



# Nauticus<sup>TM</sup> Early Design

State-of-the-art solution for ship design

DNV Software

# Ship design

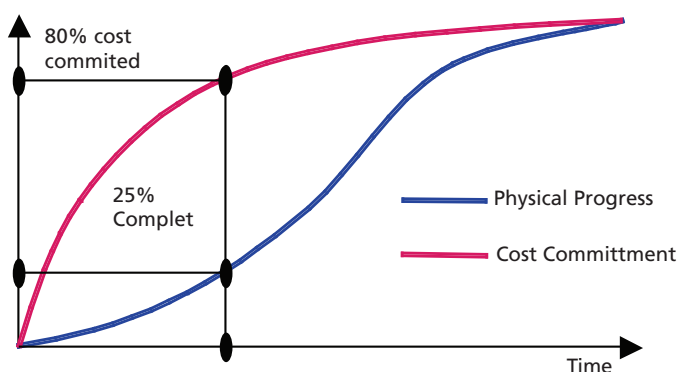
Efficient integration of people, disciplines and systems is a key issue to improve competitiveness in ship design



## Key challenges in ship design

Ship design is an iterative process – you need to guess the ship's scantlings in order to settle the scantlings. Any changes in main dimensions made during the design cycle will require new loads and hence new analysis to be carried out. The ability to effectively manage changes throughout a project, perform concurrent work across disciplines, avoid duplication of information and automate repetitive operations are all important factors to improve the competitive position in ship design.

Typically 70 to 80 per cent of the total cost of a ship newbuilding project is determined during the early



design process. Efficient tools are essential for ship designers to optimise the design and reduce the risk of costly design changes later in the process.

## Nauticus Early Design makes a difference

Technology innovation has resulted in new possibilities for bridging different design domains. Utilising the power of existing design knowledge together with new information technology in a more integrated and structured manner is an essential issue for improving design team productivity.

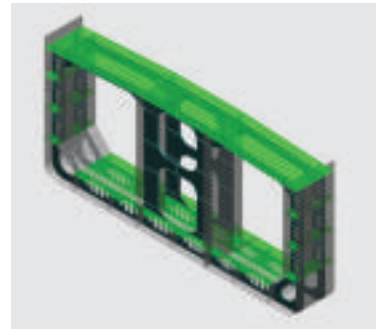
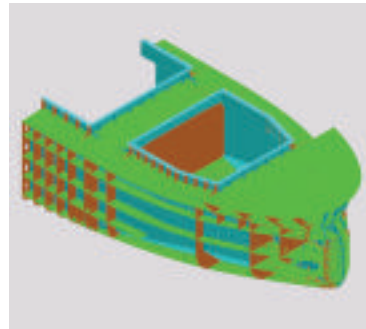
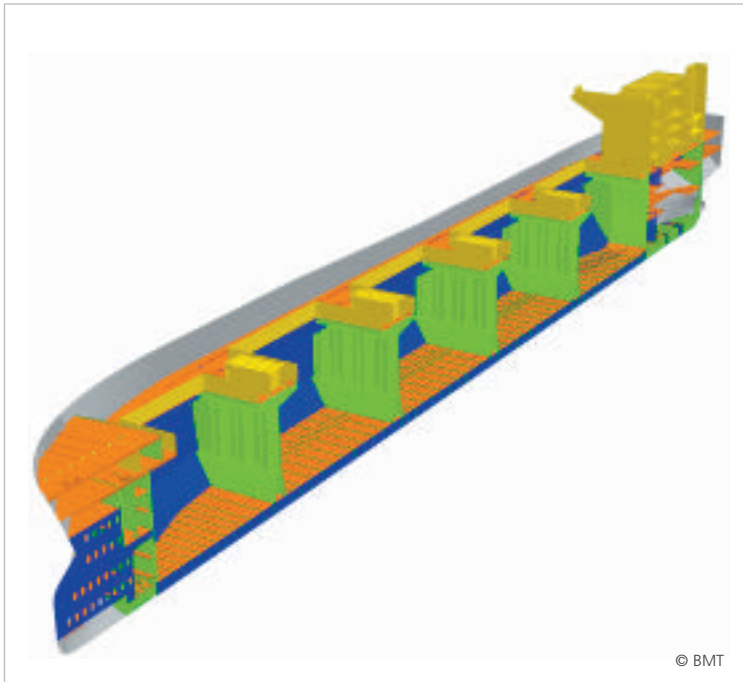
With Nauticus Early Design DNV Software has launched the next generation 3D ship design and analysis system. The system combines state-of-the-art technologies developed by DNV Software and \*Intergraph Process, Power and Marine (PPM). A powerful associative ship modeller, multi-user functionality and a rule based design environment enable ship designers to perform contract and classification design in a fast and efficient way.

*“Reducing time to market for new ship designs is a key concern of ours. By introducing Nauticus Early Design, we are achieving better integration and better collaboration between the involved parties, ensuring significant time reductions and improved solutions. In short – Nauticus Early Design means better ships quicker.”* Torben Andersen, Senior Vice President, Odense Steel Shipyard.

\*[www.intergraph.com](http://www.intergraph.com)

# Nauticus Early Design

A complete package for early design of ship structures, closing the gap between traditional draftsmen, structural engineers and naval architects



## Next generation design system for early design

Nauticus Early Design is a unique solution for early design of ship structures. The system is based on Intergraph's powerful database-driven ship design system Smart Marine 3D (SM3D) combined with DNV Software's reputed system Nauticus Hull for rule check and strength assessment.

Nauticus Early Design utilises one common concept model of the ship for all design tasks pertaining to the early design phase. Decks, bulkheads, plates and stiffeners are linked together by a robust associative data model. This allows easy modification and update of ship structures as required in an iterative ship design process.

## Improved quality and productivity

By introducing a 3D model early in the design process numerous productivity barriers imposed by current generation technology are eliminated. The model is shared across design disciplines and modifications are visible to all project members. The system's advanced rule engine allows a high degree of automation and elimination of repetitive modelling tasks, contributing to shortened lead time and improved design quality.

The system has a powerful workflow engine that allows the engineer to streamline the design process. The system provides for extensive re-use of previous design projects ensuring preservation of the corporate knowledge.

## Early planning and estimation

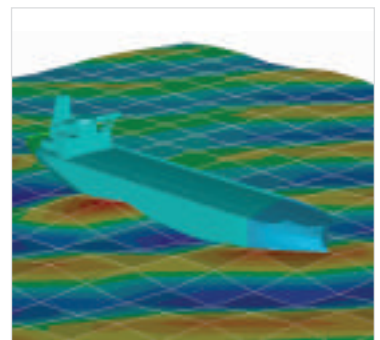
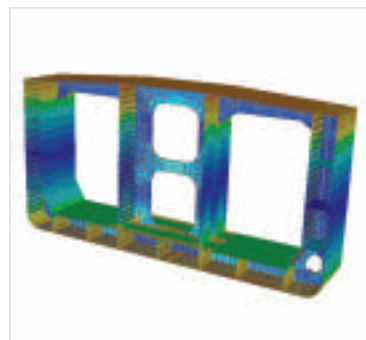
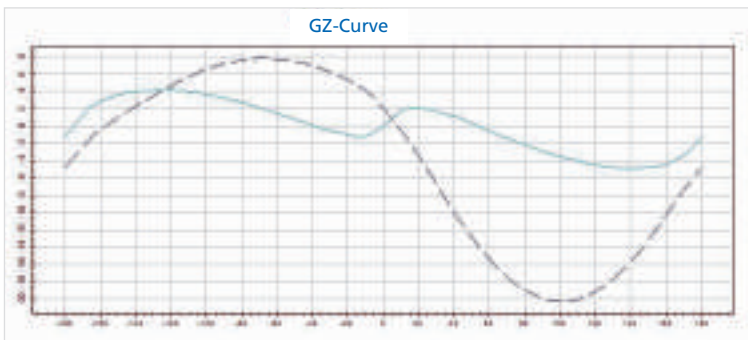
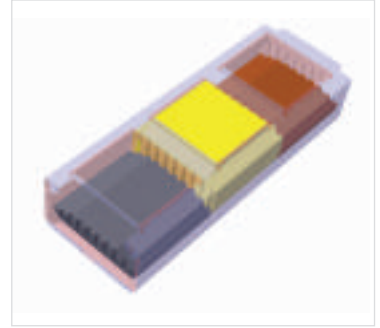
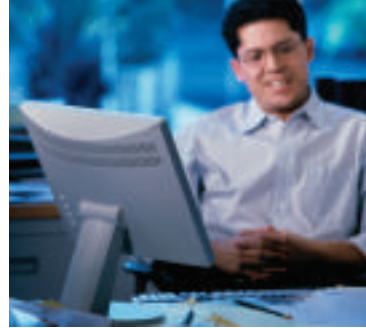
The ship's block and assembly structure can be defined early in the design process. Objects are automatically assigned to the assemblies and sub-assemblies as they are created in the product model. This top-down approach ensures that production considerations can be taken into account from the very start of a design project. The block and assembly structure can be altered at any time during the design process – e.g when changing to another production facility. With comprehensive report generation capabilities for weight, centre of gravity and material take-off, Nauticus Early Design provides the information needed to make the right decisions in the early design phase.

## Automatic classification and design drawings

Nauticus Early Design automates the production of design and key plan drawings. The drawings are automatically extracted from the 3D model and details are generated by configurable rules that ensure correct detailing and annotation based on attributes stored with the hull objects in the 3D model. This feature, together with the loosely coupled Class rule checking, ensures that classification drawings comply with the prevailing design model. A powerful equipment modeller is also included in Nauticus Early Design for visualisation, space allocation, weight estimates and definition of General Arrangement drawings.

# Integration with analysis tools

Integration of design and engineering poses a key challenge as regulations and strength requirements become more complex



## Integration cross disciplines

Effective integration is a prerequisite for improving contract and design work processes. Nauticus Early Design allows ship designers, naval architects and structural engineers to communicate through a multi-user and multidiscipline database. The system integrates the disciplines by effectively exchanging data between the design model and the various analysis programs in the Nauticus Hull suite. A unified, documented structure forms a foundation for further integration with complementary design and analysis software.

## Compartments

The compartments module is a comprehensive and versatile part of Nauticus Early Design. Compartments can be generated automatically by the system or through manual input by the user. Capacities, weight and COG calculations are readily available. Compartments and compartment data are also important elements in communication with strength assessment and naval architect calculations.

## IACS Integration with common structural rules

DNV Software's well-known scantlings tool, Nauticus Hull Rule Check, is included as an integrated part of Nauticus Early Design. Plates and stiffeners from the 3D design model can be instantly checked against the rules. Necessary modifications are communicated back to the

design model. Designers can be sure that the design model complies with basic classification rules at all times.

## Finite Element and Wave Load Analysis

Nauticus Hull FEA and Nauticus Hull Wave Load Analysis are DNV Software's solutions for finite element and hydrodynamic analysis of ship structures. Nauticus Early Design includes tools to transform the 3D CAD model to Nauticus Hull analysis models. The transformed structures pass some automatic and manual idealisation for use in GeniE. With GeniE, the user has the opportunity to further adjust the model to achieve a suitable mesh. Time-consuming 3D modelling by expert engineers is thereby eliminated, and the engineering process is moved closer to the main design workflow, ensuring data consistency and improved design quality. The GeniE concept model can further be used as basis for HydroD for hydrodynamic or hydrostatic analysis.

## Detail design and production

The 3D model created in Nauticus Early Design can be further enhanced with SM3D hull detailing and manufacturing components. This makes Nauticus Early Design combined with SM3D the most complete shipbuilding information system for ship design and production available on the market. The open data model based on emerging industry standards enables communication with other shipbuilding CAD systems.

# Brix Foundation

Safeguarding your organisation's engineering knowledge



## Best Engineering Practice

Work processes in the shipbuilding industry are becoming more and more distributed. Effective collaboration and exchange of data are necessary to improve the work processes and provide a competitive advantage. Nauticus Early Design is based on next-generation technologies that address these needs. The combination with Brix Foundation by DNV Software represents a major step forward in recognising that “systems – processes – people” must be regarded as being equally important in order to reap the maximum benefits from the investment.

Nauticus Early Design integrates people, systems and disciplines and allows for efficient management of the complete design process. This is achieved by powerful workflow management, controlled integration and sharing of data across systems. Yards and design companies are offered a rule and template-based framework for defining and monitoring the design workflow, thus capturing and optimising Best Engineering Practices.

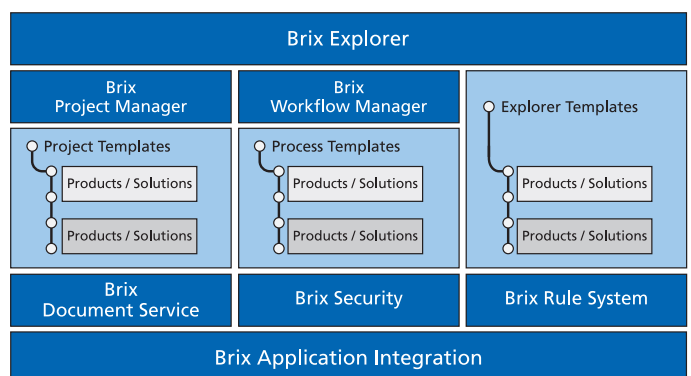
## Brix Explorer

Brix Explorer is the main entry point to all the Nauticus programs. It organises the work and gives easy access to various templates for typical jobs. It guides the user through the relevant tasks and gathers data in a single database for each job. General information about the ship, such as dimensions, applicable rules, compartment

data, loads, etc. is stored in the database and shared by all the programs.

The Brix technology will also enable you to build on Nauticus Early Design's pre-defined templates to create your own customised workflows and thereby ensure that you safeguard your organisation's engineering knowledge.

## Brix Foundation



- Brix
- Your organisation's best practice
- 3rd Party
- DNV Software

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