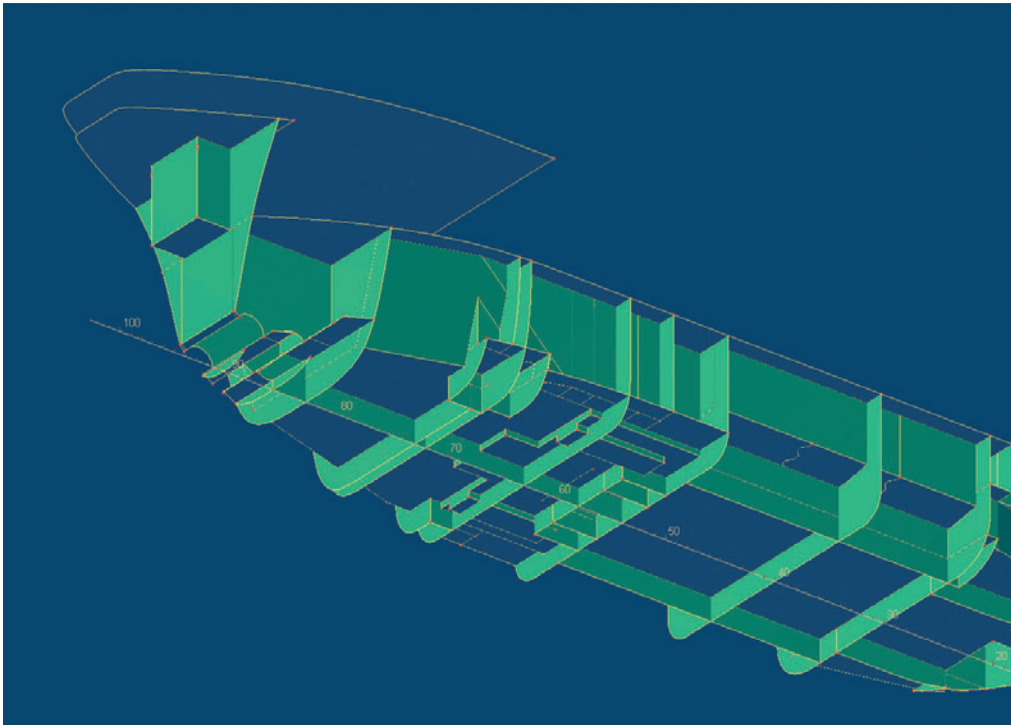


1. Initial Design

2. Basic Design
3. Hull Structure
4. Machinery & Outfitting
5. Electrical Design
6. Drafting & Mechanical CAD
7. FORAN-PLM Advanced Integration
8. Virtual Reality
9. Change & Access Control

Most cost of the ship is compromised at early design stages, where the fast propagation of design changes and the highest precision are required



FORAN Initial Design comprises the Hull Forms, General Arrangement and Naval Architecture calculations, all integrated with the rest of design disciplines in the FORAN database which ensures data integrity, fast propagation of changes, multi-user access and the reuse of information in further stages.

FORAN can define any type of **hull forms** from scratch or can import third-party ones, performs transformations and manages the lofting and fairing. The topological model based on references allows the fast generation of decks and bulkheads.

The general arrangement is performed in 3D. The definition of spaces is simple, as it is based on references to the model. The tool allows the insertion of attributes, such as the contents of tanks, and automatically calculates volumes, weights, cog's and inertia moments. Finally, the main equipment may be positioned in the model. As an output, tailored general arrangement drawings are generated automatically and can be updated after changes.

The new naval architecture solution groups all the functionality including hydrostatics, longitudinal strength, loading conditions, intact and damage stability, including deterministic and probabilistic methods, power calculation and launching. The user-friendly and interactive interface and the more powerful capability gives more added value at this important stage, in addition with the checking of results against the most modern international criteria.

Hull Forms Definition

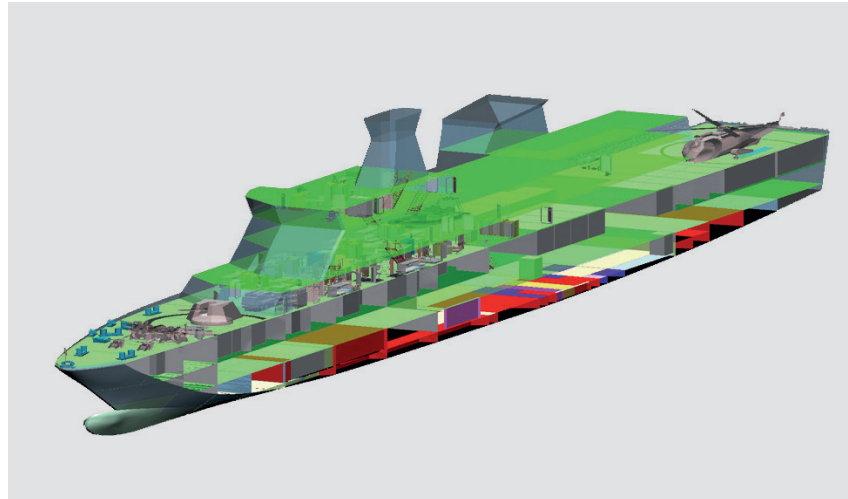
FSURF, FDESIGN

FORAN provides advanced tools to define the **ship surface model** based on NURBS formulation.

Key features:

- Conventional or special hull forms such as mono-hulls, non-symmetric vessels, multi-hulls and oil rigs
- By means of interactive graphic functions, lofting facilities and surface curvature and smoothness controls, the designer can evaluate diverse design alternatives easily
- Quadratic transformations of the ship
- FORAN imports/exports surfaces from/to other standard formats (IGES, DXF, STEP,...), and also from/to third-party proprietary formats

FORAN offers a comprehensive environment for the definition of decks and bulkheads of the ship, using interactive graphic commands with a simple parametric definition. Hulls, decks and bulkheads are associated topologically, so design modifications are automatically propagated to all related elements. Asymmetric or symmetric decks, with any type of sheer and camber, discontinuities, knuckles and steps are defined in a smart and efficient way, and their intersection with the hull surface is automatically calculated. In addition, it is possible to generate any type of flat and corrugated bulkheads.



Additionally, it is possible to position in the 3D model all **equipment** already defined in the database or interactively. This applies not only to machinery equipment but also to deck equipment, weapons or accommodation elements.

GA drawings are generated directly from the 3D model and are linked to it so any modification in the 3D model, will update drawings.

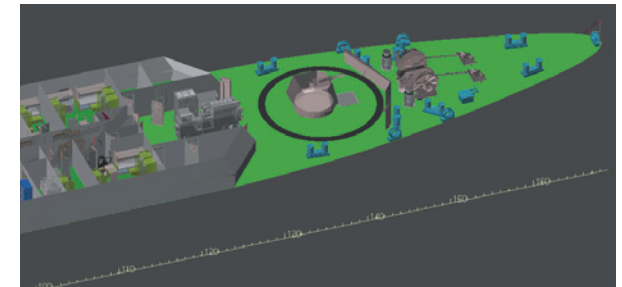
General Arrangement

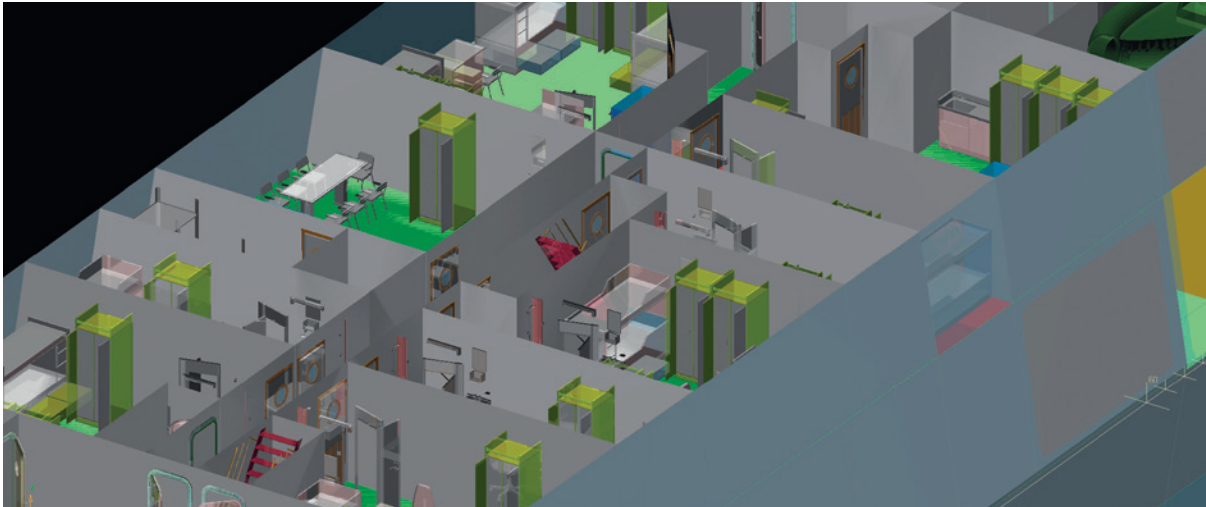
FGA

The definition of the ship **general arrangement** is innovative and it is made in 3D. The module gives many options for the spaces generation, including 2D useful views connected to the 3D model. Any ship compartment can be subdivided into subspaces, which can be created selecting the boundary surfaces, defining several sections or parametrically. The topological definition of all these elements, ensures that any modification to their limits is automatically applied to the compartment geometry.

The insertion of data related to contents of **the tanks** and associated attributes allows the calculation of relevant information that will be used later on the analysis, such as weights, cog's or volumes.

A 2D **graphic editor** in the FORAN drafting tool includes a complete set of functions with the possibility to add smart dimensions, symbols, standard components, configurable drawing templates, to insert labels and to generate part lists from the drawing information.





Naval Architecture

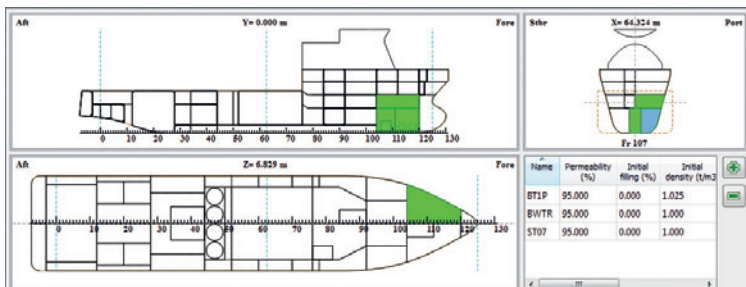
FBASIC

A new application in FORAN groups all the **naval architecture** capabilities in a single tool with a user-friendly interface, interactive tasks and powerful calculation processes, with all data hierarchically organized. The process starts

with the definition of information necessary for the calculations, such as the watertight characteristics, appendages, draught marks, openings, wave and wind profiles, sounding lines and modular cargo.

FORAN features the complete calculation of **hydrostatic values** (bonjean curves, deadweight scale, stability cross curves, freeboard, floodable and permissible lengths, sectional areas or trim diagrams).

All calculations are made in accordance with the latest national and international conventions, regulations, rules and resolutions which are continuously updated in FORAN. Even users can define their own criteria.

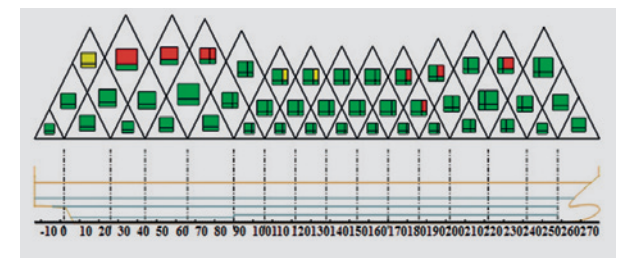


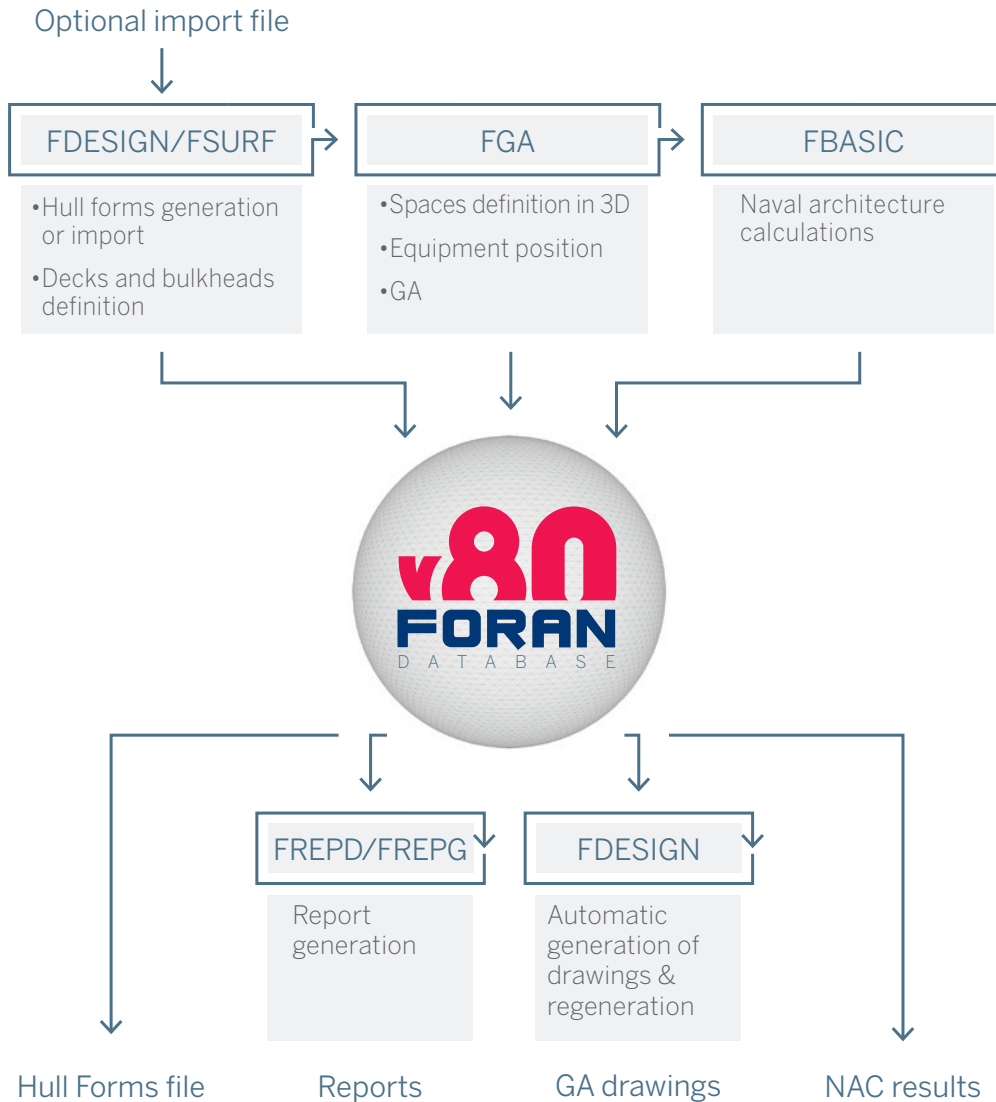
FORAN enables an accurate calculation of the **flooding conditions** and **damage stability** according to the **deterministic and probabilistic methods**, taking into account the intact stability conditions and associates the spaces to the geometric subdivision defined.

Complete dynamic calculations and analysis of ship **launching** over slipway and floating from dry dock processes are featured in FORAN, including graphic representation and static and dynamic stability calculations.

FORAN estimates also the towing resistance by a number of **powering prediction** methods, including some warship-specific ones, and with several possibilities for propeller selection and analysis. The outputs are the main features of the propeller, power-speed curves, prediction for service and trial condition (including trawl condition in trawler ships) and open-water propeller diagrams. Propeller geometry in accordance with classification societies can also be calculated.

FORAN allows to design interactively the basic particulars of the **rudder**, the schematic ship stern profile and to estimate the maneuverability characteristics.





FORAN Initial Design Benefits

- Solution integrated with the rest of FORAN design disciplines (Oracle database) or in a standalone format (sqlite database)
- The possibility to perform concurrent engineering ensures the data integrity
- The topology and the automation of tasks accelerates the model definition, the study of different design alternatives and the propagation of changes
- Advanced capability for the management of hull forms
- General arrangement solution very innovative in 3D which avoid errors and inconsistencies
- Powerful calculation and user friendly interface for the naval architecture with continuous update of regulations

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.