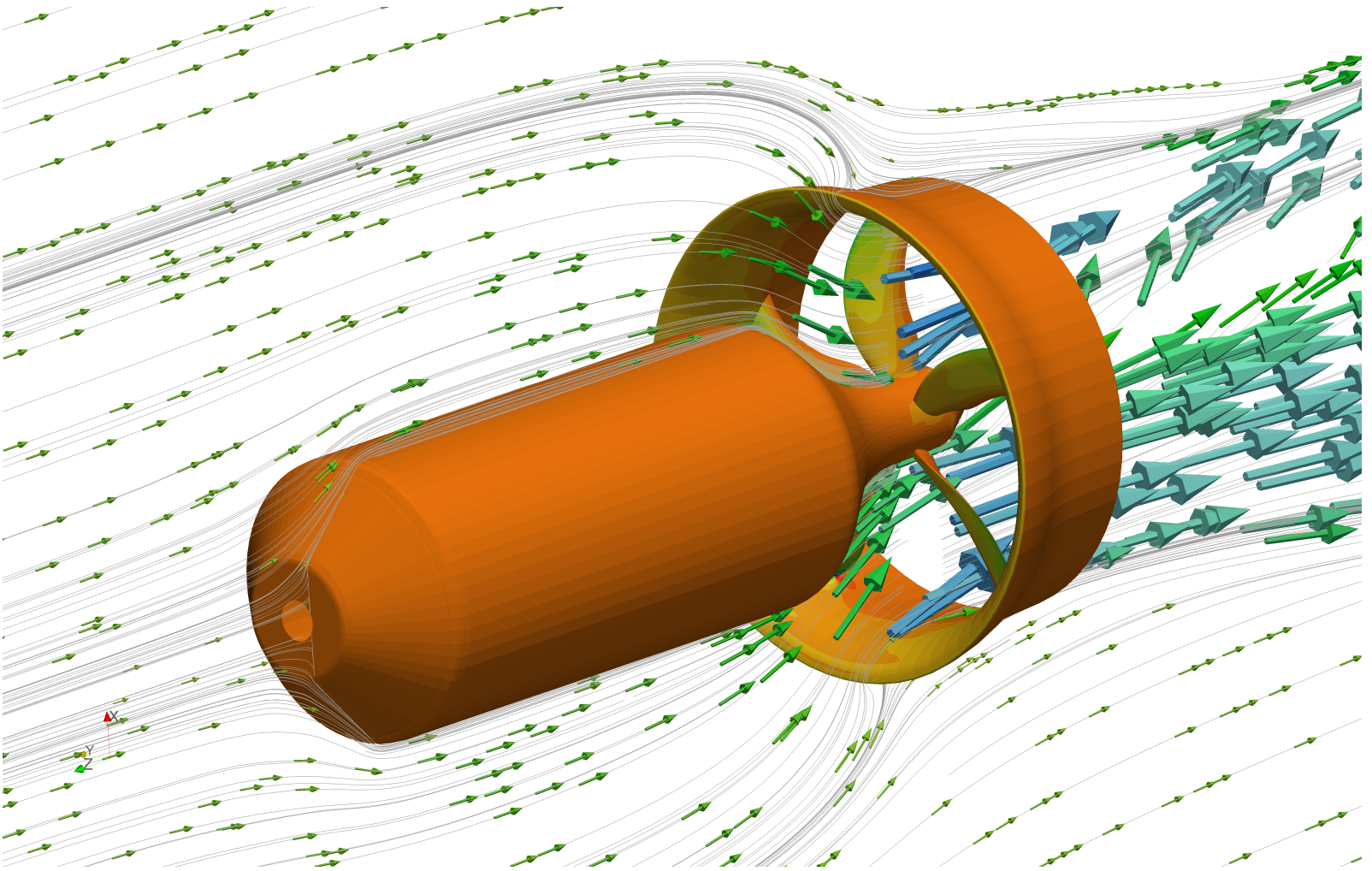
silentdynamics

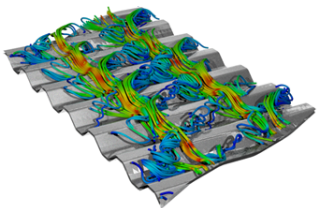


# Modeling and Simulation

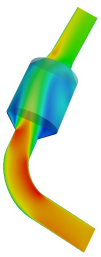
for Product Performance Prediction

# Selected Examples

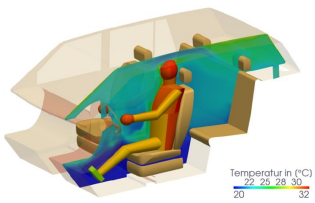
## Heat and Mass Transfer



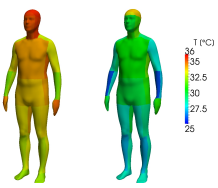
Optimization of **heat exchangers** for maximum heat transfer at minimum pressure loss by application of structured surfaces.



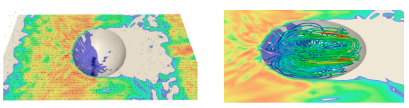
Modeling of **catalytic converters** for optimization of drag and conversion efficiency.

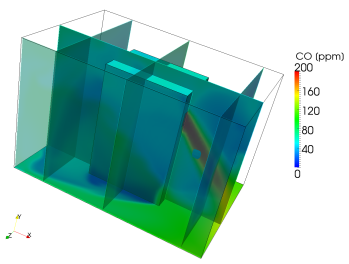



**HVAC**
analysis including a human thermoregulation model (Fiala).



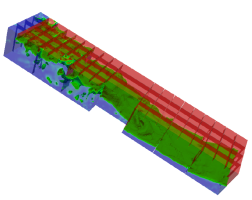

Modeling and prediction of **fouling processes** in heat exchangers.



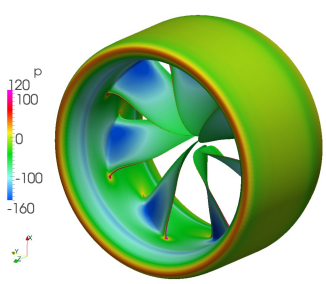



Evaluation of **gas dispersion** in different environments

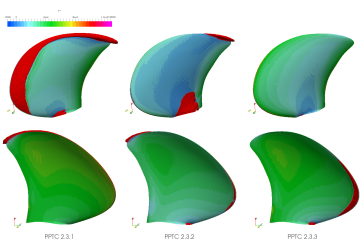
Prediction of **sloshing** in fluid tanks for optimization of baffle arrangement.



## Turbomachinery Design

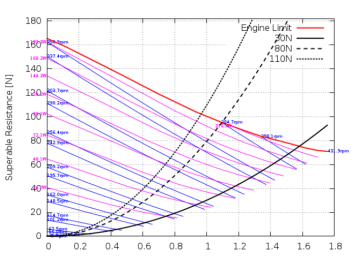



**Flow simulation** of propellers and turbomachinery devices using state-of-the-art CFD methods.

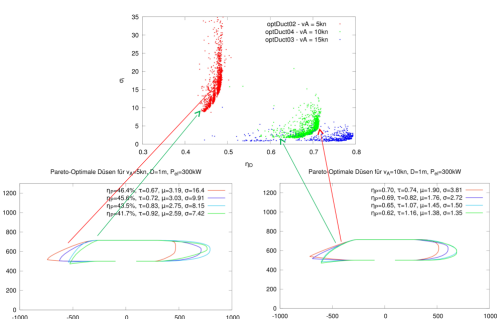


Analysis of **cavitation** at marine propeller blades and other devices operating in liquids.

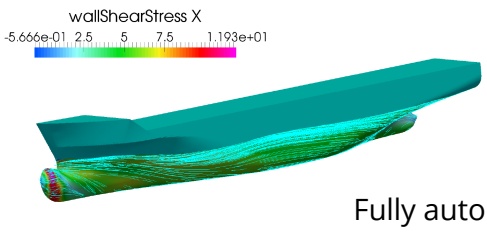
Projection and **scaling of CFD results** to different load cases, resulting e.g. in propulsion charts for propeller/ship combinations or pump capacity charts.



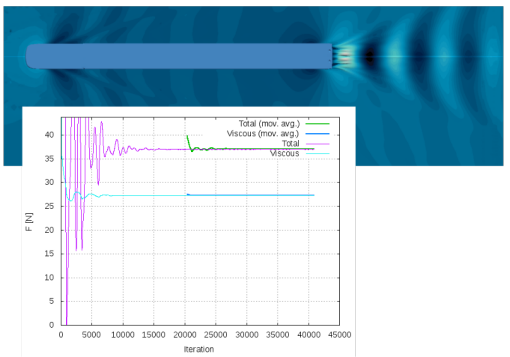

Design **optimization** using fully automated CFD analyses.



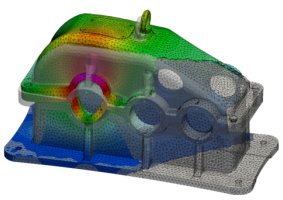
## Ship Hydrodynamics



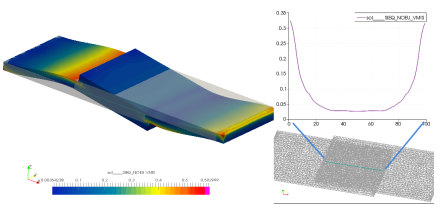

Fully automated computation of **ship resistance** computation using CFD methods. Optionally including trim and sinkage.

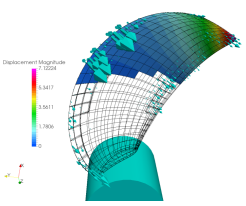



## Structural Analysis

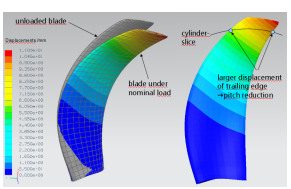


Steady or transient finite element analysis using e.g. volumes, shells, beams, prestressed bolts, glued joints and/or contact with **Code_Aster**.





Analysis of thick structures made from carbon-fiber **reinforced composites**.

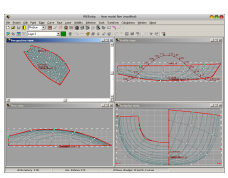


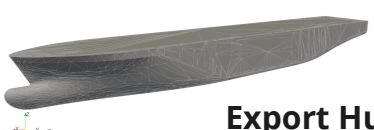

**Fluid/structure interaction** by coupling FEM and CFD analyses.

# Workflow Automation

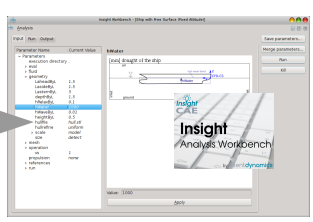
## Example

**CAD**



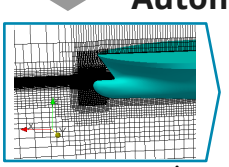


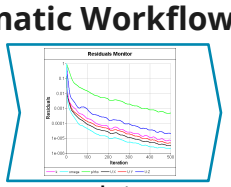
**Export Hull Geometry**
triangulated surface (STL)



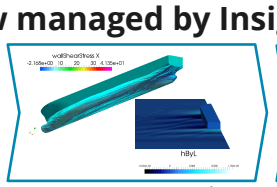

**InsightCAE Workbench GUI**
Select the geometry, set the parameters (many can be auto-detected), start analysis by a mouse click.

**Automatic Workflow managed by InsightCAE**


preprocessing

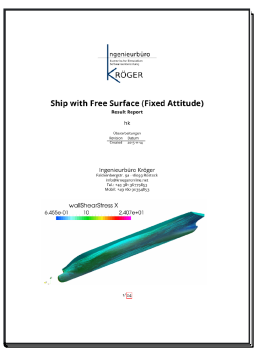


solving


postprocessing

docu-mentation

**Result Report**
Convergence information, mesh informations, resistance forces, wave pattern are automatically summarized in a ≈25 pages PDF report. OpenFOAM® case is kept on disk for further evaluation by the user.




Screencast: https://youtu.be/kxGlFxFQzPE

# InsightCAE

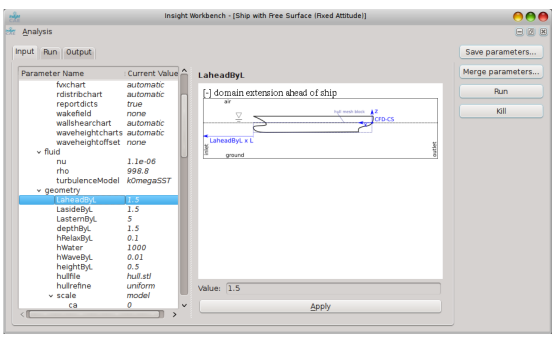
InsightCAE is our analysis automation framework. Open source and GPL licensed.

What is the idea/aim of "InsightCAE"?

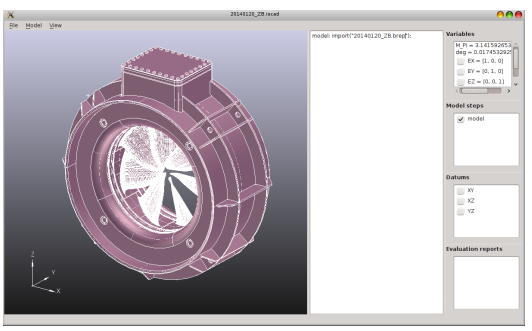
- Conduct an "analysis" as much automated as possible with a minimum of necessary parameters
- Implement a best practice for a given analysis/task
- Bundle addons, extensions and interfaces for all required external software utilities
- Deployment: provide installation package for all workflow-related software components

## InsightCAE Workbench

GUI for editing analysis parameters, launch simulations and preview result reports.



Parameter Documentation / Help



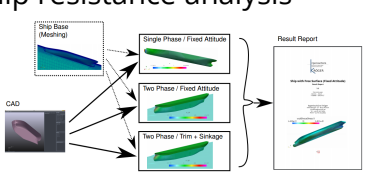
## InsightCAE ISCAD

Insight can generate fully parametric 3D models using scripts. ISCAD is a graphical interpreter for model scripts. Features include:

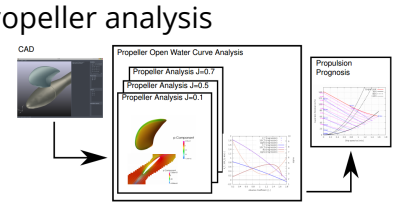
- based on OpenCASCADE, import of IGES, STEP, BREP
- vertex, edge, face selection by filtering commands
- meshing (through gmsh)
- constraint-based sketches, assemblies
- part library
- drawing export (DXF)

## Realized Analysis Modules

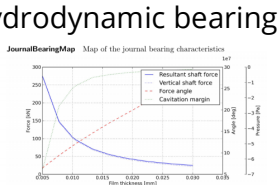
- Ship resistance analysis



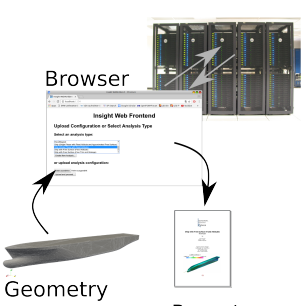
- Propeller analysis



- Hydrodynamic bearing analysis



- ***Implementation of any further analysis workflow is possible on demand!***




## Web-Workbench

Launch simulations through the web browser in on-premise clouds.

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