November 2019 technet GmbH, Pestalozzistraße 8, 70563 Stuttgart, Germany



### 1 Installing

- Please note that installing Easy Release 2020 will not overwrite an older (2019, 2018, ...) existing installation of Easy. You can use Easy 2020 and an older release of Easy on the same computer.
- Easy Release 2020 requires a new password!

### 2 System Requirements

Operating systems:

- Windows 10 (current service pack) 64-bit
- Windows 8.1 (current service pack) 64-bit
- Windows 8 (current service pack) 64-bit
- Windows 7 (current service pack) 64-bit

Minimum Hardware:

• A graphic card with an OpenGL accelerator is strongly recommended.

#### 3 General

• GEDViewer/BeamEditorViewer: The viewers are running without dongle. Saving and exporting do not work. In the EASY setup you can choose whether program icons should be created on the desktop or not.



• New Rhino plugin (BRep2Easy): Brep2Easy is the central command in the new Plugin provided by technet. With this command one or more surfaces or polysurfaces can be transferred into a common ein-file and into their corresponding triangle (dre) and polygon files (eck). BRep2Easy requires an Easy.R license which is automatically included in Easy.Vol.





### 4 EasyShell

- Help system: Support of Adobe Acrobat full version.
- Optimization of the synchronization of the project file easy.ini.
- The determination of the figure of equilibrium is now possible with a new iterative solver. The new solver is installed in the programs StatikD, VolstaD and BeamD. In the modules "Statical Analysis" and "Volume Statical Analysis" the solver can be chosen in the EasyShell.



The option for the new calculation method in Easy Beam module must be set as shown:

Eesm Editor - D/(Eesy)/2020		D ×
Project Edit View Load Case Result Report Programs Opt	ns Help	
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Brn Lavy	Pasidas	* Ø)
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Loadgen	Karakara and a second sec	
Beerr3D	•	
Beam3D/		
BearrD	•	
Bm_Oxk	•	
Brn_Easy	•	
	r Conbination	
LGSum	• •	
Hide unity	ortant Parameters	
Solver	Classic Solver (Ream3D/Beam3D/)     New Read/w Solver (Ream3D)	
Project Explorer		
	Beam Editor: Project path: D:\Easy\2020	
	Name Killer: Roady.	

The advantages of the new iterative solver are:

Based on the approximate values, the solution is achieved in many small steps. This allows, for example, the iterative adaptation of wind loads but also the observance of conditions of equal force values in many pieces of cables (slip cables).

Only the principal diagonal elements of the stiffness matrix are used for the determination of the unknowns. Large non-linear equation systems can be solved.

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Slip cables can easily modelled (see program Ged).

Very fast for chambers if the inner pressure is given.

Some calculations are only possible with classic solver for example:

- Flexibility Ellipsoids
- Redundancy values of the elements
- Eigenfrequencies and eigenvalues

#### 4.1 Cutting pattern generation

• AutoCut: New option "Adjust start and end width". The first and last strip gets the same width.

Justification of patterns: (Initial value)	Full width at start     Full width at end     Select value:
	Adjust start and end width

- Remesh and Flatten: "EckDrei" was removed.
- Cutting Patterns: Cut-Mode "Cut and Grow" removed.
- The program Strip shows the width of each strip after defining the geodesic lines and their orientation. In some cases, for example when the strips have a concave form, the fast width determination was different more than 2 centimeter from the exact value in EasyTailor. The algorithm for the fast width determination is improved by an advanced triangulation.

#### 4.2 Statics

• Integration of new iterative solvers (StatikD/VolstaD)



- Dialog "Configuration of User Interface" renamed to "EasyShell Settings"
- About-Box shows license number and remaining days of time limited passwords.

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### 5 Rhino2Easy

The Rhino CAD system is widely used by users in the architecture sector and nurbs surfaces are often used in architectural modelling. It has been a customer wish to move quickly from a Rhino model to an Easy model.

BRep2Easy is the new Rhino plugin based on RhinoCommon API provided by technet.

Brep2Easy is the central command in the Plugin. With this command one or more surfaces or polysurfaces can be transferred into a common ein-file and into their corresponding Triangle- and Polygon files.

The commands are creating a discrete mechanical Easy model (ein, eck, dre) from Rhino Nurbs surfaces. The user can define

- the mesh sizes.
- the direction of the net lines.
- the distance between the boundary points.

The result is topological correct and watertight and can be used directly for the static calculation of e.g. pneumatic membrane structures (inflatable tubes, air halls).

For more information please read the document Brep2Easy.pdf in the documents directory of your Easy installation.







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#### 6 Beam Editor

• Integration of new iterative solver "BeamD".

Solver		Classic Solver (Beam3D/Beam3DV)
	٠	New iterative Solver (BeamD)

• Support for SAP200 v21.0.1.

#### 7 Easy Tailor

• New dxf/dwg export interface. Also, dwg can be exported directly.

File type:	Dxf	~	Version:	AutoCAD R14	~

• Compensation/Seam Allowance: New option "Swap all successors" switches all following seams when changing the Line Type of a geodesic line.

Line Type	G+	$\sim$	Swap all successors

• Cutting patterns across multiple net parts using kink points.





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• Extra lines and points reorganized: Differentiation between Persistent points, Welding marks and Additional points/links:

Show Lines / Points		
System line	System line points	
Cutting line	Cutting line points	
	Persistent points	Prefix P
Welding marks	Welding mark points	Prefix: W
Additional links	Additional points	Prefix: A

• DXF export: Separate layers for Persistent points, Welding marks and Additional points/links:

Persistent Points	BLAU	$\sim$
Welding Marks	GRUEN	$\sim$
Add. Points/Links	GRAU	$\sim$

• New Pattern name position: Right bottom corner

	Pattern name	GRAU	~	Right bottom corne $\smallsetminus$
--	--------------	------	---	-------------------------------------

• Labeling of Corner points optionally inside the pattern



• Persistent points are only in stabb.ein and no longer in stadd.ein.



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### 8 GED

• Filter: Links can be also filtered by unstressed length.

🗹 Unstr. length	<	~ 0.5	
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- Dwg Export: Triangles and Polygons get color of net part.
- Dwg Export: Labeling links with current length

✓ Links	Part 1	1041	Part 1_Links	🔽 Label Link Length
			-	

• Dwg Export: Labeling of vectors with delta values and length

Vectors Part 1 0 Part 1_Vectors Label Vector	Length
--	--------

- Point properties: Copy/Paste buttons for coordinates.
- New context menu item for link: "Create Boundary Slip Cable"
- Changes the boundary cable to slip cable and creates links for a belt:

Create Boundary Slip Cable				
Belt Stiffness:	600			
Belt Prestress	2			
Additional Attribute of Slip Cable:	3000003			

- Topology Check: New context menu item "Select all points"
- File open dialogs: Allow to select more than one file.
- Copy Point: Additional Attribute of new links changed.

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#### 9 Strip

• Open Kink lines:



- Loading and showing of files with kink edges.
- The geodesic lines get kinks at these edges:



- The file name of the kink lines EIN file is stored in the Strip startup file.
- The kink lines are opened automatically at program start:

Work	ing path:	D:\Temp\Easy\Kink\Sample\0	Cutting Pattern Part001	- 3
Use	Key	Value	File extension	I/O
	DRE	TESTEIN	.DRE	40
	EIN	ENTLAG	.EIN	+11
	INP	STF	.INP	+0.
	EINP	LINES	.EIN	40
	EINC	CLOTHS	,EIN	-
	ECKC	CLOTHS	.ECK	-
	INPC	CUT	.INP	-
			Hide unimportant star	tup file

Easy 2020 Release Notes



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• The kink points of the geodesic lines can be fixed on the kink lines or they can slide on the lines to get the shortest distance between starting and ending point.



- For more information about Kink points/lines see example 16 in the Easy training manual.
- New Options "Snap to points of background/kink lines" and "Snap to links of background/kink lines"

Snap to points of background/kink lines
Snap to links of background/kink lines

- Kink points are also snapping to background data or kink lines.
- Switch orientation of geodesic lines also changes the order of the kink points
- New main menu item: "File/Save as/Geodesic Lines in EIN-File..." stores only the geodesic lines in an EIN file.
- These files can be used as slip cables data.

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### 10 FormEdit

• In FormEdit it is now possible to save user-defined default values for the properties of the model elements. It is also possible to reset elements individually or as a group to user-defined default values.

🔶 Speichern unter

+ FormEdit File Edit :	"new sketch" Select View Help								
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Boundary Point	Properties	Ψ×							
	1 boundary point selected								
General Information									
Boundary	1								
Point ID	99000004								
Off. Val. Off. Val.									
Defaults									
C Scious	Save as default								
	Reset to default								
B Help	Help								

Options Construct Snap to Grid points PreView Automatic update
Snap to Grid points PreView
Grid points
PreView
Automatic update
"No PreView" after parameter change
Default properties settings Usage     Ouse original default values     Ouse original default values     Ouse default values from file:         Dr.LYormEditHighpointDefaults.def      Reset all selected to default
⊟ Help
Help

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• The bug that the high points of a double cone are connected to each other has been fixed. This error only occurred when calculating using EasyShell.



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#### 11 Report Generator RepGen

When generating the project analysis, the minimum and maximum components of the reaction forces are better prepared and displayed in the report. In addition, a file named

RepGenProjectAnalysisReactionForces.las is now created when the report is generated. This file contains the absolute maximum vector components as shown in the report. The las file can be opened in GED as a vector file.

#### **1 Project analysis**

#### 1.1 Minimum and maximum reaction forces

_			
Pro	iect	ana	lysis
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ject analysi	5						
	MinRXL	MaxRXL	MinRYL	MaxRYL	MinRZL	MaxRZL	Max abs RXL
Point ID							Max abs RYL
Foint ID	Loadcase	Loadcase	Loadcase	Loadcase	Loadcase	Loadcase	Max abs RZL
							ResLength
	0.370450	1.191100	3.448244	12.433970	1.785595	7.222451	1.1911
99000001							12.4339
33000001	500	BW 1	PreStress	BW 1	PreStress	BW 1	7.2224
							14.4286
	-0.330409	-0.205665	2.940564	8.253245	7.366300	17.951505	-0.3304
99000002							8.2532
0000002	500	BW 1	PreStress	BW 1	PreStress	BW 1	17.9515
					0.007000		19.7606
	3.847654	20.227961	-8.165557	-1.278055	2.627008	8.769220	20.2279
9900006	Dra Otrana	DW/ 4	DW/ 4	DreCtrops	DreCtrops	DWA	-8.1655
	PreStress	BW 1	BW 1	PreStress	PreStress	BW 1	8.7692 23.5105
	-0.413125	0.036984	-11.201955	-2.558669	7.022371	13,413698	-0.4131
	-0.413123	0.036964	-11.201900	-2.000009	1.022311	13.413090	-11.2019
99000007	500	BW 1	BW 1	PreStress	PreStress	BW 1	13.4136
	500	DVV I	0001	Ficolicos	Ficolicos		17.4808
	-0.065734	0.015422	2,862058	7,393759	7,418745	18.858914	-0.0657
	0.000104	0.010422	2.002000	1.000700	1.410140	10.000014	7.3937
99000008	BW 1	PreStress	PreStress	BW 1	PreStress	BW 1	18.8589
				2			20.2566
	-0.325010	-0.054927	-14.238548	-2.971817	7.169944	15.719031	-0.3250
							-14.2385
99000011	BW 1	500	BW 1	PreStress	PreStress	BW 1	15.7190
							21.2115
	-0.026465	0.490247	-18.627465	-3.164847	6.696954	19.978176	0.4902