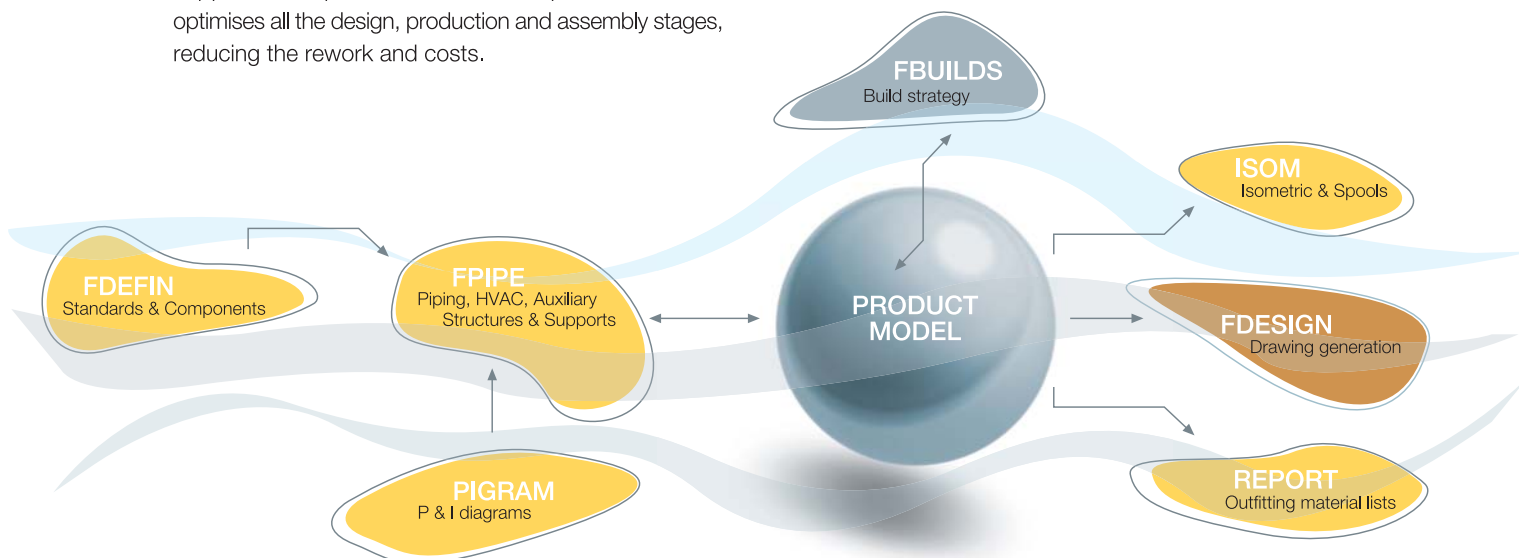
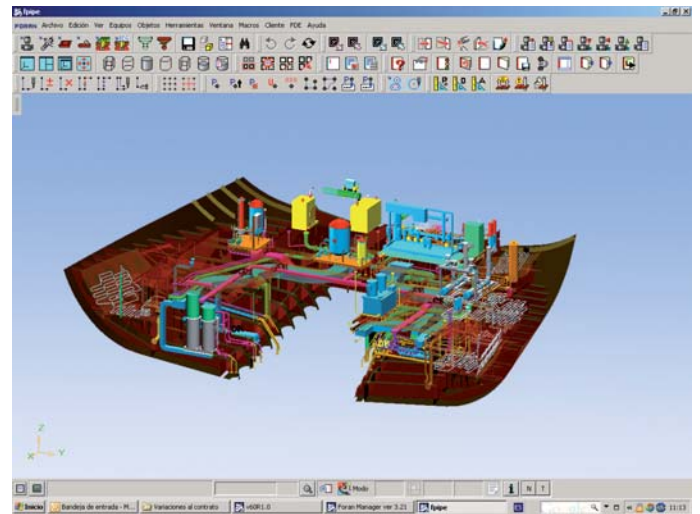


OUTFITTING

FORAN is continuously improved with state-of-the-art technologies and applications to facilitate the ship design process. Specific tools for the outfitting design have been incorporated for the equipment, piping, HVAC, auxiliary structures and supports definition. Designers and engineers gain the competitive advantage of building the outfitting in an integrated model with the hull structure in a single database, which significantly reduces costs and man-hours.

FORAN outfitting delivers a wide range of high performance tools that can be used from early stages of the design process, in conjunction with the structural model defined in the **FORAN** hull structure package.

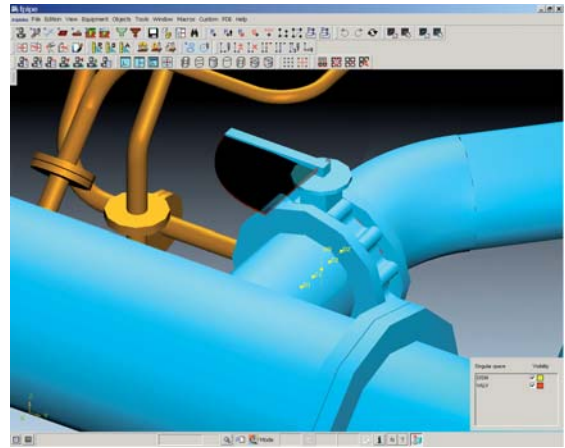
The single and easy-to-use environment in **FORAN** supports the quick creation of a ship 3D model that optimises all the design, production and assembly stages, reducing the rework and costs.



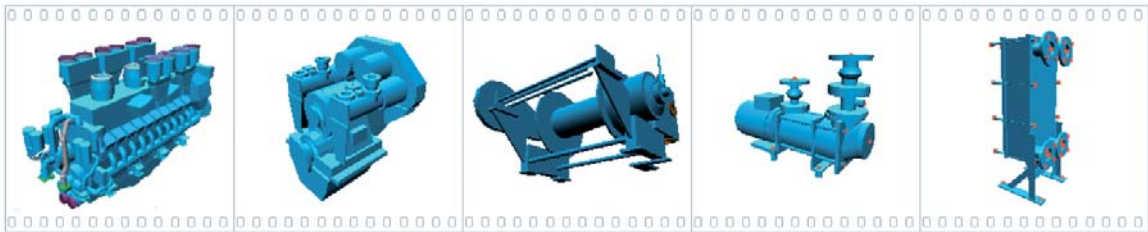
FDEFIN

FDEFIN is the module in **FORAN** that groups all the outfitting standards management tasks, with a modern and easy-to-use user interface, together with compact and integrated window dialogs. The following tasks are integrated in **FDEFIN**: library models, representation groups, user attribute templates, piping basic standards, equipment and piping classes-components, HVAC components and auxiliary structures and supports library.

The database is populated with the standard information that will be used during the design process. The division of the ship/project in zones (geographical) and systems (functional) is also made at this stage. The libraries of standards of existing projects can be easily reused in new projects.



FDEFIN provides a quick 3D model environment for the definition of equipment and auxiliary elements, which are organized in libraries defined by the user. The objects within a 3D model can be assigned to representation groups in order to consider different detail levels or to include dismounting, safety or operational areas in the representation. With **FORAN** it is also possible to incorporate technological attributes to connections of equipment models, by means of a specific tool called "Connection Manager", that allows to add/edit/delete model connections through only one command.



PIGRAM

Definition of P&I diagrams

FORAN offers a practical tool to define ship system diagrams.

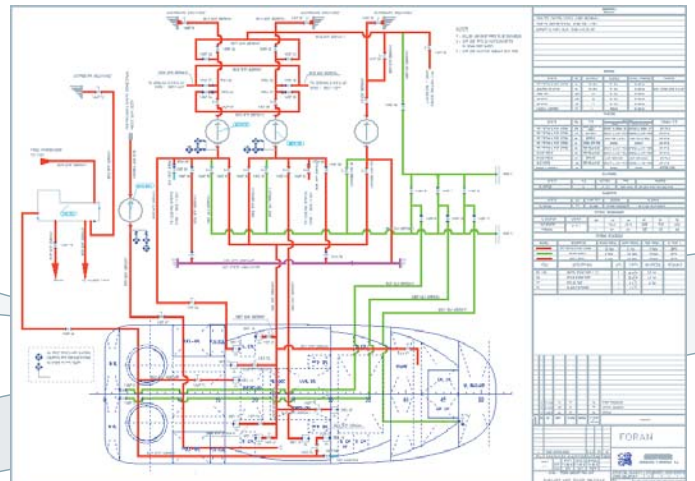
Key features:

- Routing distributors
- Insertion of fittings
- Automatic control of the logic of connections
- Intelligent labelling of equipment, fittings and pipelines
- Automatic association of graphic attributes depending on the fluid
- Generation of material lists
- Pressure drop and flow calculations

All the information created in **PIGRAM** (equipments, pipelines, fittings) is available in **FPIPE**.

Definition of 2D graphic symbols

SYVIEW offers an intuitive application for the definition and modification of the 2D graphic symbols associated to each class of equipment or fitting. Symbols will be used in the piping and instrumentation (P&I) diagrams and also in the electrical diagrams.



FPIPE

FPIPE provides powerful functionalities enabling the user to:

- Arrange the equipment
- Route the distributors (pipelines, ventilation ducts and cable trays) and insert fittings
- Generate the auxiliary structures
- Insert the supports
- Define the spooling of pipes and ducts

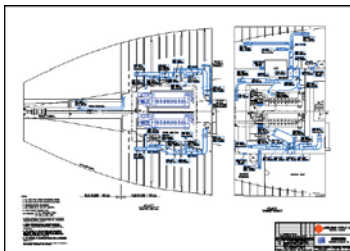
Outfitting initial design with FORAN

FORAN incorporates new concepts for the initial design of outfitting with a quick equipment definition that can be used at the early stages of the design, with direct access to the existing hull structure information. The designer works in a 3D environment, making a top-down definition of the ships elements allowing to re-use the information in the detail design.

The single database integrates all the disciplines, and guarantees the consistency of the information. The topological design allows a shorter evaluation of different design alternatives.

The main subjects of the outfitting initial design with **FORAN** are:

- P&I diagrams
- Safety drawings
- Equipment layout
- Doors, hatches, trunks and access drawings
- Ventilation ducts
- Exhaust gas pipes

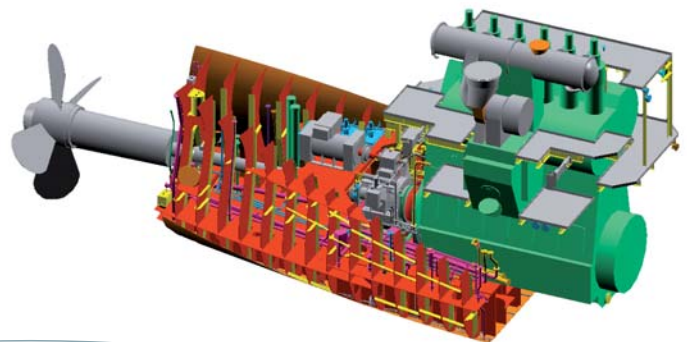


Equipment arrangement

The equipment arrangement is performed in **FPIPE**.

- A component is defined in **FDEFIN** with its main characteristics (identification, description, weight, center of gravity) and its geometry (library model or geometric macro) provided by the manufacturer
- An element is an instance of a component that is placed inside the ship. Each element inherits the component information

The user decides the positioning point, the zone and the system as well as other user-defined attributes.



Pipe routing

FORAN offers a powerful environment for the definition of the piping layout and the insertion of fittings with an interactive and user friendly interface. The designer uses all the information available regarding the hull structure elements, equipment, auxiliary structures, pipes, ducts and cable trays.

The piping specifications and diagrams are integrated in the pipe routing together with the information about parametric fittings such as valves, flanges, tees, bulkhead and deck penetrations and couplings.

A powerful set of routing tools allows to define new pipes and to modify existing ones, including those for the automatic generation.

FORAN controls the simultaneous work of different designers in the same zone although in different systems.

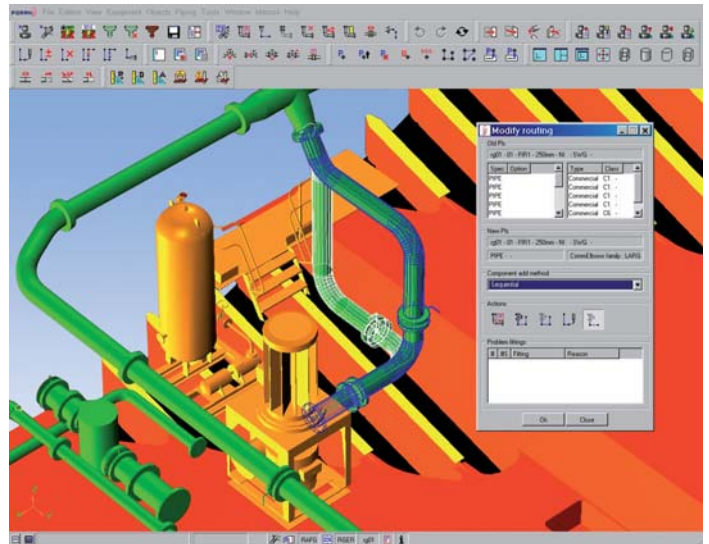
Once pipe distributors are stored, the information is available for other **FORAN** modules during the ship design process allowing for clash detection, generation of drawings and reports.

HVAC

FPIPE incorporates a modern environment for the routing of ducts, the generation of HVAC diagrams, and the calculation of pressure losses.

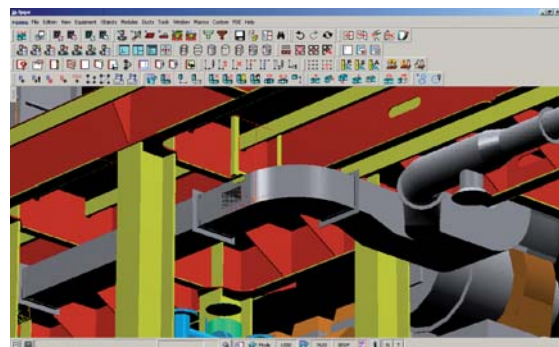
The main functionalities of this working context are the definition of duct sections and the setting of duct attributes. Ducts layout is based on polygonals or made element by element. Other available features are bending control, control of minimum lengths, twist control and suggestion of alternative solutions.

FORAN includes a new HVAC 3D design application for the definition and management of 3D diagrams, featuring pressure losses calculation, ducts dimensioning and balancing, fan dimensioning (pressure and flow) and faster ducts 3D modelling from diagrams.



The pipe routing tools have the following properties:

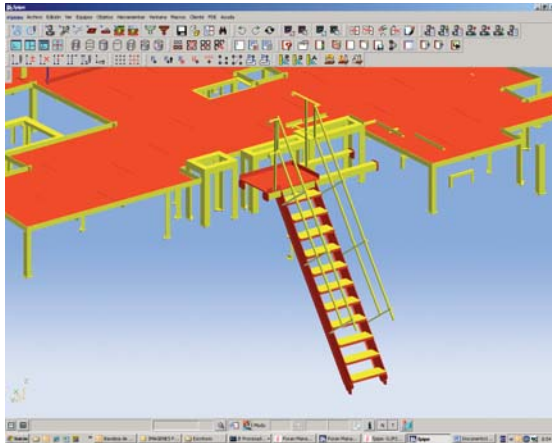
- Interactive pipe routing with an associated polygonal or by individual elements
- The pipe geometry can be referred to hull, decks, internal structure, equipment, auxiliary structure, ducting, trays, piping or fittings, or to any significant point of an object
- Automatic pipe bending checking and detection of non-consistency in the pipe routing
- Automatic consistency checking between the P&I diagram and the 3D model pipe layout
- On-line interference checking (clash detection)



Engineers and designers can make the complete HVAC design in a single working environment, fully integrated with the rest of disciplines. In order to avoid interference in the design, **FORAN** locks to other users the writing access to the working zone and system.

Auxiliary structures

Auxiliary structures, such as foundations, ladders and non-structural tanks, are defined as a combination of parametric standard plate and profile parts. Each individual part is handled as any other structural element for production and data generation purposes (i.e. nesting).



The auxiliary structures are assigned to hull structure blocks and to outfitting zones.

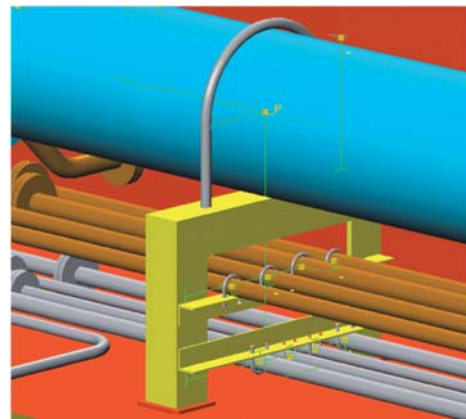
Key features:

- User-defined library of substructures
- Geometric macro files to enhance the generation of substructures
- Guided dialog windows
- Automatic fitting of profiles along a polygonal line in a plane
- Trimming tools for profile cutting
- Clash detection

Management of supports

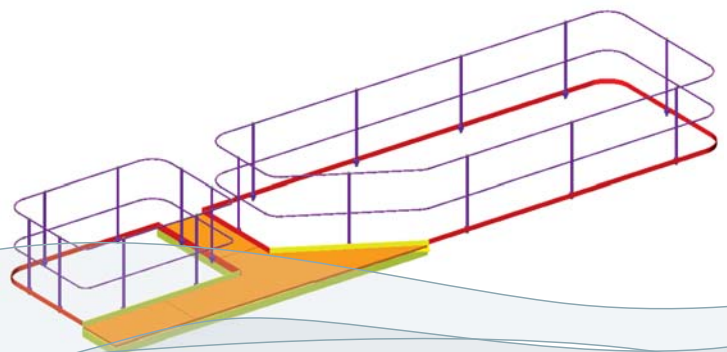
This working environment uses the hull structure standards to create entities (supports), which are stored as part of the outfitting, but also associated to hull structure blocks (as plates and profiles). Supports are really specific auxiliary structures linked to distributor elements.

Hierarchy is allowed to establish support dependence. Other advanced capabilities are the automatic control of the connectivity between the supports and the elements supported, and the concurrency controlled by preventing other user from accessing the support in use.



Management of penetrations

FORAN provides a set of functions for the definition, communication and management of penetrations within the ship project. A penetration is considered as an entity stored in the database, containing complete information about its geometry, position, characteristics, elements involved and about its status and the workflow of the whole requesting / making process.



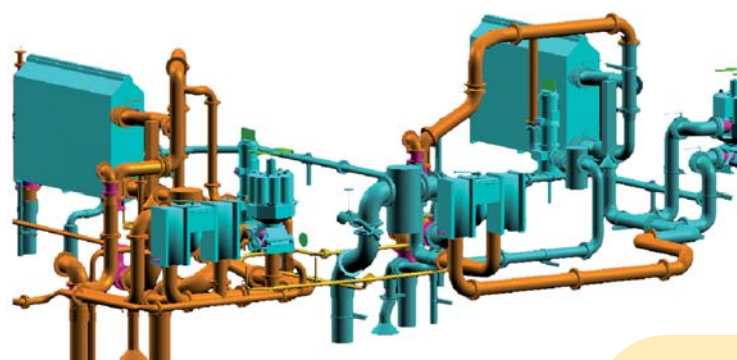
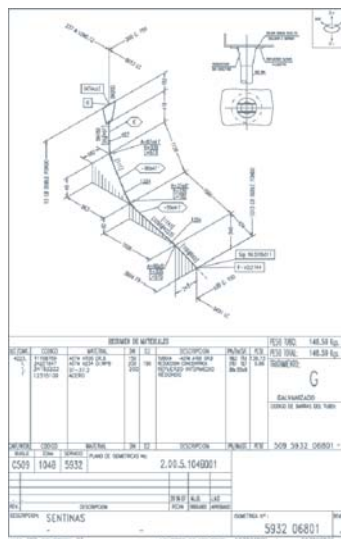
ISOM

Isometric drawings & Spools

A particularly important feature of **FORAN** is the automatic generation of detailed piping isometric drawings according to the shipyard practice and formats. Two types of drawings can be obtained:

- Fabrication spools: with all the information required for bending and flange positioning
- Assembly sketches: containing spools and fittings and providing dimensioning referred to ship references

The consistency between pipes in the 3D model and the corresponding isometric drawings is automatically controlled by the module. Specific commands allow the export NC information to bending machines. Pipe spooling allows to split the pipelines into fabrication spools, and to group them into assembly isometrics (manually or fully automatically).



REPORT

REPORT for the generation of a customized list of materials equipment, fittings and pipes, with the possibility of obtaining the information by systems, zones or build strategy. Some typical reports are:

- List of equipment, fittings and pipelines by ship systems or zones
- From-to reports of the distributors of a P&I diagram
- Itemized bill of material for equipment, fittings and distributors
- Tracing down of a distributor
- Situation of each item of equipment with respect to key data such as request for bid, reception of offer, order, reception and mounting
- Summary of fittings and pipes by zones or by systems

FBUILDS

FORAN offers a solution to set up the build strategy, i.e. to organize a **FORAN** project according to the fabrication and assembly processes that take place at the shipyard. The build strategy is defined by arranging a hierarchical tree that describes the breakdown structure of the ship. The full product model is organized into a hierarchy of interim products (IP), being possible to set up general alternative build strategies.

FBUILDS provides advanced interactive functions for IP creation and parts assignment (cut & paste, drag & drop, sorting, searching), the possibility to classify the IP using configurable attributes for each type, and the definition of the assembly sequence. Drawings and part lists of IP are created in **FDESIGN**.

FDESIGN

Drawings are generated in **FDESIGN** module, as it is described in a separated Brochure.

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