DATASHEET

AVEVA™ Hull and Outfitting

AVEVA Hull and Outfitting is a proven ship design system. It unifies all modeling disciplines together in one unique, concurrent, multi-user, multi-site design environment, streamlining the processes of hull design, outfitting design, structural detailing, weight calculation, drawing creation, and manufacturing output.

It includes three major modules:

Hull Structural Design	For structural design with analysis, cost estimates and transition to detailed design.
Hull Detailed Design	Detailed design and production information for hull steel structures.
Outfitting Design	Clash-free, specification-driven design of outfitting systems. Dedicated user interfaces for each discipline such as routed elements (piping, HVAC), structural elements (foundations, supports), standalone equipment, cables and cable ways, stairs and ladders.

AVEVA

Hull Structural Design

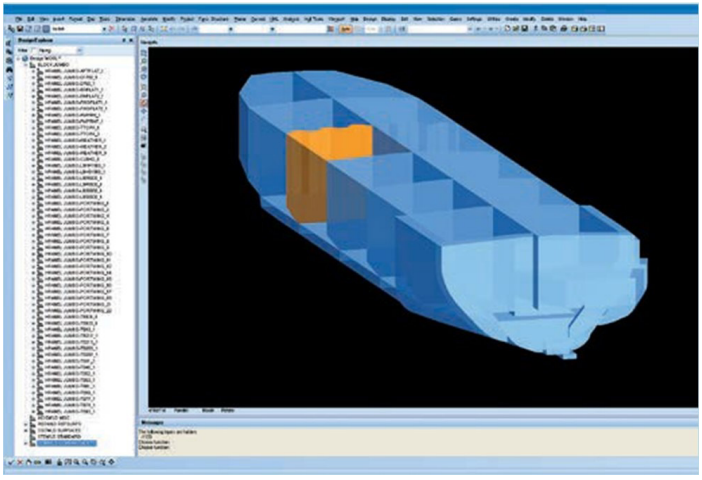
A major challenge for a shipyard in the basic design phase is to define a hull structure in a timely manner with clear objectives: to get a design that complies with classification society rules, and to estimate weight and material list. And all of this in a design context where change is the rule rather than the exception.

AVEVA Hull Structural Design is used for the preliminary definition and arrangement of the ship's structures. The application helps in making important decisions regarding naval architectural characteristics, the preliminary geometry definition and the arrangement of principal structural members.

Deliverables generated by AVEVA Hull Structural Design are classification drawings, steel material estimates, weld lengths, painting area estimates, weights and center of gravity reports. It is also possible to export the design information to several other analysis tools such as finite element calculations or classification societies software.

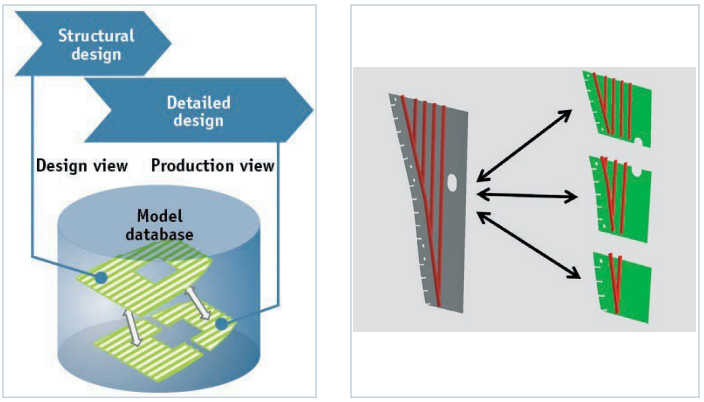
Key features

- Fast parametric modelling of hull steel structures:



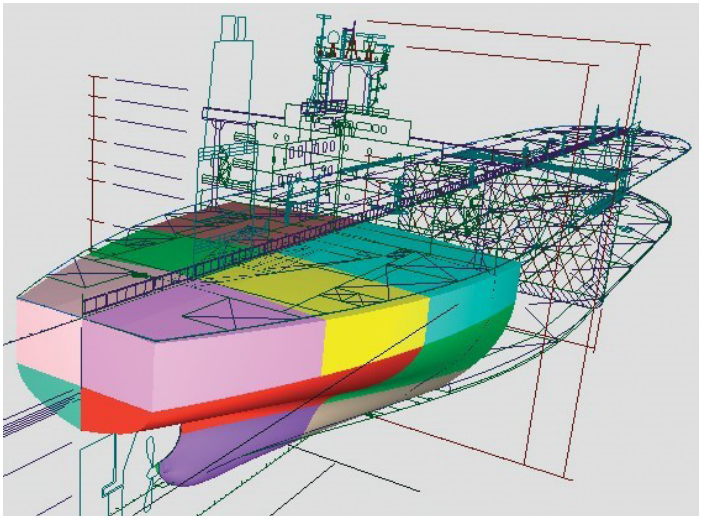
Reference surfaces in the design

- Seamless transition between structural and detailed design. The Hull Structural Design and Hull Detailed Design applications maintain two parallel views of the design in the model database: a design view for the structural engineers and a production view for the detailed designers. The structural engineers create and maintain the design panels, while the detail designers work with the production panels. The production panels are created from the design panels using the automatic block-splitting facilities. After block splitting, the two views of the steel structural model are kept synchronized so that any change to a design panel will automatically affect the corresponding production panel.



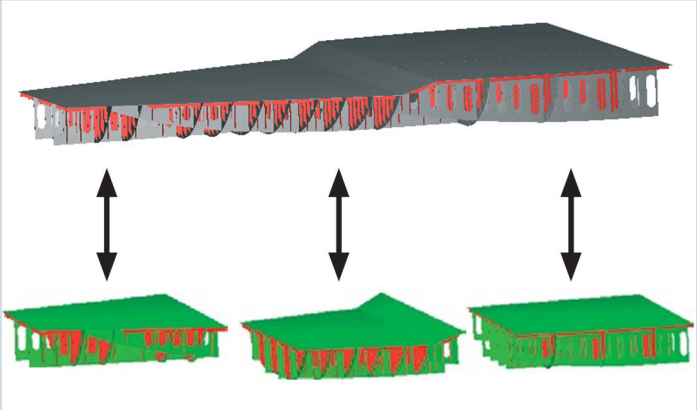
Parallel working between structural design and detailed design

- Imported 2D drawing view placed in 3D space in the model.



Imported 2D views placed as surfaces in the 3D model

- Links to classification societies' software and programs for FEM-based strength calculations. Hull Structural Design has powerful interfaces to classification societies' software programs for rule checking and strength calculations.
- Block division. The overall basic hull design can be divided, along customer-defined block seams, into detailed design blocks and panels, which can then be further refined in the Hull Detailed Design application.



Block Division

- Reuse of existing model databases. An existing production model (a model database containing production panels) can be reused by "reverse engineering" it so that design panels can be created through an intelligent merging of production panels. The newly obtained design panels can then be split to satisfy alternative production sites. This process can also be applied to old Tribon model databases converted to Hull Structural Design.

Business benefits

- Time saved in the project. Flexible modeling and drafting tools allow the creation, in only a few hours, of the structural model for classification documents. The same structural model can be used at an early stage in outfitting design.
- Project elapsed time and design hours are saved through the option of maintaining automatically synchronizable parallel views of the structural design and the detailed design. In this way, detailed design can start before the structural design is approved and can be continuously updated in a controlled manner.
- Save time and expense in the creation of classification documents by reusing earlier production designs. These can easily be converted to a structural design with the removal of block seams and other production details.
- Optimize production costs by easily investigating the costs for different design alternatives and block divisions for the project.

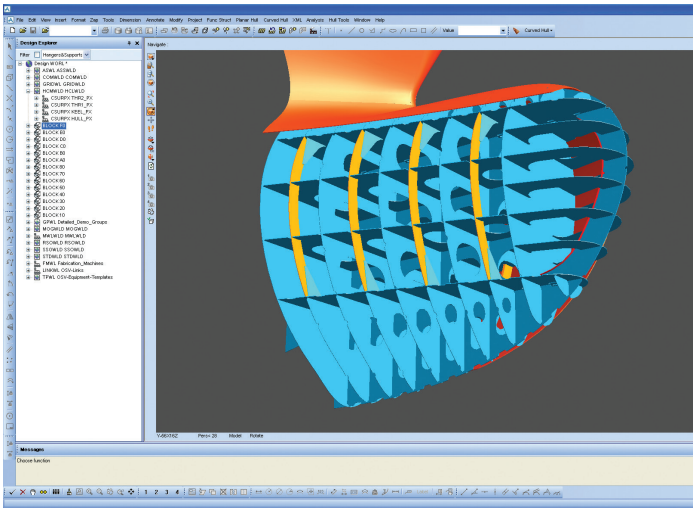
Hull Detailed Design

Detailed design and production information for main hull steel structures

Being in full control of the hull design and fabrication processes is vital for a shipyard, as this represents the core know-how of this industry. Even as parts of the hull design are subcontracted, each shipyard must fully control the hull fabrication methods and the assembly process to be successful. Dedicated engineering tools that give shipyards the freedom to adapt their design to their own fabrication process is key to this success.

Hull Detailed Design is a powerful, data-centric application for the design and creation of production information for main hull structures. The application covers the entire process, from hull design to parts manufacture and block assembly, for all types of ship. This application creates drawings and parts lists, as well as all the production information and documents required in the design and build process.

The application handles the complete flow of information, from the use of customized parametric standards, to modeling, automatic parts generation, and advanced support for generation of drawings to production.



A hull block in planar hull modeling with some plates removed to show the internal structure

Business benefits

Reduce design time:

- Powerful design definition functions developed specifically for the detailed design of main hull structures.
- Automatic creation of production information for parts manufacture and for assembly, so a separate lofting stage is not needed.
- Fewer revisions of drawings and other outputs—these can be automatically produced just before being required in production.
- Reduced rework because of better communication between design disciplines through a common model database.

Reduce production time:

- Available manufacturing equipment of the shipyard is considered during design, and the design altered to use the equipment to best advantage.
- Production output of highly accurate cutting and marking information, with allowances for weld shrinkage, can be used to directly drive all numerical controlled production equipment, such as plate-cutting machines and panel lines.
- Automatically provided check marks on parts allow for quality checking and accurate assembly positioning relative to other parts, ensuring that all parts fit first time, without rework.

Key features

- Hull standards: Hull Detailed Design is delivered with an extensive range of customizable intelligent shipbuilding standards for brackets, stiffeners, notches, cutouts and holes.

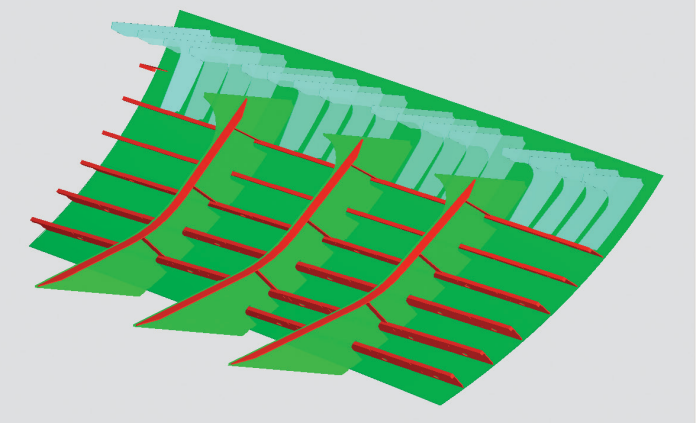
Design intent

- The model is stored with definition data, topological information and shipyard rules for the specific type of design. The design intent, defined during modeling, is used to make the hull model as independent of fixed geometry as possible. The design intent for each design object is stored, rather than the simple “numeric” geometry of the design.

- Hull Detailed Design automatically uses design intent information to carry out the lofting work and determine the exact coordinate information that defines the shape and the characteristics of the parts. Changes in one part will automatically be reflected in changed connected parts.

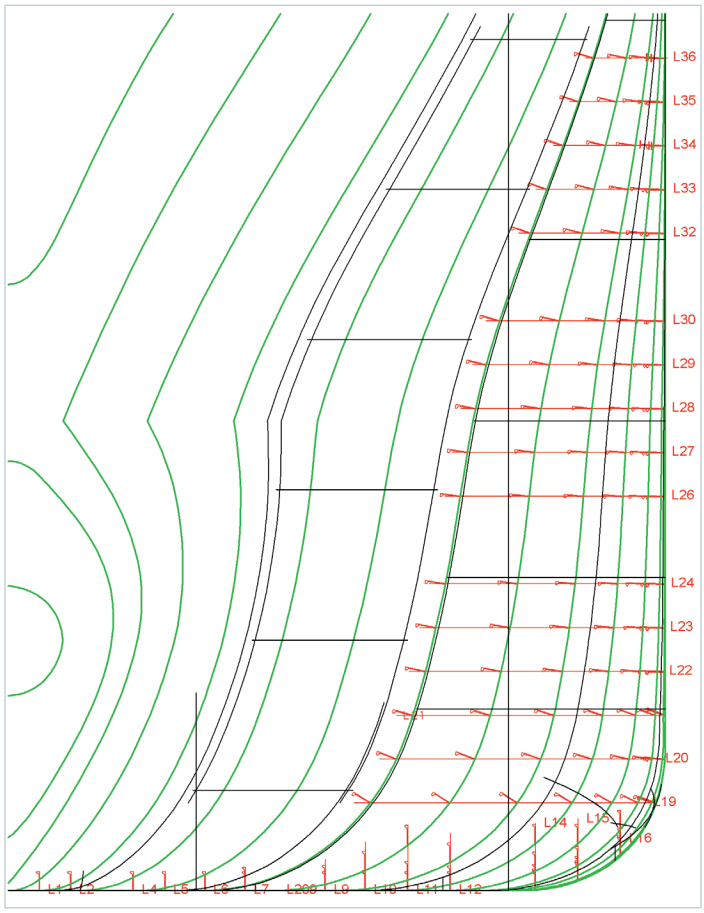
Curved hull modeling

- Various curved hull objects are interactively generated in any of the hull surfaces. Extensive interactive facilities enable the user to define any curved member with respect to basic geometry locations or relative to existing curves. The curved plates are automatically developed according to the workshop methods that are used at the shipyard. Holes in curved plates can be defined, developed and used for marking or cutting.



Curved panel

- Early material estimates for shell profiles can be obtained using the longitudinal tracing facility. Material quantities for the shell plates are obtained from the shell plate development functions.
- A curved panel generation facility is used to build the complete shell panels of the vessel, including the shell plates and the detailed descriptions of longitudinals and or transversals, for production purposes.
- A shell expansion view can be generated automatically. This view has a structure similar to all other model views and may thus be used for modeling and queries. Shell expansion views normally show half the ship (either port side or starboard side) developed from the center line. However, they may also be developed across the center line, be restricted to certain parts of the shell, be developed from arbitrary curves or planes, and so on. Holes in the shell profiles and in the internal structure against the shell can be shown symbolically in a shell expansion view.
- Body plan views are also created automatically and can, in the same way as the shell expansion views, be used for modeling and queries as in any other hull view.



Body plan view

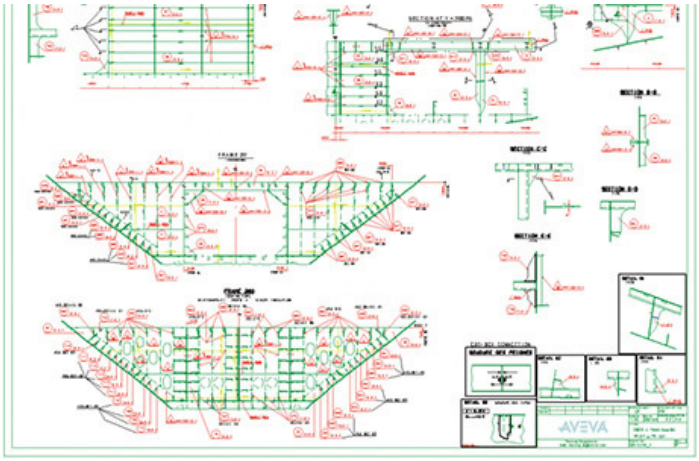
Planar hull modeling

- The complete inner steel structure of a vessel is modeled as plane panels, including plates, stiffeners, brackets and flanges, creating a complete and detailed model to be used for the retrieval of manufacturing and assembly information.
- Knuckled and swaged panels can be defined, and their production information is also available.
- The extensive shipbuilding standards, that adapt their geometry automatically, are important tools for high efficiency in model work.
- Panels can be moved and duplicated to speed up the design process. The panels will automatically adapt their shapes to the new surroundings. The new parts can be automatically numbered using customized rules for comparison and number series.

- The associativity of the model defined during modeling means that model parts are connected to the edges of adjacent parts, so the model can easily adapt to a change of the hull form or the position of a deck. This feature means that a design can be developed quickly, because the application automatically uses the references to connected parts to carry out the lofting work and determine the exact coordinate information which defines the shape of the parts. A change in one part will automatically be reflected in changes to other connected parts.

Drawing generation

- A powerful feature is the option to “model in a drawing”. This means that all kinds of panel drawings derived from the model maintain a link to the panels in the model. Changes in the panel can therefore be carried out via the drawing. This feature ensures consistency between the model and the related drawings, and reduces the time for documenting the design.
- Drawings can be made in two different styles, either with a symbolic representation of stiffeners, seams, notches and drain holes, or with full three-dimensional representation. The symbolic-style drawings are traditional for classification and working drawings, whereas the full representation can be used for the various assembly and erection drawings. The drawing functions provide the following features:
  - General 2D drafting.
  - Model picture generation.
  - Automatic generation of a shell expansion and body plan views.
  - Access to, and viewing of, outfitting objects such as equipment, pipes and cables.
  - Associative labels and dimensions.
  - Hidden line removal.
  - Section details.

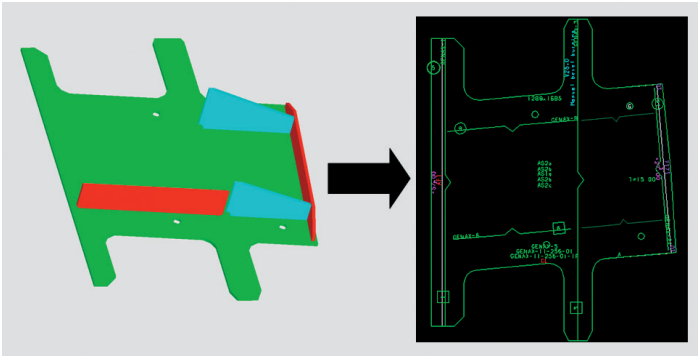


Steel workshop drawing

Production information

All the necessary manufacturing and assembly documents can be created by the system.

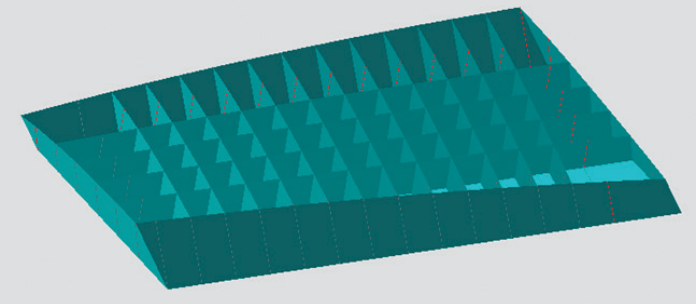
- Automatic parts generation. The plates and profiles to be manufactured (including all small parts like clips and collars) are created entirely automatically from the hull panels. All types of adjustments to part shapes, for example, shrinkage for welding or edge preparation, are considered during this process. Metal touching marking and alignment marking are available and can be customized to yard practice. Each piece part is marked to contain all the necessary information for a simplified assembly process.



An example of part checking, which shows the original model panel and the resulting part with marking lines created by automatic parts generation. Note that the part has marking lines for both the pieces attached to the model panel and the pieces attached from adjacent panels in the model database.

- Shrinkage facility. This facility is used to compensate for the shrinkage caused by welding in the assembly process. The calculations are based on a shrinkage table that contains the amount of shrinkage actually measured in the workshops. From an analysis of the welds, and based on this shrinkage table, the shrinkage facility will automatically evaluate the amount of shrinkage and directions in which it should be applied. Plates and profiles are both considered.
- Part checking function. This displays the automatically created part with all labels, marking, excess material and bevel information.
- All necessary production information can be automatically or semi-automatically extracted from the hull model:
  - Two- or three-axis plate cutting.
  - Templates for the rolling and bending of the shell plates.
  - Plate jigs and pin jigs for curved assemblies (there is an additional feature for interactively changing the automatically created jig planes).
  - Manufacturing lists, sketches and robot information for longitudinal and transverse frames and webs including information for inverse line bending.
  - Lists of weights and centers of gravity.
  - Manufacturing lists and sketches for stiffeners.
  - Material lists.
  - Part lists.
  - Early estimates for material and welds.
- The plate nesting function is used to nest plate parts on raw plates and produce NC/CNC data for cutting and marking together with a workshop sketch. Quick nesting of plates using automatic selection of parts from the parts menu is available, and there are facilities for the handling of surplus plate material. Parts can be clustered and the nesting of smaller parts in openings is supported.
- Profile nesting. Profiles generated as planar stiffeners, flanges or pillars, or as curved longitudinals and transversals, can be automatically nested on a set of raw profiles defined by the shipyard.

  Any steel quality exchange rules (substitution rules) set up by the shipyard are considered during the selection of suitable raw material for the profile nesting. The nesting algorithm will minimize the scrap percentage, taking into consideration the geometry of the end cuts, any defined bevel and different orientations of symmetrical profiles.



Eggbox type template

Optional modules

Hull Panel Line Control

The panel line control module is used to nest assembly parts onto large raw plates and produce NC information for blasting, marking, burning and text labelling. The option supports the following activities:

- Automatic creation of the large assembly parts and the individual piece parts.
- Automatic nesting of one or many assembly parts on the large raw plate.
- Nesting of other non-panel line plate parts on the raw plate to minimize scrap.
- Parallel blasting, marking and burning (including bevel cutting).
- Text labelling.
- Raster marking.
- Automatic mounting of profiles.
- NC data and sketches.

Hull Profile Cutting Interface

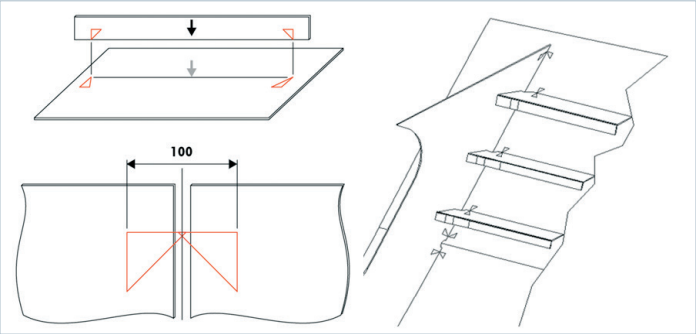
This option enables the transfer of nested profiles, or profiles, to profile-cutting robots or other systems for profile manufacturing.

Hull Plate Cutting Interface

This option enables the transfer of plate parts to external systems for plate manufacturing.

Hull Genauigkeit—GSD Marking Triangles

For any shipyard using automatic marking equipment, this option enables increased accuracy without extra design hours. Hull Genauigkeit is an option to improve accuracy by making the alignments of parts in the assembly process easier. This is achieved with marking triangles and lines that are created automatically in the automatic parts generation, with an option to add more triangles manually. The concept here is that the component itself represents the workshop drawing.



Examples of the use of marking triangles

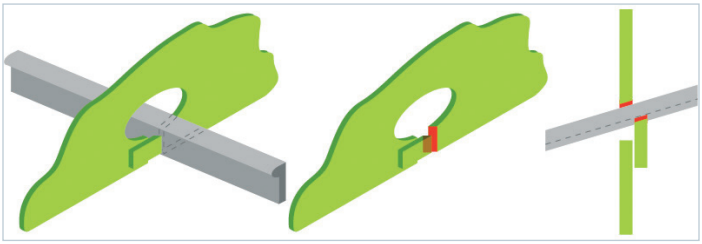
- Accuracy control. Even if the primary use is in the assembly of parts, marking triangles may also be used for accuracy control.
- Alignment of parts. Compared to traditional alignment lines, the marking triangles have the advantage that they “lock” the parts to be connected in three directions, longitudinal, transversal and vertical. The marking triangles are generated in both of the involved parts in butt and fillet joints, and in plates as well as profiles. The position of the triangles will, for example, consider expected bevel gaps in butt welding, and the shrinkage compensation in such joints. Hull Genauigkeit is supported for both the planar hull and the curved hull in the shell of the ship.

Hull Dotori—Variable Bevelling

Hull Detailed Design has an advanced feature for the set-up and control of bevel standards, both for bevel types with fixed angles and where the bevel angles vary. Support for the latter category is identified as the Hull Dotori option. With Hull Dotori, production parts will be generated with a high degree of accuracy.

The Hull Dotori calculations support the definition and use of beveling for fillet welding whenever there is to be a dependence on the connection angle between the elements involved and/ or their material thickness. Hull Dotori can be used to calculate bevels in many situations:

- At plate edges.
- In the lugs of cutouts.
- Along profile traces (shell and planar).
- In profile ends.
- At bracket edges.
- In holes.
- In flange ends.
- In clips.



An example of Dotori in a cutout and a lug

The Hull Dotori option automatically generates information to control the angle of the cutting heads according to the variety of rules specified by the customer. The actual geometry of the part is adjusted to fit with the calculated information.

Robot Interface

This option enables the transfer of the hull model in a volume format, suitable for processing by an offline programming system for welding robot facilities.

Robot Interface 2

This option is a variant of the Robot Interface. It exports part geometry and welding data based on the assembly structure and the results from Hull Weld Planning.

Outfitting Design

The 3D design application for the accurate and clash-free outfitting design of ships and offshore vessels

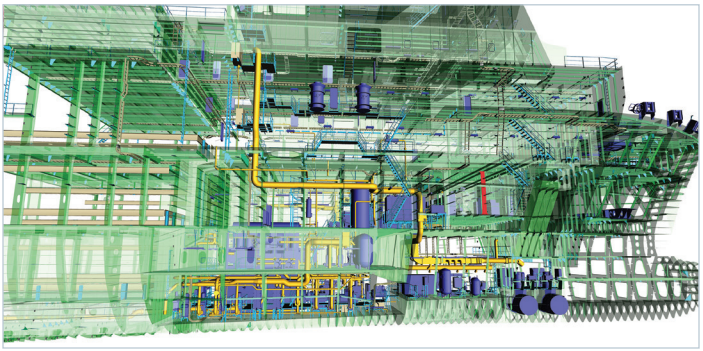
The design and construction of marine projects to demanding cost and delivery requirements demands the creation of high-quality, clash-free design and accurate production information covering both hull and outfitting disciplines.

Outfitting enables outfitting and hull design teams to achieve this through efficient collaboration and high productivity.

As the designers work, Outfitting builds the outfitting part of a sophisticated model database that also includes the hull structure. The model database is used to create 3D layout and detail drawings, together with accurate material take off (MTO) information and comprehensive reports and production information.

Outfitting enables a wide range of sophisticated design and production checks to be carried out across all aspects of the design, to verify and maximize quality. It also supports all the necessary engineering issue, revision and change-control processes.

An extensive catalogue enables pre-defined parametric components and objects to be quickly selected and positioned within the model, then automatically checked for clashes and for compliance with configurable design rules. Changes made as the design evolves can be highlighted and tracked, making it easier to identify, manage and communicate the changes across the different disciplines. The result is a more accurate, better-quality design that can minimize construction costs and time, and avoid errors that can lead to costly rework in production.



Outfitting in a hull space

Business benefits

Reduce design time

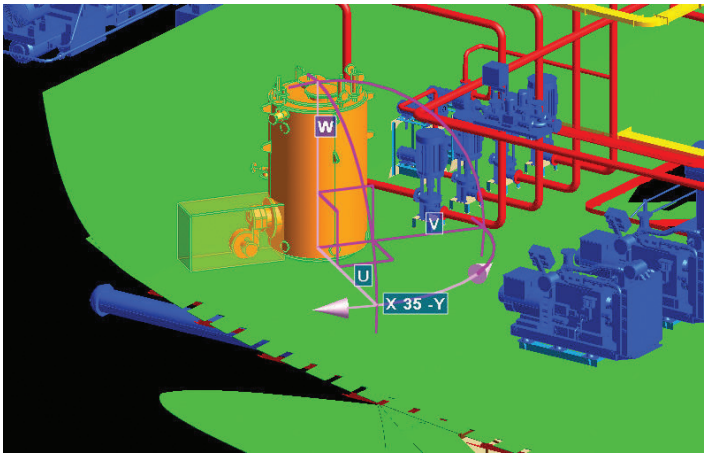
- Powerful design definition and modification functions developed specifically for vessel outfitting design.
- Reduced design rework and highest quality design, using a common model database that avoids design clashes by enabling better communication between hull and outfitting disciplines.
- When used with AVEVA™ Global, Outfitting enables geographically separate design teams to work together as if in a single office.
- High design productivity, centralized administration, robust control, and protection from communication limitations or failures.
- Design rules and checking functions enable more right-first-time design, fewer design iterations and minimum design rework.
- Automatic, just-in-time creation of drawings and other production information direct from the project model minimizes revision work.

Reduced production time

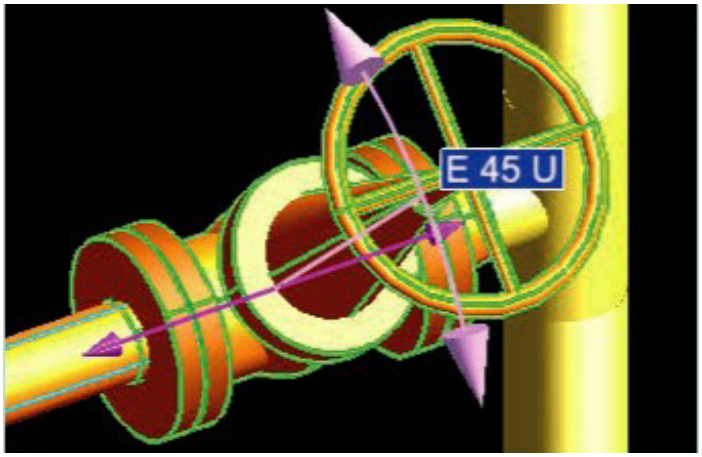
- Less design-related production rework, because outfitting and hull data are developed concurrently in a common model database.
- Maximum steel hot work can be achieved before painting because the common model database enables the early identification of outfitting support attachments and holes in hull steel.
- Highly accurate cutting and marking information can be created for producing all types of outfitting items.
- Pipe rework and remanufacturing are minimized by powerful manufacturability checks that enable the design of pipe spools that are optimized for the shipyard's pipe bending and fabrication facilities.

Key features

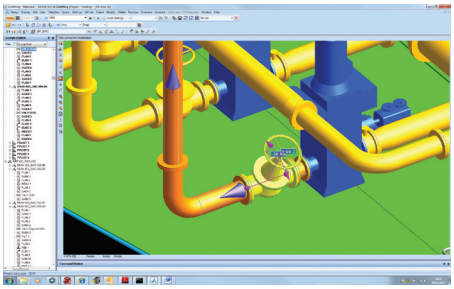
- Outfitting's fully interactive, easy-to-use 3D design environment provides every designer on the project with modern 3D graphical interaction tools, based on .NET technology and supported by an easy-to-use interface.
- As designers work, they have visibility of the entire design created in both the hull and outfitting applications.
- Designers construct a highly intelligent database for the whole ship, creating their specialist parts of the design by placing instances of parametric components from a controlled catalogue.
- Clash-checking and configurable integrity-checking rules identify errors and inconsistencies across the entire design for timely and controlled correction.
- Conventional design issue, revision, and change control processes can all be applied efficiently, even on projects that have many hundreds of users.
- Change highlighting and reversion can be easily applied for each branch of the design hierarchy. Reasons for the change are displayed by color codes in the Design Explorer.
- Powerful 3D editing features with graphical handles and numerical feedback make design creation and modification quick and easy.
- Built-in intelligence, combined with configurable rules and associations, maximizes design productivity.
- Design rules created between outfit items (for example, to link a range of pipes to a penetration in a bulkhead or to ensure that a piece of equipment is correctly located over its foundation) can be rechecked automatically at any time during the design.
- Design and component information from previous Outfitting projects can be reused or shared across multiple projects. Utilities for changing pipe sizes or specifications enable rapid adjustment to the new project.
- A general import function from Microsoft Excel allows large volumes of data from external sources to be analyzed online and bulk-loaded into the design.
- The standard Outfitting design applications can be customized by the user to suit individual, industry or project requirements, or to add further design rules or automation functions.

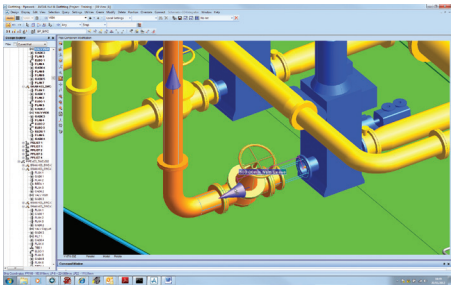


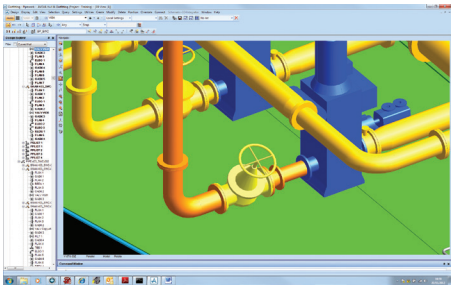
The "graphical handle" gives measurement feedback during changes



Design and modification is quick and easy, even for the novice user



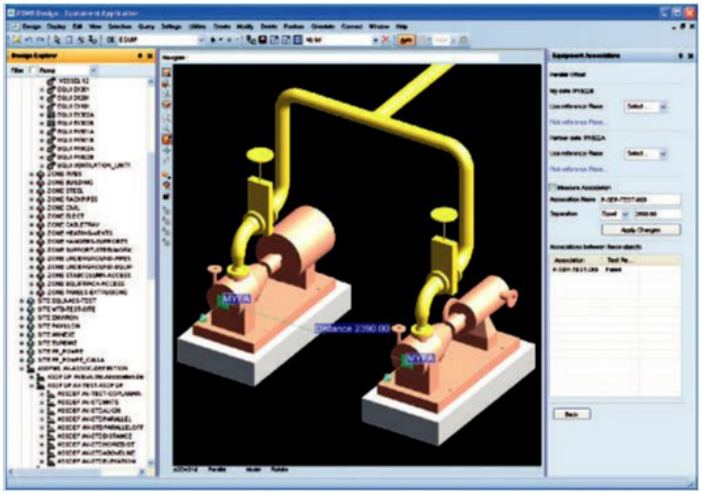




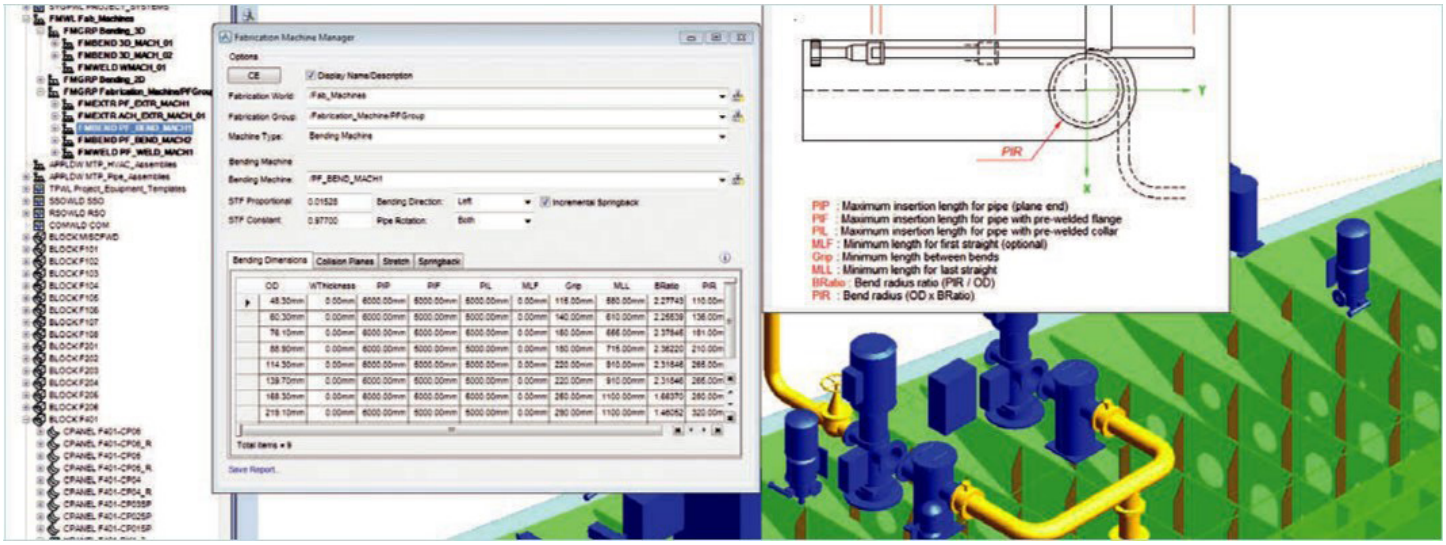
"Graphical handle" manipulation simplifies model changes

Equipment

- The Equipment functions build 3D models for all kinds of outfit items, from pumps and exchangers through to complex items such as main engines and compressors. They are used in all kinds of layout studies, arrangement drawings and connectivity or clash checks.
- Multiple graphical representations are available so that, for example, spaces required for access or maintenance activities can be visualized and clash-checked during layout and design.
- To create an equipment item in the design, the relevant template is selected and the required parameters are defined.
- Equipment templates enable complex parameterized design configurations to be defined for quick and easy reuse, even across multiple projects.
- Alternatively, complex 3D models of equipment can be imported An example of association rules from vendors' 3D CAD systems, using the Mechanical Equipment Interface. They can then be integrated in the 3D model of the ship and reused like library items for layout purposes or connection with systems.
- Equipment items include intelligent connection points, with relevant attributes, for the connection of associated piping, ducting, instrument and electrical systems.



An example of association rules

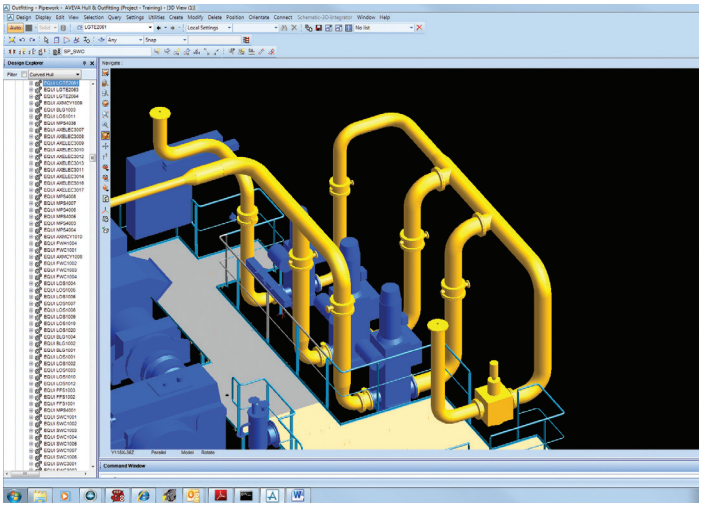


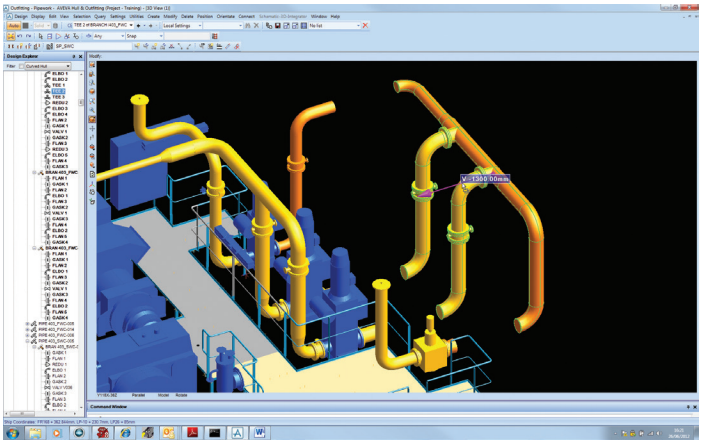
An equipment template

Key features (continued)

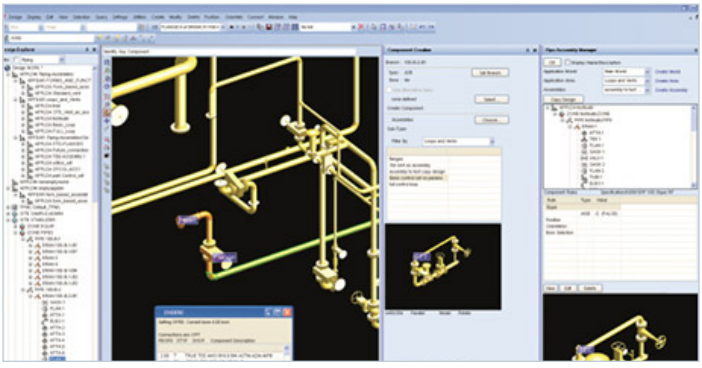
Piping

- The Piping functions build a fully detailed model of all piping systems, based on component catalogues and engineering specifications. From the piping model, piping general arrangement drawings, isometric drawings and bills of quantity are produced.
- A full range of automatically generated piping isometrics is available, as are pipe spool drawings. Extended configuration options are available to fit any relevant national, company or project requirement.
- Outfitting integrates with Outfitting Supports for the detail design of supports for piping, HVAC ducts and cable trays, and with specialist applications for pipe stress analysis via Pipe Stress Interface. Custom interfaces to flow calculation systems, wall thickness calculation and other third-party software can easily be created.
- The automated pipe routing function enables a preliminary route and a first MTO to be created very quickly. Necessary associated items such as gaskets and flanges are automatically selected.
- The quick pipe routing function enables the user to define the route of a pipe by using the mouse pointer to specify changes in direction, either by absolute position or relative to other model features. The route can be orthogonal or non-orthogonal, while easy-to-use tools enable the definition of sloping pipes. Components can be positioned explicitly or by using feature snapping. The route can be completed automatically where completion is predictable.
- To enable the piping design to be further developed, sophisticated modification capabilities include highly interactive graphical editing functions, together with functions to apply specification and pipe bore changes across the line, or to define and modify slopes.

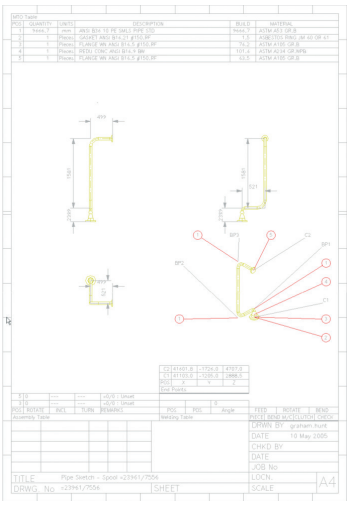




Design changes are executed easily



Regularly used pipe assemblies can be stored and reused throughout the design

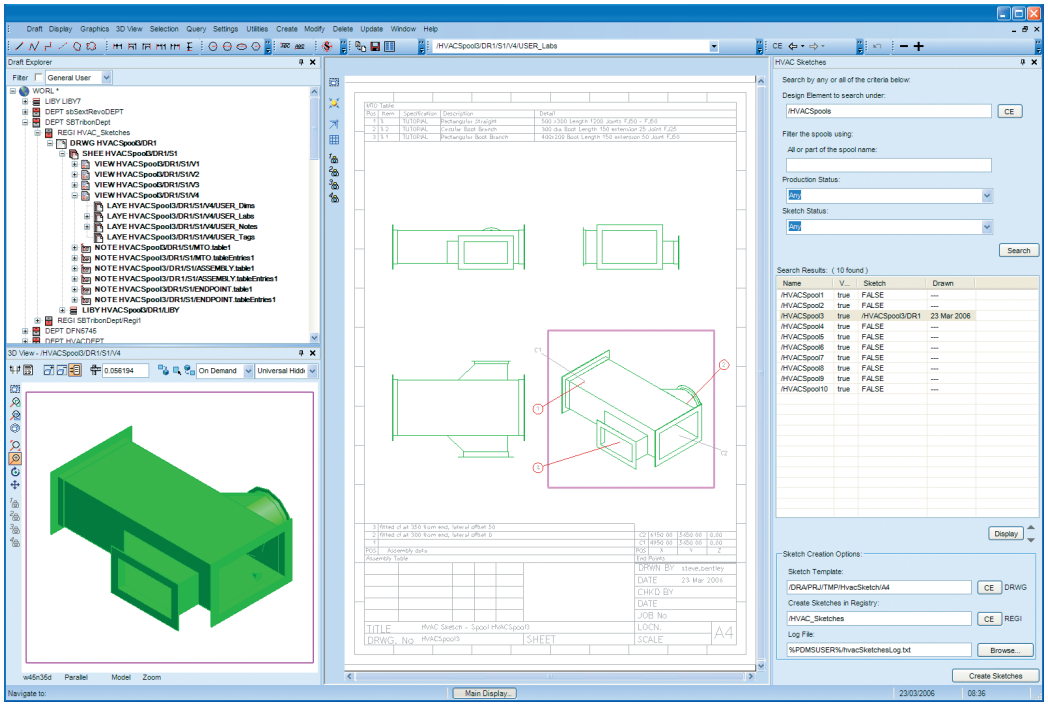


Pipe sketches are produced automatically

- Piping assemblies, such as vents, drains or control sets, can be added to the design as entities. Existing configurations can be saved as assemblies for later reuse.
- Outfitting also provides several capabilities for modeling non-standard pipe connections such as boss connections, and to generate production information for these assemblies.
- All drawings, including layouts and isometrics, have associative dimensions and intelligent annotations, and can therefore be updated automatically in line with design changes.
- Accurate MTO information can be generated on each sheet or drawing or via separate reports for any system, line, area, and so on.
- Pipe fabrication checks for bending and flange rotation can be carried out to ensure that the design easily fits the capabilities of the machines to be used for manufacture. Flange rotation checking ensures that bolt holes in mating flanges are correctly aligned.
- Intelligent rules, configured to the yard's individual pipe fabrication equipment, enable a designer to create high-quality, least-cost pipe runs quickly and efficiently.
- A comprehensive set of production checks is provided to ensure that bending, welding, painting and galvanizing processes are easily achieved.

HVAC and ducting

- Outfitting provides a specialist function for the design of all types of ducting.
- The function uses an engineering specification to select parametric components from a catalogue, enabling a full 3D model to be quickly built.
- A "fill" command automatically creates the straight parts of the route with the appropriate number of straight lengths.
- In-line equipment such as dampers, vanes, diffusers and hoods can all be included.
- The ducting model can be split into spool parts for manufacture and pre-assembly. Spool and isometric drawings can be produced automatically.

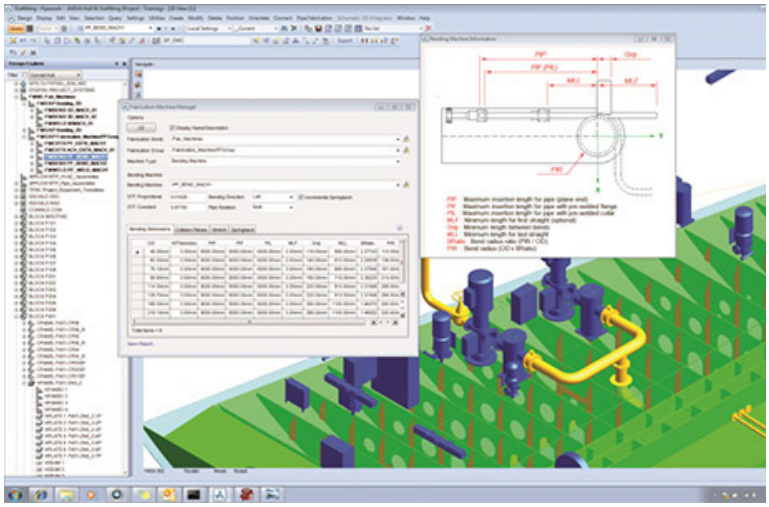


Ducting design and spool drawing

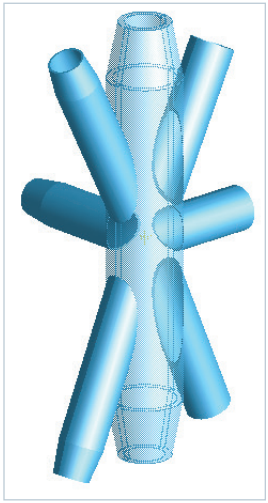
Key features (continued)

Structural

- Outfitting contains specialist functions for the design and detailing of miscellaneous steel structures found in marine projects. A wide range of layout, arrangement and detail component drawings can be produced, together with accurate weight and MTO information.
- The beams and columns function defines and maintains a fully connected nodal network of structural sections, including all joint and fitting details.
- Standard bracing configurations are available and can be customized as required.
- Curved, tapered and built-up beams are all available.
- The panels and plates function defines and maintains flat panels of any shape.
- Outfitting includes efficient tools to model the many small steel outfit items, such as equipment foundations, generally made from bent plates and negative extrusions.
- Just as for hull parts, direct generation of production information for such steel outfit items saves time and increases quality in production.
- The walls and floors function enables designers to define and maintain walls and floors of standard shapes.
- Fittings can be added to all types of beams, plates, walls, floors, and so on, to add items such as doors, windows, intelligent piping penetrations, stiffeners, lifting lugs and fireproofing.
- The access platforms, stairs and ladders functionality enables designers to efficiently create and manipulate these commonly required items. Their models are built from a set of customer-definable, parametric standards that include all details for each structure, such as handrails and kick plates. These structures can easily be modified as the design evolves, by adjusting the original parameters.
- Intelligent parametric penetrations can be defined, together with full details such as kick plates and coamings, and connected to the structure and the penetrating item (for example, pipe or duct) so that alignment and other checks can be carried out.
- Structural modeling makes extensive use of parameterized catalogues for components such as section profiles, joints and fittings. These catalogues can be added to by the user to suit particular project or other requirements.
- Profile catalogues cover the leading international and national profile standards, including angles, channels and I-beams.
- Joint catalogues contain standard types of joints, including cleats, end-plates and sniped end-preparations. Joint definitions are parameterized so that, if a section related to a joint is resized, the joint can be resized automatically.
- Fitting catalogues contain a selection of parameterized structural and industrial fittings, including lifting lugs, stiffeners, windows and doors.
- A range of interfacing options is available to link to specialist analysis software and structural fabrication systems.



Example of pipe bending machine being configured



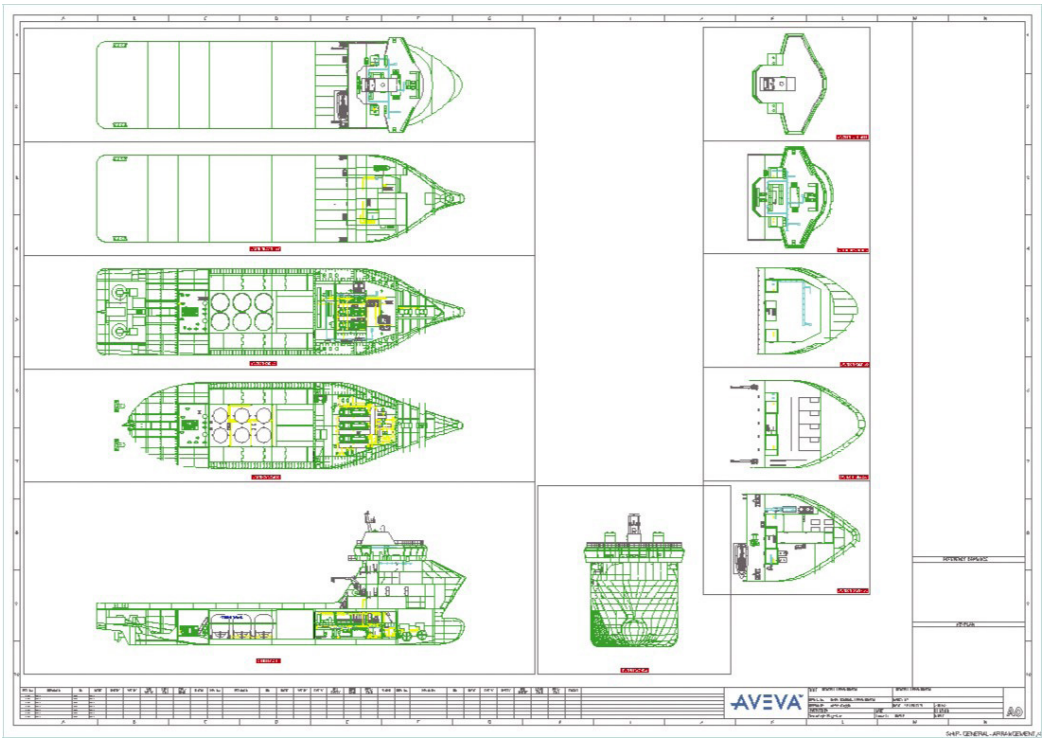
A complex joint

Electrical and instrumentation

- Outfitting allows all electrical and instrument items, including electrical cabinets, transformers and switchgear, to be located in the 3D model for the purposes of design layout, visualization, clash checking and the production of arrangement drawings.
- 3D models of electrical and offline instrument items can be created from parameterized templates.
- Valves and in-line instruments are selected from catalogues via engineering specifications. The workflow is fully integrated with piping design, enabling such items to be detailed as required, for example on piping isometrics.
- The cable tray function selects components from a catalogue via an engineering specification and creates the complete cable tray layout. A “fill” command automatically fills the straight parts of the route with the appropriate number of straight lengths.
- Cable tray isometric drawings can be automatically generated for manufacturing purposes.

Drawings and reports

- All drawings, including their annotations and dimensions, are produced directly from the model database, ensuring high levels of consistency between documents and design.
- Updates to drawings automatically include the latest design changes. Automatic change highlighting can be used to clearly show changes compared to the previous version.
- A comprehensive, flexible reporting module enables all types of reports and schedules to be produced direct from the model database. Users can customize their reports according to their needs and habits.
- Accurate MTO information is available across all disciplines, by item, unit, area, and so on.
- Reporting options include surface area, weight and center of gravity.



Example of a general arrangement drawing of a ship

Key features (continued)

Catalogues and specifications

- An extensive set of catalogues covering industry, national and international standards is available, including piping, structural steel, ducting, hangers, supports and cable trays.
- Each catalogue provides the parametric definition of all components in the required size ranges, ratings and types. So, for piping component connection types, physical and nominal size, wall thickness, flange offsets, material codes and bolt requirements are all stored.
- Engineering specifications control the way in which components from the catalogues may be used in the design.
- Standard catalogues can be defined once and shared across multiple projects.
- New catalogue items, for instance for project specials, can easily be created by the user without any programming language.
- Controlled changes to components and specifications are quick and easy. There are many functions to manage, control and apply such changes across the design.

Integration and interfacing

- A variety of interfaces to analysis systems, drafting systems and third-party design systems are available.
- A wide range of data exchange formats is supported, including DXF, DGN, SDNF and CSV.

Integration with AVEVA™ Unified Engineering solutions

- AVEVA's engineering solutions create schematics, diagrams, datasheets, engineering lists and indexes. Outfitting integrates with all the products within this category, including AVEVA™ Diagrams, AVEVA™ P&ID, AVEVA™ Engineering, AVEVA™ Electrical and AVEVA™ Instrumentation.

Localization

- An extensive range of international character sets (Unicode) can be used for data, catalogues, drawings, reports and user interfaces, including many multi-byte (Asian) and single-byte (European) character sets.
- Feet/inches and metric units are available throughout.
- Units of measurement are made available throughout, enabling management of a wide range of engineering data, and efficient conversions.