

Hull-propulsor interaction

# HPC platform for CFD for Damen Group

HPC solution provides Damen Group with a common computational platform, enabling collaboration and creating synergy within the company.

## Damen Group

Seventy percent of the earth is made up of water. Water connects worlds and allows discovery. In order to ensure global prosperity for next generations and keep the earth habitable with an ever-increasing world population, it is essential that water and the seabed is utilized as optimally, but also as responsibly, as possible. Damen provide unprecedented maritime solutions to utilise and protect these possibilities.

## Computational Fluid Dynamics

Within the Damen Group, Computational Fluid Dynamics (CFD) is used at several different global locations. CFD is widely used in the maritime industry and in recent years the use of this technology has significantly increased within the Damen Group. Due to the nature of CFD computations, there is a definite need for High Performance Computing (HPC).

After a few years of using a semi-customized solution, Damen has chosen to consolidate a new "fit-for-purpose" HPC simulation platform to accelerate the design and optimization of their boats.

Computational Fluid Dynamics (CFD) models the fluid flow with Navier-Stokes equations, accounting for their nonlinear nature, viscous and turbulent effects. It is a complete method in terms of physical modelling, where very little is left to assumptions. This allows it to be highly accurate and precise, but it also makes it very computationally expensive comparing to most engineering tools in the field.

At Damen, CFD is employed to predict ship hull resistance in calm waters, including basic sinkage and trim approximations and self-propulsion characteristics. Accuracy within 3% can be expected for calm water resistance in full scale, for a computational cost of around 100 – 300 core-hours for a single simulation. This means that the simulation is finished after 2 – 5 hours of wall-clock time. This makes it easy to compare and test various ideas early in the design.

Ample resources are needed to ensure a continuous amount of simulations can be performed concurrently and with usage fluctuation very high, it was preferable for Damen to find a fixed price agreement to mitigate the risks and increase visibility.

The number of cores is a result of a technical and economical optimum, fulfilling the usage profile of Damen. An immediate extension of capacity, by means of additional nodes readily available on demand, enabled Damen manager and allow for temporary peaks of usage. The platform is extremely flexible, offering the possibility to re-evaluate the required capacity on a regular basis, to take into account growth potential.

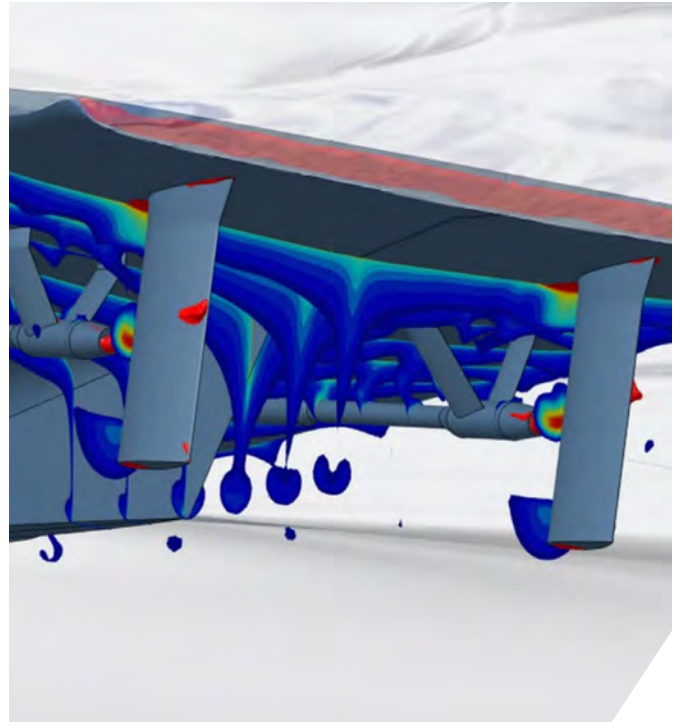
The HPC solution is able to serve the different Research departments within the Damen Group with a common computational platform enabling collaboration and creating synergy within the company on the use of this technology. A complete HPC simulation platform consolidated in the cloud allows not only share computing power but also the workspace, ensuring real-time collaboration.

**By choosing atNorth's Gompute's HPC private cloud environment with fixed resources, Damen was able to reduce the cost of a simulation by 40% compared to the previous HPC solution.**

The HPC Gompute platform features state-of-the-art computing power to run larger simulations and capture more complex phenomena, resulting in better and more accurate results. Moreover, the high performance capabilities help to reduce data transfer. As of now the very large pre- and post-processing tasks are performed directly in this platform: from grid generation, numerical setup to post-processing.

With the ability to reduce total simulation time by the use of state-of-the-art computing power and optimized resources, Damen has given CFD a new kick by using it in combination with design optimization tools to minimize resistance and improve the overall hydrodynamic performance of the hull.

With such computational power at their fingertips, the Damen R&D teams now have unlimited access to cutting-edge, state-of-the-art solutions for the design and development of the vessels of tomorrow, no matter the design constraints and the level of customization.



atNorth is a leading Pan-Nordic data center services company offering sustainable, cost-effective, and scalable co-location and high-performance computing services across Iceland, Sweden, Finland and Denmark.

With sustainability at its core, atNorth's data centers are powered by energy from renewable sources and support circular economy principles. All atNorth sites leverage innovative design, power efficiency, and intelligent operations to provide long-term infrastructure and flexible colocation deployments.

atNorth is headquartered in Reykjavik, Iceland, and is trusted by industry-leading organizations to operate their most critical workloads. The business was founded in 2009 and acquired by Partners Group in 2022.

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