LIMIT **Release Notes**
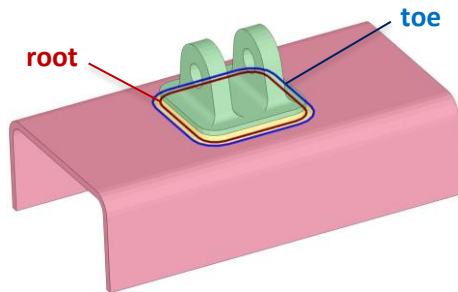
Version LIMIT2021r1

New Features in LIMIT 2021

GUI Changes:

✦ **Upgrade to Python 3**
  - Fully compatible to older LIMIT databases
  - Limit databases which were saved with LIMIT 2021 are not compatible with older versions of LIMIT (special database conversion necessary)

✦ **New Default Color Palette**
  - Better contrast and vivid colors

✦ **Optimized Coloring Modes**
  - "Colors by Thickness" with new dynamic legend window
  - "Colors by Setup Status" with new dynamic legend window

✦ **Hot Keys**
  - Improved usability by extending the keyboard shortcuts for viewport and model tree (see Help --> Hot Keys)

✦ **Model Tree**
  - Information on each item (can be obtained by selection + keyboard shortcut Q)
  - Wildcard filter and more detailed information on items

✦ **Filters in Setup Editor and Job Editor**
  - Better handling of large number of setups in one database

✦ **Improved LIMIT Viewer and Loads Visualization**

✦ **Generating Sensors by Edge Selection**

✦ **Detailed reporting on specific sensors and sections**

✦ **Recent Files Menu**
  - Recently opened files section added in file menu

SECTIONS: The New Method for the Assessment of Weld Throats

✦ New method to analyze weld throats in models based on solid meshes

✦ Is used for casted parts welded to sheets

✦ Calculates structural stresses based on nodal forces

New Codes:
  - ERRI B12 / RP17 and RP 60 for railway vehicles
  - TB/T 3506 : Code for the assessment of wheels

FEM Interfaces added:
  - Ansys 2021R2

Further Information:
  - Video: LIMIT-Release-Info-2021.mp4

Sections: The New Method for the Assessment of Weld Throats
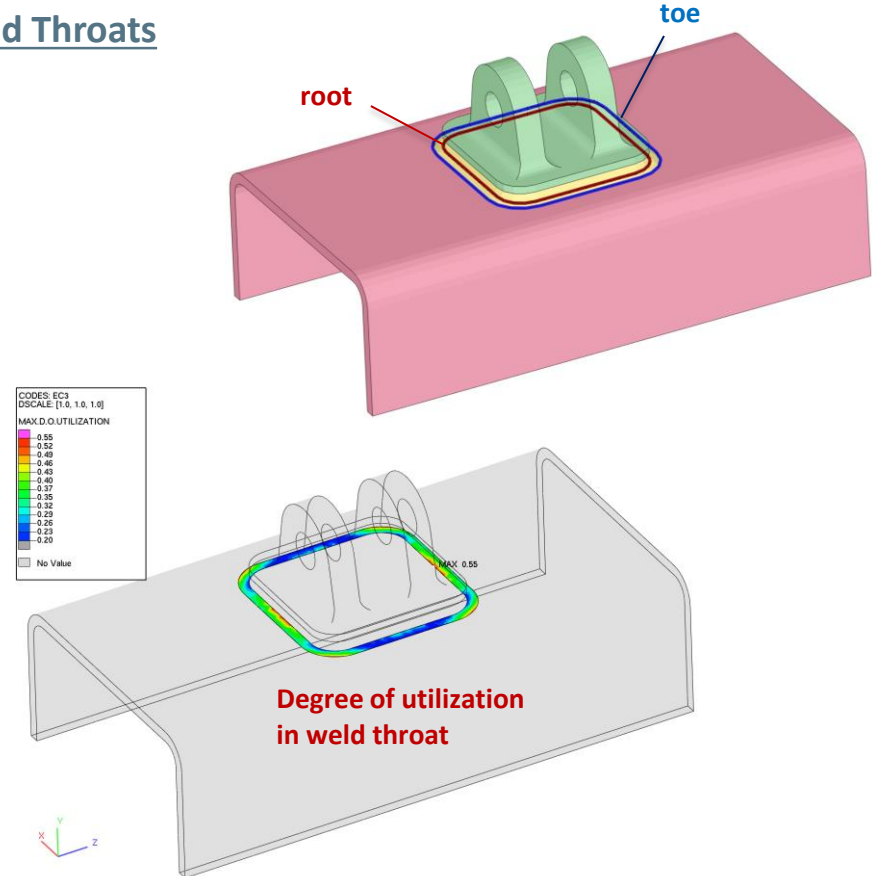
✦ **Motivation**
  - New method to analyze weld throats in models based on solid meshes
  - Is used for casted parts welded to sheets
  - Calculates structural stresses based on nodal forces
  - Enables rather coarse meshes, no R1-models needed for root assessment
  - Workflow fully integrated in LIMIT2021

✦ **Further detailed documentation on sections**
  - *LIMIT_Sections_Method_Verification_Benchmarks.pdf*
  - *LIMIT_Sections_Output.pdf*
  - Video: *LIMIT_Working_with_Sections.mp4*

✦ **Supported FEM Interfaces**
  - Abaqus, Ansys and Solvers creating OP2 files, such as Nastran, NX_Nastran, Optistruct.
  - Output of nodal forces must be defined prior to running the FEM solver, see *LIMIT_Sections_Method_Verification_Benchmarks.pdf.*

toe

root

CODES: EC3
DSCALE: [1.0, 1.0, 1.0]

MAX.D.O.UTILIZATION

- 0.55
- 0.52
- 0.49
- 0.46
- 0.43
- 0.40
- 0.37
- 0.35
- 0.32
- 0.29
- 0.26
- 0.23
- 0.20

No Value

MAX 0.55

Degree of utilization in weld throat

Upgrade to Python 3

✦ **Migration from Python 2.7 to Python 3.8**

This step was necessary to use new features of Python and to guarantee compatibility with new hardware and operating systems. Users will notice lots of small changes, many of them based on this migration. In order to provide a stable tool, we have been using and testing the Python 3 version of LIMIT in many large projects since the beginning of 2020.

✦ **Compatibility**

▪ Fully compatible to version LIMIT2020R008 databases

▪ Limit databases which were saved with LIMIT 2021 are not compatible with older versions of LIMIT (special database conversion necessary, using the plugin: SaveDatabaseAsJson.py)
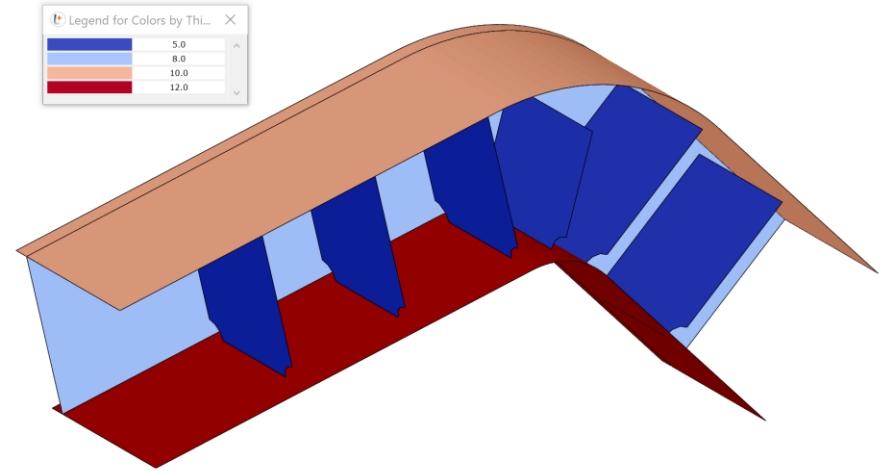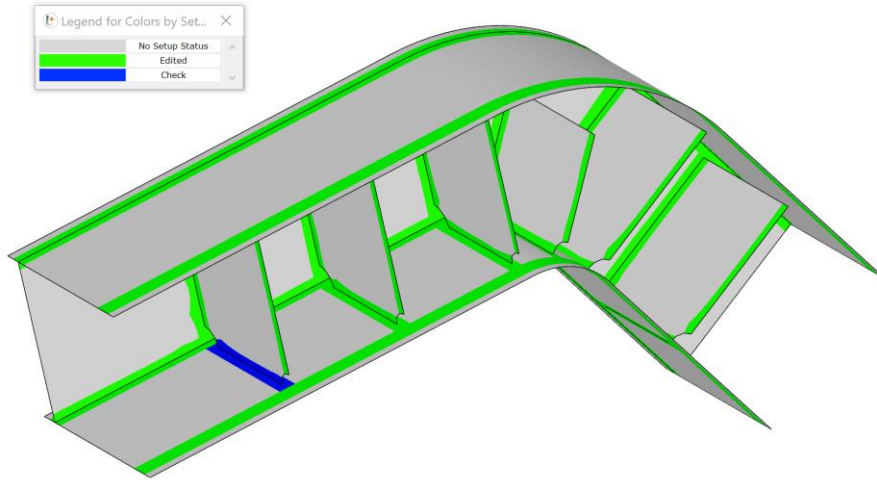
New Default Color Palette

- ✦ **Better Contrast**
- ✦ **Vivid Colours**

LIMIT2020   LIMIT2021
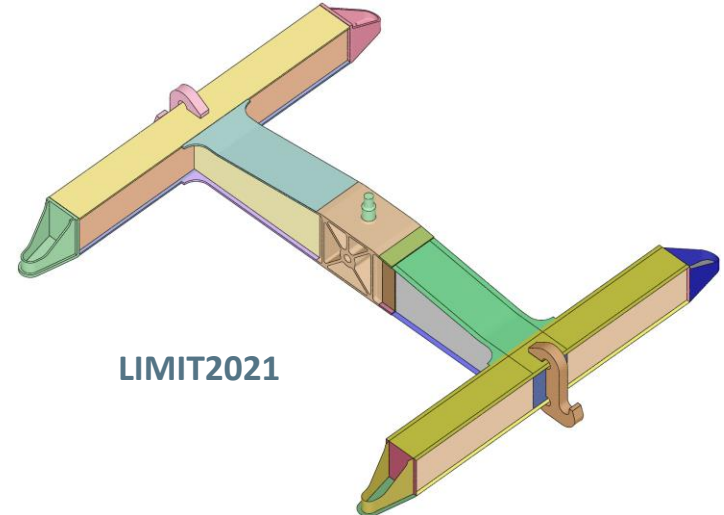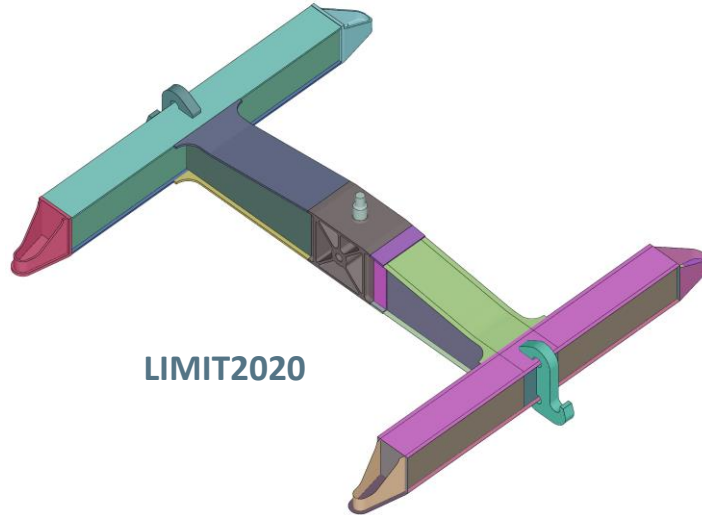
Optimized Coloring Modes

- **"Colors by Thickness" with new dynamic legend window (right picture)**
- **"Colors by Setup Status" with new dynamic legend window (left picture)**

LIMIT
stress evaluation

Hot Keys

F1	...	Open help	Ctrl + O	...	Open *LIMIT-CAE* data base
F2	...	Open set manager	Ctrl + Q	...	Quit *LIMIT-CAE / LIMIT-VIEWER*
F3	...	Open sensor manager	Ctrl + S	...	Save current *LIMIT* data base
F4	...	Open load manager	Ctrl + i	...	Save screenshot of viewport as PNG file
F5	...	Open setup manager	Ctrl + C	...	Save screenshot of viewport into clipboard
F6	...	Open job manager	Space	...	Activate / deactivate transparency mode
F7	...	Open geometry manager	E	...	Toggle visible / not visible / feature edges
F8	...	Show model in wireframe mode	N	...	Toggle visible / not visible nodes
F9	...	ISO view	P	...	Merge selected Part Sets
F10	...	XY view	W	...	Show weld scheme help
F11	...	XZ view	H	...	Hide element or selection
F12	...	YZ view	R	...	Replace element or selection
M	...	Toggle viewport manipulation	A	...	Show all elements
Q	...	Open window to Query FEM element	SHIFT + Q	...	Open window to query FEM node
S	...	Iterate forwards through selection filter	SHIFT + S	...	Iterate backwards through selection filter
G	...	Toggle between GeomElements and Elements	Y	...	Change view to next ISO view
X	...	Expand current selection by given range	ESC	...	Clear selection buffer
F	...	Center view / Fit view	i	...	Show this info on hotkeys
Ctrl + ←	...	Rotate viewport horizontally to the left	Ctrl + ↑	...	Tilt viewport vertically upwards
Ctrl + →	...	Rotate viewport horizontally to the right	Ctrl + ↓	...	Tilt viewport vertically downwards

Model Tree

✦ **Wildcard filter**

✦ **More detailed information on items**

✦ **Information on each item**
  - can be obtained by selection + keyboard shortcut Q
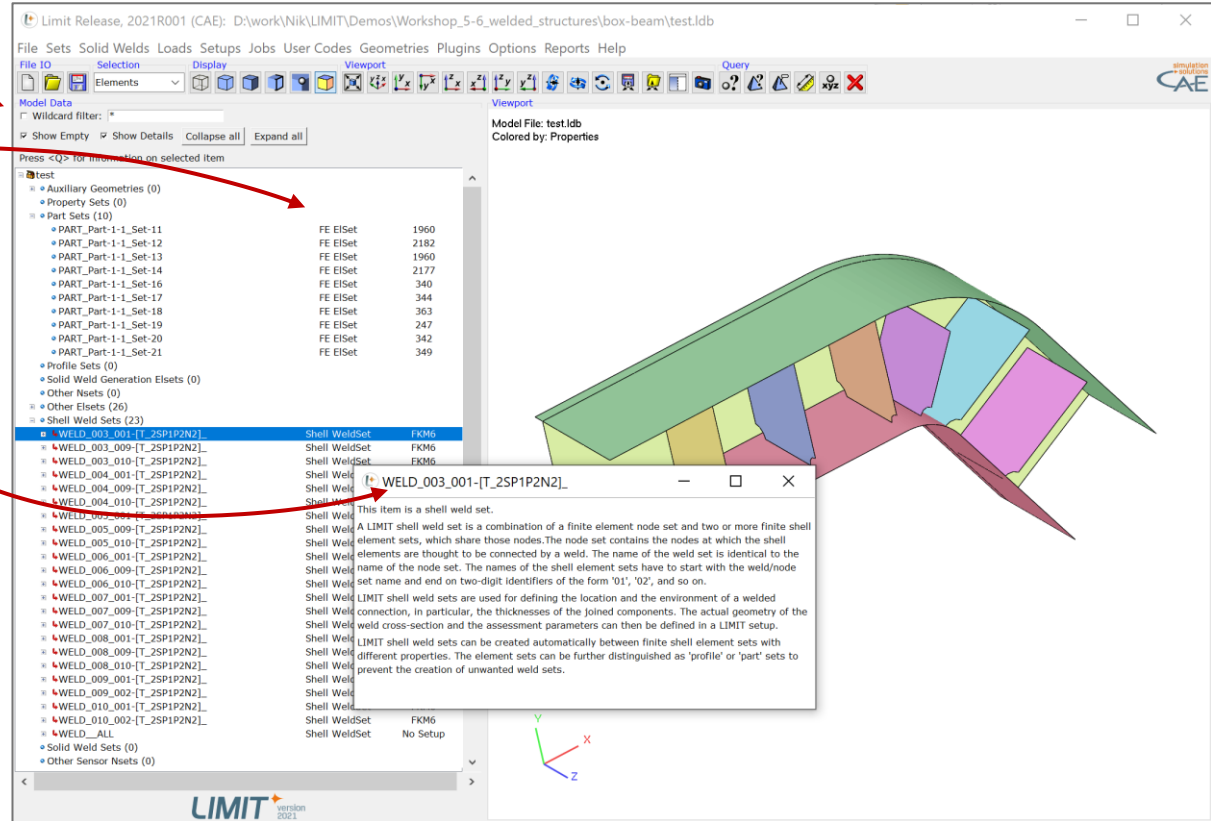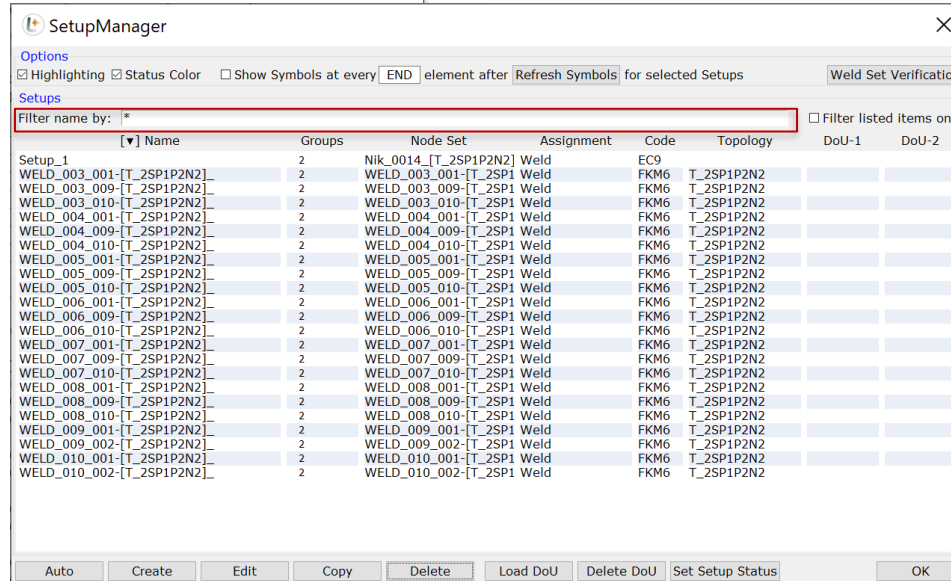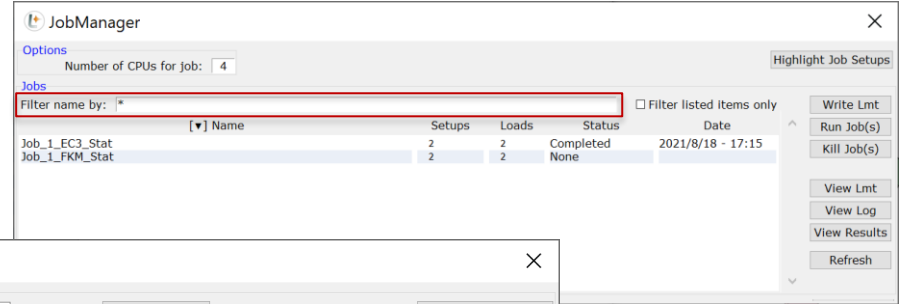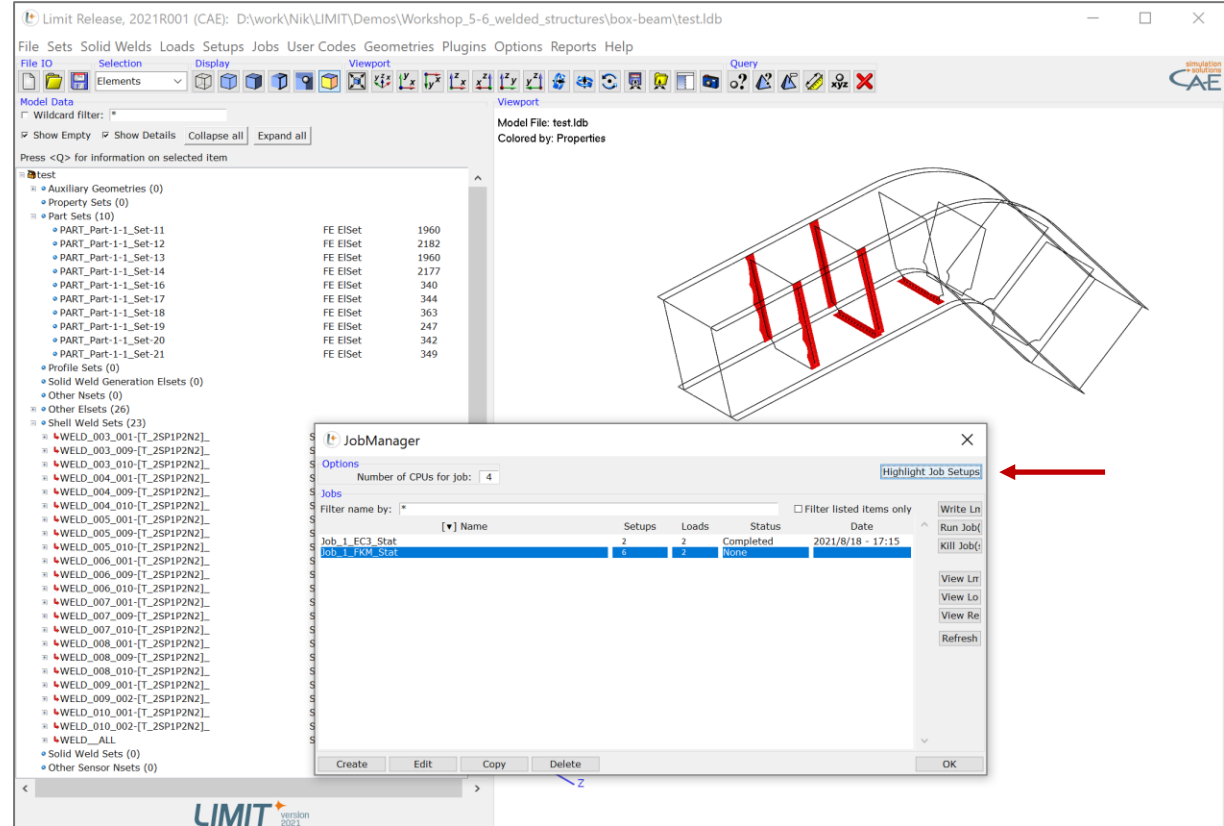
Filter in Managers

✦ **JobManager**

✦ **SetupManager**

   ■ Better handling when large number of items exist

JobManager

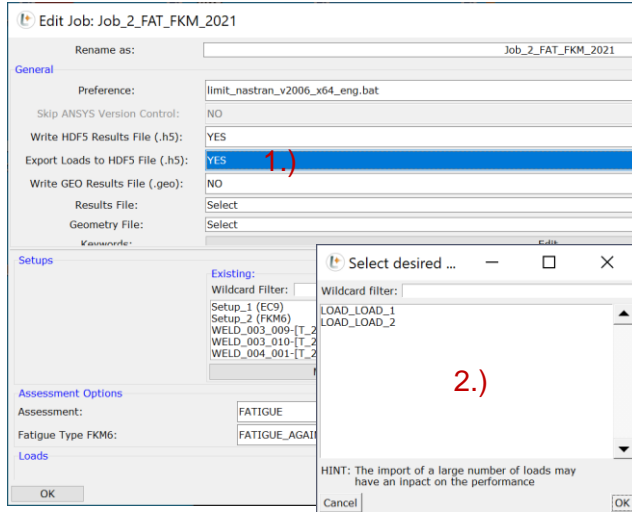**Highlight Job Setups**

- Highlights elements that are part of the assessment job
- Quick overview of jobs

LIMIT
stress evaluation

Improved LIMIT Viewer

★ **Loads Visualization**

1.) Activate Export to H5 in JobManager

2.) Select loads during start of Viewer

3.) Select load case

**4.)** Select stress component and D-Scale
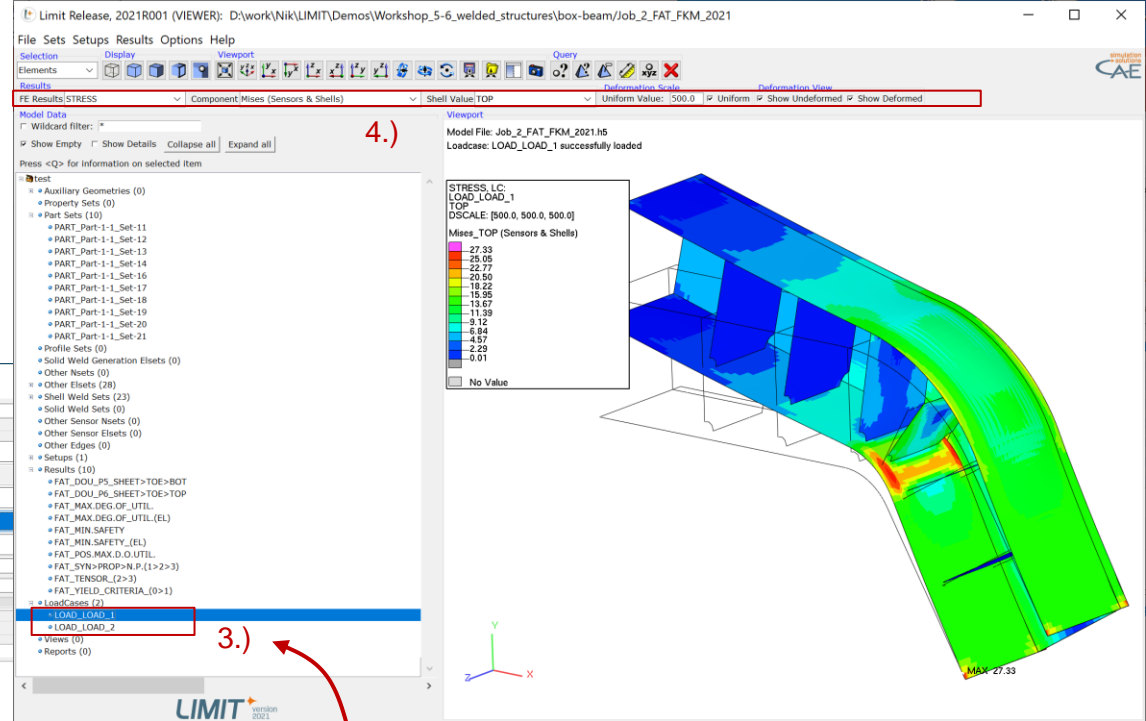
Tip 1: When marking a second load case while pushing the control key, LIMIT will plot the difference values!
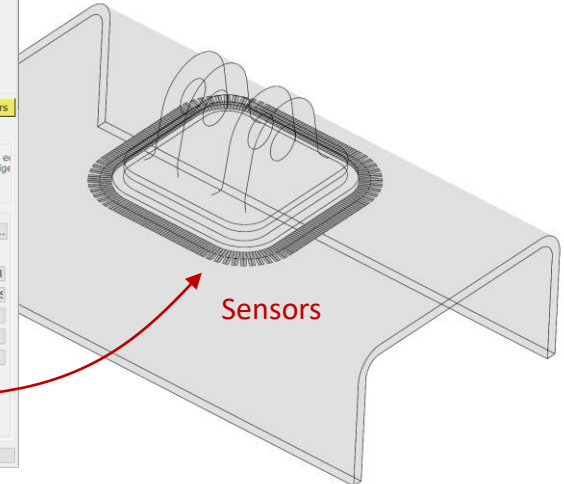*Tip 2: See video LIMIT_New_Features_LIMIT_Viewer.mp4*

Sensor Creation by Edges

✦ **Generation of multiple sensors along curved and straight edges**

✦ **Use when Auto-Create fails:**
  ▪ Select SW_set and follow instruction:
    – Select Edge
   – Select node for orientation (inside or outside of loop)
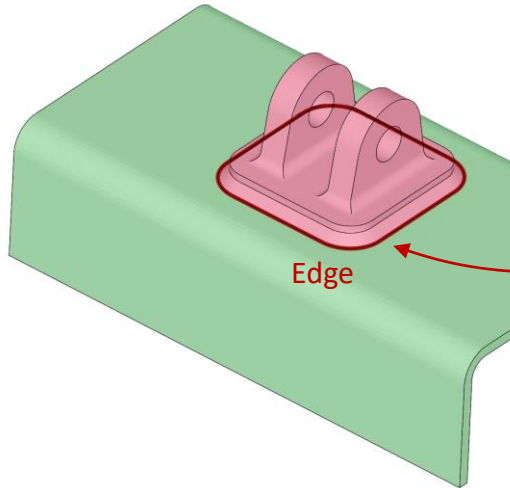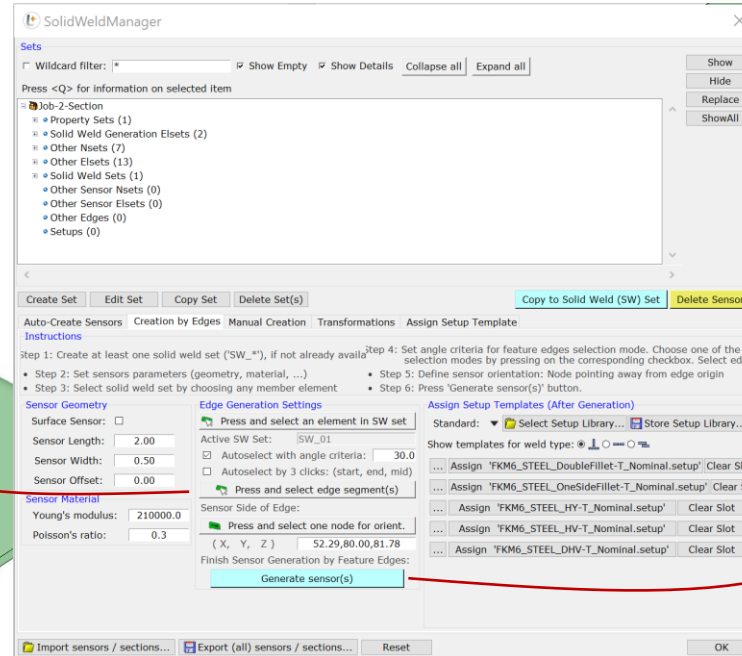

Edge

Sensors

Detailed Reporting on Specific Sensors and Sections

✦ **This option generates detailed output to the file [JobName]_detailed_results_user_elements.txt**

✦ **Two step procedure:**

- Generate section or sensor sets
  - Use selection filter "GeomElements"
  - Generate separate sets for sensors and sensors
  - Select elements in viewport
  - Store sets using right mouse key menu
- Select the sets in EditJob
  - Report Sensor Sets
  - Report Section Sets

LIMIT
stress evaluation
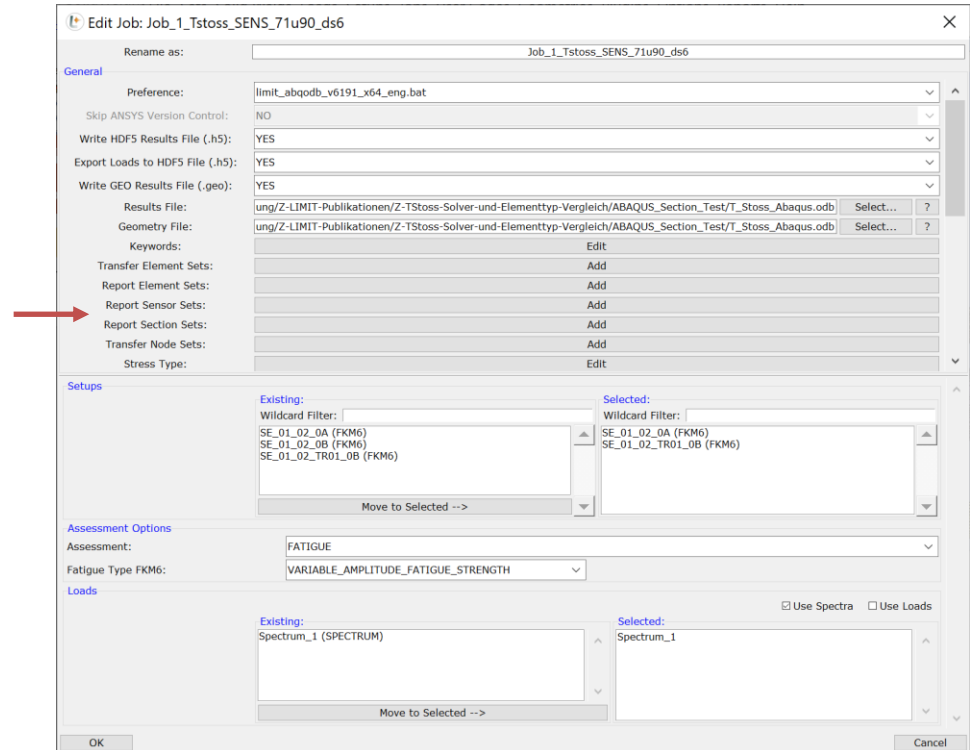
Recent Files Menu

- ✦ **Will list up to 25 databases opened in the past**

- ✦ **Quick access to older projects**
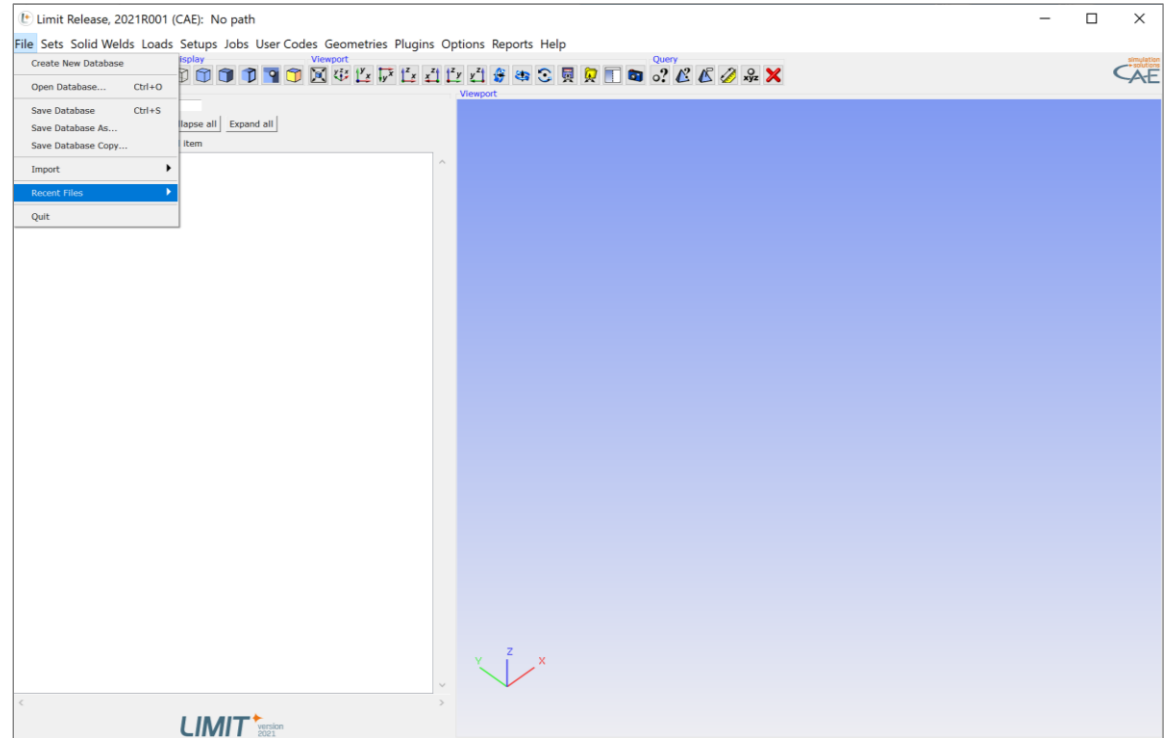
New Codes Added

✦ **ERRI B12 / RP17 and RP 60**

- Published by the European Railway Research Institute in 1997 and 2001
- Parts of the codes are currently used in EN 12663-2. A separate version of EN 12663-2 is planned for a future release.
- ERRI B12 can be used for coaches and freight wagons
- Based on Goodman-diagrams or SN-Curves (both can be edited/modified by the user)
- Further detailed documentation: *LIMIT_ERRI_B12.pdf* as part of LIMIT Help

✦ **TB/T 3506**

- Chinese standard for railway wheel design
- In parts similar to EN 13979-1. A separate version of EN 13979-1 is planned as well.
- Based on principal stress amplitude and modified Crossland criteria
- Further detailed documentation: *LIMIT_TBT3506.pdf* as part of LIMIT Help

New FEM Interfaces

- Ansys 2021R2

New Documents Added to LIMIT Help

- *LIMIT_Sections_Method_Verification_Benchmarks.pdf … explains all section topics in detail*
- *LIMIT_Sections_Output.pdf … explains additional text output for control and benchmarks*
- *LIMIT_ERRI_B12.pdf … explains important features of the implemented code*
- *LIMIT_TBT3506.pdf… explains important features of the implemented code*
- *LIMIT_Hot_Keys.pdf … complete listing of all hot keys*

New Videos Added to LIMIT Help

- *LIMIT_Release_Info_2021.mp4 … explains most important new features of LIMIT2021*
- *LIMIT_Working_with_Sections.mp4 … shows the workflow for sections*
- *LIMIT_New_Features_LIMIT_Viewer.mp4 … shows new features of LIMIT2021 Viewer*

Last slide