

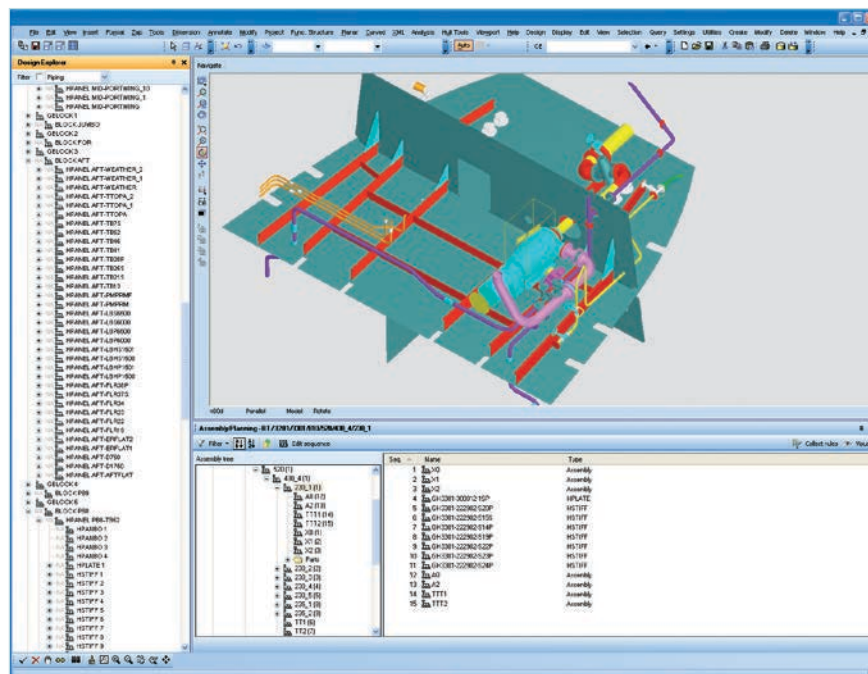
# AVEVA Assembly Planning

The proven solution - allowing optimum utilisation of shipbuilding facilities

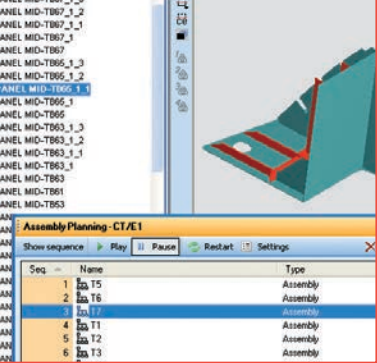
A shipbuilding project is a complex process, often carried out under time and cost pressures. One of the most important success factors is, therefore, the shipbuilder's ability to plan its resources in terms of facilities, materials and labour.

A central task is the planning of the assembly sequence for hull and outfitting items and, in particular, the planning of pre-outfitting. AVEVA Assembly Planning™ works as the tool to define the build strategy for the ship, and also as the producer of the necessary assembly documents for the workshops, such as drawings and parts lists. Through its open architecture, Assembly Planning can be adapted to interact with any systems for resource and material planning.

All parts in a ship must be assembled into one product through many stages of assembly. The aim is to manage both the planning and the physical assembly efficiently, by carrying out assembly operations at the earliest possible stage, to minimise costs. The planning of the assembly process requires extensive support to organise the design data into production assemblies.



An assembly of hull and outfitting items



## Business Benefits

- Improved coordination between design and production leads to better change control and more streamlined production processes.
- Increased degree of pre-outfitting of assemblies and blocks provides lower costs and less rework in the later construction stages.
- Fewer man-hours are needed for the creation of assembly documents, so costs are lower and lead times are shorter.
- Reduced lead time for the complete building sequence definition process as the assembly tree can be defined in parallel with building the 3D model.

# Key Features

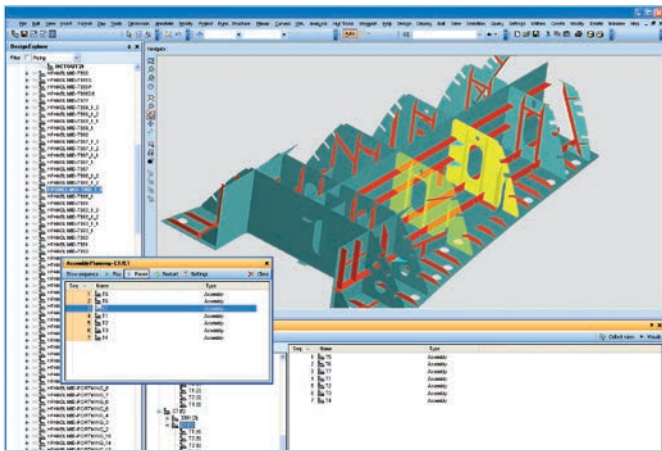
In many cases, the tasks to be performed by Assembly Planning are split between a CAD and a PDM or an ERP system. Typically, design and production drawings are created through the CAD system, while the assembly structure and the manufacturing Bill of Material are made in PDM or ERP. In such an environment, it is difficult to handle the coordination between different disciplines and design changes. Assembly Planning is an integral part of the AVEVA Marine solution, which means that any design change that impacts on the manufacturing Bill of Material is easily managed.

Assembly Planning provides functionality that manages the assembly production breakdown structure of the design model in the form of a hierarchical assembly tree. It uses this to support the definition of the vessel build strategy and the creation of assembly production information. The assembly production breakdown structure is defined and maintained in parallel with the design and modelling work.

## Build Strategy

Assembly Planning is involved from the very beginning of this process. One of the first project decisions to be taken is how the ship is to be split into main blocks. There are tools available to quickly define alternative block boundaries and to calculate the weights based on the early 3D hull steel model. The weights are critical, since they have to match the maximum lifting and transport capacity of the yard's facilities.

At this stage, early estimates of surface areas (for painting) and weld lengths can be obtained, both important parameters in the planning process. As a result of these activities a Build Strategy is defined. It specifies how the ship is to be assembled and built using the available hull steel line capacity, and how the main equipment and systems will be installed. At the build strategy stage, a 'top down' assembly production breakdown structure is created. Later, when the detailed design is available, the assembly production breakdown structure is added to in a 'bottom up' manner, by adding detailed design parts into the structure.



Editing the sequence of installation of parts for an assembly

## Detailed Planning

After the initial phase, the detailed planning of the assembly process is defined. Assembly Planning is unique in the sense that it builds the assembly data structure along with the progress of the basic and detailed design activities. One of the benefits of this integrated solution is that changes in the design will automatically be visible in the production documents.

A major application feature is the facility to plan the installation of outfitting items such as equipment and systems into the assemblies. The cost of installing a pipe on board the ship in the dock or at the outfit quay is much higher than if the pipe is installed at an early assembly stage. Assembly Planning gives production engineers a powerful tool to minimise production costs by maximising the level of pre-outfitting at each stage of assembly.

In the detailed planning stage, model parts from both the hull and outfitting disciplines or other assemblies are collected to the relevant assembly in the assembly production breakdown structure. Each assembly can contain production details, such as work location, destination for the next stage of assembly, and orientation. Some assembly properties, such as weight, centre of gravity, and the bounding box for the physical size of the assembly, can be calculated after all parts are collected in the assembly.

It is also possible to define and easily change the sequence of installation of parts for any assembly. This can be used to plan the most cost-effective assembly sequence. With Assembly Planning you can play back the assembly sequence, step by step on the screen, to clarify the process.

## Automatically Produced Assembly Documents

Traditionally, shipyards make assembly documentation in the form of Steel Working Drawings with associated parts lists. Together with the Build Strategy document, which usually contains an exploded block/assembly view of the ship, these documents are used to assemble the steel structures. Installation of systems and equipment is usually shown on Installation Drawings.

These different categories of drawings are made by different departments in the shipyard, which creates a coordination problem. Assembly Planning has functions for the automatic creation of composite assembly drawings and parts lists, in installation sequence order, for each assembly/installation job in a specific assembly station or on board the ship. These documents contain steel as well as outfit items.

## ERP Integration

Assembly Planning can create a manufacturing bill of materials and all associated drawings that are needed in typical ERP systems used in shipyards.



AVEVA Assembly Planning is one of AVEVA's Design products, which create 3D models for detailed design and produce all associated deliverables

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