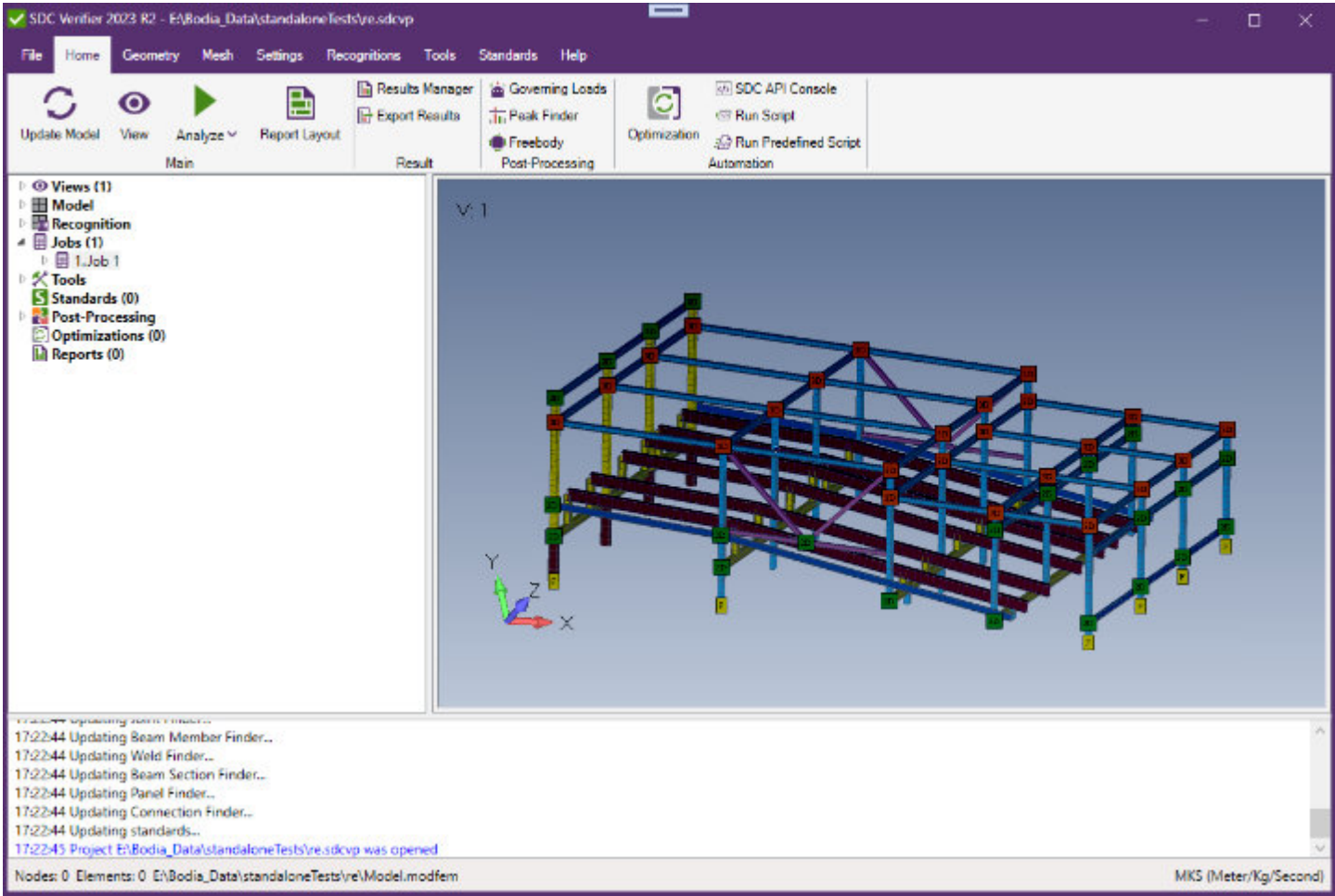


STRUCTURAL VERIFICATION ACCORDING TO STANDARDS

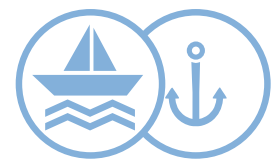
SIMULATION AND VERIFICATION SOFTWARE



Import your drawings, 3D file, or existing FEA model from any other FEA software. Or build your own design with a modern and intuitive graphical interface.

Analyze your design with a proven Simcenter Nastran solver. A reliable solver combined with the features of SDC Verifier allows engineers to cover simulation and verification with just a few clicks.

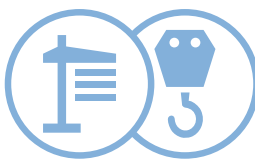
TAILOR MADE FOR THE FOLLOWING INDUSTRIES



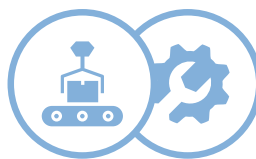
OFFSHORE AND MARITIME



OIL AND GAS



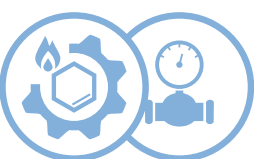
HEAVY LIFTING



MACHINERY EQUIPMENT



CIVIL ENGINEERING



PIPES AND PETROCHEMICAL



AEROSPACE



RENEWABLE ENERGY

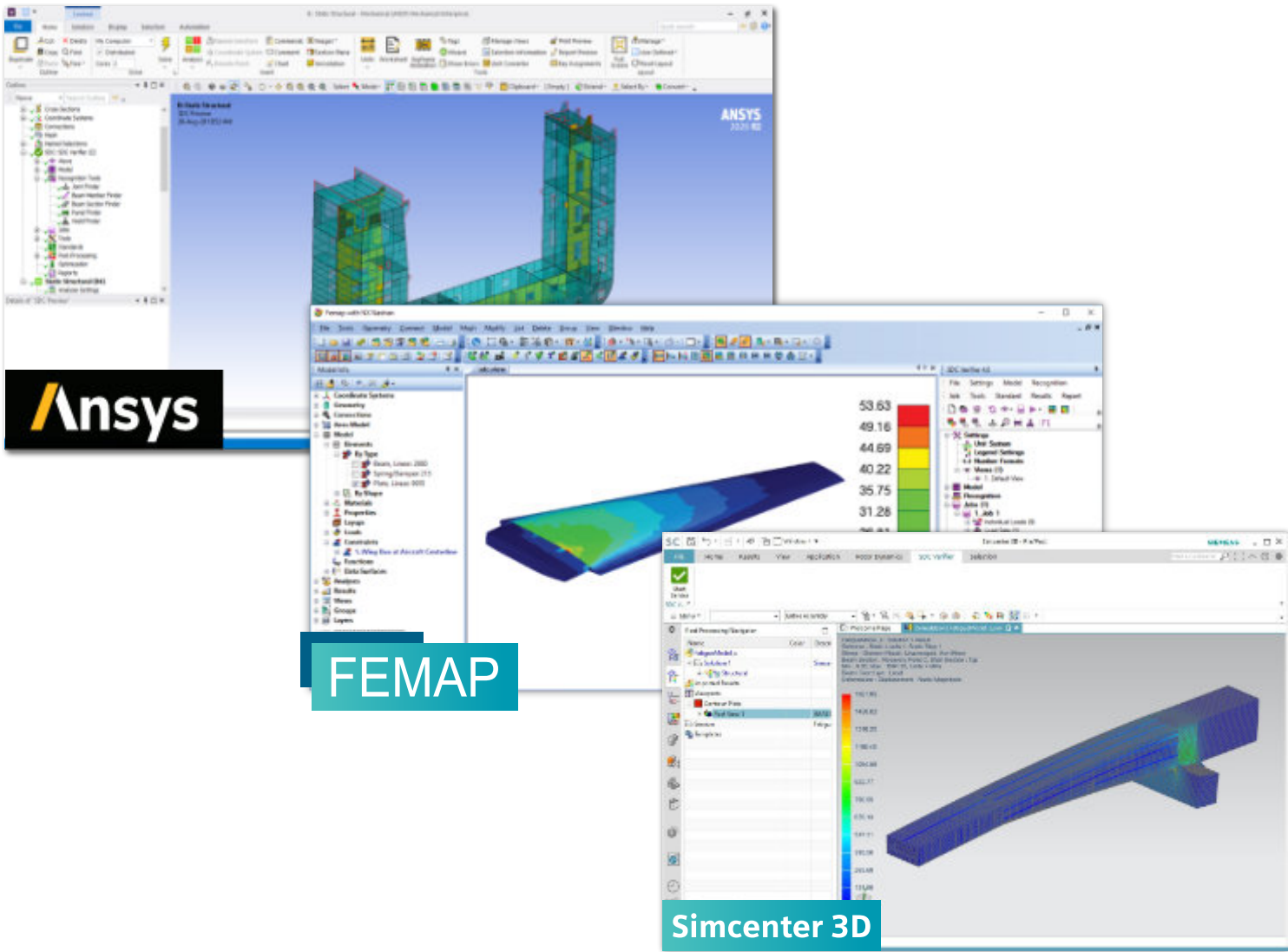
SDC Verifier can be used independently or in tandem with Ansys, Femap, and Simcenter.

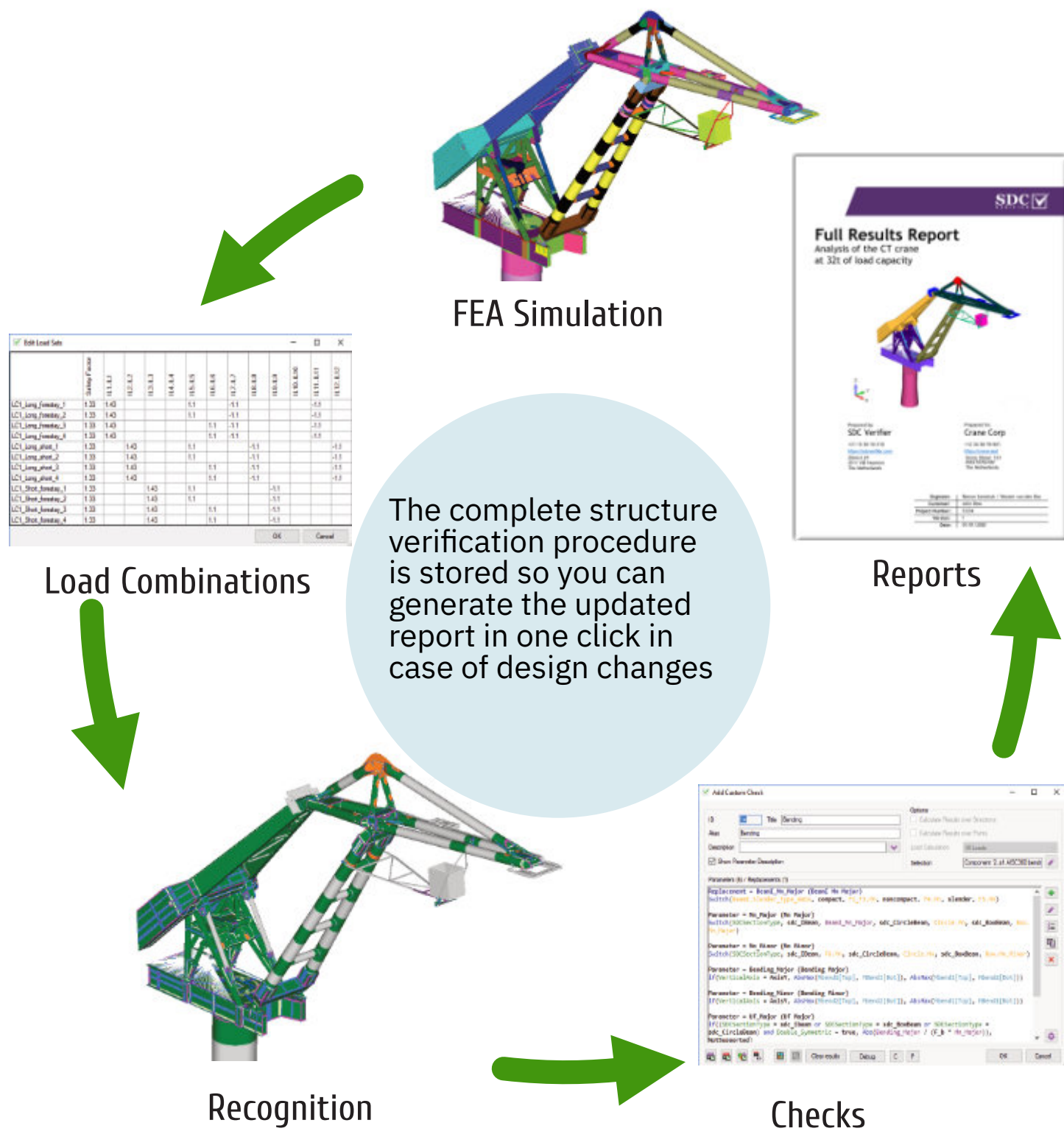
SDC Verifier automates the verification of the FEA model against predefined industry standards, design codes, rules and regulations, or your own criteria.

Report Designer is an advanced tool for automatic report generation. Reports in SDC Verifier have a template-based structure and contain model setup, model description, and calculated results presented as plots and tables. With report generation feature engineers can review and compare the design updates impact to the original design.

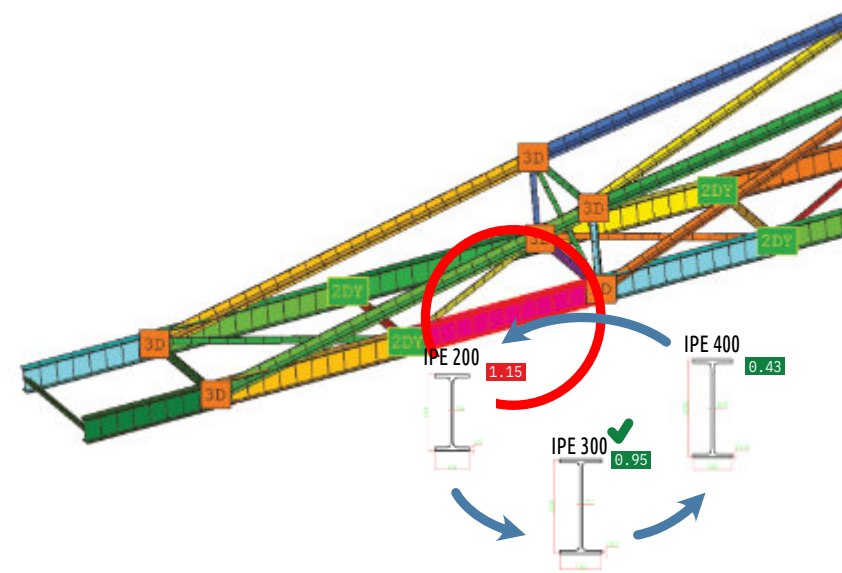
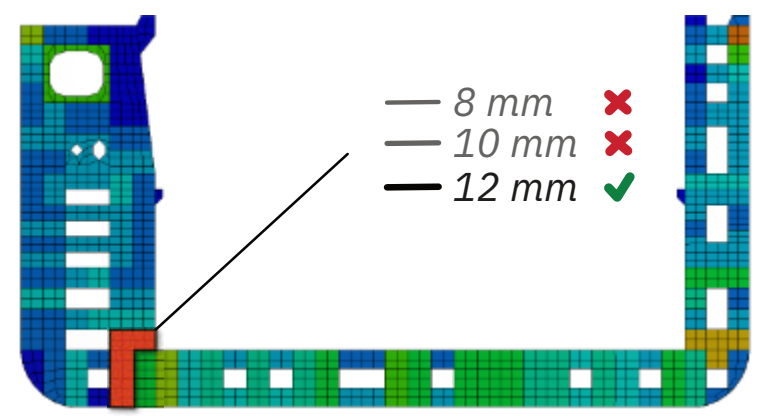
The optimization module allows the best design decision to be made for the structure by calculating different combinations of design inputs.

In addition SDC Verifier has an open API to help automate interaction with software.



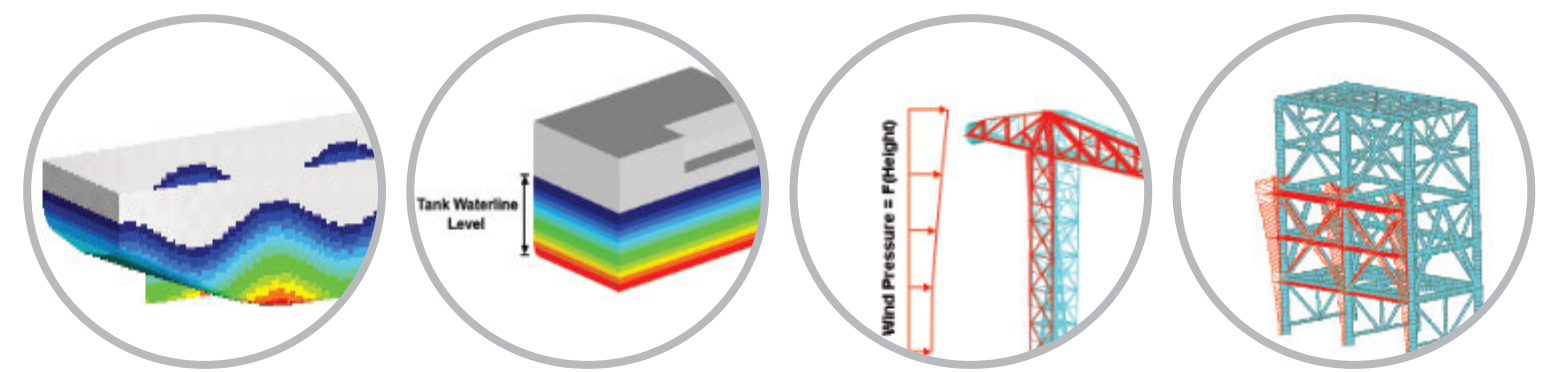


The **Optimization module** helps to take the best possible design decision acquired from code-checking results. Optimization can be based on Cross Section, Weld Type, Yield Stress, and Plate Thickness parameters.



Optimization can save time on repetitive tasks by calculating different combinations of design input and also help make the structure more cost-effective by adjusting the existing model parts for specific terms of usage.

SDC Verifier automates the application of the specific loads:



Buoyancy – a water pressure acting on a construction (e.g. ship hull), including wave parameters.

Tank Ballast – fluid level based on a mass content transferred into a pressure level on a tank surface.

Wind – height dependent pressure applied to the model taking into account the element area exposed to the wind direction.

Wave and current loads – apply force and pressure based on wave parameters (height, length, crest, amplitude, etc.).

IMPLEMENTED STANDARDS

AS 3990 (1993)

AJ (2005 Edition, 2017)

DIN 15018

NORSOK N004

ASCE 89 & 2010

F.E.M. 1.001

DNV 1995 & 2010

ISO 19902 (2007 & 2020)

ASME VIII (Div2, 2010)

Eurocode 3

API 2A RP

EN13001

ABS 2004 & 2014

FKM (5th edition, 2003; 6th edition, 2012)

DVS 1608 (2010), DVS 1612 (2014)

<https://sdcverifier.com>

MEMBER CHECKS. BUCKLING LENGTH
RECOGNITION. DEFLECTION CHECK

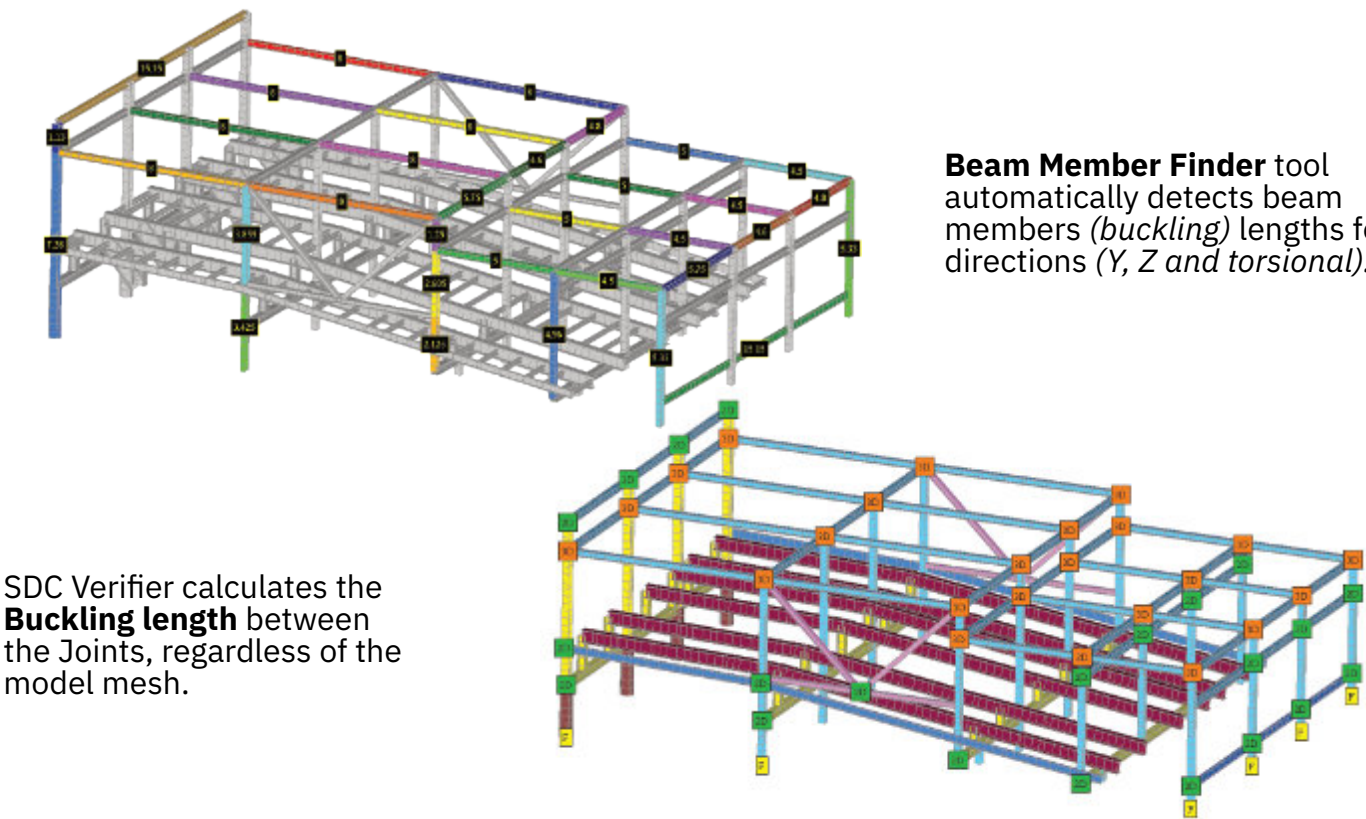
SDC Verifier implements the following standards for checking large (offshore) lattice structures:

AISC/ANSI 360-10 (Specification for Structural Steel Buildings), **API RP 2A** (Planning, Designing, and Constructing Fixed Offshore Platforms – Working Stress Design), **Eurocode 3** (Design of steel structures), **ISO 19902 (2007, 2020)** (Petroleum and natural gas industries – Fixed steel offshore structures) and **Norsok N-004** (Design of steel structures), **EN 13001** (Cranes General Design, 2018)



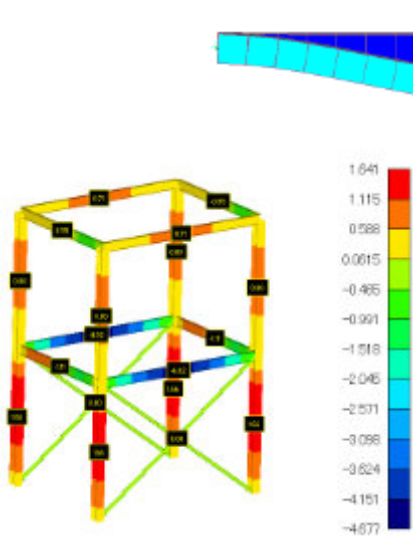
JOINT CHECK

Joint Finder tool is used to verify tubular joints according to **API RP 2A**, **Eurocode3**, **ISO 19902 (2007, 2020)**, and **Norsok N-004** standards.



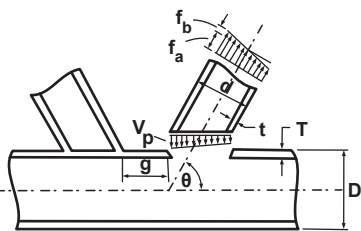
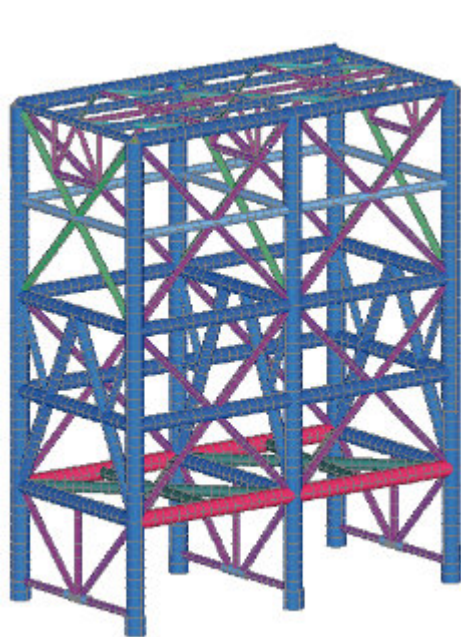
SDC Verifier calculates the **Buckling length** between the Joints, regardless of the model mesh.

The deflection of members is one of the checks that should be performed for serviceability limit state design. With the help of the **Beam Member Finder** tool SDC Verifier automatically detects beam member lengths:

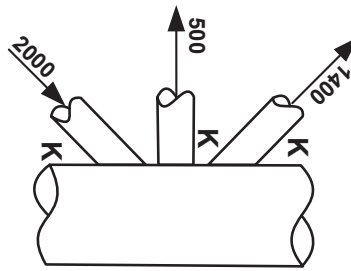
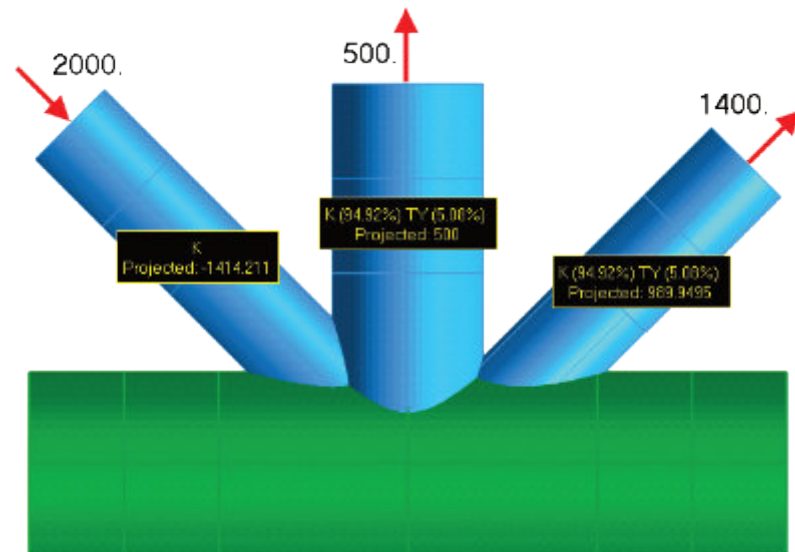
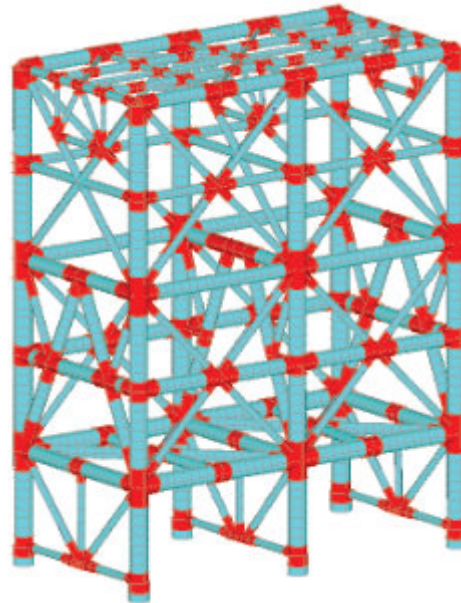


SDC Verifier contains all the necessary tools to quickly perform the **deflection check**.

The automatic beam member recognition, result transformation, and the usage of the envelope results of a load group reduce the calculation and postprocessing time significantly.



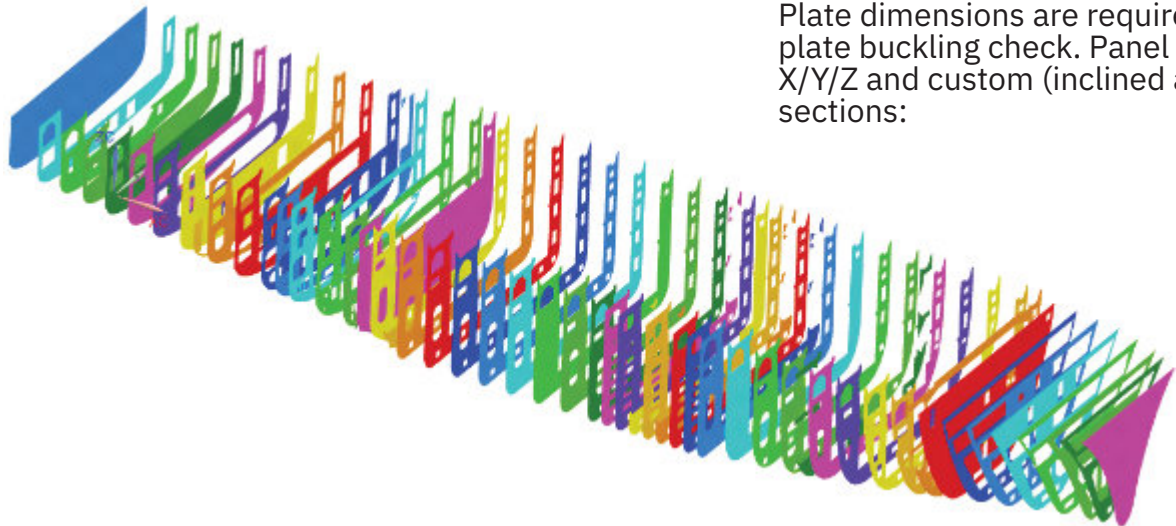
SDC Verifier automatically calculates Brace classification (depending on the load pattern) for each load situation, which significantly speeds up the verification process.



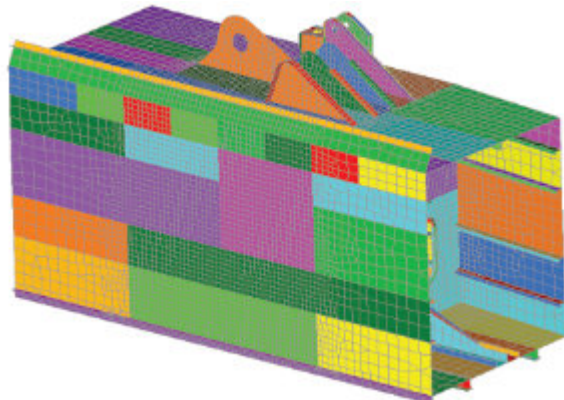
Connection ID	Brace Number	Joint Type
1	#1 (ElemID = 27)	K
	#2 (ElemID = 13)	K (94.92%) TY (8.08%)
	#3 (ElemID = 19)	K (94.92%) TY (8.08%)

AUTOMATIC DETECTION OF SECTIONS, PANELS, PLATE FIELDS, STIFFENERS, AND GIRDERS

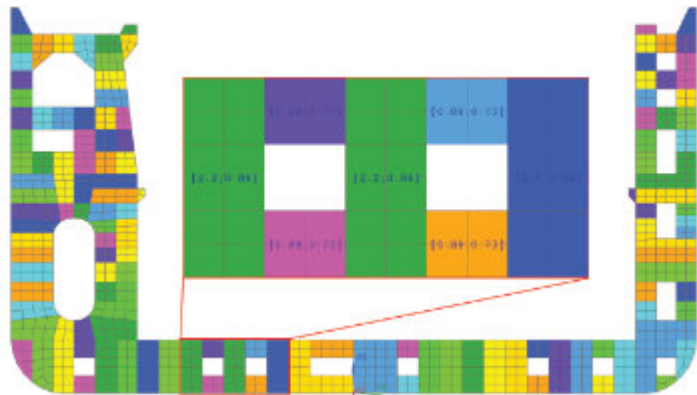
Plate buckling strength is an important aspect of offshore steel construction design. Each plate should be checked as it influences the strength and stability of the whole construction. In SDC Verifier plates can be checked against buckling according to the **ABS 2004/2014** and **DNV RP-C201 2010, Eurocode 3** rules:



The recognition is based on the mesh connectivity and can be performed on any structure using plate (*shell*) elements:



Plates with their dimensions are recognized automatically for each section:



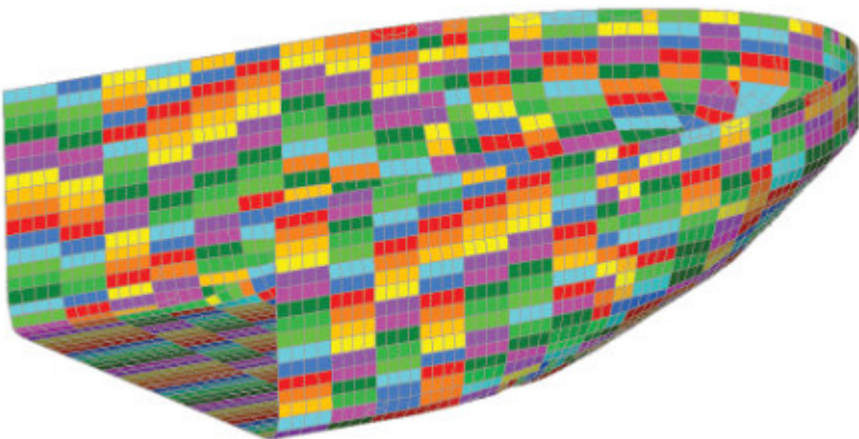
The results can be presented over sections (frames/longitudinals/decks). Those above the limit are highlighted in red:

Buckling(LS2, 5 Sections)						
Standard	10..Plate Buckling DNV 2010		Check Sections	1..Plate Buckling (Element Avg)		
Load Set	2..Load Set 2					
Search Type	Related To Last					
Section Title	Stress X in plate direction	Stress Y in plate direction	Stress XY in plate direction	Equivalent Stress	Buckling Factor Combined	Buckling Factor Overall
1..Section X 1 (X = 70) [MaxID=86]	-62.0e+6	-38.3e+6	-38.4e+6	85.8e+6	0.952	0.976
2..Section X 2 (X = 71.68) [MaxID=10]	-7.2e+6	-31.6e+6	-8.1e+6	31.9e+6	0.335	0.579
3..Section X 3 (X = 73.36) [MaxID=63]	-57.0e+6	-42.5e+6	-44.3e+6	92.3e+6	1.034	1.017
4..Section X 4 (X = 75.04) [MaxID=9]	-7.2e+6	-31.5e+6	-8.1e+6	31.9e+6	0.334	0.578
5..Section X 5 (X = 76.72) [MaxID=67]	-63.7e+6	-38.9e+6	-39.2e+6	87.8e+6	0.993	0.996
Max over Sections [3 / 63]	-57.0e+6	-42.5e+6	-44.3e+6	92.3e+6	1.034	1.017

<https://sdcverifier.com>

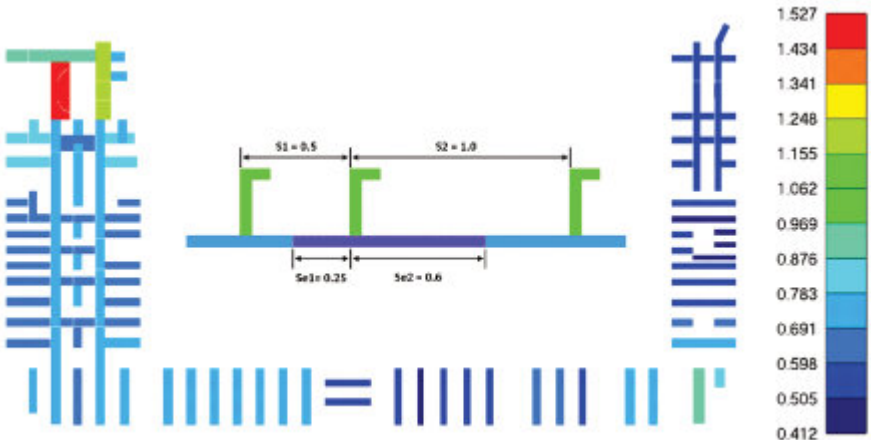
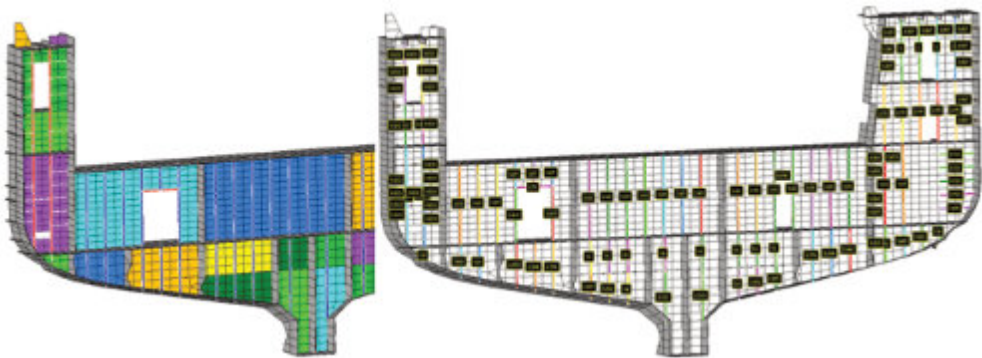
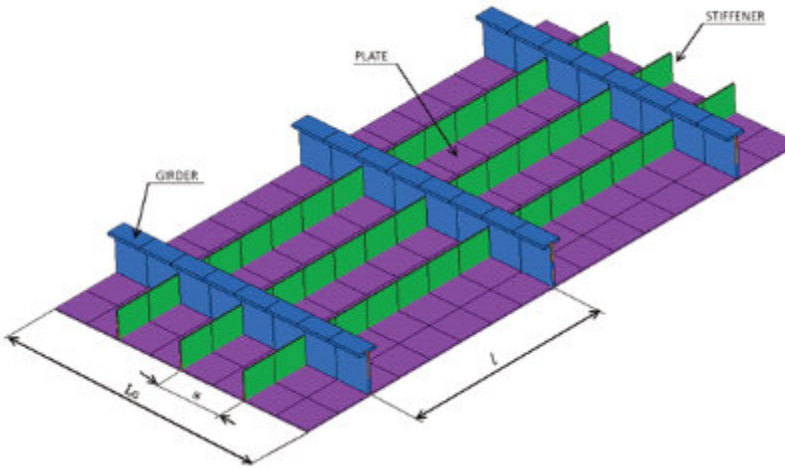
PLATE BUCKLING AND STIFFENER BUCKLING CHECKS

Colored plots with labels (*dimensions*) make it easy to preview the results of the tool. The following plot presents [buckling plates](#) on a part of the hull (*curved section*).



Stiffened Panel Finder — recognizes sections, panels, plates, stiffeners and girders and their dimensions automatically. This tool is an advanced version of the Panel Finder.

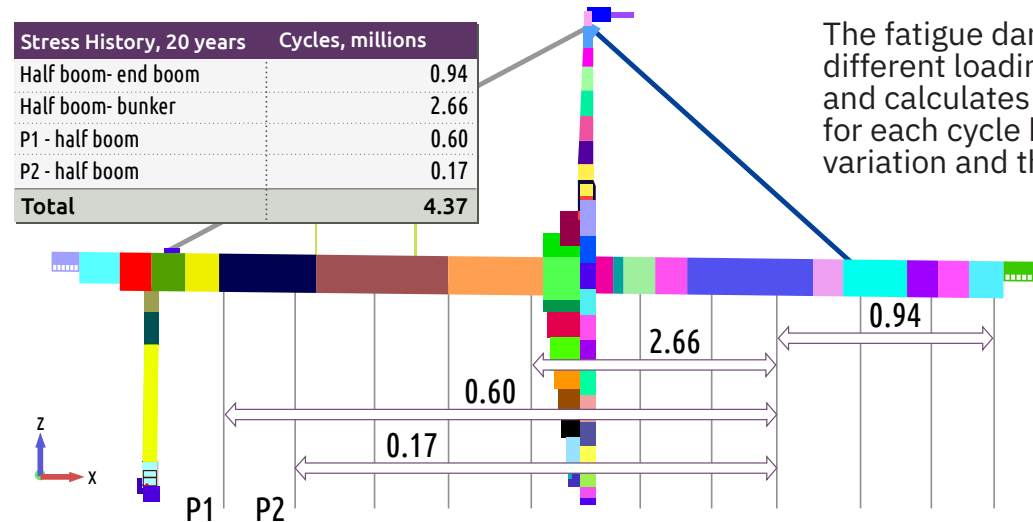
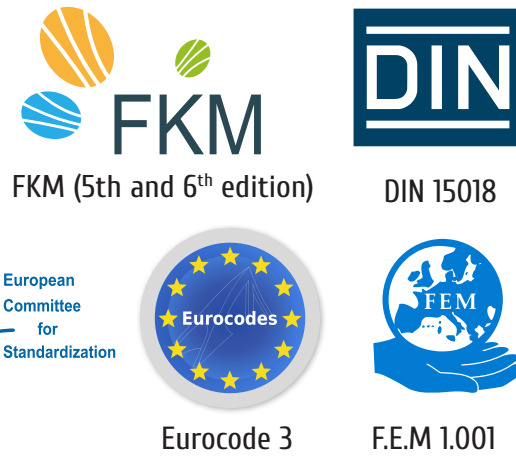
In the figure below panels, simple stiffeners (marked in blue) and girders or stiffeners supporting also other stiffeners (marked in red) are plotted.



Effective Width — calculates the plate effective width for every load situation. The Effective width is used in the stiffener buckling check according to DNV-RP-C201 2010

AUTOMATIC WELDS RECOGNITION. FATIGUE CHECKS AND WELD STRENGTH

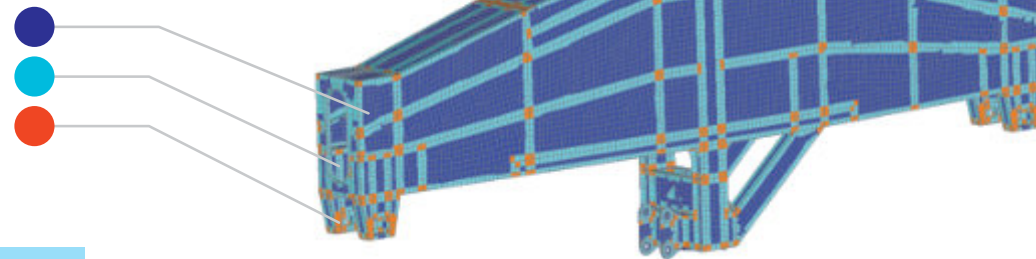
Fatigue is a progressive structural damage of materials under the cyclic loading. SDC Verifier implements the following standards (based on the *S-N curves*): **Eurocode 3** (Design of steel structures), **F.E.M 1.001** (Rules for the Design of Hoisting Appliances), **DIN 15018** (Cranes. Steel structures. Verification and analyses), **FKM** (Analytical strength assessment (5th, 6th revised edition, 2003)), **EN 13001** (Cranes General Design, 2018).



The fatigue damage method is based on different loading patterns (*stress history*) and calculates fatigue life consumption for each cycle based on the stress variation and the number of load cycles.

SDC Verifier tool **Weld Finder** detects automatically:

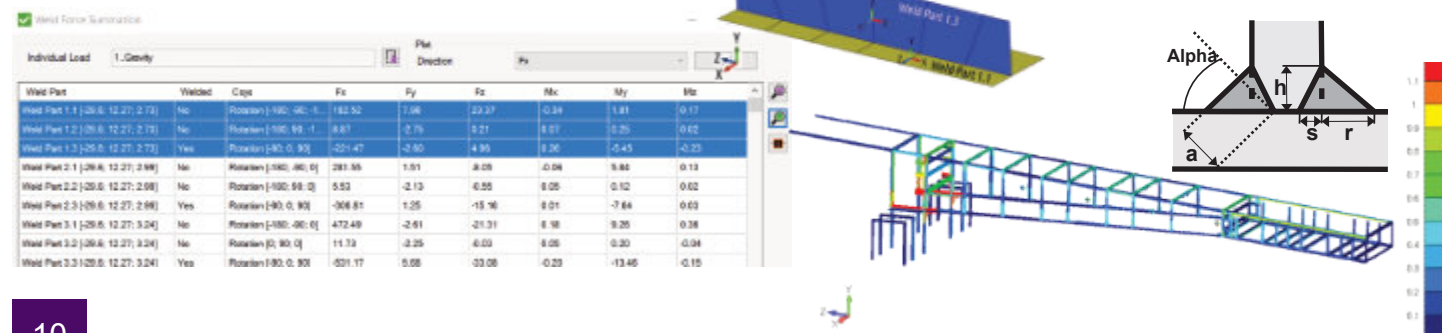
- non-welds
- welds
- crossing welds



SDC Verifier performs a weld strength check according to **DNV-OS-C101/C201, Eurocode 3**.

The forces/moments of each element of the weld are summarized into the local weld coordinate system:

The load on the total weld is compared to the capacity based on the length and such parameters as throat thickness and angle:



<https://sdcverifier.com>

WELD CLASSIFICATION

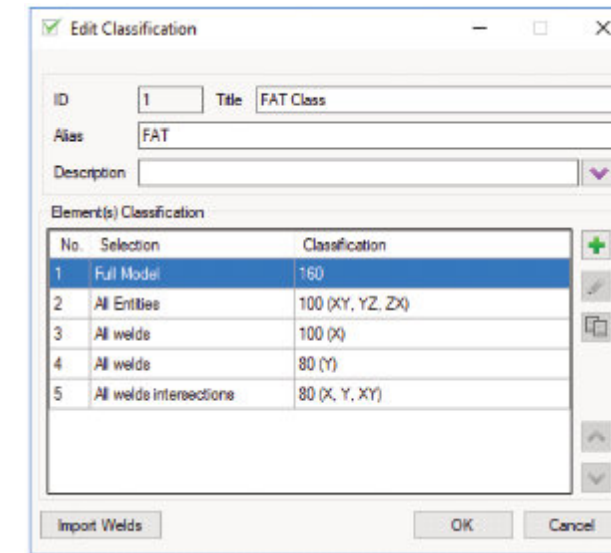




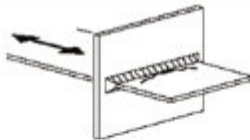


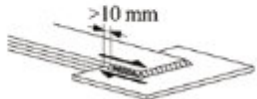
DVS 1608 (2010), DVS 1612 (2014)

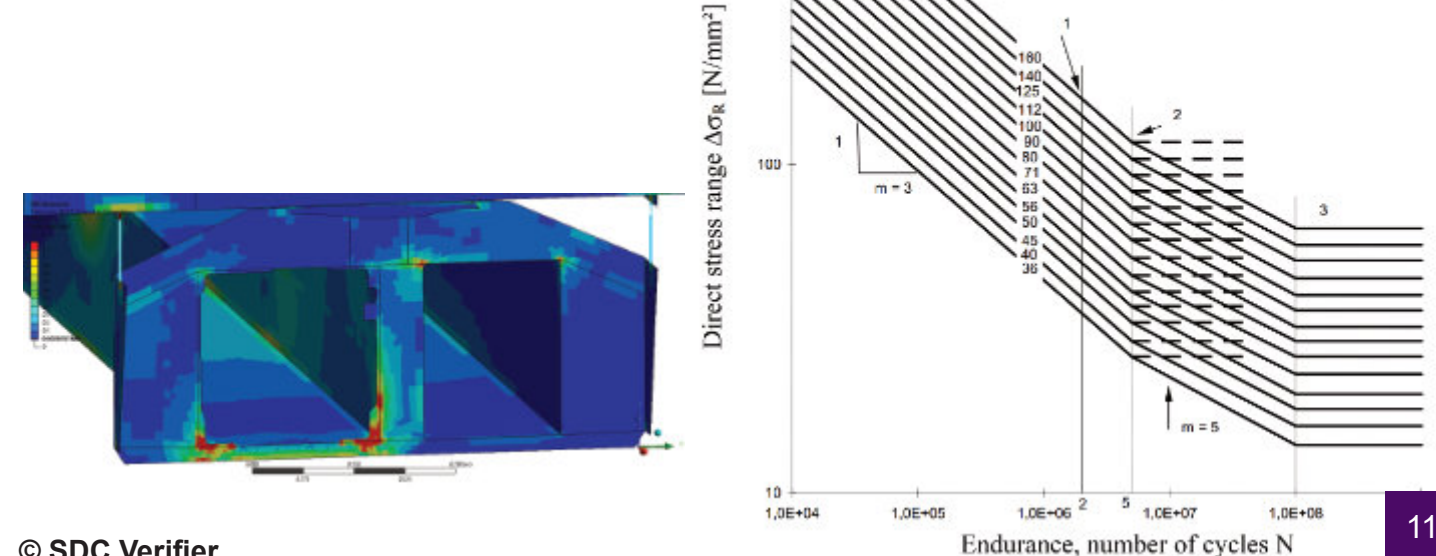
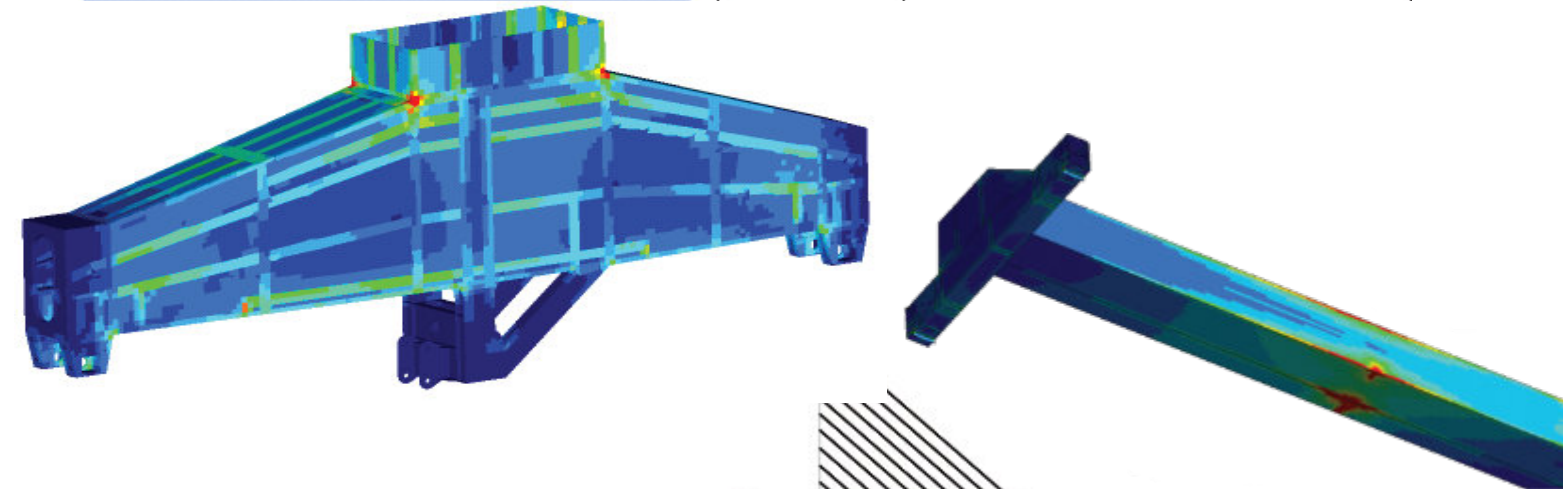
DVS 1608 (Design and strength assessment of welded structures from aluminum alloys in railway applications) – Aluminium Fatigue Check.

DVS 1612 (Design and endurance strength analysis of steel welded joints in rail-vehicle construction) – Steel Fatigue Check and Static Stress Check.

The notch group classification or fatigue strength of the welds depends on the quality and the stress direction, along the weld (X), perpendicular to the weld (Y) and the shear (XY). Stresses are converted into weld direction automatically by the weld finder.



Detailed Category	Constructional detail	
100		
80		
80		

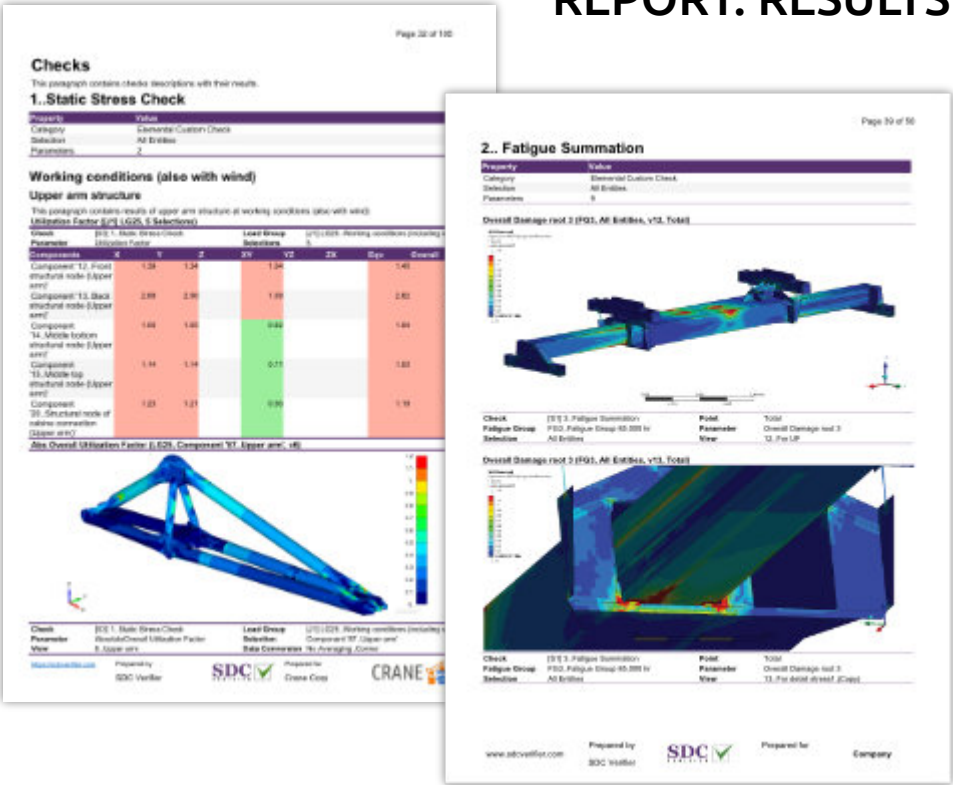


Preparing a full calculation report is one of the most time-consuming parts of the project. From project to project, an engineer repeats the same routine to create a calculation report. With SDC Verifier, the process of report generation is done automatically, reducing time expenses.

Materials and properties data (including mass overview) are described. Elements related to material/property are highlighted:

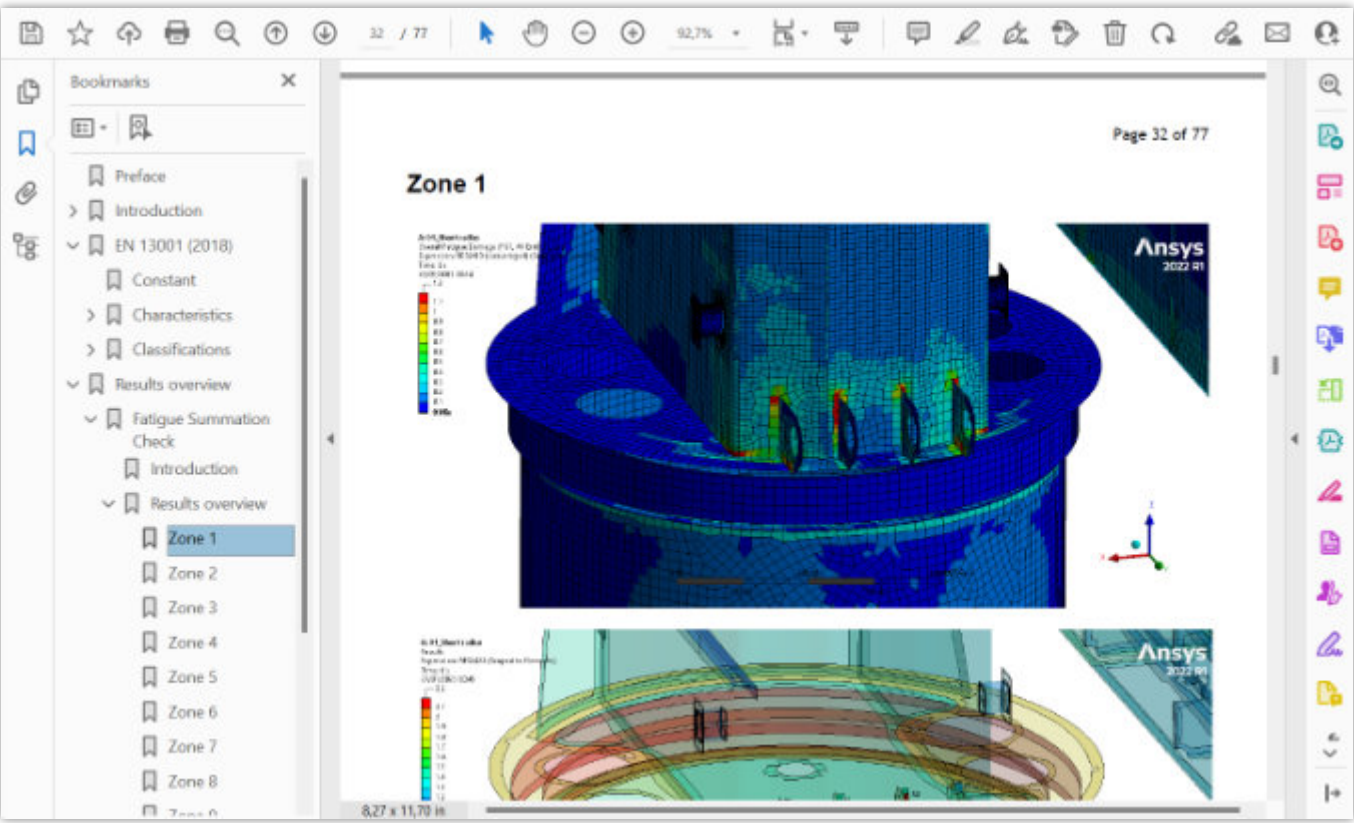
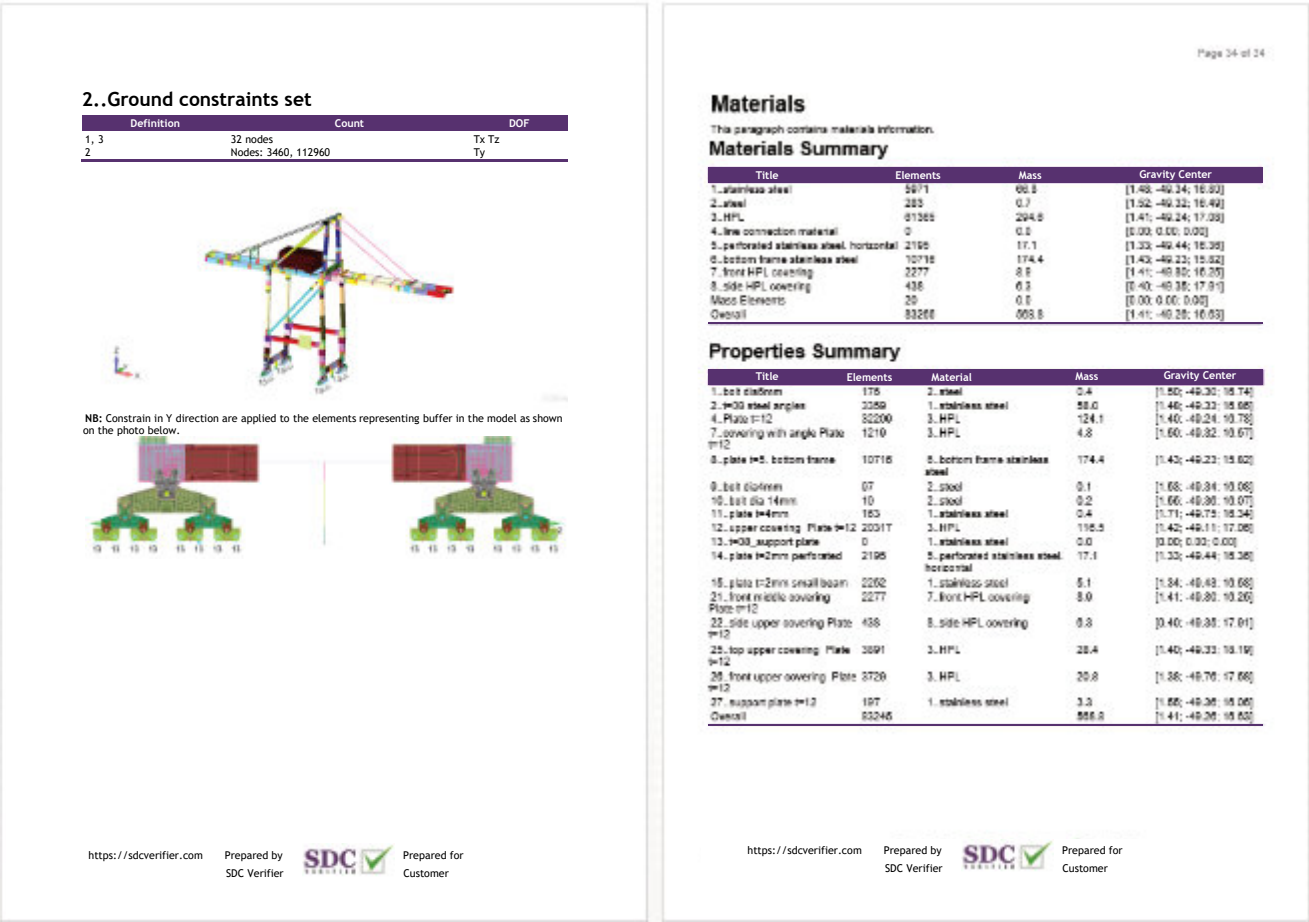


Results contain plots and tables. Detailed results for each entity, extreme results on selection, and advanced tables to compare load results are shown:



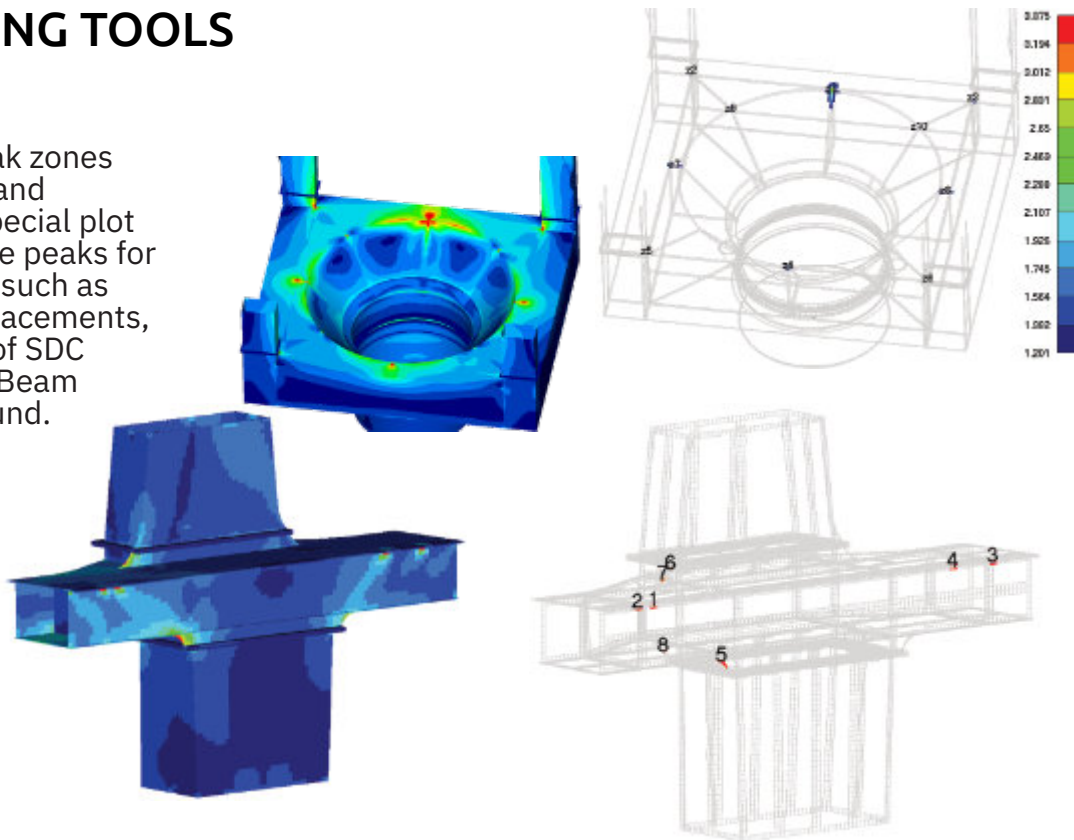
A complete setup with headings and bookmarks enables a quick navigation through the reports.

Description of applied loads and constraints, mass overview over materials/properties/groups:



With Report Designer, you can control the report's structure and easily preview and modify it. A variety of tools helps to create a huge amount of plots and tables quickly.

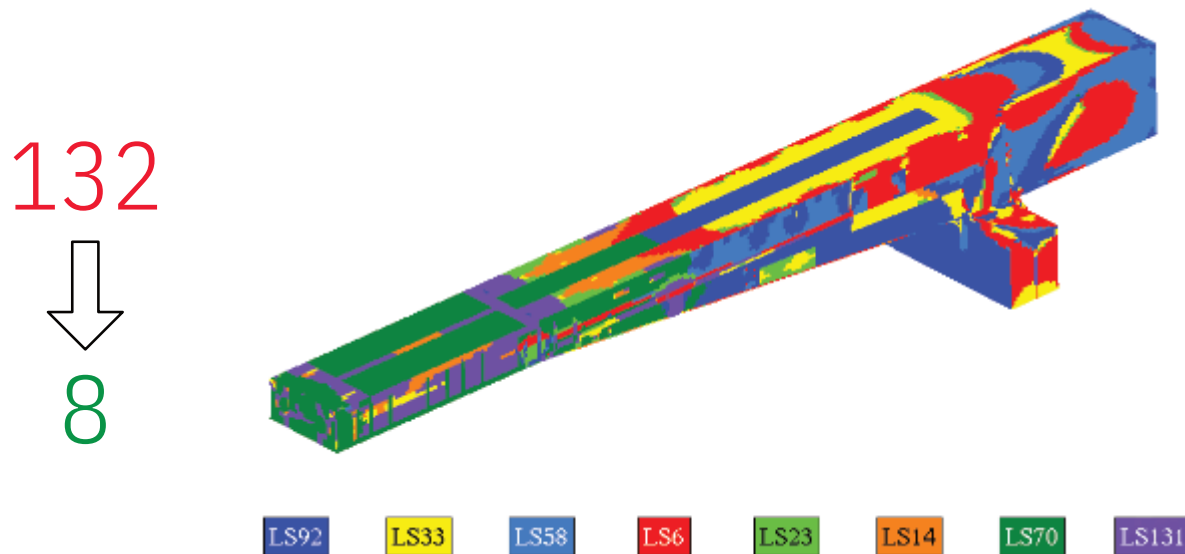
Peak Finder finds all peak zones based on output results and presents them using a special plot and a summary table. The peaks for both simple FEA results, such as stresses, strains, or displacements, and all available results of SDC Verifier checks (Fatigue, Beam Buckling, etc.) can be found.



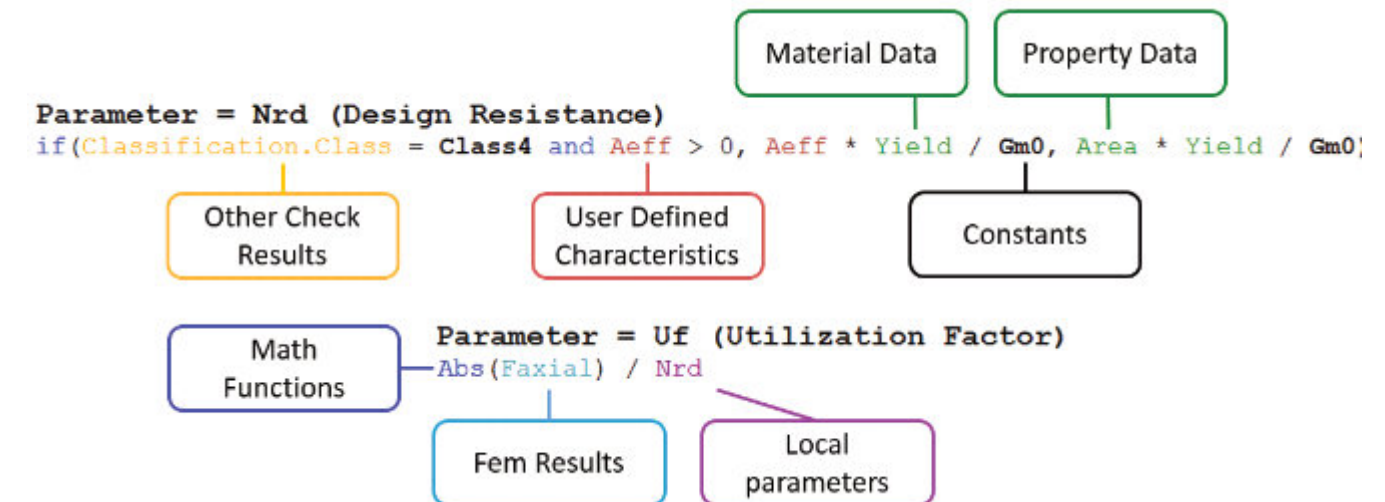
Zone	Value	Zone	Value
Zone 1 (Elements: 2)	1.45	Zone 5 (Elements: 15)	1.41
Zone 2 (Elements: 2)	1.44	Zone 6 (Elements: 1)	1.21
Zone 3 (Elements: 2)	1.43	Zone 7 (Elements: 3)	1.09
Zone 4 (Elements: 2)	1.42	Zone 8 (Elements: 1)	1.01

Governing loads tool extracts the critical loads out of a large group of load combinations. Save time focusing on important situations instead of checking each and every.

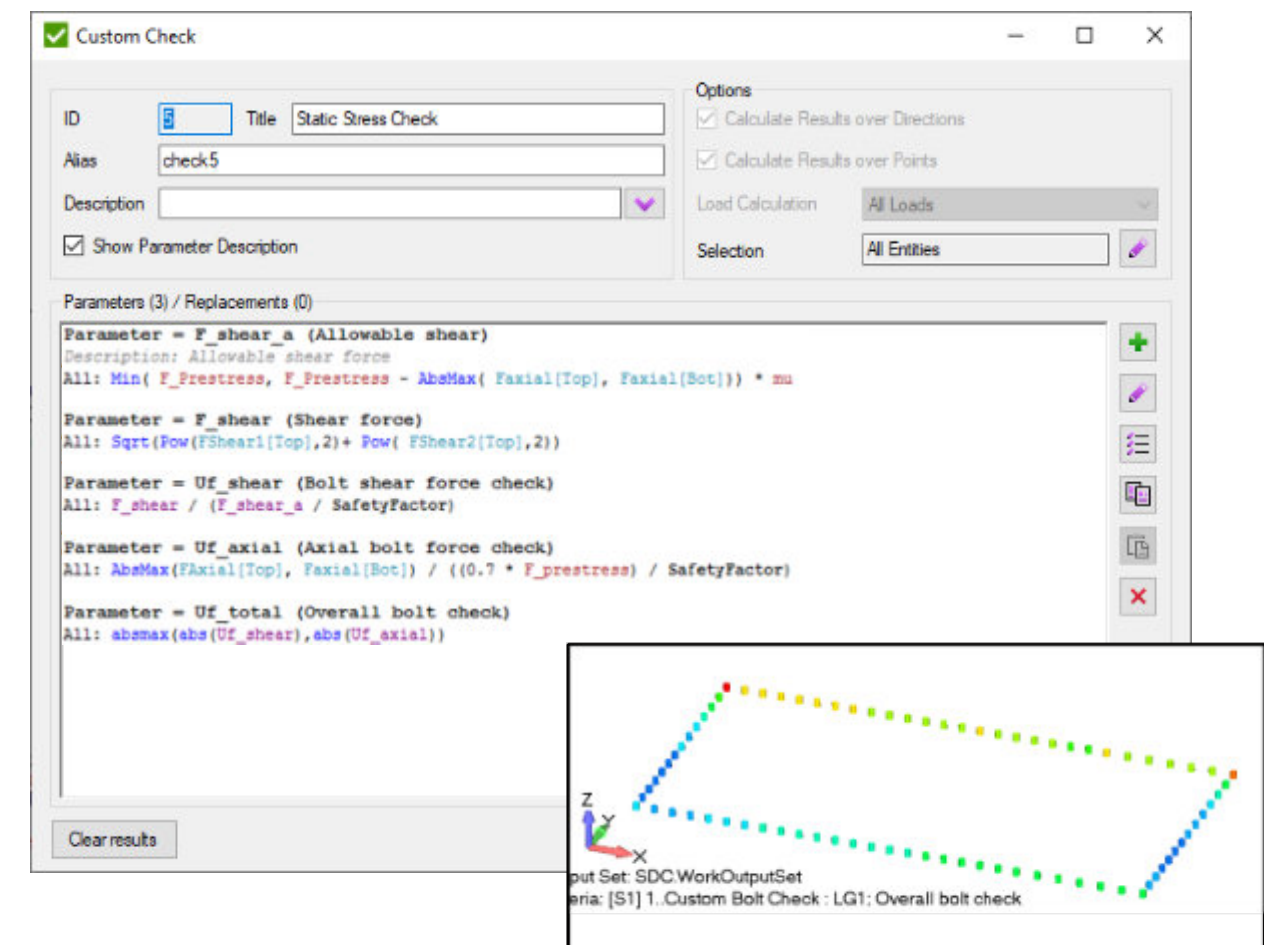
Only 8 load cases are critical for this model and selected criteria, which will dramatically speed up the further verification process.



The checks in SDC Verifier are fully customizable. With the help of the formula editor, user-defined formulas can be created based on results, model properties and recognized dimensions.



The following example demonstrates a verification of bolted connections. The Axial Force of bolts is compared with the bolt design resistance:



EXTENSIBLE MODULES

Acquire only some modules if you need specific features of the software



**SDC Reporting
and SPDM**



Weld Check



Fatigue



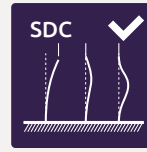
Bolt Check



**Plate & Stiffener
Buckling**



**Beam Member
and Joint Checks**



**Beam Member
Check**



**Eurocode 3
Beam Member**



FKM App



**AISC Beam
Member**

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