

MADYMO Transition Manual

Release 7.2

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MADYMO Manuals

An overview of the MADYMO solver related manuals is given below. From Acrobat Reader, these manuals can be accessed directly by clicking the manual in the table below. Manuals marked with * are also provided in hard-copy (major releases only).

Theory Manual	The theoretical concepts of the MADYMO solver.
Reference Manual*	Detailed information on how to use the MADYMO solver and how to specify the input.
Model Manual*	Dummy, Dummy Subsystem and Barrier Models with simple examples.
Applications Manual	Example applications using Dummy, Dummy Subsystem and Barrier Models.
Human Model Manual	Human Models and applications that make use of Human Models.
Tyre Model Manual	Documentation about Tyre Models.
Transition Manual	Describes the translation from MADYMO 5.4 format (DATA) to MADYMO 6.0 format (XML), including a description how to handle Dummy Models in the conversion. A full conversion table is available.
Utilities Manual	User's guide for MADYMO / Optimiser, MADYMO / Scaler, MADYMO / Dummy Generator, MADYMO / Tank Test Analysis, MADYMO / XML Translator, MADYMO / XML Reformatter and MADYMO / XML Expander.
Folder Manual	Describes the use of MADYMO / Folder.
Programmer's Manual	Information about user-defined routines.
Release Notes	Describes the new features, modifications and bug fixes with respect to the previous release.
Installation Instructions	Description for the system administrator to install MADYMO.
Coupling Manual	Description of the direct coupling with ABAQUS, LS-DYNA, PAM CRASH / SAFE and Radioss and the TCP / IP coupling with MATLAB / Simulink.

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1 The MADYMO / Translator

To make the transition from MADYMO 5.x to MADYMO 6.0 simpler, the tool MADYMO/Translator is provided, which will be explained here in detail. This chapter includes a description of the functionality (Section 1.1) and how to use this program (Section 1.2). The limitations of this software are described in Section 1.3. Finally, Section 1.4 describes how to define the User Preferences.

1.1 The Translator and what it can do

The MADYMO/Translator is a program that can translate MADYMO-3D DATA format files into the MADYMO 6.0 XML-based Input File Format.

The purpose of the Translator is to convert DATA format files that can be run with MADYMO Release 5.4.1 into valid input files for Release 6.0. The user must not consider the translated files as illustrative examples of the best way to write a MADYMO 6.0 input file.

The process of translating a model containing a dummy model is described in the next chapter. This is a complex task, because the model needs to be updated, reformatted and validated. Interactions between the dummy, the environment and the output (for example contacts and injury criterions) need to be replaced by hand.

The data from the 5.4.1 files is first stored in memory and then written to a XML file. This means that the Translator does not combine groups or re-use functions, which is a concept used in the new syntax. In general, this logic is difficult to program, so no attempt was made to do so.

In general, the translated files will produce the same results as the original DATA files. However, the user should not expect that all translated files will produce exactly the same result as the original data files. This can be explained by considering the processing of the input data and the way it can affect the results. Computers are capable of storing real numbers only up to a finite precision. The order in which objects are written and processed can affect the results slightly, due to limited computer precision. Also some of the computation algorithms have been updated (between 5.4 and 6.0) and a few bugs have been fixed which may also cause small

differences in results. The translator has stricter input checks than the 5.4.1 solver any may report warnings for conditions that the solver does not.

Comments

During translation, an attempt is made to place all comments that are in the old DATA file into COMMENT XML elements within the elements they belong to. The translator assumes that comments are placed before the keywords in the DATA file. Not all elements can take comments! When a comment has been recorded, the subsequent comments are all attached to the next element to which comments can be attached. However not all comments are handled properly. All comments are listed in a separate file COMMENTS which has the extension “com” if Madymo is run directly from the executable.

Problems can occur when the comments in the input file in the old format contain characters or statements that have a special meaning in XML, for example, characters such as “<”, “>”, “&” and “?”. If this occurs in comments in DATA files, use the preference that switches “CDATA” on (see Section 1.4). The Translator will put “CDATA” tags around the comments and any XML parser will not interpret that part.

1.2 How to use the Translator

The Translator can be invoked from the command line (run) in the same way as with MADYMO (use `madymo70` with option “-dat2mif”).

The command for translation is:

```
madymo70 -dat2mif <input>
```

An output file with extension “.xml” will be generated, as will a REPRINT file and possibly a COMMENTS file. The REPRINT file has the extension “rep”, and the COMMENTS file the extension “com”. Please take notice of the fact that the input filename must be completely specified. The following example shows how to translate the 5.4 format file “simu.dat”:

```
madymo70 -dat2mif simu.dat
```

1.3 Warnings, errors and unsupported features

Warnings or errors

In general, the translator will generate the same warnings as MADYMO 5.4.1. Files containing errors are not translated, i.e. no XML file is generated. Line numbers mentioned due to warnings which would also be generated by MADYMO 5.4.1 will refer to the input (or datexp) file. In addition, the translator can generate a number of warnings or errors that are concerned with the results or problems of the translation process. All of these messages are written into the REPRINT file as well as into the XML file (as comments at the end of the file). Comments are also written to the COMMENTS file. This way the user will be aware of the warnings and errors. If line numbers are mentioned concerning warnings or errors from the translation process, the line number indicated is the last one in the DATA file, not the actual line number causing the problem. The reason for this is that the translator has read the complete DATA file and can no longer detect where the error occurred, but it can detect some errors in the data stored in memory while trying to write the XML file.

Unsupported Features

There are a number of unsupported features that need to be identified. Some features in MADYMO 5.4.1. are not translated. Some features are translated into new features in MADYMO 6.0 because 6.0 and higher does not support exactly the same features as 5.4.1 did.

The following is a list of items which need user intervention. It is not comprehensive, but lists most of the important examples or significant items:

- The Translator can not translate multiple facet surfaces attached to one or more deformable bodies. When this occurs, a possible workaround is to:
 1. remove enough facet surface attachments to one or more bodies,
 2. translate the file
 3. add the required attachments in the XML file by hand
- Translation of **One** Facet Surface attached to Multiple Deformable Bodies is supported!
- INITIAL CONDITIONS (Release 5.4) under SECTIONS can cause problems with the Translator. SECTIONS specify a set of

vertices/nodes for which INITIAL CONDITIONS can be specified, but in Release 6.0 and higher the equivalent is INITIAL.PART which is specified based on elements only. When INITIAL CONDITIONS are specified for vertices/nodes attached to elements that are attached to different bodies, the Translator cannot determine the equivalent INITIAL.PART. Therefore these are not translated and warnings are generated.

- Flexible Beams are not translated. These are used in certain dummy models and applications. All dummy models will be translated by TASS Automotive or replaced by newer models supplied in the XML format. Thus the workaround is to use new dummy models.
- The old “Special Restraint” used in the dummy models before Release 5.3.1 is not translated. The workaround is to exchange the older dummy models with newer ones.
- The translator may stop with a “wrong license data” message, because a license check could not be translated. The workaround is to exchange the older dummy models with newer ones
- Functions must be ordered from lowest to highest X value to be successfully translated. This was not required for all functions in Release 5.4.1.
- Identifiers may become so long they must be truncated. This can result in two elements having the same name. The translated file will give an error when run.
- A wrong reference may be generated by the solver, because the translator does not count the "INERTIAL SPACE" in the dat file as one of the "SYSTEM"s in the xml file. The workaround is to change the SYSTEM part of the reference from 1 to 2. For example: “/1/head” should be “/2/head”.
- The BODY reference of an INITIAL.PART and SUPPORT are not generated correctly for a input file which used null systems.
- LOADs of type ACCELERATION in combination with COORDINATES with additional NODMAS specified (where these nodes are part of the elements on which the LOADs work) are not translated correctly. The workaround is to add the ELEMENT.MASS1 elements in the XML file.
- ACCELERATION loads and SURFACE loads sometimes give an error when translated. Because of this no XML file is produced.
- In LOADs the wrong function numbers are assigned to some degrees of freedom which should be zero in the ELEMENT_LIST

under LOAD.ELEMENT_ACC.

- When a TRIGGER is referring to a REFERENCE SIGNAL the translation will be a SWITCH.CONTROL_SYSTEM with a wrong reference to a SIGNAL.FUNC. The workaround is to add the path “/1/” of the CONTROL_SYSTEM to the reference of the INPUT_REF attribute of the SWITCH element.
- The reference of PLANE_SURFACE in CONTACT.TYRE_ROAD within the ROAD element is not correct when a reference space is defined.
- The name for the element CONTACT.TYRE_ROAD is not made unique.
- When user routines are defined, the reference to the file with user input data is not translated.
- The translator stops when joints of type USR1, ..., USR6 are used. The workaround is to change the user-defined joints into bracket joints, for example, during the translation and afterwards correct the XML file.
- The finite element module output in Release 5.4.1 to the file FEMOUT is not translated and a warning is written. Similar options are available in Release 6.0 and higher (see CONTROL_OUTPUT) but need to be added to the XML file by hand. However, the translator stops when the option “PRINT RESULTS MODULE” under FEMOUT is chosen, so this should be removed.
- The keyword DURATION has become obsolete. It appeared not to be useful and in some cases counterproductive. DURATION for spotwelds NODE-NODE and 3-NODE is not translated. The workaround is to set it to zero in your old data file if you want to compare the results from the old input file with results from the translated XML input file.
- The use of two different scaling methods in one set is not supported in Release 6.0 and higher.
- In Release 5.4.1 two signals were used in input for the TTI Injury criterion. Now three signals are needed. The translation of older signals could change the order of the signals. Please check the correctness of these signals. The 1st and 2nd signal should be from the upper and lower rib acceleration the 3rd should be from the lower spine acceleration.
- The translator gives warning when the damping velocity function is not translated correctly. This is because no value for

F(0) is entered. The workaround is to add a function row F(x=0) to the Release 5.4 input deck and translate again.

For unsupported features not listed here, an attempt has been made to generate warning and error messages. It is, however, possible that the translated file is not perfect.

The following is a list of items which became obsolete in Release 6.0 (and higher in most cases). It is not comprehensive, but lists most of the important examples or significant items:

- The velocity dependent damping coefficient for multi-body contact and Kelvin elements is not supported any longer in Release 6.0 and higher. This function has been replaced by a velocity dependent force function. Extra data points are generated to reduce the difference between these two functions due to interpolation. In the set of preferences (No. 16), a parameter can be set to modify the number of interpolation points. These are placed in a non-linear way in order to smooth the curve where it is more curved.
- Initial conditions (see 5.4 User's Manual 3D Section 4.15) will be translated, but any reference to BODY disappears due to the new syntax. This needs to be fixed by hand.
- The option ANGULAR VELOCITY (Refer to the User's Manual Release 5.4, Section 4.15.1) is not supported any longer, but it will be correctly translated into the relevant attributes within the INITIAL_JOINT_VEL element.
- Force correction for belt segments will be phased out in Release 6.2 and higher. If the parameter COR is not equal to 1.0, the equivalent (attribute FORCE_CORRECTION of element BELT_SEGMENT) will be written to the XML file. Function scaling can instead be used in 6.0.1 onwards.
- In general, undocumented features are not translated.
- The "MOVE" command for filters has become obsolete. In the new syntax, requests for filtered and unfiltered output can be given. The translator will generate the necessary equivalent output requests.
- OUTPUT of AXLOAD has become obsolete.
- Meshes with three node elements degenerated to 2 node elements were accepted in 5.4 and 6.0 but are not in 6.0.1 and higher.

- Combination of ISOLIN material and MEM3-LAYERED property was possible in 5.4 but is not in 6.0 and higher.
- Gases could be defined by the user, and standard gases redefined for each inflator in 5.4. This is not possible in 6.0, 6.0.1 and 6.1, and means that it is not possible to define as many gases in the new version as it was in 5.4. In Release 6.2 this has been restored.
- The definition of two or more roads in the inertial space is possible in Release 5.4.1. This is not possible in 6.0 and higher. The results are completely different without any warnings.
- Any contact can be defined without a loading function in 5.4.1. This is not possible in 6.0 and higher. These contacts can be taken out of the input file in most cases, because it makes no difference to the simulation results.
-

Other Remarks

- IDs in 5.x (the equivalent is NAME in 6.0) were not required to be unique. Therefore the NAME attribute of some XML elements in the translated file may not be unique, which is not accepted anymore. The translator can generate a “prefix” for the NAME attribute to make them unique. To be able to fine tune the output, a preference mechanism has been made which is explained in section D about user preferences.
- When the keyword SECTIONS is used in 5.4 syntax this can cause problems with the translation. If an element lies between nodes (or vertices) that are defined in different sections the translator cannot determine to which PART the element belongs. A solution can be to add these elements to parts in the resulting XML file or possibly to create new parts.
- When lock and unlock actions are specified within the keyword SWITCH for one joint in Release 5.4 the user could specify alternating actions (LOCK, BREAK, LOCK, BREAK, etc. , see Section 4.17, Note 1 of the MADYMO 5.4 Users Manual). When specifying two LOCK actions sequentially the effect could be the same as a logic OR.

Example:

```
SWITCH
1 BREAK LOGIC 1
1 LOCK LOGIC 2
1 LOCK LOGIC 3
END SWITCH
```

This means that the 5.4 syntax as in the example is effectively a logical OR. It could be that a logical OR between the second and the third switch condition was intended. This could have been better specified using “LOCK LOGIC 2 OR 3” instead.

If another BREAK would have been specified this statement is not true anymore. When such a sequential 5.4 input was specified the translation into 6.0 input will be a “SWITCH.MULTI_PORT” element with the same sequence. This has a different effect to a logical OR. The action specified with the second condition will take place after the first condition was found true and has had its effect and directly after that the third condition will go into action which will have effect when that condition is found true. In MADYMO 5.4 however all conditions were checked sequentially and after one had its effect it was deleted from the list of conditions. In the SWITCH.MULTI_PORT the second condition can only have effect after the previous condition was found true and has effect.

Therefore the translation of these SWITCH actions can produce a result that does not have the same effect as was intended. In this case maybe a SWITCH.LOGIC should be used instead to combine the second and the third condition into a logical OR.

Please be aware of these peculiarities and check whether the translation will have the intended effects.

- The translator may stop with a “normal termination” message for an input file requiring larger memory sizes than the default values. To solve this set the memory allocation by hand, as described in the next item.
- The translator provided with Release 6.1 (only) does not support the memory allocation options -isize, -rsize, -csize anymore. The workaround is to set:
 - the integer size with the environment variable MD_IFEMST_SIZE,
 - the real size with the environment variable MD_RFEMST_SIZE,
 - the character size with the environment variable MD_CFEMST_SIZE.
- Functions that are unused in a 5.4 input file are not translated and don't come through into the XML file. These alternate functions have to be added by hand if you want to keep them in your input file.

1.4 User Preferences

User preferences is an advanced topic. The defaults used by the Translator do not necessarily require other settings, but depending on the user's situation, it can be useful to change one or more of the preference settings. There are two mechanisms to set some of the preferences. The first are the environment variables and the second is a preference file.

Environment settings

Environment variables available to fine tune certain behaviour:

D2M_MTD_NAME:

This is an environment variable that can contain another MTD definition. The default is "mtd_3d.dtd". In general, it will not be necessary to change this default setting. The csh command to set the environment variable is:

```
setenv D2M_MTD_NAME "another_mtd.dtd"
```

The sh or ksh command to set the environment variable is:

```
D2M_MTD_NAME "another_mtd.dtd"
export D2M_MTD_NAME
```

D2M_MTD_ENCODING:

This is an environment variable that can contain the (language) encoding method ("Latin-1" or "ISO-8859-1" or "UTF-8" etc.). As a default "ISO-8859-1" is used (= "Latin-1"). This is an encoding standard, which contains a number of Western European characters such as ß or ä and ü. There are three options:

1. Use the default language encoding. This allows most commonly used European characters in text and names.
2. Set the environmental variable to another language encoding.
3. Set the environmental variable to D2M_MTD_ENCODING_EMPTY. This way the Translator will not write any encoding specification in the XML file.

The UNIX csh command to set this environment variable is:

```
setenv D2M_MTD_ENCODING D2M_MTD_ENCODING_EMPTY
```

The sh or ksh command to set the environment variable is:

```
D2M_MTD_ENCODING="D2M_MTD_ENCODING_EMPTY"  
export D2M_MTD_ENCODING
```

In this case, the translator will not write an encoding specification into the MIF file.

The command to set the environment variable in UNIX csh is (for example):

```
setenv D2M_MTD_ENCODING "ISO-8859-1"
```

The default used by a number of editors has been tested: UTF-8, which is "ASCII" compatible and "Latin-1". When using special characters in comments such as "ß" are found in certain European languages, it is necessary to use "Latin-1" (= "ISO-8859-1") language encoding. Other language encoding standards have not been tested or explicitly fail when running the MADYMO XML parser. MADYMO accepts these special characters in the attribute NAME, however it is not recommended that these are used in names and other similar items.

Preference file

The user can set a number of preferences that influence the output of the translator (i.e. a MIF file).

The preference file has strict (fixed) formatting. Each line is read as 50 characters of text (may be empty spaces) followed by three integers in five character fields and optionally followed by a floating point real in a 15 character field (In Fortran terms, the lines are read as: A50,3I5,F15.0). An exclamation mark (!) in the first column is used as comment character. The order of the preferences is irrelevant, the index no. (the 1st integer) is used. The 2nd integer determines the type of preference (1 = integer, 2 = real) and the 3rd integer contains the value (if On / Off, only 1 or 0 are effective, if an integer is expected, it depends on the preference which value can be relevant). The 4th value is an optional real value.

Example of the default preference file:

```

! start preferences
!
! 50 char text I5 + I5 + I5 + E15.x
! in case of Boolean 1 = TRUE 0 = FALSE
! type = 1 (int) , 2 (real)
! ival = 0 (off) , 1 (on)
! rval = real value for option
! nr = option nr
!
!      1      2      3      4      5      6      7      8
!234567890123456789012345678901234567890123456789012345678901234567890
! text                                     nr type ival                rval
Use F Format                             1    1    1                    0.
Truncate trailing zeros of reals          2    1    1                    0.
Boundary value to write E format          3    2    1                9999.999
Write attributes on one line              4    1    0
Write output.xxxx NAME or not             6    1    1
Modify all '-' in NAMES into '_' (=1) or not 7    1    1
Reduce all multiple "_" to one = 1        8    1    1
Indent RUNID or not                      9    1    0
Truncate NAME on x char or -x (use last x char) 10   1   -32
Write comment about table type at the end of table 11   1    0
Prefix Names or Not (unless NAME empty)    12   1    1
Write CDATA as real XML CDATA "<![CDATA[ .... ]]>" 13   1    1
Write Restraint names                    14   1    1
Prefix (1) or Postfix (0) if pref(12) = 1  15   1    1
Nr extra points p interval for Kelvin dampfunction 16   1    9
Disallow some special characters           17   1    0
FE model references by number (0) or by name (1) 18   1    1
SYS model references by number (0) or by name (1) 19   1    1
Write COMMENTS or not                    20   1    1
Write start line for each comment block    21   1    0
Write COMMENT contents as CDATA           22   1    1
Indent COMMENT                           23   1    1
Indent Func, char and tables              24   1    0
Ref Body by Name                          25   1    1
Precision of E format 1-9 (default=7) COORD 27   1    7
Precision of E format 1-9 (default=8) FUNCTIONS 28   1    8
Precision of E format 1-9 (default=6) for Reals 29   1    6

! end of preferences

```

Preferences that can be set are:

1. Use the floating point format if possible and the real value lies between bounds (by default on). This means that if the absolute value of a real lies between 1.E-3 and the upper boundary (default 9999.99 or set by preference no. 3), it will not be printed in exponential format. For example, 1.2345E+3 will be printed as

1234.5000000000.

2. Truncate trailing zeros of reals. Default = on(1). This option means that a real value 1234.5000000000 will be printed as 1234.5 when this preference as well as preference 1 are switched on.
3. Boundary value to write E format, Default = on, Default value = 9999.999. This preference is only active when preference 1 is set to "on".
4. Write attributes on one line. Default = off(0). This option enables the user to allow the Translator to write all attributes of one element on one line. This can be useful when comparing with output of some XML editors.
5. Not used.
6. Write output_xxxx NAME or not. Default = on. If the NAME attribute of certain output requests is not needed, it can be switched off (=0).
7. Modify all "-" in NAME attributes into "_" (=1) or not (=0). Default = 1. In order to make the look and feel of the NAME attributes the same, this preference can cause the Translator to write hyphens (=2) instead of underscores .
8. Reduce all multiple "_" to one (= 1). Default = 1. Multiple spaces in IDs (of 5.4.1. syntax) are translated into underscores. This is by default suppressed/compressed, but can be switched off (=0)
9. Indent RUNID or not, Default = off. By default, the MIF XML element RUNID that contains the text representing the old RUNNO and RUNID1 and 2 is not indented. This is necessary because it would also be indented in many kinds of output, which is not usually desired behaviour. By setting the preference to 1, it can be indented.
10. Truncate the NAME attribute on first x char or -x (use last x chars), Default = -32. The default of 32 (last) characters has been chosen because they often contain the most significant information and make the NAME unique. The user can make modifications by using this preference. The maximum number

of characters is 32.

11. Write comments about table type at end of table (=1), Default = off. If a TABLE is very long, it is useful in XML editors to be able to see what kind of TABLE it is when looking at the end of the table. By setting the preference to 1, the Translator will write real XML comments containing information about the TABLE type.
12. Prefix Names (or not unless NAME empty), Default = on. Because the NAME attribute (copied from the 5.4.1 ID or generated) may not be unique, a prefix can be added to make it unique.
13. Write CDATA as real XML "<![CDATA[....]]>". Default = on. If a text blocks contain specific characters which are not allowed in XML PCDATA, it is necessary to put this text block between "CDATA" tags. This is done by default, but can be switched off by setting this preference to 0.
14. Write Restraint names, Default = on. By default, all restraints will have a NAME attribute which is generated because 5.4.1 did not have IDs for those restraints. This can be switched off by setting this preference to 0.
15. Prefix (1) or Postfix (0) if pref(12) = 1, Default = 1. In preference 12, the prefix is switched on or off. If preference 12 is set to "on", this preference can take care of that it will be changed into a postfix instead of a prefix.
16. No. of extra points for the conversion of a damping coefficient-velocity function into a damping force-velocity function. The original points in the damping function can be interpolated by more or less intermediate points. By default, this is set to 5. These points are placed in non-linear intervals to take more of the curvature into account.
17. No. of characters not allowed "%."{" 1=% etc. Default = 0. In old IDs, the "%" character is sometimes used. This is allowed by XML. When one of these four characters is not needed, this preference can be set to 1, 2, 3 or 4. If set to 1, the "%" will not be translated. If set to 4 "%."{" will not be translated.
18. FE model references by number or by name, Default = on. By

default, most of the FE references are translated by NAME, and this can be switched to “by number” by setting this preference to 0.

19. SYS model references by number or by name. Default = on. By default, most of the SYS references are translated by NAME, and this can be switched to “by number” by setting this preference to 0.
20. Write COMMENTS. By default, comments near (before) certain keywords in 5.4.1 (XML elements in MIF) are collected and placed in COMMENT elements as related elements of the element to which they belong. Comments that belong to objects that do not collect comments, are placed in the COMMENT block of the next element that collects comments. If comments are not to be translated, switch this preference to 0. The comments will always be collected and written to a separate file.
21. Write start line for each comment block. Default = off. If the User would like to see from which line number in the original (expanded) file the comment originates, this preference can be switched on (=1). In this case, the Translator will write a XML comment line containing information about the line number.
22. Write COMMENT contents as CDATA, Default = on(1). By default, a comment is written between “CDATA” tags. This can be switched off (=0).
23. Indent COMMENT. Default = on(1). By default, a comment is indented along with the syntax.
24. Indent Functions and tables (in the case of CDATA), Default = off(0). By default, Function table contents are not indented because if placed between “CDATA” tags this is advantageous in some XML editors.
25. Body Ref by Name, Default = on(1). By default, most Body references are written by name.
26. Not used.
27. User-specified precision for COORDINATES (1-9), Default = 7. The number of digits behind the decimal point in the exponential format of the coordinates can be modified by

setting this preference between 1 and 9. If not set or set to zero or a value outside the range 1-9, the default will be used.

28. User-specified precision for FUNCTIONS (1-9), Default = 8. The number of digits behind the decimal point in the exponential format of the function values can be modified by setting this preference between 1 and 9. If not set or set to zero or to a value outside the range 1-9, the default will be used.
29. User-specified precision for reals (1-9), Default = 6. The number of digits behind the decimal point in the exponential format of reals can be modified by setting this preference between 1 and 9. If not set or set to zero or a value outside the range 1-9, the default will be used.

The preference file is specified with the -pref option of the runscript. The command for translation with a specified preference file is:

```
madymo70 -dat2mif <input> -pref <preference_file>
```

The recommended extension for preference files is “.pref”. If no preference file is specified, the translator will use default values and will write a preference file called **pref**.

2 MADYMO Transition Assistant: TransAs

2.1 Introduction

TransAs is a tool that, when used in combination with the standard MADYMO conversion tool *dat2mif*, gives the opportunity to translate MADYMO54 decks to the latest MADYMO release, while retaining the structure of variable definitions for 'floats' as they were in the old deck. This is done by taking the original MADYMO54 file (say 'mad54file.dat') and creating an alternative version of this file (say 'mad54file_alt.dat') in which the variable values are changed just a little, and always to a unique alternative value. After both files have been translated with 'dat2mif' to the latest MADYMO release, the resulting files mad54file.xml and mad54file_alt.xml are compared and if the combination 'original value / alternative value' is found, it is assumed that this value was a variable before and is changed back to a variable. Variables that were defined by "# var 123 1.23456 * This variable is used for ..." or by "* VAR 234 2.34E-5" will reappear in the resulting XML-file in the form of DEFINES:

```
<DEFINE
    DESCRIPTION="This variable is used for ..."
    VAR_NAME="VAR123"
    VALUE="1.23456"
    REDEFINE="WARNING"
/>

<DEFINE
    VAR_NAME="VAR234"
    VALUE="2.34E-5"
    REDEFINE="WARNING"
/>.
```

2.2 Installation

TransAs consists of one executable 'transas(.exe)' and can be installed anywhere on the computer. It is advisable though to install TransAs in a directory that is contained in the PATH, so that it can be started by typing 'transas' on the command line, without having to specify the whole path to the TransAs executable. Please note that TransAs makes use of dat2mif and that dat2mif is only available on the platforms

- sgi64r10k

- hp1100pa20
- ibmrs51
- sun4sol26U
- win32p

2.3 Usage

TransAs is a console application, it can be started by typing 'transas' on the command line. The command format is 'transas [-a] <mode> <filename>', where mode = { probinfo | altrun | merge | cleanup }. If no extension was specified with the filename, a default extension will be added by the application, i.e. it will add '.dat' in probinfo mode and '.5t6' in all other modes.

Probinfo: 'transas probinfo mad54file.dat'

The 'probinfo' mode will analyse the file 'mad54file.dat' and all its include files, and look for lines that indicate variable definitions or include files. It will use this information to create a 'Transition Project File' named 'mad54file.5t6'. The contents of this file will guide the rest of the transition proces. Probinfo will check whether variables have been used more than once and will issue a warning if this is the case. When such variables have numerical values (float or integer), these variables will not be written to the Transition Project File and thus will not be represented in the resulting XML-file. Integer values are usually limited in their range (e.g [0,1]), so they can't be automatically changed to a valid unique alternative value. Integer variables are therefore not substituted. When float values are defined as an integer ("# var 123 1", where "# var 123 1.0" was meant) this will not be recognized by the TransAs tool and such variables will be handled as integer variables and thus not substituted. At this stage the Transition Project File can be edited by the user, the user can specify other names for the alternative files and change the default variable names 'VARnnn' to more meaningful names like 'X_AXIS' or 'END_TIME'.

For instance, default values like:

```
[INCLUDES]
! Filename | AlternativeFilename | NewFilename | Comment
L:/mady_mo_541/share/dbs/dummies/inc/d3hyb350.facets |
d3hyb350_alt.facets | d3hyb350_facets.xml | ""
include/INC_FILE.inc | INC_FILE_alt.inc | INC_FILE_inc.xml |
'Include File'
```

[PARAMETERS]

```
! Filename | Varname | Value | Varname | Altvalue | Comment
mad54file.dat | 10 | -18.06 | VAR10 | -18.0618 | 'Comment on variable 10'
mad54file.dat | 112 | -0.6632 | VAR112 | -0.663266 | 'X axis value'
mad54file.dat | 113 | -0.52 | VAR113 | -0.520104 | 'Y axis value'
```

could be changed to:

[INCLUDES]

```
! Filename | AlternativeFilename | NewFilename | Comment
L:/mady_mo_541/share/dbs/dummies/inc/d3hyb350.facets |
d3hyb350.fc | d3hyb350_fc.xml | ''
include/INC_FILE.inc | include.inc | include.xml | 'Include File'
```

[PARAMETERS]

```
! Filename | Varname | Value | Varname | Altvalue | Comment
mad54file.dat | 10 | -18.06 | MY_VAR | -18.0618 | 'Comment on MY_VAR'
mad54file.dat | 112 | -0.6632 | X_AXIS | -0.663266 | 'X axis value'
mad54file.dat | 113 | -0.52 | Y_AXIS | -0.520104 | 'Y axis value'
```

Altrun: 'transas [-a] altrun mad54file.5t6'

The 'altrun' mode will read the Transition Project File 'mad54file.5t6' and create an alternative deck (NB: still in MADYMO 5.x), using the AlternativeFileNames, with all variable values replaced by the alternative values specified in the Transition Project File. Altrun will check if there already is a file by the name of mad54file_alt.dat and ask to overwrite it when it is found. The option '-a' indicates that the file can always be overwritten without asking any questions. This can be handy when a script is used. The application will check if all alternative values are different. When the application has finished, the user has two MADYMO54 decks that are the same except for the values of the float variables and the names of the include files. NB: When includes are defined by a string variable the name is replaced by the accompanying alternative name also.

Translate both decks with dat2mif and trans to the latest MADYMO release.

At this point the user should run the commands 'mady_mo -dat2mif file.dat' followed by 'mady_mo -trans -R6.1 file.xml' for both

file=mad54file and file=mad54file_alt. The result will be two MADYMO6.1 files named 'mad54file.xml' and 'mad54file_alt.xml' (or whatever was specified for NewFilename and NewAlternativeFilename in the [MAINFILE] section of the Transition Project File).

Merge: 'transas [-a] merge mad54file.5t6'

The 'merge' mode will read the Transition Project File 'mad54file.5t6' and create a result file based on NewFilename: if NewFilename equals 'mad54file.xml', the result file will be 'mad54file_par.xml'. Then it will start comparing the files NewFilename (mad54file .xml) and NewAlternativeFilename (mad54file_alt.xml) from the [MAINFILE] section. The comparison will be done line by line, assuming that the files have been created by the same release of MADYMO and on the same platform. In that case the files will be almost identical, only the values that were replaced in the altrun mode will give reason for differences. When a difference in a line was found and this difference was in a numerical string, the program will extract the numerical values and compare these with the values in the Transition Project File. If the values coincide with those in the [PARAMETERS] section the value is replaced by a reference to the variable name 'Varname' as specified in the Transition Project File (#VARnnn). If numerical differences don't coincide, a warning is printed and the original value (from NewFilename) is kept. The lines resulting from this comparison (identical lines also) are written to the result file 'mad54file_par.xml'. In the end the user will have a file 'mad54file_par.xml' with all values replaced by their variable counterpart as much as possible. The variable definitions are written to 'mad54file_par.xml' in the form of DEFINE's in the CONTROL_ANALYSIS.TIME element. Every line in the [PARAMETERS] section will account for a DEFINE element in the result file.

Cleanup: 'transas cleanup mad54file.5t6'

The 'cleanup' mode will read the Transition Project File 'mad54file.5t6' and remove all files specified as AlternativeFilename from the current directory. So this mode will remove all files created by TransAs in altrun mode.

All messages from the Transition Assistant will be written to standard output and also to a file called 'mad54file_par.rep' when the result file was called 'mad54file_par.xml'. This file is created

(and overwritten if it already existed) in probinfo mode; all other modes will just add to the contents of the file.

The Transition Assistant in merge mode issues a maximum of 20 warning- or error messages. If this number is reached the process aborts. Usually this means that the files are too much different to do a meaningful comparison. The user could do a check on the differences between NewFilename and NewAlternativeFilename by hand and try to align both files manually if, for instance, an extra comment line was found in one of them.

Command summary:

```
transas -probinfo mad54file[.dat]
transas [-a] -altrun mad54file[.5t6]

mady601 -dat2mif mad54file.dat
mady601 -trans -R6.1 mad54file.xml

mady601 -dat2mif mad54file_alt.dat
mady601 -trans -R6.1 mad54file_alt.xml

transas [-a] -merge mad54file[.5t6]
transas -cleanup mad54file[.5t6]
```


3 Replacing a Dummy in MADYMO 6.0

Automatic conversion of your applications to MADYMO 6.0 is enabled by the dat2mif translation utility. The translated file will of course only contain a translated version of the old dummy model. The Release 6.0 distribution provides dummy models that are updated and structured in a much better way, specifically for XML. Your models will be better and easier to use if you insert these new dummy models.

One of the benefits of the new XML dummy versions is that the files are separated into two parts - user files and include files (see the Database Manual, chapter 1). The user file is named with the suffix "_usr" and specifies all the information that you as a user should change to suit your specific model, for example joint positions. The include file is named with the suffix "_inc" and specifies all the information which should not be edited by the user, such as the masses of the dummy parts, for example. This system also allows you to keep your input decks shorter, and makes it simple to ensure you are always using the most up to date version of the dummy models.

The drawback, however, is that you will need to update your translated input deck by hand. In simple terms you will need to remove the dat2mif translated dummy, insert the new version, and then copy the old initial conditions, contacts, outputs and loading conditions to the new version.

You can choose if you want to remove the old dummy model before or after translation. The following two sections give some step-by-step guidelines to replace a dummy in MADYMO 6.0:

- Make sure that the untranslated application (data) runs successfully with MADYMO 5.4.1, and the dat2mif translated application (XML) runs with MADYMO 6.0.

3.1 Method A: Removing the Dummy After Translation

- Make a copy of the translated input deck for backup.
- Replace the complete SYSTEM.MODEL of the dummy with the SYSTEM.MODEL from the appropriate dummy user-file

(d_<dummy>_usr.xml).

- If it is a facet or FE dummy model, remove the FE_MODEL elements containing dummy parts from the SYSTEM.REF_SPACE.
- Check the system-ID and name of the dummy system to make sure that it is unique. If you need to change it, replace all references from the old dummy ID or name to the new one. (Bear in mind it might well be easier to change the ID of the conflicting system instead.)
- Copy the initial joint positions of the dummy from the backup file to the new one. You will only need to change those joints that are defined in the user file, as the others shouldn't be changed by the user. These joints are documented in the Database Manual, and some transition tables relating the new joint names to the old joint numbers and names are provided in section D.
- Check if there are loading conditions in the old SYSTEM.MODEL. If so, then place them in the new input-deck. Note that you can replace LOAD.BODY_ACC applied on all bodies of the dummy defined inside the system with LOAD.SYSTEM_ACC applied on one system and defined outside that system.
- Check the contact interactions concerning the dummy and adjust them. Remember MADYMO 6.0 makes contacts between groups of surfaces. For multi-body contacts the references to the analytic surfaces in the GROUP_MB elements need to be updated. For facet-surfaces and FE contacts the references in the GROUP_FE elements need to be updated. You can either use the predefined contact groups as described in the Database Manual, or you can make your own. Defining your own groups may allow you to get fewer contact interaction definitions - but do this carefully and watch your contact characteristics. The dummy contact surfaces have self-explanatory names that make this process relatively straightforward.
- Check the output signals concerning the dummy. All references to the dummy should be adjusted as required. In the new files the dummy signals are predefined in the include file, and selected under the CONTROL_OUTPUT element. Only those signals that are not already predefined should be left in your application file.
- Run your new model and superimpose the KIN3 file of your new file with that produced by the translated file. You should see no differences or only small differences caused by the dummy

update and grouping of ellipsoids in contacts.

3.2 Method B: Removing the Dummy Before Translation

- Delete the dummy from the application in the data format, before translation. You will also have to remove all contact definitions and output signals that refer to the dummy system. In this case, make sure that the stripped file will also run successfully in MADYMO 5.4.1.
- Translate the application to MADYMO6.0 using dat2mif.
- Copy the SYSTEM.MODEL from the user file of the dummy (d_<dummy>_usr.xml) into your application.
- Copy the initial joint positions of the dummy from the .dat file to the new XML file, using the translation tables as described under Method A, above.
- Add all the contact definitions that refer to the dummy. Obtain this information from the old application file.
- Insert the necessary output signals of the dummy in the application. This can be copied from the dummy user file and adjusted.
- Run your new model and superimpose the KIN3 file of your new file with that produced by the translated file. You should see no differences or only small differences caused by the dummy update and grouping of ellipsoids in contacts.

3.3 Changing Dummy Types

You can replace one type of dummy by another; e.g. an ellipsoid dummy can be replaced by a facet dummy when a higher level of detail is required. To do this:

- Start with an application that has a dummy user file which calls the appropriate include file.
- Change the name of the dummy include file to the new dummy variety.
- Check the corresponding user file of the new dummy variety. Copy any differences you see in the SYSTEM.MODEL element to

the application.

- Check the loading conditions relating to the dummy.
- Modify the contact interactions relating to the dummy. This will usually involve changing the suffix of the pre-defined contact group, and if required, the type of contact.

3.4 Joint transition tables

FRONTAL IMPACT DUMMIES

Table 3.1 Hybrid III adult family

Release 6.0 naming		Release 5.4.1 numbering
Dummy_jnt	1	dummy
NeckPivot4_jnt	12	neck pivot 4
NeckPivot3_jnt	11	neck pivot 3
NeckPivot2_jnt	10	neck pivot 2
NeckPivot1_jnt	9	neck pivot 1
NeckBracket_jnt	7	neck flexion angle adjustment bracket
ShoulderL_jnt	17	left shoulder
ShoulderR_jnt	18	right shoulder
ElbowL_jnt	19	left elbow
ElbowR_jnt	20	right elbow
WristL_jnt	21	left wrist
WristR_jnt	22	right wrist
LumbarSpine_jnt	4	lumbar spine
HipL_jnt	23	left hip
HipR_jnt	24	right hip
KneeL_jnt	27	left knee
KneeR_jnt	28	right knee
AnkleL_jnt	33	left ankle
AnkleR_jnt	34	right ankle

Table 3.2 Standing Hybrid III 50th and Hybrid II Part 572

Release 6.0 naming	Release 5.4.1 numbering	
Dummy_jnt	1	dummy
NeckPivotUp_jnt	10	upper neck pivot
NeckPivotLow_jnt	9	lower neck pivot
NeckBracket_jnt	7	neck flexion angle adjustment bracket
ShoulderL_jnt	14	left shoulder
ShoulderR_jnt	15	right shoulder
ElbowL_jnt	16	left elbow
ElbowR_jnt	17	right elbow
WristL_jnt	18	left wrist
WristR_jnt	19	right wrist
LumbarSpine_jnt	4	lumbar spine
HipL_jnt	20	left hip
HipR_jnt	21	right hip
KneeL_jnt	24	left knee
KneeR_jnt	25	right knee
AnkleL_jnt	30	left ankle
AnkleR_jnt	31	right ankle

Table 3.3 Hybrid III with TRID neck

Release 6.0 naming	Release 5.4.1 numbering	
Dummy_jnt	1	dummy
NeckPivot8_jnt	15	C2-C1 neck joint
NeckPivot7_jnt	14	C3-C2 neck joint
NeckPivot6_jnt	13	C4-C3 neck joint
NeckPivot5_jnt	12	C5-C4 neck joint
NeckPivot4_jnt	11	C6-C5 neck joint
NeckPivot3_jnt	10	C7-C6 neck joint
NeckPivot2_jnt	9	lower neck bracket - C7
NeckBracket_jnt	7	neck flexion angle adjustment bracket
ShoulderL_jnt	21	left shoulder
ShoulderR_jnt	22	right shoulder
ElbowL_jnt	23	left elbow
ElbowR_jnt	24	right elbow

Table 3.3 Hybrid III with TRID neck

Release 6.0 naming	Release 5.4.1 numbering	
WristL_jnt	25	left wrist
WristR_jnt	26	right wrist
LumbarSpine_jnt	4	lumbar spine
HipL_jnt	27	left hip
HipR_jnt	28	right hip
KneeL_jnt	31	left knee
KneeR_jnt	32	right knee
AnkleL_jnt	37	left ankle
AnkleR_jnt	38	right ankle

SIDE IMPACT DUMMIES

Table 3.4 EUROSID-1 and ES-2

Release 6.0 naming	Release 5.4.1 numbering	
Dummy_jnt	1	dummy
NeckUp_jnt	15	neck
NeckMid2_jnt	14	neck
NeckMid1_jnt	13	neck
NeckLow_jnt	12	neck
ShoulderL_jnt	28	arm position left
ShoulderR_jnt	36	arm position right
LumbarSpine_jnt	8	lumbar spine
HipL_jnt	16	left hip
HipR_jnt	17	right hip
KneeL_jnt	20	left knee
KneeR_jnt	21	right knee
AnkleL_jnt	22	left ankle
AnkleR_jnt	23	right ankle

Table 3.5 US DoT-SID

Release 6.0 naming	Release 5.4.1 numbering	
Dummy_jnt	1	dummy
LumbarSpine_jnt	3	lumbar spine
HipL_jnt	7	left thigh
HipR_jnt	8	right thigh
KneeL_jnt	11	left knee
KneeR_jnt	12	right knee
AnkleL_jnt	13	left ankle
AnkleR_jnt	14	right ankle

Table 3.6 BioSID

Release 6.0 naming	Release 5.4.1 numbering	
Dummy_jnt	1	dummy
NeckPivotUp_jnt	8	upper neck pivot
NeckPivotLow_jnt	7	lower neck pivot
Arm_jnt	29	arm positioning
RibMounting_jnt	22	rib mounting
LumbarSpine_jnt	3	lumbar spine
HipL_jnt	10	left hip
HipR_jnt	11	right hip
KneeL_jnt	14	left knee
KneeR_jnt	15	right knee
AnkleL_jnt	20	left ankle
AnkleR_jnt	21	right ankle

CHILD DUMMIES

Table 3.7 Hybrid III 6yo child

Release 6.0 naming		Release 5.4.1 numbering
Dummy_jnt	1	dummy
NeckPivotUp_jnt	10	neck pivot 3
NeckPivotMid_jnt	9	neck pivot 2
NeckPivotLow_jnt	8	neck pivot 1
ShoulderL_jnt	14	left shoulder
ShoulderR_jnt	15	right shoulder
ElbowL_jnt	16	left elbow
ElbowR_jnt	17	right elbow
WristL_jnt	18	left wrist
WristR_jnt	19	right wrist
LumbarSpine_jnt	4	lumbar spine
HipL_jnt	20	left hip
HipR_jnt	21	right hip
KneeL_jnt	24	left knee
KneeR_jnt	25	right knee
AnkleL_jnt	26	left ankle
AnkleR_jnt	27	right ankle

Table 3.8 Hybrid III 3yo child

Release 6.0 naming		Release 5.4.1 numbering
Dummy_jnt	1	dummy
NeckPivotUp_jnt	10	neck pivot 3
NeckPivotMid_jnt	9	neck pivot 2
NeckPivotLow_jnt	8	neck pivot 1
ShoulderL_jnt	16	left shoulder
ShoulderR_jnt	17	right shoulder
ElbowL_jnt	18	left elbow
ElbowR_jnt	19	right elbow
LumbarSpine_jnt	4	lumbar spine
HipL_jnt	22	left hip
HipR_jnt	23	right hip
KneeL_jnt	24	left knee

Table 3.8 Hybrid III 3yo child

Release 6.0 naming	Release 5.4.1 numbering	
KneeR_jnt	25	right knee
AnkleL_jnt	26	left ankle
AnkleR_jnt	27	right ankle

Table 3.9 CRABI 12mnth

Release 6.0 naming	Release 5.4.1 numbering	
Dummy_jnt	1	dummy
NeckPivotUp_jnt	10	upper neck pivot
NeckPivotLow_jnt	9	lower neck pivot
NeckBracket_jnt	7	neck angle adjustment bracket
ShoulderL_jnt	14	left shoulder
ShoulderR_jnt	15	right shoulder
ElbowL_jnt	16	left elbow
ElbowR_jnt	17	right elbow
WristL_jnt	18	left wrist
WristR_jnt	19	right wrist
LumbarSpine_jnt	4	lumbar spine
HipL_jnt	20	left hip
HipR_jnt	21	right hip
KneeL_jnt	24	left knee
KneeR_jnt	25	right knee
AnkleL_jnt	30	left ankle
AnkleR_jnt	31	right ankle

4 Guide to using the Transition Manual

The Transition Manual follows the sequence of the MADYMO V. 5.4 User's Manual. The Transition Manual should be used as a guide for experienced MADYMO users to convert "old keywords" to the new "XML elements". Along the edge of each page in this manual is a tab with the number corresponding to the chapter number in the MADYMO V. 5.4 User's Manual.

For more specific numbering, the number in front of the "old keyword or variable" at the top of each page corresponds to the chapter and section number in the MADYMO V. 5.4 User's Manual. For example: **3.1.1 FACET SURFACE** is found in chapter 3 in the old manual.

Once the user has found the XML element that matches the old keyword, go the dictionary part of the Reference Manual and look up the XML element alphabetically. Some keywords are now obsolete so there will be no XML element equivalent found in this manual. In many cases, there are new XML elements or attributes and these are also listed in this manual. An example from the table below, the keyword GEOMETRIES has now become in MADYMO 6.0:

PROPERTY.MEM3

PROPERTY.MEM4

To find out more about these two XML elements, look in the Reference Manual under P for PROPERTY. The elements and attributes in the tables in bold print are required. The objects or attributes in the tables in plain print are optional.

Old keyword or variable	New element or attribute
FSUID	FE_MODEL/NAME
COORDINATES, REFCSYS = 0	COORDINATE.CARTESIAN
COORDINATES, REFCSYS = 1	COORDINATE.CYLINDRICAL
FACETS, TYPE = TRIANG	ELEMENT.TRIAD3
FACETS, TYPE = QUAD	ELEMENT.QUAD4
GEOMETRIES	PROPERTY . MEM3 PROPERTY . MEM4

Old keyword or variable	New element or attribute
INITIAL CONDITIONS	INITIAL.FE_MODEL/ FE_MODEL
COMPLIANCE	GROUP_FE/CONTACT_CHAR

1 RUNNO

Old keyword or variable	New element or attribute
RUNNO	RUNID
RUNID1	
RUNID2	

2 GENERAL INPUT

Old keyword or variable	New element or attribute
T0	CONTROL_ANALYSIS.TIME/TIME_START
TE	CONTROL_ANALYSIS.TIME/TIME_END
INT	CONTROL_ANALYSIS.TIME/INT_MTH
TS	CONTROL_ANALYSIS.TIME/TIME_STEP
TOL	CONTROL_ANALYSIS.TIME/INT_TOL
TSMAX	CONTROL_ANALYSIS.TIME/MAX_STEP
ANALYSIS	CONTROL_ANALYSIS.TIME/ANALYSIS_TYPE
CONSTRAINT TOLERANCE	CONTROL_ANALYSIS.TIME/CONSTRAINT_TOL
RAMP	CONTROL_ANALYSIS.TIME/RAMP
RACO	CONTROL_ANALYSIS.TIME/RACO

3.1 INERTIAL SPACE

Old keyword or variable	New element or attribute
INERID	SYSTEM . REF_SPACE / NAME
ELLIPSOIDS	SURFACE . ELLIPSOID
CYLINDERS	SURFACE . CYLINDER
PLANES	SURFACE . PLANE
FACET SURFACE	FE_MODEL
ROAD, TYPE ≠ USER	ROAD . ANALYTIC
ROAD, TYPE = USER	ROAD . USER

3.1.1.1 FACET SURFACE

Old keyword or variable	New element or attribute
FSUID	FE_MODEL/NAME
COORDINATES, REFCSYS = 0 COORDINATES, REFCSYS = 1	COORDINATE.CARTESIAN COORDINATE.CYLINDRICAL
FACETS, TYPE = TRIANG FACETS, TYPE = QUAD	ELEMENT.TRIAD3 ELEMENT.QUAD4
GEOMETRIES	PROPERTY.MEM3 PROPERTY.MEM4
INITIAL CONDITIONS	INITIAL.FE_MODEL/FE_MODEL
COMPLIANCE	GROUP_FE/CONTACT_CHAR

3.1.1.2 ROAD

Old keyword or variable	New element or attribute
TYPE ≠ USER	ROAD . ANALYTIC / SHAPE_TYPE
TYPE = USER	ROAD . USER
XMIN XMAX YMIN YMAX	ROAD . ANALYTIC / PLANE_SURFACE ROAD . USER / PLANE_SURFACE
R1	ROAD . ANALYTIC / RP1 ROAD . USER / RP1
R2	ROAD . ANALYTIC / RP2 ROAD . USER / RP2
R3	ROAD . ANALYTIC / RP3 ROAD . USER / RP3
R4	ROAD . ANALYTIC / RP4 ROAD . USER / RP4

3.2 NULL SYSTEM

Old keyword or variable	New element or attribute
NULLID	SYSTEM.MODEL/NAME
Obsolete; null system must be modelled as a system of one body with a prescribed motion.	
ELLIPSOIDS	SURFACE.ELLIPSOID
CYLINDERS	SURFACE.CYLINDER
PLANES	SURFACE.PLANE
FACET SURFACE	FE_MODEL
MOTION	MOTION.JOINT_POS

3.2.1 MOTION

Old keyword or variable	New element or attribute
POSITION	MOTION.JOINT_POS
T X	MOTION.JOINT_POS/Q5_FUNC
T Y	MOTION.JOINT_POS/Q6_FUNC
T Z	MOTION.JOINT_POS/Q7_FUNC
ORIENTATION	MOTION.JOINT_POS/Q1_FUNC MOTION.JOINT_POS/Q2_FUNC MOTION.JOINT_POS/Q3_FUNC MOTION.JOINT_POS/Q4_FUNC

4 SYSTEM

Old keyword or variable	New element or attribute
SYSID	SYSTEM.MODEL/NAME

4.1 CONFIGURATION

Old keyword or variable	New element or attribute
NUi	
Obsolete; connectivity follows from the JOINT data	

4.2 GEOMETRY

Old keyword or variable	New element or attribute
RJX RJY RJZ	CRDSYS_OBJECT_1
Point on the child body; related element of element of JOINT class	
CGX CGY CGZ	BODY.RIGID/CENTRE_OF_GRAVITY
ID	BODY.RIGID/NAME

4.3 INERTIA

Old keyword or variable	New element or attribute
MASS	BODY . RIGID/MASS
IXX IYY IZZ IXY IXZ IYZ	BODY . RIGID/INERTIA
NEW: the order of IXZ and IYZ is swapped, see the Reference Manual for the correct order.	

4.4 BEAMS

Old keyword or variable	New element or attribute
BODY	
Obsolete; no reference to a rigid body needed	
X1 Y1 Z1	BODY.FLEXIBLE_BEAM/LINE3
X2 Y2 Z2	BODY.FLEXIBLE_BEAM/LINE3
DENS	BODY.FLEXIBLE_BEAM/DENSITY
MAREA	BODY.FLEXIBLE_BEAM/STIF_AXIAL
MAREA is set equal to AREA; if MAREA equals INFINITE, set STIF_AXIAL to OFF	
MIXX	BODY.FLEXIBLE_BEAM/MI11
E	BODY.FLEXIBLE_BEAM/E
NU	BODY.FLEXIBLE_BEAM/NU
DAMP	BODY.FLEXIBLE_BEAM/DAMP_COEF
AREA	BODY.FLEXIBLE_BEAM/AREA
IXX	BODY.FLEXIBLE_BEAM/I11
IYY	BODY.FLEXIBLE_BEAM/I22
IZZ	BODY.FLEXIBLE_BEAM/I33
NODES	BODY.FLEXIBLE_BEAM/DEF_NODE_LIST

4.5 DEFORMABLE

Old keyword or variable	New element or attribute
BODY	
Obsolete; no reference to a rigid body needed	
COORDINATES, REFCSYS = 0	COORDINATE.CARTESIAN
COORDINATES, REFCSYS = 1	COORDINATE.CYLINDRICAL
MODE	BODY.DEFORMABLE/MODE_LIST
STIFFNESS	BODY.DEFORMABLE/MODAL_STIF
DAMPING	BODY.DEFORMABLE/MODAL_DAMP

4.5.1 COORDINATES, REFCSYS = 0

Old keyword or variable	New element or attribute
NO	COORDINATE.CARTESIAN/ID
PAR1	COORDINATE.CARTESIAN/X
PAR2	COORDINATE.CARTESIAN/Y
PAR3	COORDINATE.CARTESIAN/Z
NODMAS	ELEMENT.MASS1/MASS
THICK	PROPERTY.MEM4/THICK PROPERTY.MEM3/THICK
Old vertex thickness is replaced by new element thickness.	

4.5.1 COORDINATES, REFCSYS = 1

Old keyword or variable	New element or attribute
NO	COORDINATE.CYLINDRICAL/ID
PAR1	COORDINATE.CYLINDRICAL/R
PAR2	COORDINATE.CYLINDRICAL/THETA
PAR3	COORDINATE.CYLINDRICAL/Z
NODMAS	ELEMENT.MASS1/MASS
THICK	PROPERTY.MEM4/THICK PROPERTY.MEM3/THICK

Old vertex thickness is replaced by new element thickness.

4.5.2 MODE

Old keyword or variable	New element or attribute
NO	MODE_SHAPE/ID
U	MODE_SHAPE/DX
V	MODE_SHAPE/DY
W	MODE_SHAPE/DZ
FIX	MODE_SHAPE/RX
FIY	MODE_SHAPE/RX
FIZ	MODE_SHAPE/RZ

4.5.3 STIFFNESS

Old keyword or variable	New element or attribute
KIJ	BODY . DEFORMABLE/MODAL_STIF

4.5.4 DAMPING

Old keyword or variable	New element or attribute
DIJ	BODY.DEFORMABLE/MODAL_DAMP

4.6 JOINTS

Old keyword or variable	New element or attribute
JOINT	JOINT.* /ID
Old: reference to joint number; new: definition of joint id	
JNTTYP	
Joint type included in joint element name, such as JOINT.REVO	
NODEI	CRDSYS_OBJECT_1/NODE
Node on deformable parent body	
NODEJ	CRDSYS_OBJECT_2/NODE
Node on deformable child body	

4.6.1 STIFFNESS

Old keyword or variable					New element or attribute
JOINT					RESTRAINT . JOINT / JOINT
DAMPFLG					
Obsolete; separate attributes have been introduced					
LO ₁	UNLO ₁	HYS ₁	XEL ₁	DAMP ₁	RESTRAINT . JOINT / Q1_CHAR
LO ₂	UNLO ₂	HYS ₂	XEL ₂	DAMP ₂	RESTRAINT . JOINT / Q2_CHAR
LO ₃	UNLO ₃	HYS ₃	XEL ₃	DAMP ₃	RESTRAINT . JOINT / Q3_CHAR
FRIC ₁					RESTRAINT . JOINT / Q1_FRIC_LOAD
FRIC ₂					RESTRAINT . JOINT / Q2_FRIC_LOAD
FRIC ₃					RESTRAINT . JOINT / Q3_FRIC_LOAD

4.6.2 COULOMB FRICTION

Old keyword or variable	New element or attribute
JOINT	RESTRAINT . JOINT/JOINT
FRLDS	RESTRAINT . JOINT/STATIC_FRIC_LOAD
FRLDD	RESTRAINT . JOINT/DYNAMIC_FRIC_LOAD
FRCOS	RESTRAINT . JOINT/STATIC_FRIC_COEF
FRCOD	RESTRAINT . JOINT/DYNAMIC_FRIC_COEF
OUTPUT	OUTPUT_RESTRAINT

4.7 CLOSING JOINT

Old keyword or variable	New element or attribute
JOINT	JOINT.*/ID
Old: reference to joint number; new: definition of joint id	
TYPE	
Joint type included in joint element name, such as JOINT.REVO	
BODY	CRDSYS_OBJECT_1/BODY
Parent body	
COORDINATES	CRDSYS_OBJECT_1/POS
NODE	CRDSYS_OBJECT_1/NODE
ORIENTATION	CRDSYS_OBJECT_1/ORIENT
BODY	CRDSYS_OBJECT_2/BODY
Child body	
COORDINATES	CRDSYS_OBJECT_2/POS
ORIENTATION	CRDSYS_OBJECT_2/ORIENT

4.8 CARDAN RESTRAINTS

Old keyword or variable	New element or attribute
JOINT	
Reference to joint must be replaced by reference to two bodies	
L1 U1 H1 X1 D1	RESTRAINT.CARDAN/R1_CHAR
L2 U2 H2 X2 D2	RESTRAINT.CARDAN/R2_CHAR
L3 U3 H3 X3 D3	RESTRAINT.CARDAN/R3_CHAR
F1	RESTRAINT.CARDAN/R1_FRIC_TORQUE
F2	RESTRAINT.CARDAN/R2_FRIC_TORQUE
F3	RESTRAINT.CARDAN/R3_FRIC_TORQUE

4.9 FLEXION-TORSION RESTRAINTS

Old keyword or variable	New element or attribute
JOINT	
Reference to joint must be replaced by reference to two bodies	
LOA UNLA HYSA XEA	RESTRAINT.FLEX_TORS/BENDING_CHAR
LOB UNLB HYSB XEB	RESTRAINT.FLEX_TORS/TORSION_CHAR
DAMP	RESTRAINT.FLEX_TORS/DAMP_COEF
FRI	RESTRAINT.FLEX_TORS/FRIC_TORQUE
NFAC	RESTRAINT.FLEX_TORS/BENDING_TORQUE_FUNC

4.11 ELLIPSOIDS

Old keyword or variable	New element or attribute
BODY	CRDSYS_OBJECT_1/BODY
MX MY MZ	CRDSYS_OBJECT_1/POS
A B C	SURFACE.ELLIPSOID/SEMI_AXIS
DEG	SURFACE.ELLIPSOID/DEGREE
LO UNLO HYS	SURFACE.ELLIPSOID/CHAR
ID	SURFACE.ELLIPSOID/NAME

4.12 CYLINDERS

Old keyword or variable	New element or attribute
BODY	CRDSYS_OBJECT_1/BODY
MX MY MZ	CRDSYS_OBJECT_1/POS
A B C	SURFACE.CYLINDER/SEMI_AXIS
DEG	SURFACE.CYLINDER/DEGREE
LO UNLO HYS	SURFACE.CYLINDER/CHAR
ID	SURFACE.CYLINDER/NAME

4.13 PLANES

Old keyword or variable	New element or attribute
BODY	CRDSYS_OBJECT_1/BODY
X1 Y1 Z1	SURFACE . PLANE/POINT_1
X2 Y2 Z2	SURFACE . PLANE/POINT_2
X3 Y3 Z3	SURFACE . PLANE/POINT_3
L0 UNL0 HYS	SURFACE . PLANE/CHAR
ID	SURFACE . PLANE/NAME

4.14 FACET SURFACE

Old keyword or variable	New element or attribute
FSUID	FE_MODEL/NAME
COORDINATES, REFCSYS = 0 COORDINATES, REFCSYS = 1	COORDINATE.CARTESIAN COORDINATE.CYLINDRICAL
FACETS, TYPE = TRIANG FACETS, TYPE = QUAD	ELEMENT.TRIAD3 ELEMENT.QUAD4
GEOMETRIES	
SECTIONS	
COMPLIANCE	GROUP_FE/CONTACT_CHAR

4.14.1 COORDINATES, REFCSYS = 0

Old keyword or variable	New element or attribute
NO	COORDINATE.CARTESIAN/ID
PAR1	COORDINATE.CARTESIAN/X
PAR2	COORDINATE.CARTESIAN/Y
PAR3	COORDINATE.CARTESIAN/Z
THICK	PROPERTY.MEM4/THICK PROPERTY.MEM3/THICK
Old node thickness is replaced by new element thickness.	

4.14.1 COORDINATES, REFCSYS = 1

Old keyword or variable	New element or attribute
NO	COORDINATE.CYLINDRICAL/ID
PAR1	COORDINATE.CYLINDRICAL/R
PAR2	COORDINATE.CYLINDRICAL/THETA
PAR3	COORDINATE.CYLINDRICAL/Z
THICK	PROPERTY.MEM4/THICK PROPERTY.MEM3/THICK
Old node thickness is replaced by new element thickness.	

4.14.2 FACETS

Old keyword or variable	New element or attribute
TYPE = TRIANG	ELEMENT . TRIAD3
N0	ELEMENT . TRIAD3/ID
N1	ELEMENT . TRIAD3/N1
N2	ELEMENT . TRIAD3/N2
N3	ELEMENT . TRIAD3/N3
TYPE = QUAD	ELEMENT . QUAD4/N1
N0	ELEMENT . QUAD4/ID
N1	ELEMENT . QUAD4/N1
N2	ELEMENT . QUAD4/N2
N3	ELEMENT . QUAD4/N3
N4	ELEMENT . QUAD4/N4

4.14.3 GEOMETRIES

Old keyword or variable	New element or attribute
THICKNESS	PROPERTY.MEM3/THICK
Element thickness is the mean of the corresponding node thicknesses	
SET	ELEMENT.TRIAD3/PART
The SET consists of all elements that refer to the same part	
THICKNESS	PROPERTY.MEM4/THICK
Element thickness is the mean of the corresponding node thicknesses	
SET	ELEMENT.QUAD4/PART
The SET consists of all elements that refer to the same part	

4.14.4 SECTIONS

Old keyword or variable	New element or attribute
BODY	SUPPORT/BODY
SET	INITIAL.PART/PART_LIST SUPPORT/GROUP_LIST
The SUPPORT/GROUP_LIST contains the same finite element parts as INITIAL.PART/PART_LIST	
REFERENCEBODY	INITIAL.PART/BODY
INITIAL CONDITIONS	
VERTEX	INITIAL.PART/REF_NODE
X Y Z	INITIAL.PART/POS
ORIENTATIONS	INITIAL.PART/ORIENT

4.14.5 COMPLIANCE

Old keyword or variable	New element or attribute
FACETSET	GROUP_FE
VERTEXSET	GROUP_FE

4.14.5.1 FACETSET

Old keyword or variable	New element or attribute
FACETID	GROUP_FE/NAME
FACETS	GROUP_FE/ELEMENT_LIST
CONTACT_MODEL	CHARACTERISTIC.CONTACT/CONTACT_MODEL
LOADING_FUNCTION	CHARACTERISTIC.CONTACT/LOAD_FUNC
UNLOADING_FUNCTION	CHARACTERISTIC.CONTACT/UNLOAD_FUNC
HYSTERESIS_MODEL	CHARACTERISTIC.CONTACT/HYS_MODEL
HYSTERESIS_SLOPE	CHARACTERISTIC.CONTACT/HYS_SLOPE
ELASTIC_LIMIT	CHARACTERISTIC.CONTACT/ELAS_LIMIT
DAMPING_COEFFICIENT	CHARACTERISTIC.CONTACT/DAMP_COEF
DAMPING_VELOCITY_FUNCTION	CHARACTERISTIC.CONTACT/DAMP_VEL_FUNC
DAMPING_STRESS_FUNCTION	CHARACTERISTIC.CONTACT/DAMP_AMP_FUNC
FUNCTIONS	FUNCTION.XY

4.14.5.2 VERTEXSET

Old keyword or variable	New element or attribute
VERTEXID	GROUP_FE/NAME
VERTICES	GROUP_FE/NODE_LIST
CONTACT MODEL	CHARACTERISTIC.CONTACT/CONTACT_MODEL
LOADING FUNCTION	CHARACTERISTIC.CONTACT/LOAD_FUNC
UNLOADING FUNCTION	CHARACTERISTIC.CONTACT/UNLOAD_FUNC
HYSTERESIS MODEL	CHARACTERISTIC.CONTACT/HYS_MODEL
HYSTERESIS SLOPE	CHARACTERISTIC.CONTACT/HYS_SLOPE
ELASTIC LIMIT	CHARACTERISTIC.CONTACT/ELAS_LIMIT
DAMPING COEFFICIENT	CHARACTERISTIC.CONTACT/DAMP_COEF
DAMPING VELOCITY FUNCTION	CHARACTERISTIC.CONTACT/DAMP_VEL_FUNC
DAMPING STRESS FUNCTION	CHARACTERISTIC.CONTACT/DAMP_AMP_FUNC
FUNCTIONS	FUNCTION.XY

4.15 INITIAL CONDITIONS

Old keyword or variable	New element or attribute
INITIAL . JOINT_POS/JOINT	
Must refer to the old joint between the inertial space and the reference body; only valid when the old joint is a FREE joint. The joint coordinate systems must coincide with the reference space coordinate system and the local coordinate system of the reference body.	
X	INITIAL . JOINT_POS/D1
Y	INITIAL . JOINT_POS/D2
Z	INITIAL . JOINT_POS/D3
VX	INITIAL . JOINT_VEL/V1
VY	INITIAL . JOINT_VEL/V2
VZ	INITIAL . JOINT_VEL/V3
CHO = 1, SYS BODY	
For the new case, a JOINT.FREE must be defined between the reference body and the body defined by SYS BODY.	

4.15.1 ANGULAR VELOCITY

Old keyword or variable	New element or attribute
BODY	
Obsolete	
WX	
Obsolete	
WY	
Obsolete	
WZ	
Obsolete	
CHO	
Obsolete	

4.15.2 JOINT DOF

Old keyword or variable	New element or attribute
JOINT	INITIAL . JOINT_POS/JOINT
STAT	INITIAL . JOINT_STATUS/STATUS
Q1	INITIAL . JOINT_POS/Q1
Q2	INITIAL . JOINT_POS/Q2
Q3	INITIAL . JOINT_POS/Q3
Q4	INITIAL . JOINT_POS/Q4
Q5	INITIAL . JOINT_POS/Q5
Q6	INITIAL . JOINT_POS/Q6
Q7	INITIAL . JOINT_POS/Q7
QD1	INITIAL . JOINT_VEL/QD1
QD2	INITIAL . JOINT_VEL/QD2
QD3	INITIAL . JOINT_VEL/QD3
QD4	INITIAL . JOINT_VEL/QD4
QD5	INITIAL . JOINT_VEL/QD5
QD6	INITIAL . JOINT_VEL/QD6

4.16 MOTION

Old keyword or variable	New element or attribute
TYPE	
Obsolete, motion type included in motion element name	
TYPE = JNTPOS	
JOINT	MOTION.JOINT_POS/JOINT
NF1	MOTION.JOINT_POS/Q1_FUNC
NF2	MOTION.JOINT_POS/Q2_FUNC
NF3	MOTION.JOINT_POS/Q3_FUNC
NF4	MOTION.JOINT_POS/Q4_FUNC
NF5	MOTION.JOINT_POS/Q5_FUNC
NF6	MOTION.JOINT_POS/Q6_FUNC
NF7	MOTION.JOINT_POS/Q7_FUNC
TYPE = JNTACC	
JOINT	MOTION.JOINT_ACC/JOINT
NF1	MOTION.JOINT_ACC/QDD1_FUNC
NF2	MOTION.JOINT_ACC/QDD2_FUNC
NF3	MOTION.JOINT_ACC/QDD3_FUNC
NF4	MOTION.JOINT_ACC/QDD4_FUNC
NF5	MOTION.JOINT_ACC/QDD5_FUNC
NF6	MOTION.JOINT_ACC/QDD6_FUNC
TYPE = ROTXYZ	
JOINT	MOTION.JOINT_POS/JOINT
NF1	MOTION.JOINT_POS/Q1_FUNC
NF2	MOTION.JOINT_POS/Q2_FUNC
NF3	MOTION.JOINT_POS/Q3_FUNC
NF4	MOTION.JOINT_POS/Q4_FUNC
NF5	MOTION.JOINT_POS/Q5_FUNC
NF6	MOTION.JOINT_POS/Q6_FUNC
Replace the "old" SPHE joint by JOINT.SPHE_BRYANT or the "old" FREE joint by JOINT.FREE_BRYANT	
TYPE = ROTXYX	
JOINT	MOTION.JOINT_POS/JOINT
NF1	MOTION.JOINT_POS/Q1_FUNC
NF2	MOTION.JOINT_POS/Q2_FUNC
NF3	MOTION.JOINT_POS/Q3_FUNC
NF4	MOTION.JOINT_POS/Q4_FUNC
NF5	MOTION.JOINT_POS/Q5_FUNC
NF6	MOTION.JOINT_POS/Q6_FUNC
Replace the 'old' SPHE joint by JOINT.SPHE_EULER or the 'old' FREE joint by JOINT.FREE_EULER	

4.17 SWITCH

Old keyword or variable	New element or attribute
JOINT	STATE.JOINT/JOINT_LIST
TYPE	
Obsolete, kind of status change included in STATE name	
NOI	STATE.JOINT/SWITCH
LOPI	STATE.JOINT/SWITCH

5 FEM MODEL

Old keyword or variable	New element or attribute
FEMID	FE_MODEL/NAME

5.1 MODEL PARAMETERS

Old keyword or variable	New element or attribute
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The MODEL_PARAMETERS block has been separated into CONTROL_FE_MODEL, CONTROL_FE_TIME_STEP and CONTROL_AIRBAG.

ALPHA	CONTROL_FE_MODEL/ALPHA_COEF
ALPHAFUNC	CONTROL_FE_MODEL/ALPHA_FUNC
HRGPAR	PROPERTY.MEM4/HOURLASS_PAR PROPERTY.MEM4NL/HOURLASS_PAR PROPERTY.SHELL4_LAYERED/HOURLASS_PAR PROPERTY.SHELL4/HOURLASS_PAR PROPERTY.SOLID8/HOURLASS_PAR
Obsolete; can only be defined on property level	
TSTEP	CONTROL_FE_TIME_STEP/MAX_STEP
TSTMIN	CONTROL_FE_TIME_STEP/MIN_STEP
TSTMTH	CONTROL_FE_TIME_STEP/TIME_INT_MTH
DIMINS	CONTROL_FE_TIME_STEP/REDUCTION_FACTOR
CRITEL	CONTROL_FE_TIME_STEP/CRITICAL_ELEMENTS
VARCYC	CONTROL_FE_TIME_STEP/NR_OF_CYCLES
VARMIN	CONTROL_FE_TIME_STEP/MIN_STEP
VARRAT	CONTROL_FE_TIME_STEP/MIN_STEP
IMMDAM	PROPERTY.MEM3/IMM_DAMP PROPERTY.MEM3_LAYERED/IMM_DAMP PROPERTY.MEM3NL/IMM_DAMP PROPERTY.MEM3NL_LAYERED/IMM_DAMP PROPERTY.MEM4/IMM_DAMP PROPERTY.MEM4NL/IMM_DAMP
Obsolete; IMM damping parameter can only be defined on property level	
IMMSTR	PROPERTY.MEM3/IMM_STRAIN PROPERTY.MEM3_LAYERED/IMM_STRAIN PROPERTY.MEM3NL/IMM_STRAIN PROPERTY.MEM3NL_LAYERED/IMM_STRAIN PROPERTY.MEM4/IMM_STRAIN PROPERTY.MEM4NL/IMM_STRAIN

Old keyword or variable	New element or attribute
Obsolete; IMM treshold strain can only be defined on property level	
THERMC	CONTROL_AIRBAG/THERMC
BAGV0	AIRBAG_CHAMBER/CHAMBER_V0
CHAMV0	AIRBAG_CHAMBER/CHAMBER_V0
BLOCKFLOW	CONTROL_AIRBAG/BLOCK_FLOW
FUNCTIONS	
Obsolete; functions can only be defined on function level	

5.2 COORDINATES, REFCSYS = 0

Old keyword or variable	New element or attribute
NO	COORDINATE . CARTESIAN / ID
PAR1	COORDINATE . CARTESIAN / X
PAR2	COORDINATE . CARTESIAN / Y
PAR3	COORDINATE . CARTESIAN / Z
NODMAS	ELEMENT . MASS1 / MASS

5.2 COORDINATES, REFCSYS = 1

Old keyword or variable	New element or attribute
NO	COORDINATE.CYLINDRICAL/ID
PAR1	COORDINATE.CYLINDRICAL/R
PAR2	COORDINATE.CYLINDRICAL/THETA
PAR3	COORDINATE.CYLINDRICAL/Z
NODMAS	ELEMENT.MASS1/MASS

5.3 REFERENCE COORDINATES, REFCSYS = 0

Old keyword or variable	New element or attribute
NO	COORDINATE_REF . CARTESIAN / ID
PAR1	COORDINATE_REF . CARTESIAN / X
PAR2	COORDINATE_REF . CARTESIAN / Y
PAR3	COORDINATE_REF . CARTESIAN / Z

5.3 REFERENCE COORDINATES, REFCSYS = 1

Old keyword or variable	New element or attribute
NO	COORDINATE_REF.CYLINDRICAL/ID
PAR1	COORDINATE_REF.CYLINDRICAL/R
PAR2	COORDINATE_REF.CYLINDRICAL/THETA
PAR3	COORDINATE_REF.CYLINDRICAL/Z

5.4 SCALING

Old keyword or variable	New element or attribute
TYPE	SCALING/SCALE_TYPE
XSCALE	SCALING/X_SCALE
YSCALE	SCALING/Y_SCALE
ZSCALE	SCALING/Z_SCALE
REFERENCE NODE	SCALING/REF_NODE
SET	SCALING/NODE_LIST

5.5.1 ELEMENTS, TYPE = TRUSS2

Old keyword or variable	New element or attribute
N0	ELEMENT . LINE2 / ID
N1	ELEMENT . LINE2 / N1
N2	ELEMENT . LINE2 / N2

5.5.2 ELEMENTS, TYPE = BEAM2

Old keyword or variable	New element or attribute
N0	ELEMENT . LINE3/ID
N1	ELEMENT . LINE3/N1
N2	ELEMENT . LINE3/N2

5.5.3 ELEMENTS, TYPE = MEM3

Old keyword or variable	New element or attribute
N0	ELEMENT . TRIAD3/ID
N1	ELEMENT . TRIAD3/N1
N2	ELEMENT . TRIAD3/N2
N3	ELEMENT . TRIAD3/N3

5.5.3 ELEMENTS, TYPE = MEM3NL

Old keyword or variable	New element or attribute
N0	ELEMENT . TRIAD3/ID
N1	ELEMENT . TRIAD3/N1
N2	ELEMENT . TRIAD3/N2
N3	ELEMENT . TRIAD3/N3

5.5.4 ELEMENTS, TYPE = MEM4

Old keyword or variable	New element or attribute
N0	ELEMENT . QUAD4/ID
N1	ELEMENT . QUAD4/N1
N2	ELEMENT . QUAD4/N2
N3	ELEMENT . QUAD4/N3
N4	ELEMENT . QUAD4/N4

5.5.6 ELEMENTS, TYPE = FACET6

Old keyword or variable	New element or attribute
N0	ELEMENT . TRIAD6/ID
N1	ELEMENT . TRIAD6/N1
N2	ELEMENT . TRIAD6/N2
N3	ELEMENT . TRIAD6/N3
N4	ELEMENT . TRIAD6/N4
N5	ELEMENT . TRIAD6/N5
N6	ELEMENT . TRIAD6/N6

5.5.6 ELEMENTS, TYPE = SHELL6

Old keyword or variable	New element or attribute
N0	ELEMENT.TRIAD6/ID
N1	ELEMENT.TRIAD6/N1
N2	ELEMENT.TRIAD6/N2
N3	ELEMENT.TRIAD6/N3
N4	ELEMENT.TRIAD6/N4
N5	ELEMENT.TRIAD6/N5
N6	ELEMENT.TRIAD6/N6

5.5.7 ELEMENTS, TYPE = SOLID1

Old keyword or variable	New element or attribute
N0	ELEMENT . HEXA8 / ID
N1	ELEMENT . HEXA8 / N1
N2	ELEMENT . HEXA8 / N2
N3	ELEMENT . HEXA8 / N3
N4	ELEMENT . HEXA8 / N4
N5	ELEMENT . HEXA8 / N5
N6	ELEMENT . HEXA8 / N6
N7	ELEMENT . HEXA8 / N7
N8	ELEMENT . HEXA8 / N8

5.5.8 ELEMENTS, TYPE = SOLID8

Old keyword or variable	New element or attribute
N0	ELEMENT .HEXA8/ID
N1	ELEMENT .HEXA8/N1
N2	ELEMENT .HEXA8/N2
N3	ELEMENT .HEXA8/N3
N4	ELEMENT .HEXA8/N4
N5	ELEMENT .HEXA8/N5
N6	ELEMENT .HEXA8/N6
N7	ELEMENT .HEXA8/N7
N8	ELEMENT .HEXA8/N8

5.6 MATERIALS

Old keyword or variable	New element or attribute
TYPE	
Obsolete; TYPE contained in material object name such as MATERIAL.ISOLIN, MATERIAL.ISOPLA.	
SET	PART/MATERIAL
Part provides the link between element and material type	
HRGPAR	PROPERTY.MEM4/HOURLASS_PAR PROPERTY.MEM4NL/HOURLASS_PAR PROPERTY.SHELL4/HOURLASS_PAR PROPERTY.SHELL4_LAYERED/HOURLASS_PAR PROPERTY.SOLID8/HOURLASS_PAR
To be defined at property level	
FORMULATION	PROPERTY.SOLID8/ADV_STRAIN
To be defined on property level	
PERMEABILITY	PERMEABILITY.MODEL1/PERM
FUNC1	PERMEABILITY.MODEL1/P1_FUNC
FUNC2	PERMEABILITY.MODEL1/P2_FUNC
FUNC3	PERMEABILITY.MODEL2/P3_FUNC
FUNC4	PERMEABILITY.MODEL2/P4_FUNC
FUNCT	PERMEABILITY.MODEL1/PT_FUNC
K	MATERIAL.ISOLIN/KAPPA MATERIAL.ISOPLA/KAPPA MATERIAL.ANISO/KAPPA MATERIAL.FABRIC/KAPPA MATERIAL.HYSIS0/KAPPA MATERIAL.ORTHOLIN/KAPPA MATERIAL.ORTHOLIN_LAYERED/KAPPA MATERIAL.ORTHOPLA/KAPPA

5.6.1 MATERIALS. TYPE = ISOLIN

Old keyword or variable	New element or attribute
E	MATERIAL.ISOLIN/E
NU	MATERIAL.ISOLIN/NU
DENSITY	MATERIAL.ISOLIN/DENSITY
DAMPING	MATERIAL.ISOLIN/DAMP_COEF
MU	MATERIAL.ISOLIN/MU
MODEL	DAMAGE.ISOTROPIC
EPSCRIT	DAMAGE.ISOTROPIC/EPSC
P1	DAMAGE.ISOTROPIC/P1
P2	DAMAGE.ISOTROPIC/P2
P3	DAMAGE.ISOTROPIC/P3
DC	DAMAGE.ISOTROPIC/DC
ZONE	DAMAGE.ISOTROPIC/ZONE

5.6.1 MATERIALS, TYPE = ISOTEN

Old keyword or variable	New element or attribute
	MATERIAL . ISOLIN/TENSION_ONLY
The material model ISOTEN has been replaced by MATERIAL.ISOLIN with a TENSION_ONLY switch ON.	
E	MATERIAL . ISOLIN
NU	MATERIAL . ISOLIN/NU
DENSITY	MATERIAL . ISOLIN/DENSITY
DAMPING	MATERIAL . ISOLIN/DAMP_COEF
MU	MATERIAL . ISOLIN/MU
MODEL	DAMAGE . ISOTROPIC
EPSCRIT	DAMAGE . ISOTROPIC/EPSC
P1	DAMAGE . ISOTROPIC/P1
P2	DAMAGE . ISOTROPIC/P2
P3	DAMAGE . ISOTROPIC/P3
DC	DAMAGE . ISOTROPIC/DC
ZONE	DAMAGE . ISOTROPIC/ZONE

5.6.2 MATERIALS, TYPE = ORTHOLIN

Old keyword or variable	New element or attribute
ONLY FOR NON-LAYERED MATERIAL COMPONENTS	
COMPONENT	MATERIAL.ORTHOLIN_LAYERED
Layered material components have to be defined by MATERIAL.ORTHOLIN_LAYERED.	
E11	MATERIAL.ORTHOLIN/E11
E22	MATERIAL.ORTHOLIN/E22
NU12	MATERIAL.ORTHOLIN/NU12
G12	MATERIAL.ORTHOLIN/G12
DENSITY	MATERIAL.ORTHOLIN/DENSITY
MATERIAL DIRECTION	MATERIAL.ORTHOLIN/MAT_DIR
DAMPING	MATERIAL.ORTHOLIN/DAMP_COEF
MU	MATERIAL.ORTHOLIN/MU
MODEL	DAMAGE.ORTHOTROPIC
XT	DAMAGE.ORTHOTROPIC/XT
XC	DAMAGE.ORTHOTROPIC/XC
YT	DAMAGE.ORTHOTROPIC/YT
YC	DAMAGE.ORTHOTROPIC/YC
SXY	DAMAGE.ORTHOTROPIC/S12
P1	DAMAGE.ORTHOTROPIC/P1
P2	DAMAGE.ORTHOTROPIC/P2
P4	DAMAGE.ORTHOTROPIC/P4
P5	DAMAGE.ORTHOTROPIC/P5

Old keyword or variable	New element or attribute
DC	DAMAGE . ORTHOTROPIC/DC
ZONE	DAMAGE . ORTHOTROPIC/ZONE

5.6.2 MATERIALS, TYPE = ORTHOTEN

Old keyword or variable	New element or attribute
	MATERIAL.ORTHOLIN/TENSION_ONLY
The material model ORTHOTEN has been replaced by MATERIAL.ORTHOLIN with a TENSION_ONLY switch ON.	
COMPONENT	MATERIAL.ORTHOLIN_LAYERED
Layered material components have to be defined by MATERIAL.ORTHOLIN_LAYERED with a TENSION_ONLY switch ON.	
E11	MATERIAL.ORTHOLIN/E11
E22	MATERIAL.ORTHOLIN/E22
NU12	MATERIAL.ORTHOLIN/NU12
G12	MATERIAL.ORTHOLIN/G12
DENSITY	MATERIAL.ORTHOLIN/DENSITY
MATERIAL DIRECTION	MATERIAL.ORTHOLIN/MAT_DIR
DAMPING	MATERIAL.ORTHOLIN/DAMP_COEF
MU	MATERIAL.ORTHOLIN/MU
MODEL	DAMAGE.ORTHOTROPIC
XT	DAMAGE.ORTHOTROPIC/XT
XC	DAMAGE.ORTHOTROPIC/XC
YT	DAMAGE.ORTHOTROPIC/YT
YC	DAMAGE.ORTHOTROPIC/YC
SXY	DAMAGE.ORTHOTROPIC/S12
P1	DAMAGE.ORTHOTROPIC/P1
P2	DAMAGE.ORTHOTROPIC/P2
P4	DAMAGE.ORTHOTROPIC/P4

Old keyword or variable	New element or attribute
P5	DAMAGE . ORTHOTROPIC/P5
DC	DAMAGE . ORTHOTROPIC/DC
ZONE	DAMAGE . ORTHOTROPIC/ZONE

5.6.3 MATERIALS, TYPE = ANISO

Old keyword or variable	New element or attribute
C11	MATERIAL .ANISO/C11
C22	MATERIAL .ANISO/C12
C44	MATERIAL .ANISO/C44
C12	MATERIAL .ANISO/C12
C24	MATERIAL .ANISO/C24
C41	MATERIAL .ANISO/C41
MATERIAL DIRECTION	MATERIAL .ANISO/MAT_DIR
DENSITY	MATERIAL .ANISO/DENSITY
DAMPING	MATERIAL .ANISO/DAMP_COEF
MU	MATERIAL .ANISO/MU

5.6.4 MATERIALS, TYPE = FABRIC

Old keyword or variable	New element or attribute
THREADS	THREAD
NUMBER	THREAD/SEQ_NR
E	THREAD/E
LOADING FUNCTION	THREAD/LOAD_FUNC
SCALE FACTOR	THREAD/SCALE_FACTOR
MATERIAL DIRECTION	THREAD/MAT_DIR
TENSIONONLY	MATERIAL.FABRIC/TENSION_ONLY
DENSITY	MATERIAL.FABRIC/DAMP_COEF
RATE DEPENDENT	RATE.JOHNSON
If RATE DEPENDENT is set to JOHNSON-COOK.	
RATE DEPENDENT	RATE.COWPER
If RATE DEPENDENT is set to COWPER-SYMONDS.	
DRATE	RATE.COWPER/DRATE RATE.JOHNSON/DRATE
PRATE	RATE.COWPER/PRATE RATE.JOHNSON/PRATE
DAMPING	MATERIAL.FABRIC/DAMP_COEF
MU	MATERIAL.FABRIC/MU

5.6.5 MATERIALS, TYPE = HYSTEN

Old keyword or variable	New element or attribute
	MATERIAL.HYSIS0/TENSION_ONLY
The material model HYSTEN has been replaced by MATERIAL.HYSIS0 with TENSION_ONLY switch ON.	
LOADING FUNCTION	CHARACTERISTIC.MATERIAL/LOAD_FUNC
UNLOADING FUNCTION	CHARACTERISTIC.MATERIAL/UNLOAD_FUNC
HYSTERESIS	CHARACTERISTIC.MATERIAL/HYS_SLOPE CHARACTERISTIC.MATERIAL/HYS_MODEL
ELASTIC LIMIT	CHARACTERISTIC.MATERIAL/ELAS_LIMIT
DENSITY	MATERIAL.HYSIS0/DENSITY

5.6.6 MATERIALS, TYPE = HOLE

Old keyword or variable	New element or attribute
CDEX	HOLE_MODEL1/CDEX HOLE_MODEL2/CDEX
CDP	HOLE.MODEL1/CDP_FUNC
CDT	HOLE.MODEL1/CDT_FUNC
FPF	HOLE.MODEL2/PF_FUNC
FTF	HOLE.MODEL2/TF_FUNC
DPEX	HOLE_MODEL1/DPEX HOLE_MODEL2/DPEX
DTEX	HOLE_MODEL1/DTEX HOLE_MODEL2/DTEX
DELTEX	HOLE_MODEL1/DELTEX HOLE_MODEL2/DELTEX

5.6.7 MATERIALS, TYPE = TONER

Old keyword or variable	New element or attribute
STIFFNESS	MATERIAL . TONER/STIF
MASS	MATERIAL . TONER/MASS
UNTENSIONED LENGTH	MATERIAL . TONER/UNTENS_LENGTH
RUPTURE	MATERIAL . TONER/RUPTURE

5.6.8 MATERIALS, TYPE = ISOPLA

Old keyword or variable	New element or attribute
E	MATERIAL . ISOPLA/E
NU	MATERIAL . ISOPLA/NU
DENSITY	MATERIAL . ISOPLA/DENSITY
YIELD STRESS	MATERIAL . ISOPLA/YIELD_STRESS
HARDENING FUNCTION	MATERIAL . ISOPLA/HARDENING_FUNC
RATE DEPENDENT If RATE DEPENDENT is set to COWPER-SYMONDS.	RATE . COWPER
RATE DEPENDENT If RATE DEPENDENT is set to JOHNSON-COOK.	RATE . JOHNSON
DRATE	RATE . COWPER/DRATE RATE . JOHNSON/DRATE
PRATE	RATE . COWPER/PRATE RATE . JOHNSON/PRATE
MODEL If MODEL is set to DAMAGE.	DAMAGE . ISOTROPIC
EPSCRIT	DAMAGE . ISOTROPIC/EPSC
P1	DAMAGE . ISOTROPIC/P1
P2	DAMAGE . ISOTROPIC/P2
P3	DAMAGE . ISOTROPIC/P3
DC	DAMAGE . ISOTROPIC/DC
ZONE	DAMAGE . ISOTROPIC/ZONE

5.6.9 MATERIALS, TYPE = ORTHOPLA

Old keyword or variable	New element or attribute
E11	MATERIAL.ORTHOPLA/E11
E22	MATERIAL.ORTHOPLA/E22
NU12	MATERIAL.ORTHOPLA/NU12
NU13	MATERIAL.ORTHOPLA/NU31
NU23	MATERIAL.ORTHOPLA/NU23
G12	MATERIAL.ORTHOPLA/G12
DENSITY	MATERIAL.ORTHOPLA/DENSITY
MATERIAL DIRECTION	MATERIAL.ORTHOPLA/MAT_DIR
G13	MATERIAL.ORTHOPLA/G31
G23	MATERIAL.ORTHOPLA/G23
XT	MATERIAL.ORTHOPLA/XT
YT	MATERIAL.ORTHOPLA/YT
ZT	MATERIAL.ORTHOPLA/ZT
SXY	MATERIAL.ORTHOPLA/S12
SXZ	MATERIAL.ORTHOPLA/S31
SYZ	MATERIAL.ORTHOPLA/S23
HARDENING FUNCTION	MATERIAL.ORTHOPLA/HARDENING_FUNC
RATE DEPENDENT	RATE.COWPER
If RATE DEPENDENT is set to COWPER-SYMONDS.	
RATE DEPENDENT	RATE.JOHNSON
If RATE DEPENDENT is set to JOHNSON-COOK.	

Old keyword or variable	New element or attribute
DRATE	RATE . COWPER/DRATE RATE . JOHNSON/DRATE
PRATE	RATE . COWPER/PRATE RATE . JOHNSON/PRATE
EPSCRIT	DAMAGE . ISOTROPIC/EPSC
P1	DAMAGE . ISOTROPIC/P1
P2	DAMAGE . ISOTROPIC/P2
P3	DAMAGE . ISOTROPIC/P3
DC	DAMAGE . ISOTROPIC/DC
ZONE	DAMAGE . ISOTROPIC/ZONE

5.6.10 MATERIALS, TYPE = SANDWICH

Old keyword or variable	New element or attribute
COMPONENT	MATERIAL . SANDWICH
E11	COMPONENT/E11
E22	COMPONENT/E22
NU12	COMPONENT/NU12
G12	COMPONENT/G12
DENSITY	COMPONENT/DENSITY
MATERIAL DIRECTION	MATERIAL . SANDWICH/MAT_DIR

5.6.11 MATERIALS, TYPE = MOONRIV

Old keyword or variable	New element or attribute
A	MATERIAL . MOONRIV/A
B	MATERIAL . MOONRIV/B
NU	MATERIAL . MOONRIV/NU
DENSITY	MATERIAL . MOONRIV/DENSITY
DAMPING	MATERIAL . MOONRIV/DAMP_COEF
MU	MATERIAL . MOONRIV/MU

5.6.12 MATERIALS, TYPE = LINVIS

Old keyword or variable	New element or attribute
BULK	MATERIAL.LINVIS/BULK
GINF	MATERIAL.LINVIS/GINF
RATIO	MATERIAL.LINVIS/GD1 MATERIAL.LINVIS/GD2 MATERIAL.LINVIS/GD3 MATERIAL.LINVIS/GD4
RATIO has been replaced with at most 4 sets of GDs and TAUs	
BETA	MATERIAL.LINVIS/TAU1 MATERIAL.LINVIS/TAU2 MATERIAL.LINVIS/TAU3 MATERIAL.LINVIS/TAU4
BETA has been replaced with at most 4 sets of GDs and TAUs	
DENSITY	MATERIAL.LINVIS/DENSITY

5.6.13 MATERIALS, TYPE = HONEYCOMB

Old keyword or variable	New element or attribute
EAA	MATERIAL . HONEYCOMB/E11_1 MATERIAL . HONEYCOMB/E11_2 MATERIAL . HONEYCOMB/E11_3
EBB	MATERIAL . HONEYCOMB/E22_1 MATERIAL . HONEYCOMB/E22_2 MATERIAL . HONEYCOMB/E22_3
ECC	MATERIAL . HONEYCOMB/E33_1 MATERIAL . HONEYCOMB/E33_2 MATERIAL . HONEYCOMB/E33_3
GAB	MATERIAL . HONEYCOMB/G12_1 MATERIAL . HONEYCOMB/G12_2 MATERIAL . HONEYCOMB/G12_3
GBC	MATERIAL . HONEYCOMB/G23_1 MATERIAL . HONEYCOMB/G23_2 MATERIAL . HONEYCOMB/G23_3
GCA	MATERIAL . HONEYCOMB/G31_1 MATERIAL . HONEYCOMB/G31_2 MATERIAL . HONEYCOMB/G31_3
CMPF	MATERIAL . HONEYCOMB/CMPFC_A
CMPF	MATERIAL . HONEYCOMB/CMPFC_B
DENSITY	MATERIAL . HONEYCOMB/DENSITY
MATERIAL DIRECTION	MATERIAL . HONEYCOMB/MAT_DIR_1
Material direction vector A	
MATERIAL DIRECTION	MATERIAL . HONEYCOMB/MAT_DIR_2
Material direction vector B	

5.6.14 MATERIALS, TYPE = RIGID

Old keyword or variable	New element or attribute
E	MATERIAL.NULL/E_NULL
E and NU have been replaced by E_NULL representing the bulk modulus $K = E / (3(1 - 2\nu))$	
NU	
Obsolete	
DENSITY	MATERIAL.NULL/DENSITY_NULL

5.6.15 MATERIALS, TYPE = FOAM

Old keyword or variable	New element or attribute
LOADING FUNCTION	CHARACTERISTIC.MATERIAL/LOAD_FUNC
UNLOADING FUNCTION	CHARACTERISTIC.MATERIAL/UNLOAD_FUNC
HYSTERESIS MODEL	CHARACTERISTIC.MATERIAL/HYS_MODEL
HYSTERESIS SLOPE	CHARACTERISTIC.MATERIAL/HYS_SLOPE
ELASTIC LIMIT	CHARACTERISTIC.MATERIAL/ELAS_LIMIT
DENSITY	MATERIAL.FOAM/DENSITY
RATE DEPENDENT	RATE.COWPER
If RATE DEPENDENT is set to COWPER-SYMONDS.	
RATE DEPENDENT	RATE.JOHNSON
If RATE DEPENDENT is set to JOHNSON-COOK	
DRATE	RATE.COWPER/DRATE RATE.JOHNSON/DRATE
PRATE	RATE.COWPER/PRATE RATE.JOHNSON/PRATE

5.7.1 GEOMETRIES, TYPE = TRUSS2

Old keyword or variable	New element or attribute
AREA	PROPERTY . TRUSS2/AREA
SET	PART/PROPERTY
Part provides the link between element and property type	

5.7.2.1 GEOMETRIES, TYPE = BEAM2

Old keyword or variable	New element or attribute
SECTYPE=GENERAL	PROPERTY.BEAM2_GENERAL
AREA	PROPERTY.BEAM2_GENERAL/AREA
IXX	PROPERTY.BEAM2_GENERAL/I11
IYY	PROPERTY.BEAM2_GENERAL/I22
IZZ	PROPERTY.BEAM2_GENERAL/I33
SECTION ORIENTATION	
Orientation of the element y axis defined by the third node in ELEMENT.LINE3	
FORMULATION	
If FORMULATION is set to INTPNT, the definition of the beam properties will be replaced by PROPERTY.BEAM2_USER	
SHEAREAY	PROPERTY.BEAM2_GENERAL/SHEAR_AREA_Y
SHEAREAZ	PROPERTY.BEAM2_GENERAL/SHEAR_AREA_Z
SET	PART/PROPERTY
Part provides the link between element and property type	

5.7.2.2 GEOMETRIES, TYPE=BEAM2

Old keyword or variable	New element or attribute
SECTYPE=SOLREC	PROPERTY.BEAM2_RECTANGULAR
WIDTH	PROPERTY.BEAM2_RECTANGULAR/WIDTH
HEIGHT	PROPERTY.BEAM2_RECTANGULAR/HEIGHT
SECTION ORIENTATION	
Orientation of the element y axis defined by the third node in ELEMENT.LINE3	
FORMULATION	PROPERTY.BEAM2_RECTANGULAR/INT_MTH
SECINTP	PROPERTY.BEAM2_RECTANGULAR/INT_POINTS
SHEAREAY	PROPERTY.BEAM2_RECTANGULAR/SHEAR_AREA_Y
SHEAREAZ	PROPERTY.BEAM2_RECTANGULAR/SHEAR_AREA_Z
SET	PART/PROPERTY
Part provides the link between element and property type	

5.7.2.3 GEOMETRIES, TYPE=BEAM2

Old keyword or variable	New element or attribute
SECTYPE=SOLCIR	PROPERTY.BEAM2_CIRCULAR
RADIUS	PROPERTY.BEAM2_CIRCULAR/RADIUS
SECTION ORIENTATION	
Orientation of the element y axis defined by the third node in ELEMENT.LINE3	
FORMULATION	PROPERTY.BEAM2_CIRCULAR/INT_MTH
SHEAREAY	PROPERTY.BEAM2_CIRCULAR/SHEAR_AREA_Y
SHEAREAZ	PROPERTY.BEAM2_CIRCULAR/SHEAR_AREA_Z
SET	PART/PROPERTY
Part provides the link between element and property type	

5.7.2.4 GEOMETRIES, TYPE=BEAM2

Old keyword or variable	New element or attribute
SECTYPE = SOLHEX	
Obsolete	
RADIUS	
SECTION ORIENTATION	
FORMULATION	
SHEAREAY	
SHEAREAZ	
SET	

5.7.2.5 GEOMETRIES, TYPE=BEAM2

Old keyword or variable	New element or attribute
SECTYPE = CLSREC	PROPERTY.BEAM2_BOX
WIDTH	PROPERTY.BEAM2_BOX/WIDTH
HEIGHT	PROPERTY.BEAM2_BOX/HEIGHT
THICKNESS	PROPERTY.BEAM2_BOX/THICK
SECTION ORIENTATION	
Orientation of the element y axis defined by the third node in ELEMENT.LINE3	
FORMULATION	PROPERTY.BEAM2_BOX/INT_MTH
SECINTP	PROPERTY.BEAM2_BOX/INT_POINTS
SHEAREAY	PROPERTY.BEAM2_BOX/SHEAR_AREA_Y
SHEAREAZ	PROPERTY.BEAM2_BOX/SHEAR_AREA_Z
SET	PART/PROPERTY
Part provides the link between element and property type	

5.7.2.6 GEOMETRIES, TYPE=BEAM2

Old keyword or variable	New element or attribute
SECTYPE = CLSCIR	PROPERTY.BEAM2_PIPE
RADIUS	PROPERTY.BEAM2_PIPE/RADIUS
THICKNESS	PROPERTY.BEAM2_PIPE/THICK
SECTION ORIENTATION	
Orientation of the element y axis defined by the third node in ELEMENT.LINE3	
FORMULATION	PROPERTY.BEAM2_PIPE/INT_MTH
SECINTP	PROPERTY.BEAM2_PIPE/INT_POINTS
SHEAREAY	PROPERTY.BEAM2_PIPE/SHEAR_AREA_Y
SHEAREAZ	PROPERTY.BEAM2_PIPE/SHEAR_AREA_Z
SET	PART/PROPERTY
Part provides the link between element and property type	

5.7.3 GEOMETRIES, TYPE = MEM3

Old keyword or variable	New element or attribute
LAYER	PROPERTY . MEM3_LAYERED/LAYER
THICKNESS	PROPERTY . MEM3/THICK
If no multiple layers are specified.	
THICKNESS	LAYER/THICK
If multiple layers are specified.	
COMPONENT	LAYER/COMPONENT
ANGLE	LAYER/ANGLE
UPDATETHICK	
obsolete	
SET	PART/PROPERTY
Part provides the link between element and property type.	

5.7.3 GEOMETRIES, TYPE = MEM3NL

Old keyword or variable	New element or attribute
LAYER	PROPERTY.MEM3NL_LAYERED/LAYER
THICKNESS If multiple layers are specified.	LAYER/THICK
THICKNESS If no multiple layers are specified.	PROPERTY.MEM3NL/THICK
COMPONENT	LAYER/COMPONENT
ANGLE	LAYER/ANGLE
UPDATETHICK	PROPERTY.MEM3NL/UPDATE_THICK PROPERTY.MEM3NL_LAYERED/UPDATE_THICK
SET Part provides the link between element and property type.	PART/PROPERTY

5.7.4 GEOMETRIES, TYPE = MEM4

Old keyword or variable	New element or attribute
THICKNESS	PROPERTY.MEM4NL/THICK
FORMULATION	PROPERTY.MEM4NL/FULL_INT
If FORMULATION is set to FULL INTEGRATION	
ANGLE	
Obsolete	
UPDATETHICK	PROPERTY.MEM4NL/UPDATE_THICK
SET	PART/PROPERTY
Part provides the link between element and property type.	

5.7.5 GEOMETRIES, TYPE = SHELL4

Old keyword or variable	New element or attribute
LAYER	PROPERTY.SHELL4_LAYERED
THICKNESS	PROPERTY.SHELL4/THICK
If no multiple layers are specified.	
THICKNESS	LAYER/THICK
If multiple layers are specified.	
INTEGRATION POINTS	PROPERTY.SHELL4/INT_POINT
If no multiple layers are specified.	
INTEGRATION POINTS	LAYER/INT_POINT
If multiple layers are specified.	
COMPONENT	LAYER/COMPONENT
ANGLE	LAYER/ANGLE
UPDATETHICK	PROPERTY.SHELL4/UPDATE_THICK
SET	PART/PROPERTY
Part provides the link between element and property type.	

5.7.6 GEOMETRIES, TYPE = SHELL6

Old keyword or variable	New element or attribute
THICKNESS	PROPERTY . SHELL6/THICK
INTEGRATION POINTS	PROPERTY . SHELL6/INT_POINT
UPDATETHICK	PROPERTY . SHELL6/UPDATE_THICK
SET	PART/PROPERTY
Part provides the link between element and property type.	

5.7.6 GEOMETRIES, TYPE = FACET6

Old keyword or variable	New element or attribute
THICKNESS	PROPERTY.FACET6/THICK
INTEGRATION POINTS	PROPERTY.FACET6/INT_POINT
UPDATETHICK	PROPERTY.FACET6/UPDATE_THICK
SET	PART/PROPERTY
Part provides the link between element and property type.	

5.8 INITIAL CONDITIONS

Old keyword or variable	New element or attribute
	INITIAL.FE_MODEL/FE_MODEL
Reference to actual FE model.	
NODE	INITIAL.FE_MODEL/REF_NODE
X Y Z	INITIAL.FE_MODEL/POS
VX VY VZ	INITIAL.FE_MODEL/VEL
CHO	INITIAL.FE_MODEL/BODY
SYSNO BODYNO	INITIAL.FE_MODEL/BODY
ORIENTATIONS	INITIAL.FE_MODEL/ORIENT

5.9 INITIAL DOF, TYPE = DISPLACEMENT

Old keyword or variable	New element or attribute
INITIAL DOF	INITIAL.NODE_DISP
DOF	
obsolete	
D1	INITIAL.NODE_DISP/DX
D2	INITIAL.NODE_DISP/DY
D3	INITIAL.NODE_DISP/DZ
R1	INITIAL.NODE_DISP/RX
R2	INITIAL.NODE_DISP/RY
R3	INITIAL.NODE_DISP/RZ
SET	INITIAL.NODE_DISP/GROUP_LIST INITIAL.NODE_DISP/NODE_LIST

5.9 INITIAL DOF, TYPE = VELOCITY

Old keyword or variable	New element or attribute
INITAL DOF	INITIAL.NODE_VEL
DOF	
obsolete	
D1	INITIAL.NODE_VEL/VX
D2	INITIAL.NODE_VEL/VY
D3	INITIAL.NODE_VEL/VZ
R1	INITIAL.NODE_VEL/WX
R2	INITIAL.NODE_VEL/WY
R3	INITIAL.NODE_VEL/WZ
SET	INITIAL.NODE_VEL/GROUP_LIST INITIAL.NODE_VEL/NODE_LIST

5.10 PRESCRIBED MOTION, TYPE = DISPLACEMENT

Old keyword or variable	New element or attribute
PRESCRIBED MOTION	MOTION.NODE_DISP
DOF	
obsolete	
D1	INITIAL.NODE_DISP/DX_FUNC
D2	INITIAL.NODE_DISP/DY_FUNC
D3	INITIAL.NODE_DISP/DZ_FUNC
R1	INITIAL.NODE_DISP/RX_FUNC
R2	INITIAL.NODE_DISP/RY_FUNC
R3	INITIAL.NODE_DISP/RZ_FUNC
SET	MOTION.NODE_DISP/GROUP_LIST MOTION.NODE_DISP/NODE_LIST

5.10 PRESCRIBED MOTION, TYPE = VELOCITY

Old keyword or variable	New element or attribute
PRESCRIBED MOTION	MOTION.NODE_VEL
DOF	
obsolete	
D1	INITIAL.NODE_VEL/VX_FUNC
D2	INITIAL.NODE_VEL/VY_FUNC
D3	INITIAL.NODE_VEL/VZ_FUNC
R1	INITIAL.NODE_VEL/WX_FUNC
R2	INITIAL.NODE_VEL/WY_FUNC
R3	INITIAL.NODE_VEL/WZ_FUNC
SET	
MOTION.NODE_VEL/GROUP_LIST	
MOTION.NODE_VEL/NODE_LIST	

5.11 PRESCRIBED STRUCTURAL MOTION, TYPE = DISPLACEMENT

Old keyword or variable	New element or attribute
FILE	MOTION.STRUCT_DISP/FILE

5.11 PRESCRIBED STRUCTURAL MOTION, TYPE = VELOCITY

Old keyword or variable	New element or attribute
FILE	MOTION.STRUCT_VEL/FILE

5.12 LOADS, TYPE = POINT

Old keyword or variable	New element or attribute
LOADS	LOAD.NODE
D0F	
obsolete	
D1	LOAD.NODE/FX_FUNC
D2	LOAD.NODE/FY_FUNC
D3	LOAD.NODE/FZ_FUNC
R1	LOAD.NODE/MX_FUNC
R2	LOAD.NODE/MY_FUNC
R3	LOAD.NODE/MZ_FUNC
SET	LOAD.NODE/GROUP_LIST LOAD.NODE/NODE_LIST

5.12 LOADS, TYPE = EDGE

Old keyword or variable	New element or attribute
LOADS	LOAD . EDGE
DOF	
obsolete	
D1	LOAD . EDGE / FX_FUNC
D2	LOAD . EDGE / FY_FUNC
D3	LOAD . EDGE / FZ_FUNC
R1	LOAD . EDGE / MX_FUNC
R2	LOAD . EDGE / MY_FUNC
R3	LOAD . EDGE / MZ_FUNC
SET	LOAD . EDGE / GROUP_LIST LOAD . EDGE / NODE_LIST

5.12 LOADS, TYPE = SURFACE

Old keyword or variable	New element or attribute
LOADS	LOAD.PRES
D0F	
obsolete	
D3	LOAD.PRES/PRES_FUNC
SET	LOAD.PRES/GROUP_LIST LOAD.PRES/ELEMENT_LIST

5.12 LOADS, TYPE = ACCELERATION

Old keyword or variable	New element or attribute
LOADS	LOAD.ELEMENT_ACC
DOF	
obsolete	
D1	LOAD.ELEMENT_ACC/AX_FUNC
D2	LOAD.ELEMENT_ACC/AY_FUNC
D3	LOAD.ELEMENT_ACC/AZ_FUNC
SET	LOAD.ELEMENT_ACC/GROUP_LIST LOAD.ELEMENT_ACC/ELEMENT_LIST

5.13 SUPPORTS

Old keyword or variable	New element or attribute
NUMBER	
Obsolete	
SYSTEM BODY	SUPPORT/BODY
NULL SYSTEM	SUPPORT/BODY
INERTIAL SPACE	
Obsolete; reference to REFERENCE SPACE is default!	
DOF	
obsolete	
ALL	SUPPORT/DOF_ALL
D1	SUPPORT/DOF_DX
D2	SUPPORT/DOF_DY
D3	SUPPORT/DOF_DZ
R1	SUPPORT/DOF_RX
R2	SUPPORT/DOF_RY
R3	SUPPORT/DOF_RZ
SET	SUPPORT/NODE_LIST SUPPORT/GROUP_LIST

5.14 SWITCH

Old keyword or variable	New element or attribute
	STATE.FE_MODEL/FE_MODEL_LIST
Reference to FE_MODEL unless	STATE.FE_MODEL is defined under FE_MODEL.
RIGID	STATE.FE_MODEL/SWITCH
Rigid switch to define under	STATE.FE_MODEL.
TIME	STATE.FE_MODEL/SWITCH
SYSTEM BODY	STATE.FE_MODEL/BODY
NULL SYSTEM	STATE.FE_MODEL/BODY
RIGID	STATE.FE_MODEL/SWITCH
TIME	STATE.FE_MODEL/SWITCH

5.15 RIGID

Old keyword or variable	New element or attribute
NODES	RIGID_ELEMENT/NODE_LIST
ELEMENTS	RIGID_ELEMENT/ELEMENT_LIST RIGID_ELEMENT/GROUP_LIST
MASS	RIGID_ELEMENT/ADD_MASS
CENTRE	RIGID_ELEMENT/CENTRE_OF_GRAVITY
INERTIA	RIGID_ELEMENT/ADD_INERTIA
LINEAR VELOCITY, VX VY VZ	RIGID_ELEMENT/LIN_VEL
LINEAR VELOCITY, NODE	RIGID_ELEMENT/REF_NODE
ANGULAR VELOCITY	RIGID_ELEMENT/ANG_VEL

5.16 STRAPS

Old keyword or variable	New element or attribute
N0	STRAP/ID
NODE1	STRAP/N1
NODE2	STRAP/N2
STIFFNESS	STRAP/STIF
LENGTH	STRAP/LENGTH
RUPTURE	STRAP/RUPTURE
DRTE	STRAP/RUPTURE_DURATION
BRTE	STRAP/RUPTURE_WINDOW

5.17 AIRBAG CHAMBER

Old keyword or variable	New element or attribute
SET	AIRBAG_CHAMBER/ELEMENT_LIST AIRBAG_CHAMBER/GROUP_LIST
INVERSE SET INVERSE SET	AIRBAG_CHAMBER/INV_ELEMENT_LIST AIRBAG_CHAMBER/INV_GROUP_LIST
AUTOVOLUME	AIRBAG_CHAMBER/AUTO_VOLUME
HOLE	HOLE.MODEL1 HOLE.MODEL2
INFLATOR	INFLATOR
AMBIENT	CONTROL_AIRBAG
DISCHARGE	
Functions are defined under AIRBAG_CHAMBER directly.	

5.17.1 HOLE

Old keyword or variable	New element or attribute
CDEX	HOLE . MODEL1/CDEX HOLE . MODEL2/CDEX
CDP	HOLE . MODEL1/CDP_FUNC
CDT	HOLE . MODEL1/CDT_FUNC
FPF	HOLE . MODEL2/PF_FUNC
FTF	HOLE . MODEL2/TF_FUNC
DPEX	HOLE . MODEL1/DPEX HOLE . MODEL2/DPEX
DTEX	HOLE . MODEL1/DTEX HOLE . MODEL2/DTEX
DELTEX	HOLE . MODEL1/DELTEX HOLE . MODEL2/DELTEX

5.17.2 INFLATOR

Old keyword or variable	New element or attribute
GASES	GAS_MIXTURE/GAS_FRACTION
GAS COMPOSITION	GAS_MIXTURE_VARIABLE/GAS_FRACTION
MASS FLOW	INFLATOR/MASS_FLOW_RATE_FUNC
TEMPERATURE	INFLATOR/TEMP_FUNC
POLYTROPIC CONSTANT	INFLATOR/POLYTROPIC_CONSTANT
EXIT PRESSURE	INFLATOR/EXIT_PRES_FUNC
JET	JET.CENTRE_VEL JET.CONSTANT_MOMENTUM JET.IDELCHIK
TRIGGER LOGIC	INFLATOR/SWITCH

5.17.2.1 GASES

Old keyword or variable	New element or attribute
GASNAME	GAS/GAS_NAME
MOLFRAC	GAS_FRACTION/MOL_FRACTION
MW	GAS/MW
CPA	GAS/CPA
CPB	GAS/CPB
CPC	GAS/CPC
CPD	GAS/CPD

5.17.2.2 GAS COMPOSITION

Old keyword or variable	New element or attribute
MOLAR FRACTIONS	GAS_FRACTION
To be defined under GAS_FRACTION.	
GAS DEFINITION	GAS
To be defined under GAS.	

5.17.2.2 MOLAR FRACTIONS

Old keyword or variable	New element or attribute
GASNAMI	GAS_FRACTION/GAS_NAME
TIJ FRACGSNAMIJ	GAS_FRACTION/MOL_FRACTION

5.17.2.2 GAS DEFINITION

Old keyword or variable	New element or attribute
GASNAME	GAS/GAS_NAME
MW	GAS/MW
CPA	GAS/CPA
CPB	GAS/CPB
CPC	GAS/CPC
CPD	GAS/CPD

5.17.2.3 MASS FLOW

Old keyword or variable	New element or attribute
MASS FLOW	INFLATOR/MASS_FLOW_RATE_FUNC
IPL	INFLATOR/FUNC_USAGE/INTERPOLATION
Ti Ti	FUNCTION.XY/XY_PAIR

5.17.2.4 TEMPERATURE

Old keyword or variable	New element or attribute
TEMPERATURE	INFLATOR/TEMP_FUNC
IPL	INFLATOR/FUNC_USAGE/INTERPOLATION
Ti TEMPi	FUNCTION.XY/XY_PAIR

5.17.2.5 POLYTROPIC CONSTANT

Old keyword or variable	New element or attribute
POLYTROPIC CONSTANT	INFLATOR/POLYTROPIC_CONSTANT

5.17.2.6 EXIT PRESSURE

Old keyword or variable	New element or attribute
EXIT PRESSURE	INFLATOR/EXIT_PRESSURE_FUNC
IPL	INFLATOR/FUNC_USAGE/INTERPOLATION
Ti PRESi	FUNTION.XY/XY_PAIR

5.17.2.7 JET, TYPE = CONSTANT MOMENTUM

Old keyword or variable	New element or attribute
JET	JET . CONSTANT_MOEMENTUM
SUPPORT	JET . CONSTANT_MOEMENTUM/BODY
CENTRE	JET . CONSTANT_MOEMENTUM/CENTRE
CIRCULAR OUTLET	JET_SHAPE . CIRCULAR/RADIUS
GAS OUTFLOW DIRECTION	JET . CONSTANT_MOEMENTUM/OUTFLOW_DIR
ALPHA	JET . CONSTANT_MOMENTUM/ALPHA
COEF	JET . CONSTANT_MOMENTUM/C
EFFAC	JET . CONSTANT_MOEMENTUM/EFAC
SET	JET . CONSTANT_MOEMENTUM/ELEMENT_LIST JET . CONSTANT_MOEMENTUM/GROUP_LIST

5.17.2.7 JET, TYPE = USER-DEFINED

Old keyword or variable	New element or attribute
JET	JET.CENTRE_VEL
SUPPORT	JET.CENTRE_VEL/BODY
CENTRE	JET.CENTRE_VEL/CENTRE
CIRCULAR OUTLET	JET_SHAPE.CIRCULAR/RADIUS
RECTANGULAR OUTLET, SHORT	JET_SHAPE.RECTANGULAR/SHORT_LENGTH
RECTANGULAR OUTLET, LONG	JET_SHAPE.RECTANGULAR/LONG_LENGTH
DIRECTION LONGER SIDE	JET_SHAPE.RECTANGULAR/LONG_DIR
GAS OUTFLOW DIRECTION	JET.CENTRE_VEL/OUTFLOW_DIR
ALPHA	JET.CENTRE_VEL/ALPHA
COEF	JET.CENTRE_VEL/C
FVEL	JET.CENTRE_VEL/VEL_FUNC
EFFAC	JET.CENTRE_VEL/EFAC
SET	JET.CENTRE_VEL/ELEMENT_LIST JET.CENTRE_VEL/GROUP_LIST

5.17.2.7 JET, TYPE = IDELCHIK

Old keyword or variable	New element or attribute
JET	JET.IDELCHIK
SUPPORT	JET.IDELCHIK/BODY
CENTRE	JET.IDELCHIK/CENTRE
CIRCULAR OUTLET	JET_SHAPE.CIRCULAR/RADIUS
RECTANGULAR OUTLET, SHORT	JET_SHAPE.RECTANGULAR/SHORT_LENGTH
RECTANGULAR OUTLET, LONG	JET_SHAPE.RECTANGULAR/LONG_LENGTH
DIRECTION LONGER SIDE	JET_SHAPE.RECTANGULAR/LONG_DIR
GAS OUTFLOW DIRECTION	JET.IDELCHIK/OUTFLOW_DIR
EFFAC	JET.IDELCHIK/EFAC
SET	JET.IDELCHIK/ELEMENT_LIST JET.IDELCHIK/GROUP_LIST

5.17.2.8 TRIGGER LOGIC

Old keyword or variable	New element or attribute
TRIGGER LOGIC	SWITCH.LOGIC/ID
Reference to a switch of type .LOGIC	
NOi, LOPi	SWITCH.LOGIC/LOGIC_EXPRESSION

5.17.3 AMBIENT

Old keyword or variable	New element or attribute
AMBIENT	
Obsolete	
TEMPERATURE	CONTROL_AIRBAG/TEMPERATURE
PRESSURE	CONTROL_AIRBAG/PRESSURE
GASES	GAS CONTROL_AIRBAG/GAS_MIXTURE/GAS_FRACTION

5.17.3.1 GASES

Old keyword or variable	New element or attribute
GASNAME	GAS_FRACTION/GAS_NAME GAS/GAS_NAME
MOLFRAC	GAS_FRACTION/MOL_FRACTION
MW	GAS/MW
CPA	GAS/CPA
CPB	GAS/CPB
CPC	GAS/CPD
CPD	GAS/CPD

5.17.4 DISCHARGE

Old keyword or variable	New element or attribute
FPF	AIRBAG_CHAMBER/PF_FUNC
FTF	AIRBAG_CHAMBER/TF_FUNC

5.18 FEMOUT

Old keyword or variable	New element or attribute
	PRINT_OUTPUT_FE/FE_MODEL
Reference to the actual FE model	
PRINT INITIALISATION	PRINT_OUTPUT_FE
PRINT RESULTS	PRINT_OUTPUT_FE
SELECT ELEMENTS	OUTPUT_ELEMENT_INITIAL
For PRINT INITIALISATION.	
SELECT ELEMENTS	OUTPUT_ELEMENT
For PRINT RESULTS.	
SELECT NODES	OUTPUT_NODE_INITIAL
For PRINT INITIALISATION.	
SELECT NODES	OUTPUT_NODE
For PRINT RESULTS.	
SELECT SUPPORTS	OUTPUT_NODE

5.18.1 PRINT INITIALISATION OPTION

Old keyword or variable	New element or attribute
PRINT INITIALISATION	PRINT_OUTPUT_FE/ ELEMENT_INITIAL_OUTPUT_LIST
Reference to selected element-related initialisation output: OUTPUT_ELEMENT_INITIAL	
PRINT INITIALISATION	PRINT_OUTPUT_FE/NODE_INITIAL_OUTPUT_LIST
Reference to selected node-related initialisation output: OUTPUT_NODE_INITIAL	
OPTION=MODULE Obsolete; printed by default when FEMOUT file is generated	
OPTION=FRAMES	OUTPUT_ELEMENT_INITIAL/SELECT_FRAME
OPTION=LUMPING	OUTPUT_ELEMENT_INITIAL/SELECT_LUMP
OPTION=NODES	OUTPUT_NODE_INITIAL/SELECT_POS OUTPUT_NODE_INITIAL/SELECT_VEL OUTPUT_NODE_INITIAL/SELECT_ACC OUTPUT_NODE_INITIAL/SELECT_MASS

5.18.2 PRINT RESULTS OPTION

Old keyword or variable	New element or attribute
	PRINT_OUTPUT_FE/AIRBAG_OUTPUT_LIST
Reference to selected airbag-related simulation output: OUTPUT_AIRBAG_CHAMBER	
	PRINT_OUTPUT_FE/ELEMENT_OUTPUT_LIST
Reference to selected element-related simulation output: OUTPUT_ELEMENT	
	PRINT_OUTPUT_FE/NODE_OUTPUT_LIST
Reference to selected node-related simulation output: OUTPUT_NODE	
OPTION = MODULE	OUTPUT_AIRBAG_CHAMBER/SELECT.PRESS OUTPUT_AIRBAG_CHAMBER/SELECT.TEMP OUTPUT_AIRBAG_CHAMBER/SELECT.VOLUME
OPTION = ELEMENTS	OUTPUT_ELEMENT/SELECT.STRAIN OUTPUT_ELEMENT/SELECT.STRESS OUTPUT_ELEMENT/SELECT.STRAIN_BEAM2 OUTPUT_ELEMENT/SELECT.STRESS_BEAM2 OUTPUT_ELEMENT/SELECT.STRAIN_TRUSS2 OUTPUT_ELEMENT/SELECT.STRESS_TRUSS2
OPTION = KINEMATICS	OUTPUT_NODE/SELECT.DISP OUTPUT_NODE/SELECT.VEL OUTPUT_NODE/SELECT.ACC
OPTION = FORCES	OUTPUT_NODE/SELECT.FORCE_EXTERNAL OUTPUT_NODE/SELECT.FORCE_INTERNAL
OPTION = REACTIONS	OUTPUT_NODE/SELECT.FORCE_REAC OUTPUT_NODE/SELECT.MOMENT_REAC
OPTION = GEOMETRIES	OUTPUT_ELEMENT/SELECT.PROPERTY

5.18.3 SELECT ELEMENTS ELEMSET

Old keyword or variable	New element or attribute
ELEMSET	OUTPUT_ELEMENT_INITIAL/GROUP_LIST OUTPUT_ELEMENT_INITIAL/ELEMENT_LIST
For element-related initialisation output	
ELEMSET	OUTPUT_ELEMENT/GROUP_LIST OUTPUT_ELEMENT/ELEMENT_LIST
For element-related simulation output	

5.18.4 SELECT NODES NODESET

Old keyword or variable	New element or attribute
NODESET	OUTPUT_NODE_INITIAL/GROUP_LIST OUTPUT_NODE_INITIAL/ELEMENT_LIST
For node-related initialisation output	
NODESET	OUTPUT_NODE/GROUP_LIST OUTPUT_NODE/ELEMENT_LIST
For node-related simulation output	

5.18.5 SELECT SUPPORTS SUPSET

Old keyword or variable	New element or attribute
SUPSET	OUTPUT_NODE/GROUP_LIST OUTPUT_NODE/NODE_LIST
For supported node-related simulation output	

5.19 FEMHIS

Old keyword or variable	New element or attribute
	TIME_HISTORY_FE/FE_MODEL
Reference to the actual FE model.	
NO	
Obsolete	
SELECT = PRINT NODE	TIME_HISTORY_FE/NODE_OUTPUT_LIST
References to selected node-related time-history output: OUTPUT_NODE	
SELECT = PRINT ELEMENT	TIME_HISTORY_FE/ELEMENT_OUTPUT_LIST
References to selected element-related time-history output: OUTPUT_ELEMENT	
SELECT = PRINT SUPPORT	TIME_HISTORY_FE/NODE_OUTPUT_LIST
References to selected support-related time-history output: OUTPUT_NODE	
SELECT = PRINT AIRBAG CHAMBER	TIME_HISTORY_FE/AIRBAG_OUTPUT_LIST
References to selected airbag-related time-history output: OUTPUT_AIRBAG_CHAMBER	
SELECT = PRINT STRAP	TIME_HISTORY_FE/STRAP_OUTPUT_LIST
References to selected strap-related time-history output: OUTPUT_STRAP.	
	TIME_HISTORY_FE/JET_OUTPUT_LIST
References to selected jet-related time-history output: OUTPUT.JET	

5.19 PRINT NODE

Old keyword or variable	New element or attribute
ID	OUTPUT_NODE/NAME
Refers to selected node-related time history output.	
SPECNO	OUTPUT_NODE/NODE_LIST OUTPUT_NODE/GROUP_LIST
OPTION = POSITION	OUTPUT_NODE/SELECT.POS
OPTION = DISPLACEMENT	OUTPUT_NODE/SELECT.DISP
OPTION = ROTATION	OUTPUT_NODE/SELECT.ROT
OPTION = VELOCITY	OUTPUT_NODE/SELECT.VEL
OPTION = ACCELERATION	OUTPUT_NODE/SELECT.ACC
OPTION = FORCE	OUTPUT_NODE/SELECT.FORCE
OPTION = FINT	OUTPUT_NODE/SELECT.FORCE_INTERNAL
OPTION = FEXT	OUTPUT_NODE/SELECT.FORCE_EXTERNAL
QUAL = R	OUTPUT_NODE/SELECT.*/WRITE_R
QUAL = X	OUTPUT_NODE/SELECT.*/WRITE_X
QUAL = Y	OUTPUT_NODE/SELECT.*/WRITE_Y
QUAL = Z	OUTPUT_NODE/SELECT.*/WRITE_Z
	OUTPUT_NODE/SELECT.*/WRITE_ALL
Selects all components	

5.19 PRINT ELEMENT

Old keyword or variable	New element or attribute
ID	OUTPUT_ELEMENT/NAME
Refers to selected element-related time history output.	
SPECNO	OUTPUT_ELEMENT/ELEMENT_LIST OUTPUT_ELEMENT/GROUP_LIST
i	OUTPUT_ELEMENT/INT_POINT_LIST
Select integration point numbers	
OPTION = STRESS	OUTPUT_ELEMENT/SELECT.STRESS
Select stress components for MEM3, MEM3NL, MEM4, SHELL4, FACET6, SHELL6, SOLID1, SOLID8 and SOLID4 elements For QUAL see below	
OPTION = STRAIN	OUTPUT_ELEMENT/SELECT.STRAIN
Select strain components for MEM3, MEM3NL, MEM4, SHELL4, FACET6, SHELL6, SOLID1, SOLID8 and SOLID4 elements For QUAL see below	
QUAL = M	OUTPUT_ELEMENT/SELECT.*/WRITE_VON_MISES
QUAL = T	OUTPUT_ELEMENT/SELECT.*/WRITE_TRESCA
QUAL = 1	OUTPUT_ELEMENT/SELECT.*/WRITE_PRINC_1
QUAL = 2	OUTPUT_ELEMENT/SELECT.*/WRITE_PRINC_2
QUAL = 3	OUTPUT_ELEMENT/SELECT.*/WRITE_PRINC_3
QUAL = X	OUTPUT_ELEMENT/SELECT.*/WRITE_XX
QUAL = Y	OUTPUT_ELEMENT/SELECT.*/WRITE_YY
QUAL = Z	OUTPUT_ELEMENT/SELECT.*/WRITE_ZZ
QUAL = XY	OUTPUT_ELEMENT/SELECT.*/WRITE_XY
QUAL = YZ	OUTPUT_ELEMENT/SELECT.*/WRITE_YZ
QUAL = ZX	OUTPUT_ELEMENT/SELECT.*/WRITE_ZX
	OUTPUT_ELEMENT/SELECT.*/WRITE_ALL
Selects all components	

Old keyword or variable	New element or attribute
OPTION = FORCE	OUTPUT_ELEMENT/SELECT.STRESS_BEAM2/ WRITE_FORCE OUTPUT_ELEMENT/SELECT.TRUSS_BEAM2/ WRITE_FORCE
Select axial force for BEAM2 or TRUSS2 elements	
OPTION = MOMENT	OUTPUT_ELEMENT/SELECT.STRESS_BEAM2/ WRITE_MOMENT_X
Select moment for BEAM2 element Replace WRITE_MOMENT_X with: WRITE_MOMENT_Y1 if QUAL = Y1, WRITE_MOMENT_Y2 if QUAL = Y2, WRITE_MOMENT_Z1 if QUAL = Z1, WRITE_MOMENT_Z2 if QUAL = Z2, WRITE_ALL selects all components.	
OPTION = ELONGATION, QUAL = A	OUTPUT_ELEMENT/SELECT.STRAIN_BEAM2/ WRITE_ELONG_ABS OUTPUT_ELEMENT/SELECT.STRAIN_TRUSS2/ WRITE_ELONG_ABS
Select (absolute) elongation for BEAM2 or TRUSS2 element	
OPTION = ELONGATION, QUAL = R	OUTPUT_ELEMENT/SELECT.STRAIN_BEAM2/ WRITE_ELONG_REL OUTPUT_ELEMENT/SELECT.STRAIN_TRUSS2/ WRITE_ELONG_REL
Select relative elongation for BEAM2 or TRUSS2 element	
OPTION = ROTATION, QUAL = X	OUTPUT_ELEMENT/SELECT.STRAIN_BEAM2/ WRITE_TORSION_X
Select rotational components for BEAM2 element. Replace WRITE_TORSION_X with: WRITE_KAPPA_Y1 if QUAL = Y1, WRITE_KAPPA_Y2 if QUAL = Y2, WRITE_KAPPA_Z1 if QUAL = Z1, WRITE_KAPPA_Z2 if QUAL = Z2, WRITE_ALL selects all components.	
OPTION = AREA	OUTPUT_ELEMENT/SELECT.PROPERTY/WRITE_AREA
OPTION = VOLUME	OUTPUT_ELEMENT/SELECT.PROPERTY/ WRITE_VOLUME

5.19 PRINT SUPPORT

Old keyword or variable	New element or attribute
ID	OUTPUT_NODE/NAME
Refers to selected support-related time history output.	
SPECNO	OUTPUT_NODE/NODE_LIST OUTPUT_NODE/GROUP_LIST
Refers to supported node numbers.	
OPTION = FORCE	OUTPUT_NODE/SELECT.FORCE_REAC
OPTION = MOMENT	OUTPUT_NODE/SELECT.MOMENT_REAC
QUAL = R	OUTPUT_NODE/SELECT.*/WRITE_R
QUAL = X	OUTPUT_NODE/SELECT.*/WRITE_X
QUAL = Y	OUTPUT_NODE/SELECT.*/WRITE_Y
QUAL = Z	OUTPUT_NODE/SELECT.*/WRITE_Z
	OUTPUT_NODE/SELECT.*/WRITE_ALL
Selects all components	

5.19 PRINT AIRBAG CHAMBER

Old keyword or variable	New element or attribute
ID	OUTPUT_AIRBAG_CHAMBER/NAME
Refers to selected airbag-related time history output.	
SPECNO	OUTPUT_AIRBAG_CHAMBER/AIRBAG_CHAMBER_LIST
OPTION = PRESSURE	OUTPUT_AIRBAG_CHAMBER/SELECT.PRES
select WRITE_REL if QUAL = R select WRITE_ABS if QUAL = A WRITE_ALL selects all components	
OPTION = TEMPERATURE	OUTPUT_AIRBAG_CHAMBER/SELECT.TEMP
select WRITE_REL if QUAL = R select WRITE_ABS if QUAL = A WRITE_ALL selects all components	
OPTION=VOLUME	OUTPUT_AIRBAG_CHAMBER/SELECT.VOLUME
select WRITE_INIT if QUAL = B select WRITE_TOTAL if QUAL = T WRITE_ALL selects all components	
OPTION = GAS, QUAL = M	OUTPUT_AIRBAG_CHAMBER/SELECT.MASS
select WRITE_REL if QUAL = R select WRITE_ABS if QUAL = A WRITE_ALL selects all components	
OPTION = GAS, QUAL = MFR	OUTPUT_AIRBAG_CHAMBER/ SELECT.MASS_FLOW_RATE/WRITE_TOTAL
OPTION = GAS, QUAL = MFR.i	OUTPUT_AIRBAG_CHAMBER/ SELECT.MASS_FLOW_RATE/AIRBAG_CHAMBER
Mass flow rate from referred airbag chamber	
OPTION = GAS, QUAL = MFR.A	OUTPUT_AIRBAG_CHAMBER/ SELECT.MASS_FLOW_RATE/WRITE_AMBIENT
OPTION = GAS, QUAL = I	OUTPUT_AIRBAG_CHAMBER/SELECT.INFLOW/ WRITE_TOTAL
OPTION = GAS, QUAL = INF	OUTPUT_AIRBAG_CHAMBER/SELECT.INFLOW/ WRITE_INFLATOR
OPTION = GAS, QUAL = 0	OUTPUT_AIRBAG_CHAMBER/SELECT.OUTFLOW/ WRITE_TOTAL
OPTION = GAS, QUAL = A	OUTPUT_AIRBAG_CHAMBER/SELECT.OUTFLOW/ WRITE_AMBIENT

Old keyword or variable	New element or attribute
OPTION = GAS, QUAL = i	OUTPUT_AIRBAG_CHAMBER/SELECT.OUTFLOW/ AIRBAG_CHAMBER
Outflow gas mass to referred airbag chamber	
OPTION = GAS, QUAL = D	OUTPUT_AIRBAG_CHAMBER/SELECT.OUTFLOW/ WRITE_DISCHARGE
OPTION = GAS, QUAL = OP	OUTPUT_AIRBAG_CHAMBER/SELECT.OUTFLOW_PERM/ WRITE_TOTAL
OPTION = GAS, QUAL = OP.A	OUTPUT_AIRBAG_CHAMBER/SELECT.OUTFLOW_PERM/ WRITE_AMBIENT
OPTION = GAS, QUAL = OP.i	OUTPUT_AIRBAG_CHAMBER/SELECT.OUTFLOW_PERM/ AIRBAG_CHAMBER
Outflow gas mass through permeable material to referred airbag chamber	
OPTION = GAS, QUAL = OH	OUTPUT_AIRBAG_CHAMBER/SELECT.OUTFLOW_HOLE/ WRITE_TOTAL
OPTION = GAS, QUAL = OH.A	OUTPUT_AIRBAG_CHAMBER/SELECT.OUTFLOW_HOLE/ WRITE_AMBIENT
OPTION = GAS, QUAL = OH.i	OUTPUT_AIRBAG_CHAMBER/SELECT.OUTFLOW_HOLE/ AIRBAG_CHAMBER
Outflow gas mass through holes to referred airbag chamber	
OPTION = HEAT, QUAL = P	OUTPUT_AIRBAG_CHAMBER/SELECT.HEAT/ WRITE_PRES
OPTION = HEAT, QUAL = V	OUTPUT_AIRBAG_CHAMBER/SELECT.HEAT/ WRITE_VOLUME
OPTION = HEAT, QUAL = G	OUTPUT_AIRBAG_CHAMBER/SELECT.HEAT/ WRITE_GAMMA
OPTION = FORCE, QUAL = i	OUTPUT_JET/JET_LIST OUTPUT_JET/SELECT.FORCE_RES/WRITE_FORCE
Reference to the jet of inflator i by JET_LIST.	

5.19 PRINT STRAP

Old keyword or variable	New element or attribute
ID	OUTPUT_STRAP/NAME
Refers to selected strap-related time history output.	
SPECNO	OUTPUT_STRAP/STRAP_LIST
OPTION = FORCE	OUTPUT_STRAP/SELECT.FORCE_RES
OPTION = LENGTH	OUTPUT_STRAP/SELECT.PROPERTY/WRITE_LENGTH
OPTION = ELONGATION, QUAL = A	OUTPUT_STRAP/SELECT.ELONG/WRITE_ABS
OPTION = ELONGATION, QUAL = R	OUTPUT_STRAP/SELECT.ELONG/WRITE_REL

5.20 FEMSMO

Old keyword or variable	New element or attribute
TYPE	OUTPUT_MOTION_STRUCT/MOTION_TYPE
FILE	OUTPUT_MOTION_STRUCT/FILE
SET	OUTPUT_MOTION_STRUCT/GROUP_LIST OUTPUT_MOTION_STRUCT/NODE_LIST

5.21 FEMANI

Old keyword or variable	New element or attribute
ELEMENT	OUTPUT_ANIMATION/SELECT_ELEMENT
NODE	OUTPUT_ANIMATION/SELECT_NODE

6.1 LINEAR CONSTRAINT EQUATIONS

Old keyword or variable	New element or attribute
LINEAR CONSTRAINT EQUATION	CONSTRAINT.LINEAR

EQUATION	CONSTRAINT.LINEAR/EQUATION
Refers both to EQUATION.MASTER (One) and to EQUATION.SLAVE (Many); must be repeated for each equation.	

6.1 EQUATION

Old keyword or variable	New element or attribute
EQUATION	EQUATION
MODEL <i>i</i> , NODE <i>i</i>	EQUATION.MASTER/NODE_ID EQUATION.SLAVE/NODE_ID
MASTER if <i>i</i> =1, SLAVE if <i>i</i> >1	
DOF <i>i</i>	EQUATION.MASTER/DIRECTION EQUATION.SLAVE/DIRECTION
MASTER if <i>i</i> =1, SLAVE if <i>i</i> >1	
FACTOR <i>i</i>	EQUATION.MASTER/FACTOR EQUATION.SLAVE/FACTOR
MASTER if <i>i</i> =1, SLAVE if <i>i</i> >1	

6.2 SIMPLE CONSTRAINT EQUATIONS

Old keyword or variable	New element or attribute
SIMPLE CONSTRAINT EQUATIONS	
Obsolete	
CONSTRAINT	CONSTRAINT.SIMPLE/ID
Refers to a simple constraint equation; must be repeated for each equation.	

6.2.1 CONSTRAINT

Old keyword or variable	New element or attribute
MODEL NODES	CONSTRAINT . SIMPLE / GROUP_LIST
DOF = D1 D2=DOF_DY, D3=DOF_DZ, R1=DOF_RX, R2=DOF_RY, R3=DOF_RZ	CONSTRAINT . SIMPLE / DOF_DX

6.3 SPOTWELDS

Old keyword or variable	New element or attribute
NODE - ELEMENT	
Obsolete	
NODE - NODE	SPOTWELD . NODE_NODE
3 - NODE	SPOTWELD . THREE_NODE

6.3.1 NODE-ELEMENT

Old keyword or variable	New element or attribute
MAXFN	
Obsolete	
AN	
Obsolete	
MAXFS	
Obsolete	
AS	
Obsolete	
WINDOW	
Obsolete	
DURATION	
Obsolete	
SELECT	
Obsolete	
MODEL1	
Obsolete	
NODE1	
Obsolete	
MODEL2	
Obsolete	
ITEM2	
Obsolete	
FEMHIS	
Obsolete	

6.3.2 NODE-NODE

Old keyword or variable	New element or attribute
MAXFN	SPOTWELD.NODE_NODE/MAXFN
AN	SPOTWELD.NODE_NODE/AN
MAXFS	SPOTWELD.NODE_NODE/MAXFS
AS	SPOTWELD.NODE_NODE/AS
WINDOW	SPOTWELD.NODE_NODE/WINDOW
MODEL1	SPOTWELD.NODE_NODE/FE_MODEL_1
NODE1, NODE2	CONNECT_N2/NODE_2
MODEL2	SPOTWELD.NODE_NODE/FE_MODEL_2
FEMHIS	
Obsolete	

6.3.3 3-NODE

Old keyword or variable	New element or attribute
MAXFN	SPOTWELD . THREE_NODE/MAXFN
AN	SPOTWELD . THREE_NODE/AN
MAXFS	SPOTWELD . THREE_NODE/MAXFS
AS	SPOTWELD . THREE_NODE/AS
WINDOW	SPOTWELD . THREE_NODE/WINDOW
MODEL1	SPOTWELD . THREE_NODE/FE_MODEL_1
NODE1, NODE2, NODE3	CONNECT_N3/NODE_3
MODEL2	SPOTWELD . THREE_NODE/FE_MODEL_2
MODEL3	SPOTWELD . THREE_NODE/FE_MODEL_3
FEMHIS	
Obsolete	

7.1 ACCELERATION FIELDS

Old keyword or variable	New element or attribute
SYS BODY	LOAD.BODY_ACC/BODY_LIST
FUNCX	LOAD.BODY_ACC/AX_FUNC
FUNCY	LOAD.BODY_ACC/AX_FUNC
FUNCZ	LOAD.BODY_ACC/AX_FUNC

7.2 KELVIN ELEMENT

Old keyword or variable	New element or attribute
KELVINID	RESTRAINT.KELVIN/NAME
INERTIAL SPACE	POINT_OBJECT_1
NULL SYSTEM	POINT_OBJECT_1/BODY
SYSTEM BODY	POINT_OBJECT_1/BODY
POINT	POINT_OBJECT_1/POS
NODE	POINT_OBJECT_1/NODE
INERTIAL SPACE	POINT_OBJECT_2
NULL SYSTEM	POINT_OBJECT_2/BODY
SYSTEM BODY	POINT_OBJECT_2/BODY
POINT	POINT_OBJECT_2/POS
NODE	POINT_OBJECT_2/NODE
PRET	RESTRAINT.KELVIN/INITIAL_STRAIN
RESTRAINT.KELVIN/ELONG must be set equal to REL	
L0	RESTRAINT.KELVIN/UNTENS_LENGTH
RESTRAINT.KELVIN/ELONG must be set equal to ABS	
LOADING FUNCTION	RESTRAINT.KELVIN/CHAR
UNLOADING FUNCTION	
HYSTERESIS MODEL	
HYSTERESIS SLOPE	
ELASTIC LIMIT	
DAMPING COEFFICIENT	
DAMPING FORCE FUNCTION	
DAMPER TYPE	RESTRAINT.KELVIN/DAMP_TYPE

7.3 MAXWELL ELEMENT

Old keyword or variable	New element or attribute
MAXID	RESTRAINT.MAXWELL/NAME
INERTIAL SPACE	POINT_OBJECT_1
NULL SYSTEM	POINT_OBJECT_1/BODY
SYSTEM BODY	POINT_OBJECT_1/BODY
POINT	POINT_OBJECT_1/POS
NODE	POINT_OBJECT_1/NODE
INERTIAL SPACE	POINT_OBJECT_2
NULL SYSTEM	POINT_OBJECT_2/BODY
SYSTEM BODY	POINT_OBJECT_2/BODY
POINT	POINT_OBJECT_2/POS
NODE	POINT_OBJECT_2/NODE
FUL	RESTRAINT.MAXWELL/UNTENS_LENGTH
UNTENS_LENGTH = FUL * initial distance between attachment points	
FIL	RESTRAINT.MAXWELL/INITIAL_LENGTH
INITIAL_LENGTH = FIL * initial distance between attachment points	
LOADING FUNCTION	RESTRAINT.MAXWELL/CHAR
UNLOADING FUNCTION	
HYSTERESIS MODEL	
HYSTERESIS SLOPE	
ELASTIC LIMIT	
DAMPING FORCE FUNCTION	

7.4 POINT-RESTRAINT

Old keyword or variable	New element or attribute
ID	RESTRAINT . POINT / NAME
INERTIAL SPACE	CRDSYS_OBJECT_1
NULL SYSTEM	CRDSYS_OBJECT_1 / BODY
SYSTEM BODY	CRDSYS_OBJECT_1 / BODY
POINT	CRDSYS_OBJECT_1 / POS
COINCIDING	RESTRAINT . POINT / COINCIDE_POINT
INERTIAL SPACE	POINT_OBJECT_2
NULL SYSTEM	POINT_OBJECT_2 / BODY
SYSTEM BODY	POINT_OBJECT_2 / BODY
POINT	POINT_OBJECT_2 / POS
NODE	POINT_OBJECT_2 / NODE
DIRECTION, DIR = X	
LOADING FUNCTION UNLOADING FUNCTION HYSTERESIS MODEL HYSTERESIS SLOPE ELASTIC LIMIT DAMPING COEFFICIENT	RESTRAINT . POINT / D1_CHAR
DIRECTION, DIR = Y	
LOADING FUNCTION UNLOADING FUNCTION HYSTERESIS MODEL HYSTERESIS SLOPE ELASTIC LIMIT DAMPING COEFFICIENT	RESTRAINT . POINT / D2_CHAR
DIRECTION, DIR = Z	

Old keyword or variable	New element or attribute
LOADING FUNCTION	
UNLOADING FUNCTION	
HYSTERESIS MODEL	
HYSTERESIS SLOPE	RESTRAINT.POINT/D3_CHAR
ELASTIC LIMIT	
DAMPING COEFFICIENT	

7.5 BELTS

Old keyword or variable	New element or attribute
SYS1 B0D1 X1 Y1 Z1	POINT_REF_1
SYS2 B0D2 X2 Y2 Z2	POINT_REF_2
L0 UNL0 HYS XEL	BELT_SEGMENT/CHAR
FR	BELT_TYING/FRIC_COEF
PRET	BELT_SEGMENT/INITIAL_STRAIN
LA	BELT_SEGMENT/ADD_LENGTH
COR	
Obsolete; option removed	
ID	BELT_SEGMENT/ID

7.5.1 RUPTURE

Old keyword or variable	New element or attribute
RREL	BELT_SEGMENT/RUPTURE_STRAIN
NBEL	
Obsolete; no reference to belt segment needed	

7.5.2 RETRACTOR

Old keyword or variable	New element or attribute
SPL	FUNC_USAGE/INTERPOLATION
TLOCK	BELT_RETRACTOR/SWITCH
The SWITCH must refer to SWITCH.TIME	
VLOCK	BELT_RETRACTOR/SWITCH
The SWITCH must refer to SWITCH.SENSOR that refers to a SENSOR.RETRACTOR	
NFLOCK	SWITCH.TIME_FUNC/FUNC
The SWITCH must refer to SWITCH.CONTROL_SYSTEM that refers to a SIGNAL.FUNC	
ALOCK	SWITCH.TIME_FUNC/TOL
In combination with NFLOCK 0	
DTLOCK	SWITCH.SENSOR/TIME_WINDOW SWITCH.CONTROL_SYSTEM/TIME_DELAY
If possible, translate into SWITCH.SENSOR For SWITCH.CONTROL_SYSTEM, only when during whole TIME_WINDOW time the condition is satisfied, use of TIME_DELAY will give identical result. In all other cases, it is not supported in 6.0	
N1 N2 N3	BELT_RETRACTOR/SWITCH
The SWITCH must refer to SWITCH.SENSOR that refers to a SENSOR.BODY with SIGNAL_TYPE equal to PLAN_ACC	
HYS	BELT_RETRACTOR/CHAR
XEL	BELT_RETRACTOR/CHAR
NPL XLI FLI	BELT_RETRACTOR/CHAR
NPU XUI FUI	BELT_RETRACTOR/CHAR

7.5.3 PRETENSIONER

Old keyword or variable	New element or attribute
SPL	FUNC_USAGE/INTERPOLATION
TYPE	
Obsolete; only TYPE = REEL is possible	
NOi, LOPi	BELT_RETRACTOR/PRET_SWITCH SWITCH.LOGIC/LOGIC_EXPRESSION
NP Ti Si	BELT_RETRACTOR/INLET_FUNC

7.5.4 WEBBING GRABBER

Old keyword or variable	New element or attribute
BSEG	
Obsolete; parameter was intended for future use	
TYPE	
Obsolete; only webbing grabber in retractor possible	
N0i, L0Pi	BELT_RETRACTOR/GRABBER_SWITCH SWITCH.LOGIC/LOGIC_EXPRESSION

7.5.5 FUSE BELT

Old keyword or variable	New element or attribute
BSEG	
Obsolete; defined in BELT_SEGMENT element	
RFORCE	BELT_FUSE/TEARING_FORCE
ELENG	BELT_FUSE/ADD_LENGTH
NSTEP	BELT_FUSE/TEARING_COUNTER
FBNR	BELT_FUSE/PREVIOUS_BELT_FUSE

7.6 CARDAN RESTRAINTS

Old keyword or variable	New element or attribute
SYS1 B0D1	CRDSYS_OBJECT_1/BODY
SYS2 B0D2	CRDSYS_OBJECT_2/BODY
L1 U1 H1 X1 D1	RESTRAINT.CARDAN/R1_CHAR
L2 U2 H2 X2 D2	RESTRAINT.CARDAN/R2_CHAR
L3 U3 H3 X3 D3	RESTRAINT.CARDAN/R3_CHAR
F1	RESTRAINT.CARDAN/R1_FRIC_TORQUE
F2	RESTRAINT.CARDAN/R2_FRIC_TORQUE
F3	RESTRAINT.CARDAN/R3_FRIC_TORQUE

7.7 FLEXION-TORSION RESTRAINTS

Old keyword or variable	New element or attribute
SYS1 BOD1	CRDSYS_OBJECT_1/BODY
SYS2 BOD2	CRDSYS_OBJECT_2/BODY
LOA UNLA HYSA XEA	RESTRAINT.FLEX_TORS/BENDING_CHAR
LOB UNLB HYSB XEB	RESTRAINT.FLEX_TORS/TORSION_CHAR
DAMP	RESTRAINT.FLEX_TORS/DAMP_COEF
FRI	RESTRAINT.FLEX_TORS/FRIC_TORQUE
NFAC	RESTRAINT.FLEX_TORS/BENDING_TORQUE_FUNC

7.8 TYRE-ROAD CONTACT

Old keyword or variable	New element or attribute
TYROID	CONTACT . TYRE_ROAD/NAME

7.8 TYRE-ROAD CONTACT and TYRE

Old keyword or variable	New element or attribute
SYSTEM BODY CENTRE	POINT_OBJECT_1
TYRE	CONTACT.TYRE_ROAD/TYRE
MODEL	CONTACT.TYRE_ROAD/TYRE_TYPE
FORCE	CONTACT.TYRE_ROAD/LOAD_TYPE
CONTACT METHOD	
Obsolete; only METHOD = POINT is possible	
MIRROR	CONTACT.TYRE_ROAD/MIRROR

7.8.1 TYRE DATA

Old keyword or variable	New element or attribute
TYREID	TYRE_DATA/NAME
FILE	TYRE_DATA/FILE

7.9 COUPLING

Old keyword or variable	New element or attribute
COUPLING	COUPLING
ELLIPSOIDS	COUPLING/COUPLING_SURFACE
CYLINDERS	COUPLING/COUPLING_SURFACE
PLANES	COUPLING/COUPLING_SURFACE
BODIES	COUPLING/COUPLING_BODY
FEM MODEL	COUPLING/FE_MODEL

7.9.1 ELLIPSOIDS

Old keyword or variable	New element or attribute
LABEL	COUPLING_SURFACE/EXTERNAL_REF
SYSTEM ELLIPSOID	COUPLING_SURFACE/SURFACE
VARI	COUPLING_SURFACE/EXTERNAL_DATA

7.9.2 CYLINDERS

Old keyword or variable	New element or attribute
LABEL	COUPLING_SURFACE/EXTERNAL_REF
SYSTEM CYLINDER	COUPLING_SURFACE/SURFACE
VARI	COUPLING_SURFACE/EXTERNAL_DATA

7.9.3 PLANES

Old keyword or variable	New element or attribute
LABEL	COUPLING_SURFACE/EXTERNAL_REF
SYSTEM PLANE	COUPLING_SURFACE/SURFACE
VARI	COUPLING_SURFACE/EXTERNAL_DATA

7.9.4 BODIES

Old keyword or variable	New element or attribute
LABEL	COUPLING_BODY/EXTERNAL_REF
SYSTEM BODY	COUPLING_BODY/BODY
VARI	COUPLING_BODY/EXTERNAL_DATA

8 CONTACT INTERACTIONS

Old keyword or variable	New element or attribute
EMPTY	

8.1 ELEMENTSET

Old keyword or variable	New element or attribute
ELEMENTSET	GROUP . FE
ELEMID	GROUP . FE/NAME
MODEL	GROUP . FE/FE_MODEL
ELEMENTS	GROUP . FE/ELEMENT_LIST

8.2 NODESET

Old keyword or variable	New element or attribute
NODESET	GROUP . FE
ELEMID	GROUP . FE/NAME
MODEL	GROUP . FE/FE_MODEL
NODES	GROUP . FE/NODE_LIST

8.3 FACETSET

Old keyword or variable	New element or attribute
FACETSET	GROUP_FE
FACETID	GROUP_FE/NAME
INERTIAL SPACE NULL SYSTEM SYSTEM SURFACE	GROUP_FE/FE_MODEL
FACETS	GROUP.FE/ELEMENT_LIST

8.4 VERTEXSET

Old keyword or variable	New element or attribute
VERTEXSET	GROUP_FE
VERTEXID	GROUP_FE/NAME
INERTIAL SPACE NULL SYSTEM SYSTEM SURFACE	GROUP_FE/FE_MODEL
VERTICES	GROUP . FE/NODE_LIST

8.5 ELEMENT - NODE

Old keyword or variable	New element or attribute
ELEMENTSET	CONTACT.FE_FE/MASTER_SURFACE
NODESET	CONTACT.FE_FE/SLAVE_SURFACE
SEARCH FACTOR	CONTACT.FE_FE/SEARCH_FACTOR
FRONT BACK Obsolete	
PENALTY	CONTACT_FORCE.PENALTY/PENALTY
MAXFRC	CONTACT_FORCE.PENALTY/MAX_FORCE_PAR
CONTACT MODEL	CHARACTERISTIC.CONTACT/CONTACT_MODEL
LOADING FUNCTION	CHARACTERISTIC.CONTACT/LOAD_FUNC
DAMPING COEFFICIENT	CHARACTERISTIC.CONTACT/DAMP_COEF
DAMPING VELOCITY FUNCTION	CHARACTERISTIC.CONTACT/DAMP_VEL_FUNC
DAMPING STRESS FUNCTION	CHARACTERISTIC.CONTACT/DAMP_AMP_FUNC
FRICTION FUNCTION	CONTACT_FORCE.PENALTY/FRIC_FUNC
FUNCTIONS	FUNCTION.XY
SWITCH	CONTACT.FE_FE/SWITCH
INITIAL	CONTACT.FE_FE/INITIAL_TYPE

8.6 ELEMENT-VERTEX

Old keyword or variable	New element or attribute
ELEMENTSET	CONTACT.FE_FE/MASTER_SURFACE
VERTEXSET	CONTACT.FE_FE/SLAVE_SURFACE
FRONT BACK	
Obsolete	
CONTACT MODEL	CHARACTERISTIC.CONTACT/CONTACT_MODEL
LOADING FUNCTION	CHARACTERISTIC.CONTACT/LOAD_FUNC
UNLOADING FUNCTION	CHARACTERISTIC.CONTACT/UNLOAD_FUNC
HYSTERESIS MODEL	CHARACTERISTIC.CONTACT/HYS_MODEL
HYSTERESIS SLOPE	CHARACTERISTIC.CONTACT/HYS_SLOPE
ELASTIC LIMIT	CHARACTERISTIC.CONTACT/ELAS_LIMIT
DAMPING COEFFICIENT	CHARACTERISTIC.CONTACT/DAMP_COEF
DAMPING VELOCITY FUNCTION	CHARACTERISTIC.CONTACT/DAMP_VEL_FUNC
DAMPING STRESS FUNCTION	CHARACTERISTIC.CONTACT/DAMP_AMP_FUNC
FRICTION FUNCTION	CONTACT_FORCE.PENALTY/FRIC_FUNC
FUNCTIONS	FUNCTION.XY
SWITCH	CONTACT.FE_FE/SWITCH
INITIAL	CONTACT.FE_FE/INITIAL_TYPE

8.7 FACET - NODE

Old keyword or variable	New element or attribute
FACETSET	CONTACT.FE_FE/MASTER_SURFACE
NODESET	CONTACT.FE_FE/SLAVE_SURFACE
FRONT BACK	
Obsolete	
CONTACT MODEL	CHARACTERISTIC.CONTACT/CONTACT_MODEL
LOADING FUNCTION	CHARACTERISTIC.CONTACT/LOAD_FUNC
DAMPING COEFFICIENT	CHARACTERISTIC.LOAD/DAMP_COEF
DAMPING VELOCITY FUNCTION	CHARACTERISTIC.LOAD/DAMP_VEL_FUNC
DAMPING STRESS FUNCTION	CHARACTERISTIC.LOAD/DAMP_STRESS_FUNC
FRICTION FUNCTION	CONTACT_FORCE.PENALTY/FRIC_FUNC
FUNCTIONS	FUNCTION.XY
SWITCH	CONTACT.FE_FE/SWITCH
INITIAL	CONTACT.FE_FE/INITIAL_TYPE

8.8 FACET-VERTEX

Old keyword or variable	New element or attribute
FACETSET	CONTACT . FE_FE/MASTER_SURFACE
VERTEXSET	CONTACT . FE_FE/SLAVE_SURFACE
FRONT BACK	
Obsolete	
CHARACTERISTIC	CONTACT_FORCE . CHAR/CONTACT_TYPE
CONTACT MODEL	CHARACTERISTIC . CONTACT/LOAD_FUNC
LOADING FUNCTION	CHARACTERISTIC . CONTACT/LOAD_FUNC
UNLOADING FUNCTION	CHARACTERISTIC . CONTACT/UNLOAD_FUNC
HYSTERESIS MODEL	CHARACTERISTIC . CONTACT/HYS_MODEL
HYSTERESIS SLOPE	CHARACTERISTIC . CONTACT/HYS_SLOPE
ELASTIC LIMIT	CHARACTERISTIC . CONTACT/ELAS_LIMIT
DAMPING COEFFICIENT	CHARACTERISTIC . CONTACT/DAMP_COEF
DAMPING VELOCITY FUNCTION	CHARACTERISTIC . CONTACT/DAMP_VEL_FUNC
DAMPING STRESS FUNCTION	CHARACTERISTIC . CONTACT/DAMP_AMP_FUNC
FRICTION FUNCTION	CONTACT_FORCE . CHAR/FRIC_FUNC
FUNCTIONS	FUNCTION . XY
SWITCH	CONTACT . FE_FE/SWITCH
INITIAL	CONTACT . FE_FE/INITIAL_TYPE

8.9 PLANE-VERTEX

Old keyword or variable	New element or attribute
INERTIAL SPACE, PLANE [NULL] SYSTEM, PLANE	CONTACT.MB_FE/MASTER_SURFACE
VERTEXSET	CONTACT.MB_FE/SLAVE_SURFACE
CONTACT MODEL	CHARACTERISTIC.CONTACT/CONTACT_MODEL
LOADING FUNCTION	CHARACTERISTIC.CONTACT/LOAD_FUNC
UNLOADING FUNCTION	CHARACTERISTIC.CONTACT/UNLOAD_FUNC
HYSTERESIS MODEL	CHARACTERISTIC.CONTACT/HYS_MODEL
HYSTERESIS SLOPE	CHARACTERISTIC.CONTACT/HYS_SLOPE
ELASTIC LIMIT	CHARACTERISTIC.CONTACT/ELAS_LIMIT
DAMPING COEFFICIENT	CHARACTERISTIC.CONTACT/DAMP_COEF
DAMPING VELOCITY FUNCTION	CHARACTERISTIC.CONTACT/DAMP_VEL_FUNC
DAMPING STRESS FUNCTION	CHARACTERISTIC.CONTACT/DAMP_AMP_FUNC
FRICTION FUNCTION	CONTACT_FORCE.CHAR/FRIC_FUNC
FUNCTIONS	FUNCTION.XY

8.10 ELLIPSOID-VERTEX

Old keyword or variable	New element or attribute
INERTIAL SPACE, ELLIPSOID [NULL] SYSTEM, ELLIPSOID	CONTACT.MB_FE/MASTER_SURFACE
VERTEXSET	CONTACT.MB_FE/SLAVE_SURFACE
CONTACT MODEL	CHARACTERISTIC.CONTACT/CONTACT_MODEL
LOADING FUNCTION	CHARACTERISTIC.CONTACT/LOAD_FUNC
UNLOADING FUNCTION	CHARACTERISTIC.CONTACT/UNLOAD_FUNC
HYSTERESIS MODEL	CHARACTERISTIC.CONTACT/HYS_MODEL
HYSTERESIS SLOPE	CHARACTERISTIC.CONTACT/HYS_SLOPE
ELASTIC LIMIT	CHARACTERISTIC.CONTACT/ELAS_LIMIT
DAMPING COEFFICIENT	CHARACTERISTIC.CONTACT/DAMP_COEF
DAMPING VELOCITY FUNCTION	CHARACTERISTIC.CONTACT/DAMP_VEL_FUNC
DAMPING STRESS FUNCTION	CHARACTERISTIC.CONTACT/DAMP_AMP_FUNC
FRICTION FUNCTION	CONTACT_FORCE.CHAR/FRIC_FUNC
FUNCTIONS	FUNCTION.XY

8.11 CYLINDER-VERTEX

Old keyword or variable	New element or attribute
INERTIAL SPACE, CYLINDER [NULL] SYSTEM, CYLINDER	CONTACT.MB_FE/MASTER_SURFACE
VERTEXSET	CONTACT.MB_FE/SLAVE_SURFACE
CONTACT MODEL	CHARACTERISTIC.CONTACT/CONTACT_MODEL
LOADING FUNCTION	CHARACTERISTIC.CONTACT/LOAD_FUNC
UNLOADING FUNCTION	CHARACTERISTIC.CONTACT/UNLOAD_FUNC
HYSTERESIS MODEL	CHARACTERISTIC.CONTACT/HYS_MODEL
HYSTERESIS SLOPE	CHARACTERISTIC.CONTACT/HYS_SLOPE
ELASTIC LIMIT	CHARACTERISTIC.CONTACT/ELAS_LIMIT
DAMPING COEFFICIENT	CHARACTERISTIC.CONTACT/DAMP_COEF
DAMPING VELOCITY FUNCTION	CHARACTERISTIC.CONTACT/DAMP_VEL_FUNC
DAMPING STRESS FUNCTION	CHARACTERISTIC.CONTACT/DAMP_AMP_FUNC
FRICTION FUNCTION	CONTACT_FORCE.CHAR/FRIC_FUNC
FUNCTIONS	FUNCTION.XY

8.12 PLANE-NODE

Old keyword or variable	New element or attribute
INERTIAL SPACE, PLANE [NULL] SYSTEM, PLANE	CONTACT.MB_FE/MASTER_SURFACE
NODESET	CONTACT.MB_FE/SLAVE_SURFACE
FRICTION COEFFICIENT	CONTACT_FORCE.KINEMATIC/FRIC_COEF
THICKNESS	CONTACT.MB_FE/SURFACE_THICK
CONTACT MODEL	CHARACTERISTIC.CONTACT/CONTACT_MODEL
LOADING FUNCTION	CHARACTERISTIC.CONTACT/LOAD_FUNC
UNLOADING FUNCTION	CHARACTERISTIC.CONTACT/UNLOAD_FUNC
HYSTERESIS MODEL	CHARACTERISTIC.CONTACT/HYS_MODEL
HYSTERESIS SLOPE	CHARACTERISTIC.CONTACT/HYS_SLOPE
ELASTIC LIMIT	CHARACTERISTIC.CONTACT/ELAS_LIMIT
DAMPING COEFFICIENT	CHARACTERISTIC.CONTACT/DAMP_COEF
DAMPING VELOCITY FUNCTION	CHARACTERISTIC.CONTACT/DAMP_VEL_FUNC
DAMPING STRESS FUNCTION	CHARACTERISTIC.CONTACT/DAMP_AMP_FUNC
FRICTION FUNCTION	CONTACT_FORCE.CHAR/FRIC_FUNC
FUNCTIONS	FUNCTION.XY

8.13 ELLIPSOID-NODE

Old keyword or variable	New element or attribute
INERTIAL SPACE, ELLIPSOID [NULL] SYSTEM, ELLIPSOID	CONTACT.MB_FE/MASTER_SURFACE
NODESET	CONTACT.MB_FE/SLAVE_SURFACE
FRICTION COEFFICIENT	CONTACT_FORCE.KINEMATIC/FRIC_COEF
CONTACT MODEL	CHARACTERISTIC.CONTACT/CONTACT_MODEL
THICKNESS	CONTACT.MB_FE/SURFACE_THICK
LOADING FUNCTION	CHARACTERISTIC.CONTACT/LOAD_FUNC
UNLOADING FUNCTION	CHARACTERISTIC.CONTACT/UNLOAD_FUNC
HYSTERESIS MODEL	CHARACTERISTIC.CONTACT/HYS_MODEL
HYSTERESIS SLOPE	CHARACTERISTIC.CONTACT/HYS_SLOPE
ELASTIC LIMIT	CHARACTERISTIC.CONTACT/ELAS_LIMIT
DAMPING COEFFICIENT	CHARACTERISTIC.CONTACT/DAMP_COEF
DAMPING VELOCITY FUNCTION	CHARACTERISTIC.CONTACT/DAMP_VEL_FUNC
DAMPING STRESS FUNCTION	CHARACTERISTIC.CONTACT/DAMP_AMP_FUNC
FRICTION FUNCTION	CONTACT_FORCE.CHAR/FRIC_FUNC
FUNCTIONS	FUNCTION.XY

8.14 CYLINDER-NODE

Old keyword or variable	New element or attribute
INERTIAL SPACE, CYLINDER [NULL] SYSTEM, CYLINDER	CONTACT.MB_FE/MASTER_SURFACE
NODESET	CONTACT.MB_FE/SLAVE_SURFACE
FRICTION COEFFICIENT	CONTACT_FORCE.KINEMATIC/FRIC_COEF
CONTACT MODEL	CHARACTERISTIC.CONTACT/CONTACT_MODEL
THICKNESS	CONTACT.MB_FE/SURFACE_THICK
LOADING FUNCTION	CHARACTERISTIC.CONTACT/LOAD_FUNC
UNLOADING FUNCTION	CHARACTERISTIC.CONTACT/UNLOAD_FUNC
HYSTERESIS MODEL	CHARACTERISTIC.CONTACT/HYS_MODEL
HYSTERESIS SLOPE	CHARACTERISTIC.CONTACT/HYS_SLOPE
ELASTIC LIMIT	CHARACTERISTIC.CONTACT/ELAS_LIMIT
DAMPING COEFFICIENT	CHARACTERISTIC.CONTACT/DAMP_COEF
DAMPING VELOCITY FUNCTION	CHARACTERISTIC.CONTACT/DAMP_VEL_FUNC
DAMPING STRESS FUNCTION	CHARACTERISTIC.CONTACT/DAMP_AMP_FUNC
FRICTION FUNCTION	CONTACT_FORCE.CHAR/FRIC_FUNC
FUNCTIONS	FUNCTION.XY

8.15 PLANE-ELLIPSOID

Old keyword or variable	New element or attribute
INERTIAL SPACE, PLANE [NULL] SYSTEM, PLANE	CONTACT.MB_MB/MASTER_SURFACE
INERTIAL SPACE, ELLIPSOID [NULL] SYSTEM, ELLIPSOID	CONTACT.MB_MB/SLAVE_SURFACE
CHARACTERISTIC	CONTACT_FORCE.CHAR/CONTACT_TYPE
HYSTERESIS MODEL	CHARACTERISTIC.CONTACT/HYS_MODEL
LOADING FUNCTION	CHARACTERISTIC.CONTACT/LOAD_FUNC
UNLOADING FUNCTION	CHARACTERISTIC.CONTACT/UNLOAD_FUNC
HYSTERESIS SLOPE	CHARACTERISTIC.CONTACT/HYS_SLOPE
ELASTIC LIMIT	CHARACTERISTIC.CONTACT/ELAS_LIMIT
DAMPING COEFFICIENT	CHARACTERISTIC.CONTACT/DAMP_COEF
DAMPING VELOCITY FUNCTION Obsolete; must be included in DAMP_VEL_FUNC	
DAMPING ELASTIC FORCE	CONTACT.MB_MB/DAMP_AMP_FUNC CHARACTERISTIC.CONTACT/DAMP_AMP_FUNC
DAMPING FORCE FUNCTION	CONTACT.MB_MB/DAMP_VEL_FUNC CHARACTERISTIC.CONTACT/DAMP_VEL_FUNC
FRICTION COEFFICIENT	CONTACT.MB_MB/FRIC_COEF
FRICTION FUNCTION	CONTACT._FORCE.CHAR/FRIC_FUNC
CORRECTION	CONTACT.MB_MB/INITIAL_TYPE
BOUNDARYWIDTH	CONTACT.MB_MB/BOUNDARY_WIDTH
AMPLIFICATION	CHARACTERISTIC.CONTACT/AMPLIFICATION
FUNCTIONS	FUNCTION.XY

8.16 ELLIPSOID-ELLIPSOID

Old keyword or variable	New element or attribute
INERTIAL SPACE, ELLIPSOID [NULL] SYSTEM, ELLIPSOID	CONTACT.MB_MB/MASTER_SURFACE
INERTIAL SPACE, ELLIPSOID [NULL] SYSTEM, ELLIPSOID	CONTACT.MB_MB/SLAVE_SURFACE
CHARACTERISTIC	CONTACT_FORCE.CHAR/CONTACT_TYPE
HYSTERESIS MODEL	CHARACTERISTIC.CONTACT/HYS_MODEL
LOADING FUNCTION	CHARACTERISTIC.CONTACT/LOAD_FUNC
UNLOADING FUNCTION	CHARACTERISTIC.CONTACT/UNLOAD_FUNC
HYSTERESIS SLOPE	CHARACTERISTIC.CONTACT/HYS_SLOPE
ELASTIC LIMIT	CHARACTERISTIC.CONTACT/ELAS_LIMIT
DAMPING COEFFICIENT	CHARACTERISTIC.CONTACT/DAMP_COEF
DAMPING VELOCITY FUNCTION	
Obsolete; must be included in DAMP_VEL_FUNC	
DAMPING ELASTIC FORCE	CONTACT.MB_MB/DAMP_AMP_FUNC CHARACTERISTIC.CONTACT/DAMP_AMP_FUNC
DAMPING FORCE FUNCTION	CONTACT.MB_MB/DAMP_VEL_FUNC CHARACTERISTIC.CONTACT/DAMP_VEL_FUNC
DAMPING FORCE FUNCTION	CHARACTERISTIC.CONTACT/DAMP_AMP_FUNC
FRICTION COEFFICIENT	CONTACT.MB_MB/FRIC_COEF
FRICTION FUNCTION	CONTACT._FORCE.CHAR/FRIC_FUNC
CORRECTION	CONTACT.MB_MB/INITIAL_TYPE
AMPLIFICATION	CHARACTERISTIC.CONTACT/AMPLIFICATION
FUNCTIONS	FUNCTION.XY

8.17 CYLINDER-ELLIPSOID

Old keyword or variable	New element or attribute
INERTIAL SPACE, CYLINDER [NULL] SYSTEM, CYLINDER	CONTACT.MB_MB/MASTER_SURFACE
INERTIAL SPACE, ELLIPSOID [NULL] SYSTEM, ELLIPSOID	CONTACT.MB_MB/SLAVE_SURFACE
CHARACTERISTIC	CONTACT_FORCE.CHAR/CONTACT_TYPE
HYSTERESIS MODEL	CHARACTERISTIC.CONTACT/HYS_MODEL
LOADING FUNCTION	CHARACTERISTIC.CONTACT/LOAD_FUNC
UNLOADING FUNCTION	CHARACTERISTIC.CONTACT/UNLOAD_FUNC
HYSTERESIS SLOPE	CHARACTERISTIC.CONTACT/HYS_SLOPE
ELASTIC LIMIT	CHARACTERISTIC.CONTACT/ELAS_LIMIT
DAMPING COEFFICIENT	CHARACTERISTIC.CONTACT/DAMP_COEF
DAMPING VELOCITY FUNCTION	
Obsolete; must be included in DAMP_VEL_FUNC	
DAMPING ELASTIC FORCE	CONTACT.MB_MB/DAMP_AMP_FUNC CHARACTERISTIC.CONTACT/DAMP_AMP_FUNC
DAMPING FORCE FUNCTION	CONTACT.MB_MB/DAMP_VEL_FUNC CHARACTERISTIC.CONTACT/DAMP_VEL_FUNC
FRICTION COEFFICIENT	CONTACT.MB_MB/FRIC_COEF
FRICTION FUNCTION	CONTACT_FORCE.CHAR/FRIC_FUNC
CORRECTION	CONTACT.MB_MB/INITIAL_TYPE
AMPLIFICATION	CHARACTERISTIC.CONTACT/AMPLIFICATION
FUNCTIONS	FUNCTION.XY

8.18 EVALUATIONS

Old keyword or variable	New element or attribute
EVALUATION	CONTACT_EVALUATE
MEV <i>i</i>	CONTACT_EVALUATE/CONTACT_LIST

8.19 SWITCH

Old keyword or variable	New element or attribute
SWITCH	SWITCH.CONTROL_SYSTEM SWITCH.LOGIC SWITCH.MULTIPOINT SWITCH.SENSOR SWITCH.TIME_FUNC SWITCH.TIME_FUNC
CONTACT	SWITCH.*/INVERT
TIME	SWITCH.*/ELAPSED_TIME
ELAPSED_TIME = TIME - T0	

8.20 AMPLIFICATION, TYPE = ABSPOLY

Old keyword or variable	New element or attribute
C1	AMPLIFICATION.ABS_POLY/C1
C2	AMPLIFICATION.ABS_POLY/C2
C3	AMPLIFICATION.ABS_POLY/C3
C4	AMPLIFICATION.ABS_POLY/C4
C5	AMPLIFICATION.ABS_POLY/C5

8.20 AMPLIFICATION, TYPE = ABSLOG

Old keyword or variable	New element or attribute
C1	AMPLIFICATION.LOG/C1
C2	AMPLIFICATION.LOG/C2
C3	AMPLIFICATION.LOG/C3

8.20 AMPLIFICATION, TYPE = ABSEXP

Old keyword or variable	New element or attribute
C1	AMPLIFICATION.EXP/C1
C2	AMPLIFICATION.EXP/C2
C3	AMPLIFICATION.EXP/C3
C4	AMPLIFICATION.EXP/C4

9 AMPLIFICATION, METHOD = 1

Old keyword or variable	New element or attribute
MODEL	
Obsolete; no reference to force model needed	
N01	
Obsolete; no reference to force model needed	
N02	
Obsolete; no reference to force model needed	
C1	AMPLIFICATION.ABS_POLY/C1
C2	AMPLIFICATION.ABS_POLY/C2
C3	AMPLIFICATION.ABS_POLY/C3
C4	AMPLIFICATION.ABS_POLY/C4
C5	AMPLIFICATION.ABS_POLY/C5

9 AMPLIFICATION, METHOD = 2

Old keyword or variable	New element or attribute
MODEL	
Obsolete; no reference to force model needed	
N01	
Obsolete; no reference to force model needed	
N02	
Obsolete; no reference to force model needed	
C1	AMPLIFICATION.LOG/C1
C2	AMPLIFICATION.LOG/C2
C3	AMPLIFICATION.LOG/C3

9 AMPLIFICATION, METHOD = 3

Old keyword or variable	New element or attribute
MODEL	
Obsolete; no reference to force model needed	
N01	
Obsolete; no reference to force model needed	
N02	
Obsolete; no reference to force model needed	
C1	AMPLIFICATION.EXP/C1
C2	AMPLIFICATION.EXP/C2
C3	AMPLIFICATION.EXP/C3
C4	AMPLIFICATION.EXP/C4

9 AMPLIFICATION, METHOD = 4

Old keyword or variable	New element or attribute
MODEL	
Obsolete; no reference to force model needed	
N01	
Obsolete; no reference to force model needed	
N02	
Obsolete; no reference to force model needed	
C1	AMPLIFICATION.POLY/C1
C2	AMPLIFICATION.POLY/C2
C3	AMPLIFICATION.POLY/C3
C4	AMPLIFICATION.POLY/C4

10 TRIGGERING CONDITIONS

Old keyword or variable	New element or attribute
NUMBER	SWITCH.CONTROL_SYSTEM/ID SWITCH.SENSOR/ID
If SIGNALTYPE = SENSOR translate into SWITCH.SENSOR	
SIGNALTYPE	SWITCH.CONTROL_SYSTEM/INPUT_CLASS
If SIGNALTYPE ≠ SENSOR	
SEQNUM	SWITCH.CONTROL_SYSTEM/INPUT_REF SWITCH.SENSOR/SENSOR
If SIGNALTYPE = SENSOR translate into SWITCH.SENSOR	
LEVEL	SWITCH.CONTROL_SYSTEM/LEVEL SWITCH.SENSOR/LEVEL
If SIGNALTYPE = SENSOR translate into SWITCH.SENSOR	
DELAY	SWITCH.SENSOR/TIME_WINDOW SWITCH.CONTROL_SYSTEM/TIME_DELAY
If SIGNALTYPE = SENSOR translate into SWITCH.SENSOR For SIGNALTYPE ≠ SENSOR, only when during whole TIME_WINDOW time the condition is satisfied, use of TIME_DELAY will give identical result. In all other cases, it is not supported in 6.0	
LEX	SWITCH.CONTROL_SYSTEM/LOGIC_OPERATOR
If SIGNALTYPE ≠ SENSOR	

11.1 BODY SENSORS, DIR = RELATIVE

Old keyword or variable	New element or attribute
BODY SENSORS	SENSOR.BODY_REL
NO	
Obsolete	
TYPE	SENSOR.BODY_REL/SIGNAL_TYPE
NX NY NZ	
Obsolete, not used when DIR=RELATIVE	
SYS1 BODY1 NODE1 P1X P1Y P1Z POINT_OBJECT_1	
SYS2 BODY2 NODE2 P2X P2Y P2Z POINT_OBJECT_2	
ID	SENSOR.BODY_REL/NAME
OUTPUT	OUTPUT_SENSOR

11.1 BODY SENSORS, DIR = LOCAL / INERTIAL

Old keyword or variable	New element or attribute
BODY SENSORS	SENSOR.BODY
NO	
Obsolete	
TYPE	SENSOR.BODY/SIGNAL_TYPE
DIR	SENSOR.BODY/CRDSYS
CRDSYS = OBJECT if DIR= LOCAL	
CRDSYS = REF_SPACE if DIR = INERTIAL	
NX NY NZ	SENSOR.BODY/VECTOR
SYS1 BODY1 NODE1 P1X P1Y P1Z POINT_OBJECT_1	
ID	SENSOR.BODY/NAME
OUTPUT	OUTPUT_SENSOR

11.2 JOINT SENSORS, TYPE = JNTP0S, JNTVEL, JNTACC

Old keyword or variable	New element or attribute
JOINT SENSOR	SENSOR.JOINT
NO	
Obsolete	
TYPE	SENSOR.JOINT/SIGNAL_TYPE
SYS JOINT	SENSOR.JOINT/JOINT
DOF	SENSOR.JOINT/DOF_TYPE
ID	SENSOR.JOINT/NAME
OUTPUT	OUTPUT_SENSOR

11.2 JOINT SENSORS, TYPE = JNTFOR, JNTTOR

Old keyword or variable	New element or attribute
JOINT SENSOR	SENSOR.JOINT_CONSTRAINT
NO	
Obsolete	
TYPE	SENSOR.JOINT_CONSTRAINT/SIGNAL_TYPE
SYS JOINT	SENSOR.JOINT_CONSTRAINT/JOINT
DOF	SENSOR.JOINT_CONSTRAINT/COMP SENSOR.JOINT_CONSTRAINT/SELECT_OBJECT
Use both COMP and SELECT_OBJECT	
ID	SENSOR.JOINT_CONSTRAINT/NAME
OUTPUT	OUTPUT_SENSOR

11.3 INFRARED SENSOR

Old keyword or variable	New element or attribute
ID	SENSOR.SURFACE_DIST/NAME
INERTIAL SPACE [NULL] SYSTEM	POINT_OBJECT_1
BODY	POINT_OBJECT_1/BODY
POINT	POINT_OBJECT_1/POS
DIRECTION	SENSOR.SURFACE_DIST/VECTOR
MAXDIS	SENSOR.SURFACE_DIST/MAX_DIST
SURFACE	
INERTIAL SPACE [NULL] SYSTEM ELLIPSOIDSET CYLINDERSET PLANESET	SENSOR.SURFACE_DIST/SURFACE_LIST SENSOR.SURFACE_DIST/GROUP_LIST
END SURFACE	
OUTPUT	OUTPUT_SENSOR

11.4 EXTERNAL INPUT

Old keyword or variable	New element or attribute
NO	SIGNAL.EXTERNAL_INPUT/ID
PROGRAM	
Obsolete; only MATLAB possible	
INNO	SIGNAL.EXTERNAL_INPUT/EXTERNAL_REF
ID	OUTPUT_CONTROL_SYSTEM/NAME
OUTPUT	OUTPUT_CONTROL_SYSTEM/INPUT_REF
Set INPUT_CLASS equal to SIGNAL	

11.5 REFERENCE SIGNALS

Old keyword or variable	New element or attribute
NO	SIGNAL . FUNC/ID
TYPE	SIGNAL . FUNC/ABS_VALUE
FUN	SIGNAL . FUNC/FUNC SIGNAL . FUNC/FUNC_USAGE
ID	SIGNAL . FUNC/NAME
OUTPUT	OUTPUT_CONTROL_SYSTEM
Set INPUT_CLASS equal to SIGNAL	

11.6 SUMMERS

Old keyword or variable	New element or attribute
NO	OPERATOR.SUM/ID
INTYPEi	SIGNAL_VALUE/INPUT_CLASS
INNOi	SIGNAL_VALUE/INPUT_REF
FACi	SIGNAL_VALUE/FACTOR
Set i to SIGNAL_VALUE/SEQ_NR	
ID	OPERATOR.SUM/NAME
OUTPUT	OUTPUT_CONTROL_SYSTEM
Set INPUT_CLASS equal to OPERATOR	

11.7 TRANSFORMERS

Old keyword or variable	New element or attribute
NO	OPERATOR.FUNC/ID
TYPE	
Obsolete	
INTYPE	OPERATOR.FUNC/INPUT_CLASS
INNO	OPERATOR.FUNC/INPUT_REF
FUN	OPERATOR.FUNC/FUNC OPERATOR.FUNC/FUNC_USAGE
ID	OPERATOR.FUNC/NAME
OUTPUT	OUTPUT_CONTROL_SYSTEM
Set INPUT_CLASS equal to OPERATOR	

11.8 CONTROLLERS

Old keyword or variable	New element or attribute
NO	CONTROLLER.PID/ID
TYPE	
Obsolete	
INTYPE	CONTROLLER.PID/INPUT_CLASS
INNO	CONTROLLER.PID/INPUT_REF
AMP	CONTROLLER.PID/GAIN
TAUI	CONTROLLER.PID/TAUI
TAUD	CONTROLLER.PID/TAUD
ID	CONTROLLER.PID/NAME
OUTPUT	OUTPUT_CONTROL_SYSTEM/INPUT_CLASS
Set INPUT_CLASS equal to CONTROLLER	

11.9 DELAYERS

Old keyword or variable	New element or attribute
NO	OPERATOR.DELAY/ID
INTYPE	OPERATOR.DELAY/INPUT_CLASS
INNO	OPERATOR.DELAY/INPUT_REF
TDELAY	OPERATOR.DELAY/TIME_DELAY
ID	OPERATOR.DELAY/NAME
OUTPUT	OUTPUT_CONTROL_SYSTEM
Set INPUT_CLASS equal to OPERATOR	

11.10 BODY ACTUATORS, DIR = COLLINEAR

Old keyword or variable	New element or attribute
NO	ACTUATOR.BODY_REL/ID
TYPE	ACTUATOR.BODY_REL/LOAD_TYPE
INTYPE	ACTUATOR.BODY_REL/INPUT_CLASS
INNO	ACTUATOR.BODY_REL/INPUT_REF
DIR Obsolete; in element name	
NX NY NZ Obsolete;	
SYS1 BODY1 NODE1 P1X P1Y P1Z POINT_OBJECT_1	
SYS2 BODY2 NODE2 P2X P2Y P2Z POINT_OBJECT_2	
ID	ACTUATOR.BODY_REL/NAME

11.10 BODY ACTUATORS, DIR = INERTIAL, LOCAL

Old keyword or variable	New element or attribute
NO	ACTUATOR.BODY/ID
TYPE	ACTUATOR.BODY/LOAD_TYPE
INTYPE	ACTUATOR.BODY/INPUT_CLASS
INNO	ACTUATOR.BODY/INPUT_REF
DIR	ACTUATOR.BODY/CRDSYS
CRDSYS = REF_SPACE for DIR = INERTIAL	
CRDSYS = OBJECT for DIR = LOCAL	
NX NY NZ	ACTUATOR.BODY/LOAD_DIR
SYS1 BODY1 NODE1 P1X P1Y P1Z POINT_OBJECT_1	
ID	ACTUATOR.BODY/NAME

1.11 JOINT ACTUATORS

Old keyword or variable	New element or attribute
NO	ACTUATOR.JOINT_POS/ID
TYPE	
Obsolete; only joint load is possible	
INTYPE	ACTUATOR.JOINT_POS/INPUT_CLASS
INNO	ACTUATOR.JOINT_POS/INPUT_REF
SYS JOINT	ACTUATOR.JOINT_POS/JOINT
DOF	ACTUATOR.JOINT_POS/DOF_TYPE
ID	ACTUATOR.JOINT_POS/NAME

11.12 MUSCLES

Old keyword or variable	New element or attribute
NO	MUSCLE.HILL/ID
TYPE Obsolete; muscle type included in the element name	
ATTACHMENT POINTS	MUSCLE.SEGMENT MUSCLE.CONTRACTILE
SYSNR BODYNR NODENR PX PY PZ	MUSCLE.SEGMENT/POINT_REF_! MUSCLE.SEGMENT/POINT_REF_2 MUSCLE.CONTRACTILE/POINT_REF_1 MUSCLE.CONTRACTILE/POINT_REF_2
INTYPE	MUSCLE.HILL/INPUT_CLASS
INNO	MUSCLE.HILL/INPUT_REF
FMAX	MUSCLE.CONTRACTILE/MAX_FORCE_PAR
LREF	MUSCLE.HILL/REF_LENGTH
VMAX	MUSCLE.CONTRACTILE/MAX_SHORT_VEL
FUNH	MUSCLE.CONTRACTILE/FORCE_VEL_FUNC
FUNL	MUSCLE.CONTRACTILE/ACTIVE_FORCE_FUNC
FUNV	MUSCLE.CONTRACTILE/MAX_VEL_FUNC
FUNP	MUSCLE.PASSIVE/PASSIVE_FORCE_FUNC
CESH	MUSCLE.CONTRACTILE/SHORT_SHAPE
CESHL	MUSCLE.CONTRACTILE/LENGTH_SHAPE
CEML	MUSCLE.CONTRACTILE/MAX_LOAD
SK	MUSCLE.CONTRACTILE/WIDTH_PAR
PEXM	MUSCLE.PASSIVE/REL_ELONG

Old keyword or variable	New element or attribute
PESH	MUSCLE_PASSIVE/SHAPE_PAR
RADIUS	MUSCLE_SEGMENT/RADIUS

11.13 EXTERNAL OUTPUT

Old keyword or variable	New element or attribute
EXTERNAL OUTPUT	SIGNAL.EXTERNAL_OUTPUT
NO	SIGNAL.EXTERNAL_OUTPUT/EXTERNAL_REF
PROGRAM	
Obsolete; only MATLAB is possible	
INTYPE	SIGNAL.EXTERNAL_OUTPUT/INPUT_CLASS
INNO	SIGNAL.EXTERNAL_OUTPUT/INPUT_REF
ID	SIGNAL.EXTERNAL_OUTPUT/NAME
OUTPUT	OUTPUT_CONTROL_SYSTEM/INPUT_REF
With INPUT_CLASS equal to SIGNAL	

12.1 OUTPUT CONTROL PARAMETERS

Old keyword or variable	New element or attribute
TSKIN	CONTROL_OUTPUT/TIME_STEP_KIN
KIN3 = KIN3VER Obsolete; version 5.2 format is generated	CONTROL_OUTPUT/WRITE_KIN
KIN3 = EXTENDED	CONTROL_OUTPUT/WRITE_KIN
COG	CONTROL_OUTPUT/WRITE_COG_MARKER
FEMESH	CONTROL_OUTPUT/WRITE_FEMESH
TSOUTPUT It is not possible to define ALL.	CONTROL_OUTPUT/TIME_STEP
DEBUG	CONTROL_OUTPUT/WRITE_DEBUG
TSRESTART Obsolete; restart is not possible anymore	
TIMESTEP	CONTROL_OUTPUT/WRITE_TIME_STEP

12.1 FILTER PARAMETERS

Old keyword or variable	New element or attribute
IGNORE	CONTROL_OUTPUT/FILTER_IGNORE
Can only be defined once.	
DEFAULT	
Obsolete	
PADDING	CONTROL_OUTPUT/PADDING_TIME
MOVECOMMAND	
Obsolete	

12.2 LINDIS

Old keyword or variable	New element or attribute
LINDIS	OUTPUT_BODY_REL
	OUTPUT_BODY_REL/SIGNAL_TYPE
SIGNAL_TYPE must be set equal to REL_POS	
SYS1 BODY1 X1 Y1 Z1	OUTPUT_BODY_REL/POINT_OBJECT_1
SYS2 BODY2	OUTPUT_BODY_REL/POINT_OBJECT_2/BODY
ID	OUTPUT_BODY_REL/OUTPUT_BODY/NAME
FILTERLIST	OUTPUT_BODY_REL/OUTPUT_BODY/FILTER

12.3 RELDIS

Old keyword or variable	New element or attribute
RELDIS	OUTPUT_BODY_REL
SYS1 BODY1 X1 Y1 Z1	OUTPUT_BODY_REL/POINT_OBJECT_1
SYS2 BODY2 X2 Y2 Z2	OUTPUT_BODY_REL/POINT_OBJECT_2
CHO	OUTPUT_BODY_REL/SIGNAL_TYPE
SIGNAL_TYPE must be set equal to REL_DISP (CHO = 1) or REL_POS (CHO = 0)	
ID	OUTPUT_BODY_REL/NAME
FILTERLIST	OUTPUT_BODY_REL/FILTER

12.4 LINVEL

Old keyword or variable	New element or attribute
LINVEL	OUTPUT_BODY
	OUTPUT_BODY/SIGNAL_TYPE
SIGNAL_TYPE must be set equal to LIN_VEL	
SYS BODY X Y Z	OUTPUT_BODY/POINT_OBJECT_1
IWO	OUTPUT_BODY/CRDSYS
ID	OUTPUT_BODY/NAME
FILTERLIST	OUTPUT_BODY/FILTER

12.5 DISVEL

Old keyword or variable	New element or attribute
DISVEL	OUTPUT_BODY_REL
	OUTPUT_BODY_REL/SIGNAL_TYPE
SIGNAL_TYPE must be set equal to DIST_VEL	
SYS1 BODY1 X1 Y1 Z1	OUTPUT_BODY_REL/POINT_OBJECT_1
SYS2 BODY2 X2 Y2 Z2	OUTPUT_BODY_REL/POINT_OBJECT_2
ID	OUTPUT_BODY_REL/NAME
FILTERLIST	OUTPUT_BODY_REL/FILTER

12.6 LINACC

Old keyword or variable	New element or attribute
LINACC	OUTPUT_BODY
	OUTPUT_BODY/SIGNAL_TYPE
SIGNAL_TYPE must be set equal to LIN_ACC	
SYS BODY X Y Z	OUTPUT_BODY/POINT_OBJECT_1
FX	OUTPUT_BODY/CORRECT_AX
FY	OUTPUT_BODY/CORRECT_AY
FZ	OUTPUT_BODY/CORRECT_AZ
IWO	OUTPUT_BODY/CRDSYS
ID	OUTPUT_BODY/NAME
FILTERLIST	OUTPUT_BODY/FILTER

12.7 ANGVEL

Old keyword or variable	New element or attribute
ANGVEL	OUTPUT_BODY
	OUTPUT_BODY/SIGNAL_TYPE
SIGNAL_TYPE must be set equal to ANG_VEL	
SYS BODY	OUTPUT_BODY/POINT_OBJECT_1
IWO	OUTPUT_BODY/CRDSYS
ID	OUTPUT_BODY/NAME
FILTERLIST	OUTPUT_BODY/FILTER

12.8 ANGACC

Old keyword or variable	New element or attribute
ANGACC	OUTPUT_BODY
	OUTPUT_BODY/SIGNAL_TYPE
SIGNAL_TYPE must be set equal to ANG_ACC	
SYS BODY	OUTPUT_BODY/POINT_OBJECT_1
IWO	OUTPUT_BODY/CRDSYS
ID	OUTPUT_BODY/NAME
FILTERLIST	OUTPUT_BODY/FILTER

12.9 FORCES

Old keyword or variable	New element or attribute
FOR For FOR = 3, 5 and 6	OUTPUT_RESTRAINT
NR	OUTPUT_RESTRAINT/RESTRAINT_LIST OUTPUT_RESTRAINT/GROUP_LIST
CHO	OUTPUT_RESTRAINT/EXTENDED
SYSNR Obsolete; included in the restraint reference	
ID	OUTPUT_RESTRAINT/NAME
FOR For FOR = 1, 2, 7, 8 and 9	OUTPUT_CONTACT
NR	OUTPUT_CONTACT/CONTACT_LIST
CHO	OUTPUT_CONTACT/EXTENDED
SYSNR Obsolete;	
ID	OUTPUT_CONTACT/NAME
FOR For FOR = 4	OUTPUT_BELT
NR	OUTPUT_BELT/INPUT_REF
CHO	OUTPUT_BELT/EXTENDED
SYSNR Obsolete;	
ID	OUTPUT_BELT/NAME

12.10 TORQU1

Old keyword or variable	New element or attribute
TROQU1	OUTPUT_RESTRAINT
SYS JOINT	OUTPUT_RESTRAINT/RESTRAINT_LIST
CHO	OUTPUT_RESTRAINT/EXTENDED
ID	OUTPUT_RESTRAINT/NAME

12.11 TORQU2

Old keyword or variable	New element or attribute
TORQU2	OUTPUT_RESTRAINT
SYS JOINT	OUTPUT_RESTRAINT/RESTRAINT_LIST
CHO	OUTPUT_RESTRAINT/EXTENDED
ID	OUTPUT_RESTRAINT/NAME

12.12 JOINT LOADS

Old keyword or variable	New element or attribute
JOINT LOADS	OUTPUT_RESTRAINT
SYS JOINT	OUTPUT_RESTRAINT/RESTRAINT_LIST
ID	OUTPUT_RESTRAINT/NAME

12.13 TYRES

Old keyword or variable	New element or attribute
TYRES	OUTPUT_CONTACT
NR	OUTPUT_CONTACT/CONTACT_LIST
ID	OUTPUT_CONTACT/NAME

12.14 CONSTRAINT LOADS

Old keyword or variable	New element or attribute
CONSTRAINT LOADS	OUTPUT_JOINT_CONSTRAINT
SYS JOINT	OUTPUT_JOINT_CONSTRAINT/JOINT
Separate requests are needed for joint constraint forces and torques.	
ID	OUTPUT/NAME
FILTERLIST	OUTPUT_JOINT_CONSTRAINT/FILTER
Different filters require different joint constraint load requests.	

12.15 JNTPOS

Old keyword or variable	New element or attribute
JNTPOS	OUTPUT_JOINT_DOF
SIGNAL_TYPE must be set equal to POS.	
SYS JOINT	OUTPUT_JOINT_DOF/JOINT
ID	OUTPUT_JOINT_DOF/NAME

12.16 JNTVEL

Old keyword or variable	New element or attribute
JNTVEL	OUTPUT_JOINT_DOF
SIGNAL_TYPE must be set equal to VEL.	
SYS JOINT	OUTPUT_JOINT_DOF/JOINT
ID	OUTPUT_JOINT_DOF/NAME

12.17 JNTACC

Old keyword or variable	New element or attribute
JNTACC	OUTPUT_JOINT_DOF
SIGNAL_TYPE must be set equal to ACC.	
SYS JOINT	OUTPUT_JOINT_DOF/JOINT
ID	OUTPUT_JOINT_DOF/NAME

12.18 MARKERS

Old keyword or variable	New element or attribute
MARKERS	OUTPUT_MARKER
SYS BODY X1 Y1 Z1	OUTPUT_MARKER/CRDSYS_OBJECT_1

12.19 MUSCLES

Old keyword or variable	New element or attribute
MUSCLES	OUTPUT_MUSCLE
NR	OUTPUT_MUSCLE/MUSCLE
ID	OUTPUT_MUSCLE/NAME

12.20 ENERGY

Old keyword or variable	New element or attribute
TYPE	
KINETIC	OUTPUT_ENERGY_FE_MODEL/KINETIC
DISSIPATION	OUTPUT_ENERGY_FE_MODEL/DISSIPATION
DISSIPATION.STR	OUTPUT_ENERGY_FE_MODEL/ DISSIPATION_RAYLEIGH
DISSIPATION.MAT	OUTPUT_ENERGY_FE_MODEL/ DISSIPATION_MATERIAL
DISSIPATION.PLA	OUTPUT_ENERGY_FE_MODEL/DISSIPATION_PLASTIC
DISSIPATION.IMM	OUTPUT_ENERGY_FE_MODEL/DISSIPATION_IMM
INTERNAL	OUTPUT_ENERGY_FE_MODEL/INTERNAL
INTERNAL.ELA	OUTPUT_ENERGY_FE_MODEL/INTERNAL_ELASTIC
INTERNAL.HRG	OUTPUT_ENERGY_FE_MODEL/INTERNAL_HOURLASS
INTERNAL.IMM	OUTPUT_ENERGY_FE_MODEL/INTERNAL_IMM
EXTERNAL	OUTPUT_ENERGY_FE_MODEL/EXTERNAL
EXTERNAL.FRC	OUTPUT_ENERGY_FE_MODEL/EXTERNAL_FORCES
EXTERNAL.CNT	OUTPUT_ENERGY_FE_MODEL/EXTERNAL_CONTACT
CONTACT	
Is the same as external_contact	
HOURLASS	
Is the same as internal_hourglas	
TOTAL	OUTPUT_ENERGY_FE_MODEL/TOTAL
BALANCE	OUTPUT_ENERGY_FE_MODEL/BALANCE
ALL	OUTPUT_ENERGY_FE_MODEL/ENERGY_ALL

Old keyword or variable	New element or attribute
FEM MODELS	OUTPUT_ENERGY_FE_MODEL/TOTAL
SUM FEM MODELS	OUTPUT_ENERGY_FE_MODEL/SUM_FE_MODEL

12.21 INJURY PARAMETERS

Old keyword or variable	New element or attribute
INJURY PARAMETERS	

12.21.1 HIC

Old keyword or variable	New element or attribute
HIC	INJURY.HIC
SEQNR	INJURY.HIC/OUTPUT_ACC
Refers to an OUTPUT_BODY output request with SIGNAL_TYPE = LIN_ACC	
WINDOW	INJURY.HIC/TIME_WINDOW
ID	INJURY.HIC/NAME

12.21.2 GSI

Old keyword or variable	New element or attribute
GSI	INJURY.GSI
SEQNR	INJURY.GSI/OUTPUT_ACC
Refers to an OUTPUT_BODY output request with SIGNAL_TYPE = LIN_ACC	
ID	INJURY.GSI/NAME

12.21.3 CON3MS

Old keyword or variable	New element or attribute
CON3MS	INJURY.CONTIGUOUS_3MS
SEQNR	INJURY.CONTIGUOUS_3MS/OUTPUT_ACC
Refers to an OUTPUT_BODY output request with SIGNAL_TYPE = LIN_ACC	
ID	INJURY.CONTIGUOUS_3MS/NAME

12.21.4 CUM3MS

Old keyword or variable	New element or attribute
CUM3MS	INJURY.CUMULATIVE_3MS
SEQNR	INJURY.CUMULATIVE_3MS/OUTPUT_ACC
Refers to an OUTPUT_BODY output request with SIGNAL_TYPE = LIN_ACC	
ID	INJURY.CUMULATIVE_3MS/NAME

12.21.5 TTI

Old keyword or variable	New element or attribute
TTI	INJURY.TTI
LINE1	INJURY.TTI/OUTPUT_ACC_1
Refers to an OUTPUT_BODY output request with SIGNAL_TYPE = LIN_ACC	
LINE2	INJURY.TTI/OUTPUT_ACC_2
Refers to an OUTPUT_BODY output request with SIGNAL_TYPE = LIN_ACC	
LINE3	INJURY.TTI/OUTPUT_ACC_2
Refers to an OUTPUT_BODY output request with SIGNAL_TYPE = LIN_ACC	
COMP1	INJURY.TTI/COMP_1
COMP2	INJURY.TTI/COMP_2
COMP3	INJURY.TTI/COMP_3
ID	INJURY.TTI/NAME

12.21.6 VC

Old keyword or variable	New element or attribute
VC	INJURY.VC
LINE	INJURY.VC/OUTPUT_DIST_VEL (INJURY_VC/OUTPUT_DIST IN 6.0.1)
Refers to an OUTPUT_BODY_REL output request with SIGNAL_TYPE = DIST_VEL	
SZ	INJURY.VC/HALF_TORSO_WIDTH (INJURY_VC/CHEST_DEPTH IN 6.0.1)
ID	INJURY.VC/NAME

12.21.7 FNIC

Old keyword or variable	New element or attribute
FNIC	INJURY.NIC_FORWARD
SEQNR	INJURY.NIC_FORWARD/OUTPUT_MOMENT INJURY.NIC_FORWARD/OUTPUT_FORCE
Two constraint load references are needed because joint constraint forces and torques require separate OUTPUT_JOINT_CONSTRAINT requests	
TYPE	INJURY.NIC_FORWARD/COMP
FILTER	
Obsolete; FILTER is selected in referred constraint load output request	
ID	INJURY.NIC_FORWARD/NAME

12.21.8 NIJ

Old keyword or variable	New element or attribute
SEQNR	INJURY.NIJ/OUTPUT_MOMENT INJURY.NIJ/OUTPUT_FORCE
Two constraint load references are needed because joint constraint forces and torques require separate OUTPUT_JOINT_CONSTRAINT requests	
TYPE	INJURY.NIJ/NIJ_TYPE
MYC	INJURY.NIJ/BENDING_TORQUE
FZC	INJURY.NIJ/AXIAL_FORCE
ECC	INJURY.NIJ/ECCENTRICITY
MFILTER	
Obsolete; FILTER is selected in referred constraint load output request	
FFILTER	
Obsolete; FILTER is selected in referred constraint load output request	
ID	INJURY.NIJ/NAME

12.21.9 CTI

Old keyword or variable	New element or attribute
CTI	INJURY.CTI
SEQNR1	INJURY.CTI/OUTPUT_ACC
Refers to an OUTPUT_JOINT_CONSTRAINT output request with SIGNAL_TYPE = LINC_ACC	
SEQNR2	INJURY.CTI/OUTPUT_DISP
Refers to an OUTPUT_JOINT_CONSTRAINT output request with SIGNAL_TYPE = DIST_VEL	
AINT	INJURY.CTI/INTERCEPT_ACC
DINT	INJURY.CTI/INTERCEPT_DISP
AFILTER	
Obsolete; FILTER is selected in referred constraint load output request	
DFILTER	
Obsolete; FILTER is selected in referred constraint load output request	
ID	INJURY.CTI/NAME

12.21.10 FFC

Old keyword or variable	New element or attribute
FFC	INJURY.FFC
SEQNR	INJURY.FFC/OUTPUT_FORCE
Refers to an OUTPUT_JOINT_CONSTRAINT output request	
FILTER	
Obsolete; FILTER is selected in referred constraint load output request	
ID	INJURY.FFC/NAME

12.21.11 TI

Old keyword or variable	New element or attribute
TI	INJURY.TI
SEQNR	INJURY.TI/OUTPUT_MOMENT INJURY.TI/OUTPUT_FORCE
Two constraint load references are needed because joint constraint forces and torques require separate requests.	
MCR	INJURY.TI/BENDING_TORQUE
FCR	INJURY.TI/COMPRESSIVE_FORCE
FILTER	
Obsolete; FILTER is selected in referred constraint load output request	
ID	INJURY.TI/NAME

12.21.12 TCFC

Old keyword or variable	New element or attribute
TCFC	INJURY.TCFC
SEQNR	INJURY.TCFC/OUTPUT_FORCE
Refers to an OUTPUT_JOINT_CONSTRAINT output request	
FILTER	
Obsolete; FILTER is selected in referred constraint load output request	
ID	INJURY.TCFC/NAME

12.21.13 LOAD CELL

Old keyword or variable	New element or attribute
LOAD CELL	INJURY.LOAD_CELL
SEQNR	INJURY.LOAD_CELL/OUTPUT_LOAD
Refers to an OUTPUT_JOINT_CONSTRAINT output request	
TYPE	
Obsolete; load type follows from referred constraint load signal request	
DIR	INJURY.LOAD_CELL/COMP INJURY.LOAD_CELL/SELECT_OBJECT
Use both COMP and SELECT_OBJECT. Only load selected by SELECT_OBJECT is given	
FILTER	
Obsolete; FILTER is selected in referred constraint load output request	
ID	INJURY.LOAD_CELL/NAME

13 FUNCTIONS

Old keyword or variable	New element or attribute
FUNCTIONS	FUNXTION.XY
NP	
Number of coordinate pairs needs not to be specified.	
XI FI	FUNCTION.XY/XY_PAIR

14.1 ORIENTATIONS, IOR=1

Old keyword or variable	New element or attribute
ORIENTATIONS	ORIENTATION.SUCCESSIVE_ROT
NO, ELJ, T	
Obsolete;	
ICH, BODY, IDUM	
Obsolete;	
IOR	
Obsolete;	
PAR1	ORIENTATION.SUCCESSIVE_ROT/AXIS_1
PAR2	ORIENTATION.SUCCESSIVE_ROT/R1
PAR3	ORIENTATION.SUCCESSIVE_ROT/AXIS_2
PAR4	ORIENTATION.SUCCESSIVE_ROT/R2
PAR5	ORIENTATION.SUCCESSIVE_ROT/AXIS_3
PAR6	ORIENTATION.SUCCESSIVE_ROT/R3

14.1 ORIENTATIONS, IOR=2

Old keyword or variable	New element or attribute
ORIENTATIONS	ORIENTATION.SCREW_AXIS
NO, ELJ, T	
Obsolete;	
ICH, BODY, IDUM	
Obsolete;	
IOR	
Obsolete;	
PAR1, PAR2, PAR3	ORIENTATION.SCREW_AXIS/SCREW_AXIS
PAR4	ORIENTATION.SCREW_AXIS/ANGLE

14.1 ORIENTATIONS, IOR=3

Old keyword or variable	New element or attribute
ORIENTATIONS	ORIENTATION.MATRIX
NO, ELJ, T	
Obsolete;	
ICH, BODY, IDUM	
Obsolete;	
IOR	
Obsolete;	
PAR1, PAR2, ..., PAR9	ORIENTATION.MATRIX/MATRIX

14.1 ORIENTATIONS, IOR=4

Old keyword or variable	New element or attribute
ORIENTATIONS	ORIENTATION.VECTOR
NO, ELJ, T	
Obsolete;	
ICH, BODY, IDUM	
Obsolete;	
IOR	
Obsolete;	
PAR1, PAR2, PAR3	ORIENTATION.VECTOR/VECTOR_1
PAR4, PAR5, PAR6	ORIENTATION.VECTOR/VECTOR_2