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## DIGITAL SOLUTIONS

# NAUTICUS HULL

## Rule strength analysis of hull structures

Nauticus Hull is DNV GL's software solution for strength analysis of ships and FPSOs. It offers all the programs you need for hull design and verification according to DNV GL rules for ships and FPSOs and IACS Common Structural Rules. Based on DNV GL's strong industry knowledge and expertise, the system provides a highly efficient environment for design and verification.

## Efficient design and analysis

Nauticus Hull is a complete structural analysis package, developed by naval architects for naval architects. The system is an important part of the design and verification work for more than 200 users worldwide, many of whom use it alongside Sesam GeniE. High quality technical support and a development strategy based on the latest technology make Nauticus Hull a safe long-term solution.

### Rule calculations

User-friendliness and powerful modelling capabilities make the Rule Check package a generic design tool and a preferred system among ship designers for initial hull girder design and optimization.

Rule Check includes:

### Section Scantlings

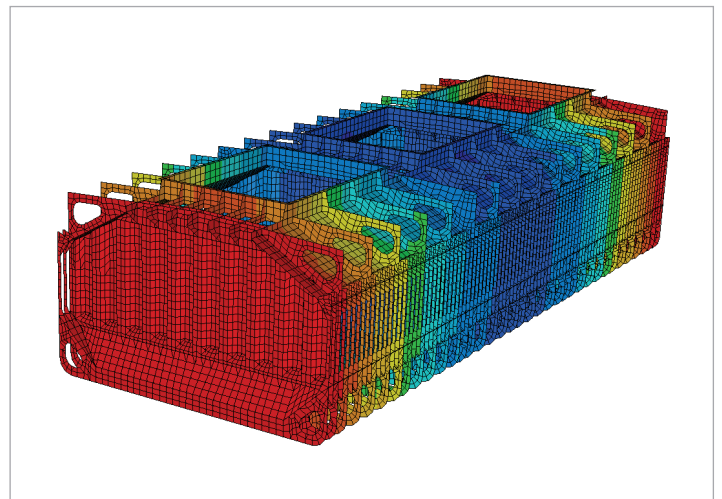
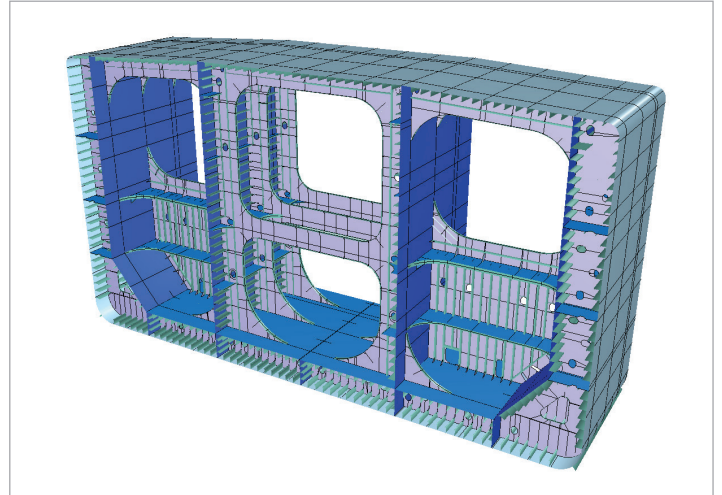
Section Scantlings is well established as the market leader for hull scantling design. Section Scantlings is used for designing ship cross-sections and transverse bulkheads. A rule check can be performed to verify the hull girder longitudinal strength, local strength and buckling of plates and stiffeners. Shear flow calculations are also included in the program. The model data defined by Section Scantlings may later be expanded into 3D finite element models.

### Fatigue

Fatigue calculations of longitudinals are done directly from Section Scantlings. Structural data such as stiffener dimensions, end connection and bracket geometry are all input in the Section Scantlings program and used to calculate the fatigue strength. As a result of this, user interaction is reduced to a minimum and results are presented directly in the Section Scantlings report.

### Rule Check XL

Together with Section Scantlings, Rule Check XL provides all features needed to carry out rule check and hull structural analysis according to the DNV Rules for Ships and the IACS Common Structural Rules. The Rule Check XL programs are all fully integrated into the Nauticus Hull system and share common ship data with the other Nauticus Hull modules.



### Finite element analysis

Nauticus Hull and Sesam form a complete software package for direct strength analysis of ships and FPSOs. It builds on DNV GL's market-leading Sesam GeniE for 3D modelling and analysis, and provides full support for cargo hold analysis.

Sesam GeniE represents the latest generation design and analysis software for maritime and offshore structures. This has been motivated and driven by end-user needs for solutions offering faster modelling speeds, closely integrated with advanced strength assessment tools.

By offering design, modelling, analysis and result evaluation features within the same user interface, Sesam GeniE supports the engineers' need for fast design iterations.



Reducing time to market is a key challenge for ship designers as regulations and strength requirements become more complex

By introducing concept modelling techniques, Sesam GeniE allows engineers to focus on real structural parts, loads and environmental conditions instead of nodes and elements. Combined with strong features for 3D visualization, this significantly reduces the time spent on modelling and documentation, and provides efficient verification.

Rule load cases, boundary conditions and corrosion additions are automatically created from Nauticus Hull and with integrated code checks the time spent on evaluation has been dramatically reduced.

#### **Beam analysis**

3DBeam is a highly efficient three-dimensional general beam element analysis program offered in the Rule Check Extended package. 3D Beam is an important supplement to the rule

check programs and a valuable tool for strength evaluation of both ship and frame structures.

3D Beam has an intuitive and user-friendly interface, tailor-made for modelling complex 3D frame structures such as web frames, foundations, deck grillages, etc. The program features a powerful solver allowing fast and accurate linear static analysis of complex models with multiple load cases.

#### **Container Securing**

Container Securing is a software tool for assessing forces on containers and securing devices during sea transport. A user-friendly environment lets the user easily model container arrangements and perform analyses. The program utilizes a seamless combination of Microsoft Excel for input specification and result presentation and Nauticus 3D Beam for the analytical solution.



### **Buckling assessment**

PULS (Panel Ultimate Limit State) is a computerized buckling code recognized by DNV GL for strength assessment of stiffened thin plate elements in ship and offshore structures.

The methods used by PULS are based on advanced mathematical models, implemented into easy and intuitive user interfaces. The PULS strength limits are quickly assessed and supported by 3D graphics for improved understanding of the buckling phenomena.

The PULS code is implemented as part of the Nauticus Hull programs for automatic buckling control. PULS buckling check is available in Section Scantlings and in Sesam GeniE for buckling assessment of finite element models. In addition, two different stand-alone user interfaces are available.

PULS XL is fast and convenient to use for automatic buckling control of many real cases.

PULS Advanced Viewer provides easy access to 3D graphics of different results such as buckling modes, redistributed stress patterns etc. This gives a deep understanding of the physical behaviour of non-linear buckling response.

### **Training, conferences, seminars and workshops**

DNV GL - Digital Solutions organizes user conferences, seminars and workshops worldwide, providing a unique opportunity to communicate with our users and receive valuable feedback.

Our training catalogue includes open courses in all regions, and customers can request customized training. Many of the courses are held jointly by our own software support team and by engineers from DNV GL, who bring essential domain expertise.