Cloud bursting for engine speed

World's largest builder of marine propulsion systems leverages HPC on demand to meet peak computing demands for engineering simulations.

Customer profile

MERCURY

Manufacturing | United States

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Arden Anderson
Engineering Simulation Specialist
Mercury Marine

Business needs

The engineering team at Mercury Marine needs on-demand access to high performance computing resources to run complex computer-aided engineering simulations.

Business results

- Accelerating design and engineering cycles
- Reducing time to market for new innovations
- Cutting product-development costs
- Creating more durable and robust products

Solutions at a glance

- HPC on Demand with R Systems
- Dell EMC PowerEdge Modular Infrastructure with Intel® Xeon® processors
- Dell EMC PowerSwitch networking

A legacy of leadership

Mercury Marine® has been making world-class outboards and sterndrives for more than 80 years. The company, which started in a small machine shop in Wisconsin, has grown into the world's largest builder of marine propulsion systems.[1] Today, Mercury Marine is number one on the water, and the company didn't get there by sitting still. It's always pushing forward.

Mercury Marine's long history is one of firsts, foremosts and constant improvements. It has continuously set and reset the standards for reliable, trouble-free performance, superior power and torque, low emission, and low fuel consumption in its outboards and sterndrives. And nobody has given boaters more ways to propel their specific boats, activities and pursuits reliably, comfortably and efficiently across the water.

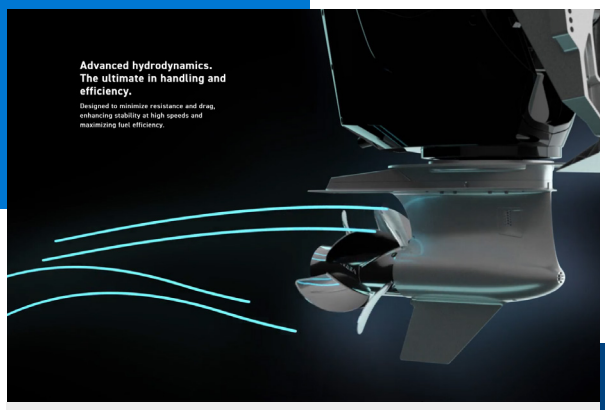
This legacy of leadership continues today as Mercury Marine pushes forward with the new Mercury V12 600hp Verado Outboard, an engine that elevates the standards of premium design and engineering. With game-changing innovations like a steerable gearcase and automatic two-speed transmission, the V12 Verado delivers an incredibly refined outboard-driving experience.

Virtual design and testing

To deliver breakthrough innovations like those in the V12, the engineers at Mercury Marine rely heavily on computer-aided engineering simulations that use software tools for computational fluid dynamics (CFD) and finite element analysis (FEA).

The use of computer-driven simulations allows Mercury Marine's engineering teams to greatly accelerate the process of evaluating different design alternatives in comparison to the costly and time-consuming process of developing physical prototypes, according to Arden Anderson, a specialist in engineering simulations for Mercury Marine and its parent company, Brunswick Corporation.

"We're running physics simulations on computer models," Anderson explains. "A very simple way to put it would be to say it's virtual testing. It's not requiring a physical prototype or physical part to do the testing, but we're doing it numerically in a computer."



For an animated look at breakthrough innovations from Mercury Marine's design and engineering teams, visit MercuryMarine.com/V12.

The benefits of virtual design include reduced product-development costs, faster testing and better time to market, Anderson notes.

"Before we jump into a new technology, we can check out ideas digitally," he says. "We can digitally look at a hundred design iterations in the amount of time it might take to do one physical iteration."

Virtual testing also brings important benefits in terms of innovation and product durability, Anderson notes.

"With virtual testing, we can test edge conditions, or very challenging conditions, on a product that might be tough to test in real life," he says.

For example, an engineering team might test how a particular design alternative will work under extremely cold conditions, such as those found in the Artic Circle. In the physical world, that sort of testing would be extremely complex, costly and time-consuming.

1 Mercury Marine, "This is Mercury," accessed May 25, 2021.

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Mercury Marine

The first V12 powerhead designed for an outboard.

7.6-liter displacement makes light work of heavy vessels to get on plane quickly and impress at every speed.

Bursting for hydrodynamics

To carry out computer-aided engineering simulations quickly and efficiently, Mercury Marine’s engineers need access to massive amounts of high performance computing power. At times, their computational requirements can exceed the limits of the company’s in-house systems, so to meet these peak demands, they leverage HPC Service (HPCaaS) from R Systems, a Dell Technologies partner.

R Systems provides HPC cluster resources and technical expertise to commercial and institutional research clients through the R Systems brand and the Dell HPC Cloud services partnership. It owns and operates bare-metal clusters and offers a variety of solutions to meet each client’s specific HPC needs. These offerings include lease time on clusters for bursting as well as for short-term and long-term projects, all available at highly competitive prices.

To meet Mercury Marine’s peak computing needs, R Systems provides on-demand access to Dell EMC PowerEdge Modular Infrastructure with Intel® Xeon® processors and Dell EMC PowerSwitch networking.

“We’ve got a base level of computational availability on hand that we own,” Anderson says. “We push work to R Systems in cases when the workload outmatches the capacity of our existing system. R Systems lets us address the peaks though bursting capabilities.”

Many of the Mercury Marine jobs running on the Dell EMC PowerEdge servers in the R Systems cloud environment focus on hydrodynamics, or the way in which the forces of water interact with a boat and its propulsion system.

With HPCaaS from R Systems, Mercury Marine’s engineers can cut the time required to run a series of hydrodynamic simulations from 48 hours on in-house systems down to just 2 hours. Time-savings like these help the company bring breakthrough innovations to market in less time — innovations like the industry’s first steerable gearcase and a dual-propeller design that helps harness the full potential of the Mercury V12 600hp Verado Outboard.

“With the resources of R Systems, we can run multiple jobs concurrently and get the results back quickly, instead of queuing the jobs one by one and waiting for the results,” Anderson says.

Another factor in choosing R System was the company’s expert technical support. R Systems strives to offer its customers full white-glove service, with R Systems engineers and technicians functioning as an extension of the customer’s in-house IT team.

“A lot of places have good pricing, but a key differentiator for R System is tech support and partnership,” Anderson says. “When we chose them for our cloud bursting needs, they were amongst the leaders for HPC performance and cost, and they were absolutely the leader for the tech support and partnership.”

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