Bentley®
Advancing Infrastructure

PRODUCT DATA SHEET

Maxsurf®

Comprehensive Naval Architecture Software for All Types of Vessels

Designed for professional naval architecture teams, Maxsurf provides capabilities for designing monohull, multihull, powered, sail, commercial, and naval vessels made from steel, aluminum, wood, and composite materials. Its integrated modules have consistent, easy-to-learn interfaces to provide immediate graphical feedback during modeling and analysis. A single parametric 3D model eliminates the need for manual file preparation and facilitates data exchange among team members and design activities. Moreover, the programming interface opens the door to customization and automation.

HULL MODELING

Maxsurf can model vessel hulls with multiple, trimmed NURBS surfaces that are modified directly by their control points. Combined with interactive surface curvature analysis and fairing capabilities, this approach aids designers in creating accurate and fair hull surfaces. When a NURBS surface model is not required, such as for a stability or performance assessment, mesh models can provide a quicker alternative for modeling existing vessels.

Maxsurf can model primary structural parts that must conform to the 3D hull shape: hull plates, frames, bulkheads, decks, and longitudinal structures. Interactive graphical capabilities facilitate the layout and fairing of longitudinal stiffeners constrained to the hull surfaces. Groups of similar frames and decks may be defined parametrically, expediting their design. You define hull plates directly from NURBS surface contours to accurately calculate the expanded 2D plates.

STABILITY ASSESMENT

With integrated compartment modeling and load case definition, you can rapidly analyze and verify code compliance of the vessel's static stability. Maxsurf's broad range of analyses include upright hydrostatics, GZ curve, floodable length, and probabilistic damage. The analyses cover intact, damaged, or partially flooded conditions. Additionally, spilling and draining from tanks, as well as conditional flooding and water on deck, may be applied. Maxsurf includes a comprehensive library of customizable stability criteria calculations and heeling arms, including many examples for specific codes.

Results are presented in user-customizable tables and graphs that can be stored in a SQLite database and exported to a Microsoft Word or plain text document.

PERFORMANCE PREDICTION

Maxsurf's performance analysis capabilities can quickly assess vessel response to waves, passenger comfort, calm-water resistance, and sailing performance.

You can predict ship motions for specified wave spectra and headings using strip theory and radiation-diffraction panel method. Maxsurf can compute response operators and spectra, as well as added resistance and crew performance metrics such as motion sickness incidence (MSI) and motion induced interruptions (MII).

Maxsurf's results have been validated against a variety of data from various independent sources, including model tests, full-scale trials, and alternative numerical methods.

STRUCTURAL RESPONSE

The general-purpose beam and plate element-based structural analysis system allows the structural response to be modeled and analyzed quickly and early in the design process. The system includes marine-specific load cases and provides static and dynamic analyses of the structure's behavior under loads.

AUTOMATION

Optimization studies, customized calculation, and reporting can be carried out through the programming interface, which provides scripting from many languages, including VBA (Microsoft Excel and Word macros), VBscript, and Python.

SYSTEM REQUIREMENTS

MINIMUM: Windows 8.1 with update KB2919355; Intel or AMD 1 GHz processor with SSE2; 4 GB RAM; 4 GB Storage; DirectX 11 and OpenGL compatible graphics, 1024 x 768 resolution screen

RECOMMENDED: Windows 10 or 11, Intel or AMD 2 GHz multicore processor with SSE2, 64 GB RAM; 64 GB Storage; DirectX 11 and OpenGL compatible graphics, 1920 x 1200 resolution screen

Maxsurf At-A-Glance

HULL MODELING

- Trimmed NURBS surfaces, NURBS curves, tri- and quad-meshes, structured and unstructured point data
- Fairing capabilities and surface curvature analysis
- Automated and guided manual fitting of NURBS surfaces and curves to point data
- Parametric transformation to target hydrostatic parameters
- Comparison with target hydrostatics and curve of areas
- Primary structure: shell plates, longitudinal stiffeners, frames, bulkheads, and decks automatically conform to hull surfaces
- Curved plate expansion to 2D
- Nesting of 2D parts on specified stock
- Shell expansion diagram

STABILITY ANALYSIS

- Comprehensive Interactive analyses: hydrostatics, large angle stability, equilibrium, specified condition, KN cross-curves, maximum VCG, floodable length, longitudinal strength, tank calibration, MARPOL outflow, cross-flooding MSC.362(92), Probabilistic damage MSC.421(98) MSC.216(82) and MSC.19(58)
- Intact, damaged, and partially flooded conditions
- Spilling and draining from tanks, fluid simulation of tank-free surfaces, conditional flooding into compartments, water on deck
- Integrated compartment editor automatically constrained to hull
- Complex compartment geometry using linked sub-compartments and boundary geometry
- Load case editor with fixed loads, load-groups, and automatic tank loads
- Wide range of stability criteria evaluated from GZ curve and equilibrium results, including heeling arms and moments fully customizable for specific regulations
- Comprehensive library of example criteria from various authorities
- Multi-core solver, batch analysis, reporting, and SQLite results database

PERFOMANCE PREDICTION

- Calm water resistance methods: Savitsky pre-planing and planing, Lahtiharju, Blount & Fox, Holtrop, Compton, Fung, Series 60, van Oortmerssen, Delft systematic yacht series
- Slender body method wave resistance and estimate of far-field wave pattern
- Sailing monohull VPP
- Ship motions in waves from strip theory and radiation-diffraction panel method
- Response operators and spectra for specified headings, speeds, and wave spectra
- Crew and passenger comfort: MSI, MII, and SM
- Animation of ship motions response to specified sea state

STRUCTURAL ANALYSIS

- Graphical modeling of beam and plate structures
- Linear analysis of 3D frame and stiffened plate structures
- Nonlinear and buckling analysis of frame structures
- Beam cross-section modeler and properties calculator
- Comprehensive loads including self weight and marine-specific buoyancy, inertial and current load cases

DATA INTEROPERABILITY

- **IMPORT**
  - MicroStation DGN NURBS surfaces and curves
  - IGES NURBS surfaces (untrimmed)
  - Rhino 3DM NURBS surfaces and curves (untrimmed)
  - IMSA NURBS surfaces (untrimmed)
  - USNA / Fastship NURBS surfaces (untrimmed)
  - DXF curves and markers background
  - GHS marker sections
  - PIAS ascii marker sections
  - Seaway marker sections
  - Wolfson LHF marker sections
  - nuShallo PAN mesh
  - Polygon PLY mesh
  - Stereo lithography STL mesh
  - WAMIT GDF mesh
  - Image PNG, JPEG, and GIF background image
- **EXPORT**
  - MicroStation DGN NURBS surfaces and curves
  - IGES NURBS surfaces
  - Rhino 3DM NURBS surfaces, curves, and meshes
  - IMSA NURBS surfaces
  - USNA / Fastship NURBS surfaces
  - DXF polylines
  - BMT Microship sections
  - MHCP sections
  - HYDROS sections
  - IHI sections
  - IMSA hull parameters
  - GHS sections
  - nuShallo mesh
  - Parametric sections
  - PD strip sections
  - PIAS ascii sections
  - SHCP sections
  - Shipflow sections and waterlines
  - Stereo
  - Veres (MASHIMO) sections
  - Wintech sections
  - Wolfson LHF sections
  - Polygon PLY mesh
  - Stereo Lithography STL mesh
  - WAMIT GDF mesh
  - Direct X mesh
  - Wavefront mesh
  - Image BMP rendered model

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