DIGITAL INDUSTRIES SOFTWARE

Simcenter Amesim Marine

Analyzing and designing optimal propulsion configuration

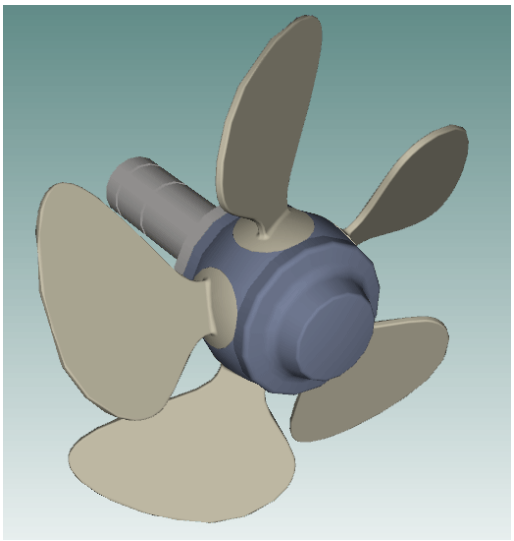
Benefits

- Analyze and design optimal propulsion configuration
- Access multiple design levels, from components to complete systems including control strategies
- Assess technological tradeoffs and electrification of propulsive systems and subsystems
- Evaluate the gains of wind assisted propulsion systems on the fuel consumption
- Significantly reduce development time and costs by anticipating potential integration issues
- •Reduce ship fuel consumption, CAPEX, OPEX and time-to-market

Summary

With Simcenter™ software system simulation solutions, Siemens Digital Industries Software addresses the ever-changing needs of industries for more accurate and competitive system modeling. The Simcenter Amesim™ software Marine solution allows you to model and simulate complex ship propulsion architectures. Moreover, you can assess performances including many loads, control strategies and operating profiles. You can evaluate the electrification of propulsion systems, investigating control strategies and the integration of subsystems such as electrical power generation, distribution and storage.

With access to more realistic boundary conditions for every onboard power loads, you will be able to assess the overall efficiency of the integrated



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Features

- Multi-domain platform and libraries
- Hull resistance, propeller and variable sea condition modeling
- Electric libraries to cover electrification challenges of any hybrid vehicle architecture
- Many engines and gensets available
- Three degrees of freedom models for maneuvering and dynamic positioning
- Dedicated tools for propulsion NVH (noise, vibration, and harshness) studies

vessel in various conditions. You can study the impact of mission requirements in terms of required power.

The solution is based on the Simcenter Amesim multi-domain system simulation platform. It provides off-the-shelf libraries with dedicated toolsets. All libraries embed customizable components that when connected represent either the main engines, gensets, the electric network or alternative energy sources like fuel cells, batteries or solar panels.

Finally, the solution helps you improve design quality while reducing development time and associated risks on vessel propulsion system.

Hybrid architecture selection

The solution provides access to mean value models for internal combustion engines that can be coupled with electrical power sources to test various hybrid configurations, from full series hybrid, with or without storage system, to a pure mechanical or parallel hybrid. Depending on the use case, it becomes possible to model the quasi static and dynamic interactions between the electrical and mechanical systems and identify the ideal architecture in terms of flexibility and consumption.

Ship resistance and propulsion systems

The ship resistance model computes the overall resistance of the hull with five navigation models:

- ITTC78
- Barrass
- Import of computational fluid dynamics (CFD)/test results
- Holtrop and Mennen
- Savitsky

Several propulsion systems are available:

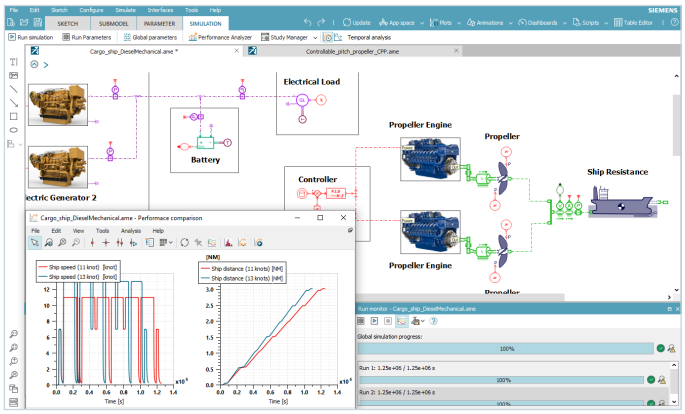
- Propellers with variable pitch, first quadrant (Kt, Kq) or multi-quadrant (Ct, Cq) models are available
- Waterjet
- Flettner rotors for wind assisted propulsion

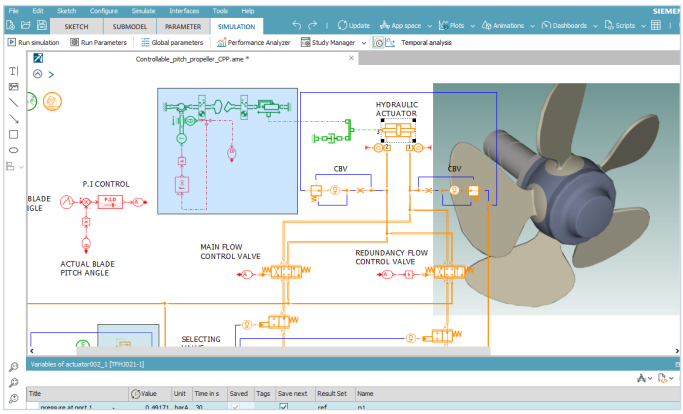
All these propulsion systems can be easily parametrized using empirical models like Wageningen B-series for propellers, or tables coming from CFD/test calculations.

Variable sea conditions

The variable sea conditions component is an add-on to the ship resistance model, enabling you to estimate navigation resistance in sea conditions, including variable weather. Resistance calculations include wave effects and wind resistance from several analytical models. Data results coming from CFD calculations can also be imported.

All these resistance effects can vary during the simulation to estimate more accurately ship fuel consumption during a mission cycle.





Maneuvering

The three degrees of freedom vessel, propeller, and rudder models, able you to assess the performances, of your vessel during maneuvering or dynamic positioning. Hydrodynamic models are based on the MMG (modeling maneuvering group) model and can be easily parametrized from CFD or tests results.

Simcenter Amesim is part of Xcelerator, a comprehensive and integrated portfolio of software and services from Siemens Digital Industries Software, which helps companies of all sizes create and leverage a comprehensive digital twin that provides organizations with new insights, opportunities and levels of automation to drive innovation.

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