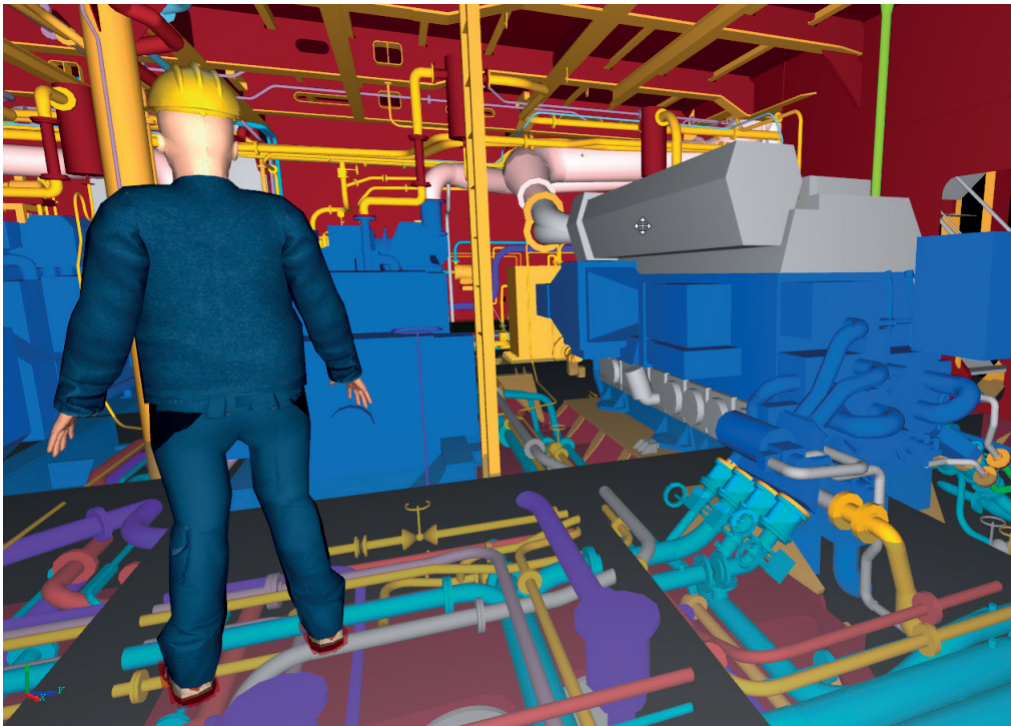


1. Initial Design
2. Basic Design
3. Hull Structure
4. Machinery & Outfitting
5. Electrical Design
6. Drafting & Mechanical CAD
7. FORAN-PLM Advanced Integration
9. Change & Access Control

8. Virtual Reality

Immersive solutions for real time access to review the FORAN 3D virtual model



FORAN Virtual Reality solution allows to access the ship 3D model developed in FORAN, taking advantage of the latest technologies. The visualization and model navigation can be managed from different devices (one side view environment, complex multi-wall simulator as caves or head mounting displays) and for many purposes (design review, simulations of operations, ergonomics, marketing, etc). Benefits can be seen in production where many costly errors can be easily avoided.

Simulation of the real environment is achieved by interaction with movement **tracking systems** that let us interacting with "virtual prototypes" with absolute immersion in the scene. As result of this high degree of 3D immersion, the product operation is very close to reality.

Functionality of FORAN Virtual Reality solution includes, among others, to walk through the ship model in real time, queries about properties and attributes, collision detection and management of collisions, insertion of annotations, measure of clearances and distances and study ergonomics.

On top of software, SENER covers also the **definition, installation and set-up of complex Virtual Reality installations** adapted the to the most challenging demands and requirements.

Applications

The **Virtual Reality solutions** in FORAN can be applied for engineering design, engineering review, manufacturing, development and planning processes in interactive and collaborative environment.

Key features:

- Resolve complex design or manufacturing issues in a collaborative environment
- Validation of complex assembly processes
- Virtual prototypes, variants and configurations to achieve the final design
- Detection of design errors
- Improve production and maintenance operations
- Ergonomic studies (reachability & usability)
- Training of assembly personnel
- Training of new personal in ships and offshore platforms

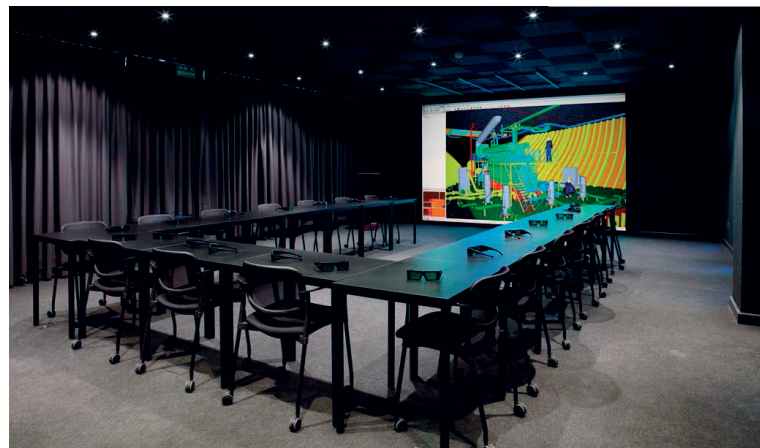
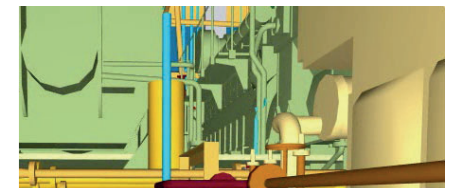
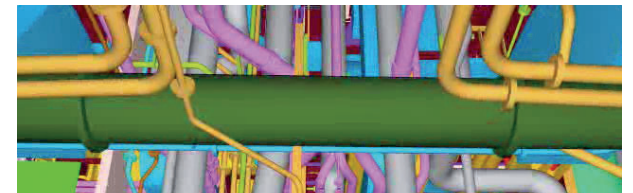
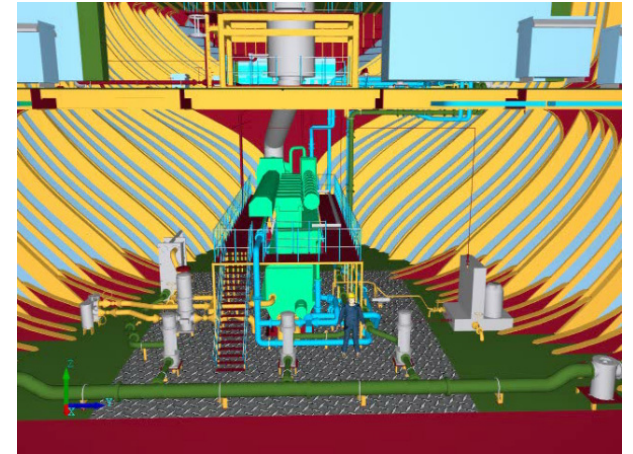
Advanced visualization installations

SENER supplies advanced **Virtual Reality installations** with the most suitable alternative depending on the customer requirements.

Type of installations:

- Scalable wall systems using large screens
- Multi-walled visualization environments (caves)
- Portable solutions, when mobility is required
- Immersive Head Mounted Displays (HMD)

The solution includes 3D projectors according to resolutions required, tracking systems (optics & ultrasounds), computers (robust cluster infrastructure and multi-channel high performance graphics engine), infrastructure (supports, cables), VR Hardware (Wand, glasses...) and VR software.



Courtesy of Navantia



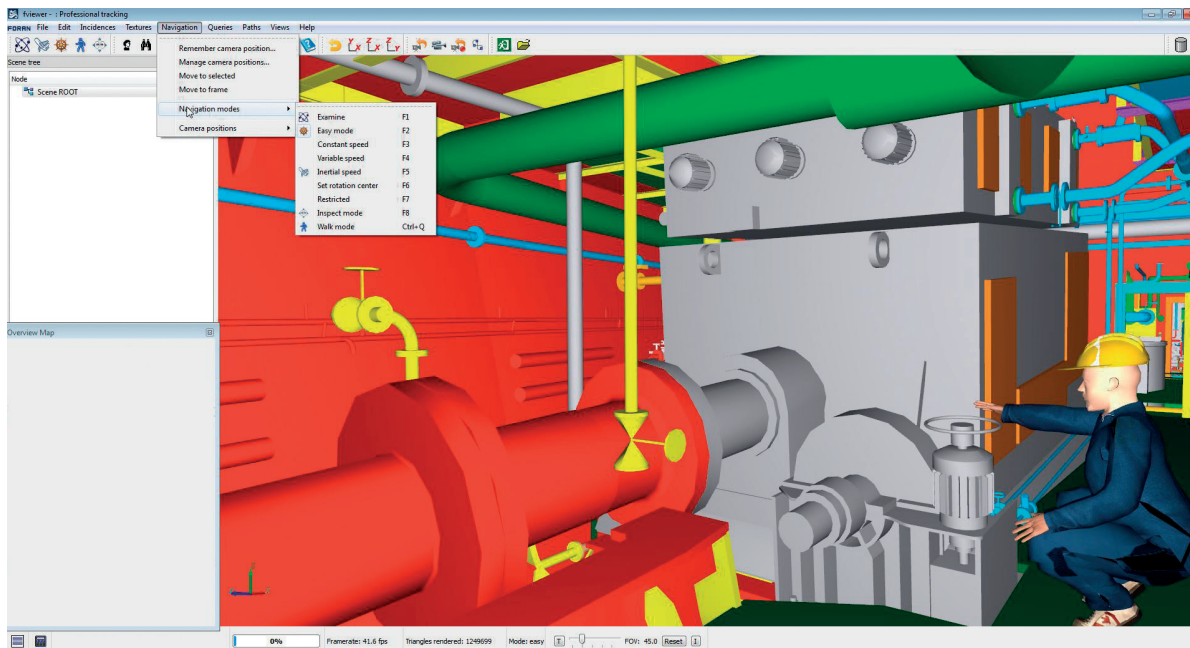
Virtual reality and design review in FORAN

FVIEWER

FVIEWER is the application that allows to **navigate through the 3D model**. The design tree information is displayed in the main window for object selection and to see information about the model and annotations. Selection of components is done by different criteria being possible to operate with groups of selected items, always with the aid of clipping planes and advanced searching tools. Finally, it is possible to import 3D models in **JT Open format** and to have screenshots and generates videos in 4K resolution.

Key features:

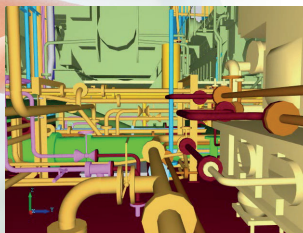
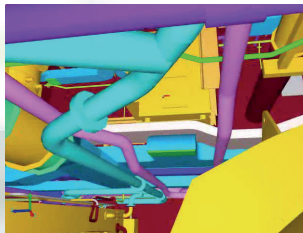
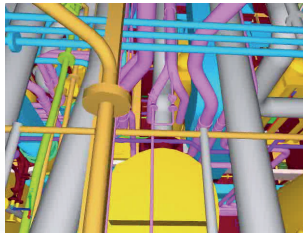
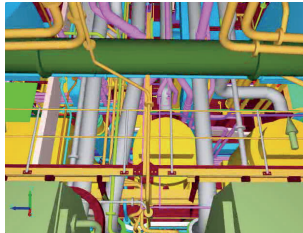
- Information about ship references
- System and user defined attributes
- Measurement between items
- Addition of notes
- Ergonomics
- Manager of simulation of assemblies
- Collision detection being possible to highlight them by means of sounds and colour and also to store them
- Path editor is available allowing to check removal and escape routes and design inconsistencies
- Overview map allowing to change the position easily
- 3D stereo projection
- Tracking systems support
- Auto install stand-alone application



Being developed in **native 64 bits** and taking advantage of the latest graphic cards capabilities, this solution can handle in an efficient way a huge amount of data. With an interactive and user-friendly approach, the module helps the user during the navigation through the 3D model.

FORAN viewer incorporates a optimised data management tools which make easier to handle **big scenes** and huge amount of information.

In addition, the module uses some techniques for improving the **performance**, such as that geometry hidden behind other geometry is not sent to the graphics pipeline, and incorporates better visualization capabilities without performance penalty.



FORAN Virtual Reality Benefits

- Complete set of solutions to navigate and review around the FORAN 3D model
- FORAN offers a virtual reality viewer that can handle a huge amount of data and can be applied for the design review
- Ergonomics studies and simulation of operations
- Training activities in a virtual environment
- Marketing applications
- Better product avoiding many costly errors in production
- Faster decisions and savings in maintenance costs
- SENER can provide customizable installations including large screens, caves, head mounting displays or tablets

