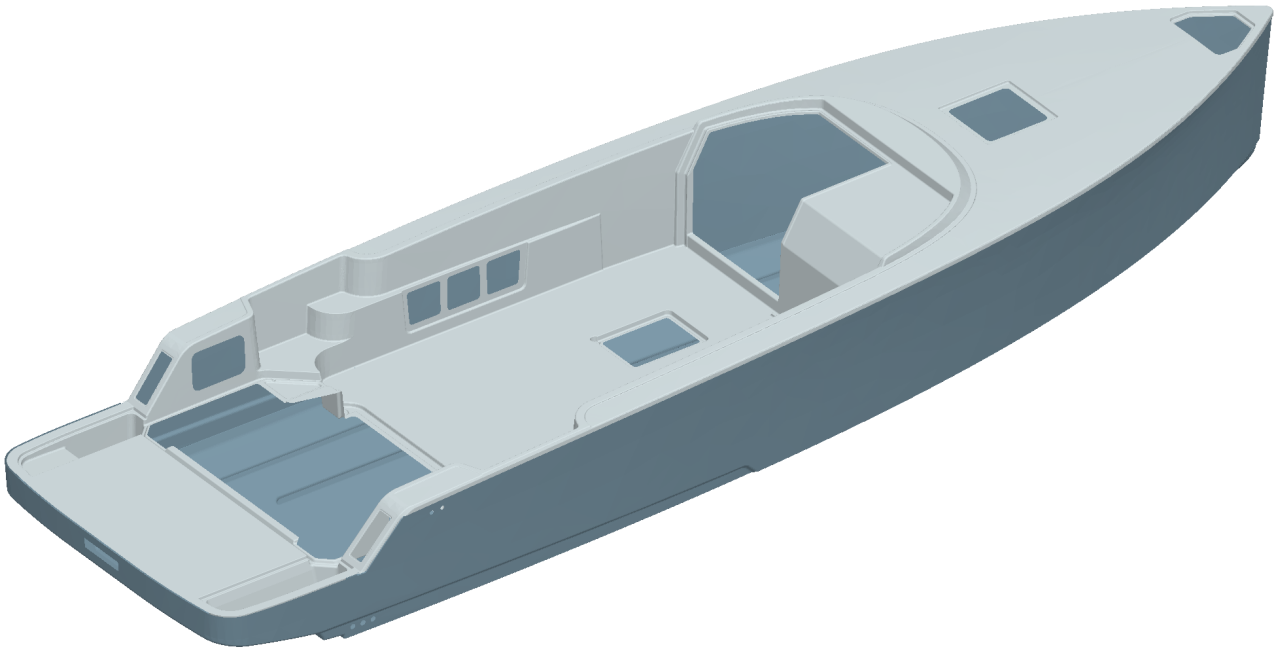
LW33
Simulation progress

Shareable review | 10 September 2026 | Revision 03



Hull and deck visualization derived from the supplied LW33 STEP geometry.

What we can say today

The CAD-derived hull is available for inspection, the computational mesh has been improved, and a working interactive interface can launch local CFD diagnostics. **No converged speed, resistance, fuel-use or seakeeping prediction is available yet.**

Reference configuration	Status
Single Volvo Penta D6-380, 380 hk	Engine specified by owner; no engine performance map used.
Loaded mass: 3,500 kg	Owner input; actual CG and loading distribution pending.
Volvo Penta Duoprop	Exact propeller set, drive model and gear ratio pending.
30 kn test condition	Imposed flow speed; not predicted achievable speed.

Progress and the blocker

The finer mesh improves wall-layer coverage, but its airflow calculation is still unstable.

Mesh measure	Baseline	Refined
Cell count	209,117	465,010
Wetted area with at least 1 layer	80.9%	91.9%
Wetted area with at least 3 layers	35.4%	56.3%

Coverage is estimated from initial hull-face centroids below the waterline. More layers alone do not establish mesh convergence or suitable near-wall resolution.

Nine diagnostic trials

Fixed-hull configuration	Saved time (ms)	Peak air speed (m/s)
Original fixed-hull control	0.464	301
Laminar flow	0.501	1460
Limited pressure corrections	0.625	274
Lower initial turbulent viscosity	0.501	1460
Tighter linear solvers	0.501	1460
Upwind momentum	0.485	4025
No momentum predictor	0.492	752
Uncorrected diffusion; limited gradients	0.743	181
Uniform initial flow	0.335	225

These extreme air velocities are numerical failure indicators, not physical predictions. Cases stop at different times, so this table is not a ranking of solver accuracy. Laminar and upwind text logs are incomplete; saved fields are retained.

What the tests establish

The instability persists with the hull held fixed. Removing turbulence, tightening linear solvers, disabling the momentum predictor, limiting corrections and changing the initial flow did not eliminate it. These tests narrow the investigation, but do not identify a confirmed root cause.

What must happen next

Isolate the affected dry-detail cells and check initial velocity, flux and pressure compatibility. Once stable, extend the physical run time and compare meshes and time steps before using averaged forces or hull motion for performance decisions.

An interactive review room

The cockpit is built. Its local solver connection has passed a real execution test.

Available now	How to use it
Inspect the actual hull	Orbit the CAD-derived hull and deck; switch between side, top and 3D views.
Prepare a scenario	Adjust test speed, mesh and motion settings, then export the scenario JSON for discussion or execution.
Review recorded evidence	Select a retained test and replay force, heave and pitch histories. All remain startup diagnostics.
Run local CFD	Use the supplied runner with Python and OpenFOAM v2412. Existing reference cases are copied into separate runs.
Explore wave appearance	Adjust analytical wave height, period and direction. This visualization does not solve wave forces or boat response.

Verification and access

An actual fixed-hull baseline job reached 0.001 seconds and returned four force samples through the local runner. Request authorization, unsupported loading and duplicate-run rejection checks passed. This verifies integration, not physical accuracy.

The cockpit is now privately published. Open the LW33 Simulation Cockpit. The owner can access the online view; forwarding its URL alone does not grant access. For colleagues, share this PDF or the portable interactive HTML. Actual CFD execution still uses the local OpenFOAM runner.

Inputs the owner is supplying

Measured centre of gravity and loading distribution; exact drive and gear ratio; propeller series/size; and, when available, RPM, GPS speed and fuel-flow measurements for calibration. Engine and propeller comparisons follow after a stable baseline is established.

Evidence and traceability

Source: LW33 - A13 - FRP Assembly.STEP; unchanged source CAD. Mesh data: layer-coverage.json. Trial results: fixed-trials.json and retained OpenFOAM fields. Runner verification: runner-test-result.json. Checkpoints: LW33-Numerical-Diagnostics-R02-Part1.zip and Part2.zip; extract both into the same folder.

Portable review: LW33-Interactive-Review.html contains the CAD viewer, recorded histories and a copy of this report. Open it in a desktop browser. On phones, file-preview applications may not execute its interactive content.