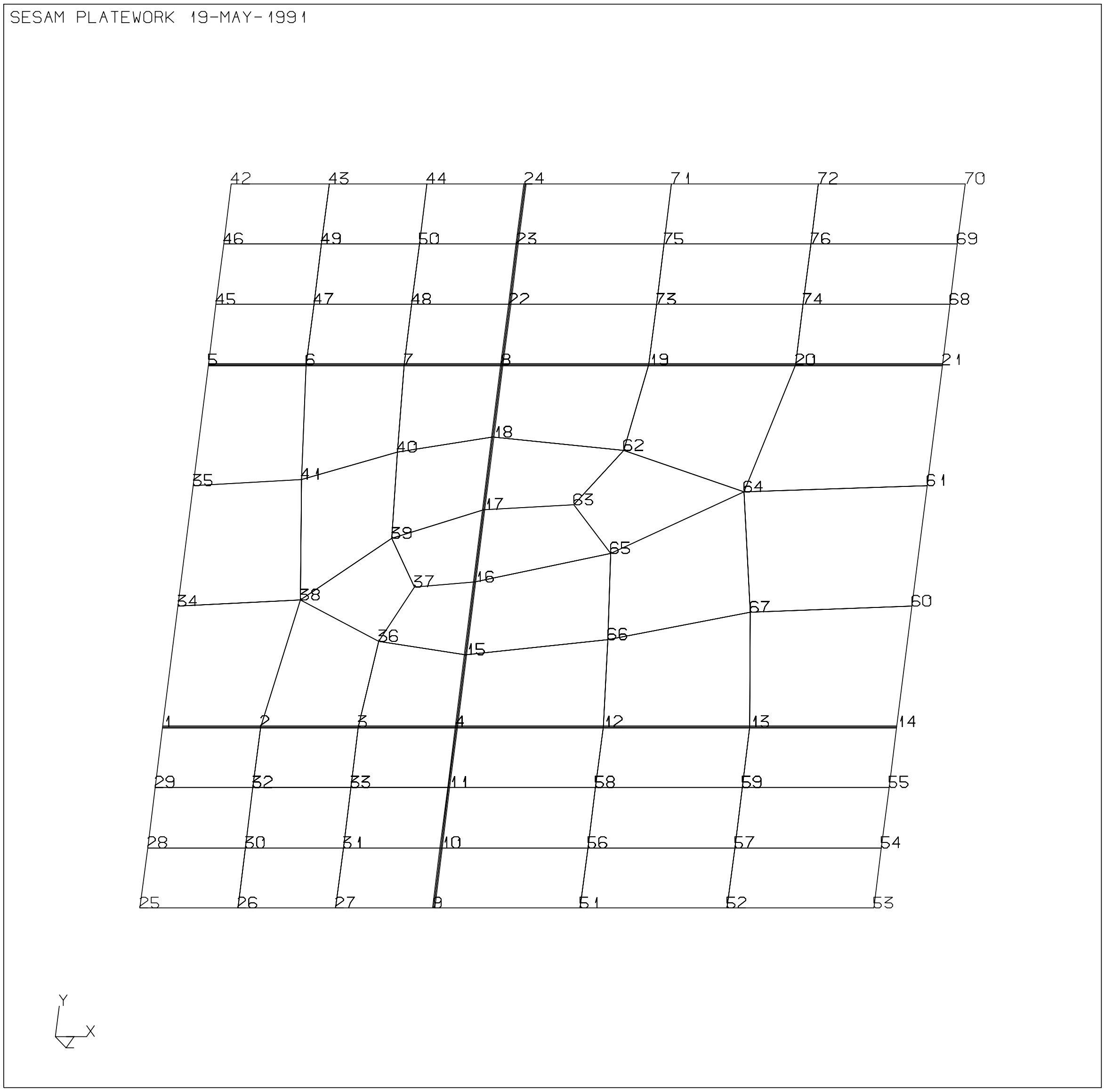

Figure A-8 Plot of mesh read from SIN-file

```
%-----------------------------------------------------------------------
% Create the Capacity Models
% Note that if API-specific Capacity Models are to be created, API must
% be the current Code of Practice (i.e. SELECT CODE API must be used).
%
% Since both girders and stiffeners have been modelled with beams,
% The AUTOMATIC features should be used.
%-----------------------------------------------------------------------
 ,
```

```
 SELECT CODE API
 ,
 CREATE ASSEMBLY-OF-CAPACITY-MODELS X82M
  NODES
  10 1 25
  10 1 53
  10 1 70
  10 1 42
  GIRDERS AUTOMATIC
  STIFFENERS AUTOMATIC
  PLATES AUTOMATIC
  MATERIALS AUTOMATIC
%-------------------------------------------------------------------------
% Display the Capacity Models and create another plot file
%-------------------------------------------------------------------------
 DISPLAY CAPACITY-MODELS
 SET PLOT FILE X82M CM
 PLOT
```

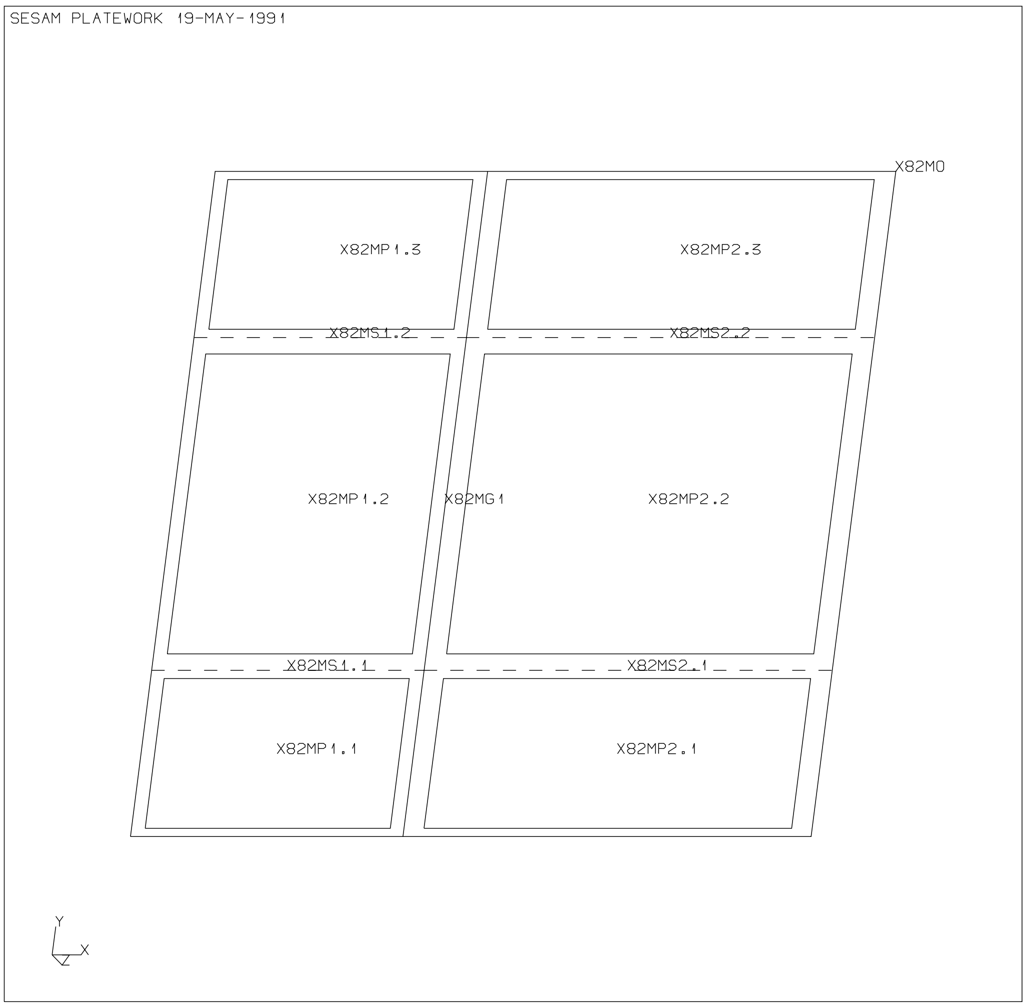

Figure A-9 Plot of Capacity Models created

```
%------------------------------------------------------------------------
% Print some Capacity Models to a separate print file
%------------------------------------------------------------------------
 ,
 SET PRINT FILE X82M CM
 PRINT CAPACITY-MODEL X82MG1
 PRINT CAPACITY-MODEL X82P2.2
 ,


19-MAY-1991 13:39 PROGRAM: SESAM    PLATEWORK D1.0-02 11-APR-1991  PAGE: 1


                  Basic Capacity Model Dimensions              SUB PAGE: 1


Capacity Model: X82MG1
Type          : GIR
----------------------

Corner coordinates
     X1 =  2.000E+03      Y1 =  0.000E+00      Z1 =  0.000E+00
     X2 =  2.000E+03      Y2 =  5.000E+03      Z2 =  0.000E+00

Material parameters
     fy =  3.400E+02      fp =  2.040E+02       E =  2.100E+05
     ny =  3.000E-01

Plate geometry
     Ly =  5.000E+03     lx1 =  2.000E+03     lx2 =  3.000E+03
     t1 =  2.500E+01      t2 =  2.500E+01     lya =  1.667E+03

Stiffener section
    hws =  1.480E+02     tws =  1.200E+01     bfs =  9.000E+01
    tfs =  1.200E+01     afs =  0.000E+00     efs =  3.900E+01

Girder section
    hwg =  3.980E+02     twg =  1.200E+01     bfg =  3.000E+02
    tfg =  2.200E+01     afg =  0.000E+00     efg =  0.000E+00

Girder parameters
    Lty =  5.000E+03      kg =  1.000E+00      mg =  8.000E+00
   GTYP =  0            GSTF =  0
```

```
19-MAY-1991 13:39 PROGRAM: SESAM    PLATEWORK D1.0-02 11-APR-1991  PAGE: 2


                  Basic Capacity Model Dimensions             SUB PAGE: 1


Capacity Model: X82MO
Type          : OSP
---------------------

Corner coordinates
     X1 =  0.000E+00      Y1 =  0.000E+00      Z1 =  0.000E+00
     X2 =  5.000E+03      Y2 =  0.000E+00      Z2 =  0.000E+00
     X3 =  5.000E+03      Y3 =  5.000E+03      Z3 =  0.000E+00
     X4 =  0.000E+00      Y4 =  5.000E+03      Z4 =  0.000E+00

Material parameters
     fy =  3.400E+02      fp =  2.040E+02       E =  2.100E+05
     ny =  3.000E-01

Plate geometry
     Lx =  5.000E+03      Ly =  5.000E+03     lxa =  2.500E+03
    lya =  1.667E+03       t =  2.500E+01

Stiffener section
    hws =  1.480E+02     tws =  1.200E+01     bfs =  9.000E+01
    tfs =  1.200E+01

Girder section
    hwg =  3.980E+02     twg =  1.200E+01     bfg =  3.000E+02
    tfg =  2.200E+01
```

```
%-------------------------------------------------------------------------
% Create 5 result combinations.
% Here, a similar set of combinations is created for each Code.
% This simplifies the Code Check analysis and the result presentation.
% Note that Capacity Model loads have not been created yet.
%
% API combinations
%-------------------------------------------------------------------------
 ,
 SELECT CODE API
 ,
 CREATE RESULTCASE API1 'API RESULTCASE 1' STATIC STORM
        COMBINATION
            1 1.0 0.0
        END
 CREATE RESULTCASE API2 'API RESULTCASE 2' STATIC STORM
```

```
        COMBINATION
            2 1.0 0.0
        END
 CREATE RESULTCASE API3 'API RESULTCASE 3' STATIC STORM
        COMBINATION
            3 1.0 0.0
        END
 CREATE RESULTCASE API4 'API RESULTCASE 4' STATIC STORM
        COMBINATION
            4 1.0 0.0
        END
 CREATE RESULTCASE API5 'API Combination 1' STATIC STORM
        COMBINATION
            1 0.5 0.0
            3 0.3 0.0
            4 0.2 0.0
        END
 '
%-------------------------------------------------------------------------
% DNV combinations
%-------------------------------------------------------------------------
 '
 SELECT CODE DNV
 '
 CREATE RESULTCASE DNV1 'DNV RESULTCASE 1' STATIC E-ULS
        COMBINATION
            1 1.0 0.0
        END
 CREATE RESULTCASE DNV2 'DNV RESULTCASE 2' STATIC E-ULS
        COMBINATION
            2 1.0 0.0
        END
 CREATE RESULTCASE DNV3 'DNV RESULTCASE 3' STATIC E-ULS
        COMBINATION
            3 1.0 0.0
        END
 CREATE RESULTCASE DNV4 'DNV RESULTCASE 4' STATIC E-ULS
        COMBINATION
            4 1.0 0.0
        END
 CREATE RESULTCASE DNV5 'DNV Combination 1' STATIC E-ULS
        COMBINATION
            1 0.5 0.0
            3 0.3 0.0
            4 0.2 0.0
        END
 '
%-------------------------------------------------------------------------
% NPD combinations
%-------------------------------------------------------------------------
```

```
 '
 SELECT CODE NPD
 '
 CREATE RESULTCASE NPD1 'NPD RESULTCASE 1' STATIC ULS
        COMBINATION
            1 1.0 0.0
        END
 CREATE RESULTCASE NPD2 'NPD RESULTCASE 2' STATIC ULS
        COMBINATION
            2 1.0 0.0
        END
 CREATE RESULTCASE NPD3 'NPD RESULTCASE 3' STATIC ULS
        COMBINATION
            3 1.0 0.0
        END
 CREATE RESULTCASE NPD4 'NPD RESULTCASE 4' STATIC ULS
        COMBINATION
            4 1.0 0.0
        END
 CREATE RESULTCASE NPD5 'NPD Combination 1' STATIC ULS
        COMBINATION
            1 0.5 0.0
            3 0.3 0.0
            4 0.2 0.0
        END
 '
%-------------------------------------------------------------------------
% Now create Capacity Model loads in all basic and combination resultcases
%-------------------------------------------------------------------------
 '
 SELECT RESULTCASE ALL ON
 CREATE LOAD-ON-CAPACITY-MODEL AUTOMATIC ALL
 '
%-------------------------------------------------------------------------
% Print some of the recently created Capacity Model loads
%-------------------------------------------------------------------------
 '
 SET PRINT FILE X82M CMLOADS
 PRINT LOAD-ON-CAPACITY-MODEL X82MP2.2 ALL
 '
```

```
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                  Capacity Model Loads                         SUB PAGE:     1

NOMENCLATURE:

Res-Name  Resultcase name
Type      Static or real/imaginary load component
fx1       Normal stress*plate thickness (x direction)
fx2       Normal stress*plate thickness (x direction)
fy1       Normal stress*plate thickness (y direction)
fy2       Normal stress*plate thickness (y direction)
fxy       In-plane shear stress*plate thickness
plat      Lateral plate load
Mbend     Beam bending moment
pdfl      Lateral plate deflection


Capacity Model: X82MP2.2
Type          : PLT

Res-Name Type    fx1        fy1        fxy        plat       pdfl       pbst
                 fx2        fy2
-------------------------------------------------------------------------------
1        S    -7.755E+02 -4.701E+02  2.886E+02 -4.000E-03    ----       ----
              -7.577E+02 -4.503E+02
2        S    -1.126E+03 -9.000E+02 -3.150E+02  7.000E-03    ----       ----
              -1.120E+03 -1.029E+03
3        S    -1.233E+03 -4.642E+02 -6.323E+01 -1.500E-02    ----       ----
              -4.552E+02 -1.879E+02
4        S    -1.281E+03 -4.475E+02 -1.616E+02  1.500E-02    ----       ----
              -4.155E+02 -9.358E+02
API1     S    -7.755E+02 -4.701E+02  2.886E+02 -4.000E-03    ----       ----
              -7.577E+02 -4.503E+02
API2     S    -1.126E+03 -9.000E+02 -3.150E+02  7.000E-03    ----       ----
              -1.120E+03 -1.029E+03
API3     S    -1.233E+03 -4.642E+02 -6.323E+01 -1.500E-02    ----       ----
              -4.552E+02 -1.879E+02
API4     S    -1.281E+03 -4.475E+02 -1.616E+02  1.500E-02    ----       ----
              -4.155E+02 -9.358E+02
API5     S    -1.037E+03 -4.760E+02  9.301E+01 -3.500E-03    ----       ----
              -6.242E+02 -5.138E+02
DNV1     S    -7.755E+02 -4.701E+02  2.886E+02 -4.000E-03    ----       ----
              -7.577E+02 -4.503E+02
DNV2     S    -1.126E+03 -9.000E+02 -3.150E+02  7.000E-03    ----       ----
              -1.120E+03 -1.029E+03
DNV3     S    -1.233E+03 -4.642E+02 -6.323E+01 -1.500E-02    ----       ----
              -4.552E+02 -1.879E+02
```

DNV4	S	-1.281E+03	-4.475E+02	-1.616E+02	1.500E-02	----	----
		-4.155E+02	-9.358E+02				
DNV5	S	-1.037E+03	-4.760E+02	9.301E+01	-3.500E-03	----	----
		-6.242E+02	-5.138E+02				
NPD1	S	-7.755E+02	-4.701E+02	2.886E+02	-4.000E-03	----	----
		-7.577E+02	-4.503E+02				
NPD2	S	-1.126E+03	-9.000E+02	-3.150E+02	7.000E-03	----	----
		-1.120E+03	-1.029E+03				
NPD3	S	-1.233E+03	-4.642E+02	-6.323E+01	-1.500E-02	----	----
		-4.552E+02	-1.879E+02				
NPD4	S	-1.281E+03	-4.475E+02	-1.616E+02	1.500E-02	----	----
		-4.155E+02	-9.358E+02				
NPD5	S	-1.037E+03	-4.760E+02	9.301E+01	-3.500E-03	----	----
		-6.242E+02	-5.138E+02				

```
%-------------------------------------------------------------------------
% Display some of the basic and combination loads.
% Send plots to separate plot files.
%-------------------------------------------------------------------------
 ,
 DISPLAY LOAD-ON-CAPACITY-MODEL X82MG1 3 NORMAL
 SET PLOT FILE X82M LODG1R3
 PLOT
```

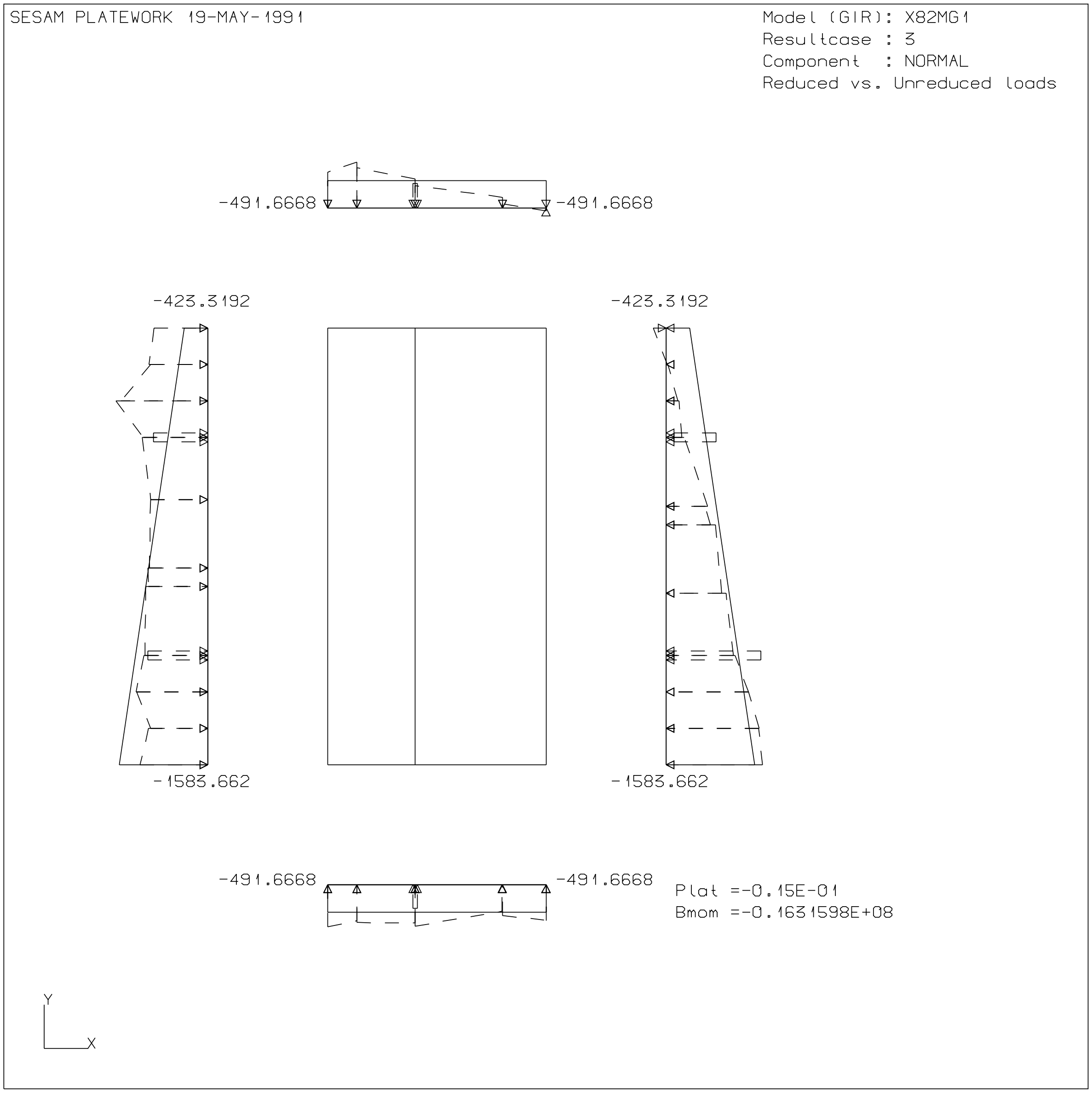

Figure A-10 Plot of girder load

```
DISPLAY LOAD-ON-CAPACITY-MODEL X82MP2.2 2 NORMAL
SET PLOT FILE X82M LODP22R2
PLOT
```

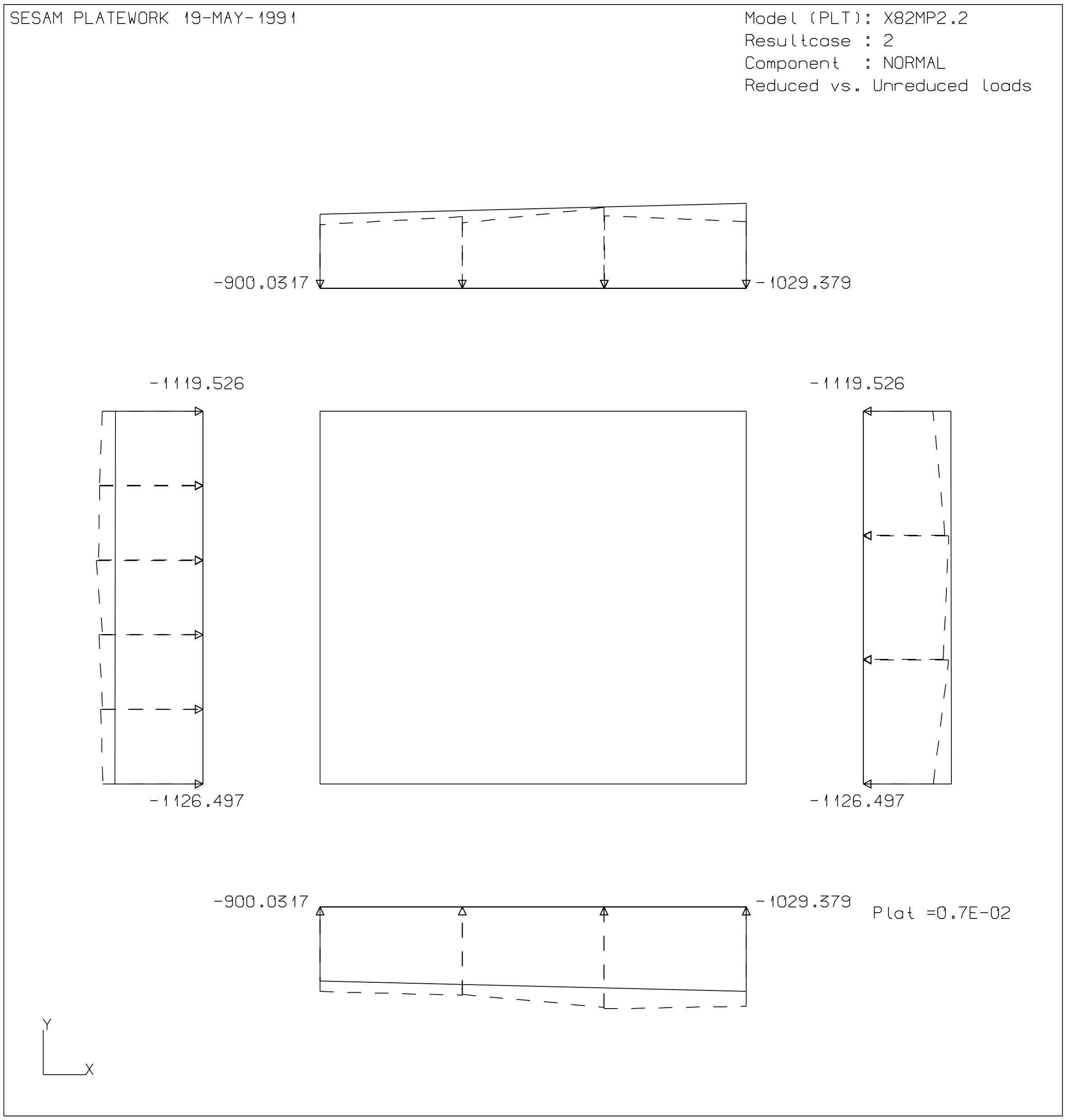

Figure A-11 Plot of plate load

```
DISPLAY LOAD-ON-CAPACITY-MODEL X82MS2.2 API5 NORMAL
SET PLOT FILE X82M LODS22R5
PLOT
'
```

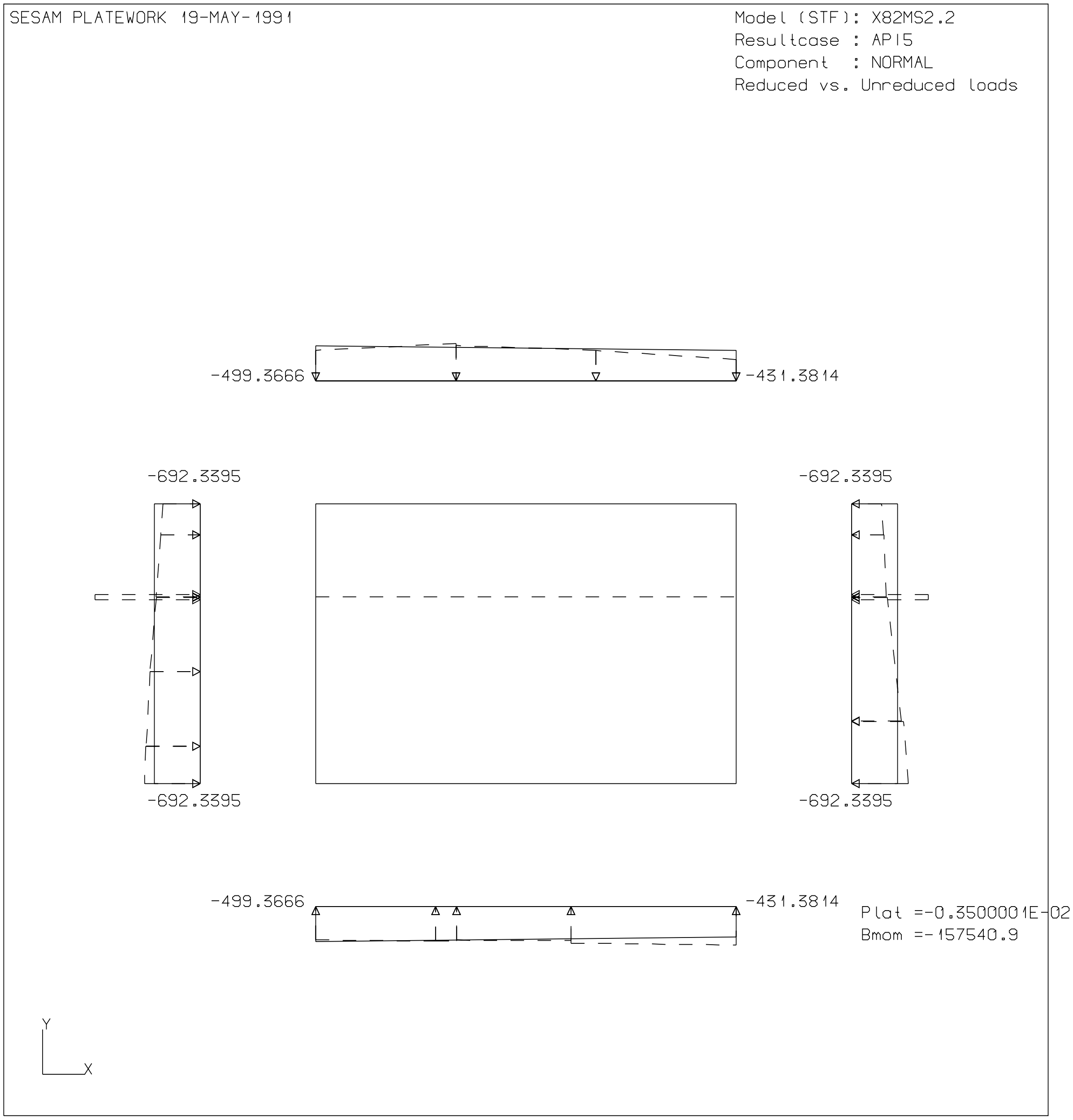

Figure A-12 Plot of stiffener load

```
%-------------------------------------------------------------------------
% Run API Code Check.
% Select API resultcases first.
%-------------------------------------------------------------------------
 '
 SELECT CODE API
 SELECT RESULTCASE ALL OFF
 SELECT RESULTCASE API1 ON
 SELECT RESULTCASE API2 ON
 SELECT RESULTCASE API3 ON
 SELECT RESULTCASE API4 ON
 SELECT RESULTCASE API5 ON
 RUN CODE-CHECK-ANALYSIS
 '
%-------------------------------------------------------------------------
% Run DnV Code Check.
% Select DnV resultcases first.
%-------------------------------------------------------------------------
 '
 SELECT CODE DNV
 SELECT RESULTCASE ALL OFF
 SELECT RESULTCASE DNV1 ON
 SELECT RESULTCASE DNV2 ON
 SELECT RESULTCASE DNV3 ON
 SELECT RESULTCASE DNV4 ON
 SELECT RESULTCASE DNV5 ON
 RUN CODE-CHECK-ANALYSIS
 '
%-------------------------------------------------------------------------
% Run NPD Code Check.
% Select NPD resultcases first.
%-------------------------------------------------------------------------
 '
 SELECT CODE NPD
 SELECT RESULTCASE ALL OFF
 SELECT RESULTCASE NPD1 ON
 SELECT RESULTCASE NPD2 ON
 SELECT RESULTCASE NPD3 ON
 SELECT RESULTCASE NPD4 ON
 SELECT RESULTCASE NPD5 ON
 RUN CODE-CHECK-ANALYSIS
 '
%-------------------------------------------------------------------------
% Print a full documentation of the 3 worst failures in each code check.
% Also plot UCmax in the worst resultcase for each code check.
%-------------------------------------------------------------------------
 '
 SELECT RESULTCASE ALL ON
 '
 SELECT CODE API
```

```
 SET PRINT FILE X82MAPI RESULTS
 DEFINE SORTING MAX-ENTRIES UNLIMITED
 PRINT CODE-CHECK-RESULTS SUMMARY


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                  API Code Check Results
                  Summary Table                                SUB PAGE:     1



NOMENCLATURE:

Status            Check status
UCmax             Maximum of all Unity Criterion factors
Res-Name          Resultcase name
L-stat            Resultcase Limit-state
Phas              Phase angle
Capacity-Model    Basic Capacity Model name
Type              Basic Capacity Model type

+--------------------------------------------------------------+
! Sorting Parameter: UCMAX        ! Max Entries: UNLIMITED    !
! Sorting Order    : DECREASING   ! Max Value  : UNLIMITED    !
!                                 ! Min Value  : UNLIMITED    !
+--------------------------------------------------------------+

Status   UCmax      Res-Name L-stat Phas     Capacity-Model   Type
-------------------------------------------------------------------
**-PB      5.14     API2     STORM           X82MP2.2         PLT
**-PB      3.39     API2     STORM           X82MP1.2         PLT
**-LB      3.05     API4     STORM           X82MS2.2         STF
**-LB      3.05     API5     STORM           X82MS2.2         STF
**-LB      3.05     API1     STORM           X82MS2.1         STF
**-LB      3.05     API1     STORM           X82MS2.2         STF
**-LB      3.05     API3     STORM           X82MS2.2         STF
**-LB      3.05     API2     STORM           X82MS2.2         STF
**-LB      3.05     API2     STORM           X82MS2.1         STF
**-LB      3.05     API3     STORM           X82MS2.1         STF
**-LB      3.05     API4     STORM           X82MS2.1         STF
**-LB      3.05     API5     STORM           X82MS2.1         STF
**-PB      2.76     API4     STORM           X82MP2.2         PLT
**-LB      2.03     API2     STORM           X82MS1.1         STF
**-LB      2.03     API3     STORM           X82MS1.1         STF
**-LB      2.03     API4     STORM           X82MS1.1         STF
**-LB      2.03     API5     STORM           X82MS1.1         STF
```

```
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                  API Code Check Results
                  Summary Table                                 SUB PAGE:     2
```

Status	UCmax	Res-Name	L-stat Phas	Capacity-Model	Type
**-LB	2.03	API1	STORM	X82MS1.2	STF
**-LB	2.03	API2	STORM	X82MS1.2	STF
**-LB	2.03	API3	STORM	X82MS1.2	STF
**-LB	2.03	API4	STORM	X82MS1.2	STF
**-LB	2.03	API1	STORM	X82MS1.1	STF
**-LB	2.03	API5	STORM	X82MS1.2	STF
**-PB	1.98	API3	STORM	X82MP1.2	PLT
**-PB	1.93	API5	STORM	X82MP2.2	PLT
**-PB	1.75	API4	STORM	X82MP1.2	PLT
**-PB	1.67	API1	STORM	X82MP2.2	PLT
**-LB	1.52	API4	STORM	X82MG1	GIR
**-LB	1.52	API5	STORM	X82MG1	GIR
**-LB	1.52	API1	STORM	X82MG1	GIR
**-LB	1.52	API3	STORM	X82MG1	GIR
**-LB	1.52	API2	STORM	X82MG1	GIR
**-PY	1.49	API3	STORM	X82MP2.2	PLT
**-PB	1.12	API5	STORM	X82MP1.2	PLT
**-PB	1.07	API2	STORM	X82MP2.1	PLT
OK-PB	0.92	API4	STORM	X82MP2.1	PLT
OK-PB	0.57	API3	STORM	X82MP2.1	PLT
OK-PB	0.56	API2	STORM	X82MP1.1	PLT
OK-PB	0.55	API1	STORM	X82MP1.2	PLT
OK-PB	0.52	API2	STORM	X82MP1.3	PLT
OK-PB	0.47	API3	STORM	X82MP1.3	PLT
OK-PB	0.46	API2	STORM	X82MP2.3	PLT
OK-PB	0.41	API1	STORM	X82MP2.3	PLT
OK-PB	0.39	API3	STORM	X82MP1.1	PLT
OK-PB	0.37	API5	STORM	X82MP2.1	PLT
OK-PB	0.34	API4	STORM	X82MP1.1	PLT
OK-PB	0.32	API5	STORM	X82MP1.3	PLT
OK-PY	0.31	API4	STORM	X82MP2.3	PLT
OK-PB	0.29	API5	STORM	X82MP1.1	PLT
OK-OPBE	0.28	API2	STORM	X82MO	OSP
OK-PB	0.27	API4	STORM	X82MP1.3	PLT
OK-PB	0.25	API5	STORM	X82MP2.3	PLT
OK-PY	0.24	API3	STORM	X82MP2.3	PLT
OK-PB	0.22	API1	STORM	X82MP1.3	PLT
OK-PB	0.21	API1	STORM	X82MP1.1	PLT
OK-OPBE	0.21	API4	STORM	X82MO	OSP
OK-OPBE	0.18	API3	STORM	X82MO	OSP
OK-OPBE	0.17	API5	STORM	X82MO	OSP
OK-PY	0.17	API1	STORM	X82MP2.1	PLT
OK-OPBE	0.13	API1	STORM	X82MO	OSP

```
 DEFINE SORTING MAX-ENTRIES 3
 PRINT CODE-CHECK-RESULTS FULL



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                  API Code Check Results
                  Full Table                                     SUB PAGE:
1



NOMENCLATURE:

Plate          Plate parameter name
dimension      Geometric dimension value
Material       Capacity Model material parameter
Mat-Value      Material parameter value
CM-Load        Capacity Model load
Load-Value     Load value
UC-Factor      Unity Criterion factor
UC-Val         Unity Criterion factor value

+--------------------------------------------------------------+
! Sorting Parameter: UCMAX        ! Max Entries:          3   !
! Sorting Order    : DECREASING   ! Max Value  : UNLIMITED    !
!                                 ! Min Value  : UNLIMITED    !
+--------------------------------------------------------------+
```

```
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                  API Code Check Results
                  Full Table                                      SUB PAGE:     2

+---------------------------------------------------------------+
! Capacity Model   : X82MP2.2           ! Type       : PLT     !
! Resultcase Name  : API2               ! Limit-State: STORM   !
! Code Check Status: **-PB              !                      !
+---------------------------------------------------------------+

Plate     dimension  Material  Mat-Value  CM-Load   Load-Value UC-Factor UC-Val
-------------------------------------------------------------------------------
     lx =  3.000E+03      fy =  3.400E+02     fx1 = -1.126E+03   UCmax =   5.14
     ly =  2.500E+03      fp =  2.040E+02     fx2 = -1.120E+03 UCinplS =   5.14
      t =  2.500E+01       E =  2.100E+05     fy1 = -9.000E+02 UCinplU =   0.87
                          ny =  3.000E-01     fy2 = -1.029E+03  UCWeWa =   0.70
    Plate parameter                           fxy = -3.150E+02 UCstrsS =   0.39
   PTYP =  0                                 plat =  7.000E-03 UCplatU =   0.02
   PSTF =  0                                 pdfl =  ----
   PDEF =  0                                 pbst =  ----
     wa = -1.000E+00
     wp = -1.000E+00


INTERMEDIATE CODE CHECK RESULTS:

Parameter   Value    Parameter   Value    Parameter   Value
-------------------------------------------------------------
  UCmax =  5.137E+00 UCinplS =  5.137E+00 UCinplU =  8.667E-01
 UCWeWa =  6.950E-01 UCstrsS =  3.861E-01 UCplatU =  2.408E-02
  FSSLS =  1.250E+00   FSULS =  1.500E+00   sigx1 = -4.506E+01
  sigx2 = -4.478E+01   sigy1 = -3.600E+01   sigy2 = -4.118E+01
  tauxy = -1.260E+01     fxe =  7.592E+01     fye =  5.449E+01
   taue =  1.541E+02      kx =  4.000E+00      ky =  2.871E+00
   ktau =  8.118E+00    feqb =  3.289E+01     fxs =  3.508E+01
    fys =  3.013E+01    fxys =  1.413E+02    beta =  4.024E+00
    fxu =  1.480E+02     fyu =  1.284E+02    fxyu =  1.662E+02
     We =  5.792E+00      Wa =  8.333E+00     fxb =  1.799E+01
    fyb =  1.580E+01    feqt =  3.327E+01    feqc =  6.301E+01
  platu =  4.360E-01      Wp =  2.012E+01
```

```
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                  API Code Check Results
                  Full Table                                     SUB PAGE:     3

+----------------------------------------------------------------+
! Capacity Model   : X82MP1.2          ! Type       : PLT      !
! Resultcase Name  : API2              ! Limit-State: STORM    !
! Code Check Status: **-PB             !                       !
+----------------------------------------------------------------+

Plate     dimension  Material  Mat-Value  CM-Load   Load-Value UC-Factor UC-Val
--------------------------------------------------------------------------------
     lx =  2.000E+03      fy =  3.400E+02     fx1 = -1.287E+03   UCmax =   3.39
     ly =  2.500E+03      fp =  2.040E+02     fx2 = -1.504E+03 UCinplS =   3.39
      t =  2.500E+01       E =  2.100E+05     fy1 = -1.312E+03 UCinplU =   0.79
                          ny =  3.000E-01     fy2 = -8.159E+02  UCWeWa =   0.37
    Plate parameter                           fxy =  1.976E+01 UCstrsS =   0.37
   PTYP =  0                                 plat =  7.000E-03 UCplatU =   0.02
   PSTF =  0                                 pdfl =  ----
   PDEF =  0                                 pbst =  ----
     wa = -1.000E+00
     wp = -1.000E+00


INTERMEDIATE CODE CHECK RESULTS:

Parameter   Value     Parameter   Value     Parameter   Value
--------------------------------------------------------------
  UCmax =  3.390E+00 UCinplS =  3.390E+00 UCinplU =  7.860E-01
 UCWeWa =  3.665E-01 UCstrsS =  3.692E-01 UCplatU =  1.814E-02
  FSSLS =  1.250E+00   FSULS =  1.500E+00   sigx1 = -5.150E+01
  sigx2 = -6.017E+01   sigy1 = -5.249E+01   sigy2 = -3.264E+01
  tauxy =  7.903E-01     fxe =  7.976E+01     fye =  1.186E+02
   taue =  2.343E+02      kx =  2.690E+00      ky =  4.000E+00
   ktau =  7.900E+00    feqb =  4.851E+01     fxs =  5.361E+01
    fys =  4.086E+01    fxys =  1.680E+02    beta =  3.219E+00
    fxu =  1.493E+02     fyu =  1.784E+02    fxyu =  1.805E+02
     We =  2.545E+00      Wa =  6.944E+00     fxb =  9.313E+00
    fyb =  1.110E+01    feqt =  4.114E+01    feqc =  6.025E+01
  platu =  5.788E-01      Wp =  1.609E+01
```

```
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                  API Code Check Results
                  Full Table                                    SUB PAGE:     4

+---------------------------------------------------------------+
! Capacity Model    : X82MS2.2           ! Type        : STF     !
! Resultcase Name   : API4               ! Limit-State: STORM   !
! Code Check Status: **-LB               !                       !
+---------------------------------------------------------------+

Stiffener  section   Material  Mat-Value  CM-Load   Load-Value UC-Factor UC-Val
-------------------------------------------------------------------------------
    hws =  1.480E+02      fy =  3.400E+02     fx1 = -5.129E+02   UCmax =   3.05
    tws =  1.200E+01      fp =  2.040E+02     fy1 = -4.129E+02   UCcbU =   0.15
    bfs =  9.000E+01       E =  2.100E+05     fy2 = -6.632E+02  UCbcbU =   0.20
    tfs =  1.200E+01      ny =  3.000E-01     fxy = -3.016E+02  UCtfbU =   0.20
    afs =  0.000E+00                         plat =  1.500E-02   UCpbU =   0.03
    efs =  3.900E+01 Stiffener parameter    Mbend =  3.452E+06  UCpdtw =   0.24
                          Ly =  5.000E+03                       UCcdtw =   0.21
    Plate dimension      Ltx =  3.000E+03                      UCpbftf =   0.54
     lx =  3.000E+03     ks0 =  1.000E+00                      UCcbftf =   0.40
    ly1 =  2.500E+03     ms0 =  8.000E+00                      UClasup =   3.05
    ly2 =  1.250E+03     ksp =  6.000E-01                       UCsreq =   0.12
     t1 =  2.500E+01     msp =  1.600E+01                      UCsreql =   0.00
     t2 =  2.500E+01    SEND =  Continous
                        STYP =  0
                        SSTF =  0
```

```
INTERMEDIATE CODE CHECK RESULTS:

Parameter   Value    Parameter   Value    Parameter   Value
--------------------------------------------------------------
  UCmax =  3.048E+00   UCcbU =  1.494E-01  UCbcbU =  2.031E-01
 UCtfbU =  1.958E-01   UCpbU =  2.623E-02  UCpdtw =  2.427E-01
 UCcdtw =  2.150E-01 UCpbftf =  5.389E-01 UCcbftf =  4.024E-01
UClasup =  3.048E+00  UCsreq =  1.214E-01 UCsreql =  0.000E+00
  FSSLS =  1.250E+00   FSULS =  1.500E+00    sigx = -1.934E+01
  sigy1 = -1.652E+01   sigy2 = -2.653E+01   tauxy = -1.206E+01
  beta1 =  4.024E+00   beta2 =  2.012E+00     Cx1 =  4.353E-01
    Cx2 =  7.470E-01     be1 =  1.088E+03     be2 =  9.338E+02
     Ae =  2.813E+04      zs =  1.546E+02      zp =  1.185E+01
    Iez =  4.385E+07      re =  3.948E+01     Wep =  3.699E+06
    Wes =  2.835E+05     Wpl =  6.253E+05       J =  1.371E+05
     Cw =  1.644E+08      Is =  3.662E+07      Ic =  7.540E+06
      P = -9.617E+05     Ftw =  5.655E+05     Fwi =  2.284E+05
  Mbend =  3.452E+06      ms =  1.600E+01  lambda =  5.839E-01
     ks =  6.000E-01     PEe =  2.805E+07     PFu =  9.654E+06
     Mu =  9.640E+07      B1 =  1.000E+00     PTe =  1.440E+07
   PTFe =  1.000E+07    PTFu =  7.369E+06     Mup =  1.975E+08
   Fxyu =  1.931E+02    Rdtw =  1.233E+01 etapdtw =  5.082E+01
etacdtw =  5.738E+01   Rbftf =  7.500E+00 etapbft =  1.392E+01
etacbft =  1.864E+01     RLb =  3.000E+03 etaL1L2 =  9.842E+02
    RIs = -5.321E+06     RIl =  0.000E+00   etaIe =  4.385E+07
```

```
SET PLOT FILE X82MAPI R2UCMAX
DISPLAY CODE-CHECK-RESULTS API2 UCmax
PLOT
'
```

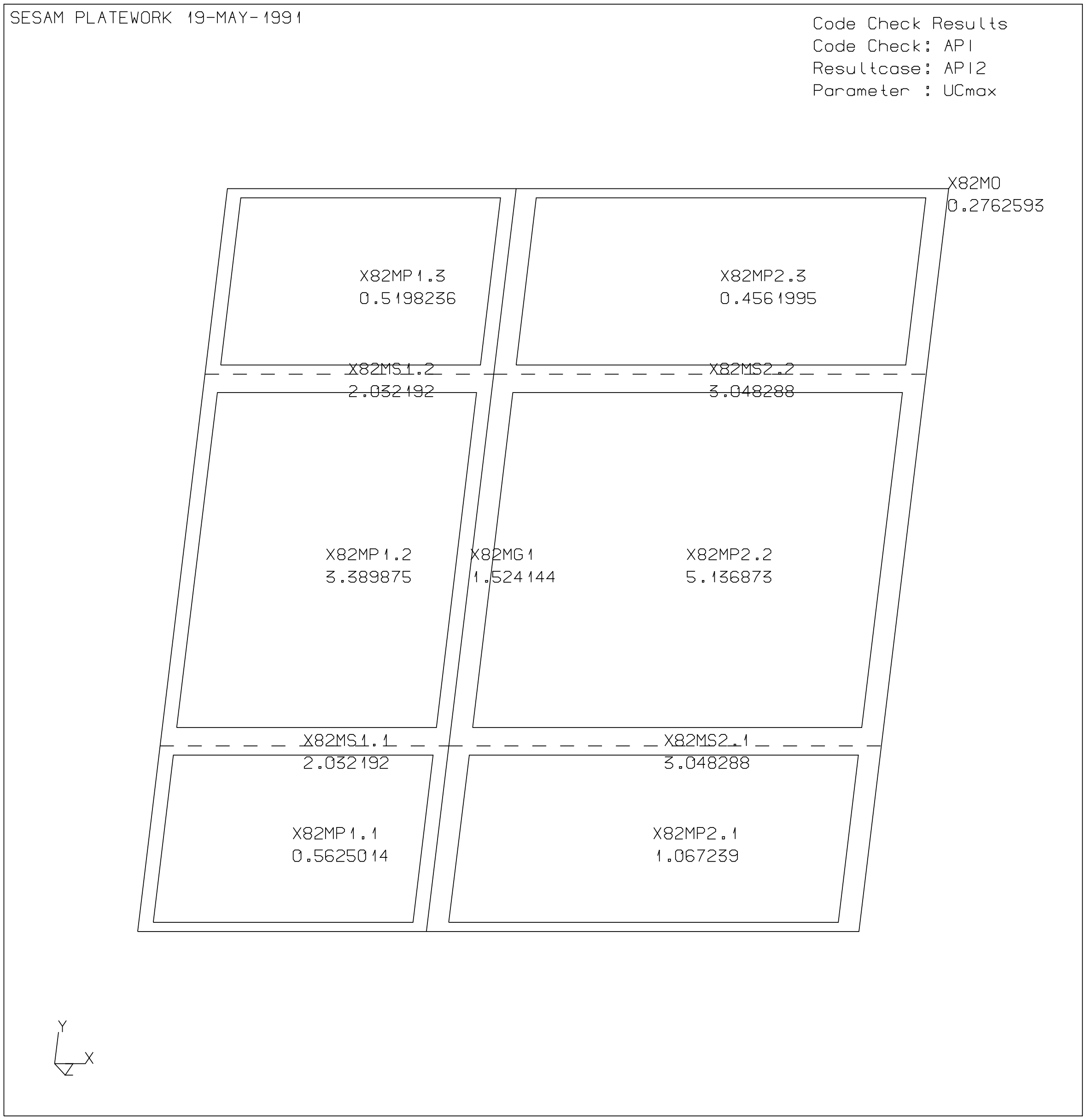

Figure A-13 Plot of API Code Check results calculated

```
SELECT CODE DNV
SET PRINT FILE X82MDNV RESULTS
DEFINE SORTING MAX-ENTRIES UNLIMITED
PRINT CODE-CHECK-RESULTS SUMMARY
```

```
19-MAY-1991 13:43 PROGRAM: SESAM    PLATEWORK D1.0-02 11-APR-1991  PAGE:     1


                  DNV Code Check Results
                  Summary Table                                SUB PAGE:     1

NOMENCLATURE:

Status            Check status
UCmax             Maximum of all Unity Criterion factors
Res-Name          Resultcase name
L-stat            Resultcase Limit-state
Phas              Phase angle
Capacity-Model    Basic Capacity Model name
Type              Basic Capacity Model type

+--------------------------------------------------------------+
! Sorting Parameter: UCMAX        ! Max Entries: UNLIMITED     !
! Sorting Order    : DECREASING   ! Max Value  : UNLIMITED     !
!                                 ! Min Value  : UNLIMITED     !
+--------------------------------------------------------------+

Status   UCmax      Res-Name L-stat Phas     Capacity-Model   Type
------------------------------------------------------------------
**-PB      1.87      DNV2     E-ULS           X82MP2.2         PLT
**-PB      1.48      DNV2     E-ULS           X82MP1.2         PLT
**-PB      1.39      DNV4     E-ULS           X82MP2.2         PLT
**-PB      1.15      DNV3     E-ULS           X82MP1.2         PLT
**-PB      1.14      DNV5     E-ULS           X82MP2.2         PLT
**-PB      1.10      DNV1     E-ULS           X82MP2.2         PLT
**-PB      1.09      DNV4     E-ULS           X82MP1.2         PLT
OK-PB      1.00      DNV3     E-ULS           X82MP2.2         PLT
OK-PB      0.90      DNV2     E-ULS           X82MP2.1         PLT
OK-PB      0.88      DNV4     E-ULS           X82MP2.1         PLT
OK-PB      0.86      DNV5     E-ULS           X82MP1.2         PLT
OK-LB1F    0.82      DNV1     E-ULS           X82MG1           GIR
OK-LB1P    0.81      DNV2     E-ULS           X82MG1           GIR
OK-LB1F    0.76      DNV5     E-ULS           X82MG1           GIR
OK-LB1F    0.74      DNV3     E-ULS           X82MG1           GIR
OK-LB1P    0.72      DNV4     E-ULS           X82MG1           GIR
OK-PB      0.70      DNV3     E-ULS           X82MP2.1         PLT
OK-PIF2    0.67      DNV2     E-ULS           X82MS1.2         STF
OK-PB      0.66      DNV2     E-ULS           X82MP1.3         PLT
OK-LB1S    0.65      DNV3     E-ULS           X82MS1.1         STF
OK-LB1P    0.65      DNV2     E-ULS           X82MS1.1         STF
OK-LB1P    0.65      DNV4     E-ULS           X82MS1.1         STF
OK-LB1S    0.65      DNV1     E-ULS           X82MS1.1         STF
OK-LB1S    0.65      DNV1     E-ULS           X82MS1.2         STF
OK-LB1S    0.65      DNV5     E-ULS           X82MS1.1         STF
OK-LB1S    0.65      DNV3     E-ULS           X82MS1.2         STF
```

DNV Code Check Results
Summary Table SUB PAGE: 2

Status	UCmax	Res-Name	L-stat Phas	Capacity-Model	Type
OK-LB1P	0.65	DNV4	E-ULS	X82MS1.2	STF
OK-LB1S	0.65	DNV5	E-ULS	X82MS1.2	STF
OK-LB1S	0.65	DNV1	E-ULS	X82MS2.1	STF
OK-LB1P	0.65	DNV2	E-ULS	X82MS2.1	STF
OK-LB1S	0.65	DNV1	E-ULS	X82MS2.2	STF
OK-LB1S	0.65	DNV5	E-ULS	X82MS2.1	STF
OK-LB1P	0.65	DNV4	E-ULS	X82MS2.1	STF
OK-LB1S	0.65	DNV3	E-ULS	X82MS2.1	STF
OK-LB1P	0.65	DNV2	E-ULS	X82MS2.2	STF
OK-LB1S	0.65	DNV5	E-ULS	X82MS2.2	STF
OK-LB1P	0.65	DNV4	E-ULS	X82MS2.2	STF
OK-LB1S	0.65	DNV3	E-ULS	X82MS2.2	STF
OK-PB	0.63	DNV2	E-ULS	X82MP1.1	PLT
OK-PB	0.60	DNV1	E-ULS	X82MP1.2	PLT
OK-PB	0.60	DNV3	E-ULS	X82MP1.3	PLT
OK-PB	0.60	DNV2	E-ULS	X82MP2.3	PLT
OK-PB	0.54	DNV1	E-ULS	X82MP2.3	PLT
OK-PB	0.48	DNV3	E-ULS	X82MP1.1	PLT
OK-PB	0.48	DNV5	E-ULS	X82MP2.1	PLT
OK-PB	0.47	DNV4	E-ULS	X82MP1.1	PLT
OK-PB	0.39	DNV4	E-ULS	X82MP1.3	PLT
OK-PB	0.39	DNV5	E-ULS	X82MP1.3	PLT
OK-PB	0.37	DNV5	E-ULS	X82MP1.1	PLT
OK-PB	0.32	DNV4	E-ULS	X82MP2.3	PLT
OK-PB	0.31	DNV1	E-ULS	X82MP1.3	PLT
OK-PB	0.31	DNV5	E-ULS	X82MP2.3	PLT
OK-PB	0.28	DNV1	E-ULS	X82MP2.1	PLT
OK-PB	0.26	DNV1	E-ULS	X82MP1.1	PLT
OK-PB	0.23	DNV3	E-ULS	X82MP2.3	PLT

```
 DEFINE SORTING MAX-ENTRIES 3
 PRINT CODE-CHECK-RESULTS FULL


19-MAY-1991 13:43 PROGRAM: SESAM    PLATEWORK D1.0-02 11-APR-1991  PAGE:     3


                  DNV Code Check Results
                  Full Table                                     SUB PAGE:     1


NOMENCLATURE:

Plate         Plate parameter name
dimension     Geometric dimension value
Material      Capacity Model material parameter
Mat-Value     Material parameter value
CM-Load       Capacity Model load
Load-Value    Load value
UC-Factor     Unity Criterion factor
UC-Val        Unity Criterion factor value

+---------------------------------------------------------------+
! Sorting Parameter: UCMAX       ! Max Entries:          3   !
! Sorting Order    : DECREASING  ! Max Value  : UNLIMITED    !
!                                ! Min Value  : UNLIMITED    !
+---------------------------------------------------------------+
```

```
19-MAY-1991 13:43 PROGRAM: SESAM    PLATEWORK D1.0-02 11-APR-1991  PAGE:     4


                  DNV Code Check Results
                  Full Table                                    SUB PAGE:     2

+---------------------------------------------------------------+
! Capacity Model    : X82MP2.2           ! Type        : PLT     !
! Resultcase Name   : DNV2               ! Limit-State: E-ULS    !
! Code Check Status: **-PB               !                       !
+---------------------------------------------------------------+

Plate     dimension  Material  Mat-Value  CM-Load   Load-Value UC-Factor UC-Val
-------------------------------------------------------------------------------
     lx =  3.000E+03      fy =  3.400E+02     fx1 = -1.126E+03   UCmax =   1.87
     ly =  2.500E+03      fp =  2.040E+02     fx2 = -1.120E+03   UCpbs =   1.87
      t =  2.500E+01       E =  2.100E+05     fy1 = -9.000E+02   UCpbu =   0.90
                          ny =  3.000E-01     fy2 = -1.029E+03  UCplat =   0.11
    Plate parameter                           fxy = -3.150E+02
   PTYP =  0                                 plat =  7.000E-03
   PSTF =  0                                 pdfl =  ----
   PDEF =  0                                 pbst =  ----
     wa = -1.000E+00
     wp = -1.000E+00


INTERMEDIATE CODE CHECK RESULTS:

Parameter   Value    Parameter   Value    Parameter   Value
-------------------------------------------------------------
  UCmax =  1.869E+00   UCpbs =  1.869E+00   UCpbu =  8.952E-01
 UCplat =  1.117E-01    eta0 =  6.000E-01    etap =  6.600E-01
  sigx1 = -4.506E+01   sigx2 = -4.478E+01   sigy1 = -3.600E+01
  sigy2 = -4.118E+01   tauxy = -1.260E+01   sigex =  7.614E+01
  sigey =  5.796E+01    taue =  1.541E+02      Cx =  4.012E+00
     Cy =  3.054E+00    Ctau =  8.118E+00 VonMise =  4.844E+01
 lambda =  2.932E+00 sigescr =  3.928E+01 sigeucr =  8.199E+01
   etas =  1.233E+00    etau =  5.908E-01   platu =  9.496E-02
```

```
19-MAY-1991 13:43 PROGRAM: SESAM    PLATEWORK D1.0-02 11-APR-1991  PAGE:     5


                  DNV Code Check Results
                  Full Table                                     SUB PAGE:     3

+----------------------------------------------------------------+
! Capacity Model   : X82MP1.2          ! Type       : PLT     !
! Resultcase Name  : DNV2              ! Limit-State: E-ULS   !
! Code Check Status: **-PB             !                      !
+----------------------------------------------------------------+

Plate     dimension  Material  Mat-Value  CM-Load   Load-Value UC-Factor UC-Val
--------------------------------------------------------------------------------
     lx =  2.000E+03      fy =  3.400E+02     fx1 = -1.287E+03   UCmax =   1.48
     ly =  2.500E+03      fp =  2.040E+02     fx2 = -1.504E+03   UCpbs =   1.48
      t =  2.500E+01       E =  2.100E+05     fy1 = -1.312E+03   UCpbu =   0.86
                          ny =  3.000E-01     fy2 = -8.159E+02  UCplat =   0.02
    Plate parameter                           fxy =  1.976E+01
   PTYP =  0                                 plat =  7.000E-03
   PSTF =  0                                 pdfl =  ----
   PDEF =  0                                 pbst =  ----
     wa = -1.000E+00
     wp = -1.000E+00


INTERMEDIATE CODE CHECK RESULTS:

Parameter   Value    Parameter   Value    Parameter   Value
---------------------------------------------------------------
  UCmax =  1.476E+00   UCpbs =  1.476E+00   UCpbu =  8.576E-01
 UCplat =  2.449E-02    eta0 =  6.000E-01    etap =  6.600E-01
  sigx1 = -5.150E+01   sigx2 = -6.017E+01   sigy1 = -5.249E+01
  sigy2 = -3.264E+01   tauxy =  7.903E-01   sigex =  8.564E+01
  sigey =  1.447E+02    taue =  2.343E+02      Cx =  2.888E+00
     Cy =  4.879E+00    Ctau =  7.900E+00 VonMise =  5.674E+01
 lambda =  2.398E+00 sigescr =  5.824E+01 sigeucr =  1.002E+02
   etas =  9.742E-01    etau =  5.660E-01   platu =  4.330E-01
```

```
19-MAY-1991 13:43 PROGRAM: SESAM    PLATEWORK D1.0-02 11-APR-1991  PAGE:     6


                  DNV Code Check Results
                  Full Table                                   SUB PAGE:     4

+---------------------------------------------------------------+
! Capacity Model    : X82MP2.2          ! Type       : PLT     !
! Resultcase Name   : DNV4              ! Limit-State: E-ULS   !
! Code Check Status: **-PB             !                       !
+---------------------------------------------------------------+

Plate     dimension  Material  Mat-Value  CM-Load   Load-Value UC-Factor UC-Val
--------------------------------------------------------------------------------
     lx =  3.000E+03      fy =  3.400E+02     fx1 = -1.281E+03   UCmax =   1.39
     ly =  2.500E+03      fp =  2.040E+02     fx2 = -4.155E+02   UCpbs =   1.39
      t =  2.500E+01       E =  2.100E+05     fy1 = -4.475E+02   UCpbu =   0.76
                          ny =  3.000E-01     fy2 = -9.358E+02  UCplat =   0.26
    Plate parameter                           fxy = -1.616E+02
   PTYP =  0                                 plat =  1.500E-02
   PSTF =  0                                 pdfl =  ----
   PDEF =  0                                 pbst =  ----
     wa = -1.000E+00
     wp = -1.000E+00


INTERMEDIATE CODE CHECK RESULTS:

Parameter   Value    Parameter   Value    Parameter   Value
--------------------------------------------------------------
  UCmax =  1.386E+00   UCpbs =  1.386E+00   UCpbu =  7.595E-01
 UCplat =  2.551E-01    eta0 =  6.000E-01    etap =  6.600E-01
  sigx1 = -5.123E+01   sigx2 = -1.662E+01   sigy1 = -1.790E+01
  sigy2 = -3.743E+01   tauxy = -6.462E+00   sigex =  1.119E+02
  sigey =  7.251E+01    taue =  1.541E+02      Cx =  5.897E+00
     Cy =  3.820E+00    Ctau =  8.118E+00 VonMise =  4.726E+01
 lambda =  2.550E+00 sigescr =  5.167E+01 sigeucr =  9.427E+01
   etas =  9.146E-01    etau =  5.013E-01   platu =  8.910E-02
```

```
SET PLOT FILE X82MDNV R2UCMAX
DISPLAY CODE-CHECK-RESULTS DNV2 UCmax
PLOT
,
```

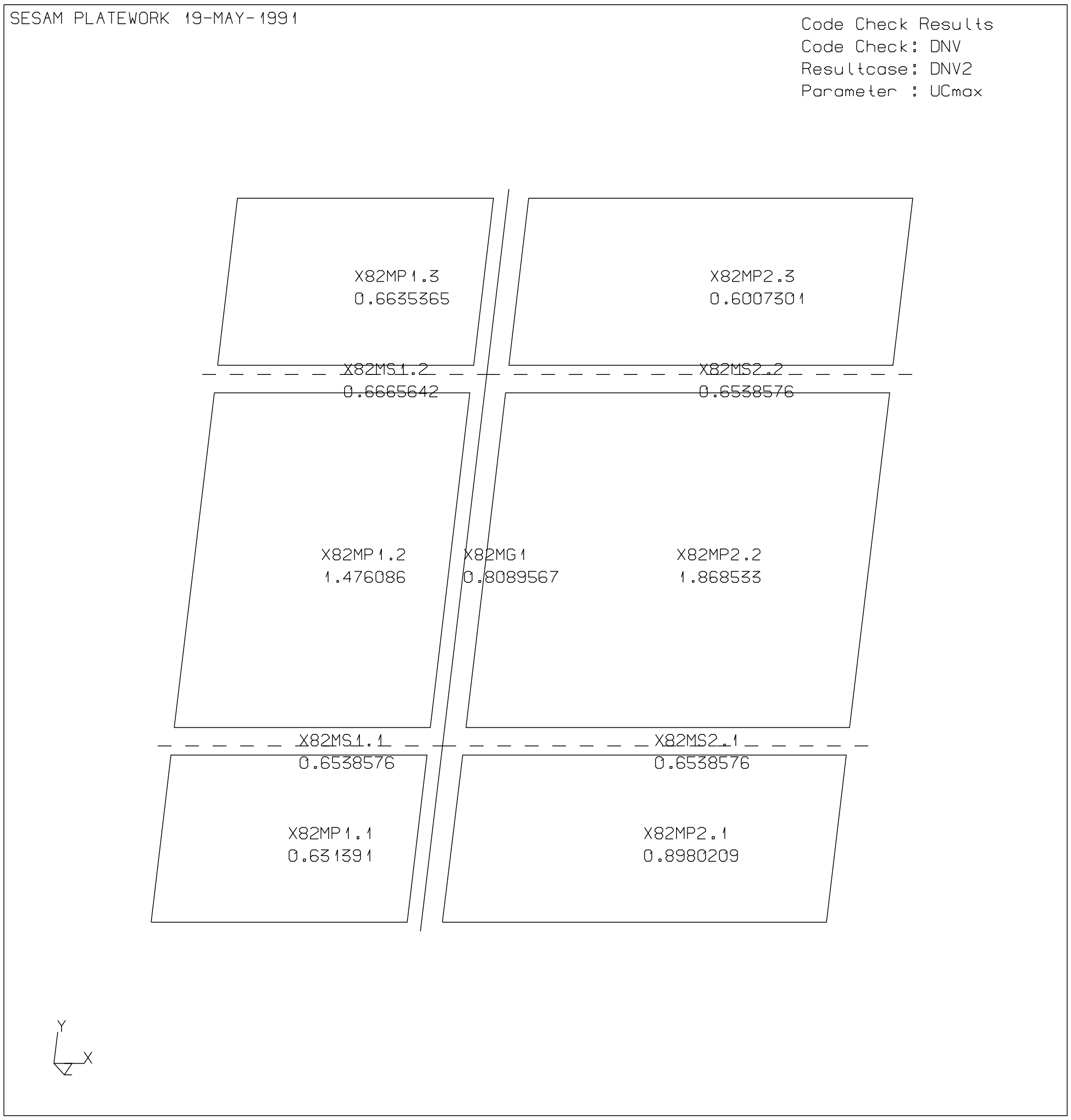

Figure A-14 Plot of DnV Code Check results calculated

```
SELECT CODE NPD
SET PRINT FILE X82MNPD RESULTS
DEFINE SORTING MAX-ENTRIES UNLIMITED
PRINT CODE-CHECK-RESULTS SUMMARY
```

```
19-MAY-1991 13:43 PROGRAM: SESAM    PLATEWORK D1.0-02 11-APR-1991  PAGE:     1

                  NPD Code Check Results
                  Summary Table                                SUB PAGE:     1


NOMENCLATURE:

Status            Check status
UCmax             Maximum of all Unity Criterion factors
Res-Name          Resultcase name
L-stat            Resultcase Limit-state
Phas              Phase angle
Capacity-Model    Basic Capacity Model name
Type              Basic Capacity Model type

+---------------------------------------------------------------+
! Sorting Parameter: UCMAX        ! Max Entries: UNLIMITED    !
! Sorting Order    : DECREASING   ! Max Value  : UNLIMITED    !
!                                 ! Min Value  : UNLIMITED    !
+---------------------------------------------------------------+
```

Status	UCmax	Res-Name	L-stat	Phas	Capacity-Model	Type
**-PB	1.42	NPD2	ULS		X82MP2.2	PLT
**-PB	1.12	NPD2	ULS		X82MP1.2	PLT
**-PB	1.05	NPD4	ULS		X82MP2.2	PLT
OK-PB	0.87	NPD3	ULS		X82MP1.2	PLT
OK-PB	0.86	NPD5	ULS		X82MP2.2	PLT
OK-PB	0.83	NPD1	ULS		X82MP2.2	PLT
OK-PB	0.82	NPD4	ULS		X82MP1.2	PLT
OK-LB1F	0.82	NPD1	ULS		X82MG1	GIR
OK-LB1P	0.81	NPD2	ULS		X82MG1	GIR
OK-LB1F	0.76	NPD5	ULS		X82MG1	GIR
OK-PB	0.76	NPD3	ULS		X82MP2.2	PLT
OK-LB1F	0.74	NPD3	ULS		X82MG1	GIR
OK-LB1P	0.72	NPD4	ULS		X82MG1	GIR
OK-PB	0.68	NPD2	ULS		X82MP2.1	PLT
OK-PB	0.67	NPD4	ULS		X82MP2.1	PLT
OK-SIF1	0.66	NPD3	ULS		X82MS2.1	STF
OK-LB1S	0.65	NPD5	ULS		X82MS1.1	STF
OK-LB1P	0.65	NPD4	ULS		X82MS1.1	STF
OK-LB1S	0.65	NPD3	ULS		X82MS1.1	STF
OK-LB1P	0.65	NPD2	ULS		X82MS1.1	STF
OK-LB1S	0.65	NPD1	ULS		X82MS1.1	STF
OK-LB1S	0.65	NPD1	ULS		X82MS1.2	STF
OK-LB1P	0.65	NPD2	ULS		X82MS1.2	STF
OK-LB1S	0.65	NPD3	ULS		X82MS1.2	STF

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NPD Code Check Results
Summary Table SUB PAGE: 2

Status	UCmax	Res-Name	L-stat	Phas	Capacity-Model	Type
OK-LB1S	0.65	NPD5	ULS		X82MS1.2	STF
OK-LB1P	0.65	NPD4	ULS		X82MS1.2	STF
OK-LB1S	0.65	NPD1	ULS		X82MS2.1	STF
OK-LB1S	0.65	NPD1	ULS		X82MS2.2	STF
OK-LB1S	0.65	NPD5	ULS		X82MS2.1	STF
OK-LB1P	0.65	NPD4	ULS		X82MS2.1	STF
OK-LB1P	0.65	NPD2	ULS		X82MS2.1	STF
OK-LB1P	0.65	NPD2	ULS		X82MS2.2	STF
OK-LB1S	0.65	NPD5	ULS		X82MS2.2	STF
OK-LB1P	0.65	NPD4	ULS		X82MS2.2	STF
OK-LB1S	0.65	NPD3	ULS		X82MS2.2	STF
OK-PB	0.65	NPD5	ULS		X82MP1.2	PLT
OK-PB	0.53	NPD3	ULS		X82MP2.1	PLT
OK-PB	0.50	NPD2	ULS		X82MP1.3	PLT
OK-PB	0.48	NPD2	ULS		X82MP1.1	PLT
OK-PB	0.46	NPD1	ULS		X82MP1.2	PLT
OK-PB	0.46	NPD3	ULS		X82MP1.3	PLT
OK-PB	0.46	NPD2	ULS		X82MP2.3	PLT
OK-PB	0.41	NPD1	ULS		X82MP2.3	PLT
OK-PB	0.37	NPD3	ULS		X82MP1.1	PLT
OK-PB	0.36	NPD5	ULS		X82MP2.1	PLT
OK-PB	0.35	NPD4	ULS		X82MP1.1	PLT
OK-PB	0.29	NPD4	ULS		X82MP1.3	PLT
OK-PB	0.29	NPD5	ULS		X82MP1.3	PLT
OK-PB	0.28	NPD5	ULS		X82MP1.1	PLT
OK-PB	0.24	NPD4	ULS		X82MP2.3	PLT
OK-PB	0.24	NPD1	ULS		X82MP1.3	PLT
OK-PB	0.23	NPD5	ULS		X82MP2.3	PLT
OK-PB	0.21	NPD1	ULS		X82MP2.1	PLT
OK-PB	0.20	NPD1	ULS		X82MP1.1	PLT
OK-PB	0.17	NPD3	ULS		X82MP2.3	PLT

```
 DEFINE SORTING MAX-ENTRIES 3
 PRINT CODE-CHECK-RESULTS FULL


19-MAY-1991 13:43 PROGRAM: SESAM    PLATEWORK D1.0-02 11-APR-1991  PAGE:     3


                  NPD Code Check Results
                  Full Table                                    SUB PAGE:     1


NOMENCLATURE:

Plate          Plate parameter name
dimension      Geometric dimension value
Material       Capacity Model material parameter
Mat-Value      Material parameter value
CM-Load        Capacity Model load
Load-Value     Load value
UC-Factor      Unity Criterion factor
UC-Val         Unity Criterion factor value

+--------------------------------------------------------------+
! Sorting Parameter: UCMAX        ! Max Entries:          3    !
! Sorting Order    : DECREASING   ! Max Value  : UNLIMITED     !
!                                 ! Min Value  : UNLIMITED     !
+--------------------------------------------------------------+
```

```
19-MAY-1991 13:43 PROGRAM: SESAM    PLATEWORK D1.0-02 11-APR-1991  PAGE:     4


                  NPD Code Check Results
                  Full Table                                     SUB PAGE:     2

+---------------------------------------------------------------+
! Capacity Model   : X82MP2.2          ! Type       : PLT     !
! Resultcase Name  : NPD2              ! Limit-State: ULS     !
! Code Check Status: **-PB             !                      !
+---------------------------------------------------------------+

Plate     dimension  Material  Mat-Value  CM-Load   Load-Value UC-Factor UC-Val
-------------------------------------------------------------------------------
     lx =  3.000E+03      fy =  3.400E+02     fx1 = -1.126E+03   UCmax =   1.42
     ly =  2.500E+03      fp =  2.040E+02     fx2 = -1.120E+03   UCpbs =   1.42
      t =  2.500E+01       E =  2.100E+05     fy1 = -9.000E+02   UCpbu =   0.68
                          ny =  3.000E-01     fy2 = -1.029E+03  UCplat =   0.04
    Plate parameter                           fxy = -3.150E+02
   PTYP =  0                                 plat =  7.000E-03
   PSTF =  0                                 pdfl =  ----
   PDEF =  0                                 pbst =  ----
     wa = -1.000E+00
     wp = -1.000E+00


INTERMEDIATE CODE CHECK RESULTS:

Parameter   Value    Parameter   Value    Parameter   Value
-----------------------------------------------------------------
  UCmax =  1.418E+00   UCpbs =  1.418E+00   UCpbu =  6.794E-01
 UCplat =  3.538E-02  gammam =  1.150E+00   sigx1 = -4.506E+01
  sigx2 = -4.478E+01   sigy1 = -3.600E+01   sigy2 = -4.118E+01
  tauxy = -1.260E+01   sigex =  7.614E+01   sigey =  5.796E+01
   taue =  1.541E+02      kx =  4.012E+00      ky =  3.054E+00
   ktau =  8.118E+00 VonMise =  4.844E+01  lambda =  2.932E+00
  sigke =  3.928E+01   sigku =  8.199E+01  sigked =  3.416E+01
 sigkud =  7.130E+01   platd =  1.978E-01
```

```
19-MAY-1991 13:43 PROGRAM: SESAM    PLATEWORK D1.0-02 11-APR-1991  PAGE:     5


                  NPD Code Check Results
                  Full Table                                    SUB PAGE:     3

+---------------------------------------------------------------+
! Capacity Model    : X82MP1.2          ! Type        : PLT     !
! Resultcase Name   : NPD2              ! Limit-State: ULS      !
! Code Check Status: **-PB              !                       !
+---------------------------------------------------------------+

Plate     dimension  Material  Mat-Value  CM-Load   Load-Value UC-Factor UC-Val
-------------------------------------------------------------------------------
     lx =  2.000E+03      fy =  3.400E+02     fx1 = -1.287E+03   UCmax =   1.12
     ly =  2.500E+03      fp =  2.040E+02     fx2 = -1.504E+03   UCpbs =   1.12
      t =  2.500E+01       E =  2.100E+05     fy1 = -1.312E+03   UCpbu =   0.65
                          ny =  3.000E-01     fy2 = -8.159E+02  UCplat =   0.02
    Plate parameter                           fxy =  1.976E+01
   PTYP =  0                                 plat =  7.000E-03
   PSTF =  0                                 pdfl =  ----
   PDEF =  0                                 pbst =  ----
     wa = -1.000E+00
     wp = -1.000E+00


INTERMEDIATE CODE CHECK RESULTS:

Parameter   Value    Parameter   Value    Parameter   Value
--------------------------------------------------------------
  UCmax =  1.120E+00   UCpbs =  1.120E+00   UCpbu =  6.509E-01
 UCplat =  2.360E-02  gammam =  1.150E+00   sigx1 = -5.150E+01
  sigx2 = -6.017E+01   sigy1 = -5.249E+01   sigy2 = -3.264E+01
  tauxy =  7.903E-01   sigex =  8.564E+01   sigey =  1.447E+02
   taue =  2.343E+02      kx =  2.888E+00      ky =  4.879E+00
   ktau =  7.900E+00 VonMise =  5.674E+01  lambda =  2.398E+00
  sigke =  5.824E+01   sigku =  1.002E+02  sigked =  5.064E+01
 sigkud =  8.717E+01   platd =  2.966E-01
```

```
19-MAY-1991 13:43 PROGRAM: SESAM    PLATEWORK D1.0-02 11-APR-1991  PAGE:     6


                  NPD Code Check Results
                  Full Table                                 SUB PAGE:     4

+----------------------------------------------------------------+
! Capacity Model   : X82MP2.2           ! Type       : PLT     !
! Resultcase Name  : NPD4               ! Limit-State: ULS     !
! Code Check Status: **-PB              !                      !
+----------------------------------------------------------------+

Plate     dimension  Material  Mat-Value  CM-Load   Load-Value UC-Factor UC-Val
--------------------------------------------------------------------------------
     lx =  3.000E+03      fy =  3.400E+02     fx1 = -1.281E+03   UCmax =   1.05
     ly =  2.500E+03      fp =  2.040E+02     fx2 = -4.155E+02   UCpbs =   1.05
      t =  2.500E+01       E =  2.100E+05     fy1 = -4.475E+02   UCpbu =   0.58
                          ny =  3.000E-01     fy2 = -9.358E+02  UCplat =   0.08
    Plate parameter                           fxy = -1.616E+02
   PTYP =  0                                 plat =  1.500E-02
   PSTF =  0                                 pdfl =  ----
   PDEF =  0                                 pbst =  ----
     wa = -1.000E+00
     wp = -1.000E+00


INTERMEDIATE CODE CHECK RESULTS:

Parameter   Value     Parameter   Value     Parameter   Value
---------------------------------------------------------------
  UCmax =  1.052E+00   UCpbs =  1.052E+00   UCpbu =  5.765E-01
 UCplat =  7.622E-02  gammam =  1.150E+00   sigx1 = -5.123E+01
  sigx2 = -1.662E+01   sigy1 = -1.790E+01   sigy2 = -3.743E+01
  tauxy = -6.462E+00   sigex =  1.119E+02   sigey =  7.251E+01
   taue =  1.541E+02      kx =  5.897E+00      ky =  3.820E+00
   ktau =  8.118E+00 VonMise =  4.726E+01  lambda =  2.550E+00
  sigke =  5.167E+01   sigku =  9.427E+01  sigked =  4.493E+01
 sigkud =  8.197E+01   platd =  1.968E-01
```

```
SET PLOT FILE X82MNPD R2UCMAX
DISPLAY CODE-CHECK-RESULTS NPD2 UCmax
PLOT
```

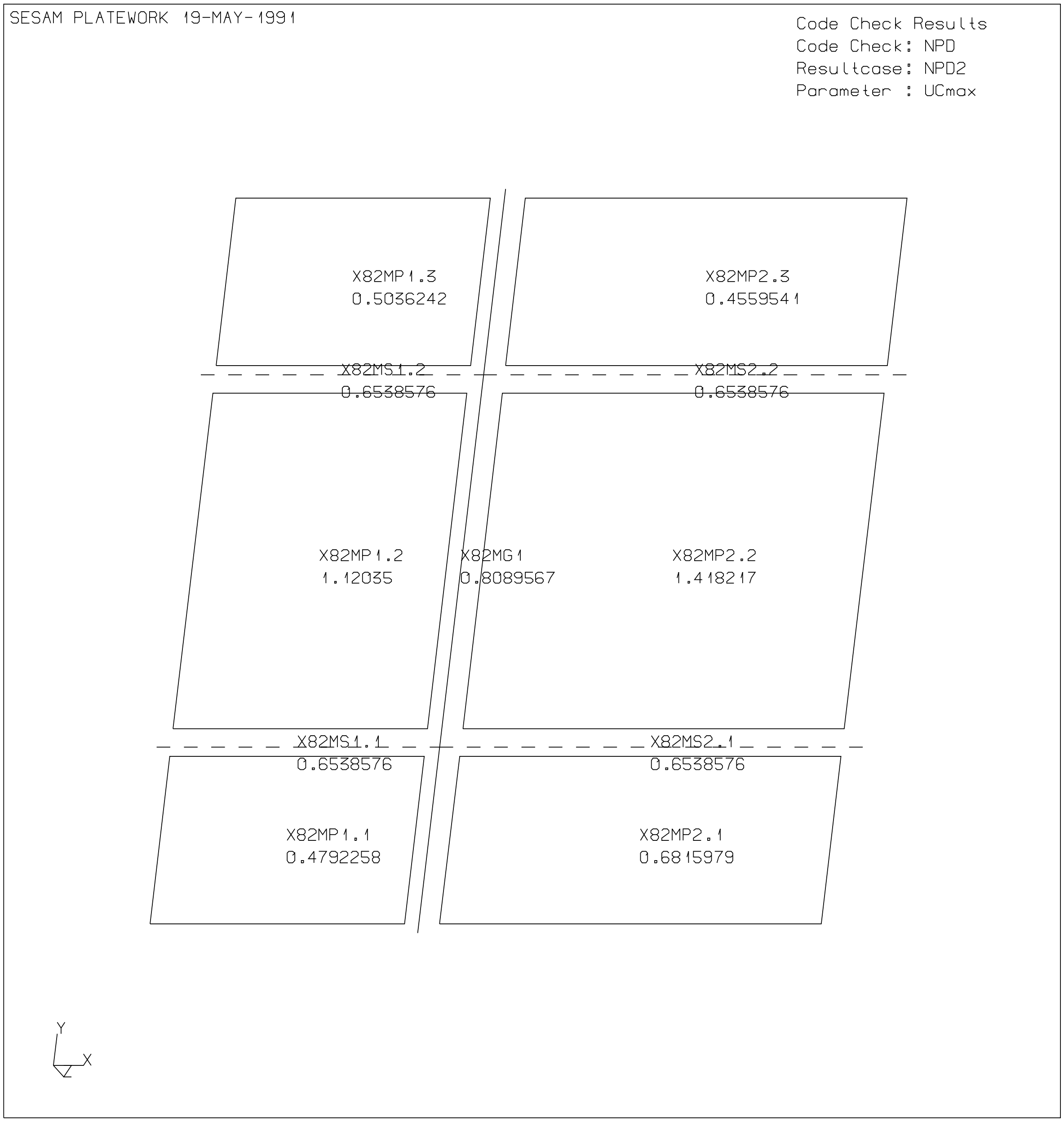

Figure A-15 Plot of NPD Code Check results calculated

```
EXIT
%%
%% CLOSED DATE: 19-MAY-1991  12:40:53
%%
```

Appendix A References

1 PLATEWORK, Theoretical Manual
Veritec Report no. 90-3062
Revision 1-1, May 1991

2 PLATEWORK, Maintenance Manual
Veritas Sesam Systems A.S Report 91-7022
June 1, 1991.

3 SESAM Interface File

a FEM, Input Interface File, File Description
Veritas Sesam Systems A.S Report 89-7012
November 13., 1989

b SIF, Results Interface File, File Description
Veritas Sesam Systems A.S Report 88-7001
Revision 1, August 1, 1989

c SIFTOOL, SESAM Interface File Toolkit, Programmer's Manual
Veritas Sesam Systems A.S Report 89-7003
Revision 1, May 1, 1989

4 PREPOST, Utility Program for SESAM Postprocessing, User's Manual
Veritas Sesam Systems A.S Report, 89-7002
Revision 2, February 15, 1990

5 POSTFEM, General Finite Element Graphics Postprocessor, User's Manual
Veritas Sesam Systems A.S Report 80-7007
Revision 1, November 15, 1989

6 POSTFRAME, Postprocessor for Frame Structures, User's Manual
Veritas Sesam Systems A.S Report 90-7015
Revision 0, March 1, 1990

7 PREFEM, Preprocessor for General Finite Element Programs, User's Manual
Veritas Sesam Systems A.S Report 87-3166
Revision 1, March 1, 1989

8 SESTRA, Super Element Structural Analysis, User's Manual
Veritas Report 87-3166
Revision 1, March 1, 1989