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Faculty of Science and Technology

In-place and Lift Analysis of an Offshore Module: Comparative Study

Bahram Momeni

30 ECTS thesis submitted as part of fulfilment of a Master degree in

Mechanical and Structural Engineering (Offshore Construction)

Supervisor

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Abstract

Design of offshore structures involves a variety of subjects including effects of harsh environmental conditions, variable loading patterns at each stage of the work and different accident scenarios e.g. explosions and collision.

A structural engineer need to have sufficient knowledge and experience and pay due attention to each and every detail along with the general design considerations in order to overcome all design challenges and fulfil the requirements set up for structures.

The main objective of this thesis is to gain an overall understanding of diverse issues related to design and analyses of the offshore structures through a redesign and comparison work. Results from this global structural reanalysis can be used to assess and ensure the safety level of the existing structure within the assumed conditions.

Analysis and design evaluation of an existing topside module have also been the pretext for presenting some of the general design consideration within this thesis. Comparison between the old existing practice and the current practice will be made wherever possible.

This master's thesis includes the following topics:

- Study and implementation of regulations and rules for offshore construction.
- In-place and lift analysis of an existing offshore module for the relevant actions in order to verify structural capacity and ensure safety of the structure.
- Learning the analysis software SESAM GeniE and using it as the analysis tool.
- Detail modelling of joints using plate elements and connecting the joint to the main analysis model to find the maximum stress values.
- Padeye model made with plate elements for analysis of stress distribution when subjected to the maximum sling load.

The analyses done for in-place condition and lifting operation of the module verify that all engineering work complies with the given specifications, maintains the structural integrity and level of quality needed to ensure safe operation of the installation.

Preface

This thesis is submitted in partial fulfilment of the requirements for my master's degree in Mechanical Engineering specialization in Offshore Construction at the University of Stavanger (UiS), Norway.

Topic of the thesis was chosen in collaboration with Aibel As, Stavanger Office, and the work was supported by the company.

I am very grateful to my faculty supervisor, Associated Professor S.A. Sudath C Siriwardane, for all his support, help with finding the relevant literature and excellent guidance during the thesis work.

I would like to thank Aibel As for providing me with time, office space and all the necessary computer programs. I would also like to thank my colleagues Gustavo Quintela and Fuad Nuhic for their support and guidance with the analysis program, GeniE.

Special thanks to my brother, my wife and my friends for all their supports and encouragements.

Bahram Momeni
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Abbreviations

ALS	Accidental Limit State
API	American Petroleum Institute
ASD	Allowable Stress Design
COG	Centre Of Gravity
DAF	Dynamic Amplification Factor
DF	Design Factor
DNV	Det Norske Veritas
DOF	Degrees Of Freedom
FE	Finite Element(method)
GBS	Gravity Base Structure
ISO	International Organization for Standardization
LAT	Lowest Astronomical Tide
NPD	Norwegian Petroleum Directorate
SKL	Skew Load Factor
SLS	Serviceability Limit State
ULS	Ultimate Limit State

1. Introduction

1.1 Background

Platforms can be classified in several categories according to their main distinguishing features, such as load support, mobility, dynamic response and material used.

Fixed concrete platforms under the category of fixed platforms, often referred to as gravity base structures (GBS) were developed in the mid-1970s. Many of the fixed concrete platforms have very big topsides, often consisting of a heavy module support frame (MSF) and a number of modules on top of the MSF. [1]

Modules are usually fabricated separately and then installed on the main support frame. Each module unit shall be designed and checked for different phases e.g. Lifting, Transport and In-place condition.

Structural design and analysis of offshore installations involves a variety of very complex and interesting engineering subjects. Having working experience from the modification and maintenance sector of the offshore industry, it was decided to make a complete set of in-place ULS, SLS, ALS and lifting operation analyses of a module in this thesis. This was in order to gain an overall understanding of the analysis methods, procedures, standards and regulations.

A platform elevation (looking north) overview including the water depth and the location of the chosen module is shown in Figure 1-1

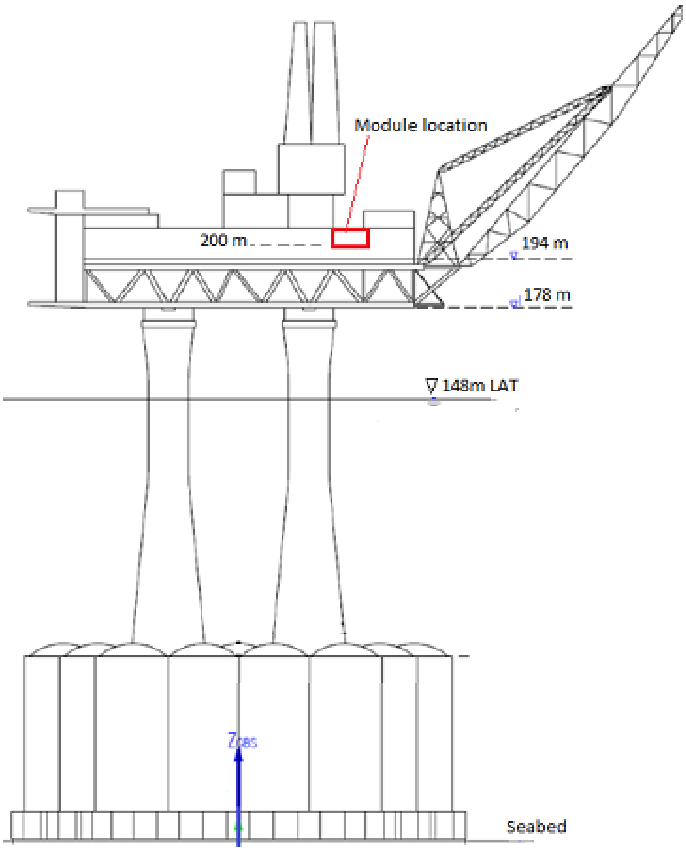


Figure 1-1 Platform elevation overview ***[2]***

1.2 Scope of Work

This master's thesis includes global structural reanalysis of an existing offshore module in accordance to the current design codes and regulations. Results of the analyses can be used to ensure safety level of the existing structure, for instance by identifying the potential locations of failure. A comparison of the original design practice vs. the current practice in order to find and discuss the differences will also be presented.

The global Accidental Limit State analysis for in-place condition of offshore installations would normally include Fires and explosions, Impact Loads and Environmental Actions. The module structure will be checked for extreme earthquake actions in the accidental limit state.

Lifting operations are very common on offshore facilities, the operation could be heavy lifting between platform and barge/vessel, lifting within a platform using platforms carne or lifting of objects inside the modules using monorails, lifting lugs and chain hoist.

For the offshore lifting operation from barge onto the platform, capacity of the main structural members, padeyes and used lifting equipment have been checked. A finite element model of the padeye will also be presented that will illustrate the local stress distribution.

1.3 Limitations

The main focus in this master's thesis is on module global in-place analyses for the relevant loads and environmental conditions.

ALS checks in this thesis will be limited to the most severe applicable environmental action, namely earthquake loading. This thesis does not cover all the checks for ALS e.g. fire, explosion, collision and dropped objects as each of these analysis requires more extensive and elaborated work which is out of the time budget for this thesis.

The lifting calculations are limited to the lifting operation from the barge onto the platform. Yard lifting and transportation are not a part of this work.

1.4 Thesis Organization

This master's thesis is organised in 7 chapters as follows:

Chapter 1: Gives a brief introduction of the scope of thesis and limitations.

Chapter 2: Explains briefly the legal system and the regulations related to the petroleum activities in Norway. This chapter presents also an overview of the different limit states.

Chapter 3: Comprises an outline of the thesis methodology, basis of the design and the acceptance criteria for the design.

Chapter 4: Explains different external actions related to structural analyses of offshore structures.

Chapter 5: Includes in-place analyses of the module. Modelling of the module using GeniE is explained in successive steps, and actions are applied through the relevant load combinations. The results of code checking are presented for each limit state.

Chapter 6: Discusses offshore lifting operation and Padeye analyses based on NORSOK R-002 and relevant DNV standards. This chapter includes also FE-employed analysis and padeye calculations using the empirical approach given by the standards.

Chapter 7: Provides Conclusion and Recommendations for further works

2. Design principles for offshore structures

All petroleum activity on the Norwegian continental shelf has to comply with the requirements in Norwegian laws and regulations. The general hierarchical structure of the legal system can be illustrated by Figure 2-1

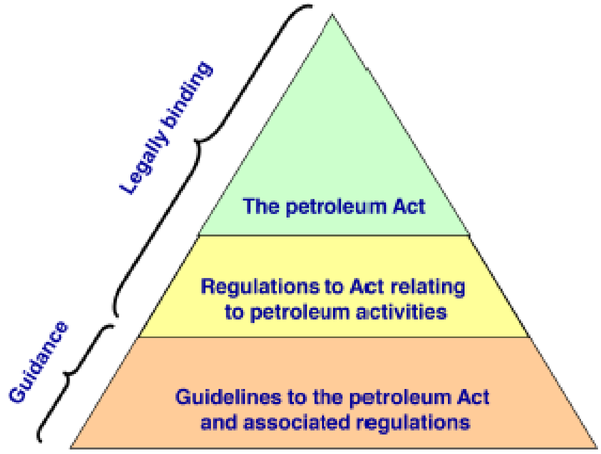


Figure 2-1 Hierarchy of the legal system in Norway [1]

The framework for Norwegian petroleum activities is established by the Norwegian parliament, Stortinget. All major matters of great public importance and development plans related to petroleum sector must be discussed and decided by the Storting.[1]

The government has the executive power and responsibility in applying the petroleum policy. Several ministries are involved in executing the various roles within the petroleum policy, while the Ministry of Petroleum and Energy holds the overall responsibility for management of petroleum resources on the Norwegian continental shelf.[1]

The Norwegian Petroleum Directorate (NPD) as a governmental specialist directorate maintains the administrative and financial control of exploration and recovery of the petroleum resources, in order to ensure that such exploration and recovery is in accordance with legislation and regulations.

Certification Authorities: act as independent body or third party. We can name Det Norske Veritas (DNV) as an example of certification/classification authority.

Codes and Standards: Codes and standards provide details, rules and guidelines on how structures should be designed, built, and operated. The difference between a code and a standard is that a code is a set of rules or principles or laws which must be followed, while a standard sets recommended practices and guidelines that should be followed. Examples of the codes and standards are such as: Eurocode 3, IS0 Codes for Design of Offshore Structures and NORSOK Standards.

2.1 Standards for offshore structures

ISO 19900, *Petroleum and natural gas industries – General requirements for offshore structures*

The general principles for offshore structures given in the ISO 19900 are applicable worldwide to all types of offshore structures including bottom-founded structures as well as floating structures and to all types of materials used including steel, concrete and aluminium.

ISO 19900 defines general requirements for the design, construction, installation and assessment of structures subjected to known or predictable actions. The standard specifies also applicable principles for different stages from construction to installation, use of the structure and its decommissioning. The given guidelines are also applicable to the modification and assessment of existing offshore structures.

NORSOK standards

The NORSOK standards are the most used standards in projects related to petroleum activities on the Norwegian continental shelf. The NORSOK standards are developed by the Norwegian petroleum industry and are based on recognised international standards. These standards are developed to ensure adequate safety, value adding and cost effectiveness for petroleum industry developments and operations. In addition, NORSOK standards are intended to replace oil company specifications and serve as references in the authorities' regulations. [3]

Some of the NORSOK standards used for offshore steel constructions and lifting equipment are:

- NORSOK N-001: Integrity of offshore structures.
- NORSOK N-003: Actions and actions effect.
- NORSOK N-004: Design of steel structures.
- NORSOK R-002: Lifting Equipment.

According to NORSOK N-001 all load bearing structures used in the petroleum activities shall comply with relevant national and international regulations.

The NORSOK standard N-001 is the principal standard for offshore structures as it is based on ISO 19900 and Norwegian regulations. N-001 specifies general principles and guidelines for the structural design and verification of load bearing structures subjected to foreseeable actions.

"*A structural system, its components and details should be designed to comply with the international standard ISO 19 900 and the following listed principles:*

- *Structures and structural elements shall normally be designed with ductile resistance*
- *Structures shall be designed such that an unintended event does not escalate into an accident of significantly greater extent than the original event*
- *Structures shall be designed with the objective to minimize overall dynamic stress concentrations and provide a simple stress path*
- *Structures shall be designed such that fabrication, including surface treatment, can be accomplished in accordance with relevant recognized techniques and practices*
- *Design of structural details, selection of structural profiles and use of materials shall be done with the objective to minimize corrosion and the need for special precautions to prevent corrosion*
- *Adequate access for inspection, surveillance, maintenance and repair shall be provided*
- *Satisfy functional requirements as given in the Design Premises.*"[3]

2.2 Limit states design

The principles of the limit states design method and the definitions of the four limit states categories are given in ISO 19 900.

In a limit-state design, the design of structures shall be checked within the respective groups of limit states to ensure that the safety margin between the maximum likely loads and the weakest possible resistance of the structure is large enough and it must be checked that the structure has sufficient ductility to develop the relevant failure mechanism. [3]

2.2.1 Ultimate limit state (ULS)

The ULS is defined as a condition where a criterion state governing the load-carrying ability or use of the structure is reached. The structure must not experience failure of critical components, loss of static equilibrium, excessive deformation or brittle fracture when subjected to the design load for which it was designed. [4]

Ultimate limit state includes two conditions:

- ULS-a reflecting extreme permanent loads with regular environmental conditions.
- ULS-b reflecting large permanent loads with extreme environmental conditions.

2.2.2 Serviceability limit state (SLS)

The serviceability and operational requirements of the offshore structures can be affected by excessive relative displacements or vibrations

- Deflections which may affect integrity and prevent the intended operation of equipment
- Deflections which may damage architectural finishes or alter the effect of the acting forces
- Vibrations which may cause discomfort to personnel or exceed the limitation of equipment
- Serviceability requirements will normally be defined by the operator for the specific project. [3]

2.2.3 Accidental limit state (ALS)

The overall objective of an ALS design check is to ensure that the accidental action does not lead to complete loss of integrity or performance of the structure, and that the main safety functions remain intact. It implies that minor structural damage is accepted in ALS, including damage that cannot be repaired, e.g. in connection with the foundation.

The ALS is checked in two steps:

a) Verifications shall be done to ensure that the structure will maintain the prescribed load carrying function for the defined accidental load.

b) In case the resistance has been reduced due to local damage caused by an accidental load as described in a), the structure shall continue to resist defined environmental actions. [3]

2.2.4 Fatigue limit state (FLS)

In fatigue limit state structures are designed to withstand the presupposed repetitive (fatigue) actions during the life span of the structure, so that the fatigue failure is unlikely to occur. Design fatigue factors (DFF) shall be applied taking into account the damage consequences and the need for in-service inspection, maintenance and repair. [3]

According to NORSOK N-004 design fatigue life for the structure components should be based on the structure service life specified by the operator otherwise a service life of 15 years shall be used.

3. Methodology

In order to discuss the main aspects of design of offshore structures a case study on design analysis of an existing offshore module will be conducted. The analysis will be performed using the latest codes and standards and results of this new analysis will be compared to the original design wherever comparison is possible.

3.1 Design Philosophy

The main purpose of a structural engineer should be to achieve efficient design solutions which result in minimum structural weight and cost.

Structures, in this case the module, shall be designed to maintain integrity during all stages of its life. This includes construction, transportation, installation and operation. In order to ensure safety and functional requirements, reliable and recognised design methods have to be deployed.

Load and Resistance Factor Design (LRFD)

The LRFD is an approach for reliability-based design method, which takes the variability in both loading and resistance into account. In this method, predicted characteristic external actions are multiplied by appropriate load factors to determine the factored load effects (magnification), and a resistance factor is applied to the characteristic strength, nominal resistance, of each component (reduction). The level of safety of a structural element is considered to be satisfactory, if the sum of the factored load/action effects are below the factored strength/resistance.[4]

$$S_d = S_k \gamma_f \qquad R_d = R_k/\gamma_m \qquad S_d < R_d \qquad \text{(Eq.3-1)}$$

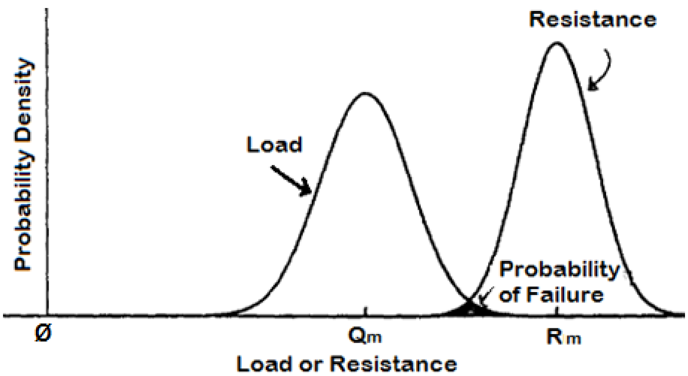


Figure 3-1 Load and Resistance Factor Design concept

The LRFD method has two main advantages over the methods based on permissible stresses e.g. ASD method. Firstly, by utilizing limit state design, the engineer does not have to assume linearity between stress and force. Secondly, different load factors account for the degree of uncertainty for various loads (dead and live). These benefits of LRFD result in a more consistent reliability of the structural steel design process, and in many cases a more cost-effective steel structure design.

As for the limitations of LRFD, one can mention that the method requires availability of statistical data to select appropriate factors for specific cases, and the resistance factors vary with design methods and are not constant.

3.2 Material Specifications

Structural steel with guaranteed yield strength of 355 MPa to be used for:

Primary Structural Steel; All main load carrying members participating in the overall integrity of the structure including the following items:

- Main trusses and girders
- Columns and wind bracing
- Seafastenings

Secondary Structural Steel; All steel exposed to local loading and includes the following items:

- Deck and roof plating
- Stiffener for deck and roof plates
- Support stringers

3.2.1 Material Properties

The following constants will be used for all steel design:

Modulus of Elasticity $E = 2.1 \times 10^5\ N/mm^2$

Shear Modulus $G = 0.8 \times 10^5\ N/mm^2$

Mass Density of Steel $\rho = 7850\ kg/m^3$

Poisson's Ratio $\nu = 0.3$

3.2.2 Special Structural Steel

This is to be used in members essential to the overall integrity of the structure and includes:

- Padeyes and nodes to which padeyes are attached
- Complete joints connected to padeyes
- Complex joints
- Highly stressed areas where there exists tension across the plate thickness/10/

3.2.3 Material Factors

The material factors are according to NORSOK N-004

ULS:

- Resistance of cross sections $\gamma_{M0} = \gamma_{M1} = 1.15$
- Resistance of welds and bolted connections $\gamma_{Mw} = \gamma_{M2} = 1.3$

SLS & ALS:

- The material factor for serviceability and accidental limit state $\gamma_M = 1.0$

3.3 Analysis Tool

The module is modelled using the linear elastic analysis program GeniE. Sesam GeniE is a pre-processor for beam, shell and plate structures used for design and analysis of fixed and floating offshore and maritime structures.

Some of the useful features of the software are listed below:

- Concept modelling and automated processes support fast design iterations and optimization
- Static and dynamic structural analysis incorporating environmental load calculation
- All analyses are based on the Finite Element Methodology where beams and plates are connected
- Intelligent tubular joint design based on user defined rules.
- Easy to interrogate the model by using browser techniques.
- Flexible load application by modelling equipments, their footprints and load transfer rules.
- Flexible handling and conversion of units. [5]

GeniE is fully owned, maintained and supported by DNV Software, an independent business unit of Det Norske Veritas AS, Norway.

3.4 Acceptance criteria

Von Mises yield criterion for the elastic verification of a critical point of the cross section as given in Eurocode3 [6] section 6.2.1:

$$\left(\frac{\sigma_{x,Ed}}{f_y/\gamma_{M0}}\right)^2+\left(\frac{\sigma_{z,Ed}}{f_y/\gamma_{M0}}\right)^2-\left(\frac{\sigma_{x,Ed}}{f_y/\gamma_{M0}}\right)\left(\frac{\sigma_{z,Ed}}{f_y/\gamma_{M0}}\right)+3\left(\frac{\tau_{Ed}}{f_y/\gamma_{M0}}\right)^2\leq 1 \qquad \text{(Eq.3-2)}$$

$\sigma_{x,Ed}$ is the design value of the local longitudinal stress at the point of consideration

$\sigma_{z,Ed}$ is the design value of the local transverse stress at the point of consideration

$\tau_{,Ed}$ is the design value of the local shear stress at the point of consideration

The majority of design cases can be more efficiently and effectively checked by using the interaction formulas given in section 6.3.3.[6]

$$\frac{N_{Ed}}{\frac{\chi_y N_{Rk}}{\gamma_{M1}}}+k_{yy}\frac{M_{y,Ed}+\Delta M_{y,Ed}}{\chi_{LT}\frac{M_{y,Rk}}{\gamma_{M1}}}+k_{yz}\frac{M_{z,Ed}+\Delta M_{z,Ed}}{\frac{M_{z,Rk}}{\gamma_{M1}}}\leq 1 \qquad \text{(uf661)} \qquad \text{(Eq.3-3)}$$

$$\frac{N_{Ed}}{\frac{\chi_z N_{Rk}}{\gamma_{M1}}}+k_{zy}\frac{M_{y,Ed}+\Delta M_{y,Ed}}{\chi_{LT}\frac{M_{y,Rk}}{\gamma_{M1}}}+k_{zz}\frac{M_{z,Ed}+\Delta M_{z,Ed}}{\frac{M_{z,Rk}}{\gamma_{M1}}}\leq 1 \qquad \text{(uf662)} \qquad \text{(Eq.3-4)}$$

3.4.1 SLS, limitation of vertical deflection

Table 3-1 Limiting values for vertical deflections/N-001/

Condition	Limit for δ_{max}	Limit for δ_2
Deck beams	L/200	L/300
Deck beams supporting plaster or other brittle finish or non-flexible partitions	L/250	L/350

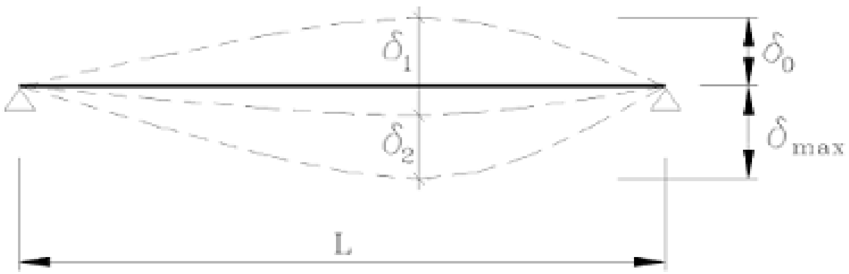


Figure 3-2 Definitions of vertical deflections [3]

The maximum vertical deflection is: $\delta_{max} = \delta_1 + \delta_2 - \delta_0$

Where

δ_{max} is the sagging in the final state relative to the straight line joining the supports

δ_0 is the pre-camber

δ_1 is the variation of the deflection of the beam due to the permanent actions immediately after loading

δ_2 is the variation of the deflection of the beam due to the variable actions plus any time dependent deformations due to the permanent load [3]

3.5 Some Considerations Regarding Seismic Analyses

The experience from many earthquake response analyses of platforms and topside structures in the North Sea indicate mostly linear elastic behaviour under abnormal earthquake excitations. According to NPD, abnormal earthquake has an annual probability of exceedance equal to 10^{-4}. [7]

Analyses have also shown limited plastic behaviour for certain platform types and topside structures. If the response from so-called "response spectrum" analysis have been used as the basis for code checking, it is important to be aware of the conservatism and uncertainties associated with this design approach. [7]

It has therefore been emphasized that utilization ratios from a linear elastic earthquake response spectrum analysis, accounting for static loads, shall only be regarded as a basis for further strength and ductility evaluations. Considering the progressive collapse limit state, design focus should be on plastic behaviour rather than strengthening. [7]

3.5.1 API RP2A Recommendations

The API recommendations are primarily given for seismic design of piled steel jacket platforms and the U.S. coast, but the principles and procedures given in API apply in general to all fixed platforms also in other parts of the world.[7]

The API seismic design recommendations are based on a two level design approach.

- **Strength Requirements:** The platform is designed for a severe earthquake which has a reasonable likelihood of not being exceeded during the platform life.

- **Ductility Requirements:** The platform is then checked for a rare earthquake with a very low probability of occurrence e.g. 10^{-4}

The objective of the strength requirements is to prevent significant interruption of normal platform operations after exposure to a relatively severe earthquake. Response spectrum method or time history approach is normally applied.[7]

The objective of the ductility requirements is to ensure that the platform has adequate capacity to prevent total collapse under a rare intense earthquake. Member damage such as in-elastic member yielding and member buckling are allowed to occur, but the structure foundation system should remain stable under the load imposed.[7]

3.5.2 Multicomponent earthquake excitation

Ground motions at a site due to earthquake can be described by means of a vector process. The vector is normally resolved into component processes convenient for design purposes. The rotational components are usually neglected, and the translational components are given in two horizontal and one vertical direction.[7] This is described in NORSOK N-003 section 6.5.1 as following:

"*The earthquake motion can be described by two orthogonally horizontal oscillatory motions and one vertical motion acting simultaneously. These motion components are assumed to be statistically independent. One of the horizontal excitations should be parallel to a main structural axis, with the major component directed to obtain the maximum value for the response quantity considered. Unless more accurate calculations are performed, the orthogonal horizontal component may be set equal to 2/3 of the major component and the vertical component equal to 2/3 of the major component*" [8]

4. Actions

Definitions according to ISO:

Action: *external load applied to the structure (direct action) or an imposed deformation or acceleration (indirect action)*

Action effect: *effect of actions on structural components (Internal force, moment, stress or strain)*

4.1 Permanent Actions

Permanent actions are defined as actions with no variation in magnitude, position or direction during a specified time period.

4.1.1 **Self-Weight** (339t)

The self-weight shall include weight of all structural elements

Self-weight of the primary structural steel

Self-weight of the outfitting and secondary structural steel

Weight of partitions, cladding, fire walls and insulation shall be

Self-weight of the module structure is 339 tonnes which includes generated self-weight in the GeniE model and non-generated self-weight which is accounted for by multiplying a factor to the automatically generated part.

4.1.2 **Equipment Dead load**

The equipment weights should be accurately defined either by weighing or the weight specified by the manufacturer. For this analysis, equipment weights per discipline are obtained from the weight report/SUMSECTIONDISC/and presented in the table below:

Table 4-1 Equipment dead load per discipline

Number	Discipline	Gross Dry Weight (t)	Content Weight (t)
1	Electrical	8	
2	Instrument & Telecom	17	
3	Fire & Safety	23	0.7
4	Mechanical	3	0.2
5	Piping & Layout	618	27.3
6	Surface protection, Insulation	2.9	
Total	Manifold Module	671.9 tonnes	28.2 tonnes

4.2 Variable Actions

NORSOK N-003 defines variable actions as actions originated from normal operation of the structure, but with variation in position, direction and magnitude during the design phase considered.

4.2.1 Deck Live Load

Live load on the deck and roof areas used in the analysis of the module shall include weight of:

Stored liquids in tanks

Removable parts of the structure

Weight of persons and tools

Live load in laydown and storage areas

Pressure, temperature and variable ballast [8]

Table 4-2 Variable actions in various deck areas

Deck/Roof area	Local Design		Primary design
	Distributed load q kN/m^2	Point Load p kN	Factor to be applied to distributed action
Storage Areas	q	1.5 q	1
Laydown Areas	q	1.5 q	f
Free area between equipment	5	5	f
Walkways, staircases and platforms	4	4	f
f is the minimum of 1.0 and (0.5 + 3/A0.5), where A is the action area in m^2.			

$q = 15kN/m^2$ has been used for distributed load on the deck and roof areas.

External walkways in the original analysis of the module are designed for a distributed load of $6\ kN/m^2$

Equipment live load for in-place analysis includes the maximum operating weight of stored bulk or liquid content of the pipework, pressure vessels and storage containers.

4.3 Environmental Actions

Environmental actions on structures should be defined on the basis of existing information and measurements at the actual or close to the location of the installation. Uncertainties connected to the measurements, methods and environmental changes should be accounted for when determining the characteristic value of the actions.

4.3.1 Wind Load

According to the module design manual [9] all wind loads shall be derived assuming the in-place position and the following formula: $F = 0.61 \times 10^{-3} C V^2 A$

Where:

F: wind force in kN,

C: Shape coefficient, set as 2 for I and H cross sections

V: wind velocity in $\frac{m}{s}$ at the appropriate elevation above sea level

A: Projected area of object (m^2)

For cladding, individual members and structures where horizontal and vertical dimensions are less than 50m, the 3 second gust velocities given in the table below to be used.

Table 4-3 Wind 3 Sec gust velocities at different elevations

Elevation above sea level (m)	3 sec. Gust speed (m/s)
10	55.5
25	60.3
50	63.9
75	66.0
100	67.5

The velocity values and formula given in the original module design will be compared to the guidelines given by NORSOK N-003

The characteristic wind velocity u(z,t)(m/s) at a height z(m) above sea level and corresponding averaging time period **t** less than or equal to t_0 = 3600 s may be calculated as:

$U(z,t) = U_z\,[1-0.41 I_u(z) \ln (t/t_0)]$

where the 1 h mean wind speed U(z)(m/s) is given by: $U(z) = U_0[1+C \ln(z/10)]$

$C = 5.73 \times 0.01 \sqrt{(1 + 0.15\, U_0)}$

and where the turbulence intensity factor $I_u(z)$ is given by:

$I_u(z) = 0.061[1+0.043U_0] \left(\frac{z}{10}\right)^{-0.22}$ Where, U_0 (m/s) is the 1 h mean wind speed at 10 m

The mean wind action, F, on a structural member or surface, acting normal to the member axes or surface is given by: $F = 0.5\rho\, Cs\, A\, Um^2\, Sin\, \alpha$

where

ρ mass density of air taken as 1.225 kg/m^3

C_S shape coefficient

A area of the member or surface area normal to the direction of the force

U_m wind speed

α angle between the direction of the wind and the axis of the exposed member or surface

Assuming elevation 75m above sea level and shape coefficient 2, A=1 $m^2$and $\alpha = 90\,\text{deg}$ we have:

Method used in the original design: F= 5.314 kN

Method given in NORSOK N-003: F= 5.346 kN (Detail calculation is presented in Appendix C)

We can see that the NORSOK method gives slightly higher value, but the difference is negligible.

4.3.2 Wave Loads

A design wave is specified by the wave height H, the wave period T, and direction and may especially be used to determine structural action effects which are not influenced by system dynamics.[8]

Action effects with e.g. annual exceedance probability of 10^{-2} can be determined in a simplified, conservative manner by the design wave approach for preliminary design of fixed platforms. For fixed platforms which respond to wave actions with negligible dynamic effects, maximum action effects occur for the highest waves.[8]

The relevant wave height H_{100} is then taken to be that with the 10^{-2} exceedance probability. H_{100} may be taken to be 1.9 times the significant wave height Hs, corresponding to an annual exceedance probability of 10^{-2}, as obtained from long-term statistics, when the duration of the sea-state is 3 h.[8]

The design wave height for the field and the corresponding 90% confidence interval for the wave period are presented in table below.

Table 4-4 Wave data – Omni directional [2]

Return Period	Wave Height	P5	Mean	P95
100 years	28.2 m	13.2 s	15.3 s	17.5 s

For the module analysis, wave loads are not relevant as the module is installed at elevation 52 m above the sea level.

4.3.3 Snow and Ice Loads

For Snow actions NORSOK N-003 refers to the extreme snow values given for the relevant costal municipality in NS 3491-3 or a characteristic snow action equal to 0.5 kPa.

The module original design basis specifies a distributed load of 2.0 kN/m^2 for weather deck areas which should be considered acting simultaneously with wind.

No ice loads will be considered on the module.

4.3.4 Earthquake actions

Earthquake with a return period of 100 years and appropriate action and material factors shall be used to assess the structural components in ultimate strength condition (ULS). In ALS check effects of earthquakes with an annual probability of occurrence of 10^{-4} with appropriate action and material factors, given in NORSOK N-001, shall be used to verify that the structure will not collapse.

The earthquakes with an annual probability of exceedance of 10^{-2} can be disregarded when the ALS requirement reveals to be governing.[3]

4.4 Deformation Loads

Deformation actions are caused by deformations due to

Temperature differences due to function or the surrounding conditions

Fabrication tolerances and errors

Uneven settlements of the foundations [3]

In the module analysis the differential support settlement will be considered.

4.5 Accidental Loads

4.5.1 Explosion

Overpressure and drag actions are results of an explosion. The overpressure action may be described by the pressure variation in time and space. The drag action is a result of the blast generated wind.[8]

NORSOK N-003 recommends that main fire walls in enclosed areas to be designed to withstand a blast pressure of at least 70 kN/m^2 with a duration of 0.2s and an overpressure rise time of 0.1s.

Blast analysis of the module is not covered by this master thesis.

4.5.2 Dropped Object

The dropped object criterion is a 7 tonne object with a constant area of 1 meter diameter falling from a height of 3 meters. This gives impact energy of 206 kJ. [10]

After installation of the module a crash barrier structure is added to the north east face of it to protect it from swaying objects due to crane operations. Plastic deformation is allowed for such crash barriers and nonlinear elastic analysis is usually used. This reinforcement has not been a part of the original module design nor the available drawings, hence is not considered within this master thesis.

5. In-place Analysis

5.1 General Considerations for Modelling

The existing manifold module (M12) on Statfjord C platform is used for the analysis. Dimensions of the model are shown in Figure 5-1, more details to be found in Appendix A: Geometry.

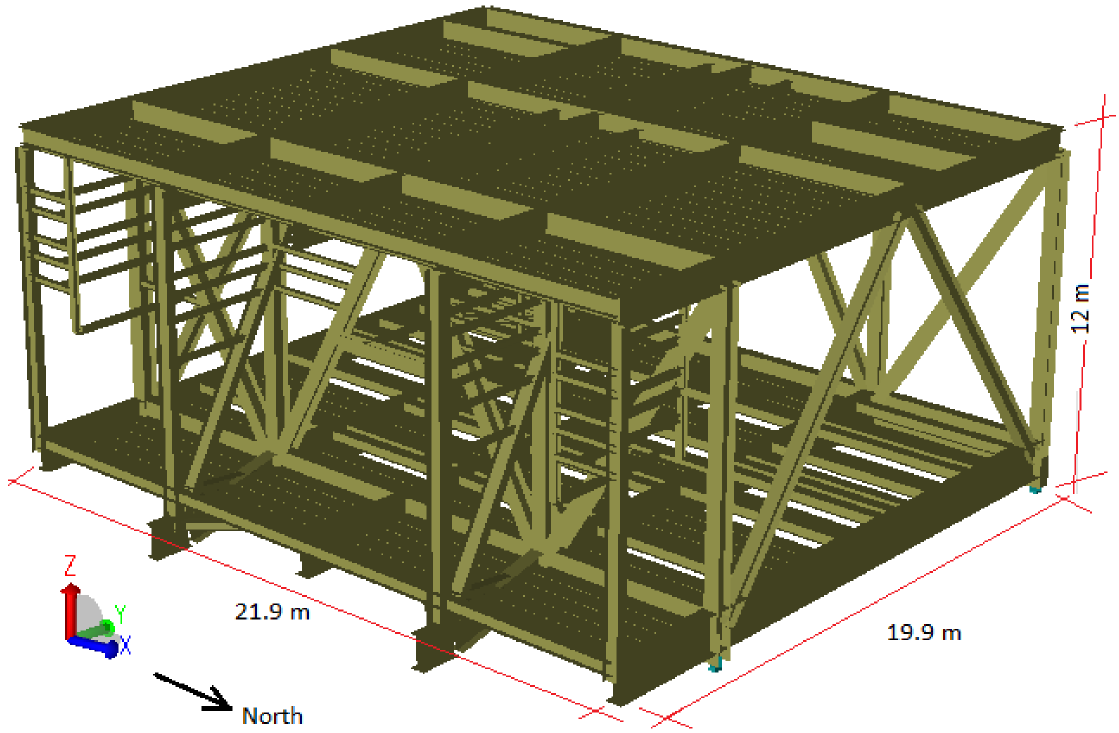


Figure 5-1 Overall dimensions and the coordinate system

5.1.1 System of Unites

All design and analysis will be carried out using the SI system of unites as follows:

Length: meter (m)

Mass: tonene (T)

Time: second (s)

Force: kilo Newton (kN)

5.1.2 Global Coordinate System

The global coordinate system is chosen such that X-axis points towards North, Y-axis towards West and Z-axis upwards.

5.1.3 Boundary Conditions

The module is assumed to be simply supported at 4 support points for all stages of its life. This means the module is restrained for vertical and horizontal translations, but there are no rotational restraints.

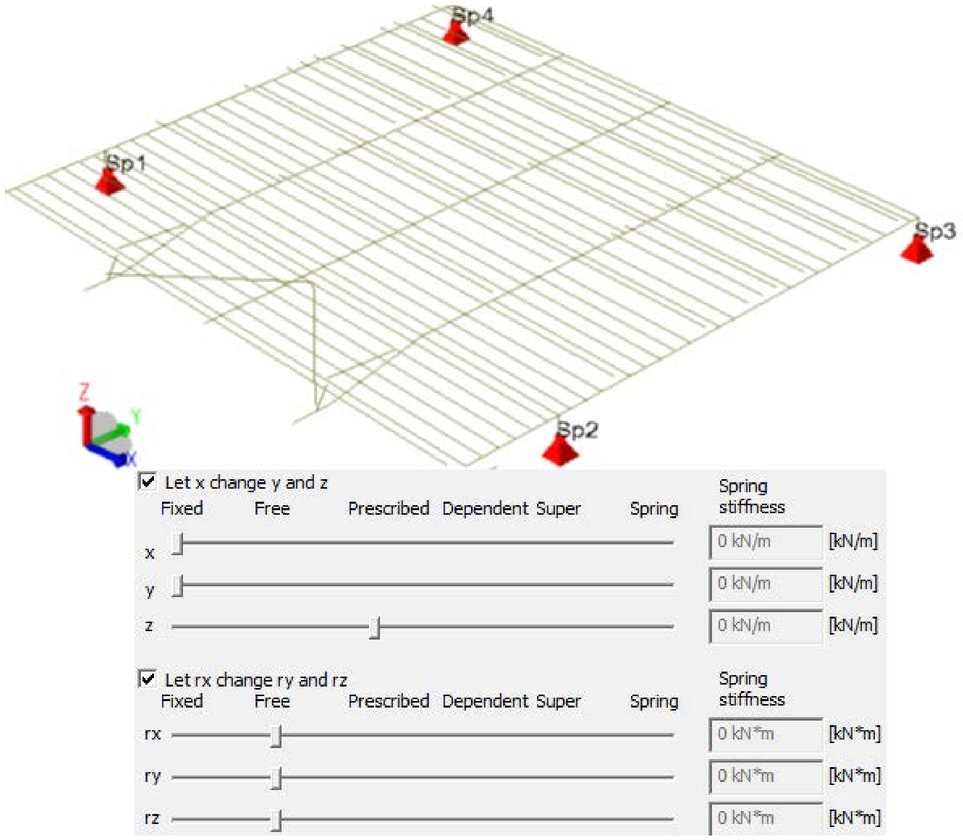


Figure 5-2 Boundary conditions used in the GeniE model

5.1.4 Plate and Stiffener Modelling

The main aim of the analysis is to check the primary steel including main members of the deck, roof, columns and the bracing.

Secondary steel such as deck plates and stiffeners are important with respect to the shear capacity of the deck and roof panels. Plate and stiffeners are modelled at the elevation of the neutral axis of the plate girders to not increase moment capacity of the beams.

5.2 SLS and ULS Analysis

5.2.1 Load cases

Relevant basic load cases used in the GeniE analysis are presented in the table below:

Table 5-1 Basic loadcases for In-place ULS analysis

Loadcase number	Description
1	Generated and Non Generated Self Weight
2	Equipment dead load(in -Z-direction)
3	Live Load(in -Z-direction)
4	Wind Load (in +Y-direction)
5	Deformation Load

5.2.1.1 Generated Self Weight and Non Generated Self Weight

Generated Self Weight includes weight of the primary steel and that part of the secondary steel which is modelled. Since most part of the outfitting steel such as ladders, walkways, and small access platforms have not been modelled, the generated self-weight is multiplied by a factor to account for the non-generated self-weight. Mass scaling of the GeniE model will not change the position of the centre of gravity. The total mass of the modules steel used in the model is around **339** tonnes.

5.2.1.2 Equipment dead load

This load case includes weight of all equipment and piping layout installed on the roof, underneath the deck and inside the module including weight of their contents. Dimensions, mass and location of the equipment are chosen such that these represent a realistic weight distribution based on the information obtained from the weight report no (CP-ZZ-AA-RX-001), which are given in details in Equipment Dead load 4.1.2 per discipline.

All equipment shall be assigned in their respective load cases in order to be used as load or mass in the analysis. In GeniE this is done by first choosing a load case and then placing the equipment at its location. A load interface is used to direct acting loads due to equipment, to the dedicated beams. GeniE has two general options for representing equipment as action:

- Represent equipment as load
- Represent equipment as loadcase-independent mass

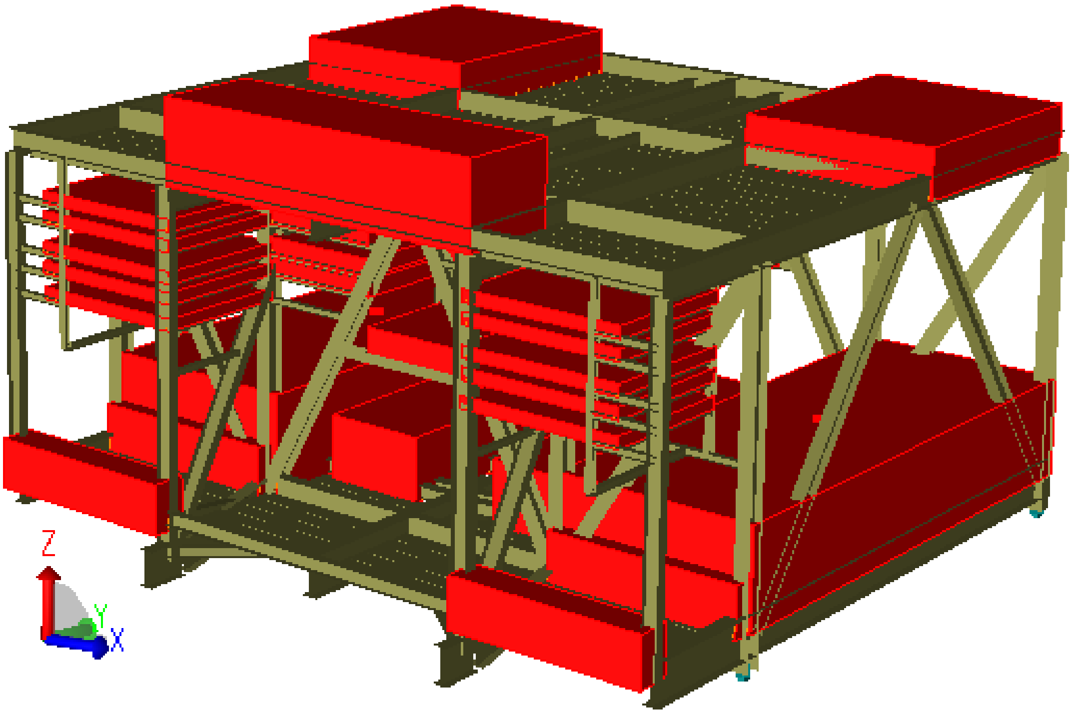


Figure 5-3 Illustration of equipment modeled in the Genie

5.2.1.3 Live Load

In general variable deck and roof area actions are applied to the structure to account for temporary loading and loose items like portable equipment, tools and weight of the personnel. Live loads are applied to the open deck and roof which is the area not covered by permanent equipment. Live load on deck and roof areas of magnitude 15 kN/m² is applied to the analysis model in form uniformly distributed line load on the beams.

Equipment live load has local effects, hence not relevant for the global analyses. Weight due to equipment content is assumed to be included in the applied live load.

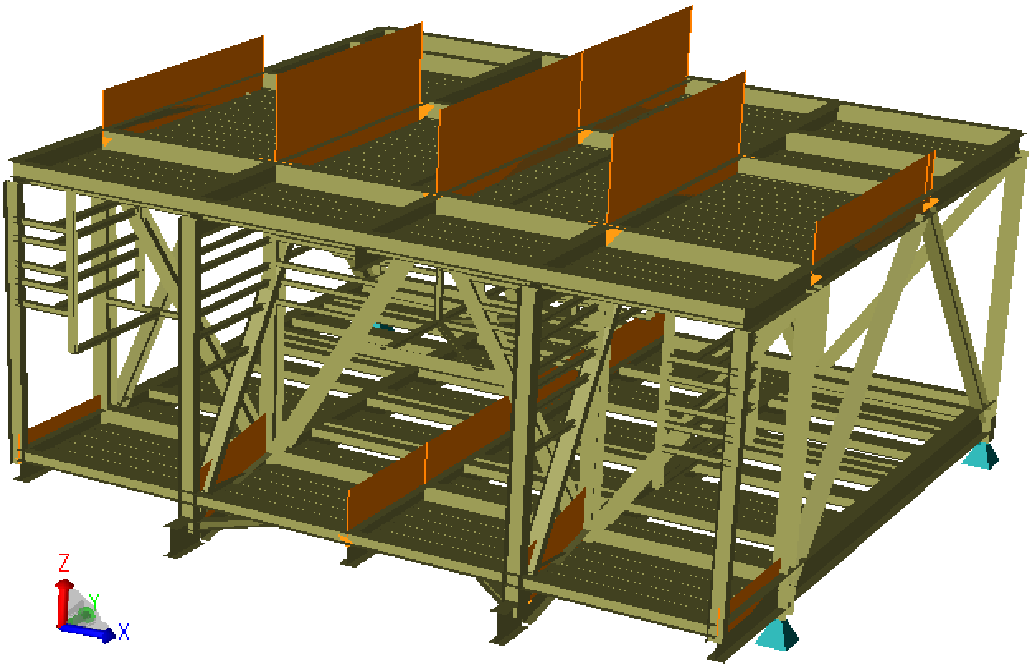


Figure 5-4 Illustration of application of Live load

5.2.1.4 Wind Load

Location of the module is so that it is exposed to wind actions only in the East-West direction. The wind actions are calculated in accordance with the guidelines given in NORSOK N-003 and presented in Appendix C.

For this module neither the horizontal nor vertical dimension exceeds 50m, thus the 3 second gust velocity at elevation 65m above the sea level is used to calculate the wind loading on the structure.

Some considerations regarding application of the wind load:

Shape coefficient (Cs) equal to 2 is used for all the beam members.

Roof of the module is at elevation 65m, using this elevation to calculate the wind load for the whole module height is conservative.

Although GeniE has possibility for trapezoidal line load, uniformly distributed line load is used which again is conservative.

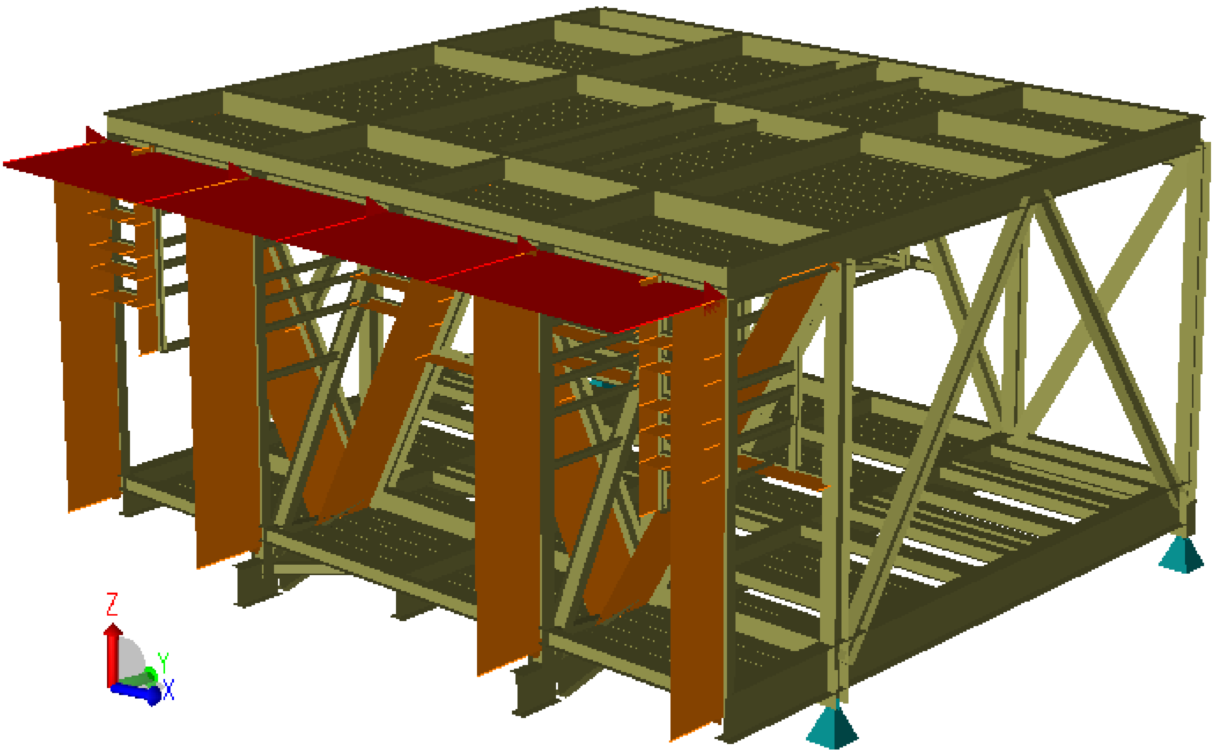


Figure 5-5 Application of the wind load to the members

5.2.1.5 Deformation Loads

All the 4 supports, one at a time, have been given a differential settlement of ±15mm to cover level inaccuracies of the support footings. Genie has its own inbuilt function for prescribed displacement at the supports.

A prescribed displacement is a boundary condition combined with the actual displacement or rotation per load case. A support point needs to be inserted first before the actual displacement or rotation can be defined. A structure may have several prescribed displacements to the same support point, but in different load cases.[5]

However it does not seem possible to define prescribed displacement for all the supports in the same GeniE model, as it causes the program to crash. Since the structure has four supports, four separate analysis models were made in order to make all the ULS and SLS load combinations.

5.2.2 Load Combinations

Since the module is exposed to the wind load only in one direction the environmental loads do not govern many members. Hence by considering the magnitude of the other permanent and variable actions, ULS-a combination is the governing limit state.

Table 5-2 Partial action factor for the ULS and SLS limit states, [3]

Limit State	Action Combinations	Permanent Actions(G)	Variable Actions(Q)	Environmental Actions(E)	Deformation Actions (D)
ULS	a	1.3	1.3	0.7	1.0
ULS	b	1.0	1.0	1.3	1.0
SLS		1.0	1.0	1.0	1.0

The load cases described in section 5.2.1 are combined into 8 load combinations as shown in the table below. The SLS load combinations are the same as given in Table 5-2, but with load factor 1.0.

Table 5-3 In-place ULS-a Load Combinations

Loadcase No.	Load Combinations							
	ULS 1	ULS 2	ULS 3	ULS 4	ULS 5	ULS 6	ULS 7	ULS 8
1	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
2	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
4	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
5	1.0 Sp1(+)	1.0 Sp1(-)	1.0 Sp2(+)	1.0 Sp2(-)	1.0 Sp3(+)	1.0 Sp3(-)	1.0 Sp4(+)	1.0 Sp4(-)

*Spi denotes the Support number and (±Z) is direction of the prescribed displacement

5.2.3 Results

The results for SLS and ULS in-place analysis are presented in the following pages.

Displacements:

Maximum deformation of the module structure is found to be within the allowable limits given by NORSOK N-001 presented in section 3.4.1.

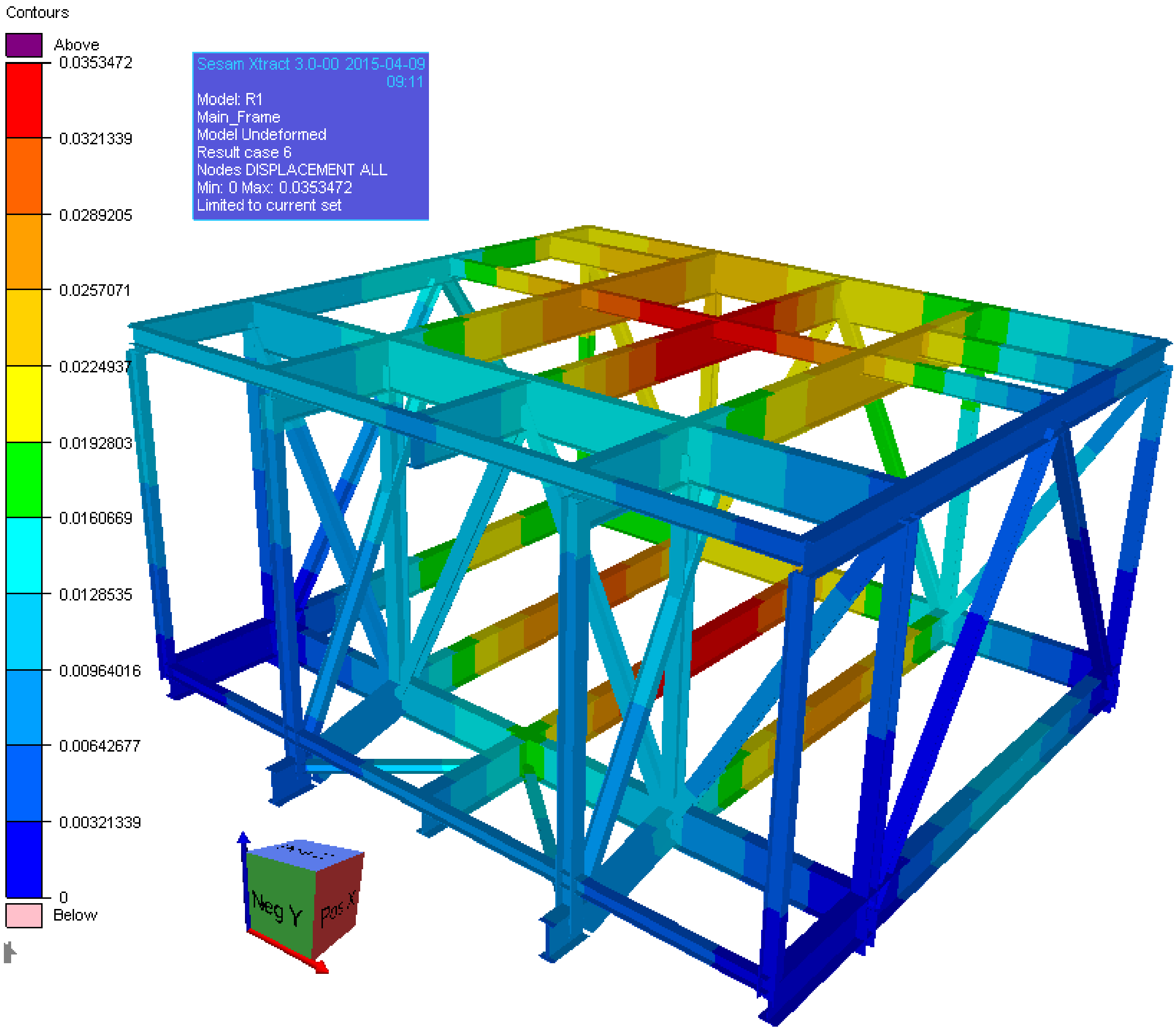


Figure 5-6 Maximum displacements of the primary steel

In GeniE the code checking positions may differ from load case to load case as:

- Code check is performed at predefined locations such as ends and 1/4, middle and 3/4 positions along the member, at each side of a transition where there is a change in section and/or material properties, and at the position where the max/min moment occurs.
- Per load case GeniE will detect where the max/min occurrence of a moment is located along a member. Such min/max points take local loads into considerations. This position may differ depending if strong or weak axis.[5]

Member check results with utilization ratio greater than 0.70 are presented in the table below:

Table 5-4 Maximum utilization ratios for in-place ULS check

Member	Load Combination	Status	Utilization Ratio	Formula
Bm100	ULS 7_Comb	OK	1.03	uf662
Bm99	ULS 7_Comb	OK	0.91	uf662
Bm5	ULS 7_Comb	OK	0.81	uf662
Bm105	ULS 7_Comb	OK	0.81	uf662
Bm118	ULS 7_Comb	OK	0.79	uf X Section
Bm3	ULS 7_Comb	OK	0.77	uf X Section
Bm76	ULS 7_Comb	OK	0.71	uf Torsion
Bm107	ULS 7_Comb	OK	0.71	uf662
Bm102	ULS 7_Comb	OK	0.69	uf662

Members at the support points are reinforced by welded plates which were not added to the beam elements in this analysis model. Results for these members are not the real utilization ratios.

5.2.4 Local Stress Analysis

Support no. 3 details

Support no 3, shown in Figure 5-2, with the highest utilized members is remodelled using plate elements to present the actual support details. Results from the linear elastic FE-analysis indicate that the stress level in the support location and the reinforced module corner is moderate. Hence structural elements at these locations have sufficient capacity.

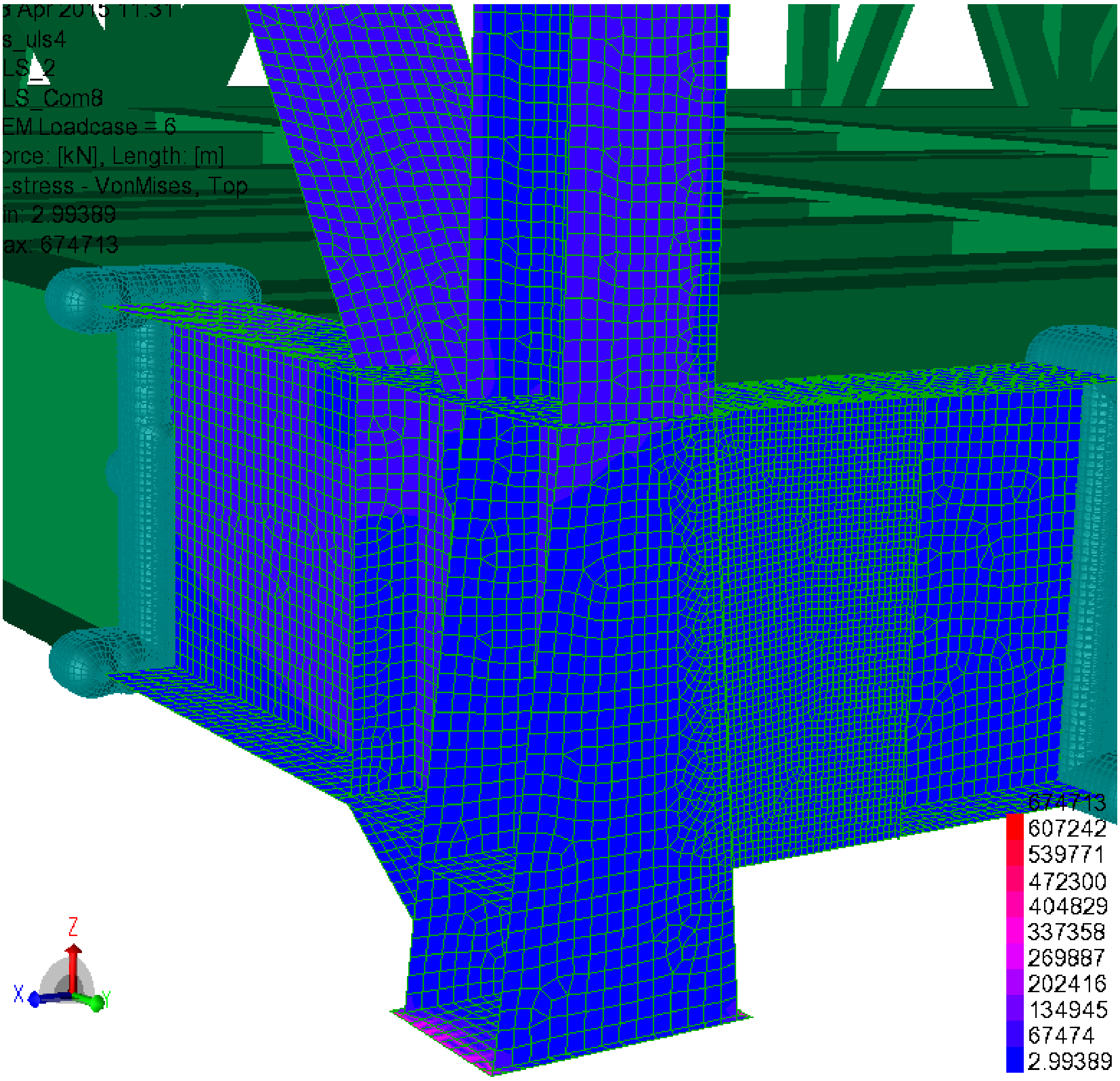


Figure 5-7 Support point modeled with plate elements (Stress values in kPa)

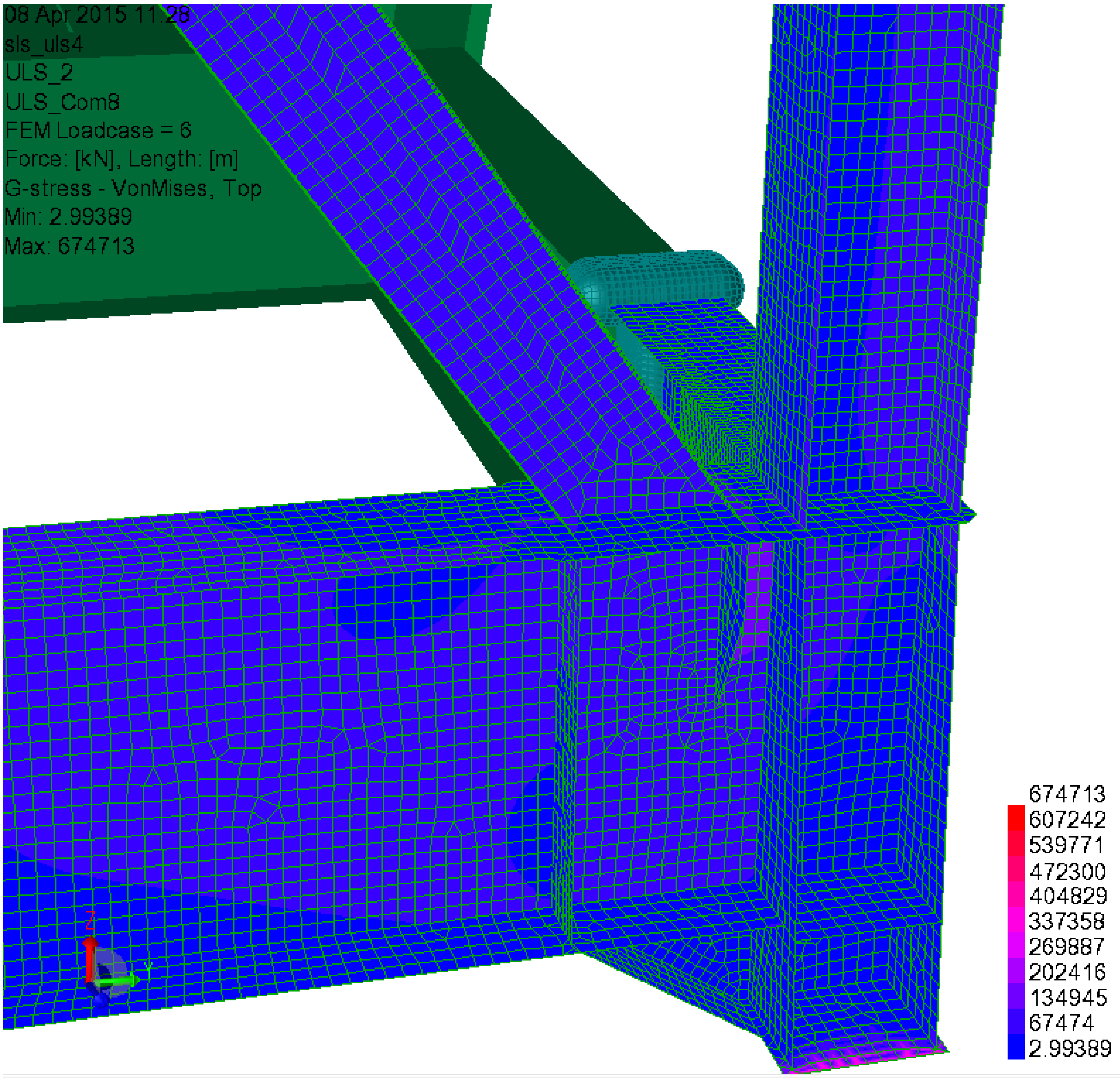


Figure 5-8 Remodeled support point (Stress values in kPa)

It can be seen that the average VonMises stress in most part of the support is less than 200 MPa. Some limited areas get 270 MPa, and the footing plate shows to have maximum stress value close to the yield limit at very limited areas of its edge.

Joint detail

The beam elements shown in Figure 5-9 below found to have highest utilization under ULS-7 and ULS-8 load combinations. A plate model of the joint at which these elements meet is made and connected to the frame model using rigid support link function in GeinE.

The joint is meshed using Advancing Front Quad mesh and membrane elements of 50 mm length.

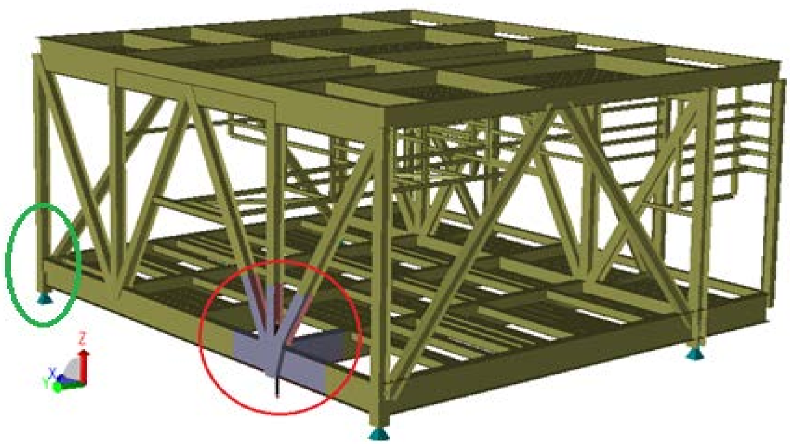


Figure 5-9 Location of the remodeled joints

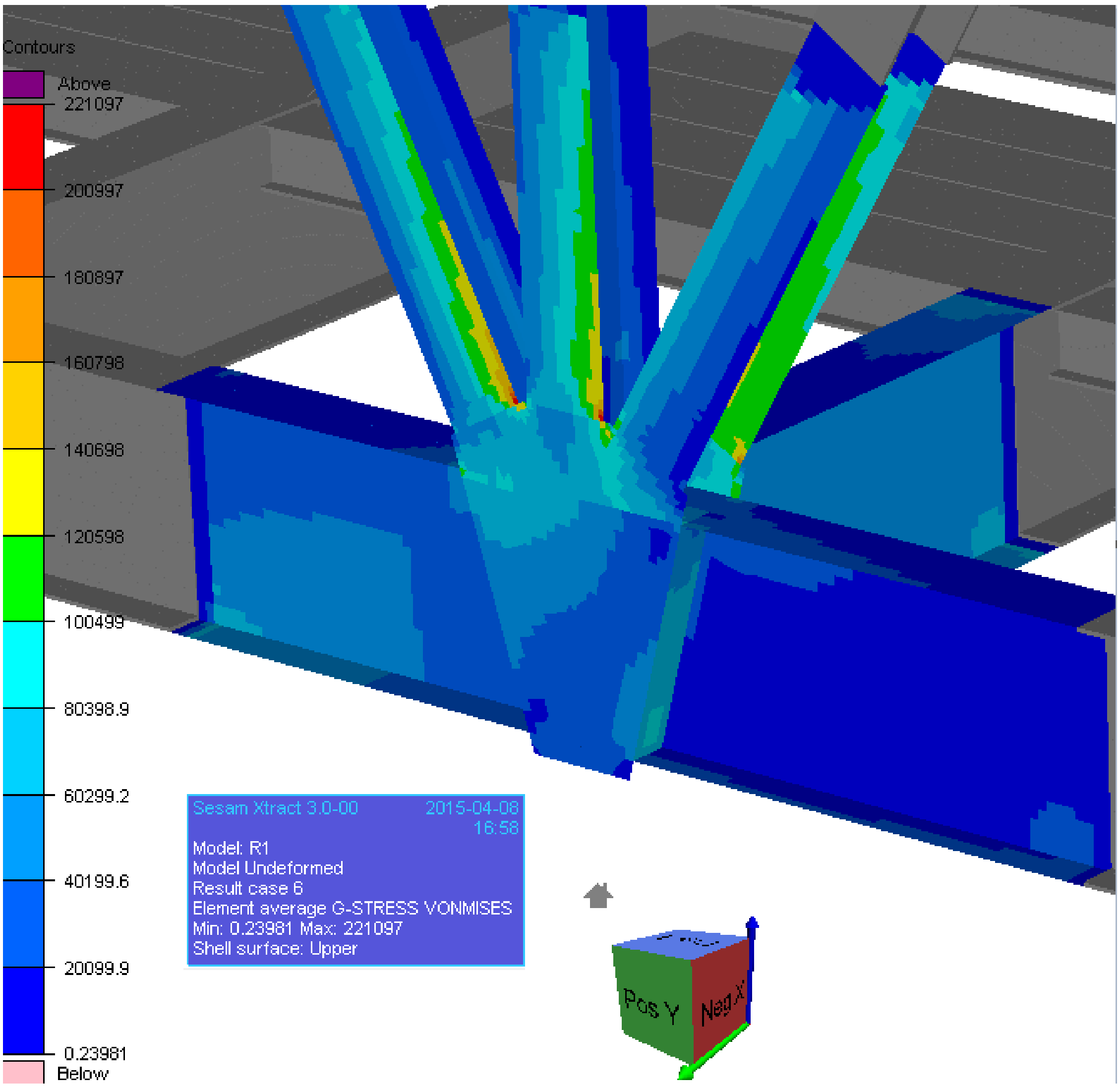


Figure 5-10 Average VonMises stress at the joint parts (Stress values in kPa)

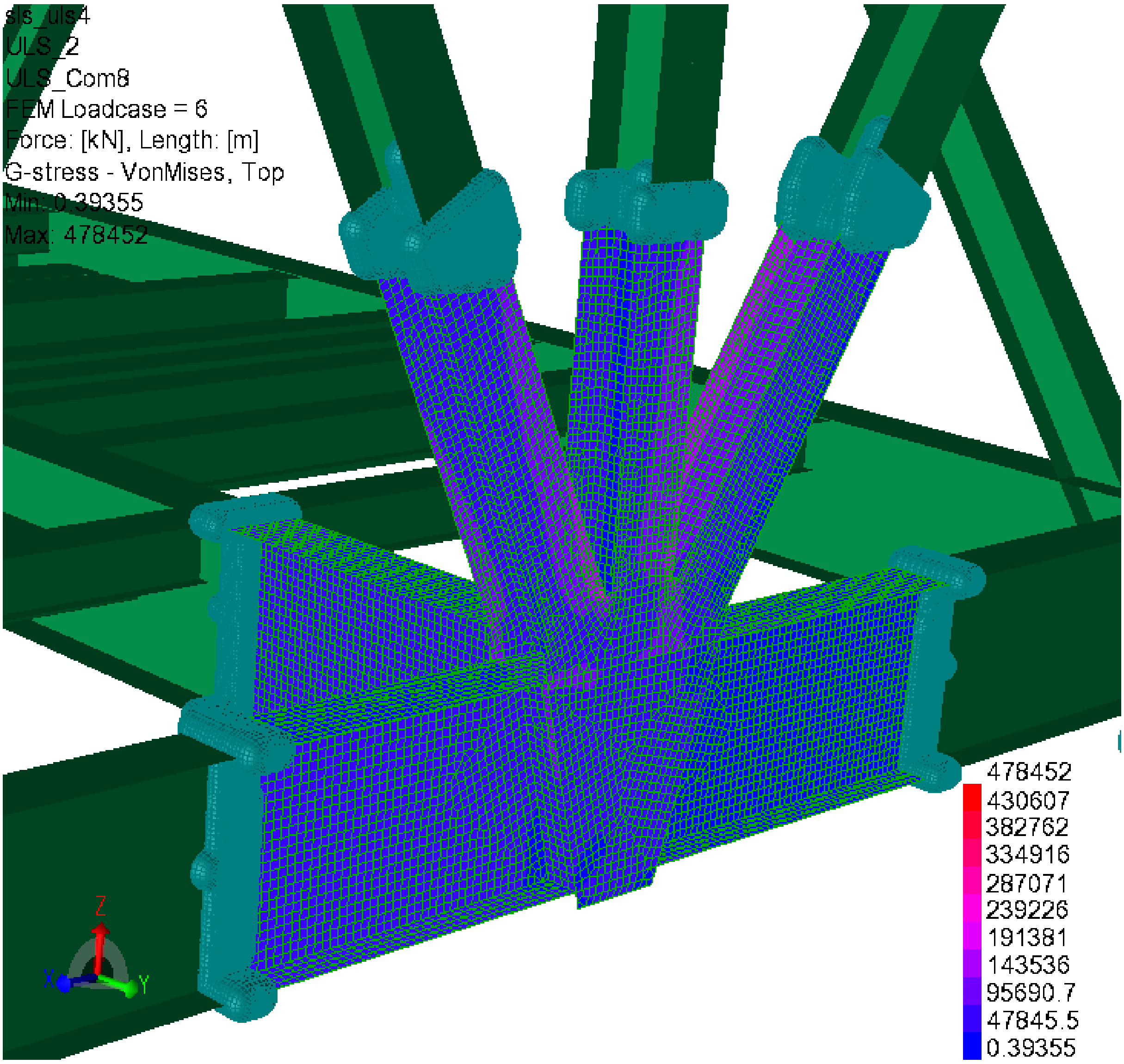


Figure 5-11 Max & Min VonMises stress at the joint parts (Stress values in kPa)

5.3 In-place ALS Analysis

ALS analysis of the module is limited to check for extreme earthquake actions. Since this is an ALS analysis it will only be necessary to verify the integrity of the main members and the module supports. Damage to the secondary steel and equipment supports is considered to be permitted for this analysis.

The main members over the entire platform shall be designed to withstand a horizontal deck acceleration of **0.21g** combined with all appropriate operating loads.[9]

The analysis method and support system is similar to that used in the ULS analysis. However the basic loadcases and load combinations are different.

Two separate GeniE models are used for ALS check in order to present the mass model in two different ways.

5.3.1 Mass Model for ALS Analysis

In general the mass model is built up from structural mass or any specific given point masses. When running a static analysis the effect from equipment are treated as forces, while in a dynamic analysis these must be treated as masses to contribute to the mass model. In GeniE masses can be added to the model using two alternatives.

- Equipment loadcase-independent mass; this alternative has three options for creating mass models. In options a) and b) mass centre of the equipment, Point mass, is at the same position as the equipment local COG.

  a) Eccentric mass: the connection between the finite element node and the mass centre is fixed in all degree of freedom which creates unrealistic moments.

  b) Beams and Mass; GeniE will automatically insert additional elements with hinges between the mass centre and the FE nodes to avoid undesired bending moments. The automatically inserted tripod elements are hinged at both their ends this causes error in the stiffness matrix and stop the analysis.

  c) Footprint mass; all masses are flushed down to the footprint level neglecting the equipment COG hence no bending moment is created.[5]

- Point mass; this alternative may be used to add masses to the structure. GeniE adds point masses to the structural mass and in the same load case.

5.3.2 ALS Loadcases

Relevant basic load cases used in the GeniE ALS-analysis are presented in the table below:

Table 5-5 Basic loadcases for In-place ALS analysis

Loadcase number	Description
1	Generated and Non Generated Self Weight in (+X)
2	Generated and Non Generated Self Weight in (+Y)
3	Generated and Non Generated Self Weight in (-Z)
4	Equipment dead load in (+X)
5	Equipment dead load in (+Y)
6	Equipment dead load in (-Z)
7	Live Load in (+X)
8	Live Load in (+Y)
9	Live Load in (-Z)

The earthquake load condition will be simulated by applying percentages of the relevant dead and live loads in the horizontal orthogonal X and Y directions in addition to the increased vertical loads.

Table 5-6 In-place ALS-Load Combinations (Extreme Earthquake)

Loadcase No.	Load Combinations							
	ALS 1 (+X)	ALS 2 (+X)	ALS 3 (-X)	ALS 4 (-X)	ALS 5 Y(+)	ALS 6 Y(+)	ALS 7 Y(-)	ALS 8 Y(-)
1	0.21	0.21	-0.21	-0.21	0.14	-0.14	0.14	-0.14
2	0.14*	-0.14	0.14	-0.14	0.21	0.21	-0.21	-0.21
3	1.14**	1.14	1.14	1.14	1.14	1.14	1.14	-1.14
4	0.21	0.21	-0.21	-0.21	0.14	-0.14	0.14	-0.14
5	0.14	-0.14	0.14	-0.14	0.21	0.21	-0.21	-0.21
6	1.14	1.14	1.14	1.14	1.14	1.14	1.14	-1.14
7	0.21	0.21	-0.21	-0.21	0.14	-0.14	0.14	-0.14
8	0.14	-0.14	0.14	-0.14	0.21	0.21	-0.21	-0.21
9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
* 2/3 x 0.21=0.14		** 2/3 x 0.21 + 1.0 = 1.14						

5.3.3 Analysis Model with Equipment Mass

Equipments are placed on the main deck, roof and the pipe rack beams. The alternative "Represent equipment as loadcase-independent mass" with option "Footprint mass" would be the only remaining choice for the mass model as the "Eccentric mass" will create unrealistic bending moments.

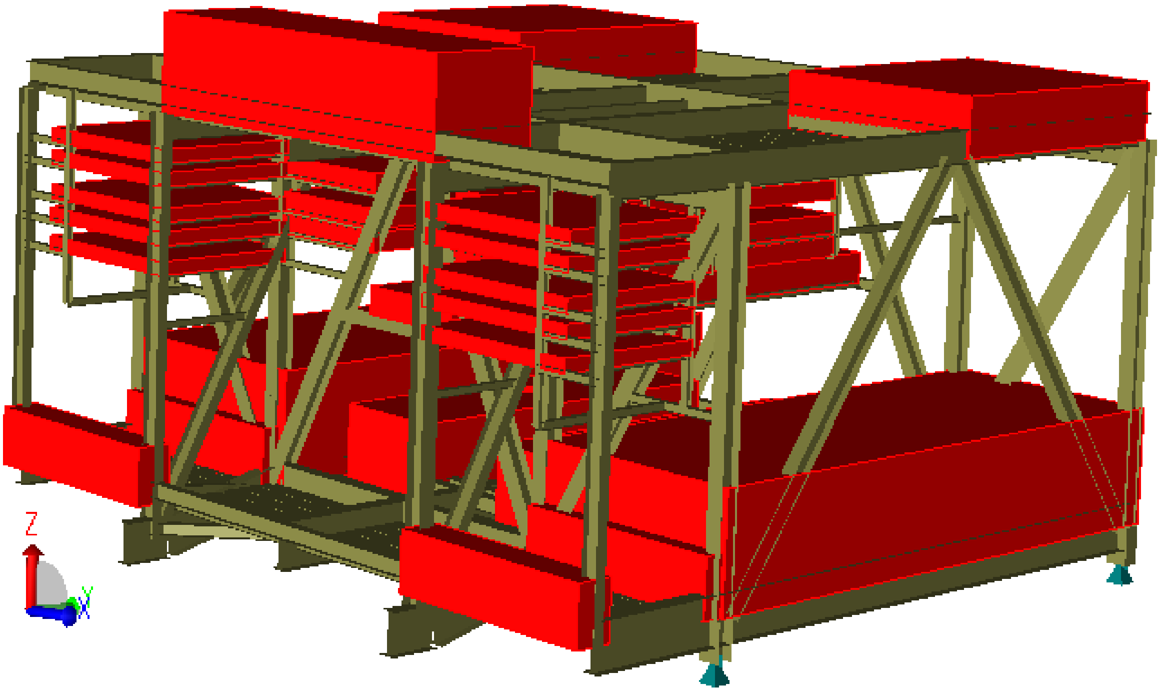


Figure 5-12 GeniE analysis model with equipments placed on the structure

Equipment footprint provides an interface between the equipment and the structure. The loads are projected over this load carrying interface and transferred to the structure. The mass element will also be flushed to the footprint. Number of created mass elements depends upon number of finite element nodes inside the footprint area.

The code check results for the 10 most utilized members are shown in Table 5-7 below for ALS-1

Table 5-7 The10 most utilized members of the analysis model with equipment mass

Member	Load Combination	Status	Utilization Ratio	Formula
Bm3	ALS1 (CombEq_X)	OK	0.79	Uf XSection
Bm118	ALS1 (CombEq_X)	OK	0.74	uf662
Bm99	ALS1 (CombEq_X)	OK	0.73	uf662
Bm104	ALS1 (CombEq_X)	OK	0.72	uf662
Bm7	ALS1 (CombEq_X)	OK	0.70	uf662
Bm522	ALS1 (CombEq_X)	OK	0.66	uf662
Bm100	ALS1 (CombEq_X)	OK	0.63	uf662
Bm126	ALS1 (CombEq_X)	OK	0.57	uf661
Bm6	ALS1 (CombEq_X)	OK	0.55	uf662
Bm516	ALS1 (CombEq_X)	OK	0.53	Uf Torsion

5.3.4 Analysis Model with Point Mass

In this model, equipment masses are presented as Mass Points which are located at the position of the centre of gravity of the equipment, and are connected to the structure by means of dummy beams.

In order to avoid unrealistic moment transfer due to the eccentricity between the mass point and the supporting structure, the dummy element end which is connected to the structure is released for rotational restraints. This will ensure transfer of vertical and lateral effects due to the mass.

GeniE treats the modelled point masses as the structural self-weight, hence primary load cases which represent generated and non-generated Self Weight will include the dead load of the equipment. A steel material with density close to zero is used for modelling of the dummy elements to keep the total mass unchanged.

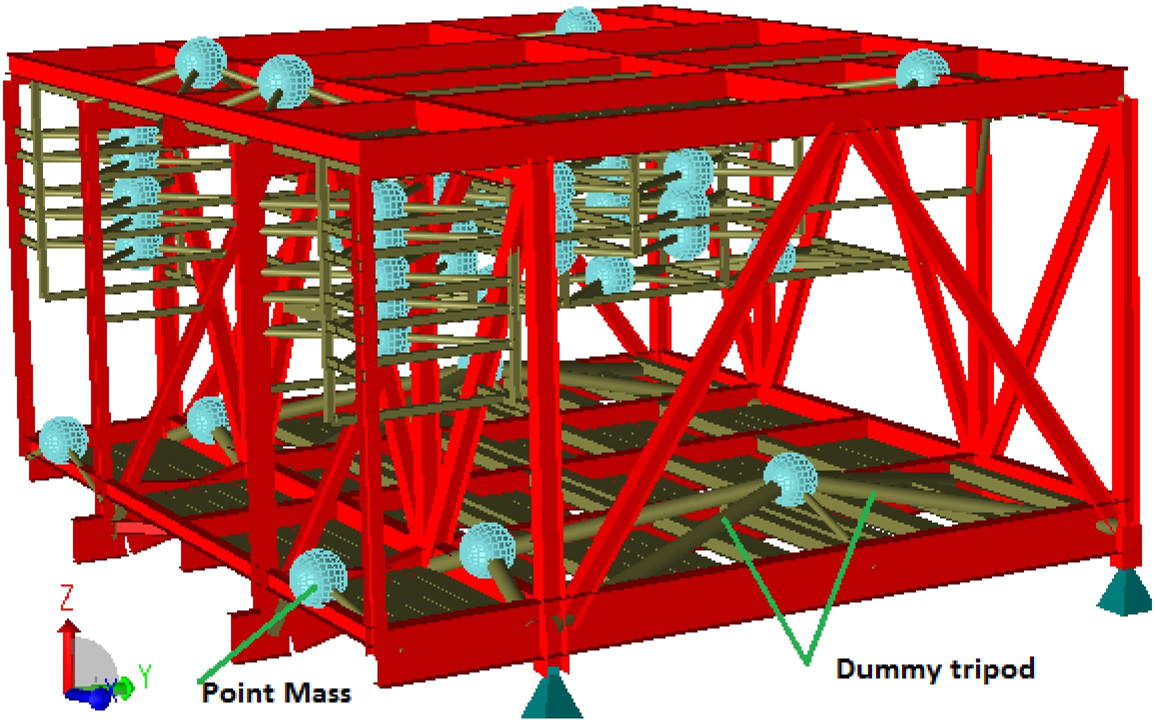


Figure 5-13 GeniE analysis model, application of point mass and dummy tripod

Code check results for the highest utilized members are shown in Table 5-8 below for ALS-2

Table 5-8 10 most utilized members of the analysis model with point mass

Member	Load Combination	Status	Utilization Ratio	Formula
Bm7	ALS1 (CombEq_X)	OK	0.93	uf662
Bm118	ALS1 (CombEq_X)	OK	0.88	uf662
Bm3	ALS1 (CombEq_X)	OK	0.84	uf661
Bm104	ALS1 (CombEq_X)	OK	0.82	uf662
Bm522	ALS1 (CombEq_X)	OK	0.74	uf662
Bm99	ALS1 (CombEq_X)	OK	0.63	uf662
Bm520	ALS1 (CombEq_X)	OK	0.62	uf662
Bm2	ALS1 (CombEq_X)	OK	0.6	ufX Section
Bm101	ALS1 (CombEq_X)	OK	0.58	uf662
Bm100	ALS1 (CombEq_X)	OK	0.55	uf662

5.3.5 Conclusion of ALS check

By comparing the results from the two analyses, we can see that the GeniE model with point mass results in higher utilization ratios. Both models have the worst case load combination when the acceleration is applied in +X direction.

Modelling with point mass provides more flexibility for adjusting the analysis model. One can insert as many point masses as needed in required locations to present a correct mass model. The dummy elements, tripods, can be used to transfer the actions to the desired supporting nodes/ elements, and the 6 DOF at each end of the dummy element can be set to control force and moment transferring. The lever arm between the point mass centre and the supporting points can easily be adjusted which again is very important with respect to the moment magnitudes.

Based on the above mentioned advantages of the analysis model with point mass it is reasonable to assume that the results obtained from this model are more reliable.

6. Lifting Analysis

Lifting analysis main purpose is to ensure that the lifting operation will be in accordance with recognized regulations and standards and that all of the safety aspects have taken into consideration. Analyses include capacity check of the structure under lifting operation and the design and selection of the suitable lifting equipment and accessories.

Lift analysis will be done using two different methods. The first method is based on the original design of the module. In the second method, safety and load coefficient taken from applicable codes will be applied to the Genie model with appropriate support condition.

Integrity of the structural members under lifting operation and the maximum sling load for design of the padeyes will be verified using both of the methods. Code based calculation in accordance with NORSOK R-002 and DNV-OS-H205 will also be done and presented in Appendix C.

6.1 Description of Method 1

This method was used in the original analysis of the module. The lifting analysis will be performed using the Genie model developed for the static analysis. This method involves the replacement of the sling members by calculated sling loads. The module is not restrained dimensionally but supports are provided to avoid singularity of the structural stiffness matrix. Given a compatible set of sling loads the reactions at the supports become zero. [9]

6.1.1 Support condition used for verification of structure

The following translation restraints have been used at the support points:

Table 6-1 Supports for the lifting condition method 1

Support No.	Translation Restraint		
	X-direction	Y-direction	Z-direction
Sp1	Free	Free	Free
Sp2	Fixed	Free	Fixed
Sp3	Free	Free	Fixed
Sp4	Fixed	Fixed	Fixed

The lift analysis shall be deemed acceptable if the reaction at any of these restrained directions is less than or equal to 1% of the total module weight. [9]

6.1.2 Factors for load combinations

The given load combinations in the Table 3-1 is based on the following factors:

Dynamic Amplification Factor (DAF): 1.5 for Offshore Lifts

Consequence Factor: 1.3 for Primary Members

Load Factor: 1.2 for Weighed Module

Applied load factor to the total lift weight of the module: $1.5 \times 1.3 \times 1.2 = 2.34$

6.1.3 Relevant Loads

Basic load numbers 1 and 2 described in Table 5-1 and unequal sling load are the only relevant load cases in this analysis.

Sling loads are calculated from the largest of the two heavily loaded corner vertical padeye reactions which is increased by the factor 1.4. This sling load represents the effect of an uneven distribution (70% and 30%) of sling forces due to inaccuracies in the fabricated sling lengths. [9]

Calculation of sling loads is done in Mathcad sheets and presented in Appendix C. Values for load cases marked by star (*)-sign to be obtained from the Mathcad sheet in Appendix C.

Table 6-2 Load combinations, Method 1

Loadcase No.	Load Combinations			
	Lift 1	Lift 2	Lift 3	Lift 4
1	2.34	2.34	2.34	2.34
2	2.34	2.34	2.34	2.34
Sling no. 1	1.40	*	*	*
Sling no. 2	*	1.40	*	*
Sling no. 3	*	*	1.40	*
Sling no. 4	*	*	*	1.40

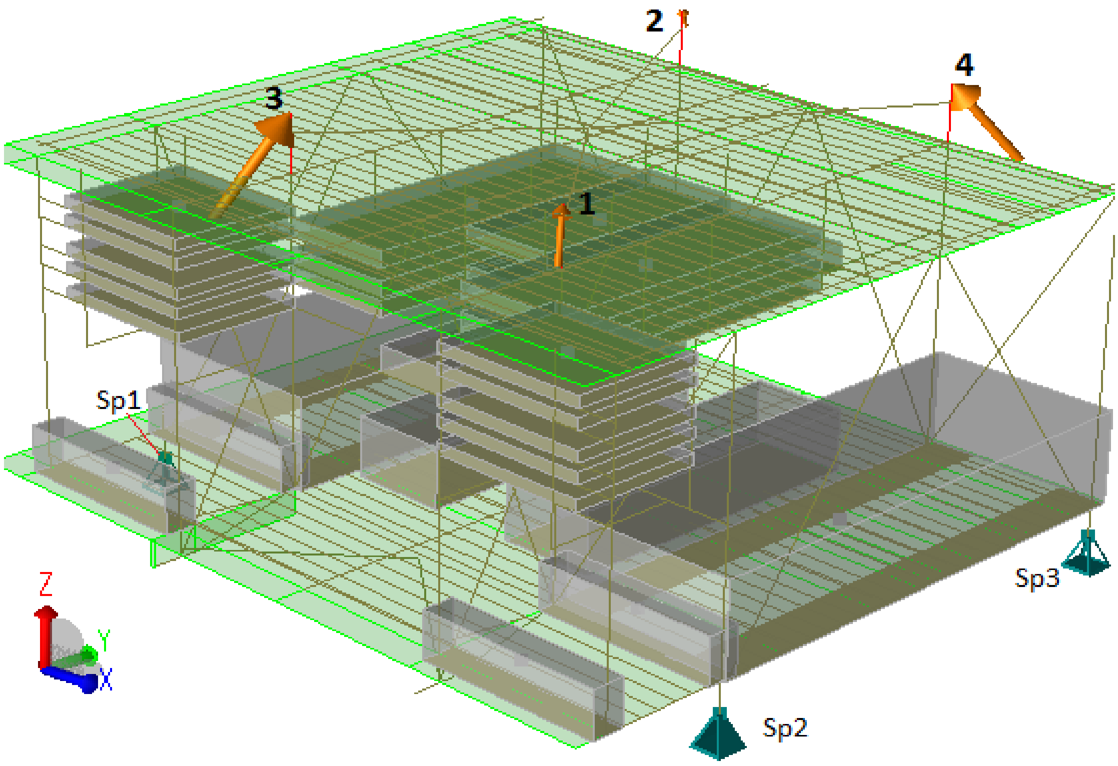


Figure 6-1 Application of the sling loads at the sling positions and in the direction of the slings

6.1.4 Results Method 1

Results based on the original lifting analysis of the module are presented in the table below.

Table 6-3 Utilization ratios obtained for method1

Member	Load Combination	Status	Utilization Ratio	Formula	Used Consequence Factor
Bm102	1.4*Sling No1	Failed(uf)	1.49	ufX Section	γc=1.3
Bm539	1.4*Sling No1	Failed(uf)	1.35	uf662	γc=1.3
Bm3	1.4*Sling No1	Failed(uf)	1.29	uf661	γc=1.3
Bm105	1.4*Sling No1	Failed(uf)	1.21	uf662	γc=1.3
Bm537	1.4*Sling No1	Failed(uf)	1.18	uf662	γc=1.3
Bm97	1.4*Sling No1	Failed(uf)	1.16	ufX Section	γc=1.3
Bm106	1.4*Sling No1	Failed(uf)	1.10	uf662	γc=1.3
Bm5	1.4*Sling No1	Failed(uf)	1.07	uf661	γc=1.3
Bm2	1.4*Sling No1	Failed(uf)	1.05	uf662	γc=1.3
Bm100	1.4*Sling No1	OK	0.92	ufX Section	γc=1.3
Bm118	1.4*Sling No1	OK	0.89	uf662	γc=1.3
Bm523	1.4*Sling No1	OK	0.87	ufX Section	γc=1.3
Bm7	1.4*Sling No1	OK	0.87	uf662	γc=1.3
Bm92	1.4*Sling No1	OK	0.87	ufX Section	γc=1.3
Bm114	1.4*Sling No1	OK	0.86	uf662	γc=1.3

Analysis shows failure of 9 members out of the first 15 highest utilized main frame members. Since no failure was reported for the original lifting operation, the analysis results should be investigated to find the cause of the high member utilizations.

Some possible reasons may be:

The unequal sling load factor which has the same purpose as the SKL factor is set to be 1.4.

The Consequence Factor (1.3) is applied to all the primary structural members. Structural members not connected to or not supporting the lift point can get a lower consequence factor.

Additional capacity due to the secondary structural elements such as deck plates and stiffeners/stringers is not accounted for in this analysis.

Considering that the load and design factors in the original design are chosen conservatively, and on the other hand the positive effects of the secondary steel are not taken into account in the new analysis model, the highest utilization ratios were neglected.

6.2 Description of Method 2, Current practice

In this method, the same GeniE model is used as in method 1, but the sling elements are added to the model. Sling angles are also the same as it was assumed in the previous method. Integrity of the structure under lift operation is checked by applying all the relevant factors, taken from NORSOK and DNV standards, to the total lift weight of the module.

Sp5 is the assumed hook position and fixed in all directions. Sp5 is positioned accurately over the COG of the module and its height above the module roof is adjusted such that the angle between the slings and the horizontal plane of the roof is between 45 and 60 degree.

The module is not restrained dimensionally but supports, as presented in Table 6-4, are provided to avoid singularity of the structural stiffness matrix. The lift analysis shall be considered acceptable if the reaction at any of the restrained directions is less than 1% of the total module weight.

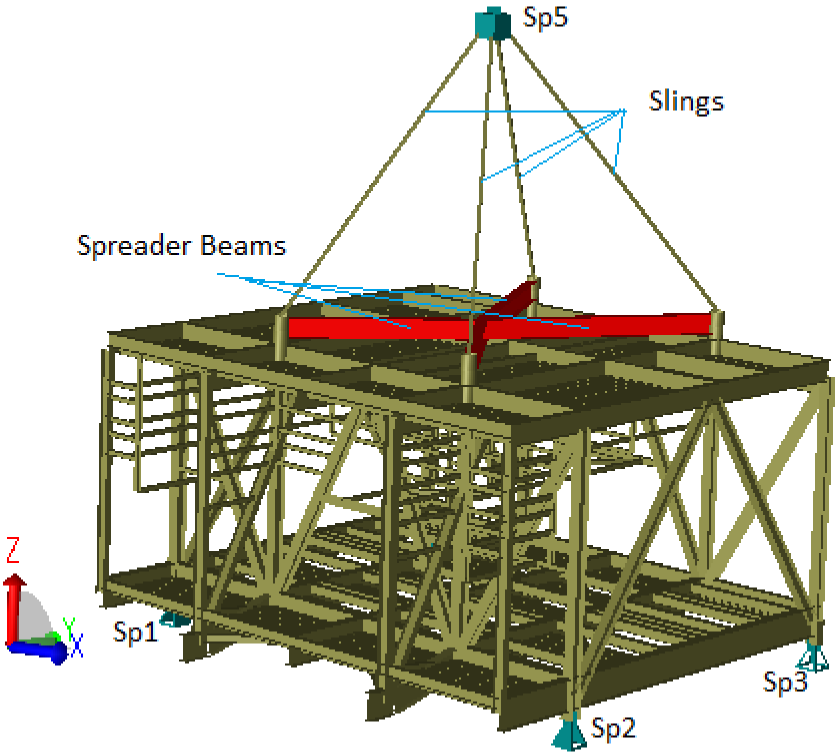


Figure 6-2 Lifting arrangement of the module

Table 6-4 Support restraints used in Method 1

Support No.	Translation Restraint		
	X-direction	Y-direction	Z-direction
Sp1	Fixed	Free	Free
Sp2	Free	Fixed	Free
Sp3	Free	Free	Free
Sp4	Free	Fixed	Free

6.2.1 Loading and Factors

6.2.1.1 Weight and centre of gravity

The object weight (W) as lifted should be the characteristic weight according to the definition given in DNV-OS-H102, Sec. 3C 100.[11]

Contingency Factor (W_{CF}): If the characteristic weight is found by weighing with a documented tolerance less than ± 3%, a contingency factor of maximum 1.03 needs to be applied.(DNV-OS-H102, Sec. 3C 103, January 2012) and (Table F.2 NORSOK R-002)

Inaccuracy in Centre of Gravity (W_{COG}): Inaccuracy in COG position shall be considered in the design loads. To allow for COG inaccuracies a COG envelope or box is recommended. (DNV-OS-H102, Sec. 3C 202)[11]

Guidance note 1: In early stages of design too small envelope/box should be avoided. Box sizes less than 0.05L × 0.05B × 0.05H are normally not recommended. L, B and H are the length, breadth and height of the main body of the lift object. (DNV-OS-H102, Sec. 3C 202, January 2012)

Guidance note 2: For operations with a linear relation between shift in COG and resulting load effects, or operations less sensitive to COG shifts, inaccuracy in estimated COG may be accounted for by an inaccuracy factor. This factor should normally not be taken less than 1.05. (DNV-OS-H102, Sec. 3C 202)[11]

6.2.1.2 Weight of rigging

The weight of rigging (W_{rig}) is the total weight of the rigging arrangement, i.e. equipment such as shackles, slings, spreader bars or frames, etc. Hook, block and hoist line weights do not need to be considered as a part of W_{rig}. (DNV-OS-H205, April 2014)[12]

6.2.1.3 Dynamic Amplification Factor (DAF)

The global dynamic load effects may be accounted for by using a dynamic amplification factor (DAF). (3.2.2.1 DNV-OS-H205)[12]

Table 6-5 Dynamic Amplification Factors (Taken from Table 3-1 DNV-OS-H205)

Static Hook Load (SHL)	DAF Onshore	DAF Inshore	DAF Offshore
100-300 t	1.05	1.12	1.25
300-1000 t	1.05	1.10	1.20
1000-2500 t	1.03	1.08	1.15
>2500 t	1.03	1.05	1.10

6.2.1.4 Skew Load Factor (SKL)

The effects of sling length tolerances are dependent on the fabrication tolerance of slings and lift points, the rigging geometry, sling characteristics and the utilization of the slings. The effects may be accounted for by a factor SKL=1.25 (DNV-OS-H205).[12]

Skew loads are additional loads from redistribution due to equipment and fabrication tolerances and other uncertainties with respect to force distribution in the rigging arrangement. (NORSOK R-002)[13]

Skew load effects on the elements of the lifted object, here module's main members, should be given appropriate consideration as these load effects are normally not covered by in-service design conditions.

Table F.3 NORSOK R-002 [13] specifies SKL values for sling lengths within fabrication tolerances and an approximately symmetrical sling configuration with a working angle not more than 45 degrees from the vertical axis.

6.2.1.5 Design Factor (DF)

The design factor DF is defined as: $DF = \gamma_c . \gamma_p$

γp = partial load factor

γc = consequence factor

Table 6-6 Design Factors (copy of Table F.4 NORSK R-002)

ELEMENT CATEGORY	γp	γc	DF
Lifting points including attachments to object Single critical elements supporting the lifting point	1.34	1.25	1.68
Lifting equipment (spreader bar, shackles, slings etc)	1.34	1.25	1.68
Main elements which are supporting the lift point	1.34	1.1	1.48
Other structural elements of the lifted object	1.34	1.0	1.34

The module expected lift weight and position of COG is obtained from the GeinE analysis model. The lift weight equals the sum of the generated and non-generated self-weight, load no. 1, and the dead weight of all the equipment, load no. 2. => W= 1010.9 tonne

Weight of the rigging is assumed to be included in the calculated equipment dead load.

6.2.2 Results Method 2

Main structural elements of the module are categorized in three capacity groups based on the consequence categories given in Table 6-6 Design Factors (copy of Table F.4 NORSK R-002).

The structure is checked for lift condition and global results of the three capacity groups are presented in Table 6-7. The spreader beams show to have utilization ratio greater than 1.0. The module members connected to or supporting the lifting points and all the other structural members show to have sufficient strength capacity.

Table 6-7 Utilization ratios obtained for method 2

Member	Load Combination	Status	Utilization Ratio	Formula	Used Consequence Factor
Bm538	Lift 2 (2.717)	Failed	1.20	uf662	γc=1.25 Spreader Beam
Bm539	Lift 2 (2.717)	Failed	1.20	uf662	γc=1.25 Spreader Beam
Bm537	Lift 2 (2.717)	Failed	1.10	uf662	γc=1.25 Spreader Beam
Bm536	Lift 2 (2.717)	Failed	1.09	uf662	γc=1.25 Spreader Beam
Bm102	Lift 2 (2.391)	OK	0.99	ufX Section	γc=1.1 Main Element
Bm101	Lift 2 (2.391)	OK	0.98	ufX Section	γc=1.1 Main Element
Bm103	Lift 2 (2.173)	OK	0.93	uf662	γc=1.0 Non Critical Element
Bm106	Lift 2 (2.173)	OK	0.85	uf662	γc=1.0 Non Critical Element
Bm7	Lift 2 (2.173)	OK	0.73	ufShear Z	γc=1.0 Non Critical Element
Bm2	Lift 2 (2.173)	OK	0.69	ufShear Z	γc=1.0 Non Critical Element
*Formulas uf661 & uf662 as given in section 3.4					

Reassessment of the failed members shows that by adding lateral restraints and stiffener plates in the middle of the spreader beams the utilization ratios will be reduced to the acceptable limits.

6.3 Padeye Analysis

6.3.1 General Considerations

Special structural steel shall be used for all parts of the padeyes and its connections to the main members. This will include the node to which the padeye is attached.

The padeye shall be designed to withstand the sling design load. The analysis shall cover both the stresses within the padeye and the connections to the main module members.

In order that the results of this analysis may be applied to all padeyes, the most severely loaded padeye shall be chosen.

It is recommended that lift points are designed with the main connections in shear rather than tension. High tensile forces acting through the thickness direction of rolled steel material shall be avoided.[12]

Holes for pins shall be drilled accurately matched between adjoining plates. For this calculation the nominal pin hole diameter to be taken 4 mm larger than the nominal pin diameter with an assumed tolerance of ±1 mm.

Cheek plates welded to the main load carrying plate shall be used to reinforce all shackle bearing holes.

10% of the design sling load is to be applied along the axis of the pin to check lateral bending of the padeye plate.

6.3.2 Design Method and Loads

Padeyes will be checked by using the empirical approach given by NORSOK R-002 and DNV-OS-H205 and a finite element analysis approach based on the linear elastic theory using GeniE. The results from the two calculations will be correlated.

In the padeye's original calculation the design sling load is obtained by dividing the vertical padeye reaction by the Sin of the true sling angle. This sling load will be compared with the sling load obtained from the GeniE analysis model multiplied to all the appropriate factors for padeye design. A summary of main design factors for verification of padeye is given in the table below.

Table 6-8 Load factors used for padeye check

Description	Partial factor (New)	Partial factor (Original)
Inaccuracy in COG Factor(WCOG)	1.05	-
Weight Contingency Factor(WCF)	1.03	1.1
Skew Load Factor (SKL)	1.25	1.4 (sling factor)
Dynamic Amplification Factor (DAF)	1.2	1.5
Partial Load Factor (γp)	1.34	1.2
Consequence Factor (γc)	1.25	1.3

Sling reactions without application of the load factors are illustrated in the figure below.

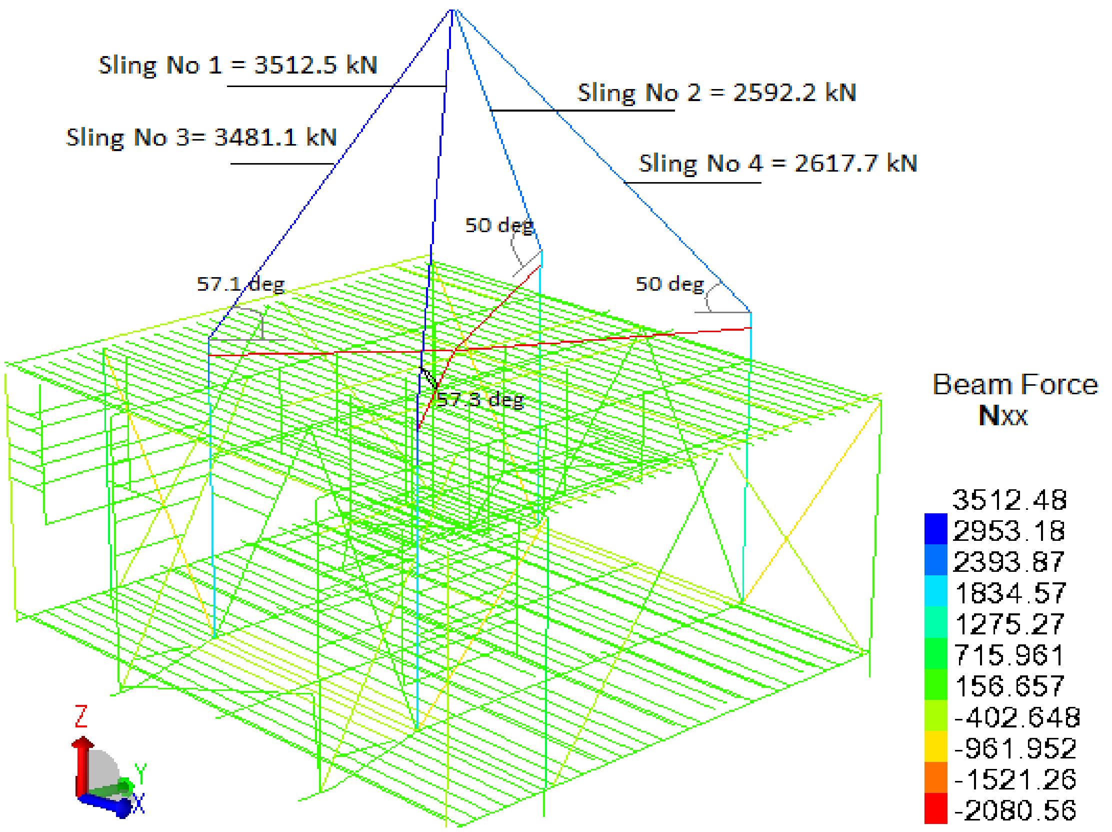


Figure 6-3 Sling numbers, angles and reactions (load factor 1.0) from GeniE model

6.3.3 Padeye Geometry

The geometry and dimensions of the padeye is illustrated on the figures below.

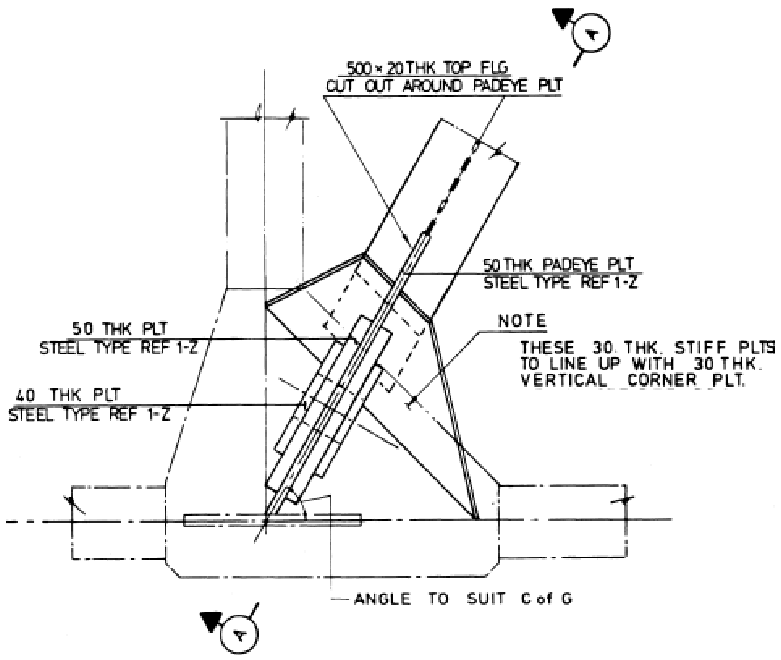


Figure 6-4 Padeye geometry looking down

The main padeye plate is 50 mm thick and is reinforced by 2x 50 mm cheek plate with diameter 1000 mm and 2x40 mm check plate with diameter 700 mm.

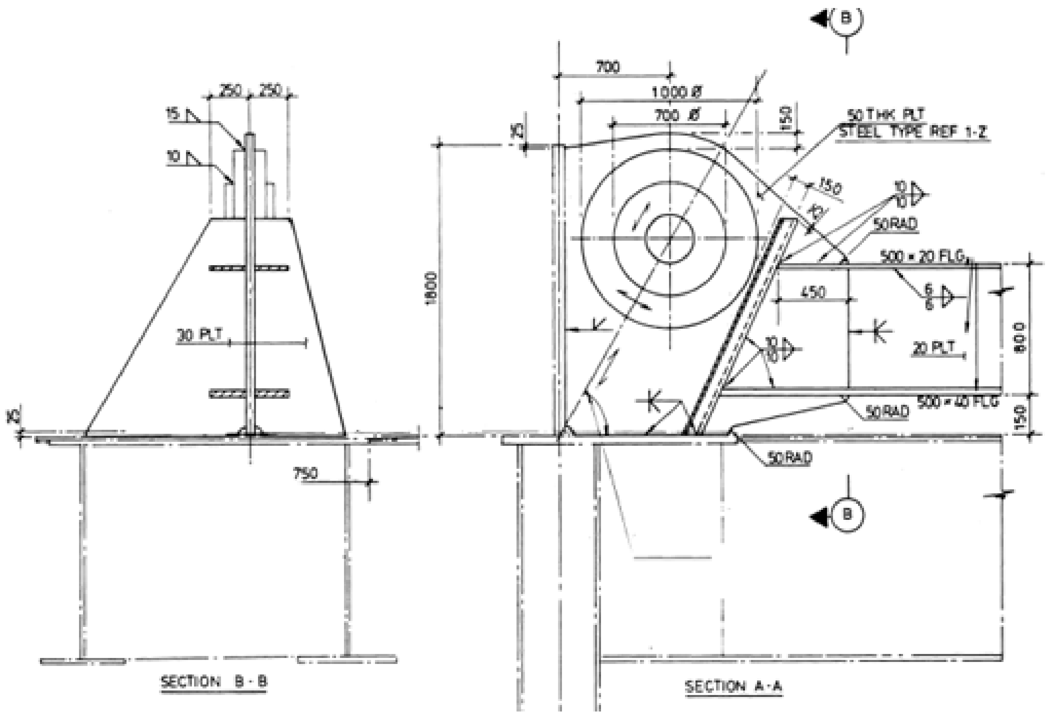


Figure 6-5 Sections showing the padeye details

6.3.4 Padeye GeniE Model

Padeye design loads are applied to the centre of the pin hole. Dummy beam elements are used to transfer the loads from the pinhole centre to the edge of the padeye plates. The beam elements are modelled such that load is applied only to half the pinhole (½ perimeter) in the sling direction.

Appropriate boundary conditions are applied to the model using Support Curve feature in GeniE. The Support Curve command opens a dialog box for specifying the support options prior to inserting it along a plate edge.

Mesh settings: used element type is membrane second order element and the mesh density over different parts of the model is decided in order to avoid element sizes less than the actual plate thickness.

In GeniE different meshing algorithms can be used. The default is the “Sesam quad mesher” but for the padeye model the option “Advancing front quad mesher” showed to be more suitable.

6.3.5 Loading and results

Load obtained from Method 1 described in 6.1:

- Load in the sling direction: $9736 \times 1.1 \div \sin(57.3°) = 12726\ kN$
- Lateral load: $10\%\ of\ Sling\ Load = 1273\ kN$

Load obtained from GeniE model using Method 2 described in 6.2:

- Load in the sling direction: $3512.5 \times 1.03 \times 1.05 \times 1.25 \times 1.2 \times 1.68 = 9544\ kN$
- Lateral load: $10\%\ of\ Sling\ Load = 955\ kN$

Load obtained from hand calculations based on method given by R-002:

- Load in the sling direction: $9500\ kN$
- Lateral load: $10\%\ of\ Sling\ Load = 950\ kN$

Loads obtained from the analysis model and by using the method given in NORSOK R-002, Appendix F, have very close values. The padeye model is checked for two load sets; one based on the method 1 and the other based on the loads obtained by Method 2.

The analysis results show a wide stress range from 0.2 MPa up to 1000 MPa. The high local stress concentrations are at sudden changes in geometry, such as corners, fillets, holes or thickness steps. We can see the peak stress occur in very small and limited areas compared to the total padeye size.

Using the option “Element average stress” in “Sesam Xtract” gives more realistic picture of distribution of stresses and also the extent of high stress zone within the padeye.

Correct choice of element type and mesh size will result in more accurate presentation of the stresses. As “high peak” stresses in “small local” regions cause no problem because of redistribution of stress due to plasticity, these stresses can be ignored.

Stress distribution within the padeye plates due to application of the two load sets one obtained from the old design and the other based on the new practice are presented in the 4 next pages.

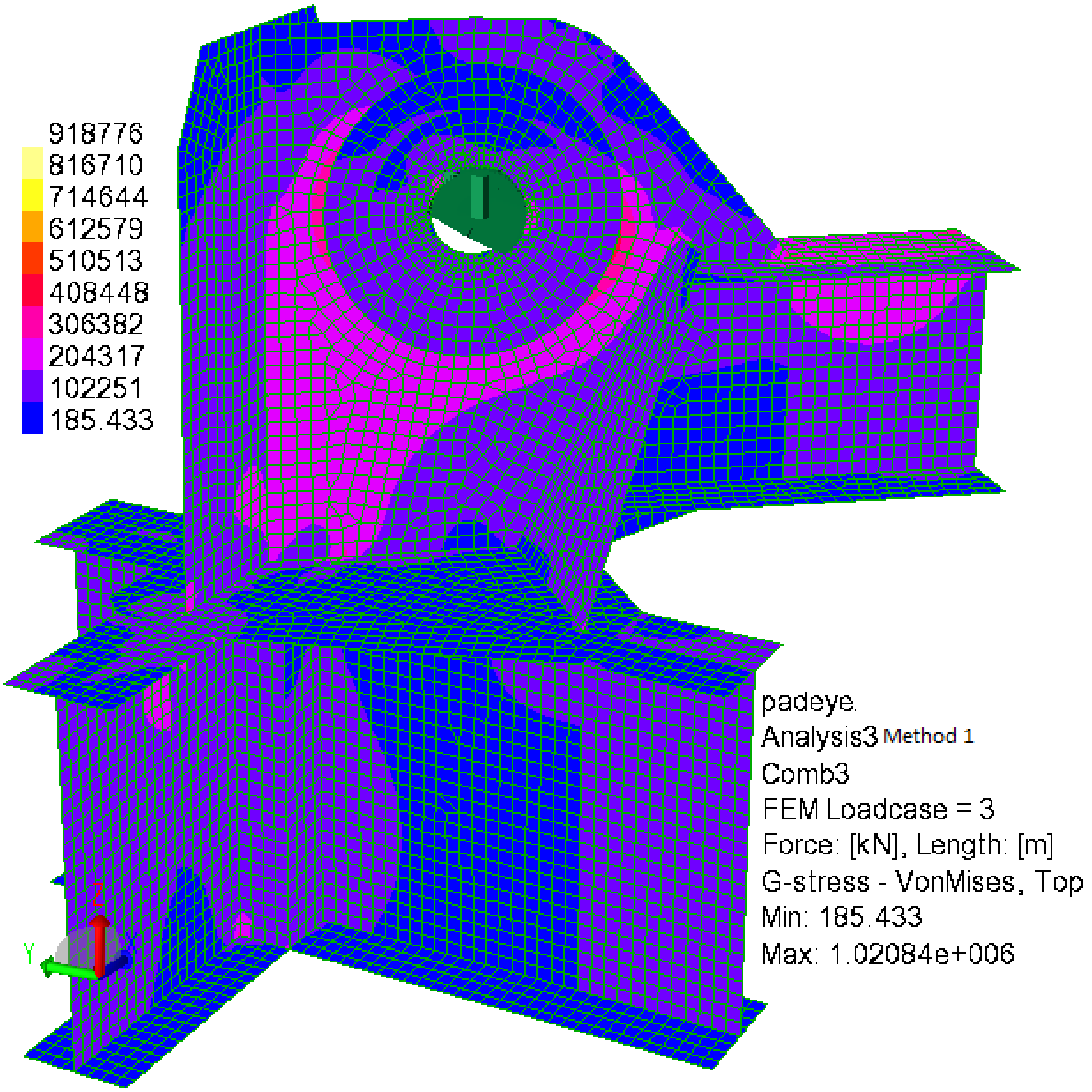


Figure 6-6 Element general VonMises stress [kPa] using the original design loads

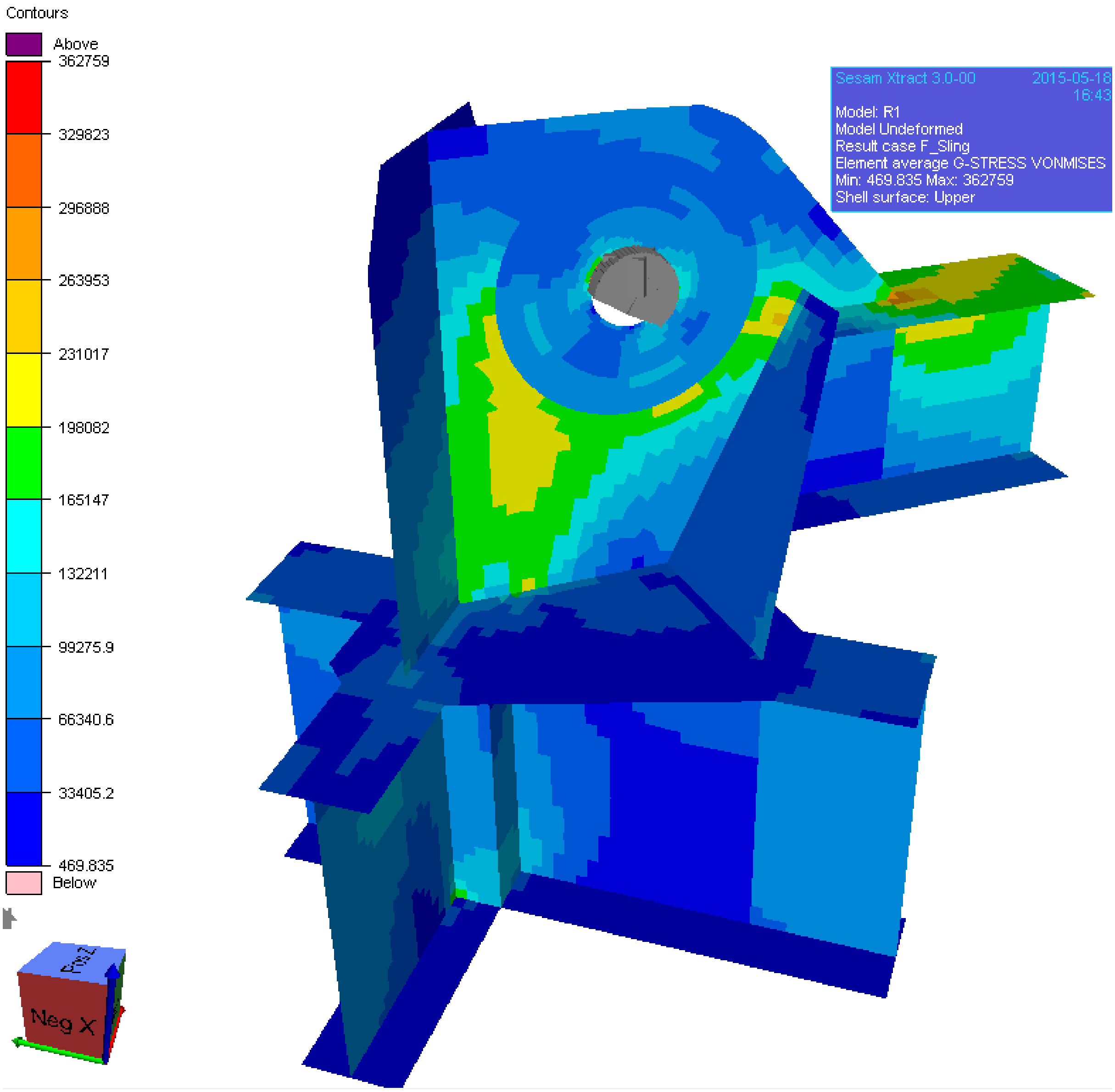


Figure 6-7 Padeye average VonMises stress [kPa] using the original design loads

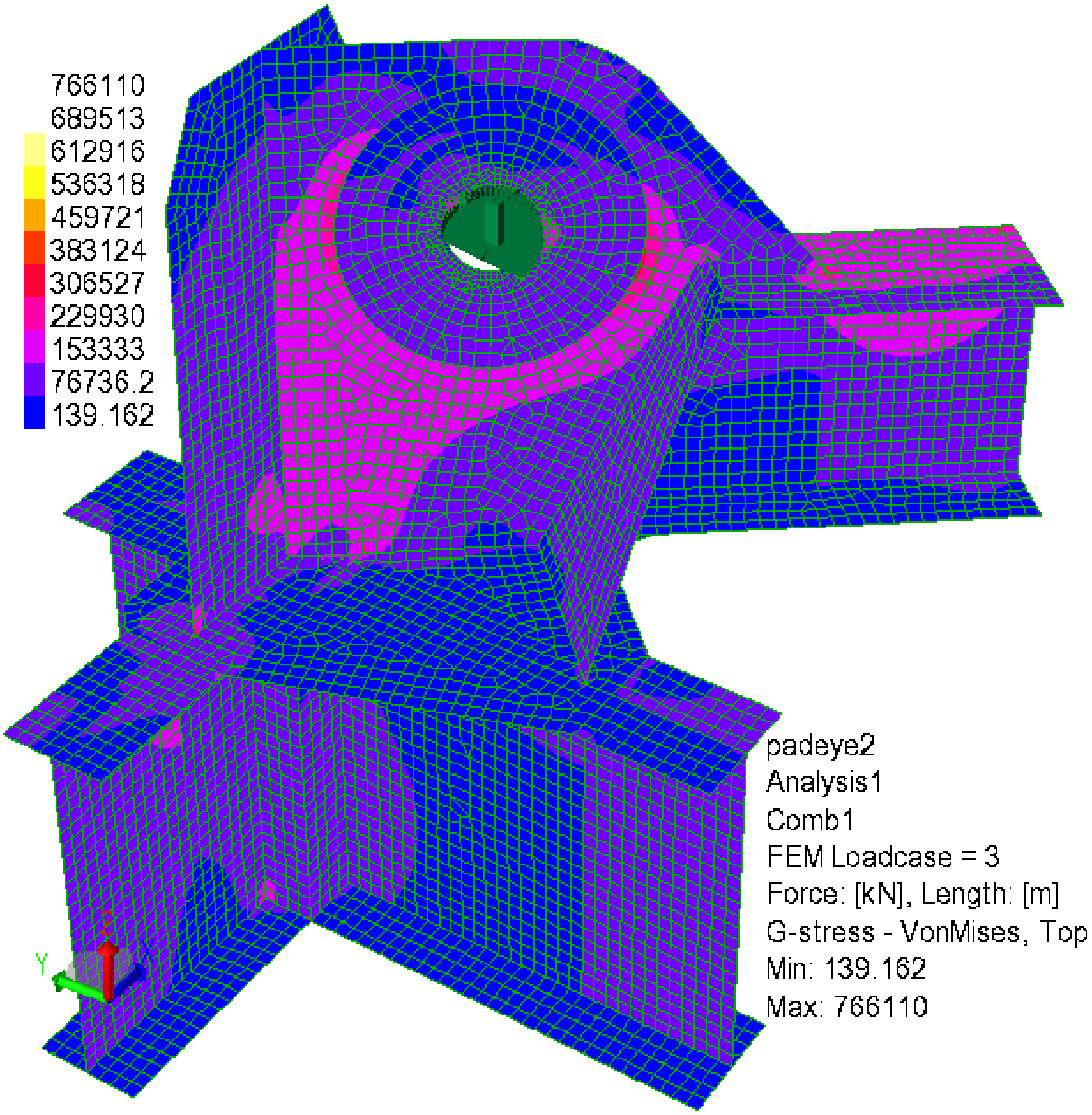


Figure 6-8 Element general VonMises stress [kPa] using the new design loads

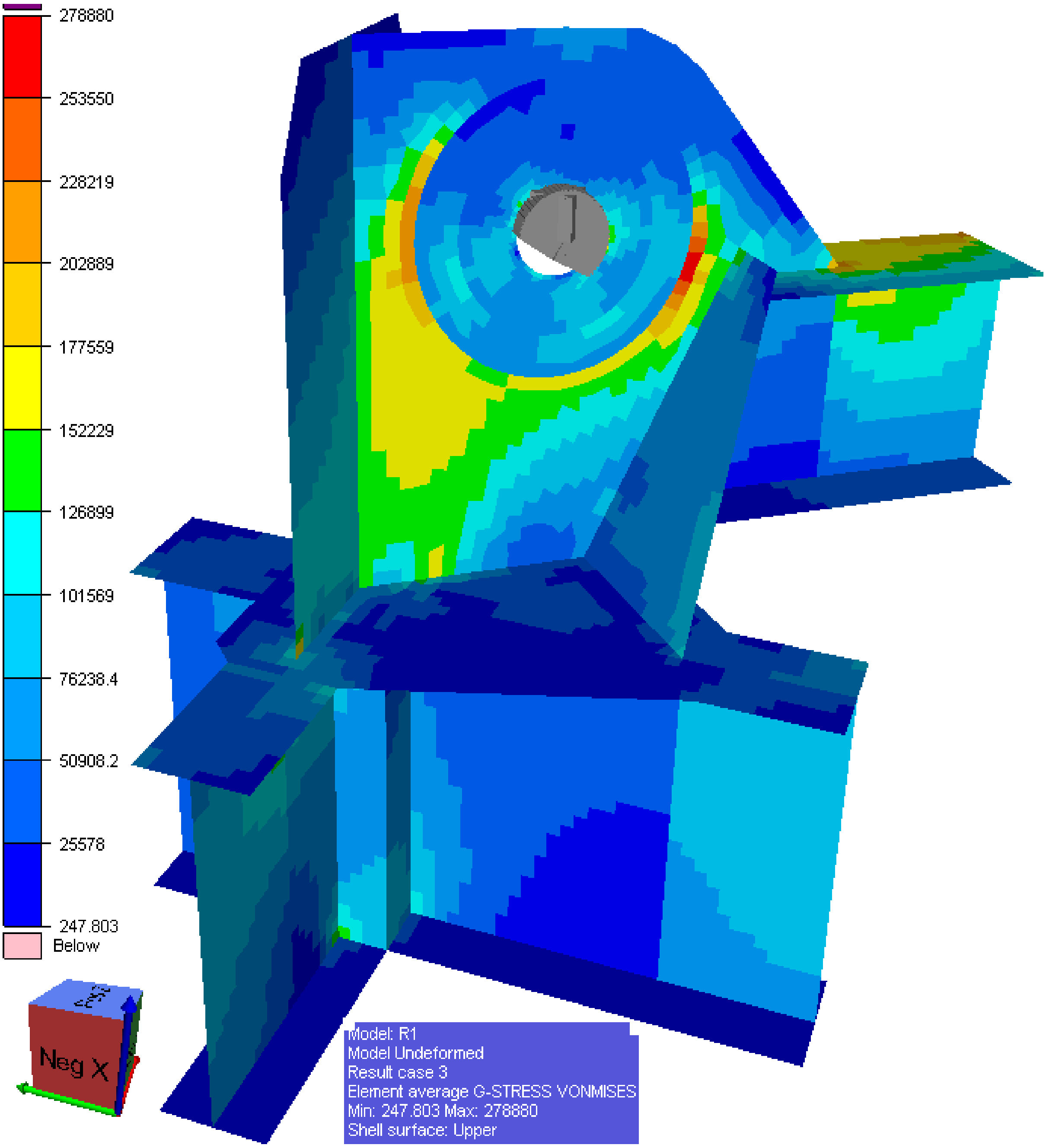


Figure 6-9 Padeye average VonMises stress [kPa] using the new design loads

7. Conclusions

In this master's thesis the existing manifold module on Statfjord C platform was redesigned and the results from the analysis are compared to its original design. The objective of the comparison is to find similarities and dissimilarities in the design analyses, approach and results. The analyses included structural integrity and capacity checks of the primary structure, to assure the safety of the existing structure and in order to identify the likely weak points that could have initiated a failure under offshore lift operation and relevant actions for the in-place condition.

SESAM GeniE was chosen and used as the analysis software for this work and I feel I have gained competency and confidence to use the software package for more complicated future projects.

For in-place condition an analysis of the existing module's primary structure was performed in order to ensure the safety and verify integrity of the existing structure.

The analyses for in-place ultimate limit state (ULS) verify the structural integrity and sufficient capacity for relevant actions. Although; all the primary structural members passed the code checks based on the current practice, it would seem like that the new standards provide stricter methods for calculation of combined stresses, Interaction Formula, and local buckling checks. This results in generally higher utilization ratios for the new practice.

Load and material factors based on the new practice were the same as the ones specified by NPD load and material factors for the original design.

There was no considerable difference between the original and the current practice for accidental limit state (ALS) approach which covers the earthquake actions. Therefore; a comparison between two different ways of modeling of the mass within the analysis program GeniE was done. As described in section 5.3.5, the model with point mass is expected to give more accurate results when applying the earthquake accelerations.

In the offshore lift operation; the original design used a sling factor of 1.4 (same as SKL factor), and a dynamic amplification factor (DAF) of 1.5. The new practice recommends SKL factor equal to 1.25 and DAF = 1.2 for offshore lifts up to 1000t. The partial load factors used in the old design of sling and padeye were slightly stricter than the ones given by the new standards.

For the padeye check, the original design method resulted in a bigger sling load which naturally gives a higher stress level within the padeye. Using the new method given by NORSOK R-002, the maximum obtained sling load will be less compared to the old calculations; hence the stress level gets lower.

All in all one can conclude that the design and analyses of this module have been performed in a safe manner. This is an existing structure which has proven its capacity and integrity during transportation, lifting and the in-place functional phase with no observed or reported failure.

Recommendations for further work:

The following topics can be recommended for further work or as subjects to new thesis:

Sea fastening and transportation analysis

Dynamic analyses of the structure subjected to equipment's vibrations

Non-linear elasto-plastic analysis can be deployed to:

- Do non-linear analysis of the padeye and critical joints
- Complete ALS analysis including blast load and dropped objects analyses

8. References

[1] Offshore Field Development (2013), Professor Jonas Odland

[2] Statfjord C Modifications, Document No. CP-ZZ-JJ-RE-0125

[3] NORSOK standard N-001, Edition 8, September 2012

[4] DNV-OS-C101, Design Of Offshore Steel Structures, General LRFD, April 2011

[5] SESAM USER MANUAL ,GENIE VOL. 1 to VOL. 4

[6] Eurocode 3: Design of steel structures-part 1-1(EN 1993-1-1)

[7] Veritas Ofshore Technology and Service, Report No. 88-3172

[8] NORSOK standard N-003, Edition 2, September 2007

[9] Module Structural Design Manual, Doc. No CP-SP-JN-001

[10] Specification No. SP-JN-N003 "Accidental Loads for Statfjord C platform"

[11] DNV-OS-H102, Marine Operations, Design and Fabrications, January 2012

[12] DNV-OS-H205, Lifting Operations, April 2014

[13] NORSOK standard R-002, Edition 2, September 2012

[14] NORSOK standard N-004, Rev. 2, October 2004

Appendix A: Geometry

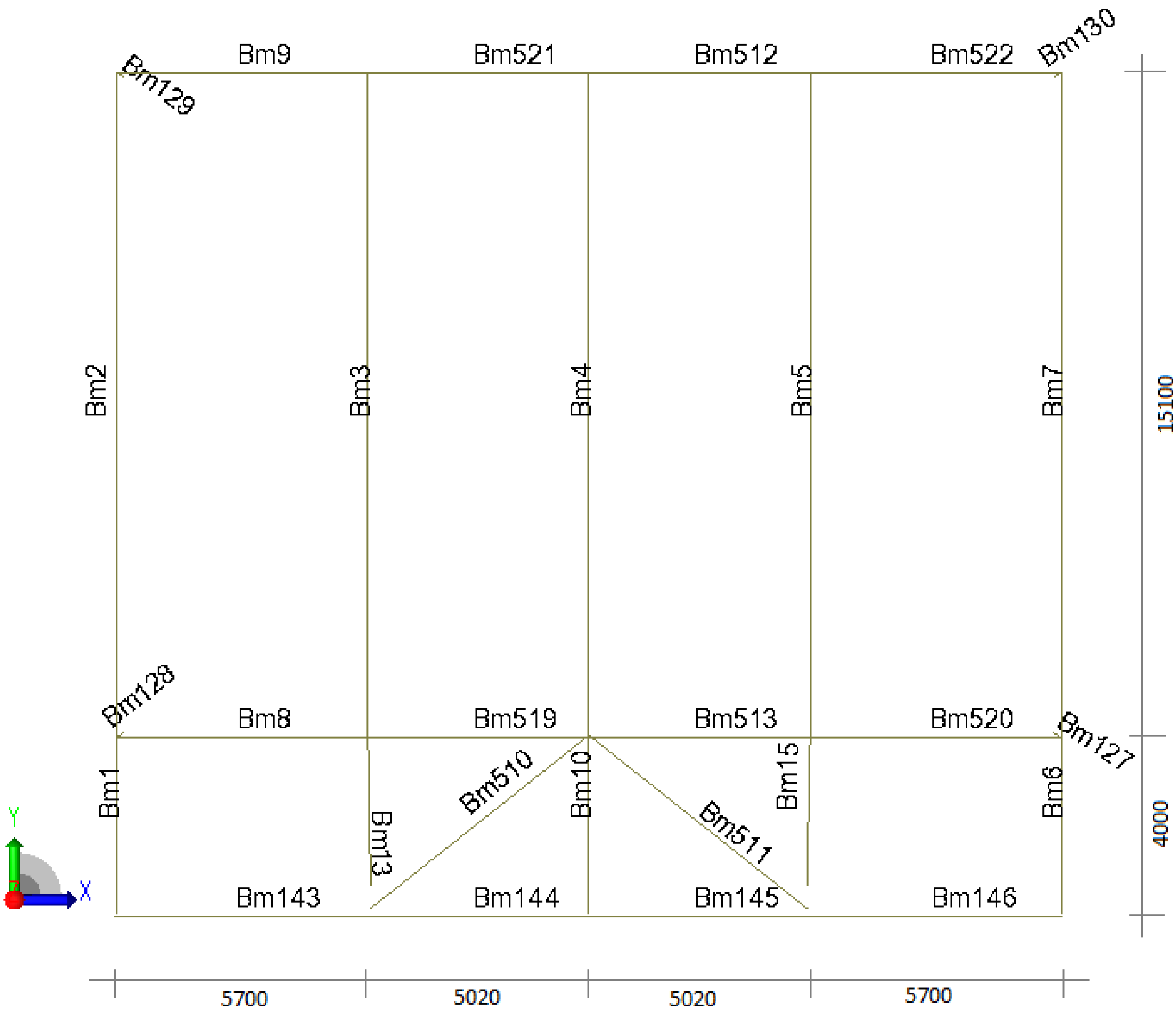


Figure A-1 Deck geometry and beam numbers

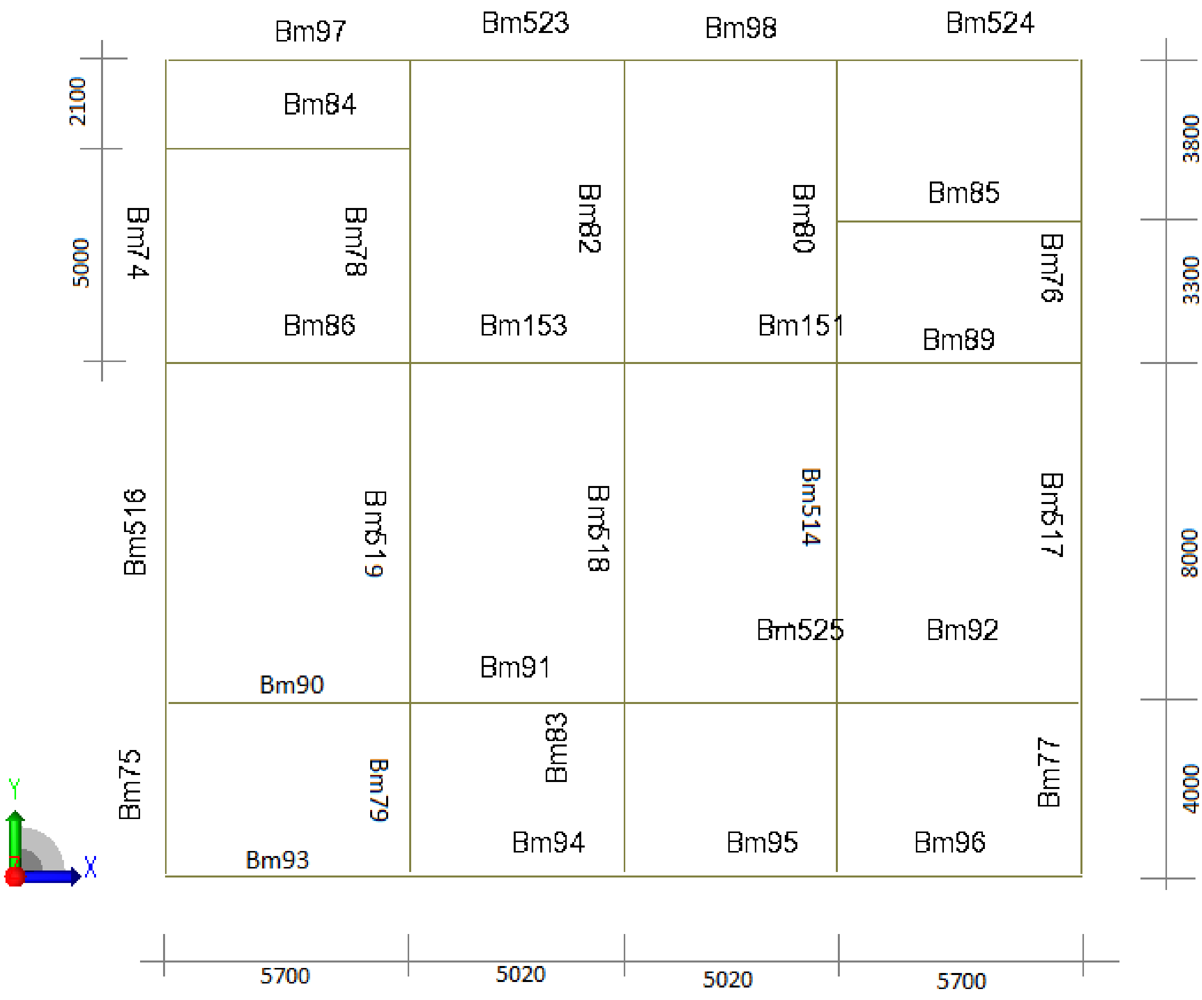


Figure A-2 Roof geometry and beam numbers

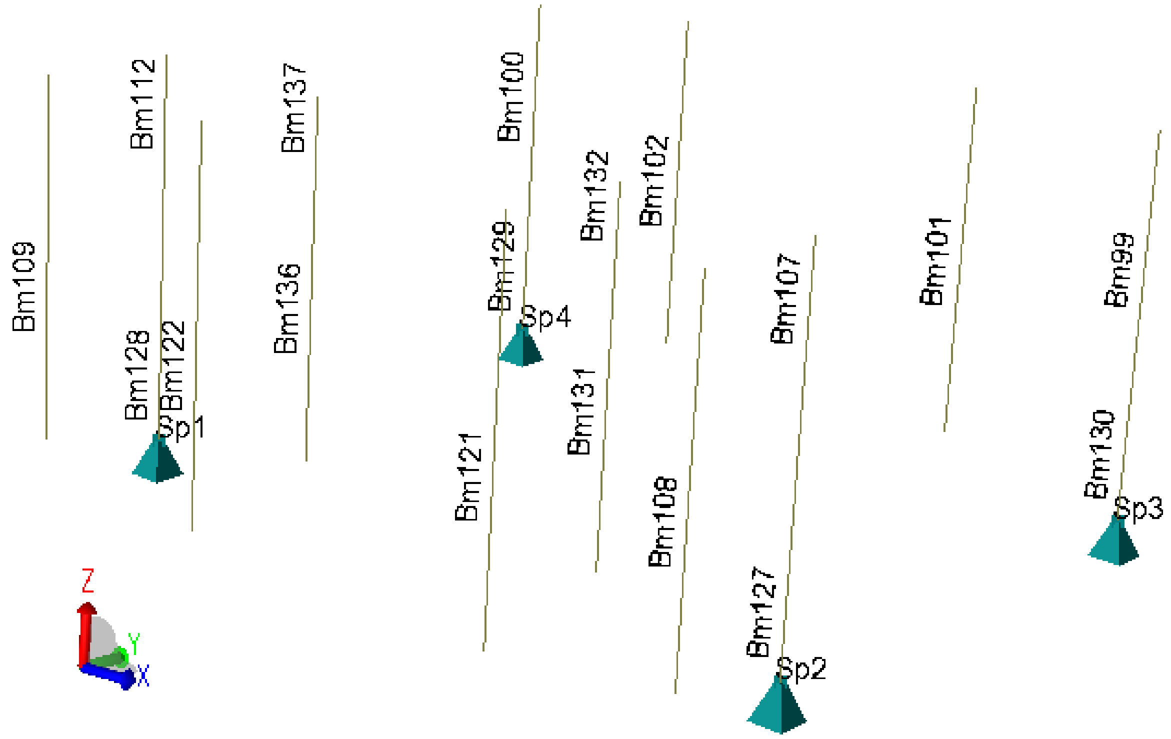


Figure A-3 Configuration of columns and beam numbers

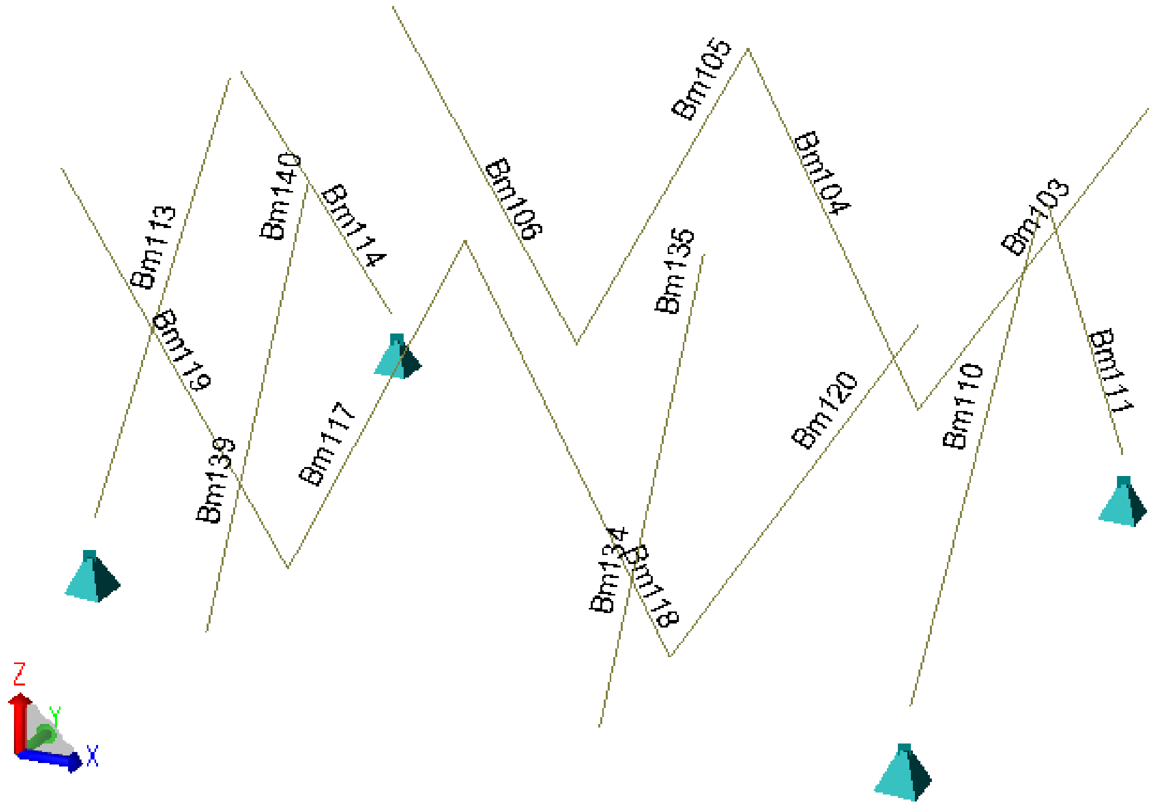


Figure A-4 Configuration of bracing and beam numbers

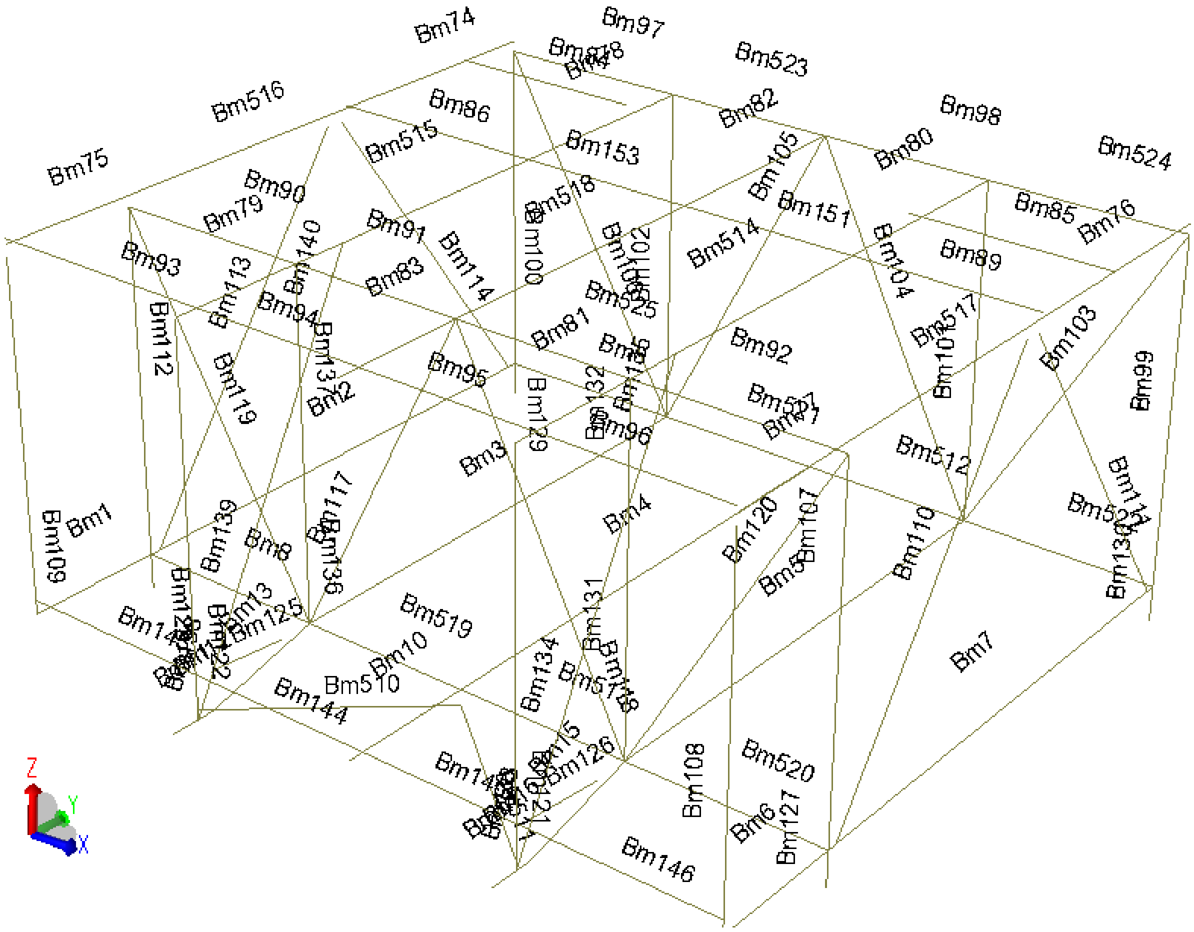


Figure A-5 Overview of the module main frame and beam numbers

Appendix B: Cross Section Properties

Cross sections are referred to using the general notation given below:

Height x Width x Web Thickness x Flange Thickness

B-1 Deck Structure

Deck Plate Girders:

1200 x 400 x 12 x 20 (Bm9, Bm512, Bm521, Bm522)

1200 x 400 x 12 x 30 (Bm8, Bm513, Bm519, Bm520)

1200 x 500 x 12 x 20 (Bm1, Bm2, Bm6, Bm7)

1200 x 500 x 15 x 20 (Bm3, Bm4, Bm5, Bm10)

1050 x 450 x 12 x 20 (Bm11, Bm12, Bm13, Bm14, Bm15, Bm16)

General Application Beams:

HE300A (Bm143, Bm144, Bm145, Bm146)

HE400A (Bm510, Bm511)

Deck Equipment Supports:

T sections are used to strengthen the deck plate locally in order to carry concentrated load from equipment. T's are directly welded to the deck plate using it as upper flange.

T 400 x 200 x 10 x 20 (Bm41 to Bm66, Bm288, Bm289, Bm290, Bm291)

L Profiles

These are used as stiffeners for deck plate and categorized as secondary steel, hence are not taken in the code check.

L 200 x 90 x 10.5 x14

B-2 Columns and Bracings

Columns and truss bracing are of built up type sections as following list:

Columns

440 x 300 x 10 x 20 (Bm108, Bm109)

490 x 300 x 10 x 20 (Bm121, Bm122)

440 x 450 x 10 x 20 (Bm99, Bm100, Bm101, Bm102)

480 x 450 x 20 x 40 (Bm131, Bm132, Bm136, Bm137)

500 x 450 x 20 x 50 (Bm107)

500 x 500 x 20 x 50 (Bm112)

Bracing

490 x 300 x 10 x 20 (Bm134, Bm135, Bm139, Bm140)

440 x 400 x 10 x 20 (Bm110, Bm111, Bm113, Bm114)

440 x 450 x 10 x 20 (Bm103, Bm104, Bm105, Bm106, Bm117, Bm118, Bm102)

460 x 450 x 15 x 30 (Bm120)

480 x 450 x 20 x 40 (Bm119)

B-3 Roof Structure

Roof Plate Girders:

1400 x 400 x 12 x 20 (Bm97, Bm98, Bm523, Bm524)

1400 x 400 x 12 x 30 (Bm90, Bm91, Bm92, Bm525)

1400 x 400 x 15 x 30 (Bm82, Bm83, Bm518)

1400 x 450 x 15 x 40 (Bm78, Bm79, Bm80, Bm81, Bm514, Bm515)

1400 x 450 x 25 x 50 (Bm79, Bm81)

800 x 400 x 10 x 20 (Bm74, Bm75, Bm76, Bm77, Bm516, Bm517)

800 x 400 x 15 x 40 (Bm84, Bm85)

600 x 300 x 15 x 20 (Bm86, Bm89, Bm151, Bm153)

General Application Beams:

HE500A (Bm93, Bm94, Bm95, Bm96)

Roof:

I sections with unequal flange thickness are used for the spreader beams as a part of the lifting arrangement.

800 x 500 x 10 x40(20 top flange) (Bm536, Bm537, Bm538, Bm539)

L Profiles

These are used as stiffeners for roof plate and categorized as secondary steel, hence are not taken in the code check.

L 250 x 90 x 10.5 x15

Appendix C: Mathcad and code based calculations

- Wind Load calculations based on NORSOK N-003
- Maximum load on the main structure under lift operation based on the original approach
- Lift and Padeye calculations according to NORSOK R-002
- Padeye calculations according to DNV-OS-H205

Wind load :

NORSOK N-003, 6.3:

Average wind velocity at reference elevation (10m above sea level) and probability of exceedance of 10^-2 as given in N-003: $U_0 := 41\frac{m}{s}$

10 min: $t_0 := 600s$

Can be considered a static load: $t_{gust} := 3s$

Density of air: $\rho_a := 1.225\frac{kg}{m^3}$

Height above sea level $z := 65m$

$$C := 5.73\cdot10^{-2}\left(1 + 0.15\cdot\frac{s}{m}U_0\right)^{0.5}$$

10 min mean wind velocity at level 75m above sea level:

$$U_z := U_0\cdot\left(1 + C\cdot\ln\left(\frac{z}{10m}\right)\right) = 52.758\frac{m}{s}$$

Intencity factor:

$$I_U := 0.06\left(1 + 0.043\cdot\frac{s}{m}U_0\right)\left(\frac{z}{10m}\right)^{-0.22} = 0.11$$

Wind speed for duration t=3s and at height 75m above the sea level:

$$U_{z.t} := U_z\cdot\left(1 - 0.41\cdot I_U\cdot\ln\left(\frac{t_{gust}}{t_0}\right)\right) = 65.345\frac{m}{s}$$

Shape Coefficient used generally for all the beams : $C_s := 2$

Worst case angle between direction of the wind and the exposed surface: $\alpha := 90deg$

Mean wind action:

$$F_w := \frac{1}{2}\cdot\rho_a\cdot C_s\cdot U_{z.t}^2\cdot\sin(\alpha) = 5.231\cdot\frac{kN}{m^2}$$

Wind load :

NORSOK N-003, 6.3:

Average wind velocity at reference elevation (10m above sea level) and probability of exceedance of 10^-2 as given in N-003:

$$U_0 := 41\frac{m}{s}$$

10 min:

$$t_0 := 600s$$

Can be considered a static load:

$$t_{gust} := 3s$$

Density of air:

$$\rho_a := 1.225\frac{kg}{m^3}$$

Height above sea level

$$z := 75m$$

$$C := 5.73\cdot 10^{-2}\left(1 + 0.15\cdot\frac{s}{m}U_0\right)^{0.5}$$

10 min mean wind velocity at level 75m above sea level:

$$U_z := U_0\cdot\left(1 + C\cdot\ln\left(\frac{z}{10m}\right)\right) = 53.657\frac{m}{s}$$

Intencity factor:

$$I_U := 0.06\left(1 + 0.043\cdot\frac{s}{m}U_0\right)\left(\frac{z}{10m}\right)^{-0.22} = 0.106$$

Wind speed for duration t=3s and at height 75m above the sea level:

$$U_{z.t} := U_z\cdot\left(1 - 0.41\cdot I_U\cdot\ln\left(\frac{t_{gust}}{t_0}\right)\right) = 66.062\frac{m}{s}$$

Shape Coefficient used generally for all the beams : $C_s := 2$

Worst case angle between direction of the wind and the exposed surface:

$$\alpha := 90deg$$

Mean wind action:

$$F_w := \frac{1}{2}\cdot\rho_a\cdot C_s\cdot U_{z.t}^{2}\cdot\sin(\alpha) = 5.346\cdot\frac{kN}{m^2}$$

Vertical Padeye Loads:

The sling loads shall represent the effect of an uneven distributaion of sling forces due to inaccuracies in the fabricated sling lengths.
Each of the largest corner vertical padeye reactions is increased by a factor 1.4 and the remaining three vertical padeye reactions are then found by applying the laws of statics.
The obtained vertical and horizontal reactions are then applied to the locations of the padeyes to check the main structural members under lifting operation.

Parameters From Genie Model:

$L_x := 10.04m$

$L_y := 15.1m$

$e_x := 5.7m$

$e_y := 4.0m$

$X_1 := 10.75m$

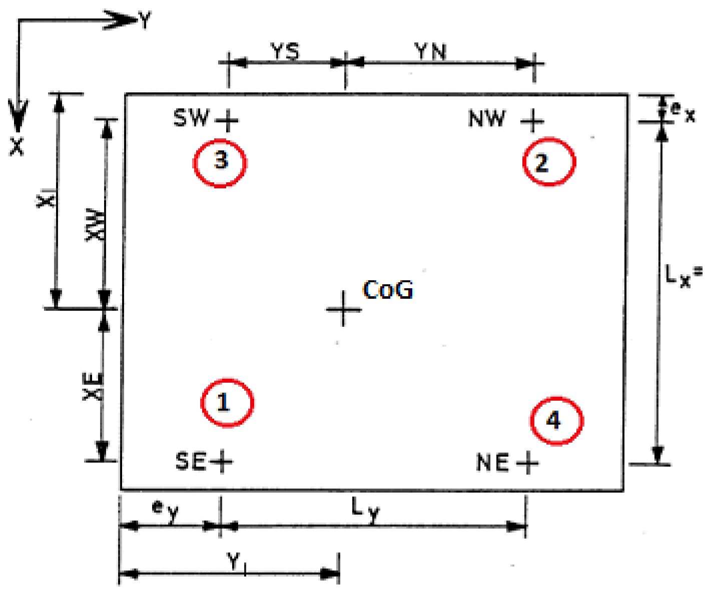
$Y_1 := 10.1m$

$X_W := X_1 - e_x = 5.05\,m$

$Y_S := Y_1 - e_y = 6.1\,m$

$X_E := L_x - X_W = 4.99\,m$

$Y_N := L_y - Y_S = 9\,m$



Self Weight and Equipment Weight (the total weight) are multiplied by (DAF*SKL*γf)

Total vertical reaction: $F_z := 23197kN$

Hook Height From Roof $h_1 := 12.25m$

$R_N := F_z \cdot \frac{(Y_1 - e_y)}{L_y} = 9.371 \times 10^3 \cdot kN$ Sum vertical loding for Slings no 2 & 4

$R_S := F_z - R_N = 1.383 \times 10^4 \cdot kN$ Sum vertical loding for Slings no 1 & 3

$R_{NE} := R_N \cdot \frac{(X_1 - e_x)}{L_x} = 4.713 \times 10^3 \cdot kN$ Vertical Sling Reaction at Point 4

$R_{NW} := R_N - R_{NE} = 4.657 \times 10^3 \cdot kN$ Vertical Sling Reaction at Point 2

$R_{SE} := R_S \cdot \frac{(X_1 - e_x)}{L_x} = 6.954 \times 10^3 \cdot kN$ Vertical Sling Reaction at Point 1

$R_{SW} := R_S - R_{SE} = 6.872 \times 10^3 \cdot kN$ Vertical Sling Reaction at Point 3

True Sling Angles:

θ.i is the angle between sling No.i and the horizontal plane

$\theta_1 := 57.3deg$ $\theta_2 := 50deg$ $\theta_3 := 57.1deg$ $\theta_4 := 50deg$

Loading No.1 RSE > RNW

Vertical Components Of Sling Loads: (Sling 1 > Sling 2)

$$R_{SE1} := R_{SE} \cdot 1.4 = 9.736 \times 10^{3} \cdot kN$$

$$R_{SW1} := R_{S} - R_{SE1} = 4.09 \times 10^{3} \cdot kN$$

$$R_{NE1} := \frac{(F_z \cdot X_W)}{L_x} - R_{SE1} = 1.932 \times 10^{3} \cdot kN$$

$$R_{NW1} := R_{N} - R_{NE1} = 7.439 \times 10^{3} \cdot kN$$

Horizontal Components Of Sling Loads:

$$H_{SEX1} := \frac{(R_{SE1} \cdot X_E)}{h_1} = 3.966 \times 10^{3} \cdot kN$$
Loading No.1, X component in Sling No.1

$$H_{SEY1} := \frac{(R_{SE1} \cdot Y_S)}{h_1} = 4.848 \times 10^{3} \cdot kN$$
Loading No.1, Y component in Sling No.1

$$H_{NWX1} := \frac{(R_{NW1} \cdot X_W)}{h_1} = 3.067 \times 10^{3} \cdot kN$$
Loading No.1, X component in Sling No.2

$$H_{NWY1} := \frac{(R_{NW1} \cdot Y_N)}{h_1} = 5.466 \times 10^{3} \cdot kN$$
Loading No.1, Y component in Sling No.2

$$H_{SWX1} := \frac{(R_{SW1} \cdot X_W)}{h_1} = 1.686 \times 10^{3} \cdot kN$$
Loading No.1, X component in Sling No.3

$$H_{SWY1} := \frac{(R_{SW1} \cdot Y_S)}{h_1} = 2.037 \times 10^{3} \cdot kN$$
Loading No.1, Y component in Sling No.3

$$H_{NEX1} := \frac{(R_{NE1} \cdot X_E)}{h_1} = 786.895 \cdot kN$$
Loading No.1, X component in Sling No.4

$$H_{NEY1} := \frac{(R_{NE1} \cdot Y_N)}{h_1} = 1.419 \times 10^{3} \cdot kN$$
Loading No.1, Y component in Sling No.4

Loading No.2 RNW > RSE

Vertical Components Of Sling Loads: (Sling 2 > Sling 1)

$$R_{NW2} := R_{NW} \cdot 1.4 = 6.52 \times 10^{3} \cdot kN$$

$$R_{NE2} := R_{N} - R_{NW2} = 2.85 \times 10^{3} \cdot kN$$

$$R_{SW2} := \frac{\left(F_{z} \cdot X_{E}\right)}{L_{x}} - R_{NW2} = 5.009 \times 10^{3} \cdot kN$$

$$R_{SE2} := R_{S} - R_{SW2} = 8.817 \times 10^{3} \cdot kN$$

Horizontal Components Of Sling Loads:

$$H_{SEX2} := \frac{\left(R_{SE2} \cdot X_{E}\right)}{h_{1}} = 3.592 \times 10^{3} \cdot kN$$ Loading No.2, X component in Sling No.1

$$H_{SEY2} := \frac{\left(R_{SE2} \cdot Y_{S}\right)}{h_{1}} = 4.391 \times 10^{3} \cdot kN$$ Loading No.2, Y component in Sling No.1

$$H_{NWX2} := \frac{\left(R_{NW2} \cdot X_{W}\right)}{h_{1}} = 2.688 \times 10^{3} \cdot kN$$ Loading No.2, X component in Sling No.2

$$H_{NWY2} := \frac{\left(R_{NW2} \cdot Y_{N}\right)}{h_{1}} = 4.791 \times 10^{3} \cdot kN$$ Loading No.2, Y component in Sling No.2

$$H_{SWX2} := \frac{\left(R_{SW2} \cdot X_{W}\right)}{h_{1}} = 2.065 \times 10^{3} \cdot kN$$ Loading No.2, X component in Sling No.3

$$H_{SWY2} := \frac{\left(R_{SW2} \cdot Y_{S}\right)}{h_{1}} = 2.494 \times 10^{3} \cdot kN$$ Loading No.2, Y component in Sling No.3

$$H_{NEX2} := \frac{\left(R_{NE2} \cdot X_{E}\right)}{h_{1}} = 1.161 \times 10^{3} \cdot kN$$ Loading No.2, X component in Sling No.4

$$H_{NEY2} := \frac{\left(R_{NE2} \cdot Y_{N}\right)}{h_{1}} = 2.094 \times 10^{3} \cdot kN$$ Loading No.2, Y component in Sling No.4

Loading No.3 RSW > RNE

Vertical Components Of Sling Loads: (Sling 3 > Sling 4)

$$R_{SW3} := R_{SW} \cdot 1.4 = 9.62 \times 10^3 \cdot kN$$

$$R_{SE3} := R_S - R_{SW3} = 4.206 \times 10^3 \cdot kN$$

$$R_{NW3} := \frac{(F_z \cdot X_E)}{L_x} - R_{SW3} = 1.909 \times 10^3 \cdot kN$$

$$R_{NE3} := R_N - R_{NW3} = 7.462 \times 10^3 \cdot kN$$

Horizontal Components Of Sling Loads:

$$H_{SEX3} := \frac{(R_{SE3} \cdot X_E)}{h_1} = 1.713 \times 10^3 \cdot kN$$ Loading No.3, X component in Sling No.1

$$H_{SEY3} := \frac{(R_{SE3} \cdot Y_S)}{h_1} = 2.094 \times 10^3 \cdot kN$$ Loading No.3, Y component in Sling No.1

$$H_{NWX3} := \frac{(R_{NW3} \cdot X_W)}{h_1} = 786.895 \cdot kN$$ Loading No.3, X component in Sling No.2

$$H_{NWY3} := \frac{(R_{NW3} \cdot Y_N)}{h_1} = 1.402 \times 10^3 \cdot kN$$ Loading No.3, Y component in Sling No.2

$$H_{SWX3} := \frac{(R_{SW3} \cdot X_W)}{h_1} = 3.966 \times 10^3 \cdot kN$$ Loading No.3, X component in Sling No.3

$$H_{SWY3} := \frac{(R_{SW3} \cdot Y_S)}{h_1} = 4.791 \times 10^3 \cdot kN$$ Loading No.3, Y component in Sling No.3

$$H_{NEX3} := \frac{(R_{NE3} \cdot X_E)}{h_1} = 3.04 \times 10^3 \cdot kN$$ Loading No.3, X component in Sling No.4

$$H_{NEY3} := \frac{(R_{NE3} \cdot Y_N)}{h_1} = 5.482 \times 10^3 \cdot kN$$ Loading No.3, Y component in Sling No.4

Loading No.4 RNE > RSW

Vertical Components Of Sling Loads: (Sling 4 > Sling 3)

$$R_{NE4} := R_{NE} \cdot 1.4 = 6.599 \times 10^{3} \cdot kN$$

$$R_{NW4} := R_{N} - R_{NE4} = 2.772 \times 10^{3} \cdot kN$$

$$R_{SE4} := \frac{\left(F_z \cdot X_E\right)}{L_x} - R_{NE4} = 4.93 \times 10^{3} \cdot kN$$

$$R_{SW4} := R_{S} - R_{SE4} = 8.896 \times 10^{3} \cdot kN$$

Horizontal Components Of Sling Loads:

$$H_{SEX4} := \frac{\left(R_{SE4} \cdot X_E\right)}{h_1} = 2.008 \times 10^{3} \cdot kN$$

Loading No.4, X component in Sling No.1

$$H_{SEY4} := \frac{\left(R_{SE4} \cdot Y_S\right)}{h_1} = 2.455 \times 10^{3} \cdot kN$$

Loading No.4, Y component in Sling No.1

$$H_{NWX4} := \frac{\left(R_{NW4} \cdot X_W\right)}{h_1} = 1.143 \times 10^{3} \cdot kN$$

Loading No.4, X component in Sling No.2

$$H_{NWY4} := \frac{\left(R_{NW4} \cdot Y_N\right)}{h_1} = 2.037 \times 10^{3} \cdot kN$$

Loading No.4, Y component in Sling No.2

$$H_{SWX4} := \frac{\left(R_{SW4} \cdot X_W\right)}{h_1} = 3.667 \times 10^{3} \cdot kN$$

Loading No.4, X component in Sling No.3

$$H_{SWY4} := \frac{\left(R_{SW4} \cdot Y_S\right)}{h_1} = 4.43 \times 10^{3} \cdot kN$$

Loading No.4, Y component in Sling No.3

$$H_{NEX4} := \frac{\left(R_{NE4} \cdot X_E\right)}{h_1} = 2.688 \times 10^{3} \cdot kN$$

Loading No.4, X component in Sling No.4

$$H_{NEY4} := \frac{\left(R_{NE4} \cdot Y_N\right)}{h_1} = 4.848 \times 10^{3} \cdot kN$$

Loading No.4, Y component in Sling No.4

1. Introduction

Calculations have to be performed in order that lifting gear can be properly selected.
Calculation procedure made according to NORSOK R-002.

Factors relevant for lifting design are shown in Table 1.

		Load factors					Resistance factor	
					DF = ($\gamma_p \cdot \gamma_c$)			
APPLICATION	TO FIND	W_{COG}	SKL	DAF	γ_p	γ_c	$\frac{1}{\gamma_e}$	γ_{Rm}
Lifting accessories								
Sling design	MBL	X	X	X	X	X	X	X
Shackle selection	MBL	X	X	X	X	X		X
Master link/ Forerunner	MBL			X	X	X	X	X
Check of structural capacity during lifting								
Check of structure capacity	Design capacity	X	X	X	X	X		X
Lifting lug design	Design capacity	X	X	X	X	X		X

Table 1: Factors relevant for lifting design

2. Working load limit calculation (WLL)

Total mass of lifted object: $W := 1010.9 \cdot tonne$

Working load limit (WLL) is product of object's estimated weight and weight contingency factor according to Table 2:

METHOD TO DETERMINE THE WEIGHT	W_{CF}	COMMENT
Weighing	1,03	Incl. weighing by platform crane with calibrated loadcell within ±3 % accuracy.
Detailed calculation, based on up-to-date drawings	1,1	NOTE Possibility of significant weight development during construction and fabrication.
Detailed calculation, based on less updated drawings/info	≥1,2	W_{CF} to be assessed specifically. A factor of 1,5 or more should be considered for demolition lift.

Table 2: Weight contingency factor

Selected contingency factor: $W_{CF} := 1.03$

Working load limit: $WLL := W \cdot W_{CF}$

$WLL = 1041.227 \cdot tonne$

3. Load factors selection and calculation

3.1 Centre of gravity (CoG) envelope factor

For weighted objects or objects with simple weight pattern: $W_{COG} := 1$

For unweighted objects or objects with complex weight pattern: $W_{COG} := 1.1$

For weighted object with complex weight pattern(the module) I will use:

Selected weight contengency factor: $W_{COG} := 1.05$

3.2. Skew load factor (SKL)

Skew load factor is selected according to Table 3:

LIFTING CONFIGURATION	SKL
Single hook 4 point lift without spreader bar (statically indeterminate)	1,25
Single hook 4 point lift with 1 or 2 floating spreader bars	1,10
Tandem lift and 4 point lifts (statically determinate)	1,00
3 point lift or less (statically determinate)	1,00

Table 3: Skew load factors

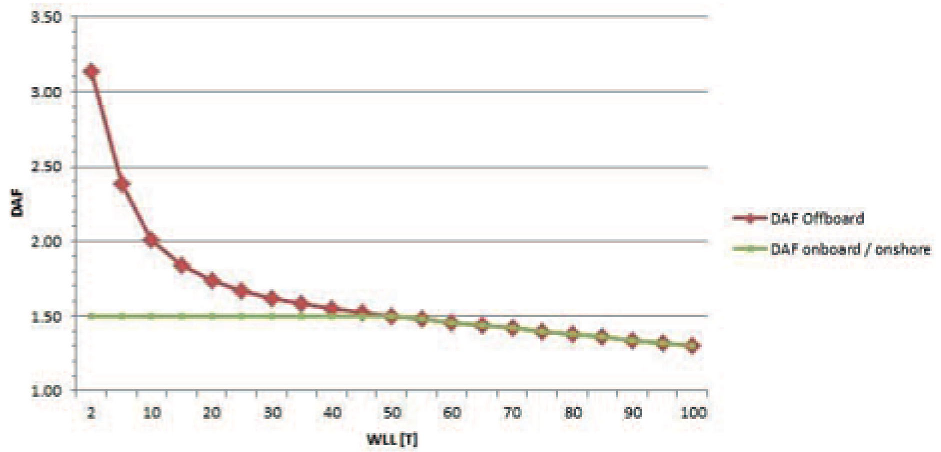
Skew factor selected is: $SKL := 1.25$

3.3 Dynamic load factor (DAF)

Dynamic load factor is given Norsok R-002, section F.7.2.3.5. Since the WLL greater than 100 tonnes is not covered by this part, the guidelines given in the DNV Offshore Standard(DNV-OS-H205, April 2014) Table 3-1 is used. DAF value of 1.2 is chosen which is conservative

SHL (Static Hook Load)	*DAF Onshore*	*DAF Inshore*	*DAF Offshore*
$3^{2)} - 100$ t	1.10	$1.07 + 0.05\sqrt{100/SHL}$	$1 + 0.25\sqrt{100/SHL}$
100 - 300 t	1.05	1.12	$DAF := 1.2$
300 - 1000 t	1.05	1.10	1.20
1000 - 2500 t	1.03	1.08	1.15
> 2500 t	1.03	1.05	1.10

DNV-OS-H205, April 2014



NORSOK R-002

Figure 1: DAF distribution for offboard and onboard lifts

3.4 Design factor (DF)

Design factor is defined as product of partial load factors and it is shown in Table 4.

ELEMENT CATEGORY	γ_p	γ_c	DF ($\gamma_p \cdot \gamma_c$)
Lifting points including attachments to object Single critical elements supporting the lifting point	1,34	1,25	1,68
Lifting equipment (spreader bar, shackles, slings etc)	1,34	1,25	1,68
Main elements which are supporting the lift point	1,34	1,10	1,48
Other structural elements of the lifted object	1,34	1,0	1,34

Table 4: Design factors

Partial load factor: $\gamma_P := 1.34$

Consequence factor: $\gamma_C := 1.25$

Design factor: $DF := \gamma_P \cdot \gamma_C$

$DF = 1.68$

4. Resistance factors

4.1 End termination factor

Wire rope slings:

Ferrule secure termination EN 13411-3: $\gamma_e := 0.9$

Spliced terminatios EN 13411-2: $\gamma_e := 0.8$

Chain slings EN 818-2: $\gamma_e := 1.0$

Fibre slings spliced termination EN 1492-4: $\gamma_e := 0.9$

Fibre endless soft slings and webbing slings EN 1492-1 and EN 1492-2: $\gamma_e := 1.0$

Selected termination factor: $\gamma_e := 0.9$

4.2 Material resistance factor

Check against minimum breaking load (MBL):

Wire rope slings: $\gamma_{1Rm} := 2.0$

Chain slings: $\gamma_{2Rm} := 1.8$

Shackle and rings: $\gamma_{3Rm} := 1.8$

Fibre slings: $\gamma_{4Rm} := 2.8$

Structural parts: $\gamma_{5Rm} := 1.15$

Welds and bolts: $\gamma_{6Rm} := 1.3$

5. Load calculations and arrangement assesment

Number of lifting points used in the arrangement. Available number of lifting points is 1, 2, 3 or 4.

Number of lifting points: $n_{LP} := 4$

One point lift arrangement

Two point lift arrangement

Three point lift arrangement

Four point lift arrangement

Calculations are performed with assumption af symmetrical 4 point lift:

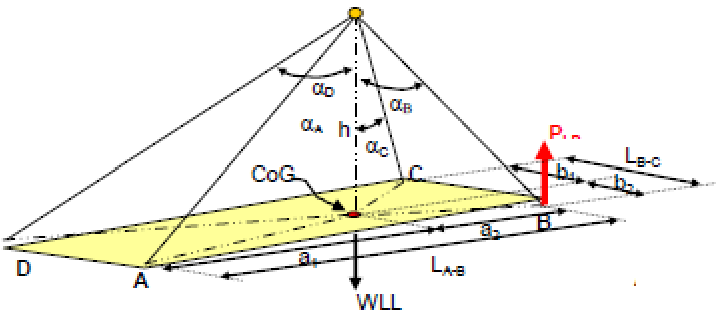


Figure 2: 4 point lift arrangement sketch

$L_A := 15.1 \cdot m$

$L_B := 10.04 \cdot m$

$a_1 := 8.88 \cdot m$

$b_1 := 5.05 \cdot m$

Cosine of the smallest angle, *cosβ*.

$\cos\beta := 0.8387$

$$P_{LP4} := \frac{WLL \cdot b_1 \cdot a_1 \cdot W_{COG} \cdot SKL \cdot DAF}{L_A \cdot L_B} \qquad P_{LP4} = 485.087 \cdot tonne$$

$$P_{LP} = 485.087 \cdot tonne$$

Four point lift arrangement

6. Equipment selection criteria

6.1 Required shackle size

Safety factor provided by manufacturer: $SF_m := 4$

Minimum Breaking Load:

$$MBL_{shackle} := \frac{P_{LP} \cdot \gamma_{3Rm} \cdot DF}{\cos\beta}$$

$$MBL_{shackle} = 1743.815 \cdot tonne$$

Required WLL for shackle will then be:

$$WLL_{shackle} := \frac{MBL_{shackle}}{SF_m}$$

$$WLL_{shackle} = 435.954 \cdot tonne$$

6.2 Required slings

Minimum Breaking Load:

$$MBL_{slings} := \frac{P_{LP} \cdot \gamma_{4Rm} \cdot DF}{\cos\beta \cdot \gamma_e}$$

$$MBL_{slings} = 3014.001 \cdot tonne$$

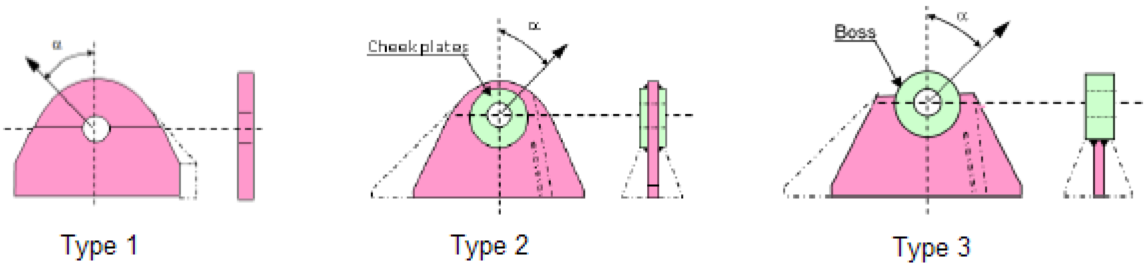
7. Lifting lug design

Lifting lug has to be able to accomodate shackle selected according to WLL criteria calculated in Section 6.1. WLL of the selected shackle has to be higher then calculated.

Calculated WLL of the shackle is: $WLL_{shackle} = 435.954 \cdot tonne$

If recalculation necessary, input manually: $WLL_{shackle} = 435.954 \cdot tonne$

There are three basic types of lifting lugs:



Select lifting lug type: $Type := 2$

Shackle is selected from IBS catalogue according to calculated or manually entered WLL.

Selected shackle has WLL of: $WLL_{selected}$ = "Load tonnes;h, please revise"

7.1. Shackle dimensions

$d_1 := 285mm$

$d_2 := 550$

$a_s := 300mm$

$c := 750mm$

$e := 500mm$

Weight := 5kN

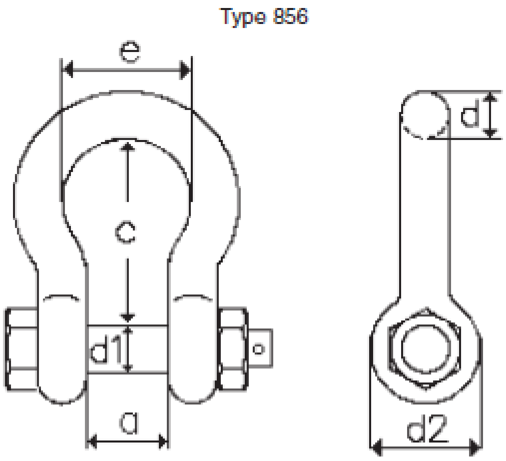


Figure 3: Shackle dimensions

If dimensions are not satisfactory, enter new WLL for shackle selection manually, but never less then previously calculated.

7.2 Lug material

Material yield strength: $f_y := 335MPa$

Material ultimate strength: $f_u := 490MPa$

7.3. Lug design load

Design load: $P_P := \frac{P_{LP} \cdot DF}{\cos\beta}$ $P_P = 968.786 \cdot tonne$

7.3. Lug dimensions

Lifting lug type 1

Lifting lug type 2

$t_p = 50 \cdot mm$

$d_h = 290 \cdot mm$

$R = 650 \cdot mm$

$h = 1150 \cdot mm$

$L = 2000 \cdot mm$

$k = 100 \cdot mm$

$R_b := 500mm$

$t_c := 50mm$

$a := 20mm$

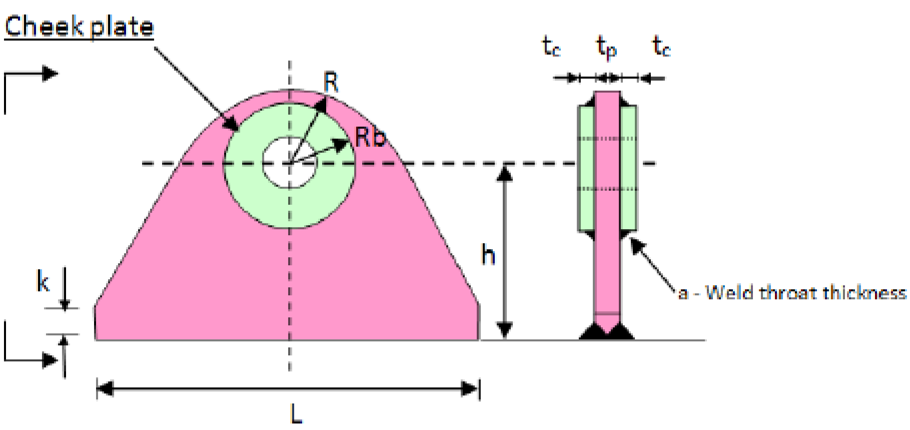


Figure 4: Lifting lug dimensions (Type 2)

7.4. Lifting lug strength calculations

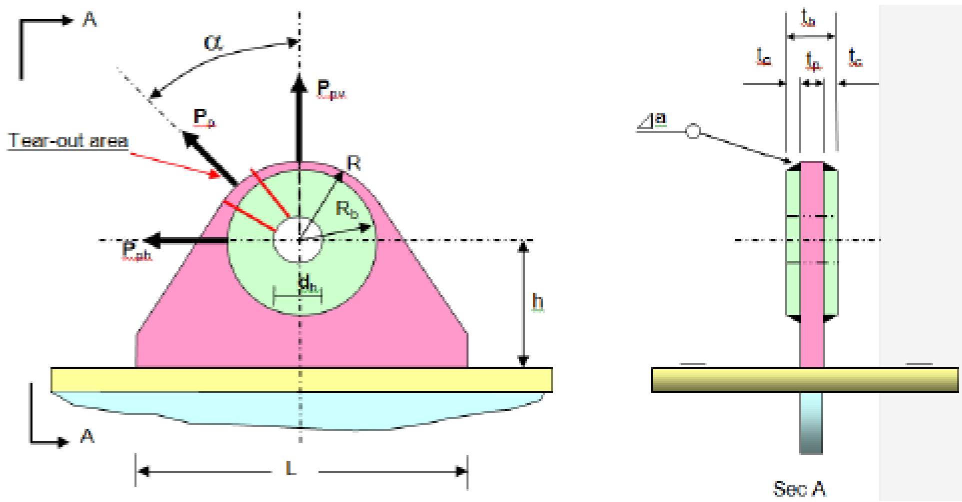


Figure 5: Lifting lug loads

7.5 Load components

Lifting lug design load is calculated in section 5.3:

Lifting lug design load is calculated in section 7.3:

Design load: $P_d := P_P \cdot g = 9500.545 \cdot kN$ $P_P := P_d = 9500.545 \cdot kN$

Action angle α: $\alpha := 32.7 \cdot deg$

Load vertical component: $P_{pv} := P_P \cdot \cos(\alpha)$ $P_{pv} = 7994.811 \cdot kN$

Load horizontal component: $P_{ph} := P_P \cdot \sin(\alpha)$ $P_{ph} = 5132.577 \cdot kN$

7.6 Limit design stress

$$f_d := \frac{f_y}{\gamma_{5Rm}} \qquad f_d = 291.304 \cdot MPa$$

7.7 Tear out limit design stress

Tear out area:

$$A_{sh} := \left(R - \frac{d_h}{2}\right) \cdot t_p + 2 \cdot \left(R_b - \frac{d_h}{2}\right) \cdot t_c$$

$$A_{sh} = 60750 \cdot mm^2$$

Tear out stress:

$$\tau_{Ed} := \frac{P_P}{2 \cdot A_{sh}} \qquad \tau_{Ed} = 78.194 \cdot MPa$$

Verification:

$$T2\_Tear\_stress := \begin{cases} \text{"OK"} & \text{if } \tau_{Ed} \le \dfrac{f_y}{\sqrt{3} \cdot \gamma_{5Rm}} \\ \text{"NOT OK"} & \text{otherwise} \end{cases} \qquad UF_{ts2} := \frac{\tau_{Ed}}{\dfrac{f_y}{\sqrt{3} \cdot \gamma_{5Rm}}}$$

$T2\_Tear\_stress = \text{"OK"}$

$UF_{ts2} = 0.465$

7.8 Load bearing limit design stress at pinhole edge

Effective thickness:

$$t_{eff} := t_p + 2 \cdot t_c$$

$$t_{eff} = 150 \cdot mm$$

Pinhole bearing stress:

$$\sigma_B := \frac{P_P}{t_{eff} \cdot d_1} \qquad \sigma_B = 222.235 \cdot MPa$$

Verification:

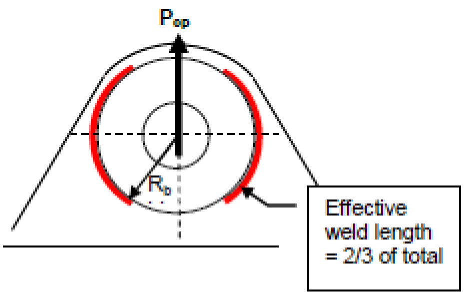
$$T2\_Pinhole\_bearing\_stress := \begin{cases} \text{"OK"} & \text{if } \sigma_B \le 1.5 \dfrac{f_y}{\gamma_{5Rm}} \\ \text{"NOT OK"} & \text{otherwise} \end{cases} \qquad UF_{pbs2} := \frac{\sigma_B}{\left(1.5 \dfrac{f_y}{\gamma_{5Rm}}\right)}$$

$T2\_Pinhole\_bearing\_stress = \text{"OK"}$

$UF_{pbs2} = 0.509$

7.9 Fillet weld limit design stress for type 2 (Cheek plates)

Effective weld length is 2/3 of total circumference:



$$L_{eff} := \frac{2}{3} \cdot 2 \cdot \pi \cdot R_b$$

$$L_{eff} = 2094.395 \cdot mm$$

Load through weld of cheek plate:

$$P_{cp} := \frac{P_P \cdot t_c}{t_p + 2 \cdot t_c} \qquad P_{cp} = 3166.848 \cdot kN$$

Fillet weld shear stress:

Nominal throat size of fillet weld: $a_w := 15 \cdot mm$

Weld shear stress: $\tau_{Ed} := \frac{P_{cp}}{L_{eff} \cdot a_w}$ $\qquad \tau_{Ed} = 100.804 \cdot MPa$

Verification:

$$Cheek\_plate\_fillet\_weld := \begin{cases} \text{"OK"} & \text{if } \tau_{Ed} \le \frac{f_y}{\sqrt{3} \cdot \gamma_{5Rm}} \\ \text{"NOT OK"} & \text{otherwise} \end{cases}$$

$$UF_{fw} := \frac{\tau_{Ed}}{\frac{f_y}{\sqrt{3} \cdot \gamma_{5Rm}}}$$

$Cheek\_plate\_fillet\_weld = \text{"OK"}$ $\qquad UF_{fw} = 0.599$

7.10 Dimensional check

Most of the dimensional checks for the existing padeyes in accordance with R-002 are NOT OK as the original design dates back to almost 40 years ago !

Hole :

Minimum hole diameter: $d_{hmin} := 1.03 \cdot d_1 + 2 \cdot mm$ $\qquad d_{hmin} = 295.55 \cdot mm$

Maximum hole diameter: $d_{hmax} := 1.05 \cdot d_h$ $\qquad d_{hmax} = 304.5 \cdot mm$

$$T2\_Hole := \begin{cases} \text{"OK"} & \text{if } d_{hmin} < d_h < d_{hmax} \\ \text{"NOT OK"} & \text{otherwise} \end{cases}$$

$T2\_Hole = \text{"NOT OK"}$

Plate thickness:

$$T2\_Plate\_thickness := \begin{cases} \text{"OK"} & \text{if } 0.4 \cdot a_s < t_p < 0.6 \cdot a_s \\ \text{"NOT OK"} & \text{otherwise} \end{cases}$$

$$T2\_Plate\_thickness = \text{"NOT OK"}$$

Outher lug radius:

$$T2\_Radius := \begin{cases} \text{"OK"} & \text{if } 1.0 \cdot d_h < R_b < 1.5 \cdot d_h \\ \text{"NOT OK"} & \text{otherwise} \end{cases}$$

$$T2\_Radius = \text{"NOT OK"}$$

Lug height:

$$T2\_Height := \begin{cases} \text{"OK"} & \text{if } 2.2 \cdot d_h < h < 2.4 \cdot d_h \\ \text{"NOT OK"} & \text{otherwise} \end{cases}$$

$$T2\_Height = \text{"NOT OK"}$$

Lug length:

$$T2\_Length := \begin{cases} \text{"OK"} & \text{if } 2.4 \cdot h < L < 2.7 \cdot h \\ \text{"NOT OK"} & \text{otherwise} \end{cases}$$

$$T2\_Length = \text{"NOT OK"}$$

8. Summary and verification

Shackle :

Shackle WLL: $WLL_{selected}$ = "Lc tonnes high, please revise"

Slings :

Slings minimum breaking load: $MBL_{slings} = 3014.001 \cdot tonne$

Lifting lugs:

Lifting lugs type: Type = 2

Lifting lug dimensions:

$t_p = 50 \cdot mm$

$d_h = 290 \cdot mm$

$R = 650 \cdot mm$

$h = 1150 \cdot mm$

$L = 2000 \cdot mm$

$k = 100 \cdot mm$

$R_b = 500 \cdot mm$

$t_c = 50 \cdot mm$

Minimum lug hole diameter: $d_{hmin} = 295.55 \cdot mm$

Maximum lug hole diameter: $d_{hmax} = 304.5 \cdot mm$

Dimensional check:

Hole :	$d_h = 290 \cdot mm$	T2_Hole = "NOT OK"
Radius :	$R = 650 \cdot mm$	T2_Radius = "NOT OK"
Plate thickness:	$t_p = 50 \cdot mm$	T2_Plate_thickness = "NOT OK"
Lug height:	$h = 1150 \cdot mm$	T2_Height = "NOT OK"
Length :	$L = 2000 \cdot mm$	T2_Length = "NOT OK"

Structural strength check:

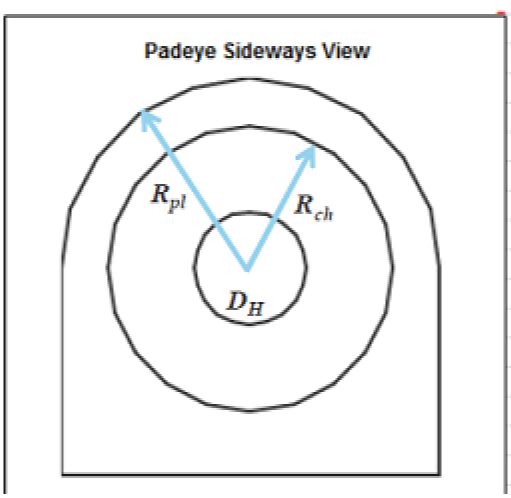
Tear stress:	$UF_{ts2} = 0.465$	T2_Tear_stress = "OK"
Pinhole bearing stress:	$UF_{pbs2} = 0.509$	T2_Pinhole_bearing_stress = "OK"
Fillet weld:	$UF_{fw} = 0.599$	Cheek_plate_fillet_weld = "OK"

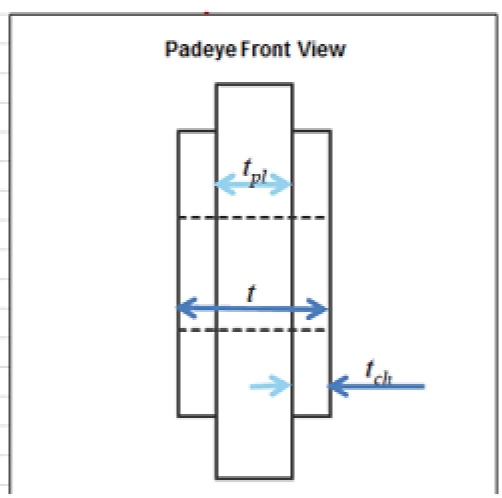
PADEYE CALCULATIONS
Based on DNV-OS-H205 Appendix B

By hand calculations the actual stress distribution will be impossible to predict accurately. Hence, such
calculations should include capacity evaluations based on an assumed stress distribution. At least adequate
capacity of the following items should be documented:
a) Bearing pressure/capacity in the pin hole.
b) Tear out from the pin hole.
c) Cheek plate welds, if applicable.
d) Combined axial, shear and bending in the padeye (plate + stiffeners, if applicable).

For padeyes the following design considerations normally apply:
— The outside radius of the padeye main plate shall be no less than the diameter of the pin hole.
— The pad eye thickness at the hole shall not be less than 75% the inside width of the shackle.
— The padeye hole diameter should be carefully selected to fit the shackle pin diameter. For strength purposes
the difference in hole and pin diameter should be as small as possible, but shackle pin maximum diameter
including tolerance should be considered in order to ensure that the pin will enter the hole.
— For padeyes with significant (i.e. > 10%) out of plane loading, it is recommended that the shackle pindiameter is not less than 94% of the padeye hole diameter.

— Nominal shackle pin- and hole diameter should/could be applied in the strength calculations.





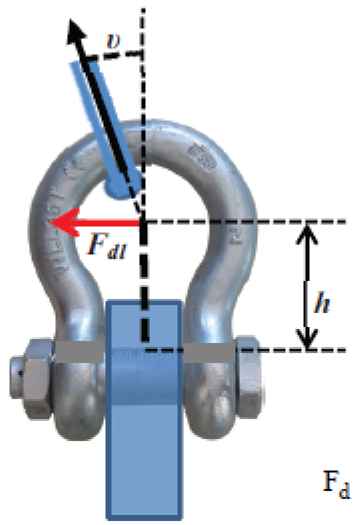
B.2.2 Definitions

In the equations in this subsection the following definitions are applied:

F_{ds} Design load in sling direction, see [5.1.4.2].
F_d Padeye design load in line with padeye plate
F_{dl} Lateral padeye design load
M_e Design moment in centre of padeye hole
σ_y Yield stress of padeye material
γ_m Material factor
E Elastic modulus
D_{pin} Diameter of shackle pin
D_H Diameter of pinhole
β Adjustment factor –Bearing pressure
δ Adjustment factor –Lateral load
υ Sling out-of-(padeye)plane angle
t Total thickness of padeye at hole including cheek plates $(t = t_{pl} + 2 \times t_{ch})$
R_{pad} Radius of padeye,

Where:
R_{pl} *is minimum distance form centre hole to edge of plate*
R_{ch} *is radius of cheek plates (two equal plates assumed)*
t_{pl} *is the thickness of the padeye plate*
t_{ch} *is the thickness of the cheek plates*

- The sling load (F_{ds}) is transferred to the padeye through a shackle as indicated on the sketch.
- No friction between sling and shackle.
- The shackle is positioned centric in the padeye.
- Lateral load (F_{dl}) is transferred to the padeye through contact pressure between shackle body and padeye and/or as friction force between pin and padeye. Load resultant is assumed to work at top of pin.
- Moment (M_e) is transferred to the padeye through contact pressure between shackle pin and padeye.



$\upsilon := 0\text{deg}$

$h_1 := 1 \cdot m$

$F_d = F_{ds} \times \text{Cos}(\upsilon)$ $\quad F_{dl} = F_{ds} \times \text{Sin}(\upsilon)$ $\quad Me = F_{dl} \times h$

$F_{ds} := 10975 \cdot kN$

$F_d := F_{ds} \cdot \cos(\upsilon) = 1.097 \times 10^4 \cdot kN$

$F_{dl} := F_{ds} \cdot \sin(\upsilon) = 0\,N$ $\quad M_e := F_{dl} \cdot h_1 = 0\,J$

$\sigma_y := 335 \cdot MPa$

$\gamma_m := 1.15$

$E := 210000 \cdot MPa$

$D_{pin} := 285mm$

$D_H := 289mm$

$t_{pl} := 50mm$

$t_{ch} := 50mm$

$t_1 := t_{pl} + 2 \cdot t_{ch} = 0.15\,m$

$R_{pl} := 650mm$

$R_{ch} := 500mm$

$D_{ch} := 2 \cdot R_{ch} = 1\,m$

$a_w := 15mm$ Fillet weld throat thickness

$$R_{pad} := \frac{R_{pl} \cdot t_{pl} + 2 \cdot R_{ch} \cdot t_{ch}}{t_1} = 0.55\,m$$

— b = 1.0 if the (shackle) pin will rotate in the hole during lift (upending).
— b = 0.7 for padeyes that will be used for multiple lifts without pin rotation.
— b = 0.5 for single lift use without pin rotation.

$\beta_1 := 1.0$

$$\delta_1 := 4 \cdot \tan(\upsilon) \cdot \frac{h_1}{t_1} + 1 = 1$$

$$\frac{D_{pin}}{D_H} = 0.986 \qquad \sigma_d := \frac{\sigma_y}{\gamma_m} = 291.304 \cdot MPa$$

B.2.4 Bearing pressure

$$Bearing_p := 0.036 \cdot \sqrt{\frac{F_d \cdot E \cdot \beta_1}{D_H \cdot t_1}} = 262.494 \cdot MPa$$

B.2.5 Tear out

A tear out check is normally considered sufficient to check the padeye material above (i.e. in the load direction) the hole.

$$Tear_{out} := \frac{1.7 \cdot F_d}{\left(2 \cdot R_{pad} - D_H\right) \cdot t_1} = 153.37 \cdot MPa$$

B.2.6 Cheek plate welds

$$W_{ch} := \frac{F_d \cdot t_{ch} \cdot \delta_1}{1.5 \cdot t_1 \cdot D_{ch} \cdot a_w} = 162.593 \cdot MPa$$

Appendix D: GeniE Analysis Results

The GeniE model is used to check the primary structure when subjected to following:

- ULS, worst case
- ALS, model using equipment mass
- ALS, model using point mass
- Lift, loads obtained using original approach
- Lift, loads obtained using current practice
- Maximum Sling Load values

ULS_7 : Frame Code Check

Description : Capacity Manager

Description : Norsok N-004 2004

General options

Code	Norsok
CapendIncluded	true
UseCommentary663	true
MaterialFactor	1.15
Azimuthal Tolerance Angle	5

General options

Code	EN 1993-1-1
GammaM0	1.15
GammaM1	1.15
Method1	true
NationalAnnex	Norwegian

ULS_7.run(1) : Member Result Brief

- Sorted by UfTot (Descending)
- Then sorted by LoadCase (Ascending)
- Filtered by Limit : (UfTot >= 0.5)
- Run : ULS_7.run(1)
- Worst LoadCase per Member
- All SubChecks per Member
- Worst Position along Member

Member	LoadCase	Position	Status	UfTot	Formula	GeomCheck	SubCheck	Run
Bm129	ULS_Com7	1.00	Failed(uf)	1.06	uf62	Geom OK	EN 1993-1-1 member	ULS_7.run(1)
Bm100	ULS_Com7	0.00	Failed(uf)	1.03	uf662	Geom OK	EN 1993-1-1 member	ULS_7.run(1)
Bm127	ULS_Com7	1.00	OK	0.91	uf62	Geom OK	EN 1993-1-1 member	ULS_7.run(1)
Bm99	ULS_Com7	0.00	OK	0.91	uf662	Geom OK	EN 1993-1-1 member	ULS_7.run(1)
Bm5	ULS_Com7	0.00	OK	0.81	ufXSection	Geom OK	EN 1993-1-1 member	ULS_7.run(1)
Bm105	ULS_Com7	0.00	OK	0.81	uf662	Geom OK	EN 1993-1-1 member	ULS_7.run(1)
Bm118	ULS_Com7	0.00	OK	0.79	uf662	Geom OK	EN 1993-1-1 member	ULS_7.run(1)
Bm3	ULS_Com7	0.00	OK	0.77	ufXSection	Geom OK	EN 1993-1-1 member	ULS_7.run(1)
Bm107	ULS_Com7	0.00	OK	0.71	uf662	Geom OK	EN 1993-1-1 member	ULS_7.run(1)
Bm76	ULS_Com7	0.99	OK	0.71	ufTorsion	Geom OK	EN 1993-1-1 member	ULS_7.run(1)
Bm102	ULS_Com7	0.00	OK	0.69	uf662	Geom OK	EN 1993-1-1 member	ULS_7.run(1)
Bm516	ULS_Com7	0.05	OK	0.67	ufTorsion	Geom OK	EN 1993-1-1 member	ULS_7.run(1)
Bm106	ULS_Com7	0.00	OK	0.66	ufXSection	Geom OK	EN 1993-1-1 member	ULS_7.run(1)
Bm130	ULS_Com7	1.00	OK	0.66	uf62	Geom OK	EN 1993-1-1 member	ULS_7.run(1)
Bm128	ULS_Com7	1.00	OK	0.64	uf62	Geom OK	EN 1993-1-1 member	ULS_7.run(1)
Bm101	ULS_Com7	0.00	OK	0.63	uf662	Geom OK	EN 1993-1-1 member	ULS_7.run(1)
Bm7	ULS_Com7	0.00	OK	0.60	uf662	Geom OK	EN 1993-1-1 member	ULS_7.run(1)
Bm103	ULS_Com7	0.00	OK	0.60	ufXSection	Geom OK	EN 1993-1-1 member	ULS_7.run(1)
Bm104	ULS_Com7	0.00	OK	0.57	uf662	Geom OK	EN 1993-1-1 member	ULS_7.run(1)
Bm97	ULS_Com7	0.00	OK	0.57	uf662	Geom OK	EN 1993-1-1 member	ULS_7.run(1)
Bm517	ULS_Com7	0.95	OK	0.57	uf662	Geom OK	EN 1993-1-1 member	ULS_7.run(1)
Bm120	ULS_Com7	0.00	OK	0.55	uf62	Geom OK	EN 1993-1-1 member	ULS_7.run(1)
Bm114	ULS_Com7	0.00	OK	0.55	uf662	Geom OK	EN 1993-1-1 member	ULS_7.run(1)
Bm112	ULS_Com7	0.00	OK	0.54	uf662	Geom OK	EN 1993-1-1 member	ULS_7.run(1)
Bm9	ULS_Com7	0.00	OK	0.54	uf662	Geom OK	EN 1993-1-1 member	ULS_7.run(1)
Bm117	ULS_Com7	0.00	OK	0.53	uf662	Geom OK	EN 1993-1-1 member	ULS_7.run(1)
Bm2	ULS_Com7	0.00	OK	0.53	uf662	Geom OK	EN 1993-1-1 member	ULS_7.run(1)
Bm520	ULS_Com7	0.00	OK	0.52	uf662	Geom OK	EN 1993-1-1 member	ULS_7.run(1)
Bm514	ULS_Com7	0.73	OK	0.52	uf662	Geom OK	EN 1993-1-1 member	ULS_7.run(1)

ULS_7.run(1) : EN199311 Member Result

- Sorted by Member (Ascending)
- Then sorted by LoadCase (Ascending)
- Filtered by Limit : (UfTot >= 0.5)
- Run : ULS_7.run(1)
- Worst LoadCase per Member
- Selected SubCheck per Member
- Worst Position along Member

Member	LoadCase	Position	Status	UfTot	Formula	GeomCheck	SubCheck	Run	ufEuler
	ufAxial	ufTorsion	ufShearz	ufSheary	ufXSection	uf646	uf655	uf661	uf661ax
	uf661mo	uf661my	uf661mz	uf662	uf662ax	uf662mo	uf662my	uf662mz	uf62
	uf62ax	uf62mo	uf62my	uf62mz	sldComp	relpos	fy	E	gammaM0
	gammaM1	NEd	MyEd	MzEd	TEd	VyEd	VzEd	KLy	KLz
	L	Ncry	Ncrz	NtRd	classF	classW	NcRd	MycRd	MzcRd
	alphay	alphaz	chiy	chiz	NbRd	C1	Mcr	chiLT	MbRd
	Cmy	Cmz	CmLT	kyy	kyz	kzy	kzz		
Bm2	ULS_Com7	0.00	OK	0.53	uf662	Geom OK	EN 1993-1-1 member	ULS_7.run(1)	0.055
	0.030	0.293	0.422	0.030	0.439	0.091	0.349	0.487	0.031
	0.455	0.349	0.106	0.529	0.091	0.438	0.336	0.102	0.379
	0.030	0.349	0.349	0.000	129.4038086	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	-231.7525024	-1479.56311	29.20113564	8.70056057	-94.50737	-641.1808472	14.34500027	14.34500027
	15.10000038	85849.75781	4198.370605	10470.95605	4	4	7729.029785	4244.850098	480.9082642
	0.3400000036	0.4900000095	0.9560694098	0.3295592666	2547.173584	1	354200.0625	1	4244.850098
	1	1	1	1.002587557	1.058299899	0.9649103284	1.018528938		
Bm3	ULS_Com7	0.00	OK	0.77	ufXSection	Geom OK	EN 1993-1-1 member	ULS_7.run(1)	0.000
	0.020	0.143	0.387	0.109	0.770	0.000	0.374	0.753	0.000
	0.753	0.355	0.398	0.721	0.000	0.721	0.340	0.381	0.394
	0.020	0.374	0.374	0.000	135.8538666	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	230.1349792	-1668.641479	-182.1890717	-5.078245163	366.0783081	-875.5128174	14.34500027	14.34500027
	15.10000038	89780.11719	4199.974121	11545.21777	4	3	11545.21777	4461.348145	484.0997925
	0.3400000036	0.4900000095	0.9321556687	0.2393638492	2763.507568	1	354324.4063	1	4461.348145
	1	1	1	1.002395153	1.057786465	0.9602288604	1.013290048		
Bm5	ULS_Com7	0.00	OK	0.81	ufXSection	Geom OK	EN 1993-1-1 member	ULS_7.run(1)	0.000
	0.021	0.146	0.386	0.124	0.813	0.000	0.377	0.797	0.000
	0.797	0.356	0.440	0.761	0.000	0.761	0.340	0.421	0.398
	0.021	0.377	0.377	0.000	135.8538666	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	246.9760895	-1680.32605	200.7417145	5.154055595	-416.3770447	-871.8354492	14.34500027	14.34500027
	15.10000038	89780.11719	4199.974121	11545.21777	4	3	11545.21777	4461.348145	484.0997925
	0.3400000036	0.4900000095	0.9321556687	0.2393638492	2763.507568	1	354324.4063	1	4461.348145
	1	1	1	1.002570868	1.062279344	0.9572661519	1.014276505		
Bm7	ULS_Com7	0.00	OK	0.60	uf662	Geom OK	EN 1993-1-1 member	ULS_7.run(1)	0.053
	0.029	0.303	0.465	0.049	0.558	0.087	0.414	0.566	0.030
	0.536	0.415	0.122	0.604	0.087	0.517	0.400	0.117	0.442
	0.029	0.414	0.414	0.000	129.4038086	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	-221.88237	-1756.034668	-55.4671402	-8.997716904	151.5895386	-705.5852661	14.34500027	14.34500027
	15.10000038	85849.75781	4198.370605	10470.95605	4	4	7729.029785	4244.850098	480.9082642
	0.3400000036	0.4900000095	0.9560694098	0.3295592666	2547.173584	1	354200.0625	1	4244.850098
	1	1	1	1.002477169	1.055678368	0.966437161	1.017725825		
Bm9	ULS_Com7	0.00	OK	0.54	uf662	Geom OK	EN 1993-1-1 member	ULS_7.run(1)	0.053

Member	LoadCase	Position	Status	UfTot	Formula	GeomCheck	SubCheck	Run	ufEuler
	ufAxial	ufTorsion	ufShearz	ufSheary	ufXSection	uf646	uf655	uf661	uf661ax
	uf661mo	uf661my	uf661mz	uf662	uf662ax	uf662mo	uf662my	uf662mz	uf62
	uf62ax	uf62mo	uf62my	uf62mz	sldComp	relpos	fy	E	gammaM0
	gammaM1	NEd	MyEd	MzEd	TEd	VyEd	VzEd	KLy	KLz
	L	Ncry	Ncrz	NtRd	classF	classW	NcRd	MycRd	MzcRd
	alphay	alphaz	chiy	chiz	NbRd	C1	Mcr	chiLT	MbRd
	Cmy	Cmz	CmLT	kyy	kyz	kzy	kzz		
	0.118	0.002	0.190	0.002	0.400	0.166	0.277	0.496	0.118
	0.378	0.293	0.085	0.538	0.166	0.372	0.288	0.084	0.371
	0.118	0.253	0.253	0.000	64.10323334	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	-800.4863281	-927.2637329	-9.451192856	0.04987164214	6.313482761	-313.7218933	5.414999962	5.414999962
	5.699999809	504050.8438	15091.09473	9236.173828	3	4	6777.356934	3668.863037	329.5331726
	0.3400000036	0.4900000095	1	0.7131108046	4833.006348	1	16558.71875	0.9120417833	3346.15625
	1	1	1.055475473	1.057154417	1.056014895	1.040434599	1.039313078		
Bm76	ULS_Com7	0.99	OK	0.71	ufTorsion	Geom OK	EN 1993-1-1 member	ULS_7.run(1)	0.007
	0.010	0.710	0.364	0.048	0.313	0.018	0.191	0.407	0.011
	0.396	0.198	0.198	0.413	0.018	0.395	0.198	0.197	0.201
	0.010	0.191	0.191	0.000	75.42802429	0.9933874607	355000	210000000	1.149999976
	1.149999976	-64.27261353	-412.4993896	-36.91532135	-15.1102562	90.18916321	321.8552551	7.172500134	7.172500134
	7.550000191	112804.8281	8597.369141	7285.217285	3	4	6174.875977	2160.828369	329.3731079
	0.3400000036	0.4900000095	0.9818882346	0.594416976	3670.450928	1	120090.1953	1	2160.828369
	1	1	1	1.000559807	1.007521749	0.9975227714	1.004463553		
Bm97	ULS_Com7	0.00	OK	0.57	uf662	Geom OK	EN 1993-1-1 member	ULS_7.run(1)	0.073
	0.162	0.004	0.082	0.007	0.371	0.227	0.025	0.510	0.162
	0.348	0.149	0.199	0.568	0.227	0.341	0.146	0.195	0.187
	0.162	0.025	0.025	0.000	66.62014008	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	-1102.089966	-106.7228394	60.79265594	0.1084222272	-20.70394707	-142.9430389	5.414999962	5.414999962
	5.699999809	716284.25	15093.13086	9977.043945	3	4	6809.130371	4329.023926	329.5605774
	0.3400000036	0.4900000095	1	0.7120937109	4848.739258	1	212186.8594	1	4329.023926
	1	1	1	1.001541018	1.078771114	0.9793310165	1.054848552		
Bm99	ULS_Com7	0.00	OK	0.91	uf662	Geom OK	EN 1993-1-1 member	ULS_7.run(1)	0.293
	0.315	0.000	0.031	0.003	0.556	0.605	0.124	0.739	0.381
	0.358	0.192	0.167	0.910	0.605	0.305	0.163	0.142	0.439
	0.315	0.124	0.124	0.000	80.03651428	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	-2084.579346	-147.8319092	-48.6914978	0.0002496731468	9.983027458	-22.41146278	9.404999733	9.404999733
	9.899999619	19863.72461	7118.121094	6791.304199	3	4	6620.508301	1189.507202	416.7848511
	0.3400000036	0.4900000095	0.8273569345	0.5203425288	3444.931885	1	8874.77832	1	1189.507202
	1	1	1.408643961	1.542580247	1.386080384	1.312987924	1.17978096		
Bm100	ULS_Com7	0.00	Failed(uf)	1.03	uf662	Geom OK	EN 1993-1-1 member	ULS_7.run(1)	0.341
	0.366	0.000	0.032	0.003	0.602	0.704	0.122	0.836	0.443
	0.394	0.205	0.188	1.027	0.704	0.323	0.169	0.155	0.488
	0.366	0.122	0.122	0.000	80.03651428	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	-2424.061768	-145.4198151	47.20676804	0.0005864099367	-10.12485313	-22.47453308	9.404999733	9.404999733
	9.899999619	19863.72461	7118.121094	6791.304199	3	4	6620.508301	1189.507202	416.7848511
	0.3400000036	0.4900000095	0.8273569345	0.5203425288	3444.931885	1	8874.77832	1	1189.507202
	1	1	1.510519505	1.680158615	1.480874181	1.378918767	1.215364575		
Bm101	ULS_Com7	0.00	OK	0.63	uf662	Geom OK	EN 1993-1-1 member	ULS_7.run(1)	0.066
	0.071	0.001	0.067	0.003	0.430	0.137	0.235	0.598	0.086
	0.512	0.380	0.132	0.634	0.137	0.497	0.369	0.129	0.306
	0.071	0.235	0.235	0.000	80.03651428	9.999999747e-	355000	210000000	1.149999976

Member	LoadCase	Position	Status	UfTot	Formula	GeomCheck	SubCheck	Run	ufEuler
	ufAxial	ufTorsion	ufShearz	ufSheary	ufXSection	uf646	uf655	uf661	uf661ax
	uf661mo	uf661my	uf661mz	uf662	uf662ax	uf662mo	uf662my	uf662mz	uf62
	uf62ax	uf62mo	uf62my	uf62mz	sldComp	relpos	fy	E	gammaM0
	gammaM1	NEd	MyEd	MzEd	TEd	VyEd	VzEd	KLy	KLz
	L	Ncry	Ncrz	NtRd	classF	classW	NcRd	MycRd	MzcRd
	alphay	alphaz	chiy	chiz	NbRd	C1	Mcr	chiLT	MbRd
	Cmy	Cmz	CmLT	kyy	kyz	kzy	kzz		
						006			
	1.149999976	-470.750946	-279.5898743	-51.72758865	0.01726467162	8.933650017	-47.777565	9.404999733	9.404999733
	9.899999619	19863.72461	7118.121094	6791.304199	3	4	6620.508301	1189.507202	416.7848511
	0.3400000036	0.4900000095	0.8273569345	0.5203425288	3444.931885	1	8874.77832	1	1189.507202
	1	1	1.066657662	1.087990522	1.066348791	1.056657314	1.035638809		
Bm102	ULS_Com7	0.00	OK	0.69	uf662	Geom OK	EN 1993-1-1 member	ULS_7.run(1)	0.068
	0.073	0.001	0.074	0.003	0.484	0.141	0.257	0.655	0.089
	0.566	0.402	0.164	0.690	0.141	0.549	0.390	0.159	0.331
	0.073	0.257	0.257	0.000	80.03651428	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	-486.5084534	-305.7988281	63.76947403	-0.0294538755	-11.21211624	-53.05477142	9.404999733	9.404999733
	9.899999619	19863.72461	7118.121094	6791.304199	3	4	6620.508301	1189.507202	416.7848511
	0.3400000036	0.4900000095	0.8273569345	0.5203425288	3444.931885	1	8874.77832	1	1189.507202
	1	1	1.069192171	1.09130621	1.06872952	1.058779597	1.036875725		
Bm103	ULS_Com7	0.00	OK	0.60	ufXSection	Geom OK	EN 1993-1-1 member	ULS_7.run(1)	0.000
	0.288	0.001	0.033	0.005	0.595	0.000	0.157	0.229	0.000
	0.229	0.000	0.229	0.178	0.000	0.178	0.000	0.178	0.445
	0.288	0.157	0.157	0.000	92.35453796	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	1957.079956	-186.1761627	-62.64849854	-0.02290738747	15.4260931	-23.68050957	10.85247707	10.85247707
	11.42365932	14918.34277	5345.95459	6791.304199	3	1	6791.304199	1189.507202	416.7848511
	0.3400000036	0.4900000095	0.7702471614	0.429646492	2917.860107	1	8874.77832	1	1189.507202
	1	1	1.571373105	1.748001218	1.524610519	1.360515356	1.186644554		
Bm104	ULS_Com7	0.00	OK	0.57	uf662	Geom OK	EN 1993-1-1 member	ULS_7.run(1)	0.079
	0.068	0.007	0.072	0.004	0.452	0.149	0.239	0.524	0.086
	0.438	0.281	0.157	0.570	0.149	0.421	0.270	0.151	0.307
	0.068	0.239	0.239	0.000	89.73805237	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	-447.3900452	284.2023621	60.74064255	0.1682058573	-14.02472401	51.25294495	10.54501724	10.54501724
	11.10001755	15800.96875	5662.241699	6791.304199	3	4	6620.508301	1189.507202	416.7848511
	0.3400000036	0.4900000095	0.7870042324	0.4535116553	3002.477783	1	92447.32031	1	1189.507202
	1	1	1	1.022791147	1.079094052	0.9830497503	1.037165046		
Bm105	ULS_Com7	0.00	OK	0.81	uf662	Geom OK	EN 1993-1-1 member	ULS_7.run(1)	0.158
	0.136	0.008	0.080	0.006	0.577	0.299	0.263	0.728	0.172
	0.555	0.346	0.210	0.809	0.299	0.510	0.318	0.192	0.399
	0.136	0.263	0.263	0.000	89.73805237	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	-897.1262817	-313.1707764	74.46537781	-0.1728245616	-17.68894577	-57.18423462	10.54501724	10.54501724
	11.10001755	15800.96875	5662.241699	6791.304199	3	4	6620.508301	1189.507202	416.7848511
	0.3400000036	0.4900000095	0.7870042324	0.4535116553	3002.477783	1	8874.77832	1	1189.507202
	1	1	1.183653355	1.239016891	1.173227429	1.137833953	1.077417254		
Bm106	ULS_Com7	0.00	OK	0.66	ufXSection	Geom OK	EN 1993-1-1 member	ULS_7.run(1)	0.000
	0.347	0.001	0.031	0.005	0.663	0.000	0.147	0.289	0.000
	0.289	0.000	0.289	0.208	0.000	0.208	0.000	0.208	0.494
	0.347	0.147	0.147	0.000	92.35453796	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	2357.841309	174.9912567	-70.13703156	0.0118339099	16.56253052	22.16263962	10.85247707	10.85247707

Member	LoadCase	Position	Status	UfTot	Formula	GeomCheck	SubCheck	Run	ufEuler
	ufAxial	ufTorsion	ufShearz	ufShreary	ufXSection	uf646	uf655	uf661	uf661ax
	uf661mo	uf661my	uf661mz	uf662	uf662ax	uf662mo	uf662my	uf662mz	uf62
	uf62ax	uf62mo	uf62my	uf62mz	sldComp	relpos	fy	E	gammaM0
	gammaM1	NEd	MyEd	MzEd	TEd	VyEd	VzEd	KLy	KLz
	L	Ncry	Ncrz	NtRd	classF	classW	NcRd	MycRd	MzcRd
	alphay	alphaz	chiy	chiz	NbRd	C1	Mcr	chiLT	MbRd
	Cmy	Cmz	CmLT	kyy	kyz	kzy	kzz		
	11.42365932	14918.34277	5345.95459	6791.304199	3	1	6791.304199	1189.507202	416.7848511
	0.3400000036	0.4900000095	0.7702471614	0.429646492	2917.860107	1	92447.32031	1	1189.507202
	1	1	1	1.138611674	1.715103149	0.8190876245	1.23380053		
Bm107	ULS_Com7	0.00	OK	0.71	uf662	Geom OK	EN 1993-1-1 member	ULS_7.run(1)	0.247
	0.268	0.009	0.002	0.004	0.084	0.592	0.010	0.438	0.336
	0.102	0.014	0.088	0.714	0.592	0.122	0.008	0.114	0.360
	0.268	0.092	0.010	0.082	78.55834961	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	-4389.71875	-32.25494766	129.7132874	-1.241887093	-35.13677979	-2.768679857	9.404999733	9.404999733
	9.899999619	56099.08984	17799.59961	16360.86914	1	1	16360.86914	3372.5	1575.119507
	0.4900000095	0.7599999905	0.7976858616	0.4529801607	7411.149414	1	29814.71484	1	3372.5
	1	1	1.299553275	1.436241984	0.892567575	0.7958090305	1.161430717		
Bm112	ULS_Com7	0.00	OK	0.54	uf662	Geom OK	EN 1993-1-1 member	ULS_7.run(1)	0.169
	0.230	0.008	0.003	0.004	0.074	0.451	0.011	0.362	0.288
	0.074	0.014	0.059	0.541	0.451	0.090	0.008	0.082	0.315
	0.230	0.085	0.011	0.073	70.17021942	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	-4123.771484	-41.72648621	-142.3854523	1.24550128	37.21281815	-3.70857954	9.404999733	9.404999733
	9.899999619	62054.61719	24414.13672	17904.34766	1	1	17904.34766	3719.782715	1941.695679
	0.4900000095	0.7599999905	0.7995023131	0.510530889	9140.722656	1	39092.46094	1	3719.782715
	1	1	1.177997947	1.263228416	0.7782862782	0.6916563511	1.080284953		
Bm114	ULS_Com7	0.00	OK	0.55	uf662	Geom OK	EN 1993-1-1 member	ULS_7.run(1)	0.263
	0.146	0.001	0.005	0.001	0.264	0.435	0.076	0.331	0.195
	0.136	0.081	0.055	0.547	0.435	0.112	0.066	0.046	0.222
	0.146	0.076	0.076	0.000	111.5189743	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	-875.510498	81.1239624	-13.74276257	0.01986403763	1.952776313	3.774756193	11.51852989	11.51852989
	12.12476826	11864.06934	3333.124512	6173.913086	3	4	6003.117188	1065.654785	329.3268127
	0.3400000036	0.4900000095	0.7470926046	0.3350776136	2011.510254	1	65051.25781	1	1065.654785
	1	1	1	1.058348656	1.329455137	0.8729054928	1.096508861		
Bm117	ULS_Com7	0.00	OK	0.53	uf662	Geom OK	EN 1993-1-1 member	ULS_7.run(1)	0.110
	0.094	0.002	0.011	0.004	0.316	0.208	0.072	0.465	0.120
	0.345	0.178	0.167	0.534	0.208	0.326	0.168	0.158	0.167
	0.094	0.072	0.072	0.000	89.73805237	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	-625.1630859	86.027565	62.3620224	0.04774327576	-13.25390339	8.151907921	10.54501724	10.54501724
	11.10001755	15800.96875	5662.241699	6791.304199	3	4	6620.508301	1189.507202	416.7848511
	0.3400000036	0.4900000095	0.7870042324	0.4535116553	3002.477783	1	92447.32031	1	1189.507202
	1	1	1	1.032138467	1.114334702	0.9750604033	1.052711129		
Bm118	ULS_Com7	0.00	OK	0.79	uf662	Geom OK	EN 1993-1-1 member	ULS_7.run(1)	0.203
	0.173	0.002	0.019	0.005	0.457	0.382	0.092	0.680	0.220
	0.459	0.224	0.235	0.792	0.382	0.410	0.200	0.210	0.266
	0.173	0.092	0.092	0.000	89.73805237	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	-1148.440063	-109.9801331	79.47071838	-0.04935954884	-17.54648209	-13.48687553	10.54501724	10.54501724
	11.10001755	15800.96875	5662.241699	6791.304199	3	4	6620.508301	1189.507202	416.7848511
	0.3400000036	0.4900000095	0.7870042324	0.4535116553	3002.477783	1	8874.77832	1	1189.507202

	Report:	Model Id:	Sign:
SESAM GeniE V6.4-08	sls_uls43	sls_uls43	ofsbamom
		Description: sls_uls4	Date: 28-Apr-2015
		Model file name: C:\DNV\Workspaces\GeniE\SLS_ULS4	Last saved: 28-Apr-2015 16:46:47

Member	LoadCase	Position	Status	UfTot	Formula	GeomCheck	SubCheck	Run	ufEuler
	ufAxial	ufTorsion	ufShearz	ufSheary	ufXSection	uf646	uf655	uf661	uf661ax
	uf661mo	uf661my	uf661mz	uf662	uf662ax	uf662mo	uf662my	uf662mz	uf62
	uf62ax	uf62mo	uf62my	uf62mz	sldComp	relpos	fy	E	gammaM0
	gammaM1	NEd	MyEd	MzEd	TEd	VyEd	VzEd	KLy	KLz
	L	Ncry	Ncrz	NtRd	classF	classW	NcRd	MycRd	MzcRd
	alphay	alphaz	chiy	chiz	NbRd	C1	Mcr	chiLT	MbRd
	Cmy	Cmz	CmLT	kyy	kyz	kzy	kzz		
	1	1	1.24955523	1.325367212	1.23383069	1.183005571	1.101301193		
Bm120	ULS_Com7	0.00	OK	0.55	uf62	Geom OK	EN 1993-1-1 member	ULS_7.run(1)	0.000
	0.425	0.007	0.006	0.005	0.113	0.000	0.021	0.175	0.000
	0.175	0.000	0.175	0.164	0.000	0.164	0.000	0.164	0.549
	0.425	0.124	0.021	0.103	92.34820557	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	4329.062012	41.41567612	-97.41383362	0.3640931249	26.27144432	-6.706373692	10.85247707	10.85247707
	11.42365932	23406.99219	8020.031738	10186.95605	1	1	10186.95605	1977.195679	944.6087036
	0.3400000036	0.4900000095	0.7794832587	0.4296856225	4377.188965	1	143086.9063	1	1977.195679
	1	1	1	1.276764512	1.695044518	0.7143681645	1.58891952		
Bm127	ULS_Com7	1.00	OK	0.91	uf62	Geom OK	EN 1993-1-1 member	ULS_7.run(1)	0.002
	0.321	0.000	0.417	0.114	0.481	0.321	0.138	0.684	0.321
	0.363	0.127	0.237	0.744	0.321	0.423	0.066	0.357	0.912
	0.321	0.591	0.138	0.453	5.996936798	0.9999899864	355000	210000000	1.149999976
	1.149999976	-6422.731934	505.2754517	-1181.869385	6.748074586e-017	-1181.881226	-505.2805176	0.9499999881	0.9499999881
	1	5243066.5	3734522.75	20003.47852	1	1	20003.47852	3669.773926	2606.625977
	0.4900000095	0.7599999905	1	1	20003.47852	1	469461	1	3669.773926
	1	1	1	0.920322597	0.5217975974	0.4810065031	0.7875364423		
Bm128	ULS_Com7	1.00	OK	0.64	uf62	Geom OK	EN 1993-1-1 member	ULS_7.run(1)	0.001
	0.277	0.000	0.189	0.076	0.312	0.277	0.062	0.497	0.277
	0.220	0.058	0.162	0.548	0.277	0.271	0.030	0.240	0.640
	0.277	0.363	0.062	0.300	5.996936798	0.9999899864	355000	210000000	1.149999976
	1.149999976	-5543.641602	229.0964813	782.3560181	-6.487866065e-017	782.3638306	-229.0987701	0.9499999881	0.9499999881
	1	5243066.5	3734522.75	20003.47852	1	1	20003.47852	3669.773926	2606.625977
	0.4900000095	0.7599999905	1	1	20003.47852	1	469461	1	3669.773926
	1	1	1	0.9304395914	0.5392843485	0.4865039587	0.8005001545		
Bm129	ULS_Com7	1.00	Failed(uf)	1.06	uf62	Geom OK	EN 1993-1-1 member	ULS_7.run(1)	0.001
	0.318	0.000	0.237	0.199	0.465	0.318	0.000	0.842	0.318
	0.524	0.295	0.229	0.866	0.318	0.549	0.173	0.376	1.063
	0.318	0.745	0.323	0.423	5.372384548	0.9999899864	355000	210000000	1.149999976
	1.149999976	-3931.255859	-657.6494141	870.2096558	1.083073586e-014	870.2183838	657.6560059	0.9499999881	0.9499999881
	1	2879580.75	3105444.25	12378.69531	1	1	12378.69531	2038.857666	2058.151123
	0.4900000095	0.4900000095	1	1	12378.69531	1	165075.3125	1	2038.857666
	1	1	1	0.9139519334	0.5426467061	0.5353550911	0.8896045089		
Bm130	ULS_Com7	1.00	OK	0.66	uf62	Geom OK	EN 1993-1-1 member	ULS_7.run(1)	0.001
	0.249	0.000	0.133	0.108	0.229	0.249	0.000	0.546	0.249
	0.297	0.169	0.127	0.557	0.249	0.308	0.099	0.208	0.660
	0.249	0.411	0.182	0.229	5.372384548	0.9999899864	355000	210000000	1.149999976
	1.149999976	-3083.219238	-371.0809937	-470.696228	-1.146585471e-014	-470.7009277	371.0847168	0.9499999881	0.9499999881
	1	2879580.75	3105444.25	12378.69531	1	1	12378.69531	2038.857666	2058.151123
	0.4900000095	0.4900000095	1	1	12378.69531	1	165075.3125	1	2038.857666
	1	1	1	0.9312183857	0.5563355684	0.5458248258	0.9112841487		
Bm514	ULS_Com7	0.73	OK	0.52	uf662	Geom OK	EN 1993-1-1	ULS_7.run(1)	0.015

Member	LoadCase	Position	Status	UfTot	Formula	GeomCheck	SubCheck	Run	ufEuler
	ufAxial	ufTorsion	ufShearz	ufSheary	ufXSection	uf646	uf655	uf661	uf661ax
	uf661mo	uf661my	uf661mz	uf662	uf662ax	uf662mo	uf662my	uf662mz	uf62
	uf62ax	uf62mo	uf62my	uf62mz	sldComp	relpos	fy	E	gammaM0
	gammaM1	NEd	MyEd	MzEd	TEd	VyEd	VzEd	KLy	KLz
	L	Ncry	Ncrz	NtRd	classF	classW	NcRd	MycRd	MzcRd
	alphay	alphaz	chiy	chiz	NbRd	C1	Mcr	chiLT	MbRd
	Cmy	Cmz	CmLT	kyy	kyz	kzy	kzz		
							member		
	0.024	0.055	0.359	0.012	0.113	0.038	0.038	0.509	0.024
	0.485	0.241	0.244	0.520	0.038	0.482	0.239	0.242	0.062
	0.024	0.038	0.038	0.000	72.81567383	0.7250099778	355000	210000000	1.149999976
	1.149999976	-334.3325806	-323.8055115	-43.14148331	-5.085966587	73.48577881	887.2921753	7.599999905	7.599999905
	8	700662.1875	21812.40039	17225.2168	1	4	13952.02441	8610.915039	833.9876099
	0.3400000036	0.4900000095	1	0.6260451674	8734.597656	1	596360.5625	1	8610.915039
	1	1	1	1.000477433	1.01556623	0.9946872592	1.009688735		
Bm516	ULS_Com7	0.05	OK	0.67	ufTorsion	Geom OK	EN 1993-1-1 member	ULS_7.run(1)	0.000
	0.030	0.665	0.353	0.003	0.242	0.000	0.192	0.354	0.000
	0.354	0.179	0.175	0.349	0.000	0.349	0.177	0.172	0.222
	0.030	0.192	0.192	0.000	79.92373657	0.05000999942	355000	210000000	1.149999976
	1.149999976	216.6500854	-415.1907043	6.618237495	14.14677143	6.515293121	315.7950745	7.599999905	7.599999905
	8	100471.2031	7657.367676	7285.217285	3	3	7285.217285	2160.828369	329.3731079
	0.3400000036	0.4900000095	0.9682117701	0.5137212873	3742.571289	1	120090.1953	1	2160.828369
	1	1	1	1.002092123	1.029046178	0.9881696105	1.01474905		
Bm517	ULS_Com7	0.95	OK	0.57	uf662	Geom OK	EN 1993-1-1 member	ULS_7.run(1)	0.012
	0.016	0.084	0.173	0.072	0.140	0.027	0.046	0.559	0.017
	0.542	0.219	0.324	0.567	0.027	0.540	0.218	0.322	0.062
	0.016	0.046	0.046	0.000	75.42802429	0.9470298886	355000	210000000	1.149999976
	1.149999976	-100.7759705	-98.39347076	25.6255455	-1.776784182	199.4664154	177.5308685	7.172500134	7.172500134
	7.550000191	112804.8281	8597.369141	7285.217285	3	4	6174.875977	2160.828369	329.3731079
	0.3400000036	0.4900000095	0.9818882346	0.594416976	3670.450928	1	120090.1953	1	2160.828369
	1	1	1	1.000877976	1.011844397	0.9961023927	1.00701642		
Bm520	ULS_Com7	0.00	OK	0.52	uf662	Geom OK	EN 1993-1-1 member	ULS_7.run(1)	0.042
	0.103	0.004	0.073	0.003	0.262	0.141	0.076	0.488	0.103
	0.384	0.293	0.092	0.521	0.141	0.380	0.289	0.091	0.175
	0.103	0.071	0.071	0.000	58.74454498	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	-955.569519	355.1240234	43.39091873	0.1740532964	-14.45674324	119.7229691	5.414999962	5.414999962
	5.699999809	685406.25	22630.53516	11631.65234	1	4	9243.131836	4988.904297	494.1664124
	0.3400000036	0.4900000095	1	0.7337380648	6782.037598	1	24951.82227	0.9328232408	4653.766113
	1	1	1.042986631	1.044442654	1.044086337	1.032324791	1.031972528		

EQ_Xdir : Frame Code Check

Description : Norsok N-004 2004

General options

Code	Norsok
CapendIncluded	true
UseCommentary663	true
MaterialFactor	1
Azimuthal Tolerance Angle	5

General options

Code	EN 1993-1-1
GammaM0	1
GammaM1	1
Method1	true
NationalAnnex	Standard

EQ_Xdir.run(1) : Member Result Brief

- Sorted by UfTot (Descending)
- Then sorted by LoadCase (Ascending)
- Filtered by Limit : (UfTot >= 0.5)
- Run : EQ_Xdir.run(1)
- Worst LoadCase per Member
- All SubChecks per Member
- Worst Position along Member

Member	LoadCase	Position	Status	UfTot	Formula	GeomCheck	SubCheck	Run
Bm130	CombEq_X	1.00	OK	0.93	uf62	Geom OK	EN 1993-1-1 member	EQ_Xdir.run(1)
Bm127	CombEq_X	1.00	OK	0.79	uf62	Geom OK	EN 1993-1-1 member	EQ_Xdir.run(1)
Bm3	CombEq_X	0.00	OK	0.79	ufXSection	Geom OK	EN 1993-1-1 member	EQ_Xdir.run(1)
Bm118	CombEq_X	0.00	OK	0.74	uf662	Geom OK	EN 1993-1-1 member	EQ_Xdir.run(1)
Bm99	CombEq_X	0.00	OK	0.73	uf662	Geom OK	EN 1993-1-1 member	EQ_Xdir.run(1)
Bm104	CombEq_X	0.00	OK	0.72	uf662	Geom OK	EN 1993-1-1 member	EQ_Xdir.run(1)
Bm7	CombEq_X	1.00	OK	0.70	uf662	Geom OK	EN 1993-1-1 member	EQ_Xdir.run(1)
Bm522	CombEq_X	1.00	OK	0.66	uf662	Geom OK	EN 1993-1-1 member	EQ_Xdir.run(1)
Bm100	CombEq_X	0.00	OK	0.63	uf662	Geom OK	EN 1993-1-1 member	EQ_Xdir.run(1)
Bm126	CombEq_X	1.00	OK	0.57	uf661	Geom OK	EN 1993-1-1 member	EQ_Xdir.run(1)
Bm6	CombEq_X	1.00	OK	0.55	uf662	Geom OK	EN 1993-1-1 member	EQ_Xdir.run(1)
Bm520	CombEq_X	1.00	OK	0.55	uf662	Geom OK	EN 1993-1-1 member	EQ_Xdir.run(1)
Bm516	CombEq_X	0.05	OK	0.53	ufTorsion	Geom OK	EN 1993-1-1 member	EQ_Xdir.run(1)
Bm107	CombEq_X	0.00	OK	0.52	uf662	Geom OK	EN 1993-1-1 member	EQ_Xdir.run(1)
Bm5	CombEq_X	0.00	OK	0.51	uf661	Geom OK	EN 1993-1-1 member	EQ_Xdir.run(1)
Bm128	LL_X_dir	1.00	OK	0.51	uf62	Geom OK	EN 1993-1-1 member	EQ_Xdir.run(1)
Bm2	CombEq_X	0.98	OK	0.51	uf662	Geom OK	EN 1993-1-1 member	EQ_Xdir.run(1)

EQ_Xdir.run(1) : EN199311 Member Result

- Sorted by Member (Ascending)
- Then sorted by LoadCase (Ascending)
- Filtered by Limit : (UfTot >= 0.5)
- Run : EQ_Xdir.run(1)
- Worst LoadCase per Member
- Selected SubCheck per Member
- Worst Position along Member

Member	LoadCase	Position	Status	UfTot	Formula	GeomCheck	SubCheck	Run	ufEuler
	ufAxial	ufTorsion	ufShearz	ufSheary	ufXSection	uf646	uf655	uf661	uf661ax
	uf661mo	uf661my	uf661mz	uf662	uf662ax	uf662mo	uf662my	uf662mz	uf62
	uf62ax	uf62mo	uf62my	uf62mz	sldComp	relpos	fy	E	gammaM0
	gammaM1	NEd	MyEd	MzEd	TEd	VyEd	VzEd	KLy	KLz
	L	Ncry	Ncrz	NtRd	classF	classW	NcRd	MycRd	MzcRd
	alphay	alphaz	chiy	chiz	NbRd	C1	Mcr	chiLT	MbRd
	Cmy	Cmz	CmLT	kyy	kyz	kzy	kzz		
Bm2	CombEq_X	0.98	OK	0.51	uf662	Geom OK	EN 1993-1-1 member	EQ_Xdir.run(1)	0.066
	0.031	0.034	0.207	0.009	0.175	0.095	0.103	0.463	0.033
	0.431	0.243	0.187	0.506	0.095	0.411	0.232	0.179	0.135
	0.031	0.103	0.103	0.000	129.4038086	0.9768111706	355000	210000000	1
	1	-277.5873413	-504.1566467	-22.35780525	1.151438832	-35.87644958	386.975769	14.34500027	14.34500027
	15.10000038	85849.75781	4198.370605	12041.59961	4	4	8888.383789	4881.577637	553.0444946
	0.3400000036	0.4900000095	0.9560694098	0.3295592666	2929.249512	1	354200.0625	1	4881.577637
	1	1	1	1.003100991	1.070646405	0.9577813745	1.02227509		
Bm3	CombEq_X	0.00	OK	0.79	ufXSection	Geom OK	EN 1993-1-1 member	EQ_Xdir.run(1)	0.000
	0.018	0.192	0.365	0.110	0.785	0.000	0.354	0.775	0.000
	0.775	0.337	0.438	0.741	0.000	0.741	0.322	0.419	0.373
	0.018	0.354	0.354	0.000	135.8538666	9.999999747e-006	355000	210000000	1
	1	240.1454163	-1818.741333	-229.8073425	-7.798481464	413.2812195	-932.7200317	14.34500027	14.34500027
	15.10000038	89780.11719	4199.974121	13277	4	3	13277	5130.550781	556.7147217
	0.3400000036	0.4900000095	0.9321556687	0.2393638492	3178.033691	1	354324.4063	1	5130.550781
	1	1	1	1.00249958	1.060452461	0.9584686756	1.0138762		
Bm5	CombEq_X	0.00	OK	0.51	uf661	Geom OK	EN 1993-1-1 member	EQ_Xdir.run(1)	0.000
	0.015	0.191	0.302	0.077	0.506	0.000	0.293	0.509	0.000
	0.509	0.279	0.230	0.490	0.000	0.490	0.269	0.222	0.308
	0.015	0.293	0.293	0.000	135.8538666	9.999999747e-006	355000	210000000	1
	1	199.9982605	-1504.123535	109.9261398	7.75716114	-289.4530029	-771.3811646	14.34500027	14.34500027
	15.10000038	89780.11719	4199.974121	13277	4	3	13277	5130.550781	556.7147217
	0.3400000036	0.4900000095	0.9321556687	0.2393638492	3178.033691	1	354324.4063	1	5130.550781
	1	1	1	1.002080798	1.049840808	0.9655125141	1.011529684		
Bm6	CombEq_X	1.00	OK	0.55	uf662	Geom OK	EN 1993-1-1 member	EQ_Xdir.run(1)	0.001
	0.009	0.193	0.258	0.064	0.553	0.009	0.287	0.553	0.009
	0.545	0.287	0.257	0.554	0.009	0.545	0.287	0.257	0.296
	0.009	0.287	0.287	0.000	34.27915573	0.9999899864	355000	210000000	1
	1	-75.98801422	-1401.566284	-142.1088867	6.60378027	-240.1906433	472.337677	3.799999952	3.799999952
	4	1223412.75	59829.40234	12041.59961	4	4	8888.383789	4881.577637	553.0444946
	0.3400000036	0.4900000095	1	0.904994905	8043.942383	1	32147.00391	1	4881.577637
	1	1	1.000762463	1.000824571	1.001271725	1.000703692	1.001150727		
Bm7	CombEq_X	1.00	OK	0.70	uf662	Geom OK	EN 1993-1-1 member	EQ_Xdir.run(1)	0.105
	0.050	0.123	0.327	0.059	0.323	0.151	0.194	0.641	0.052
	0.589	0.326	0.263	0.697	0.151	0.546	0.302	0.244	0.244

Member	LoadCase	Position	Status	UfTot	Formula	GeomCheck	SubCheck	Run	ufEuler
	ufAxial	ufTorsion	ufShearz	ufSheary	ufXSection	uf646	uf655	uf661	uf661ax
	uf661mo	uf661my	uf661mz	uf662	uf662ax	uf662mo	uf662my	uf662mz	uf62
	uf62ax	uf62mo	uf62my	uf62mz	sldComp	relpos	fy	E	gammaM0
	gammaM1	NEd	MyEd	MzEd	TEd	VyEd	VzEd	KLy	KLz
	L	Ncry	Ncrz	NtRd	classF	classW	NcRd	MycRd	MzcRd
	alphay	alphaz	chiy	chiz	NbRd	C1	Mcr	chiLT	MbRd
	Cmy	Cmz	CmLT	kyy	kyz	kzy	kzz		
	0.050	0.194	0.194	0.000	129.4038086	0.9999899864	355000	210000000	1
	1	-442.0042725	-948.6348877	-43.40699387	4.19276619	-228.898941	599.0809326	14.34500027	14.34500027
	15.10000038	85849.75781	4198.370605	12041.59961	4	4	8888.383789	4881.577637	553.0444946
	0.3400000036	0.4900000095	0.9560694098	0.3295592666	2929.249512	1	354200.0625	1	4881.577637
	1	1	1	1.004946709	1.117413998	0.9316758513	1.035943031		
Bm99	CombEq_X	0.00	OK	0.73	uf662	Geom OK	EN 1993-1-1 member	EQ_Xdir.run(1)	0.285
	0.266	0.001	0.029	0.002	0.426	0.512	0.105	0.575	0.322
	0.253	0.160	0.094	0.728	0.512	0.217	0.137	0.080	0.371
	0.266	0.105	0.105	0.000	80.03651428	9.999999747e-006	355000	210000000	1
	1	-2026.852905	-143.4795837	-26.31430626	-0.01793703996	8.153298378	-23.45080948	9.404999733	9.404999733
	9.899999619	19863.72461	7118.121094	7810	3	4	7613.584961	1367.93335	479.3025818
	0.3400000036	0.4900000095	0.8273569345	0.5203425288	3961.671875	1	8874.77832	1	1367.93335
	1	1	1.3926723	1.521084905	1.371203542	1.302255273	1.173936486		
Bm100	CombEq_X	0.00	OK	0.63	uf662	Geom OK	EN 1993-1-1 member	EQ_Xdir.run(1)	0.234
	0.219	0.001	0.020	0.002	0.388	0.421	0.075	0.498	0.265
	0.234	0.105	0.129	0.628	0.421	0.207	0.093	0.114	0.294
	0.219	0.075	0.075	0.000	80.03651428	9.999999747e-006	355000	210000000	1
	1	-1666.647461	-102.7467575	45.08963394	-0.01690666191	-7.208169937	-16.68273354	9.404999733	9.404999733
	9.899999619	19863.72461	7118.121094	7810	3	4	7613.584961	1367.93335	479.3025818
	0.3400000036	0.4900000095	0.8273569345	0.5203425288	3961.671875	1	8874.77832	1	1367.93335
	1	1	1.30065167	1.397676349	1.285399199	1.238203049	1.138736606		
Bm104	CombEq_X	0.00	OK	0.72	uf662	Geom OK	EN 1993-1-1 member	EQ_Xdir.run(1)	0.171
	0.127	0.003	0.067	0.007	0.524	0.280	0.203	0.648	0.161
	0.487	0.256	0.230	0.723	0.280	0.444	0.234	0.210	0.330
	0.127	0.203	0.203	0.000	89.73805237	9.999999747e-006	355000	210000000	1
	1	-966.1905518	277.8193665	92.86061096	0.08390582353	-26.55029488	55.19152451	10.54501724	10.54501724
	11.10001755	15800.96875	5662.241699	7810	3	4	7613.584961	1367.93335	479.3025818
	0.3400000036	0.4900000095	0.7870042324	0.4535116553	3452.849365	1	8874.77832	1	1367.93335
	1	1	1.20106113	1.261782408	1.189247608	1.149985075	1.083876967		
Bm107	CombEq_X	0.00	OK	0.52	uf662	Geom OK	EN 1993-1-1 member	EQ_Xdir.run(1)	0.209
	0.198	0.008	0.002	0.002	0.033	0.437	0.017	0.326	0.248
	0.078	0.023	0.055	0.522	0.437	0.085	0.012	0.073	0.248
	0.198	0.050	0.017	0.033	78.55834961	9.999999747e-006	355000	210000000	1
	1	-3725.116943	-66.64328766	59.11622238	-1.187725782	-22.40211105	-3.483854532	9.404999733	9.404999733
	9.899999619	56099.08984	17799.59961	18815	1	1	18815	3878.375	1811.387451
	0.4900000095	0.7599999905	0.7976858616	0.4529801607	8522.821289	1	29814.71484	1	3878.375
	1	1	1.238188028	1.3420403	0.8549564481	0.7197378874	1.130771995		
Bm118	CombEq_X	0.00	OK	0.74	uf662	Geom OK	EN 1993-1-1 member	EQ_Xdir.run(1)	0.230
	0.171	0.003	0.020	0.007	0.435	0.377	0.073	0.628	0.217
	0.410	0.168	0.243	0.737	0.377	0.360	0.147	0.213	0.244
	0.171	0.073	0.073	0.000	89.73805237	9.999999747e-006	355000	210000000	1

Member	LoadCase	Position	Status	UfTot	Formula	GeomCheck	SubCheck	Run	ufEuler
	ufAxial	ufTorsion	ufShearz	ufSheary	ufXSection	uf646	uf655	uf661	uf661ax
	uf661mo	uf661my	uf661mz	uf662	uf662ax	uf662mo	uf662my	uf662mz	uf62
	uf62ax	uf62mo	uf62my	uf62mz	sldComp	relpos	fy	E	gammaM0
	gammaM1	NEd	MyEd	MzEd	TEd	VyEd	VzEd	KLy	KLz
	L	Ncry	Ncrz	NtRd	classF	classW	NcRd	MycRd	MzcRd
	alphay	alphaz	chiy	chiz	NbRd	C1	Mcr	chiLT	MbRd
	Cmy	Cmz	CmLT	kyy	kyz	kzy	kzz		
	1	-1302.039063	-100.2838058	91.31364441	-0.07147036493	-24.15464401	-16.32188034	10.54501724	10.54501724
	11.10001755	15800.96875	5662.241699	7810	3	4	7613.584961	1367.93335	479.3025818
	0.3400000036	0.4900000095	0.7870042324	0.4535116553	3452.849365	1	8874.77832	1	1367.93335
	1	1	1.293573976	1.383281231	1.274245739	1.211958408	1.116427183		
Bm126	CombEq_X	1.00	OK	0.57	uf661	Geom OK	EN 1993-1-1 member	EQ_Xdir.run(1)	0.000
	0.010	0.079	0.284	0.100	0.230	0.000	0.158	0.573	0.000
	0.573	0.183	0.390	0.573	0.000	0.573	0.183	0.390	0.157
	0.010	0.147	0.147	0.000	30.88830566	0.9999899864	355000	210000000	1
	1	36.49317551	-62.34217072	-10.96138954	-0.700686872	166.5878296	134.0882721	2.37851119	2.37851119
	2.503696203	63323.93359	23085.62109	3772.584961	3	1	3772.584961	423.1746521	149.1317291
	0.3400000036	0.4900000095	0.9843280315	0.8950716257	3376.733887	1	1336.212891	0.9336144924	395.0819702
	1	1	1	1.000567555	1.001574278	1.000410438	1.001416922		
Bm127	CombEq_X	1.00	OK	0.79	uf62	Geom OK	EN 1993-1-1 member	EQ_Xdir.run(1)	0.001
	0.223	0.000	0.063	0.144	0.560	0.223	0.020	0.554	0.223
	0.332	0.019	0.312	0.690	0.223	0.467	0.010	0.457	0.795
	0.223	0.572	0.020	0.552	5.838612556	0.9999899864	355000	210000000	1
	1	-5377.836914	102.1931686	-1771.525391	-2.933764258e-016	-1770.859497	-102.647438	0.9499999881	0.9499999881
	1	7249375	4134363.5	24140	1	1	24140	5076.5	3209.199951
	0.4900000095	0.7599999905	1	1	24140	1	594775.4375	1	5076.5
	1	1	1	0.9480231404	0.5660790801	0.4932511151	0.827825129		
Bm128	LL_X_dir	1.00	OK	0.51	uf62	Geom OK	EN 1993-1-1 member	EQ_Xdir.run(1)	0.000
	0.040	0.000	0.041	0.118	0.453	0.000	0.013	0.301	0.000
	0.301	0.000	0.301	0.437	0.000	0.437	0.000	0.437	0.507
	0.040	0.466	0.013	0.453	5.838612556	0.9999899864	355000	210000000	1
	1	970.4337769	67.80604553	-1454.077515	2.775557562e-017	-1454.077515	-67.80604553	0.9499999881	0.9499999881
	1	7249375	4134363.5	24140	1	1	24140	5076.5	3209.199951
	0.4900000095	0.7599999905	1	1	24140	1	594775.4375	1	5076.5
	1	1	1	0.9901996255	0.6641943455	0.5160418749	0.9635949135		
Bm130	CombEq_X	1.00	OK	0.93	uf62	Geom OK	EN 1993-1-1 member	EQ_Xdir.run(1)	0.001
	0.211	0.000	0.224	0.218	0.389	0.211	0.000	0.740	0.211
	0.529	0.311	0.218	0.755	0.211	0.544	0.183	0.360	0.931
	0.211	0.720	0.331	0.389	5.441313267	0.9999899864	355000	210000000	1
	1	-3520.42334	-894.3601074	-1228.586548	-1.649212112e-014	-1228.126221	894.0557861	0.9499999881	0.9499999881
	1	3290102.25	4680133.5	16685	1	1	16685	2700.662598	3159.5
	0.4900000095	0.4900000095	1	1	16685	1	232177.0781	1	2700.662598
	1	1	1	0.9379640818	0.5618379712	0.5537278056	0.9261925817		
Bm516	CombEq_X	0.05	OK	0.53	ufTorsion	Geom OK	EN 1993-1-1 member	EQ_Xdir.run(1)	0.000
	0.010	0.534	0.211	0.012	0.151	0.000	0.121	0.223	0.000
	0.223	0.122	0.101	0.222	0.000	0.222	0.121	0.100	0.132
	0.010	0.121	0.121	0.000	79.92373657	0.05000999942	355000	210000000	1
	1	87.53214264	-301.2357483	7.313559055	13.06763554	-28.86195564	224.2303772	7.599999905	7.599999905

Member	LoadCase	Position	Status	UfTot	Formula	GeomCheck	SubCheck	Run	ufEuler
	ufAxial	ufTorsion	ufShearz	ufSheary	ufXSection	uf646	uf655	uf661	uf661ax
	uf661mo	uf661my	uf661mz	uf662	uf662ax	uf662mo	uf662my	uf662mz	uf62
	uf62ax	uf62mo	uf62my	uf62mz	sldComp	relpos	fy	E	gammaM0
	gammaM1	NEd	MyEd	MzEd	TEd	VyEd	VzEd	KLy	KLz
	L	Ncry	Ncrz	NtRd	classF	classW	NcRd	MycRd	MzcRd
	alphay	alphaz	chiy	chiz	NbRd	C1	Mcr	chiLT	MbRd
	Cmy	Cmz	CmLT	kyy	kyz	kzy	kzz		
	8	100471.2031	7657.367676	8378	3	3	8378	2484.952637	378.7790833
	0.3400000036	0.4900000095	0.9682117701	0.5137212873	4303.957031	1	120090.1953	1	2484.952637
	1	1	1	1.00084424	1.011535287	0.995275557	1.005907059		
Bm520	CombEq_X	1.00	OK	0.55	uf662	Geom OK	EN 1993-1-1 member	EQ_Xdir.run(1)	0.056
	0.120	0.002	0.263	0.002	0.442	0.163	0.340	0.510	0.120
	0.390	0.361	0.029	0.547	0.163	0.384	0.355	0.029	0.437
	0.120	0.317	0.317	0.000	58.74454498	0.9999899864	355000	210000000	1
	1	-1272.201172	-1820.128906	2.839713812	0.1082532182	10.37169743	497.1878052	5.414999962	5.414999962
	5.699999809	685406.25	22630.53516	13376.40039	1	4	10629.60156	5737.240234	568.2913818
	0.3400000036	0.4900000095	1	0.7337380648	7799.343262	1	24951.82227	0.9328232408	5351.831055
	1	1	1.058448553	1.060416818	1.05956459	1.043861389	1.043022513		
Bm522	CombEq_X	1.00	OK	0.66	uf662	Geom OK	EN 1993-1-1 member	EQ_Xdir.run(1)	0.065
	0.127	0.002	0.169	0.005	0.557	0.178	0.327	0.618	0.127
	0.492	0.350	0.141	0.660	0.178	0.482	0.344	0.138	0.425
	0.127	0.298	0.298	0.000	64.10323334	0.9999899864	355000	210000000	1
	1	-987.3151855	-1258.411255	49.98509979	-0.0501367189	16.98633575	322.1349792	5.414999962	5.414999962
	5.699999809	504050.8438	15091.09473	10621.59961	3	4	7793.960449	4219.192383	378.9631653
	0.3400000036	0.4900000095	1	0.7131108046	5557.95752	1	16558.71875	0.9120417833	3848.079834
	1	1	1.069457173	1.071556091	1.070003629	1.050459385	1.04893744		

Eq_X : Frame Code Check

Description : Capacity Manager

Description : Norsok N-004 2004

Code	Norsok
CapendIncluded	true
UseCommentary663	true
MaterialFactor	1
Azimuthal Tolerance Angle	5

General options

Code	EN 1993-1-1
GammaM0	1
GammaM1	1
Method1	true
NationalAnnex	Standard

Eq_X.run(1) : Member Result Brief

- Sorted by UfTot (Descending)
- Then sorted by LoadCase (Ascending)
- Filtered by Limit : (UfTot >= 0.5)
- Run : Eq_X.run(1)
- Worst LoadCase per Member
- All SubChecks per Member
- Worst Position along Member

Member	LoadCase	Position	Status	UfTot	Formula	GeomCheck	SubCheck	Run
Bm130	CombEq_X	1.00	Failed(uf)	1.15	uf62	Geom OK	EN 1993-1-1 member	Eq_X.run(1)
Bm127	CombEq_X	1.00	Failed(uf)	1.07	uf62	Geom OK	EN 1993-1-1 member	Eq_X.run(1)
Bm7	CombEq_X	1.00	OK	0.93	uf662	Geom OK	EN 1993-1-1 member	Eq_X.run(1)
Bm118	CombEq_X	0.00	OK	0.88	uf662	Geom OK	EN 1993-1-1 member	Eq_X.run(1)
Bm3	CombEq_X	0.54	OK	0.84	uf661	Geom OK	EN 1993-1-1 member	Eq_X.run(1)
Bm104	CombEq_X	0.00	OK	0.82	uf662	Geom OK	EN 1993-1-1 member	Eq_X.run(1)
Bm522	CombEq_X	1.00	OK	0.74	uf662	Geom OK	EN 1993-1-1 member	Eq_X.run(1)
Bm99	CombEq_X	0.00	OK	0.63	uf662	Geom OK	EN 1993-1-1 member	Eq_X.run(1)
Bm520	CombEq_X	1.00	OK	0.61	uf662	Geom OK	EN 1993-1-1 member	Eq_X.run(1)
Bm2	CombEq_X	0.00	OK	0.60	ufXSection	Geom OK	EN 1993-1-1 member	Eq_X.run(1)
Bm101	CombEq_X	0.00	OK	0.58	uf662	Geom OK	EN 1993-1-1 member	Eq_X.run(1)
Bm100	CombEq_X	0.00	OK	0.55	uf662	Geom OK	EN 1993-1-1 member	Eq_X.run(1)
Bm107	CombEq_X	0.00	OK	0.54	uf662	Geom OK	EN 1993-1-1 member	Eq_X.run(1)
Bm103	CombEq_X	0.00	OK	0.53	ufXSection	Geom OK	EN 1993-1-1 member	Eq_X.run(1)
Bm129	CombEq_X	1.00	OK	0.52	uf62	Geom OK	EN 1993-1-1 member	Eq_X.run(1)
Bm5	CombEq_X	0.54	OK	0.50	ufXSection	Geom OK	EN 1993-1-1 member	Eq_X.run(1)
Bm1	CombEq_X	0.15	OK	0.50	uf662	Geom OK	EN 1993-1-1 member	Eq_X.run(1)

Eq_X.run(1) : EN199311 Member Result

- Sorted by Member (Ascending)
- Then sorted by LoadCase (Ascending)
- Filtered by Limit : (UfTot >= 0.5)
- Run : Eq_X.run(1)
- Worst LoadCase per Member
- Selected SubCheck per Member
- Worst Position along Member

Member	LoadCase	Position	Status	UfTot	Formula	GeomCheck	SubCheck	Run	ufEuler
	ufAxial	ufTorsion	ufShearz	ufShreary	ufXSection	uf646	uf655	uf661	uf661ax
	uf661mo	uf661my	uf661mz	uf662	uf662ax	uf662mo	uf662my	uf662mz	uf62
	uf62ax	uf62mo	uf62my	uf62mz	sldComp	relpos	fy	E	gammaM0
	gammaM1	NEd	MyEd	MzEd	TEd	VyEd	VzEd	KLy	KLz
	L	Ncry	Ncrz	NtRd	classF	classW	NcRd	MycRd	MzcRd
	alphay	alphaz	chiy	chiz	NbRd	C1	Mcr	chiLT	MbRd
	Cmy	Cmz	CmLT	kyy	kyz	kzy	kzz		
Bm1	CombEq_X	0.15	OK	0.50	uf662	Geom OK	EN 1993-1-1 member	Eq_X.run(1)	0.000
	0.002	0.000	0.112	0.019	0.061	0.003	0.019	0.502	0.002
	0.500	0.208	0.292	0.503	0.003	0.500	0.208	0.292	0.021
	0.002	0.019	0.019	0.000	34.27915573	0.1499900073	355000	210000000	1
	1	-20.59689522	-92.12554932	22.03854752	-0.01112446189	77.28981018	215.6053467	3.799999952	3.799999952
	4	1223412.75	59829.40234	12041.59961	4	4	8888.383789	4881.577637	553.0444946
	0.3400000036	0.4900000095	1	0.904994905	8043.942383	1	32147.00391	1	4881.577637
	1	1	1	1.000016809	1.000344396	0.9999841452	1.000311613		
Bm2	CombEq_X	0.00	OK	0.60	ufXSection	Geom OK	EN 1993-1-1 member	Eq_X.run(1)	0.000
	0.041	0.000	0.152	0.083	0.596	0.000	0.220	0.590	0.000
	0.590	0.180	0.410	0.537	0.000	0.537	0.164	0.374	0.261
	0.041	0.220	0.220	0.000	129.4038086	9.999999747e-006	355000	210000000	1
	1	494.320343	-1074.083008	-185.1241913	-0.007086127996	340.834198	-286.5588989	14.34500027	14.34500027
	15.10000038	85849.75781	4198.370605	12041.59961	4	3	12041.59961	4881.577637	553.0444946
	0.3400000036	0.4900000095	0.9360630512	0.2593203187	3122.631592	1	354200.0625	1	4881.577637
	1	1	1	1.005419016	1.133034468	0.9153154492	1.03149426		
Bm3	CombEq_X	0.54	OK	0.84	uf661	Geom OK	EN 1993-1-1 member	Eq_X.run(1)	0.000
	0.144	0.015	0.085	0.059	0.693	0.000	0.286	0.844	0.000
	0.844	0.145	0.700	0.517	0.000	0.517	0.088	0.429	0.430
	0.144	0.286	0.286	0.000	135.8538666	0.5397251248	355000	210000000	1
	1	1911.940186	1465.472534	146.5650482	-0.6284655333	242.1784058	-229.1572113	14.34500027	14.34500027
	15.10000038	89780.11719	4199.974121	13277	4	3	13277	5130.550781	556.7147217
	0.3400000036	0.4900000095	0.9321556687	0.2393638492	3178.033691	1	354324.4063	1	5130.550781
	1	1	1	1.020253062	1.832919955	0.6246971488	1.122290134		
Bm5	CombEq_X	0.54	OK	0.50	ufXSection	Geom OK	EN 1993-1-1 member	Eq_X.run(1)	0.000
	0.078	0.013	0.077	0.046	0.503	0.000	0.257	0.444	0.000
	0.444	0.182	0.262	0.356	0.000	0.356	0.146	0.210	0.335
	0.078	0.257	0.257	0.000	135.8538666	0.5397251248	355000	210000000	1
	1	1032.203247	1321.087891	-93.63825226	0.5266163349	-188.9357605	-209.181839	14.34500027	14.34500027
	15.10000038	89780.11719	4199.974121	13277	4	3	13277	5130.550781	556.7147217
	0.3400000036	0.4900000095	0.9321556687	0.2393638492	3178.033691	1	354324.4063	1	5130.550781
	1	1	1	1.010833144	1.324799895	0.8106991649	1.062503934		
Bm7	CombEq_X	1.00	OK	0.93	uf662	Geom OK	EN 1993-1-1 member	Eq_X.run(1)	0.182
	0.086	0.062	0.373	0.148	0.364	0.261	0.220	0.855	0.090
	0.765	0.241	0.524	0.927	0.261	0.666	0.210	0.456	0.306
	0.086	0.220	0.220	0.000	129.4038086	0.9999899864	355000	210000000	1

Member	LoadCase	Position	Status	UfTot	Formula	GeomCheck	SubCheck	Run	ufEuler
	ufAxial	ufTorsion	ufShearz	ufSheary	ufXSection	uf646	uf655	uf661	uf661ax
	uf661mo	uf661my	uf661mz	uf662	uf662ax	uf662mo	uf662my	uf662mz	uf62
	uf62ax	uf62mo	uf62my	uf62mz	sldComp	relpos	fy	E	gammaM0
	gammaM1	NEd	MyEd	MzEd	TEd	VyEd	VzEd	KLy	KLz
	L	Ncry	Ncrz	NtRd	classF	classW	NcRd	MycRd	MzcRd
	alphay	alphaz	chiy	chiz	NbRd	C1	Mcr	chiLT	MbRd
	Cmy	Cmz	CmLT	kyy	kyz	kzy	kzz		
	1	-764.9337158	-1074.266113	-32.12817001	2.126652718	-590.4463501	692.4713745	14.34500027	14.34500027
	15.10000038	85849.75781	4198.370605	12041.59961	4	4	8888.383789	4881.577637	553.0444946
	0.3400000036	0.4900000095	0.9560694098	0.3295592666	2929.249512	1	354200.0625	1	4881.577637
	1	1	1	1.00859189	1.222306728	0.8778659105	1.063880682		
Bm99	CombEq_X	0.00	OK	0.63	uf662	Geom OK	EN 1993-1-1 member	Eq_X.run(1)	0.292
	0.273	0.001	0.019	0.002	0.356	0.524	0.047	0.459	0.329
	0.130	0.063	0.067	0.634	0.524	0.110	0.053	0.057	0.320
	0.273	0.047	0.047	0.000	80.03651428	9.999999747e-006	355000	210000000	1
	1	-2075.535889	-64.40013123	-17.19946671	-0.02043902874	8.452785492	-15.8555336	9.404999733	9.404999733
	9.899999619	19863.72461	7118.121094	7810	3	4	7613.584961	1367.93335	479.3025818
	0.3400000036	0.4900000095	0.8273569345	0.5203425288	3961.671875	1	92447.32031	1	1367.93335
	1	1	1	1.094630241	1.383727551	0.9325661063	1.178861499		
Bm100	CombEq_X	0.00	OK	0.55	uf662	Geom OK	EN 1993-1-1 member	Eq_X.run(1)	0.204
	0.190	0.001	0.018	0.002	0.343	0.366	0.052	0.431	0.230
	0.201	0.069	0.132	0.547	0.366	0.181	0.063	0.119	0.243
	0.190	0.052	0.052	0.000	80.03651428	9.999999747e-006	355000	210000000	1
	1	-1449.687866	-71.3214798	48.09661865	-0.03570538387	-5.630389214	-14.56147003	9.404999733	9.404999733
	9.899999619	19863.72461	7118.121094	7810	3	4	7613.584961	1367.93335	479.3025818
	0.3400000036	0.4900000095	0.8273569345	0.5203425288	3961.671875	1	8874.77832	1	1367.93335
	1	1	1.250869155	1.331252694	1.238908648	1.201907277	1.118535399		
Bm101	CombEq_X	0.00	OK	0.58	uf662	Geom OK	EN 1993-1-1 member	Eq_X.run(1)	0.051
	0.047	0.001	0.032	0.007	0.376	0.091	0.124	0.552	0.057
	0.495	0.281	0.214	0.575	0.091	0.484	0.275	0.209	0.172
	0.047	0.124	0.124	0.000	80.03651428	9.999999747e-006	355000	210000000	1
	1	-360.6916199	-169.9508209	-97.729599	0.0349012129	25.16508102	-25.87077713	9.404999733	9.404999733
	9.899999619	19863.72461	7118.121094	7810	3	4	7613.584961	1367.93335	479.3025818
	0.3400000036	0.4900000095	0.8273569345	0.5203425288	3961.671875	1	8874.77832	1	1367.93335
	1	1	1.049284816	1.065289021	1.05002439	1.042012095	1.027081013		
Bm103	CombEq_X	0.00	OK	0.53	ufXSection	Geom OK	EN 1993-1-1 member	Eq_X.run(1)	0.000
	0.262	0.000	0.027	0.005	0.526	0.000	0.111	0.241	0.000
	0.241	0.000	0.241	0.184	0.000	0.184	0.000	0.184	0.372
	0.262	0.111	0.111	0.000	92.35453796	9.999999747e-006	355000	210000000	1
	1	2044.25769	-151.1634674	-73.81732941	0.006243998185	19.38356781	-21.90028191	10.85247707	10.85247707
	11.42365932	14918.34277	5345.95459	7810	3	1	7810	1367.93335	479.3025818
	0.3400000036	0.4900000095	0.7702471614	0.429646492	3355.539063	1	8874.77832	1	1367.93335
	1	1	1.612863421	1.803183794	1.562162638	1.381211638	1.196593046		
Bm104	CombEq_X	0.00	OK	0.82	uf662	Geom OK	EN 1993-1-1 member	Eq_X.run(1)	0.220
	0.164	0.005	0.055	0.009	0.555	0.361	0.164	0.731	0.208
	0.523	0.236	0.287	0.822	0.361	0.461	0.208	0.253	0.328
	0.164	0.164	0.164	0.000	89.73805237	9.999999747e-006	355000	210000000	1
	1	-1246.801758	224.3907318	109.0881577	0.1245212331	-32.71107864	45.13096237	10.54501724	10.54501724
	11.10001755	15800.96875	5662.241699	7810	3	4	7613.584961	1367.93335	479.3025818

SESAM GeniE V6.4-08	Report: eq_pm5	Model Id: eq_pm5	Sign: ofsbamom
		Description: eq_pm	Date: 28-Apr-2015
		Model file name: C:\DNV\Workspaces\GeniE\EQ_PM	Last saved: 28-Apr-2015 17:00:21

Member	LoadCase	Position	Status	UfTot	Formula	GeomCheck	SubCheck	Run	ufEuler
	ufAxial	ufTorsion	ufShearz	ufSheary	ufXSection	uf646	uf655	uf661	uf661ax
	uf661mo	uf661my	uf661mz	uf662	uf662ax	uf662mo	uf662my	uf662mz	uf62
	uf62ax	uf62mo	uf62my	uf62mz	sldComp	relpos	fy	E	gammaM0
	gammaM1	NEd	MyEd	MzEd	TEd	VyEd	VzEd	KLy	KLz
	L	Ncry	Ncrz	NtRd	classF	classW	NcRd	MycRd	MzcRd
	alphay	alphaz	chiy	chiz	NbRd	C1	Mcr	chiLT	MbRd
	Cmy	Cmz	CmLT	kyy	kyz	kzy	kzz		
	0.3400000036	0.4900000095	0.7870042324	0.4535116553	3452.849365	1	8874.77832	1	1367.93335
	1	1	1.277391315	1.361969471	1.259393573	1.201424479	1.11093998		
Bm107	CombEq_X	0.00	OK	0.54	uf662	Geom OK	EN 1993-1-1 member	Eq_X.run(1)	0.218
	0.207	0.005	0.019	0.002	0.047	0.456	0.041	0.352	0.259
	0.093	0.044	0.049	0.544	0.456	0.088	0.024	0.064	0.252
	0.207	0.046	0.041	0.005	78.55834961	9.999999747e-006	355000	210000000	1
	1	-3885.477783	157.1162109	9.131905556	-0.8331699967	-15.42516994	30.53531265	9.404999733	9.404999733
	9.899999619	56099.08984	17799.59961	18815	1	1	18815	3878.375	1811.387451
	0.4900000095	0.7599999905	0.7976858616	0.4529801607	8522.821289	1	254814.2813	1	3878.375
	1	1	1	1.087720752	0.8629410267	0.5837423801	1.136849642		
Bm118	CombEq_X	0.00	OK	0.88	uf662	Geom OK	EN 1993-1-1 member	Eq_X.run(1)	0.288
	0.214	0.002	0.016	0.009	0.507	0.472	0.051	0.757	0.272
	0.485	0.154	0.331	0.879	0.472	0.407	0.129	0.278	0.265
	0.214	0.051	0.051	0.000	89.73805237	9.999999747e-006	355000	210000000	1
	1	-1628.560791	-69.49808502	115.923172	-0.05645940825	-33.31455231	-13.40309429	10.54501724	10.54501724
	11.10001755	15800.96875	5662.241699	7810	3	4	7613.584961	1367.93335	479.3025818
	0.3400000036	0.4900000095	0.7870042324	0.4535116553	3452.849365	1	92447.32031	1	1367.93335
	1	1	1	1.088274598	1.37020421	0.913382411	1.150004268		
Bm127	CombEq_X	1.00	Failed(uf)	1.07	uf62	Geom OK	EN 1993-1-1 member	Eq_X.run(1)	0.001
	0.232	0.000	0.206	0.202	0.789	0.232	0.067	0.731	0.232
	0.499	0.063	0.436	0.907	0.232	0.675	0.033	0.642	1.074
	0.232	0.842	0.067	0.776	5.838612556	0.9999899864	355000	210000000	1
	1	-5594.691895	337.7579346	-2489.63623	-1.887378665e-017	-2488.296143	-338.216217	0.9499999881	0.9499999881
	1	7249375	4134363.5	24140	1	1	24140	5076.5	3209.199951
	0.4900000095	0.7599999905	1	1	24140	1	594775.4375	1	5076.5
	1	1	1	0.9460617304	0.5621748567	0.4921822846	0.8277417421		
Bm129	CombEq_X	1.00	OK	0.52	uf62	Geom OK	EN 1993-1-1 member	Eq_X.run(1)	0.001
	0.132	0.000	0.108	0.132	0.229	0.132	0.000	0.414	0.132
	0.282	0.148	0.133	0.438	0.132	0.306	0.087	0.218	0.516
	0.132	0.384	0.154	0.229	5.406789303	0.9999899864	355000	210000000	1
	1	-2280.00708	434.2684937	-783.3001099	-1.278220659e-014	-782.9834595	-433.2993774	0.9499999881	0.9499999881
	1	3438601.5	5317851	17217.5	1	1	17217.5	2811.15625	3413.768799
	0.4900000095	0.4900000095	1	1	17217.5	1	860711.5625	1	2811.15625
	1	1	1	0.9612072706	0.579754889	0.5660300851	0.951531291		
Bm130	CombEq_X	1.00	Failed(uf)	1.15	uf62	Geom OK	EN 1993-1-1 member	Eq_X.run(1)	0.001
	0.217	0.000	0.406	0.203	0.590	0.217	0.000	0.957	0.217
	0.740	0.542	0.198	0.861	0.217	0.644	0.319	0.326	1.148
	0.217	0.931	0.578	0.353	5.406789303	0.9999899864	355000	210000000	1
	1	-3736.595459	1624.317993	-1204.268066	1.000435019e-014	-1203.955688	-1623.36084	0.9499999881	0.9499999881
	1	3438601.5	5317851	17217.5	1	1	17217.5	2811.15625	3413.768799
	0.4900000095	0.4900000095	1	1	17217.5	1	860711.5625	1	2811.15625
	1	1	1	0.9379869699	0.5617337823	0.5518670082	0.9229723215		

Member	LoadCase	Position	Status	UfTot	Formula	GeomCheck	SubCheck	Run	ufEuler
	ufAxial	ufTorsion	ufShearz	ufSheary	ufXSection	uf646	uf655	uf661	uf661ax
	uf661mo	uf661my	uf661mz	uf662	uf662ax	uf662mo	uf662my	uf662mz	uf62
	uf62ax	uf62mo	uf62my	uf62mz	sldComp	relpos	fy	E	gammaM0
	gammaM1	NEd	MyEd	MzEd	TEd	VyEd	VzEd	KLy	KLz
	L	Ncry	Ncrz	NtRd	classF	classW	NcRd	MycRd	MzcRd
	alphay	alphaz	chiy	chiz	NbRd	C1	Mcr	chiLT	MbRd
	Cmy	Cmz	CmLT	kyy	kyz	kzy	kzz		
Bm520	CombEq_X	1.00	OK	0.61	uf662	Geom OK	EN 1993-1-1 member	Eq_X.run(1)	0.042
	0.090	0.004	0.292	0.001	0.535	0.123	0.464	0.587	0.090
	0.497	0.485	0.011	0.614	0.123	0.491	0.480	0.011	0.524
	0.090	0.433	0.433	0.000	58.74454498	0.9999899864	355000	210000000	1
	1	-961.5253296	-2485.347656	6.19464922	0.1930935979	2.86485815	551.7418823	5.414999962	5.414999962
	5.699999809	685406.25	22630.53516	13376.40039	1	4	10629.60156	5737.240234	568.2913818
	0.3400000036	0.4900000095	1	0.7337380648	7799.343262	1	24951.82227	0.9328232408	5351.831055
	1	1	1.043273211	1.044738889	1.044373274	1.032539487	1.032178164		
Bm522	CombEq_X	1.00	OK	0.74	uf662	Geom OK	EN 1993-1-1 member	Eq_X.run(1)	0.068
	0.131	0.004	0.194	0.003	0.621	0.183	0.428	0.697	0.131
	0.566	0.459	0.107	0.738	0.183	0.555	0.450	0.105	0.521
	0.131	0.390	0.390	0.000	64.10323334	0.9999899864	355000	210000000	1
	1	-1018.83252	-1645.114258	37.91825104	-0.1060585231	8.586833954	369.2749329	5.414999962	5.414999962
	5.699999809	504050.8438	15091.09473	10621.59961	3	4	7793.960449	4219.192383	378.9631653
	0.3400000036	0.4900000095	1	0.7131108046	5557.95752	1	16558.71875	0.9120417833	3848.079834
	1	1	1.071852326	1.074023247	1.072400093	1.052168846	1.050578713		

ULS1 : Frame Code Check

Description : Norsok N-004 2004

General options

Code	Norsok
CapendIncluded	true
UseCommentary663	true
MaterialFactor	1.15
Azimuthal Tolerance Angle	5

General options

Code	EN 1993-1-1
GammaM0	1.15
GammaM1	1.15
Method1	true
NationalAnnex	Norwegian

ULS1.run(1) : Member Result Brief

- Sorted by UfTot (Descending)
- Then sorted by LoadCase (Ascending)
- Filtered by Limit : (UfTot >= 0.6)
- Run : ULS1.run(1)
- Worst LoadCase per Member
- All SubChecks per Member
- Worst Position along Member

Member	LoadCase	Position	Status	UfTot	Formula	GeomCheck	SubCheck	Run
Bm102	ULS_Com1	1.00	Failed(uf)	1.49	ufXSection	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm539	ULS_Com1	0.00	Failed(uf)	1.35	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm3	ULS_Com1	0.58	Failed(uf)	1.29	uf661	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm105	ULS_Com1	0.00	Failed(uf)	1.21	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm537	ULS_Com1	0.00	Failed(uf)	1.18	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm97	ULS_Com1	1.00	Failed(uf)	1.16	ufXSection	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm106	ULS_Com1	0.00	Failed(uf)	1.10	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm5	ULS_Com1	0.00	Failed(uf)	1.07	uf661	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm2	ULS_Com1	0.00	Failed(uf)	1.05	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm100	ULS_Com1	0.00	OK	0.92	ufXSection	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm118	ULS_Com1	0.00	OK	0.89	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm523	ULS_Com1	0.00	OK	0.87	ufXSection	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm7	ULS_Com1	0.98	OK	0.87	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm92	ULS_Com1	0.00	OK	0.87	ufXSection	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm114	ULS_Com1	0.00	OK	0.86	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm103	ULS_Com1	0.00	OK	0.83	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm532	ULS_Com1	0.00	OK	0.82	uf6_31	Geom OK	Norsok member	ULS1.run(1)
Bm533	ULS_Com1	0.00	OK	0.82	uf6_31	Geom OK	Norsok member	ULS1.run(1)
Bm131	ULS_Com1	0.00	OK	0.78	uf62	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm4	ULS_Com1	0.18	OK	0.76	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm104	ULS_Com1	0.00	OK	0.76	ufXSection	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm132	ULS_Com1	1.00	OK	0.74	uf62	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm76	ULS_Com1	0.99	OK	0.69	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm516	ULS_Com1	0.06	OK	0.67	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm9	ULS_Com1	0.00	OK	0.66	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm521	ULS_Com1	0.00	OK	0.66	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm120	ULS_Com1	0.78	OK	0.65	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm74	ULS_Com1	0.00	OK	0.60	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)

ULS1.run(1) : EN199311 Member Result

- Sorted by Member (Ascending)
- Then sorted by LoadCase (Ascending)
- Filtered by Limit : (UfTot >= 0.6)
- Run : ULS1.run(1)
- Worst LoadCase per Member
- Selected SubCheck per Member
- Worst Position along Member

Member	LoadCase	Position	Status	UfTot	Formula	GeomCheck	SubCheck	Run	ufEuler
	ufAxial	ufTorsion	ufShearz	ufSheary	ufXSection	uf646	uf655	uf661	uf661ax
	uf661mo	uf661my	uf661mz	uf662	uf662ax	uf662mo	uf662my	uf662mz	uf62
	uf62ax	uf62mo	uf62my	uf62mz	sldComp	relpos	fy	E	gammaM0
	gammaM1	NEd	MyEd	MzEd	TEd	VyEd	VzEd	KLy	KLz
	L	Ncry	Ncrz	NtRd	classF	classW	NcRd	MycRd	MzcRd
	alphay	alphaz	chiy	chiz	NbRd	C1	Mcr	chiLT	MbRd
	Cmy	Cmz	CmLT	kyy	kyz	kzy	kzz		
Bm2	ULS_Com1	0.00	Failed(uf)	1.05	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)	0.038
	0.025	0.025	0.799	0.067	1.006	0.066	0.562	1.034	0.026
	1.008	0.617	0.391	1.050	0.066	0.984	0.603	0.382	0.630
	0.025	0.604	0.604	0.000	115.7823563	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	-196.9940186	-2384.744873	180.8628387	0.751183033	-237.5634155	-1302.580811	12.83500004	12.83500004
	15.10000038	107237.9375	5244.331543	10470.95605	4	4	7729.029785	4244.850098	480.9082642
	0.3400000036	0.4900000095	0.9685291648	0.3880310357	2999.103516	1	354200.0625	1	4244.850098
	1	1	1	1.001782298	1.038969159	0.9784699082	1.01479125		
Bm3	ULS_Com1	0.58	Failed(uf)	1.29	uf661	Geom OK	EN 1993-1-1 member	ULS1.run(1)	0.000
	0.016	0.001	0.079	0.111	0.726	0.000	0.588	1.291	0.000
	1.291	0.585	0.705	1.258	0.000	1.258	0.570	0.687	0.605
	0.016	0.588	0.588	0.000	121.5534592	0.5794801712	355000	210000000	1.149999976
	1.149999976	186.7099304	2625.260986	58.94670486	0.01907366514	-394.1677246	186.7679596	12.83500004	12.83500004
	15.10000038	112147.4844	5246.334473	11545.21777	4	3	11545.21777	4461.348145	484.0997925
	0.3400000036	0.4900000095	0.9477084875	0.2868351042	3311.573486	1	354324.4063	1	4461.348145
	1	1	1	1.001580238	1.036811471	0.9759825468	1.010313392		
Bm4	ULS_Com1	0.18	OK	0.76	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)	0.004
	0.002	0.008	0.133	0.091	0.251	0.006	0.189	0.757	0.002
	0.755	0.379	0.376	0.759	0.006	0.753	0.378	0.375	0.191
	0.002	0.189	0.189	0.000	121.5534592	0.1821292043	355000	210000000	1.149999976
	1.149999976	-18.4710598	842.7915649	29.26491547	0.2910233736	-322.7524414	-314.0813293	12.83500004	12.83500004
	15.10000038	112147.4844	5246.334473	11545.21777	4	4	8704.834961	4461.348145	484.0997925
	0.3400000036	0.4900000095	0.9645574689	0.3562193513	3100.830566	1	354324.4063	1	4461.348145
	1	1	1	1.000158906	1.003527284	0.9978949428	1.001255751		
Bm5	ULS_Com1	0.00	Failed(uf)	1.07	uf661	Geom OK	EN 1993-1-1 member	ULS1.run(1)	0.000
	0.045	0.008	0.630	0.061	1.005	0.000	0.631	1.071	0.000
	1.071	0.589	0.482	0.994	0.000	0.994	0.547	0.447	0.686
	0.045	0.641	0.641	0.000	121.5534592	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	517.9797363	-2816.818359	154.4337311	0.2986995578	-214.9318848	-1484.302734	12.83500004	12.83500004
	15.10000038	112147.4844	5246.334473	11545.21777	4	3	11545.21777	4461.348145	484.0997925
	0.3400000036	0.4900000095	0.9477084875	0.2868351042	3311.573486	1	354324.4063	1	4461.348145
	1	1	1	1.004396439	1.10927844	0.9318397641	1.029145122		
Bm7	ULS_Com1	0.98	OK	0.87	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)	0.020
	0.013	0.013	0.582	0.042	0.177	0.035	0.097	0.857	0.014

Member	LoadCase	Position	Status	UfTot	Formula	GeomCheck	SubCheck	Run	ufEuler
	ufAxial	ufTorsion	ufShearz	ufSheary	ufXSection	uf646	uf655	uf661	uf661ax
	uf661mo	uf661my	uf661mz	uf662	uf662ax	uf662mo	uf662my	uf662mz	uf62
	uf62ax	uf62mo	uf62my	uf62mz	sldComp	relpos	fy	E	gammaM0
	gammaM1	NEd	MyEd	MzEd	TEd	VyEd	VzEd	KLy	KLz
	L	Ncry	Ncrz	NtRd	classF	classW	NcRd	MycRd	MzcRd
	alphay	alphaz	chiy	chiz	NbRd	C1	Mcr	chiLT	MbRd
	Cmy	Cmz	CmLT	kyy	kyz	kzy	kzz		
	0.843	0.594	0.249	0.867	0.035	0.833	0.587	0.246	0.111
	0.013	0.097	0.097	0.000	115.7823563	0.9768311977	355000	210000000	1.149999976
	1.149999976	-103.8422852	-411.4854126	-31.87437439	0.3790861964	-149.5624695	951.3395996	12.83500004	12.83500004
	15.10000038	107237.9375	5244.331543	10470.95605	4	4	7729.029785	4244.850098	480.9082642
	0.3400000036	0.4900000095	0.9685291648	0.3880310357	2999.103516	1	354200.0625	1	4244.850098
	1	1	1	1.000938773	1.020169735	0.9887461066	1.007742882		
Bm9	ULS_Com1	0.00	OK	0.66	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)	0.007
	0.019	0.004	0.125	0.011	0.339	0.025	0.034	0.659	0.019
	0.640	0.349	0.290	0.664	0.025	0.638	0.349	0.290	0.051
	0.019	0.031	0.031	0.000	57.35552597	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	-130.9649048	114.7482605	-94.95423889	-0.1029227972	32.42370605	206.7751617	4.84499979	4.84499979
	5.699999809	629627.5	18850.81445	9236.173828	3	4	6777.356934	3668.863037	329.5331726
	0.3400000036	0.4900000095	1	0.7596117854	5148.160156	1	16558.71875	0.9120417833	3346.15625
	1	1	1.006481767	1.006691098	1.006996036	1.005000949	1.005305409		
Bm74	ULS_Com1	0.00	OK	0.60	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)	0.009
	0.018	0.049	0.349	0.002	0.455	0.026	0.274	0.594	0.018
	0.576	0.274	0.302	0.601	0.026	0.575	0.273	0.301	0.292
	0.018	0.274	0.274	0.000	63.46575546	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	-110.835083	-592.1152954	53.8571167	1.045822024	-4.280639648	-360.9197998	6.034999847	6.034999847
	7.099999905	159336.125	12143.73047	7285.217285	3	4	6174.875977	2160.828369	329.3731079
	0.3400000036	0.4900000095	0.9960631728	0.6843262911	4225.629883	1	120090.1953	1	2160.828369
	1	1	1	1.000693321	1.009208202	0.997794807	1.006285071		
Bm76	ULS_Com1	0.99	OK	0.69	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)	0.044
	0.077	0.078	0.229	0.041	0.168	0.117	0.022	0.663	0.077
	0.586	0.185	0.401	0.694	0.117	0.577	0.182	0.395	0.099
	0.077	0.022	0.022	0.000	67.48823547	0.9933874607	355000	210000000	1.149999976
	1.149999976	-474.0194092	-47.37562561	-22.68065071	1.668230057	113.1889648	234.8611298	6.417500019	6.417500019
	7.550000191	140908.4531	10739.27344	7285.217285	3	4	6174.875977	2160.828369	329.3731079
	0.3400000036	0.4900000095	0.9913121462	0.6538921595	4037.702881	1	120090.1953	1	2160.828369
	1	1	1	1.003345966	1.046146393	0.9875914454	1.02971983		
Bm92	ULS_Com1	0.00	OK	0.87	ufXSection	Geom OK	EN 1993-1-1 member	ULS1.run(1)	0.000
	0.078	0.004	0.449	0.007	0.867	0.000	0.664	0.783	0.000
	0.783	0.601	0.182	0.776	0.000	0.776	0.595	0.181	0.695
	0.078	0.617	0.617	0.000	54.20654678	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	960.7739258	-3641.717773	85.09355164	0.1903709769	-30.47932434	-780.2232056	4.84499979	4.84499979
	5.699999809	1206918.375	28271.13672	12372.52148	1	4	12372.52148	5901.580078	494.1958008
	0.3400000036	0.4900000095	1	0.7188460827	8893.939453	1	29008.73633	0.9293686748	5484.743652
	1	1	1.034394979	1.035219073	1.035179853	1.025080085	1.025041223		
Bm97	ULS_Com1	1.00	Failed(uf)	1.16	ufXSection	Geom OK	EN 1993-1-1 member	ULS1.run(1)	0.000
	0.093	0.006	0.381	0.011	1.164	0.000	0.878	1.108	0.000
	1.108	0.816	0.292	1.090	0.000	1.090	0.803	0.287	0.892
	0.093	0.799	0.799	0.000	59.60749054	0.9999899864	355000	210000000	1.149999976
	1.149999976	931.2619629	-3456.771484	-89.5328598	0.1568617225	-31.75237274	665.5059814	4.84499979	4.84499979
	5.699999809	894735.75	18853.35742	9977.043945	3	4	9977.043945	4329.023926	329.5605774

GeniE V6.4-08	Report: sls_uls15	Model Id: sls_uls15	Sign: ofsbamom
		Description: sls_uls1	Date: 29-Apr-2015
		Model file name: C:\DNV\Workspaces\GeniE\Lift2 -1	Last saved: 29-Apr-2015 09:13:36

Member	LoadCase	Position	Status	UfTot	Formula	GeomCheck	SubCheck	Run	ufEuler
	ufAxial	ufTorsion	ufShearz	ufSheary	ufXSection	uf646	uf655	uf661	uf661ax
	uf661mo	uf661my	uf661mz	uf662	uf662ax	uf662mo	uf662my	uf662mz	uf62
	uf62ax	uf62mo	uf62my	uf62mz	sldComp	relpos	fy	E	gammaM0
	gammaM1	NEd	MyEd	MzEd	TEd	VyEd	VzEd	KLy	KLz
	L	Ncry	Ncrz	NtRd	classF	classW	NcRd	MycRd	MzcRd
	alphay	alphaz	chiy	chiz	NbRd	C1	Mcr	chiLT	MbRd
	Cmy	Cmz	CmLT	kyy	kyz	kzy	kzz		
	0.3400000036	0.4900000095	1	0.6746487617	6731	1	19297.79297	0.9094808102	3937.164307
	1	1	1.051568031	1.052663684	1.05196166	1.035163403	1.034473062		
Bm100	ULS_Com1	0.00	OK	0.92	ufXSection	Geom OK	EN 1993-1-1 member	ULS1.run(1)	0.000
	0.258	0.000	0.117	0.007	0.920	0.000	0.437	0.573	0.000
	0.573	0.236	0.336	0.525	0.000	0.525	0.217	0.308	0.696
	0.258	0.437	0.437	0.000	71.61161804	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	1754.269043	-520.2282715	-93.32671356	0.005862914026	20.92265701	-83.53787994	8.414999962	8.414999962
	9.899999619	24812.47266	8891.494141	6791.304199	3	1	6791.304199	1189.507202	416.7848511
	0.3400000036	0.4900000095	0.8561396003	0.5771499276	3919.601074	1	8874.77832	1	1189.507202
	1	1	1.240951777	1.320906162	1.232303977	1.209641814	1.128502846		
Bm102	ULS_Com1	1.00	Failed(uf)	1.49	ufXSection	Geom OK	EN 1993-1-1 member	ULS1.run(1)	0.000
	0.721	0.003	0.346	0.001	1.488	0.000	0.726	0.103	0.000
	0.103	0.015	0.089	0.071	0.000	0.071	0.010	0.060	1.447
	0.721	0.726	0.726	0.000	71.61161804	0.9999899864	355000	210000000	1.149999976
	1.149999976	4894.268066	863.8167114	-17.19874001	-0.05669736862	-2.591493607	-246.5786133	8.414999962	8.414999962
	9.899999619	24812.47266	8891.494141	6791.304199	3	1	6791.304199	1189.507202	416.7848511
	0.3400000036	0.4900000095	0.8561396003	0.5771499276	3919.601074	1	8874.77832	1	1189.507202
	1	1	2.215774536	2.665990591	2.148469687	1.818640232	1.46560657		
Bm103	ULS_Com1	0.00	OK	0.83	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)	0.205
	0.207	0.003	0.052	0.003	0.483	0.412	0.247	0.718	0.253
	0.465	0.330	0.135	0.830	0.412	0.418	0.296	0.121	0.454
	0.207	0.247	0.247	0.000	82.63300323	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	-1369.538452	-294.0036621	-12.12396431	-0.06746504456	10.6644125	-37.33395386	9.710110664	9.710110664
	11.42365932	18635.02344	6677.818848	6791.304199	3	4	6620.508301	1189.507202	416.7848511
	0.3400000036	0.4900000095	0.8169070482	0.5016608834	3321.250244	1	8874.77832	1	1189.507202
	1	1	1.25311327	1.333151221	1.239991546	1.198429108	1.114683628		
Bm104	ULS_Com1	0.00	OK	0.76	ufXSection	Geom OK	EN 1993-1-1 member	ULS1.run(1)	0.000
	0.298	0.003	0.127	0.002	0.758	0.000	0.385	0.331	0.000
	0.331	0.132	0.199	0.282	0.000	0.282	0.113	0.169	0.683
	0.298	0.385	0.385	0.000	80.29194641	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	2026.265381	457.8333435	-31.16267776	-0.07128196955	6.37679863	90.36052704	9.435015678	9.435015678
	11.10001755	19737.54297	7072.903809	6791.304199	3	1	6791.304199	1189.507202	416.7848511
	0.3400000036	0.4900000095	0.8222193718	0.5110318065	3470.57251	1	8874.77832	1	1189.507202
	1	1	1.396063209	1.524767995	1.3735708	1.300466776	1.171511412		
Bm105	ULS_Com1	0.00	Failed(uf)	1.21	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)	0.233
	0.249	0.007	0.100	0.000	0.671	0.479	0.397	1.130	0.301
	0.829	0.553	0.276	1.214	0.479	0.735	0.491	0.244	0.645
	0.249	0.397	0.397	0.000	80.29194641	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	-1645.790771	-472.1187744	-10.6829958	-0.14808321	-0.04013694078	-71.52648163	9.435015678	9.435015678
	11.10001755	19737.54297	7072.903809	6791.304199	3	4	6620.508301	1189.507202	416.7848511
	0.3400000036	0.4900000095	0.8263403177	0.5184805393	3432.60498	1	8874.77832	1	1189.507202
	1	1	1.298190475	1.394259691	1.28298521	1.235827208	1.137197137		

Member	LoadCase	Position	Status	UfTot	Formula	GeomCheck	SubCheck	Run	ufEuler
	ufAxial	ufTorsion	ufShearz	ufSheary	ufXSection	uf646	uf655	uf661	uf661ax
	uf661mo	uf661my	uf661mz	uf662	uf662ax	uf662mo	uf662my	uf662mz	uf62
	uf62ax	uf62mo	uf62my	uf62mz	sldComp	relpos	fy	E	gammaM0
	gammaM1	NEd	MyEd	MzEd	TEd	VyEd	VzEd	KLy	KLz
	L	Ncry	Ncrz	NtRd	classF	classW	NcRd	MycRd	MzcRd
	alphay	alphaz	chiy	chiz	NbRd	C1	Mcr	chiLT	MbRd
	Cmy	Cmz	CmLT	kyy	kyz	kzy	kzz		
Bm106	ULS_Com1	0.00	Failed(uf)	1.10	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)	0.275
	0.277	0.003	0.082	0.002	0.614	0.553	0.323	0.976	0.340
	0.636	0.351	0.285	1.099	0.553	0.546	0.301	0.245	0.600
	0.277	0.323	0.323	0.000	82.63300323	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	-1836.357422	384.1149902	-5.652257919	0.05672464147	6.378861904	58.7351799	9.710110664	9.710110664
	11.42365932	18635.02344	6677.818848	6791.304199	3	4	6620.508301	1189.507202	416.7848511
	0.3400000036	0.4900000095	0.8169070482	0.5016608834	3321.250244	1	92447.32031	1	1189.507202
	1	1	1	1.087548494	1.352233291	0.9329670668	1.160030246		
Bm114	ULS_Com1	0.00	OK	0.86	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)	0.290
	0.201	0.001	0.038	0.001	0.576	0.511	0.297	0.679	0.254
	0.425	0.318	0.107	0.858	0.511	0.347	0.259	0.088	0.499
	0.201	0.297	0.297	0.000	99.78013611	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	-1209.360352	316.8678894	25.55223465	-0.01056441665	-3.674770355	27.30819511	10.30605316	10.30605316
	12.12476826	14819.82324	4163.521973	6173.913086	3	4	6003.117188	1065.654785	329.3268127
	0.3400000036	0.4900000095	0.7934889197	0.3940614164	2365.596924	1	65051.25781	1	1065.654785
	1	1	1	1.069235206	1.383979678	0.8724408746	1.129256129		
Bm118	ULS_Com1	0.00	OK	0.89	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)	0.232
	0.248	0.002	0.042	0.001	0.475	0.479	0.189	0.764	0.300
	0.463	0.263	0.201	0.890	0.479	0.411	0.233	0.178	0.437
	0.248	0.189	0.189	0.000	80.29194641	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	-1643.762085	-224.3864746	15.83430958	-0.0345630087	-2.503228188	-30.26565933	9.435015678	9.435015678
	11.10001755	19737.54297	7072.903809	6791.304199	3	4	6620.508301	1189.507202	416.7848511
	0.3400000036	0.4900000095	0.8263403177	0.5184805393	3432.60498	1	8874.77832	1	1189.507202
	1	1	1.297705412	1.39361155	1.282532692	1.235479712	1.137004852		
Bm120	ULS_Com1	0.78	OK	0.65	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)	0.226
	0.223	0.000	0.029	0.006	0.100	0.450	0.047	0.513	0.271
	0.241	0.151	0.091	0.650	0.450	0.200	0.082	0.118	0.369
	0.223	0.146	0.047	0.100	82.62734222	0.7807117701	355000	210000000	1.149999976
	1.149999976	-2266.717041	-91.9407959	-94.39655304	-0.01994879544	29.55474854	31.38871384	9.710110664	9.710110664
	11.42365932	29238.49219	10018.10156	10186.95605	1	1	10186.95605	1977.195679	944.6087036
	0.3400000036	0.4900000095	0.8201624751	0.4942416847	5034.818848	1	143086.9063	1	1977.195679
	1	1	1	1.100884676	0.9062641859	0.5990443826	1.181184769		
Bm131	ULS_Com1	0.00	OK	0.78	uf62	Geom OK	EN 1993-1-1 member	ULS1.run(1)	0.000
	0.479	0.001	0.094	0.002	0.466	0.000	0.267	0.021	0.000
	0.021	0.000	0.021	0.034	0.000	0.034	0.000	0.034	0.777
	0.479	0.298	0.267	0.031	48.84207153	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	6509.271973	-717.8914795	39.38473511	-0.06729348749	-11.27593231	-134.0774231	5.740320683	5.740320683
	6.753318787	116607.1563	38228.17578	13582.6084	1	1	13582.6084	2691.826172	1262.565186
	0.3400000036	0.4900000095	0.9393525124	0.7619031668	10348.63184	1	21623.3418	1	2691.826172
	1	1	1.188089132	1.215278625	0.6579868197	0.6708811522	1.084405422		
Bm132	ULS_Com1	1.00	OK	0.74	uf62	Geom OK	EN 1993-1-1 member	ULS1.run(1)	0.000
	0.509	0.003	0.092	0.005	0.321	0.000	0.174	0.028	0.000

Member	LoadCase	Position	Status	UfTot	Formula	GeomCheck	SubCheck	Run	ufEuler
	ufAxial	ufTorsion	ufShearz	ufShreary	ufXSection	uf646	uf655	uf661	uf661ax
	uf661mo	uf661my	uf661mz	uf662	uf662ax	uf662mo	uf662my	uf662mz	uf62
	uf62ax	uf62mo	uf62my	uf62mz	sldComp	relpos	fy	E	gammaM0
	gammaM1	NEd	MyEd	MzEd	TEd	VyEd	VzEd	KLy	KLz
	L	Ncry	Ncrz	NtRd	classF	classW	NcRd	MycRd	MzcRd
	alphay	alphaz	chiy	chiz	NbRd	C1	Mcr	chiLT	MbRd
	Cmy	Cmz	CmLT	kyy	kyz	kzy	kzz		
	0.028	0.000	0.028	0.044	0.000	0.044	0.000	0.044	0.739
	0.509	0.230	0.174	0.056	22.75776482	0.9999899864	355000	210000000	1.149999976
	1.149999976	6917.692383	467.0759888	-71.0644989	0.2790689468	-34.65355682	-131.7521362	2.674679279	2.674679279
	3.146681309	537098.75	176081.0156	13582.6084	1	1	13582.6084	2691.826172	1262.565186
	0.3400000036	0.4900000095	1	0.9502493739	12906.86523	1	197189.7969	1	2691.826172
	1	1	1	0.9248960614	0.491414398	0.4841960967	0.7879719734		
Bm516	ULS_Com1	0.06	OK	0.67	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)	0.081
	0.126	0.000	0.038	0.063	0.331	0.202	0.024	0.612	0.128
	0.484	0.039	0.445	0.670	0.202	0.468	0.038	0.431	0.150
	0.126	0.024	0.024	0.000	71.51071167	0.05626000091	355000	210000000	1.149999976
	1.149999976	-778.0355225	-52.05907822	-59.45956421	0.004454135895	179.2660522	-39.62216187	6.800000191	6.800000191
	8	125502.0938	9565.084961	7285.217285	3	4	6174.875977	2160.828369	329.3731079
	0.3400000036	0.4900000095	0.986546874	0.6235762835	3850.506104	1	120090.1953	1	2160.828369
	1	1	1	1.006153584	1.088452101	0.9737820625	1.053432703		
Bm521	ULS_Com1	0.00	OK	0.66	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)	0.023
	0.081	0.006	0.189	0.009	0.579	0.101	0.351	0.641	0.081
	0.560	0.360	0.200	0.658	0.101	0.557	0.358	0.199	0.402
	0.081	0.321	0.321	0.000	50.51311111	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	-550.5150146	-1176.012817	-58.46825027	-0.1534189284	24.49954987	-313.5240479	4.267000198	4.267000198
	5.019999981	811756.875	24303.69922	9236.173828	3	4	6777.356934	3668.863037	329.5331726
	0.3400000036	0.4900000095	1	0.805177331	5456.974609	1	16558.71875	0.9120417833	3346.15625
	1	1	1.022653937	1.023347974	1.023176432	1.018747926	1.018577337		
Bm523	ULS_Com1	0.00	OK	0.87	ufXSection	Geom OK	EN 1993-1-1 member	ULS1.run(1)	0.000
	0.134	0.008	0.489	0.003	0.870	0.000	0.710	0.692	0.000
	0.692	0.595	0.096	0.681	0.000	0.681	0.586	0.095	0.780
	0.134	0.645	0.645	0.000	52.49642181	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	1337.619629	-2794.148438	-29.93927193	-0.2043537945	9.675895691	-857.677002	4.267000198	4.267000198
	5.019999981	1153551.625	24306.97852	9977.043945	3	4	9977.043945	4329.023926	329.5605774
	0.3400000036	0.4900000095	1	0.7326930165	7310.109863	1	19297.79297	0.9094808102	3937.164307
	1	1	1.057839036	1.059067011	1.05823493	1.042833686	1.04201436		
Bm537	ULS_Com1	0.00	Failed(uf)	1.18	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)	0.255
	0.550	0.001	0.045	0.001	0.711	0.785	0.141	1.005	0.563
	0.442	0.397	0.045	1.181	0.779	0.402	0.361	0.041	0.707
	0.550	0.158	0.158	0.000	56.92119217	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	-7309.716797	427.7449951	-2.642556429	-0.06684991717	-2.825803757	-118.5376968	6.725836754	6.725836754
	7.91274929	220252.75	28658.21094	13829.56543	4	4	13292.44531	3023.729004	746.5681763
	0.3400000036	0.4900000095	0.9773821831	0.7058253884	9306.228516	1	328365.3438	1	3023.729004
	1	1	1	1.033524632	1.341358185	0.9396777749	1.219559193		
Bm539	ULS_Com1	0.00	Failed(uf)	1.35	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)	0.445
	0.566	0.001	0.025	0.000	0.907	1.002	0.297	1.069	0.597
	0.472	0.424	0.048	1.347	0.994	0.352	0.316	0.036	0.880
	0.566	0.314	0.314	0.000	74.06269836	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	-7524.629883	899.1693726	-20.14221191	-0.05128335953	1.334354401	-65.38463593	8.751285553	8.751285553

1 ULS0 : Frame Code Check

General options: Consequence factor 1.25

Description : Norsok N-004 2004

Code	Norsok
CapendIncluded	true
UseCommentary663	true
MaterialFactor	1.15
Azimuthal Tolerance Angle	5

Code	EN 1993-1-1
GammaM0	1.15
GammaM1	1.15
Method1	true
NationalAnnex	Norwegian

ULS0.run(1) : Member Result Brief

- Sorted by UfTot (Descending)
- Then sorted by LoadCase (Ascending)
- Filtered by Limit : (UfTot >= 0.7)
- Run : ULS0.run(1)
- Worst LoadCase per Member
- All SubChecks per Member
- Worst Position along Member (Load factor 2.717)

Member	LoadCase	Position	Status	UfTot	Formula	GeomCheck	SubCheck	Run
Bm5	ULS_Comb	0.00	Failed(uf)	2.03	uf661	Geom OK	EN 1993-1-1 member	ULS0.run(1)
Bm3	ULS_Comb	0.00	Failed(uf)	2.02	uf661	Geom OK	EN 1993-1-1 member	ULS0.run(1)
Bm7	ULS_Comb	0.54	Failed(uf)	1.87	uf661	Geom OK	EN 1993-1-1 member	ULS0.run(1)
Bm2	ULS_Comb	0.56	Failed(uf)	1.78	uf661	Geom OK	EN 1993-1-1 member	ULS0.run(1)
Bm103	ULS_Comb	0.00	Failed(uf)	1.40	uf662	Geom OK	EN 1993-1-1 member	ULS0.run(1)
Bm106	ULS_Comb	0.00	Failed(uf)	1.38	uf662	Geom OK	EN 1993-1-1 member	ULS0.run(1)
Bm4	ULS_Comb	0.18	Failed(uf)	1.22	uf662	Geom OK	EN 1993-1-1 member	ULS0.run(1)
Bm538	ULS_Comb	0.00	Failed(uf)	1.20	uf662	Geom OK	EN 1993-1-1 member	ULS0.run(1)
Bm539	ULS_Comb	0.00	Failed(uf)	1.20	uf662	Geom OK	EN 1993-1-1 member	ULS0.run(1)
Bm102	ULS_Comb	1.00	Failed(uf)	1.12	ufXSection	Geom OK	EN 1993-1-1 member	ULS0.run(1)
Bm101	ULS_Comb	1.00	Failed(uf)	1.12	ufXSection	Geom OK	EN 1993-1-1 member	ULS0.run(1)
Bm537	ULS_Comb	0.00	Failed(uf)	1.10	uf662	Geom OK	EN 1993-1-1 member	ULS0.run(1)
Bm536	ULS_Comb	0.00	Failed(uf)	1.09	uf662	Geom OK	EN 1993-1-1 member	ULS0.run(1)
Bm76	ULS_Comb	0.13	OK	0.85	uf662	Geom OK	EN 1993-1-1 member	ULS0.run(1)
Bm99	ULS_Comb	0.00	OK	0.81	ufXSection	Geom OK	EN 1993-1-1 member	ULS0.run(1)
Bm100	ULS_Comb	0.00	OK	0.79	ufXSection	Geom OK	EN 1993-1-1 member	ULS0.run(1)
Bm74	ULS_Comb	0.14	OK	0.78	uf662	Geom OK	EN 1993-1-1 member	ULS0.run(1)
Bm111	ULS_Comb	0.00	OK	0.77	uf662	Geom OK	EN 1993-1-1 member	ULS0.run(1)
Bm114	ULS_Comb	0.00	OK	0.74	uf662	Geom OK	EN 1993-1-1 member	ULS0.run(1)
Bm524	ULS_Comb	0.00	OK	0.73	uf655	Geom OK	EN 1993-1-1 member	ULS0.run(1)
Bm97	ULS_Comb	1.00	OK	0.71	uf655	Geom OK	EN 1993-1-1 member	ULS0.run(1)

ULS0.run(1) : EN199311 Member Result

- Sorted by Member (Ascending)
- Then sorted by LoadCase (Ascending)
- Filtered by Limit : (UfTot >= 0.7)
- Run : ULS0.run(1)
- Worst LoadCase per Member
- Selected SubCheck per Member
- Worst Position along Member
- (Load factor 2.717)

Member	LoadCase	Position	Status	UfTot	Formula	GeomCheck	SubCheck	Run	ufEuler
	ufAxial	ufTorsion	ufShearz	ufSheary	ufXSection	uf646	uf655	uf661	uf661ax
	uf661mo	uf661my	uf661mz	uf662	uf662ax	uf662mo	uf662my	uf662mz	uf62
	uf62ax	uf62mo	uf62my	uf62mz	sldComp	relpos	fy	E	gammaM0
	gammaM1	NEd	MyEd	MzEd	TEd	VyEd	VzEd	KLy	KLz
	L	Ncry	Ncrz	NtRd	classF	classW	NcRd	MycRd	MzcRd
	alphay	alphaz	chiy	chiz	NbRd	C1	Mcr	chiLT	MbRd
	Cmy	Cmz	CmLT	kyy	kyz	kzy	kzz		
Bm97	ULS_Comb	1.00	OK	0.71	uf655	Geom OK	EN 1993-1-1 member	ULS0.run(1)	0.000
	0.062	0.007	0.271	0.001	0.617	0.000	0.711	0.675	0.000
	0.675	0.649	0.025	0.667	0.000	0.667	0.642	0.025	0.592
	0.062	0.530	0.530	0.000	59.60749054	0.9999899864	355000	210000000	1.149999976
	1.149999976	620.2225342	-2294.224854	-8.057481766	0.1930193007	-2.392577171	472.5550232	4.84499979	4.84499979
	5.699999809	894735.75	18853.35742	9977.043945	3	4	9977.043945	4329.023926	329.5605774
	0.3400000036	0.4900000095	1	0.6746487617	6731	1	9614.236328	0.7452548146	3226.22583
Bm101	ULS_Comb	1.00	Failed(uf)	1.12	ufXSection	Geom OK	EN 1993-1-1 member	ULS0.run(1)	0.000
	0.487	0.000	0.299	0.001	1.118	0.000	0.851	0.379	0.000
	0.379	0.331	0.048	0.310	0.000	0.310	0.270	0.039	1.109
	0.487	0.622	0.622	0.000	71.61161804	0.9999899864	355000	210000000	1.149999976
	1.149999976	3307.01001	739.6437988	-3.806355238	-0.009343666025	-1.671031952	-212.9731598	8.414999962	8.414999962
	9.899999619	24812.47266	8891.494141	6791.304199	3	1	6791.304199	1189.507202	416.7848511
	0.3400000036	0.4900000095	0.8561396003	0.5771499276	3919.601074	1	1878.906372	0.7302536964	868.6420898
	1	1	1.585992813	1.79027462	1.557718158	1.463432193	1.273332477		
Bm102	ULS_Comb	1.00	Failed(uf)	1.12	ufXSection	Geom OK	EN 1993-1-1 member	ULS0.run(1)	0.000
	0.479	0.000	0.307	0.001	1.125	0.000	0.870	0.428	0.000
	0.428	0.378	0.050	0.351	0.000	0.351	0.310	0.041	1.115
	0.479	0.635	0.635	0.000	71.61161804	0.9999899864	355000	210000000	1.149999976
	1.149999976	3255.504395	755.6699219	4.288598537	0.002714948263	1.751773357	-219.0493164	8.414999962	8.414999962
	9.899999619	24812.47266	8891.494141	6791.304199	3	1	6791.304199	1189.507202	416.7848511
	0.3400000036	0.4900000095	0.8561396003	0.5771499276	3919.601074	1	1878.906372	0.7302536964	868.6420898
	1	1	1.57149899	1.770362377	1.544081688	1.453746915	1.267934799		
Bm524	ULS_Comb	0.00	OK	0.73	uf655	Geom OK	EN 1993-1-1 member	ULS0.run(1)	0.000
	0.062	0.007	0.276	0.000	0.625	0.000	0.726	0.687	0.000
	0.687	0.664	0.023	0.679	0.000	0.679	0.657	0.022	0.603
	0.062	0.541	0.541	0.000	59.60749054	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	622.6224365	-2342.346191	-7.18076849	-0.1819797456	1.214919806	-482.2226868	4.84499979	4.84499979
	5.699999809	894735.75	18853.35742	9977.043945	3	4	9977.043945	4329.023926	329.5605774
	0.3400000036	0.4900000095	1	0.6746487617	6731	1	9614.236328	0.7452548146	3226.22583
	1	1	1.033765435	1.034485221	1.034152389	1.023116946	1.02278769		
Bm536	ULS_Comb	0.00	Failed(uf)	1.09	uf662	Geom OK	EN 1993-1-1 member	ULS0.run(1)	0.200

Member	LoadCase	Position	Status	UfTot	Formula	GeomCheck	SubCheck	Run	ufEuler
	ufAxial	ufTorsion	ufShearz	ufSheary	ufXSection	uf646	uf655	uf661	uf661ax
	uf661mo	uf661my	uf661mz	uf662	uf662ax	uf662mo	uf662my	uf662mz	uf62
	uf62ax	uf62mo	uf62my	uf62mz	sldComp	relpos	fy	E	gammaM0
	gammaM1	NEd	MyEd	MzEd	TEd	VyEd	VzEd	KLy	KLz
	L	Ncry	Ncrz	NtRd	classF	classW	NcRd	MycRd	MzcRd
	alphay	alphaz	chiy	chiz	NbRd	C1	Mcr	chiLT	MbRd
	Cmy	Cmz	CmLT	kyy	kyz	kzy	kzz		
	0.422	0.001	0.039	0.001	0.573	0.776	0.120	0.958	0.432
	0.526	0.481	0.044	1.092	0.602	0.489	0.448	0.041	0.539
	0.422	0.117	0.117	0.000	57.52298355	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	-5613.111816	316.0987244	-25.43170929	0.06135497242	6.473323822	-104.0210571	6.796944618	6.796944618
	7.996405602	215668.4063	28061.71875	13829.56543	4	4	13292.44531	3023.729004	746.5681763
	0.3400000036	0.4900000095	0.9763787985	0.7010033727	7229.024902	1	8905.740234	0.8711423278	2634.098145
	1	1	1.395590544	1.431979656	1.249254227	1.33321023	1.163088083		
Bm537	ULS_Comb	0.00	Failed(uf)	1.10	uf662	Geom OK	EN 1993-1-1 member	ULS0.run(1)	0.199
	0.424	0.001	0.042	0.001	0.562	0.776	0.106	0.964	0.434
	0.530	0.487	0.043	1.097	0.603	0.494	0.454	0.040	0.529
	0.424	0.105	0.105	0.000	57.25138092	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	-5633.493164	279.1092529	24.8973465	-0.08871670067	-6.365781784	-110.487175	6.764852047	6.764852047
	7.958649158	217719.5313	28328.60156	13829.56543	4	4	13292.44531	3023.729004	746.5681763
	0.3400000036	0.4900000095	0.9768317938	0.7031806111	7260.055176	1	8976.975586	0.8726220727	2638.57251
	1	1	1.392823339	1.428940535	1.247457266	1.331702709	1.162569284		
Bm538	ULS_Comb	0.00	Failed(uf)	1.20	uf662	Geom OK	EN 1993-1-1 member	ULS0.run(1)	0.293
	0.380	0.005	0.024	0.000	0.598	0.894	0.252	1.035	0.401
	0.634	0.610	0.024	1.202	0.662	0.540	0.519	0.021	0.590
	0.380	0.209	0.209	0.000	73.39948273	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	-5056.899414	599.6916504	-6.415406704	0.3380220234	1.880734205	-63.66389084	8.672920227	8.672920227
	10.2034359	132459.5469	17234.98828	13829.56543	4	4	13292.44531	3023.729004	746.5681763
	0.3400000036	0.4900000095	0.9493553638	0.5743996501	5656.272949	1	5990.699707	0.7875131965	2381.226318
	1	1	1.661038995	1.723504782	1.412406445	1.467602015	1.202695012		
Bm539	ULS_Comb	0.00	Failed(uf)	1.20	uf662	Geom OK	EN 1993-1-1 member	ULS0.run(1)	0.291
	0.375	0.005	0.024	0.000	0.596	0.884	0.257	1.031	0.395
	0.635	0.610	0.025	1.196	0.655	0.542	0.520	0.021	0.588
	0.375	0.213	0.213	0.000	73.61153412	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	-4985.504883	611.4434814	5.423959732	-0.3284776807	-1.833732367	-62.82634735	8.697976112	8.697976112
	10.23291302	131697.5156	17135.83789	13829.56543	4	4	13292.44531	3023.729004	746.5681763
	0.3400000036	0.4900000095	0.9489856362	0.5727617741	5638.396484	1	5963.661621	0.786438942	2377.978271
	1	1	1.650662184	1.712171197	1.407493353	1.459714413	1.199960828		

2 ULS1 : Frame Code Check

General options: Consequence factor 1.10, Load factor 2.391

ULS1.run(1) : Member Result Brief

- Sorted by UfTot (Descending)
- Then sorted by LoadCase (Ascending)
- Filtered by Limit : (UfTot >= 0.6)
- Run : ULS1.run(1)
- Worst LoadCase per Member
- All SubChecks per Member
- Worst Position along Member

Member	LoadCase	Position	Status	UfTot	Formula	GeomCheck	SubCheck	Run
Bm5	ULS_Com1	0.00	Failed(uf)	1.78	uf661	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm3	ULS_Com1	0.00	Failed(uf)	1.77	uf661	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm7	ULS_Com1	0.54	Failed(uf)	1.65	uf661	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm2	ULS_Com1	0.56	Failed(uf)	1.56	uf661	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm103	ULS_Com1	0.00	Failed(uf)	1.21	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm106	ULS_Com1	0.00	Failed(uf)	1.20	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm538	ULS_Com1	0.00	Failed(uf)	1.08	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm4	ULS_Com1	0.18	Failed(uf)	1.07	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm539	ULS_Com1	0.00	Failed(uf)	1.07	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm102	ULS_Com1	1.00	OK	0.99	ufXSection	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm101	ULS_Com1	1.00	OK	0.98	ufXSection	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm537	ULS_Com1	0.00	OK	0.98	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm536	ULS_Com1	0.00	OK	0.97	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm76	ULS_Com1	0.13	OK	0.75	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm99	ULS_Com1	0.00	OK	0.71	ufXSection	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm111	ULS_Com1	0.00	OK	0.69	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm100	ULS_Com1	0.00	OK	0.69	ufXSection	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm74	ULS_Com1	0.14	OK	0.68	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm114	ULS_Com1	0.00	OK	0.66	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm524	ULS_Com1	0.00	OK	0.64	uf655	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm97	ULS_Com1	1.00	OK	0.63	uf655	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm104	ULS_Com1	0.00	OK	0.61	uf661	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm120	ULS_Com1	0.00	OK	0.60	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)
Bm105	ULS_Com1	0.00	OK	0.60	uf661	Geom OK	EN 1993-1-1 member	ULS1.run(1)

ULS1.run(1) : EN199311 Member Result

- Sorted by Member (Ascending)
- Then sorted by LoadCase (Ascending)
- Filtered by Limit : (UfTot >= 0.6)
- Run : ULS1.run(1)
- Worst LoadCase per Member
- Selected SubCheck per Member
- Worst Position along Member

Member	LoadCase	Position	Status	UfTot	Formula	GeomCheck	SubCheck	Run	ufEuler
	ufAxial	ufTorsion	ufShearz	ufSheary	ufXSection	uf646	uf655	uf661	uf661ax
	uf661mo	uf661my	uf661mz	uf662	uf662ax	uf662mo	uf662my	uf662mz	uf62
	uf62ax	uf62mo	uf62my	uf62mz	sldComp	relpos	fy	E	gammaM0
	gammaM1	NEd	MyEd	MzEd	TEd	VyEd	VzEd	KLy	KLz
	L	Ncry	Ncrz	NtRd	classF	classW	NcRd	MycRd	MzcRd
	alphay	alphaz	chiy	chiz	NbRd	C1	Mcr	chiLT	MbRd
	Cmy	Cmz	CmLT	kyy	kyz	kzy	kzz		
Bm74	ULS_Com1	0.14	OK	0.68	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)	0.011
	0.020	0.009	0.280	0.007	0.189	0.030	0.083	0.677	0.020
	0.657	0.312	0.344	0.684	0.030	0.654	0.311	0.343	0.082
	0.020	0.063	0.063	0.000	67.19903564	0.1408550739	355000	210000000	1.149999976
	1.149999976	-122.9301071	-135.1252594	-34.94023514	-0.1896754354	20.08555603	-292.2987671	6.389999866	6.389999866
	7.099999905	142123.8906	10831.9082	7285.217285	3	4	6174.875977	2160.828369	329.3731079
	0.3400000036	0.4900000095	0.9916541576	0.6560794711	4051.208984	1	3729.09668	0.7534613609	1628.100708
	1	1	1.010358334	1.0112257	1.011471868	1.007256389	1.007501602		
Bm76	ULS_Com1	0.13	OK	0.75	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)	0.014
	0.021	0.026	0.286	0.010	0.171	0.034	0.096	0.736	0.021
	0.715	0.340	0.375	0.745	0.034	0.711	0.338	0.373	0.091
	0.021	0.070	0.070	0.000	71.45812988	0.132460326	355000	210000000	1.149999976
	1.149999976	-130.7915955	-150.5889435	26.3842411	0.5438027382	28.621418	-297.4502258	6.795000076	6.795000076
	7.550000191	125686.8594	9579.166992	7285.217285	3	4	6174.875977	2160.828369	329.3731079
	0.3400000036	0.4900000095	0.9866092801	0.6239706874	3852.941406	1	3331.770752	0.723744154	1563.886963
	1	1	1.012719274	1.01376009	1.013828635	1.008524537	1.008592725		
Bm97	ULS_Com1	1.00	OK	0.63	uf655	Geom OK	EN 1993-1-1 member	ULS1.run(1)	0.000
	0.055	0.007	0.238	0.001	0.543	0.000	0.626	0.593	0.000
	0.593	0.571	0.022	0.586	0.000	0.586	0.564	0.022	0.521
	0.055	0.466	0.466	0.000	63.11381531	0.9999899864	355000	210000000	1.149999976
	1.149999976	545.8049316	-2018.951782	-7.090703487	0.1698598266	-2.105503321	415.8554077	5.130000114	5.130000114
	5.699999809	798082.1875	16816.72852	9977.043945	3	4	9977.043945	4329.023926	329.5605774
	0.3400000036	0.4900000095	1	0.6458389759	6443.563477	1	9614.236328	0.7452548146	3226.22583
	1	1	1.033158064	1.033865094	1.033544779	1.021726727	1.021410227		
Bm99	ULS_Com1	0.00	OK	0.71	ufXSection	Geom OK	EN 1993-1-1 member	ULS1.run(1)	0.000
	0.188	0.001	0.103	0.004	0.715	0.000	0.517	0.534	0.000
	0.534	0.325	0.209	0.496	0.000	0.496	0.302	0.194	0.565
	0.188	0.378	0.378	0.000	75.82406616	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	1273.485107	-449.3064575	62.3056221	-0.02685683966	-13.75098228	-73.24054718	8.909999847	8.909999847
	9.899999619	22132.11328	7930.993164	6791.304199	3	1	6791.304199	1189.507202	416.7848511
	0.3400000036	0.4900000095	0.8400398493	0.5443946123	3697.149658	1	1878.906372	0.7302536964	868.6420898
	1	1	1.186657548	1.246929169	1.179763913	1.158171296	1.09578692		

Member	LoadCase	Position	Status	UfTot	Formula	GeomCheck	SubCheck	Run	ufEuler
	ufAxial	ufTorsion	ufShearz	ufSheary	ufXSection	uf646	uf655	uf661	uf661ax
	uf661mo	uf661my	uf661mz	uf662	uf662ax	uf662mo	uf662my	uf662mz	uf62
	uf62ax	uf62mo	uf62my	uf62mz	sldComp	relpos	fy	E	gammaM0
	gammaM1	NEd	MyEd	MzEd	TEd	VyEd	VzEd	KLy	KLz
	L	Ncry	Ncrz	NtRd	classF	classW	NcRd	MycRd	MzcRd
	alphay	alphaz	chiy	chiz	NbRd	C1	Mcr	chiLT	MbRd
	Cmy	Cmz	CmLT	kyy	kyz	kzy	kzz		
							9		
Bm100	ULS_Com1	0.00	OK	0.69	ufXSection	Geom OK	EN 1993-1-1 member	ULS1.run(1)	0.000
	0.184	0.001	0.098	0.004	0.691	0.000	0.494	0.505	0.000
	0.505	0.301	0.204	0.470	0.000	0.470	0.280	0.190	0.545
	0.184	0.361	0.361	0.000	75.82406616	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	1251.144897	-429.4735107	-60.76961899	0.02028676309	13.44840145	-70.04425049	8.909999847	8.909999847
	9.899999619	22132.11328	7930.993164	6791.304199	3	1	6791.304199	1189.507202	416.7848511
	0.3400000036	0.4900000095	0.8400398493	0.5443946123	3697.149658	1	1878.906372	0.7302536964	868.6420898
	1	1	1.182688832	1.241652608	1.176029801	1.154991388	1.093948722		
Bm101	ULS_Com1	1.00	OK	0.98	ufXSection	Geom OK	EN 1993-1-1 member	ULS1.run(1)	0.000
	0.429	0.000	0.263	0.000	0.984	0.000	0.693	0.308	0.000
	0.308	0.266	0.042	0.249	0.000	0.249	0.215	0.034	0.976
	0.429	0.547	0.547	0.000	75.82406616	0.9999899864	355000	210000000	1.149999976
	1.149999976	2910.217529	650.8974609	-3.349648476	-0.008222564124	-1.470532656	-187.4195251	8.909999847	8.909999847
	9.899999619	22132.11328	7930.993164	6791.304199	3	1	6791.304199	1189.507202	416.7848511
	0.3400000036	0.4900000095	0.8400398493	0.5443946123	3697.149658	1	2380.99292	0.7899394631	939.6386719
	1	1	1.573498368	1.768888593	1.542283773	1.433232784	1.249627352		
Bm102	ULS_Com1	1.00	OK	0.99	ufXSection	Geom OK	EN 1993-1-1 member	ULS1.run(1)	0.000
	0.422	0.000	0.270	0.000	0.990	0.000	0.708	0.347	0.000
	0.347	0.304	0.043	0.283	0.000	0.283	0.247	0.035	0.981
	0.422	0.559	0.559	0.000	75.82406616	0.9999899864	355000	210000000	1.149999976
	1.149999976	2864.891602	665.0007324	3.774029732	0.002389193978	1.54158628	-192.7666321	8.909999847	8.909999847
	9.899999619	22132.11328	7930.993164	6791.304199	3	1	6791.304199	1189.507202	416.7848511
	0.3400000036	0.4900000095	0.8400398493	0.5443946123	3697.149658	1	2380.99292	0.7899394631	939.6386719
	1	1	1.559420466	1.749678731	1.529132009	1.424323559	1.244787812		
Bm103	ULS_Com1	0.00	Failed(uf)	1.21	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)	0.273
	0.246	0.003	0.071	0.003	0.554	0.525	0.398	1.117	0.309
	0.809	0.591	0.217	1.214	0.525	0.689	0.504	0.185	0.535
	0.246	0.289	0.289	0.000	87.49377441	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	-1627.750366	-343.6336975	-8.085698128	-0.07164020836	8.698411942	-50.87257385	10.28129387	10.28129387
	11.42365932	16621.98047	5956.449219	6791.304199	3	4	6620.508301	1189.507202	416.7848511
	0.340000003	0.490000009	0.796654582	0.468231797	3099.932617	1	1850.55224	0.726162016	863.774963

Member	LoadCase	Position	Status	UfTot	Formula	GeomCheck	SubCheck	Run	ufEuler
	ufAxial	ufTorsion	ufShearz	ufSheary	ufXSection	uf646	uf655	uf661	uf661ax
	uf661mo	uf661my	uf661mz	uf662	uf662ax	uf662mo	uf662my	uf662mz	uf62
	uf62ax	uf62mo	uf62my	uf62mz	sldComp	relpos	fy	E	gammaM0
	gammaM1	NEd	MyEd	MzEd	TEd	VyEd	VzEd	KLy	KLz
	L	Ncry	Ncrz	NtRd	classF	classW	NcRd	MycRd	MzcRd
	alphay	alphaz	chiy	chiz	NbRd	C1	Mcr	chiLT	MbRd
	Cmy	Cmz	CmLT	kyy	kyz	kzy	kzz		
	6	5		2			6	4	4
	1	1	1.37069118	1.486673117	1.346317053	1.266280174	1.146731377		
Bm104	ULS_Com1	0.00	OK	0.61	uf661	Geom OK	EN 1993-1-1 member	ULS1.run(1)	0.000
	0.032	0.002	0.110	0.002	0.487	0.000	0.560	0.610	0.000
	0.610	0.534	0.076	0.600	0.000	0.600	0.526	0.074	0.414
	0.032	0.382	0.382	0.000	85.01499939	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	216.8295288	454.4335938	-30.51500511	0.05084162205	7.301375866	78.65868378	9.990015984	9.990015984
	11.10001755	17605.40039	6308.855957	6791.304199	3	1	6791.304199	1189.507202	416.7848511
	0.3400000036	0.4900000095	0.8025337458	0.4775724113	3243.3396	1	1584.979736	0.682813704	812.211792
	1	1	1.031569242	1.041867137	1.03304863	1.025366426	1.016687632		
Bm105	ULS_Com1	0.00	OK	0.60	uf661	Geom OK	EN 1993-1-1 member	ULS1.run(1)	0.000
	0.043	0.002	0.111	0.002	0.485	0.000	0.563	0.601	0.000
	0.601	0.529	0.072	0.588	0.000	0.588	0.518	0.070	0.427
	0.043	0.384	0.384	0.000	85.01499939	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	289.1507568	-457.1629333	-24.17228699	-0.04624541104	5.158254147	-79.35686493	9.990015984	9.990015984
	11.10001755	17605.40039	6308.855957	6791.304199	3	1	6791.304199	1189.507202	416.7848511
	0.3400000036	0.4900000095	0.8025337458	0.4775724113	3243.3396	1	1584.979736	0.682813704	812.211792
	1	1	1.043962598	1.057906628	1.044589639	1.035411954	1.022378206		
Bm106	ULS_Com1	0.00	Failed(uf)	1.20	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)	0.269
	0.242	0.003	0.070	0.003	0.549	0.517	0.396	1.103	0.304
	0.800	0.585	0.215	1.200	0.517	0.683	0.500	0.184	0.530
	0.242	0.288	0.288	0.000	87.49377441	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	-1602.123535	342.2207336	-8.067714691	0.06788222492	8.723963737	49.93867493	10.28129387	10.28129387
	11.42365932	16621.98047	5956.449219	6791.304199	3	4	6620.508301	1189.507202	416.7848511
	0.3400000036	0.4900000095	0.796654582	0.4682317972	3099.932617	1	1850.552246	0.7261620164	863.7749634
	1	1	1.362624049	1.475957274	1.338897347	1.26120615	1.144088387		
Bm111	ULS_Com1	0.00	OK	0.69	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)	0.123
	0.076	0.001	0.024	0.001	0.365	0.209	0.399	0.623	0.099
	0.525	0.466	0.059	0.695	0.209	0.486	0.431	0.054	0.313
	0.076	0.237	0.237	0.000	105.6495514	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	-455.8818359	252.4041748	-17.12542152	0.01815171912	1.706987262	17.0167675	10.91229153	10.91229153
	12.12476826	13218.91699	3713.759033	6173.913086	3	4	6003.117188	1065.654785	329.3268127
	0.3400000036	0.4900000095	0.7707536221	0.3631066978	2179.771973	1	1056.243408	0.5931890607	632.1348267

Member	LoadCase	Position	Status	UfTot	Formula	GeomCheck	SubCheck	Run	ufEuler
	ufAxial	ufTorsion	ufShearz	ufSheary	ufXSection	uf646	uf655	uf661	uf661ax
	uf661mo	uf661my	uf661mz	uf662	uf662ax	uf662mo	uf662my	uf662mz	uf62
	uf62ax	uf62mo	uf62my	uf62mz	sldComp	relpos	fy	E	gammaM0
	gammaM1	NEd	MyEd	MzEd	TEd	VyEd	VzEd	KLy	KLz
	L	Ncry	Ncrz	NtRd	classF	classW	NcRd	MycRd	MzcRd
	alphay	alphaz	chiy	chiz	NbRd	C1	Mcr	chiLT	MbRd
	Cmy	Cmz	CmLT	kyy	kyz	kzy	kzz		
	1	1	1.135509372	1.166516542	1.130673766	1.079831839	1.046652555		
Bm114	ULS_Com1	0.00	OK	0.66	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)	0.117
	0.073	0.001	0.022	0.001	0.348	0.200	0.380	0.590	0.094
	0.496	0.440	0.056	0.660	0.200	0.461	0.409	0.052	0.298
	0.073	0.225	0.225	0.000	105.6495514	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	-435.4354553	240.1714478	16.35593796	-0.01734353974	-1.598633409	15.66792393	10.91229153	10.91229153
	12.12476826	13218.91699	3713.759033	6173.913086	3	4	6003.117188	1065.654785	329.3268127
	0.3400000036	0.4900000095	0.7707536221	0.3631066978	2179.771973	1	1056.243408	0.5931890607	632.1348267
	1	1	1.128427386	1.157823205	1.124045253	1.075853705	1.044467092		
Bm120	ULS_Com1	0.00	OK	0.60	uf662	Geom OK	EN 1993-1-1 member	ULS1.run(1)	0.212
	0.186	0.010	0.029	0.002	0.141	0.404	0.176	0.535	0.233
	0.302	0.243	0.059	0.605	0.404	0.201	0.131	0.070	0.316
	0.186	0.130	0.127	0.003	87.48777008	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	-1895.911499	250.2422791	2.907778502	0.4830074906	9.123361588	30.94791794	10.28129387	10.28129387
	11.42365932	26080.01367	8935.899414	10186.95605	1	1	10186.95605	1977.195679	944.6087036
	0.3400000036	0.4900000095	0.8002573252	0.4608588815	4694.749023	1	2987.574707	0.7182303071	1420.081787
	1	1	1.258699059	1.379776239	1.012078285	0.7456095219	1.192994714		
Bm524	ULS_Com1	0.00	OK	0.64	uf655	Geom OK	EN 1993-1-1 member	ULS1.run(1)	0.000
	0.055	0.006	0.243	0.000	0.550	0.000	0.639	0.604	0.000
	0.604	0.584	0.020	0.597	0.000	0.597	0.578	0.020	0.531
	0.055	0.476	0.476	0.000	63.11381531	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	547.9168701	-2061.299316	-6.319182396	-0.1601448655	1.06914711	-424.3630676	5.130000114	5.130000114
	5.699999809	798082.1875	16816.72852	9977.043945	3	4	9977.043945	4329.023926	329.5605774
	0.3400000036	0.4900000095	1	0.6458389759	6443.563477	1	9614.236328	0.7452548146	3226.22583
	1	1	1.033292174	1.034002066	1.033679008	1.021814108	1.021494865		

3 ULS2 : Frame Code Check

General options: Consequence factor 1.0, (Load factor 2.173)

ULS2.run(1) : Member Result Brief

- Sorted by UfTot (Descending)
- Then sorted by LoadCase (Ascending)
- Filtered by Limit : (UfTot >= 0.5)
- Run : ULS2.run(1)
- Worst LoadCase per Member
- All SubChecks per Member
- Worst Position along Member

Member	LoadCase	Position	Status	UfTot	Formula	GeomCheck	SubCheck	Run
Bm103	ULS_Com2	0.00	OK	0.93	uf662	Geom OK	EN 1993-1-1 member	ULS2.run(1)
Bm102	ULS_Com2	1.00	OK	0.90	ufXSection	Geom OK	EN 1993-1-1 member	ULS2.run(1)
Bm101	ULS_Com2	1.00	OK	0.89	ufXSection	Geom OK	EN 1993-1-1 member	ULS2.run(1)
Bm106	ULS_Com2	0.00	OK	0.85	uf662	Geom OK	EN 1993-1-1 member	ULS2.run(1)
Bm7	ULS_Com2	0.00	OK	0.73	ufShearz	Geom OK	EN 1993-1-1 member	ULS2.run(1)
Bm2	ULS_Com2	0.00	OK	0.69	ufShearz	Geom OK	EN 1993-1-1 member	ULS2.run(1)
Bm3	ULS_Com2	0.00	OK	0.67	ufXSection	Geom OK	EN 1993-1-1 member	ULS2.run(1)
Bm5	ULS_Com2	0.00	OK	0.67	ufXSection	Geom OK	EN 1993-1-1 member	ULS2.run(1)
Bm99	ULS_Com2	0.00	OK	0.65	ufXSection	Geom OK	EN 1993-1-1 member	ULS2.run(1)
Bm100	ULS_Com2	0.00	OK	0.63	ufXSection	Geom OK	EN 1993-1-1 member	ULS2.run(1)
Bm76	ULS_Com2	0.13	OK	0.59	uf662	Geom OK	EN 1993-1-1 member	ULS2.run(1)
Bm74	ULS_Com2	0.14	OK	0.55	uf662	Geom OK	EN 1993-1-1 member	ULS2.run(1)
Bm533	ULS_Com2	0.00	OK	0.52	uf6_26	Geom OK	Norsok member	ULS2.run(1)
Bm531	ULS_Com2	0.00	OK	0.52	uf6_26	Geom OK	Norsok member	ULS2.run(1)
Bm524	ULS_Com2	0.00	OK	0.50	ufXSection	Geom OK	EN 1993-1-1 member	ULS2.run(1)

ULS2.run(1) : EN199311 Member Result

Total applied factor:2.173

Member	LoadCase	Position	Status	UfTot	Formula	GeomCheck	SubCheck	Run	ufEuler
	ufAxial	ufTorsion	ufShearz	ufShreary	ufXSection	uf646	uf655	uf661	uf661ax
	uf661mo	uf661my	uf661mz	uf662	uf662ax	uf662mo	uf662my	uf662mz	uf62
	uf62ax	uf62mo	uf62my	uf62mz	sldComp	relpos	fy	E	gammaM0
	gammaM1	NEd	MyEd	MzEd	TEd	VyEd	VzEd	KLy	KLz
	L	Ncry	Ncrz	NtRd	classF	classW	NcRd	MycRd	MzcRd
	alphay	alphaz	chiy	chiz	NbRd	C1	Mcr	chiLT	MbRd
	Cmy	Cmz	CmLT	kyy	kyz	kzy	kzz		
Bm2	ULS_Com2	0.00	OK	0.69	ufShearz	Geom OK	EN 1993-1-1 member	ULS2.run(1)	0.000
	0.018	0.389	0.693	0.025	0.568	0.000	0.444	0.566	0.000
	0.566	0.470	0.095	0.552	0.000	0.552	0.459	0.093	0.476
	0.018	0.458	0.458	0.000	115.7823563	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	189.0987549	-1886.343994	44.22438049	11.56513119	-72.5094986	-1025.432495	12.83500004	12.83500004
	15.10000038	107237.9375	5244.331543	10470.95605	4	3	10470.95605	4244.850098	480.9082642
	0.3400000036	0.4900000095	0.9510908723	0.3096295595	3242.117676	1	354200.0625	1	4244.850098
	1	1	1	1.001679897	1.037316918	0.976547718	1.01129055		
Bm3	ULS_Com2	0.00	OK	0.67	ufXSection	Geom OK	EN 1993-1-1 member	ULS2.run(1)	0.000
	0.030	0.223	0.585	0.053	0.673	0.000	0.509	0.636	0.000
	0.636	0.496	0.139	0.605	0.000	0.605	0.472	0.133	0.542
	0.030	0.512	0.512	0.000	121.5534592	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	346.3488464	-2271.159668	63.07462692	-7.901228428	-172.6195679	-1286.083008	12.83500004	12.83500004
	15.10000038	112147.4844	5246.334473	11545.21777	4	3	11545.21777	4461.348145	484.0997925
	0.3400000036	0.4900000095	0.9477084875	0.2868351042	3311.573486	1	354324.4063	1	4461.348145
	1	1	1	1.00293541	1.070510268	0.9549592733	1.019301534		
Bm5	ULS_Com2	0.00	OK	0.67	ufXSection	Geom OK	EN 1993-1-1 member	ULS2.run(1)	0.000
	0.029	0.224	0.581	0.057	0.670	0.000	0.485	0.656	0.000

Member	LoadCase	Position	Status	UfTot	Formula	GeomCheck	SubCheck	Run	ufEuler
	ufAxial	ufTorsion	ufShearz	ufSheary	ufXSection	uf646	uf655	uf661	uf661ax
	uf661mo	uf661my	uf661mz	uf662	uf662ax	uf662mo	uf662my	uf662mz	uf62
	uf62ax	uf62mo	uf62my	uf62mz	sldComp	relpos	fy	E	gammaM0
	gammaM1	NEd	MyEd	MzEd	TEd	VyEd	VzEd	KLy	KLz
	L	Ncry	Ncrz	NtRd	classF	classW	NcRd	MycRd	MzcRd
	alphay	alphaz	chiy	chiz	NbRd	C1	Mcr	chiLT	MbRd
	Cmy	Cmz	CmLT	kyy	kyz	kzy	kzz		
	0.656	0.492	0.163	0.625	0.000	0.625	0.470	0.156	0.517
	0.029	0.488	0.488	0.000	121.5534592	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	334.6542664	-2165.371338	-74.04611969	7.920801163	185.3832703	-1278.162598	12.83500004	12.83500004
	15.10000038	112147.4844	5246.334473	11545.21777	4	3	11545.21777	4461.348145	484.0997925
	0.3400000036	0.4900000095	0.9477084875	0.2868351042	3311.573486	1	354324.4063	1	4461.348145
	1	1	1	1.002835989	1.067967176	0.9565149546	1.018637657		
Bm7	ULS_Com2	0.00	OK	0.73	ufShearz	Geom OK	EN 1993-1-1 member	ULS2.run(1)	0.000
	0.018	0.389	0.731	0.025	0.591	0.000	0.454	0.597	0.000
	0.597	0.494	0.103	0.582	0.000	0.582	0.481	0.101	0.492
	0.018	0.474	0.474	0.000	115.7823563	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	189.5670776	-1926.921265	-47.89056396	-11.57364178	74.77993774	-1081.094971	12.83500004	12.83500004
	15.10000038	107237.9375	5244.331543	10470.95605	4	3	10470.95605	4244.850098	480.9082642
	0.3400000036	0.4900000095	0.9510908723	0.3096295595	3242.117676	1	354200.0625	1	4244.850098
	1	1	1	1.00168407	1.037412763	0.9764888287	1.011318922		

ULS0 : Frame Code Check

Description : Maximum Load in SLINGs and SPREADER beams

Description : Norsok N-004 2004

General options

Code	Norsok
CapendIncluded	true
UseCommentary663	true
MaterialFactor	1.15
Azimuthal Tolerance Angle	5

General options

Code	EN 1993-1-1
GammaM0	1.15
GammaM1	1.15
Method1	true
NationalAnnex	Norwegian

ULS0.run(1) : Member Result Brief

- Sorted by UfTot (Descending)
- Then sorted by LoadCase (Ascending)
- Filtered by Limit : (UfTot >= 0.7)
- Run : ULS0.run(1)
- Worst LoadCase per Member
- All SubChecks per Member
- Worst Position along Member

Member	LoadCase	Position	Status	UfTot	Formula	GeomCheck	SubCheck	Run
Bm5	ULS_Comb	0.00	Failed(uf)	2.03	uf661	Geom OK	EN 1993-1-1 member	ULS0.run(1)
Bm3	ULS_Comb	0.00	Failed(uf)	2.02	uf661	Geom OK	EN 1993-1-1 member	ULS0.run(1)
Bm7	ULS_Comb	0.54	Failed(uf)	1.87	uf661	Geom OK	EN 1993-1-1 member	ULS0.run(1)
Bm541	ULS_Comb	1.00	Failed(geo)	1.87	ufXSection	sldComp	EN 1993-1-1 member	ULS0.run(1)
Bm540	ULS_Comb	1.00	Failed(geo)	1.86	ufXSection	sldComp	EN 1993-1-1 member	ULS0.run(1)
Bm2	ULS_Comb	0.56	Failed(uf)	1.78	uf661	Geom OK	EN 1993-1-1 member	ULS0.run(1)
Bm542	ULS_Comb	1.00	Failed(geo)	1.40	ufXSection	sldComp	EN 1993-1-1 member	ULS0.run(1)
Bm103	ULS_Comb	0.00	Failed(uf)	1.40	uf662	Geom OK	EN 1993-1-1 member	ULS0.run(1)
Bm543	ULS_Comb	1.00	Failed(geo)	1.40	ufXSection	sldComp	EN 1993-1-1 member	ULS0.run(1)
Bm106	ULS_Comb	0.00	Failed(uf)	1.38	uf662	Geom OK	EN 1993-1-1 member	ULS0.run(1)
Bm4	ULS_Comb	0.18	Failed(uf)	1.22	uf662	Geom OK	EN 1993-1-1 member	ULS0.run(1)
Bm538	ULS_Comb	0.00	Failed(uf)	1.20	uf662	Geom OK	EN 1993-1-1 member	ULS0.run(1)
Bm539	ULS_Comb	0.00	Failed(uf)	1.20	uf662	Geom OK	EN 1993-1-1 member	ULS0.run(1)
Bm102	ULS_Comb	1.00	Failed(uf)	1.13	ufXSection	Geom OK	EN 1993-1-1 member	ULS0.run(1)
Bm101	ULS_Comb	1.00	Failed(uf)	1.12	ufXSection	Geom OK	EN 1993-1-1 member	ULS0.run(1)
Bm537	ULS_Comb	0.00	Failed(uf)	1.10	uf662	Geom OK	EN 1993-1-1 member	ULS0.run(1)
Bm536	ULS_Comb	0.00	Failed(uf)	1.09	uf662	Geom OK	EN 1993-1-1 member	ULS0.run(1)
Bm76	ULS_Comb	0.13	OK	0.84	uf662	Geom OK	EN 1993-1-1 member	ULS0.run(1)
Bm99	ULS_Comb	0.00	OK	0.81	ufXSection	Geom OK	EN 1993-1-1 member	ULS0.run(1)
Bm100	ULS_Comb	0.00	OK	0.79	ufXSection	Geom OK	EN 1993-1-1 member	ULS0.run(1)
Bm74	ULS_Comb	0.14	OK	0.78	uf662	Geom OK	EN 1993-1-1 member	ULS0.run(1)
Bm111	ULS_Comb	0.00	OK	0.77	uf662	Geom OK	EN 1993-1-1 member	ULS0.run(1)
Bm114	ULS_Comb	0.00	OK	0.74	uf662	Geom OK	EN 1993-1-1 member	ULS0.run(1)
Bm524	ULS_Comb	0.00	OK	0.73	uf655	Geom OK	EN 1993-1-1 member	ULS0.run(1)
Bm97	ULS_Comb	1.00	OK	0.71	uf655	Geom OK	EN 1993-1-1 member	ULS0.run(1)

ULS0.run(1) : EN199311 Member Result

- Sorted by Member (Ascending)
- Then sorted by LoadCase (Ascending)
- Filtered by Limit : (UfTot >= 0.7)
- Run : ULS0.run(1)
- Worst LoadCase per Member
- Selected SubCheck per Member
- Worst Position along Member

Member	LoadCase	Position	Status	UfTot	Formula	GeomCheck	SubCheck	Run	ufEuler
	ufAxial	ufTorsion	ufShearz	ufSheary	ufXSection	uf646	uf655	uf661	uf661ax
	uf661mo	uf661my	uf661mz	uf662	uf662ax	uf662mo	uf662my	uf662mz	uf62
	uf62ax	uf62mo	uf62my	uf62mz	sldComp	relpos	fy	E	gammaM0
	gammaM1	NEd	MyEd	MzEd	TEd	VyEd	VzEd	KLy	KLz
	L	Ncry	Ncrz	NtRd	classF	classW	NcRd	MycRd	MzcRd
	alphay	alphaz	chiy	chiz	NbRd	C1	Mcr	chiLT	MbRd
	Cmy	Cmz	CmLT	kyy	kyz	kzy	kzz		
Bm536	ULS_Comb	0.00	Failed(uf)	1.09	uf662	Geom OK	EN 1993-1-1 member	ULS0.run(1)	0.200
	0.422	0.001	0.039	0.001	0.574	0.777	0.120	0.959	0.433
	0.526	0.482	0.045	1.092	0.603	0.490	0.448	0.042	0.539
	0.422	0.117	0.117	0.000	57.52298355	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	-5614.60791	316.7018433	-25.73028374	0.06483916938	6.549664021	-103.9479446	6.796944618	6.796944618
	7.996405602	215668.4063	28061.71875	13829.56543	4	4	13292.44531	3023.729004	746.5681763
	0.3400000036	0.4900000095	0.9763787985	0.7010033727	7229.024902	1	8905.740234	0.8711423278	2634.098145
	1	1	1.395742655	1.432145834	1.249337316	1.333334088	1.163138628		
Bm537	ULS_Comb	0.00	Failed(uf)	1.10	uf662	Geom OK	EN 1993-1-1 member	ULS0.run(1)	0.199
	0.424	0.001	0.042	0.001	0.561	0.776	0.106	0.963	0.434
	0.529	0.487	0.043	1.096	0.603	0.493	0.454	0.040	0.528
	0.424	0.104	0.104	0.000	57.25138092	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	-5631.797363	278.4284668	24.61642265	-0.08533162624	-6.293637276	-110.5685577	6.764852047	6.764852047
	7.958649158	217719.5313	28328.60156	13829.56543	4	4	13292.44531	3023.729004	746.5681763
	0.3400000036	0.4900000095	0.9768317938	0.7031806111	7260.055176	1	8976.975586	0.8726220727	2638.57251
	1	1	1.392652988	1.428754687	1.247364402	1.331563592	1.162512302		
Bm538	ULS_Comb	0.00	Failed(uf)	1.20	uf662	Geom OK	EN 1993-1-1 member	ULS0.run(1)	0.294
	0.381	0.005	0.024	0.000	0.598	0.894	0.251	1.034	0.401
	0.633	0.610	0.024	1.202	0.663	0.539	0.519	0.020	0.589
	0.381	0.209	0.209	0.000	73.39948273	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	-5058.643555	597.8460693	-6.203953743	0.3359425068	1.830127835	-63.84736252	8.672920227	8.672920227
	10.2034359	132459.5469	17234.98828	13829.56543	4	4	13292.44531	3023.729004	746.5681763
	0.3400000036	0.4900000095	0.9493553638	0.5743996501	5656.272949	1	5990.699707	0.7875131965	2381.226318
	1	1	1.661433578	1.723936558	1.412607789	1.467863083	1.202779055		
Bm539	ULS_Comb	0.00	Failed(uf)	1.20	uf662	Geom OK	EN 1993-1-1 member	ULS0.run(1)	0.291
	0.375	0.005	0.024	0.000	0.596	0.884	0.258	1.031	0.395
	0.636	0.610	0.026	1.197	0.655	0.542	0.520	0.022	0.589
	0.375	0.214	0.214	0.000	73.61153412	9.999999747e-006	355000	210000000	1.149999976
	1.149999976	-4983.574219	613.3657837	5.631610394	-0.3305507898	-1.883362293	-62.63460541	8.697976112	8.697976112
	10.23291302	131697.5156	17135.83789	13829.56543	4	4	13292.44531	3023.729004	746.5681763
	0.3400000036	0.4900000095	0.9489856362	0.5727617741	5638.396484	1	5963.661621	0.786438942	2377.978271
	1	1	1.650229335	1.711697459	1.407270789	1.45942831	1.199867845		

GeniE V6.4-08	Report: sls_uls15	Model Id: sls_uls15	Sign: ofsbamom
		Description: sls_uls1	Date: 29-Apr-2015
		Model file name: C:\DNV\Workspaces\GeniE\SLS_Lift1	Last saved: 29-Apr-2015 16:46:31

Member	LoadCase	Position	Status	UfTot	Formula	GeomCheck	SubCheck	Run	ufEuler
	ufAxial	ufTorsion	ufShearz	ufSheary	ufXSection	uf646	uf655	uf661	uf661ax
	uf661mo	uf661my	uf661mz	uf662	uf662ax	uf662mo	uf662my	uf662mz	uf62
	uf62ax	uf62mo	uf62my	uf62mz	sldComp	relpos	fy	E	gammaM0
	gammaM1	NEd	MyEd	MzEd	TEd	VyEd	VzEd	KLy	KLz
	L	Ncry	Ncrz	NtRd	classF	classW	NcRd	MycRd	MzcRd
	alphay	alphaz	chiy	chiz	NbRd	C1	Mcr	chiLT	MbRd
	Cmy	Cmz	CmLT	kyy	kyz	kzy	kzz		
Bm540	ULS_Comb	1.00	Failed(geo)	1.86	ufXSection	sldComp	EN 1993-1-1 member	ULS0.run(1)	0.000
	1.828	0.000	0.000	0.000	1.862	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.859
	1.828	0.031	0.031	0.000	286.4151306	0.9999899864	265000	210000000	1.149999976
	1.149999976	9477.378906	-4.01794529	0.3506610692	0	0.02441980131	0.2991350591	12.40213871	12.40213871
	14.59075165	568.4727783	568.4727783	5184.782715	3	3	5184.782715	129.6195679	129.6195679
	0.4900000095	0.4900000095	0.08256582916	0.08256582916	428.0858765	1	1539.592651	1	129.6195679
	1	1	1	-2.655982018	-2.655982018	-2.655982018	-2.655982018		
Bm541	ULS_Comb	1.00	Failed(geo)	1.87	ufXSection	sldComp	EN 1993-1-1 member	ULS0.run(1)	0.000
	1.827	0.000	0.000	0.000	1.868	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.860
	1.827	0.033	0.033	0.000	286.3475647	0.9999899864	265000	210000000	1.149999976
	1.149999976	9472.931641	-4.318638802	-0.9547244906	0	-0.06573843956	0.3197725117	12.39921379	12.39921379
	14.58731079	568.7409668	568.7409668	5184.782715	3	3	5184.782715	129.6195679	129.6195679
	0.4900000095	0.4900000095	0.08260191232	0.08260191232	428.2729492	1	1539.955933	1	129.6195679
	1	1	1	-2.660885334	-2.660885334	-2.660885334	-2.660885334		
Bm542	ULS_Comb	1.00	Failed(geo)	1.40	ufXSection	sldComp	EN 1993-1-1 member	ULS0.run(1)	0.000
	1.374	0.000	0.000	0.000	1.404	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.401
	1.374	0.027	0.027	0.000	313.8782654	0.9999899864	265000	210000000	1.149999976
	1.149999976	7125.434082	-3.443386316	-0.4307849109	0	-0.02720749564	0.2461544126	13.59132767	13.59132767
	15.98979759	473.3463745	473.3463745	5184.782715	3	3	5184.782715	129.6195679	129.6195679
	0.4900000095	0.4900000095	0.06963594258	0.06963594258	361.0472107	1	1404.884277	1	129.6195679
	1	1	1	-20.72451401	-20.72451401	-20.72451401	-20.72451401		
Bm543	ULS_Comb	1.00	Failed(geo)	1.40	ufXSection	sldComp	EN 1993-1-1 member	ULS0.run(1)	0.000
	1.365	0.000	0.000	0.000	1.397	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.390
	1.365	0.025	0.025	0.000	313.9398804	0.9999899864	265000	210000000	1.149999976
	1.149999976	7076.831055	-3.213629484	-0.9508603811	0	-0.05928894505	0.2317611873	13.59399605	13.59399605
	15.99293709	473.160553	473.160553	5184.782715	3	3	5184.782715	129.6195679	129.6195679
	0.4900000095	0.4900000095	0.06961041689	0.06961041689	360.9148865	1	1404.608521	1	129.6195679
	1	1	1	-24.3137722	-24.3137722	-24.3137722	-24.3137722		