Competences:
Simulation in Shipbuilding

Innovative shipbuilding from the future

The characteristics of shipbuilding production place high demands on simulation.

✅ Products are complex one-offs with a high number of variants

✅ Most of the production process is defined by the individual product

✅ Interlinking of different manufacturing principles

➢ Each substructure of the ship has its own requirements for manufacturing, assembly, space allocation and resource use
➢ Special logistics requirements for storage & transportation of large, heavy sections or blocks

Simulation has established itself as the most important decision support tool in shipbuilding.

In order to be able to dynamically evaluate the diverse and multi-layered dependecies between the complex product ship, the production processes and the multitude of resources involved, process simulation is increasingly being used.

In the process, the ships are built in the simulation model, taking into account the relevant dependencies, prior to real production, and the processes are then analyzed and evaluated with regard to the specific task.
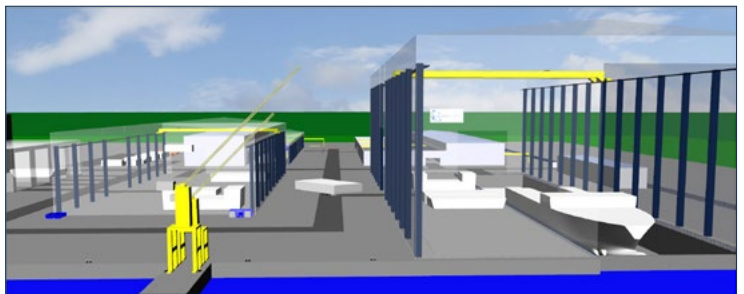

The analysis capabilities of simulation are mainly used in the development and design of shipyards and their production or logistics systems, as well as in the planning and control of production.

In addition to production-oriented applications, simulation is also used for the logistical design of ships. Thus, logistical aspects, such as loading and unloading, are already investigated in the early design phase of the ship. The ship/port interface and port logistics are also included if dependencies make this necessary.

With the help of process simulation, benefits are achieved on completely different levels:

- Rough or detailed evaluation of the shipbuilding production and logistics processes taking into account their dynamic dependencies
  - → Examination of capacities and identification of bottlenecks or potentials
- Analysis of various scenarios without disrupting real production; this includes new production concepts or facilities as well as new ships or new shipbuilding programs.
  - → Securing new planning for the upcoming order book leads to a significant increase in planning reliability, both in strategic and tactical planning and operational control.
- Generation and analysis of plan changes in the simulation with less effort, thus significantly increasing planning flexibility
- Increased transparency of the processes for all participants and responsible persons due to the analysis and animation possibilities of the simulation
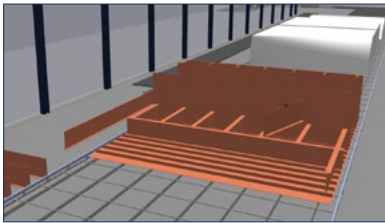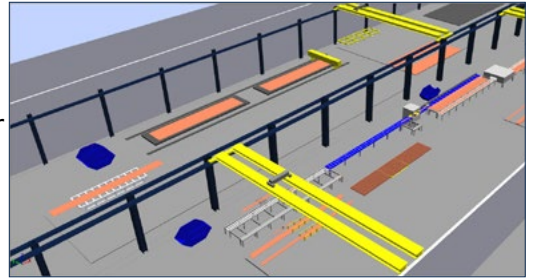
In order to effectively and efficiently model the shipbuilding process, which is characterized by complex one-off processes mostly as construction site production, special simulation modules are required.

For this reason the **STS simulation kit (Simulation Toolkit Shipbuilding)** was developed for modeling complex production and logistics processes. The basis is the Plant Simulation software from Siemens Digital Industries Software. General and shipbuilding-specific simulation functionalities are programmed reusable in the STS building block kit.

The STS is being further developed across industries as well as being used in shipyards or related industries worldwide.

Project examples:

Applications in shipyard development

- Panel production: Simulation-based development of a new panel line
  - → Productivity doubled
- Parts manufacturing: Simulation-based development of a new sheet metal production line
  - → Throughput +30%, job savings
- Parts manufacturing: Analysis of layout variants and production concepts
  - → Production area halved

Application in production planning and control:

- Panel production: Simulation-based planning and control
  - → 40% savings in production hours
- Hull assembly: Simulation-based planning and control
  - → Savings of 5000 man-hours per ship
- Parts production: Simulation-based optimization of production sequences
  - → 15% more throughput

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