DELL Technologies

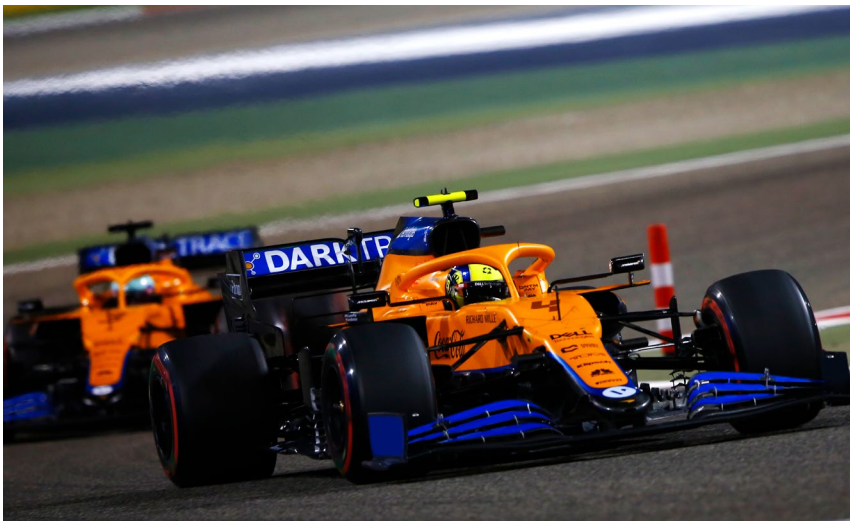
McLaren Group

McLaren RACING

Manufacturing | United Kingdom

Data-driven innovation starts at racing's edge to improve race car aerodynamics — and speed

McLaren Racing continuously prototypes and streamlines its Formula 1 race cars supported with end-to-end solutions from Dell Technologies.



McLaren race cars are expertly driven faster than 200 miles per hour. They act as sleek edge devices streaming as many as 100,000 data points a second. Engineers continuously prototype them to get the most performance and competitive advantage, using a wide range of secure IT solutions from Dell Technologies.

Transformations

McLaren's trackside edge data center is securely tied to HPC at headquarters for closed-loop performance analysis.

McLaren streamlines race car aerodynamics using data-driven 3D digital twin and 3D printing models.

McLaren's continuous rapid prototyping to improve car performance helps boost its standings from race to race.

Outcomes

Accelerates time to innovation with HPC aerodynamic simulations.

Enables simulations via digital twins to validate car enhancements.

Addresses new restrictions on spending and aerodynamic testing.

Optimizes race performance and speed to innovation with data analytics.

Small gains equal big competitive advantages

In Formula 1 racing, cars often exceed 200 miles per hour on the straightaways of the many track circuits they race across the globe. At those speeds, small differences in a car's aerodynamics can make big differences in race outcomes. After all, the disparities between the fastest and slowest cars are as small as 4%. Among the top five cars, those can be even smaller — a razor-thin 0.15%.

For the latest racing season, Formula 1's governing body set caps on both team spending and the time allowed in wind tunnels to study aerodynamic improvements. "While we've always looked for ways to speed up innovation in our car design, including its aerodynamics, these new restrictions have forced us to be even more efficient in all we do," says Edward Green, principal digital architect at McLaren Racing.

In Green's view, the race isn't just on the track, but off it, too. "We're in a constant state of rapid prototyping of our cars to make them go faster with data-driven engineering changes, on average about every 20 minutes," he says.

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Aerodynamics, a key to speed

Much of those engineering changes involves aerodynamic simulations on 3D digital twins — virtual proxies of the physical cars in software — using computational fluid dynamics (CFD).

These complex studies are conducted via the latest high performance computing (HPC) infrastructure at McLaren's U.K. headquarters. If green-lighted, a component will be prototyped at a reduced scale and tested in a wind tunnel. Often these parts are produced on rapid prototyping machines using 3D printing techniques."We deployed our latest HPC in just weeks, with a big hand from Dell Technologies, versus the six to nine months HPC solutions can require," Green says.

Data from edge to core to cloud drives innovation

Data is driving innovation at McLaren, according to Green, who thinks of its race cars as fast-moving edge devices. "Our cars are streaming hundreds of thousands of data points every second," he says. "Each car transmits key telemetry data in real time, and our trackside IT infrastructure from Dell Technologies relays it to our headquarters engineers, who use our HPC and advanced simulations to find ways to boost performance even more. It's closed-loop innovation supported by Dell Technologies that helps keep McLaren Racing ahead of the pack."