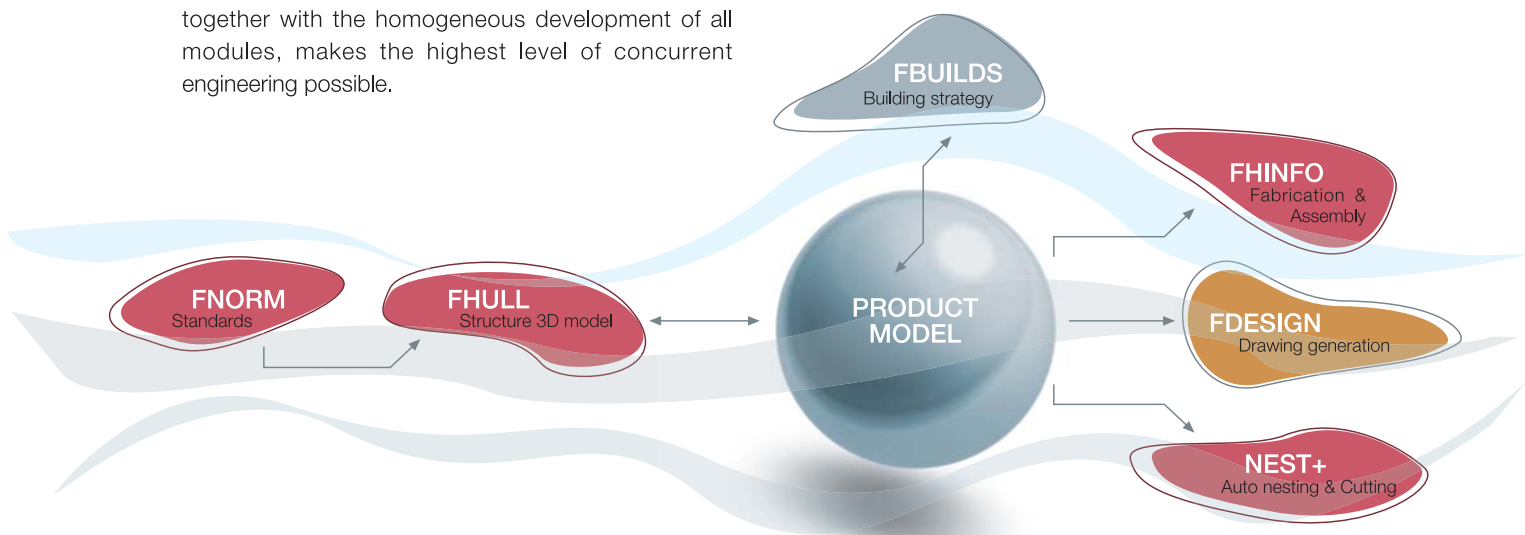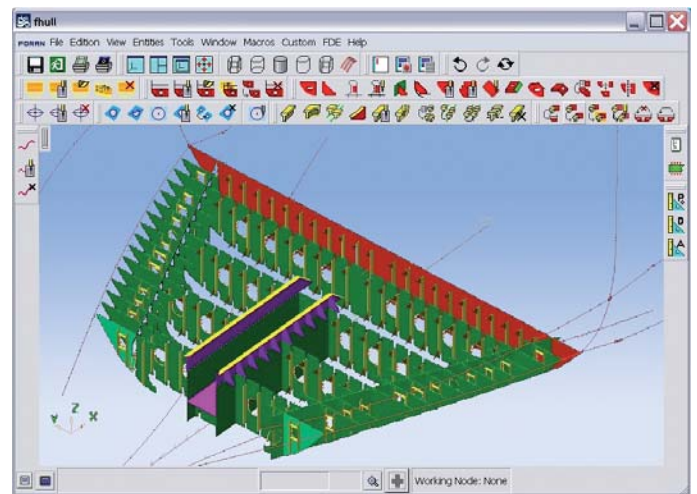# FORAN

Integrated Shipbuilding CAD/CAM/CAE System

HULL STRUCTURE

FORAN offers unequal solutions for the fast definition of a complete and accurate 3D model of the ship structure. All the work is carried out on the full-ship product model, which supports both the basic and detailed design stages within a single environment, simplifying the organisation and increasing the overall performance of the design process.

The solution addresses all shipyard and design offices requirements by means of powerful capabilities, automatic mechanisms, extensive use of topology and user-configurable procedures and macros.

One of the most important characteristics of **FORAN** is the integration of the entire range of ship design disciplines. This property, combined with the seamless continuity between the basic and the detail stages of the design, together with the homogeneous development of all modules, makes the highest level of concurrent engineering possible.

FBUILDS
Building strategy

FHINFO
Fabrication & Assembly

FNORM
Standards

FHULL
Structure 3D model

PRODUCT MODEL

FDESIGN
Drawing generation
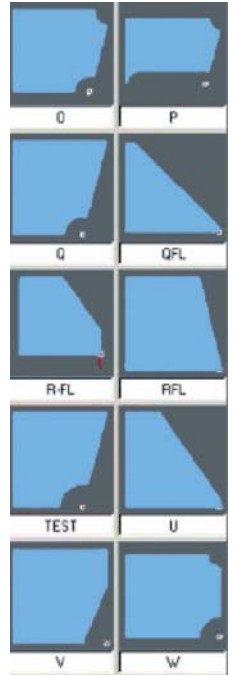
NEST+
Auto nesting & Cutting

FNORM

All the information concerning norms, standards, configuration parameters and other essential shipyard requirements is centralised in the **FORAN** database. The gross materials catalogue, the plate and profile fabrication methods and the parameters for configuring all the workshop drawings and outputs are defined through an intuitive user interface.

FORAN offers a complete 2D graphic interactive environment to define cut-outs, holes, brackets, collars, profile end cuts, bevels and other parametric standards, in which the geometry is described as a macro of procedural commands representing associative geometrical constructions.

The definition can be established either by creating or copying from another existing project.

There are three main tasks in **FNORM**:

- Definition of configuration parameters
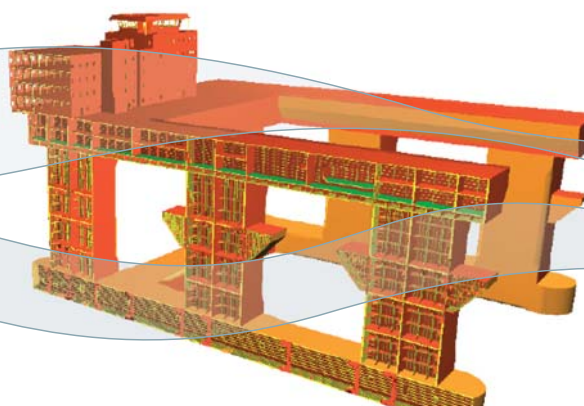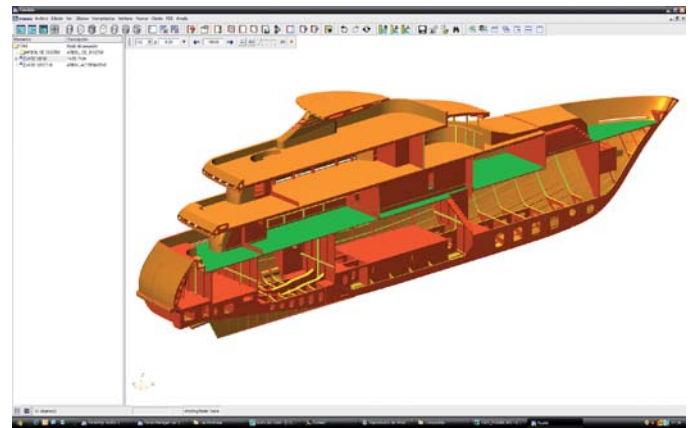- Creation of gross material
- Parametric standards

FHULL

FHULL allows a complete definition of the 3D structural model of any kind of ship, including curved and flat plates, frames, longitudinal profiles, standard plates and face bars covering the initial, basic, and detail design stages.

In order to reduce definition complexity, **FORAN** incorporates two application contexts, for curved and planar surfaces.

Key features:

- Topological definition
- Intuitive user interface
- Preliminary part lists and weight and centre of gravity calculations
- XML information transfer
- Macro language
- Three levels of visualization detail
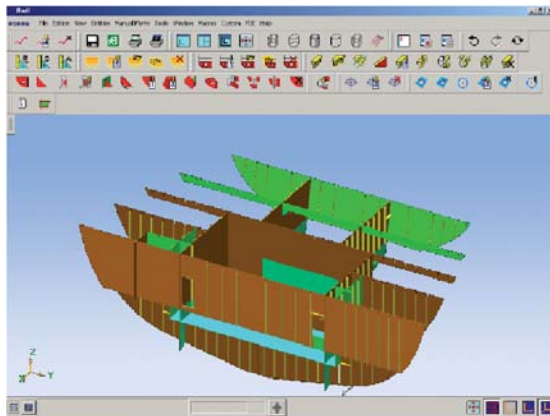- Built-in walk-through application
- Entity pop-ups with most useful commands
- Undo, redo

FHULL

FHULL incorporates new concepts for the initial design of the structure with a quick single 3D model definition that can start in the early stages of the design.

Even with a very preliminary definition of the hull and decks surfaces, the level of detail is increased with part definition without assigning to an assembly unit or a structural area.

FORAN includes a topological definition of butts, seams and curved plates and advanced functions for easy definition and modification of plates, profiles, holes and face bars.

The work division is done using surface, structural element and zone concepts.

The powerful functions to split, multi-edit and multi-copy plates and the possibility to introduce attributes for the detail design are some of the capabilities that allow the reusing of all the information and significantly reduce the rework.
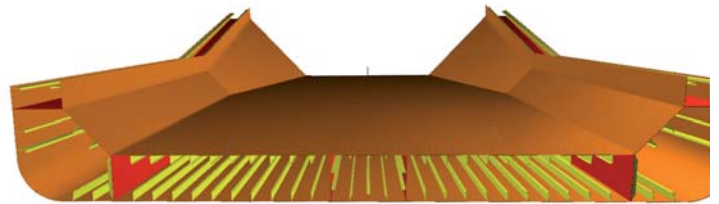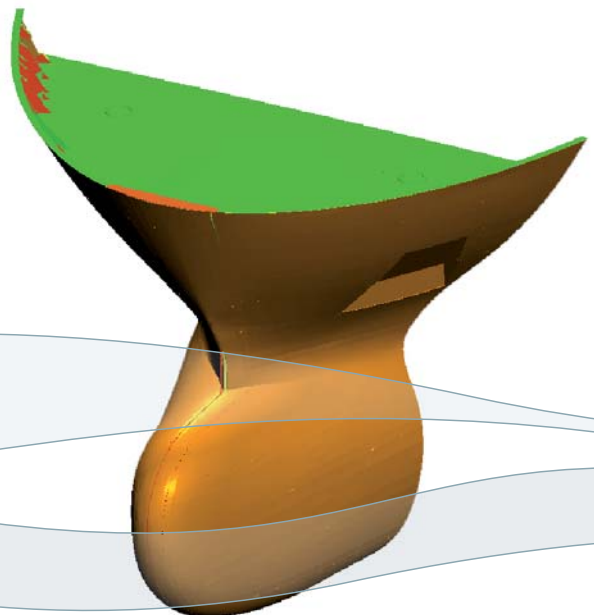
Shell & Deck

FORAN has a curved surfaces mode that makes possible the fast definition of plates, profiles and holes. The work is organized attending to the surface and zone concepts, enabling multi-user access to any surface.

Shell and deck holes, longitudinals, frames, deck beams and general profiles can be created using topological references to other structural elements or to early design concepts. Plates are created as zones of the surface and provided with attributes such as thickness orientation, material and edge characteristics.

One of the new capabilities in **FORAN** is that the internal structure can be used as a topological reference, allowing for the building of a single topological model.

Some of the advanced capabilities are:

- Automatic insertion of profile cut-outs at the plate and profile-profile crossing points

- Automatic insertion of scallops at the intersections of profiles with butts and seams

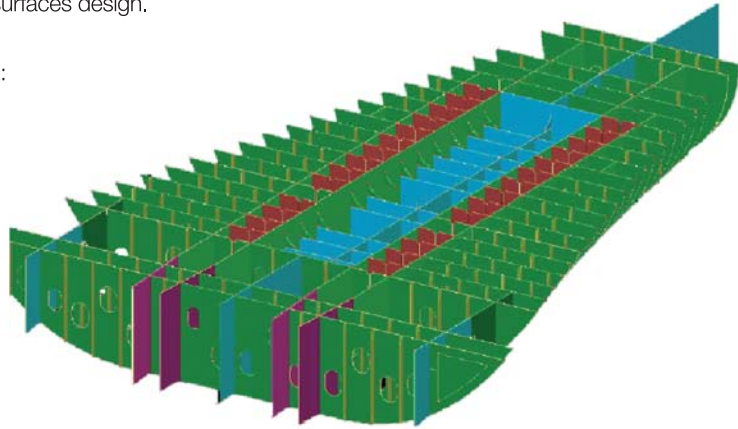Shell and deck profiles can be affected by penetrations defined in outfitting subsystem.

Internal structure

The flat surfaces mode of **FORAN** provides functions for the definition and modification of internal parts.

It is based on the same high performance topological and visualization environment that for curved surfaces design.

Any part types can be defined, including:

- Flat plate parts

- Holes

- Straight and curved stiffeners

- Flat bars

- Flanged parts
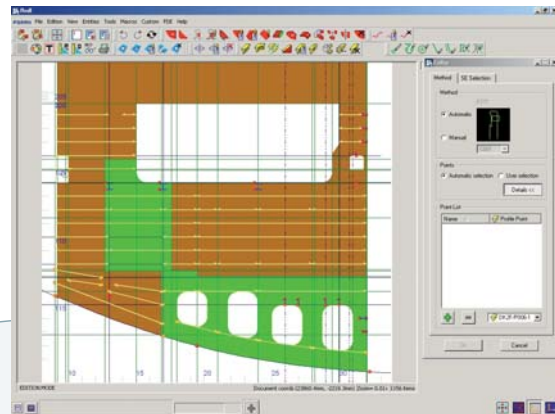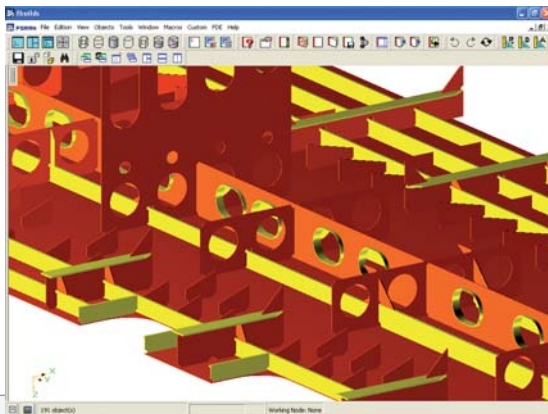
- Corrugated parts

- Brackets

- Collars

Multi-user access to any surface enables work division by means of surface and structural element concepts.

Two synchronized working modes allow to interact with the 3D model and the 2D sketcher (using auxiliary geometry). The 2D sketcher mode incorporates new capabilities such as the possibility to handle off-line intersections through the virtual extension of the geometry.

The wide range of high productivity tools and commands significantly reduces the use of auxiliary geometry and allows to split, multi-edit and multi-copy plates and profiles in the same or in different surfaces and structural elements.

FHULL provides the following automatic functions for the definition of the detail structure:

- Split of structures crossing other structures

- Insertion of clips and collars, cut-outs and scallops both por plates and profiles

- Modification of the plate contours when inserting standard or free shaped holes

- Interactive functions for bracket definition (brackets connecting two profiles, with variable geometry and off-plane brackets)

FHINFO

FHINFO generates workshop information for parts fabrication and assembly, providing a dual user interface that shows both the ship 3D model and the build strategy tree. The user is able to generate, in a very intuitive way, the required information for building all the structural parts, obtaining the reports and drawings.

Plate development & Bending

FORAN offers several methods for the plate expansion and bending in a user-configurable way.

Drawing files and text outputs are created with all relevant information, including numeric tables with the geometry of all the curves, for manual marking or cutting. Solid template parts are stored in the database for nesting.

Profile fabrication

Profile fabrication sketches are automatically generated and include end cut details with automatic dimensioning, holes, scallops and cut outs positions, bending information, profile attributes and the list of identical and symmetrical profile parts.
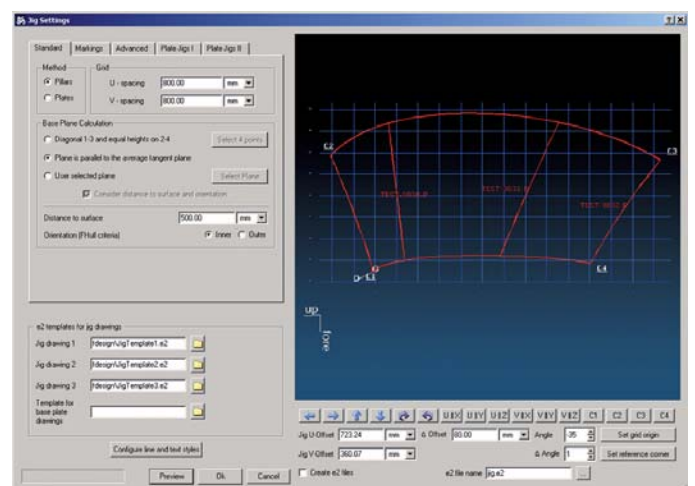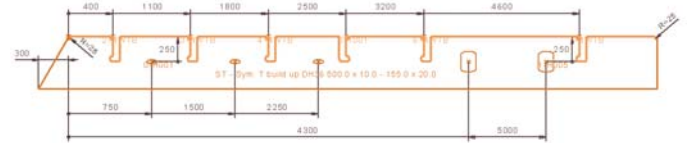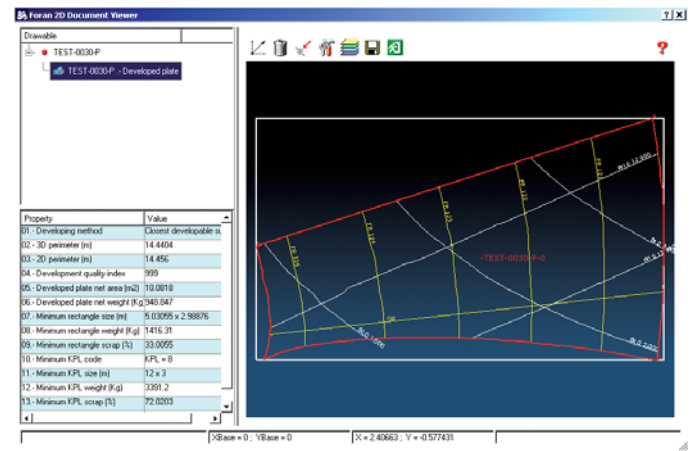
FHINFO automatically generates one sketch for each profile or group of profiles processed, which can be configured using **FDESIGN** drawing templates.

Prefabrication jigs

FHINFO provides a specific task for curved panel assembly providing the prefabrication jigs (plate or pin). The jig base plane is automatically calculated, and a graphic 2D interface shows the panel projection on the base plane for the interactive precision alignment of the panel on the jigs. A configurable set of outputs is automatically produced, describing all the relevant data for panel assembly and marking.

Hull structure report generator

FORAN provides advanced and user-configurable generation of the structure model reports (**FREPHULL**). It includes both fixed format reports, such as bill of materials and part lists with different formats, and customized reports.

NEST

Automatic plate & Profile nesting

FORAN provides an operative solution to produce plate and profile nesting according to yard standards, production devices and fabrication methods. **NEST** can be used to calculate the necessary gross material in order to produce the material take-off, and to generate NC information, drawings and cutting statistics during the detail design stage.

NEST can operate in a fully automatic mode, offering the possibility to use build strategic criteria for selecting the parts to be nested.
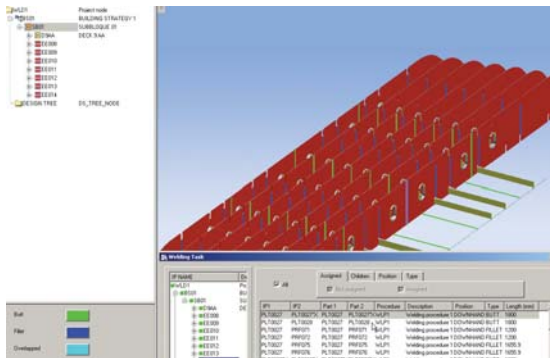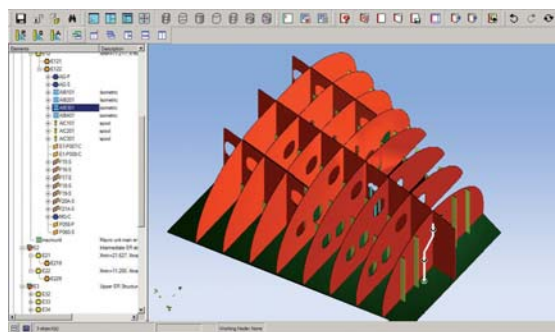
FBUILDS

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**.

Welding management

FORAN incorporates new capabilities for the automatic calculation of lengths, and the classification of welding by different criteria (position and interim product level). The welding information is obtained through reports in **FHINFO** and drawings in **FDESIGN**.

FDESIGN

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