3. **Hull Structure**

High performance solution for the fast, complete and accurate definition of the 3D model and outputs of any ship or offshore unit

**FORAN Hull Structure** provides a complete solution for the definition of the 3D model of structure, and for the automatic generation of all information required for manufacturing and production.

The solution can be applied in all stages of the design, starting with an early 3D model from Initial design to class design, detail design and production. The model is transparently stored in the FORAN database as it is created and the transition between design phases is smooth allowing the reuse of data. With a multi-user and concurrent modelling environment, all other FORAN disciplines offer access for reading, navigating, checking clashes, managing penetrations and referencing the structure model. Outfitting, machinery and electrical 3D models are also available when modelling structure.

Modelling functions make an extensive use of **topology**. Every structural item is stored along with its references to the surfaces and structures that support the item or define its boundaries. Topology enables a smooth propagation of the changes downstream the modified item, and the use of smart copy functions.

The automatic oriented approach in FORAN ensures the fastest model generation allowing the shipyards and design offices to save design man hours.

FORAN Hull Structure provides a complete set of tools for generating all necessary documentation for fabrication and assembly.
Hull Structure Standards

FNORM

FORAN Hull Structure standards library comprises materials catalogues (gross plates and profiles), geometric standards and a number of configuration parameters controlling the modelling and the output generation processes. The parametric standards encompasses brackets, clips, other standard plate parts, openings of different types, profile ends, edge preparations and constructive solutions made up of several parts.

Hull Structure 3D Model

FHULL

The structure is primarily built on top of the surface model.

Key features:

• Solid modelling of plates and profiles (BREP based), including thickness, end cuts, cut-outs, drain holes, etc.
• Automatic insertion of profile and welding openings
• One click insertion of brackets, clips, face bars and stiffeners
• Interactive or rule based part detailing, including edge preparations, welding bevels, precision assembly markings, margins and shrinkage
• Calculation of weights, centre of gravity and painting surface
• Visualization of the 3D model from other disciplines (piping, electrical) and definition of openings on penetrations requests

FORAN provides functions for the definition of butts, seams and landings, as well as plate parts, profile parts and openings on deck, bulkhead and hull surfaces.

FORAN Hull Structure includes tools for the smart definition of plate and profile parts on single planes, sequences of connected planes (extruded sections) or corrugated surfaces. Watertight or non-watertight notches, collar parts, edge preparation, split of secondary structures,... are automatically achieved.

Penetrations Management

FORAN Hull Structure modelling environment provides on line access to the FORAN penetration management tool, which shows the list of opening requirements by outfitting designers and the status of each penetration. Structure designers can accept or reject each penetration request, and eventually make the hole in the affected parts.
Assembly Plan

FORAN provides a powerful tool for configuring the assembly plan, or build strategy. All items of the FORAN 3D model, including structure, outfitting and electrical, are organized in a hierarchical tree that simulates the assembly sequence.

Assemblies can be classified in categories, and each category can be assigned a drawing template. For every assembly, FORAN can generate an automatic drawing, with 3D and 2D views, details, automatic dimensioning, labelling or part lists, based on a configurable template. Other functions connected to the assembly plan are the calculation of welding lengths, weights and centre of gravity.

Structure Fabrication and Assembly

FHINFO, FDESIGN

FORAN provides a complete set of tools for creating all necessary documents for fabrication and assembly.

The following manufacturing and assembly tools are available:

• Plate and profile nesting, and CNC files for cutting, marking and lettering
• Profile manufacturing sketches
• Plate expansion and bending
• Jig drawings for curved panels assembly
• Remarking drawings
• Part lists and BOM
• Automatic assembly drawings, 3D drawings and welding traceability drawings

Nesting

FORAN provides a highly efficient plate and profile nesting application. It can work in automatic or interactive mode, and supports both regular production nesting and global nesting for material estimate. FORAN nesting features part integrity between 3D model and nesting, definition and reuse of scraps and symmetric/copied nesting.

Welding Traceability

FORAN provides advanced functions for the automatic calculation and classification of welding lengths, attending to different criteria such as type, position and assembly step. The welding calculation is performed downstream from one assembly, or from the complete project.
FORAN Hull Structure Benefits

- FORAN Hull Structure is strongly 3D oriented, and fully aligned with the FORAN model-to-drawing principle
- Seamlessly applicable to all project stages, from initial design to production engineering
- Fast and accurate structure modelling environment
- Extensive use of topology ensuring a fast definition of elements, smart copy functions and propagation of changes
- Complete set of automatic fabrication and assembly outputs
- Regeneration of drawings after changes in the model
- Customised NC data
- Powerful management of penetrations
- Build Strategy definition with advanced welding management

Reports
All reports in FORAN are generated in a single application with powerful capabilities and user-friendly interface. The outputs can be easily generated and update after changes.