Software Solutions for Ship Design Excellence
In its nearly 30 years of operation, NAPA has become a global leader in maritime software, services and data analysis for the maritime industry. NAPA’s mission is to provide best in class data-led solutions for safety, efficiency and productivity in both ship design and operations.

With a solid track record in setting new standards for 3D ship modeling and ship performance analysis, NAPA’s integrated solutions for design and operations ensure the highest quality vessel from concept through operational lifetime.

**Eco-Efficiency in Design**

NAPA’s philosophy is that true eco-efficiency starts with the design process and continues through a vessel’s operational lifecycle. In order to achieve maximum energy efficiency and optimal design, both the hydrodynamic performance of the hull form and the required capacity and mission of the vessel must be considered.

The only way to do this is to consider the relevant aspects at the same time in a single system: hull form, capacity, weight, and performance.

NAPA for Design incorporates state of the art hull surface and 3D model definition with advanced hydrodynamic, stability, and structural design software tools, thus enabling the handling of all aspects of eco-efficiency at the early design stages in a single software system.

**NAPA’s Role in the Design Process**

NAPA can be used to design any type of floating structure, and it accommodates every designer’s needs in the early design phases. From the first sketches through hull design and fairing, basic structural design, and performance predictions to statutory calculations and delivery documents, only one tool is needed: NAPA.
Relied on by the Maritime Industry

NAPA has been the preferred partner for industry’s leading organizations for several decades. Today, NAPA is used successfully by several hundreds professional organizations, including the leading shipyards, classification societies, maritime authorities, consultancies, model basins, research institutes, ship owners, and ship operators worldwide.

Software Solutions for Design and Analysis

NAPA for Design is a single integrated software system covering the following primary design disciplines:

- **Contract Design** for finding the optimum design solution before signing the contract
- **Hull Form and Performance** for hull design, hydrodynamics, and performance optimization
- **Statutory Compliance** for assuring that the design meets all rules and regulations
- **NAPA Steel** for structural design in the early design stages
- **Offshore Structures** for efficient design and comprehensive analysis of offshore structures

There are also special applications for emergency response, outfitting, and tools for developing and customizing NAPA to suit user needs. NAPA’s modular nature makes it possible to select the functionality required to realize the desired design.

Technical Gains and Advantages

NAPA has been developed and tested in true shipbuilding environments, ensuring that it meets the most demanding needs of naval architects and maritime industry professionals. The 3D product model applicable in all NAPA software solutions forms the central pillar of the accuracy and speed at which NAPA solutions operate.

- A 3D flexible top-down product model supports rapid changes in design
- Any kind of floating structure can be modeled
- A wide range of analysis for design, stability, hydrodynamics and structures
- Completely customizable automatic document generation
- An application generator, scripting language, and tools for managing working processes support efficient customizations
- Interfaces to numerous standard and proprietary formats for data transfer
Utilized by leading shipyards and design consultancies, NAPA Steel offers a new level of speed and flexibility for structural design of ships and offshore structures. NAPA Steel is an integrated tool for various structural design tasks. It supports structural design from the initial design phases to the classification drawings and rule check. NAPA Steel minimizes risks by securing consistent design right from the beginning and improves through-put and total cost of design.

NAPA Steel delivers value through:

- Intuitive 3D modelling tool NAPA Designer Accurate weight estimation
- High quality auto FE modelling
- NAPA Drafting – state-of-the-art drawing tools and information exchange from NAPA 3D product model
- Rule interfaces to most of the leading class society rule check software

We are proud to be able to contribute to our customers’ cost-efficiency and competitive product design by providing NAPA’s modern, effective 3D design solutions for the ship structure design. Better tools lead to better designs.

**Product Model**

The product model approach permits fast modeling during the early design stages. The flexibility of the NAPA product model allows rapid changes to the structural design and provides the numerical figures for the optimization of the structures.

Detailed information on the steel production cost and production methods used can be extracted from the model. When the design progresses further, NAPA Steel allows a top-down approach for refining early structural concepts up to the detailed unique solutions for each individual structural member.

Use of the 3D product model:

- Structural design for classification
- Cost-related information, e.g. weight, bill of materials, welding lengths, and painting areas
- Production planning
- Generation of drawings and visualizations
- Export of the 3D structural model to outfit, classification, and detail design systems, such as AVEVA Marine, NUPAS-CADMATIC and SM3D by Integraf
- Automatic FEM mesh generation for common software, such as Nastran and Ansys
- IGES and DXF interfaces for linking to a wide variety of general CAD systems, such as AutoCAD
NAPA Designer – a new revolutionary geometry modelling tool

NAPA has launched an interactive, easy to use application for geometry modelling of ship structures and compartments as well as statutory compliance.

NAPA Designer is an interactive state of the art geometry modelling tool for Naval Architecture and NAPA’s 3D structure design application NAPA Steel. It brings a completely new way of making real interactive ship design from concept level naval architecture up to structural plan approval and engineering. NAPA Designer offers an intuitive 3D modelling interface, requiring little training for a vessel designer to adapt to from a conventional 2D approach.

NAPA Drafting – Intelligent Classification Drawings

NAPA’s drawing functions make it possible to create drawings for structural design approval quickly and easily from the 3D NAPA Steel model. The drawing is linked to the model, so that when the model is changed, the drawing is updated automatically, including all identifying markings and texts. This is an obvious advantage of the NAPA system; a feature preventing the inconsistencies between drawings that often result when relying on 2D CAD drawing systems.

Automatic FEM Mesh Generation

The 3D NAPA Steel model can be applied to produce a good quality FEM mesh for further analysis. The user can reproduce the mesh anytime the model is changed or updated. Predefined parameters control the mesh production automatically. A change of the parameter set controls the idealization of real structures to the geometry of the FEM mesh required for global, local, or fine mesh models. The mesh can be exported in several formats for FEM software packages, such as Patran, Nastran, and Ansys.
NAPA Contract Design

NAPA contains all of the functions necessary for the contract design of ships and offshore structures.

In the early design stages, it is vital to obtain reliable and accurate information quickly. It is also essential that rapid and extensive changes can easily be made to the design. The NAPA 3D product model is the primary source of design information at the stages leading up to the contract. With NAPA, compartments and structures can be modeled quickly and easily, the relevant detailed analysis can be done, changes can be made, and the design can be optimized.

Unrivalled Functionality

NAPA is continuously focusing on providing the best solutions to meet the needs of the people involved in contract design. The NAPA system provides the tools needed at the early stages of design, including:

- Hull form design
- Compartmentation
- Hydrostatics and stability
- General arrangement
- Tank calibration and capacity tables Freeboard and tonnage calculation
- Loading conditions and intact stability studies
- Longitudinal strength
- Damage stability
- Speed and power prediction
- Seakeeping and maneuvering
- Weight and cost estimation
- Drawings and documentation

Contract Design Made Easy

The Contract Design NAPA Manager application is intended for quick and easy creation of the whole 3D model with NAPA. It provides the logical workflow for contract design.

The NAPA Manager works as a user-oriented, visual interface for NAPA and manages extensive design processes. Changes, adjustments and updates are done easily with the NAPA Manager. All tasks, their relative order, up-to-date status and dependencies can be seen at a glance.

Advantages

The key benefit of NAPA is the unequalled speed at which design variations can be investigated and the design accomplished. NAPA offers an integrated package with a wide variety of applications needed in ship design. The outcome of the early design with NAPA can be further developed in the latter stages of design, including meeting the final challenges of delivery and operation.
NAPA Hull Form and Performance

NAPA brings the conceptual hull form all the way to the production stage, including final fairing. The unique NAPA hull design methodology allows better control and more flexibility in the hull surface at the early stages than other modeling systems, and guarantees the exactness needed for final fairing work.

- 3D surface modeling using NURBS surfaces
- Transformations and parametric definitions
- Export to design systems for detailed and production design of the structures and outfitting components

Hydrodynamic Design and Analysis

Integrated performance prediction routines facilitate the evaluation of the hull design quickly in the early design stage. A dedicated and intuitive graphical user interface makes the analysis easy to carry out and understand, resulting in an optimal design.

- Power prediction, including EEDI calculation, based on model and full scale reference data
- Seakeeping analysis, seakeeping criteria, and downtime evaluation
- Maneuvering simulations, including generation of the Wheelhouse Poster and Pilot card
- Automatically generated reports

Hull Form Optimization and CFD Analysis

More detailed hull design evaluation and optimization based on CFD is available entirely within NAPA.

- Potential flow calculation for optimizing the hull form with respect to wave making resistance
- RANS viscous flow calculations for detailed study of the flow around the hull and control of the hull form for maximum energy efficiency
- Parametric variations of the hull form to quickly change the design
- Multi-objective genetic algorithms to handle any kind of optimization problem

Interfacing and Data Exchange

A very wide variety of links and interfaces allow the user to transfer the hull surface to production systems, CAD programs, CFD software, and other systems capable of handling 3D surfaces, including:

- AVEVA Marine/TRIBON
- NUPAS-CADMATIC
- Intergraph SmartMarine 3D
- FORAN
- IGES
- DXF/AutoCAD
- CFD links to Shipflow, Rapid and Shallow, and many more
NAPA Statutory Compliance

Through its extensive set of tools for designing and calculating stability and longitudinal strength, NAPA offers comprehensive functionality beyond the initial design phase.

The NAPA Statutory Compliance Manager automates routine tasks, such as calculation of probabilistic damage stability and generation of statutory documents during the design process.

The NAPA system has been approved, and is continuously used, by the world’s leading classification societies and maritime administrations, a factor which means a smooth approval process. NAPA is also one of the main tools used by experts in the development of new stability regulations.

Main Characteristics

- Assessment of rule compliance considering
  - Intact and damage stability
  - Longitudinal strength
- Support for relevant international regulations, such as
  - Intact Stability code 2008
  - SOLAS II-1
  - Directive 2003/25/EC (Stockholm Agreement)
  - Special purpose ship (SPS) code
  - MARPOL
  - IACS UR S and HCSR longitudinal strength
  - Grain Code
  - IBC, IGC
  - MODU Code
  - DR68 (Dredger calculations)
  - U.S. Navy DDS 079-1
- Inclining test
- Freeboard Calculation
- Extensive reporting functions to automation of the booklet generation

The Leader in Stability Analysis Software

NAPA has proved its power and efficiency in the field of stability analysis. Thanks to the strong product model and the extremely fast and accurate calculation engine, NAPA is the de facto standard for the shipbuilding industry.

NAPA includes a comprehensive stability criteria library covering a substantial portion of the existing statutory requirements. In addition, macro-based criteria can be defined for any existing regulation. With NAPA, it is straightforward to calculate damage stability according to the probabilistic codes, such as SOLAS 2009 and SPS.

The Flooding Simulation feature for calculating progressive flooding and the floating position of a damaged ship offers a powerful tool especially for future stability regulations.
NAPA for Design Approval

NAPA effectively integrates the design approval with the overall design process. Most classification societies and maritime authorities use NAPA for their plan approval, including:

- American Bureau of Shipping
- Bureau Veritas
- China Classification Society
- DNV-GL
- Directorate General of Merchant Marine, Spain
- Finnish Transport Safety Agency
- German Federal Maritime and Hydrographic Agency
- Hellenic Register of Shipping
- Indian Register of Shipping
- Intermaritime Certification Services Panama
- Korean Register of Shipping
- Lloyd's Register
- Ministry of Land, Infrastructure, Transport and Tourism, Japan
- Nippon Kaiji Kyokai (ClassNK)
- Registro Italiano Navale
- Russian Maritime Register of Shipping Swedish Transport Agency
- United States Coast Guard
- Vietnam Register

Specific tools have been developed together with leading classification societies to further improve the integration and design process. The provided tools help the designer to meet the classification and statutory requirements with minimal effort.

Structural Rules

NAPA’s modeling tools allow the user to create 3D product models easily and effectively. The same 3D model can be used for both structural rule check and in NAPA for various other design purposes and disciplines.

A variety of links and tools exists to help reuse the design information from the classification process and vice versa. For example, the NAPA Steel model can be exported to ClassNK PrimeShip, LR ShipRight and SDA software, DNV GL Poseidon and Nauticus, BV Marss2000 and VeriSTAR and KR SeaTrust-HullScan.

Benefits of NAPA’s Design Approval tools:

- Integrate the latest regulations and knowledge
- Save time during the design approval process
- Are fully integrated into the design process
NAPA Offshore

Offshore structures are different enough from ships to warrant their own consideration in NAPA. For this reason, NAPA has emphasized new tools and techniques specifically to make the handling of semisubmersibles, jackups, and other offshore structures as efficient as possible.

**Offshore Structures Stability Manager**

The key NAPA applications for offshore structures is in the 3D modeling, stability analysis, and reporting. The Offshore Structures Stability Manager (OSS) captures all the essential items required in the conceptual design of the platform.

- 3D product model allows for quick design variations
- Streamlined work process for stability analysis
- Reporting and watertight integrity plans

**Stability Analysis and Reporting**

All functions necessary for the intact and damage stability calculations are included in the OSS manager.

- Wind moment analysis
- Loading conditions
- Intact and damage stability analysis
- Generation of intact and damage VCG curves
- Final operational limits plot
- Stability Analysis Report

**Freeboard Plan**

The OSS Manager also includes tools to calculate and gather the data required to generate watertight integrity plans and showing the limits for watertight and weathertight integrity on the structure. Scale drawings showing the compartment arrangement, openings and integrity limits can be generated and exported to DXF and AutoCAD for the incorporation of additional drawing details.

**Application of Other NAPA Solution Offerings**

The use of NAPA Offshore Structures is not limited to the stability analysis alone. The 3D product model of a platform can be used as with any 3D product model for ships. This means that relevant applications from other solution offerings are just as functional with offshore structures as with ship-shaped hull forms. For instance:

- Motion and downtime analysis using the Seakeeping linear diffraction theory
- Export of pressures from motion analysis to FEA programs
- Structural design using NAPA Steel
- FEM model generation and export to FEA software systems
- Structural drawing generation and export
Maintenance and Customer Service

- NAPA is developed continuously; two to four new system updates are issued every year
- Our Customer Service team of professional naval architects provides continuous technical advice and answers to your NAPA-related questions
- Training courses are held frequently at NAPA offices around the world and tailor-made training sessions can be given on-site
- The annual NAPA User Meeting and Asian User Seminars bring together NAPA users to discuss the application and development of NAPA
- The NapaNet website provides the latest news, training course information, a discussion forum, and other useful information for registered users. Personal accounts ensure a safe way to transfer files between the user and NAPA Customer Service.

Cooperative Work

NAPA plays an active role in international research projects. The company is regularly represented in a number of domestic and international projects. NAPA is also actively used in the development of new regulations and in research projects.

About NAPA

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NAPA operates globally, with offices across Asia, Europe and the Americas supported by its Helsinki headquarters. To date, NAPA has nearly 400 user organizations for its design solutions and over 2,000 installations onboard vessels. For more information, visit www.napa.fi