RM2000

Static and Dynamic Analysis

of Space frames

Release notes - 8.63.03

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1 Important notes

1.1 Tdv2000 applications require a basic installation

The basic part of Tdv2000 applications has been separated from the application (e.g. RM2000, GP2000). The new basic installation (BaseWin) contains the common files for all Tdv2000 program systems and the hardlock driver for the hardlock security system. Therefore, you must install the package "BaseWin" before installing any application.

Existing RM2000/GP20000 installation should be uninstalled and replaced by the Basic installation and the single installation of RM2000 and GP2000.

Please always uninstall old program versions before installing a new program release!

1.2 Unit dependency of Import/Export of RM2000

Export and Import of RM2000 database is now UNIT dependent!
In this case:

- Import of PARTIAL project, created by RM2000 Version older than 8.27.02 is possible, but the UNITS in the user project have to be set first to basic units (m, KN) first. Thus, the IMPORT can be started!
- Import of COMPLETE project, created by RM2000 Version older than 8.27.02 is possible WITHOUT any PROBLEMS!

1.3 Data conversion from RM7 to RM2000

It is possible to export most of the important input data prepared for a project using RM7 into the RM2000 database directly.

The RM7 project directory must be opened before starting the data transfer and a SYSAK file run that will activate the whole structural system. Only the materials and cross-sections used in the project will be transferred.

Attention:	**For exporting data from RM7 use at least release 7.52.02. If it was not delivered with RM2000, order it at your support office! Please refer to the manual "RM2000 user guide" for further details!**

2 Licence files

In order to run RM2000 and GP2000, a user must have a valid Tdv licence file (*.lic). The Tdv licence file is directly connected to a specific hardlock (dongle).
The licence is valid until such time as the user rights are upgraded or the validity of a time limited version has expired.

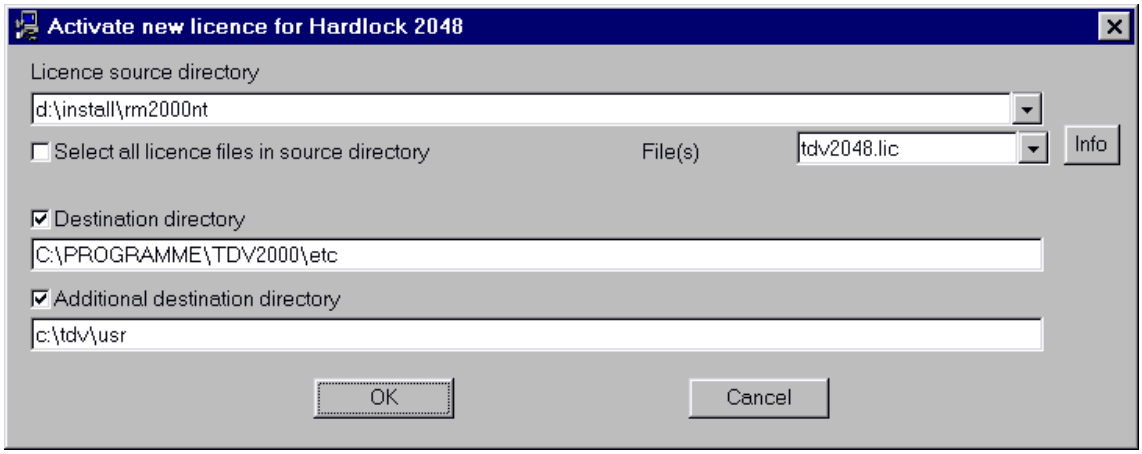
New RM2000/GP2000 users as well as existing RM7 users must get a licence file from Tdv or one of the support offices in order to run the latest program versions of RM2000 or GP2000.

The licence will either be supplied:

-On a CD e.g. in directory CD:\install\licence or CD:\install*program*
-On a Floppy disk
-By Email attachment

Cd-Rom:
Choose on the main dialogue `<TDV2000 components>,` select item "**Licence**" and press `<OK>.`

File on disk or floppy drive:
Open the Windows Explorer, change to the licence directory and double click onto the desired licence file.



Choose "**Select all licence files in source directory",** if you want to copy several licence files in one task.

If there is exists an active older program installation (Tdvshell and any older application like RM7, GEOP, M3, …) , then the licence files will be activated also in the displayed "Additional destination directory". Press `<OK>` to finish the update.

Alternatively the licence manager can be started over the Windows start menu:

Select: **Start menu ⇨ Tdv2000 ⇨ Licence activation**

2. Activate the licence manually

Copy these licence file(s) into the "Tdv2000\etc" directory:

e.g. from CD drive D: to c:\program files\tdv2000\etc

d:\install\rm2000nt\tdv2048.lic ⇨ c:\program files\tdv2000\etc\tdv2048.lic

Attention: Server licence files are numbered with tdv19xx.lic. If you want to activate the server licence, please copy the licence file also to the a file named "tdv.lic":

e.g. from CD drive D: to c:\program files\tdv2000\etc

d:\install\rm2000nt\tdv1911.lic ⇨ c:\program files\tdv2000\etc\tdv1911.lic
d:\install\rm2000nt\tdv1911.lic ⇨ c:\program files\tdv2000\etc\tdv.lic

3 RM2000 Release history

3.1 Version 8.63.03

- Rm9/RM2004 export added
- New loading type : Variable load along element

3.2 Version 8.63.01, 8.63.02

- Minor changes

3.3 Version 8.62.01, 8.62.02

- Minor changes

3.4 Version 8.62.01

- Material table added for Finish standard
- Calculation rule CQCX added: Result values including their signs will be added together, using CQC rule

3.5 Version 8.60.01

- Australian design code improved.

3.6 Version 8.59.02

- Minor changes

3.7 Version 8.59.01

- Minor changes

3.8 Version 8.58.01

- Australian materials for design code AS5100 activated.

3.9 Version 8.57.03

- New module “ActOn” and “ActOff” are available to allow multiple activation/deactivation of elements.

3.10 Version 8.57.02

- TCL export: error (LCSUM, only in 8.57.01) corrected.

3.11 Version 8.57.01

- Minor changes

3.12 Version 8.56.06

- Minor changes

3.13 Version 8.56.05

- Minor changes

3.14 Version 8.56.03

- Calculation for cross shear stress for composite sections

3.15 Version 8.56.02

- New live load macro for Hongkong Design Code 1997

3.16 Version 8.56.01

- Minor changes

3.17 Version 8.55.01

- Minor changes

3.18 Version 8.54.02

- New module LiveSet for non-linear live load calculation

3.19 Version 8.54.01

- AASHTO LRFD design code with interims up to the year 2000 activated
- Reinforced concrete design module improved

3.20 Version 8.53.01

- Minor changes

3.21 Version 8.52.01

- Minor changes

3.22 Version 8.51.06

- Novell network release of V8.51.05.
  Works only with Windows machines running a Novell client and the appropriate server licence!

3.23 Version 8.51.05

- Licence access for steel design improved

3.24 Version 8.51.04

- Indian design code activated

3.25 Version 8.51.03

- Added feature to configure TCL export(recalc window)

3.26 Version 8.51.01

- New module “PrChk” for principle stress calculation
- Added feature to create master and slave geometry tendon profiles

3.27 Version 8.50.02

- Added possibility to have different cross sections G-Modules for shear stresses due to Mx, Qy, Qz.
- Creep and shrinkage calculation is numerically extended to cover more exactly “creep of creep” effects (it is possible to decrease number of time steps).
- Extensions of British Standard live load calculation
- Added possibility to force TCL-export with cross section values even if cross sections are assigned.

3.28 Version 8.50.01

- ILM pre-processor integrated into RM2000

3.29 Version 8.49.02

- Action Sup2D (copy superposition file results to 2D result superposition file) added
- Quick help for buttons and symbols integrated
- Reorganisation of graphic interface, separate menu for SCRIPTS
- Easy access to numeric result post-processing (former “List-Gen”) und RESULTS

3.30 Version 8.49.01

- Actions for diagram plot of internal forces, deformations, stresses and reinforcement amount added
- Additionally option “Diagram” added to the “Result/Load case” and “Result/Superposition” pad.
- Update of graphical resolution

3.31 Version 8.48.03

- Actions UltChk and UltRein modified
- Actions CracChk and RobuChk added to “Check actions”
- WindX option added to the AeroClass definition
- Load set group “Special” added for pier dimensioning
- Load set “Mean drag for longitudinal wind component” added to the load set group “Wind load”
- Parameters for additional group added

3.32 Version 8.48.02

- Update of Austrian design code

3.33 Version 8.47.01

- Update of Hungary design code

3.34 Version 8.46.06

- Action LiveL supplemented with element number if the load train should be set to the expected min/max position of the selected element
- Action PlElTnd : tendons with their nominal and duct area are drawn in scale
- Special external tendon features activated.

3.35 Version 8.46.05

- Pre-processor for suspension bridges in structure-special
- Compensation of element length macro in structure-special
- Demonstration of new postprocessor look (TDF) in structure-special
- New chapter for cable-stayed bridges in user manual
- TCL export error (manual perimeter input) corrected

3.36 Version 8.46.04X

- Beta versions

3.37 Version 8.46.02 – 8.46.03

- Minor changes

3.38 Version 8.46.01

- New module “PlWind” – plotting of wind input data

3.39 Version 8.45.04

- RM2000.Exe rebuilt due to a hardware error.

3.40 Version 8.45.03

- New module “TndDist” – calculation of tendon overlapping
- New module “PlElTnd” – plot cross section with marked tendon positions
- New macro for live load combination for British Standard

3.41 Version 8.45.02

- Tendon position view for each CS (element begin and end) along the tendon added (Structure / Tendon / 3D - Information Icon)
- New action : CS plot with all tendons, belonged to, (PlElTnd) has been added to the group List/Plot in menu Construction schedule/Action

3.42 Version 8.45.01

- Plot option “PLASC” in PlSys editor modified
- New plot option “PLHEAD” for PlSys added (capture “Free plot”)
- Creep and shrinkage variables corrected (cs-di45.rmd)
- Principle tensile stress check according to DIN Standard save results in comma-delimited database

3.43 Version 8.44.05

- Additional constraints modified (more lines input for variable load cases added to enable the condition from sum of variable load cases)
- Max number of cross-section points increased (6000)
- Composite cross-section values represented (“Properties/CS/Values” resp. “Properties/CS/Comp”)
- Material file according DIN Standard Code corrected
- External tendon calculation correction
- Principle tensile stress check according to DIN Standard added (Actions PrDinU and PrDinS added to Stage/Action modules)

3.44 Version 8.44.04

- Text file updated

3.45 Version 8.44.02-8.44.03

- Minor changes

3.46 Version 8.44.01

- Additional Constraints modified
- Composite cross section modified (“Properties/CS”)
- Cross section shear stresses calculation added (graphical presentation “Properties/CS” and stage action “PlShear”)
- New LoadSet DISCOR added (cable end displacement correction)
- Wind input modified (choice of integration type and calculation rule)
- Special setting button added (Tdv mode superposition method)
- Option “Join” added for stage action UltRein
- Option “Subspace” added for stage action Eigen

3.47 Version 8.43.03- 8.43.05

- Minor changes

3.48 Version 8.43.02

- Module “TndChk” and “TndFib” extended for superposition file as well
- “Properties/CS”: Long file names possible (max. 16 characters)

- New module “CabSag” for taking effects of cable sagging in linear calculation
- “PlTens”: Added possibility to plot tendon forces from superposition files
- “Stage/Tendon/Info”: Added possibility to plot tendon forces from superposition files
- Shear capacity: New release of British standard

3.49 Version 8.42.02

- Minor changes

3.50 Version 8.42.01

- Additional option JOIN added to the action UltChk to consider results of partial elements in case of composite elements
- The action PlUlt draws the ultimate load state diagram also for partial elements of the composite elements
- Additional option EXP added to the action DoList to print out the results in E-format, if the values overstep the normal F-format
- Structure local axis will be drawn also for zero-length elements (PlSys – option SYSO)
- Values, drawn by option PLASC can have GLOBAL or LOCAL direction (PlSys)
- Additional options EXP/NOEXP added in PlSys editor to choose between E- and F-format of the written values.
- Information about units added to the plot file of the action PlInfl, screen plot Results/ PlInfl and to the list file of the action DoList/Influence file.
- New possibility of aero class definition added: couple of constants (factor Cd and its derivation Cd’) for all directions.
- Additional option for calculation of cross section shear area
- TCL import/export unit error corrected (load sets GM, G0)

3.51 Version 8.41.03

- TCL Export for module CALCELONG
- List for module RespS
- Program doesn’t stop anymore in the RECALC procedure, if a warning or an error has been detected
- Elem/Info completed
- Minor changes

3.52 Version 8.41.01-8.41.02

- Minor changes

3.53 Version 8.40.06

- Novell networks Release. Does not work on non Novell machines.

3.54 Version 8.40.05

- New module “Reload” – redistribution of forces for non-tension elements at cross section level
- Calculation of Shear-Lag effect changed to pure stress redistribution

3.55 Version 8.40.03-8.40.04

- Minor changes

3.56 Version 8.40.02

- Element class added in “Elem” “Reinf” pad
- Subtraction with (b) input moved from “Elem” “Time” to “Elem” “Reinf”

3.57 Version 8.40.01

- Split and Join added in “Additional Constraint“ for superposition files
- Correction of join results in “DoList” for load cases
- Additional options in PLSYS for representing of stresses (FIBSUP)
- Minor improvements in lists and optimisation

3.58 Version 8.39.07

- Option “Optimise” added to the menu “File” for optimisation of calculation time
- Info text for generation of default data base added

3.59 Version 8.39.06

- Option “Update/Ignore” added to the stage calculation action “Restart”

3.60 Version 8.39.04-8.39.05

- New load set group „Normal forces (stiffness change)“ for non-linear II. order theory calculation added
- Option “Initialise the element results in loading case” added to the load set “Element removing”
- Option “Load set can be increased” added to the Load case input
- New module in stage calculation actions “Buckle” : Buckling analyse
- New module in stage calculation actions “Failure” : Buckling analyse till failure
- New possibility of separately stage action start (not only in RECALC procedure). Therefore the option “Run stage action” in Result/Script menu has been added

3.61 Version 8.39.03

- New Icon „Skip“ added to Construction Schedule/Stage/Action menu
- Option “Skip” also added to existing Icon “Renumber” in Construction Schedule/Stage menu
- Additional option added to the “Delete” Icon for all menus

- New option “Plot to file” added to Result/PlInfl,PlCrSh,PlSys menu with direct access to CRT Icon
- Minor changes and error correction in Structure/Element/Material list for the case when non standard units were applied but the value of Alpha did not change accordingly

3.62 Version 8.38.05-8.39.02

- Minor changes

3.63 Version 8.38.04

- Width and height of composite section for wind load corrected.
- Extended printout for shear check (AAHSTO)
- Minor changes and error corrections in import/export with non-standard units
- LIST:GEN extension for selective result list of load cases, superposition files and influence lines

3.64 Version 8.38.03

- Use of combination codes “SupOrX” and “SupAndX” for superposition files corrected
- New command “PLSCFAC” in plot file editor : Multiplies the current scales (even negative)
- New module in stage check actions “FibIIRe” : Dimensioning for FibII
- New output format for FibChk module (for combination output)

3.65 Version 8.38.01-8.38.02

- Update and reorganizing of input possibilities within the action pads (Loads and Construction schedule / stages)
- Additional structural tools in new module “Special” in menu structure
- Graphic support for definition of tendon geometry relative to cross section points
- Ultimate Load Check: consider the initial strain of pre- or post-tensioned tendons
- Modified functionality of load combinations (LCOMB). Please review existing data (factors for “favourable” and “unfavourable”) after installation of latest version
- Modified consideration of “favourable” / “unfavourable” in the load combination

3.66 Version 8.37.05

- New module “Wind” turbulence fluctuation with aero dynamics damping and stiffness
- New module “FFT” power spectra calculation based on Fast Fourier Transformation

3.67 Version 8.37.04

- Wind dynamics : Aero elastic cross section coefficients Drag/Lift/Moment

3.68 Version 8.37.02-8.37.03

- Minor changes

3.69 Version 8.37.01

- Ultimate load check calculation corrected

3.70 Version 8.36.05

- Supporting sub licences of RM2000 (e.g. RM2000 –lic:a for input only)
- Limit for load cases extended to 4096

3.71 Version 8.36.04

- New module “UltRein” and “ReinIni” for reinforcement concrete design
- Limit for stress points extended to 8

3.72 Version 8.36.03 – 8.36.02

- Minor changes

3.73 Version 8.36.01

- Added feature tendon geometry relative to cross section points
- Split and Join added in module “PLSYS” and (full part/composite result)
- Split and Join added in “Additional Constraint“
- Cross section definition extended with “normal/horizontal/vertical”

3.74 Version 8.35.04-8.35.05

- Minor changes

3.75 Version 8.35.03

- Plotting of cable action improved

3.76 Version 8.35.02

- Structural optimisation is available (Additional constraint : Module “Restart”)
- Wind dynamic calculation added : Excitation/Power spectra (Module “PowerS”)
- External tendon disassembly
- Load manager can split primary/secondary effects
- 3D element preview with hidden lines and filling
- Tendon results can be optionally stored in envelope files
- Global action date added to construction schedule

3.77 Version 8.35.01

- Added feature to stress tendons several times in construction schedule
- Cross section nodes can be rotated about any reference point
- Added listed output of generalised masses and the norm of eigen vector

3.78 Version 8.34.05-8.34.06

- Minor changes

3.79 Version 8.34.04

- New material file Astho Standard

3.80 Version 8.34.03

- New Material files Önorm Standard 4700, British Standard 5400 and Honk Kong Standard 5400

3.81 Version 8.34.02

- Minor changes

3.82 Version 8.34.01

- Tendon results (primary and secondary forces) can be stored optionally into data-base. See recalc window(Store tendon results).
- New module FibII : Calculation of stresses due to state II (Cracked concrete).
- New module FibTnd: Print out of normal stresses and forces in tendon for two load cases (t-0, t-infinity).
- New module TndChk: Control of stresses in tendons.
- New module ShChk: Shear capacity check
- Calculator engine supports local variables in formula and in tables:

  Example:
  Name : XXX(a,b)
  Expression : 2*a+b

- Data base locking activated : Just one application can access the database at one time to avoid data loss.

3.83 Version 8.32.04

- Minor changes

3.84 Version 8.32.03

- Possibility in module “RESULTS”-“Load case” and “Envelope“ to print out the result list for certain elements respectively nodes (button ‘Print’).
- Module Tint – Results in List file and Plot file are unit consistent.
- Module UltChk – Results in List file and Plot file are unit consistent.
- Minor changes

3.85 Version 8.32.02

- Basic installation separated from RM2000/GP2000. The “BaseWin” package must be installed before any application installation.
- Possibility in module “RESULTS” : “Load case” and “Envelope“ to search Min/Max values between certain element/node series and element type.
- Element type name “Damper-Spring” changed to “Viscous-Damper”. The menu position has been moved from spring element group to special element group.
- Element type “Damper-Spring” has been inserted to the special element group.

3.86 Version 8.32.01

- Export Tcl includes plot files
- New module “PLOULT” activated (element N, My, Mz interaction diagram)

3.87 Version 8.31.12 (Partial updated version)

- Input only version

3.88 Version 8.31.02-8.31.04

- Minor changes

3.89 Version 8.31.01

- Convergence of non linear constraint method approved (Subspace error minimized)

3.90 Version 8.30.07-8.30.08

- Minor changes

3.91 Version 8.30.06

- Report input modified for Superposition files
- Element switch for fibre stress check(‘Element-Reinf’) is considered now at plotting of fibre stresses too.

- Minor changes

3.92 Version 8.30.05

- Results for partial elements of composite structure will be printed out by the module "DoList" (load cases and superposition)

3.93 Version 8.30.04

- Thermal coefficient is unit consistent

3.94 Version 8.30.03

- One part from composite element can be composite self (composite with composite)
- Additional Construction Stage Constraints implemented (Main/Construction Schedule/AddCon)
- Module "Restart" implemented (recalculate if constraint not sufficient)

3.95 Version 8.29.04

- Option "Skip Construction Stage" and "Skip Construction Stage Action" implemented
- Plot macros improved
- Project Defaults help implemented
- Element configuration possibility added for:

    - Fibre Stress Check
    - Ultimate Load Check
    - Shear Capacity Check
    - Reinforcement Concrete Design

- Number of iteration for "Ultimate Load Check" increased to 100
- Printing of plot files improved for original scaling

3.96 Version 8.29.03

- Result plot for spring elements available
- Stress/strain graph (material) added

3.97 Version 8.29.02

- Excel export for English operation system improved

3.98 Version 8.29.01

- Defaults for material, cross section and variables are available in TCL files (*.rmd)
- New menu item File/Default adds default materials, cross sections and variables in current project.
- Fibre stress list modified
- Module Grout produces list output
- Macro input for plot profiles
- Module Creep performance optimised

3.99 Version 8.28.03-8.28.05

- Printing of plotfiles improved

3.100 Version 8.28.02

- Generating of plotfiles improved

3.101 Version 8.28.01

- Minor changes

3.102 Version 8.27.04

- Minor changes

3.103 Version 8.27.03

- Option composite result : Split for command do list added

3.104 Version 8.27.02

- Export and Import of RM2000 database is now UNIT dependent!
  In this case:
  - Import of PARTIAL project, created by RM2000 Version older than 8.27.02 is possible, but the UNITS in the user project have to be set first to basic units (m, KN). Afterwards the IMPORT can start!
  - Import of COMPLETE project, created by RM2000 Version older than 8.27.02 is possible WITHOUT any PROBLEMS!
- Module PLOT is now UNIT dependent!

3.105 Version 8.27.01

- Module “TempVar” is available (variable temperature over cross sections)

- TCL – import / export extension
- AASHTO special loading with 2 concentrated for M_z
- Shear lag property is available

3.106 Version 8.26.03

- Windows-NT/2000: Problems with abnormal program aborts in the graphical user interface solved.
- Module Live Load: Longitudinal and centrifugal influence line calculation added (Macro1, Macro2)
- Module Pre-stressing : "Primary State" effect work correctly with any pre-stressing input order.

3.107 Version 8.26.02

- New module <TStop>: Specific feature for handling time dependent effects within the construction schedules. Time differences between the erection of different sub structures can be specified.
- New module <UpdEmod>: Time dependent Young's modulus according to e.g. CEB-FIB90.
- New User units : User can specify different units for input and output (not for all input windows available in this release).
- Module <SupAdd> corrected.

3.108 Version 8.26.01

- Load combination <Lcomb> increased to 24

3.109 Version 8.25.11

- Non-linear material <cracked concrete> is activated.

3.110 Version 8.25.7 …. 8.25.10

- Non-linear material <cracked concrete> is activated.
- Load combination <favourable/unfavourable factors> – bug is fixed.
- Ultimate limit-state is documented.
- Tendon position <relative to node > is activated.
- Server Hardlock logout is implemented (>8.25.08).
- Hardlock existence check <once per minute> is activated(>8.25.08).

3.111 Version 8.25.06

- Element reinforcement input is activated.
- Structural listing 'struct.lst' is redone.
- Order in properties menu is changed.
- Order in tendon menu is changed .

3.112 Version 8.25.05

- Minor changes

3.113 Version 8.25.04

3.113.1 RM2000 Database conversion

This release contains a new database. The user can no longer access old projects stored in RMDATA##.RM8 with the new release. The new database is stored in the files named RM-BIN##.RM8.

How to convert projects defined with the old database?

- Start the program and choose the project directory path
- Open the project
- Type "dbver200" in the command line and hit return
- The program automatically converts the binary database for the complete structure (rmdata01.rm8 – rmdata04.rm8 into rm-bin01.rm8 – rmbin04.rm8) into the new database.
- The full calculation will be made on selection of ⇧RECALC

3.113.2 Recalc Window

The user is able to control the fibre stress calculation with three check boxes

- Composite Section including the pre-stressing steel area * modular ratio
- Actual cross section with reduction for ungrouted ducts
- Calculation internal forces and stresses for modified orientation of cross sections.

3.113.3 New Action in Construction Schedule (GROUT)

The action "GROUT" in module ⇧CONSTRUCTION STAGE ⇨STAGE ⇩Tendon has been moved to ⇧CONSTRUCTION STAGE ⇨STAGE ⇩Action.