A complete set of advanced functions manage equipment, distributors and related auxiliary structures.

FORAN Machinery & Outfitting continues the design process by incorporating all aspects related with equipment, piping, HVAC ducting, auxiliary structures and supports into the same project-centric database already used for the ship hull structure and for the electrical design.

Starting at early design stages, the user can start creating libraries of models to be used even in the general arrangement definition in FORAN. In a very innovative application it is possible to position the main equipment in the 3D model very quickly. After that, the GA drawings can be generated from the 3D model as an automatic output, including these equipment.

During the basic design stage intelligent P&I diagrams are defined connected with the 3D model. The transition to the detail design stage is smooth, taking advantage of the early position of equipment developed earlier.

A single tool manages in FORAN the equipment layout, piping lines, HVAC ducts, related auxiliary structures and supports with many automation of tasks. Finally, all information for production and assembly is generated automatically, including spools, isometrics, drawings and reports.

FORAN incorporates a powerful on-line capability for clash detection, and it is integrated with the hull structure to manage the penetrations efficiently.
Outfitting Standards

FDEFIN

The FORAN Outfitting standards library comprises a set of technological attributes and built-in geometries so that pipes, fittings and equipment are easily and quickly recreated from the vendor catalogues. Moreover, user can define any kind of 3D model for equipment and fittings by means of geometric macros.

The pipes and fittings are organised in specifications applied to each system, and contain the complete list of attributes such as material, nominal and secondary diameters, schedule, nominal pressure connection types, and others. On top of that, any type of user attribute can be added to them.

The integration between disciplines allow to assign electric properties to equipment and fittings for a complete electric calculation and wiring afterwards, within the FORAN.

Equipment models may also include the connection information to ensure the correct connectivity of pipes, ducts and cables.

Outfitting P&ID

FSYSD

The FORAN application for the pipe and instrumentation diagrams allows the definition of the diagrams as part of the ship design, stored in the same database than the 3D model. A specific 2D environment contains all the needed functionality to handle the basic entities that make the essential part of the diagrams (equipment, pipes, fittings and instrumentation).

All data included in P&ID’s is available when working in the 3D model, thus guaranteeing the fully correspondence between the diagrams and the product and therefore facilitating the task of creating the as-built diagrams.

Outfitting 3D Model

FPIPE

The FORAN application for the 3D modelling in Outfitting gathers different working environments within the same module, thus enabling the designers to work with equipment, piping, ventilation, cable trays (as space reservation), auxiliary structures and line supports.

The locking policy to ensure the data integrity prevents a multiple access to the objects in the database, as combinations between the ship zone, ship system, design discipline and designer.

Routing of pipes and HVAC ducts can be done interactively, or by means of using user predefined solutions. During routing tasks, FORAN automatically checks the fabricability of the pipes and the compatibility of connections, and calculates bolts, nuts, gaskets and weldings.
As auxiliary structures, user can design any type of foundations, ladders, gratings and handrails, plus pipe, duct and cable tray supports, from scratch or taking advantage of predefined standards solutions. In the case of the supports, a strong link between the distributor and its support keeps the model consistent after changes in the distributor. All profiles and plates created as part of auxiliary structures and supports can be included in nestings.

Key features:

• Powerful hard and soft clash detection functionality
• Capable of handling a large number of objects in the scene
• Dedicated and smart tools for the distributor generation with multiple options
• Automatic and interactive access to P&ID data from 3D model
• Piping-oriented specific commands
• Handling of singular spaces

Penetrations carry their own data and are stored in the database, at the time that are subject of a strict workflow from the Outfitting (and Electrical) department to the Structure department, where to evaluate, approve and execute (if applies). The penetrations pieces have their own representation, can be included in the drawings and exported to BOM’s.

Penetrations Management

The FORAN Outfitting modelling environment starts the process for the definition of the openings in the main structure of the ship. Pipe and HVAC fitters may completely identify each of the needed holes to be cut in any plate for a watertight or non-watertight penetration.

Outfitting Production

ISOM, FBUILDS, FDESIGN

The typical outfitting production documents are obtained from FORAN in a highly automated way, especially the pipe spool isometric sketches for manufacturing and mounting. Both drawing types are capable of complete customization for symbols, labels, dimensions, boxes and paper formats, and are obtained in a fully automatic way. The manufacturing sketches may include complete bending information and can export data to CNC files.

Similarly to the FORAN Hull Structure, the outfitting entities may be assigned to any strategy tree. Pipes, HVAC ducts, auxiliary structures, supports and corresponding hotworks can be added at any level of structure assembly, thus guaranteeing the preoufitting blocks and sections with the subsequent savings in cost and delivery times.
FORAN Machinery & Outfitting Benefits

- Early use of libraries of elements at basic and class design stage
- Intelligent P&I diagrams linked to the 3D model
- Design integrity with full control of user accesses, roles and permissions
- Fast & powerful modelling environment
- Complete management of pipe routing, equipment layout, HVAC, auxiliary structures and supports
- On-line clash detection and management of penetrations
- Manufacturing parameters checking for pipes
- Automatic generation of pipe isometric sketches (fabrication spools & assembly)
- Automatic generation of reports and BOM´s

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.