

Official Team Partner



THE SECRET OF MERCEDES-AMG PETRONAS MOTORSPORT'S “UNFAIR ADVANTAGE”

A story of revolutionary technology empowerment in motorsport

By Matt Harris, Head of IT, Mercedes-AMG Petronas Motorsport





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Past performance is not necessarily an indicator of future success.

We are constantly aware of our competitors and **we are restless for more speed.**

Matt Harris, Head of IT, Mercedes-AMG Petronas Motorsport

ONE AMBITION: BE THE BEST TEAM ON AND OFF THE TRACK

Cast your mind around the diverse world of sport. It's difficult to think of another where the rewards are as great as those of Formula One.

As with every sport, in Formula One performance is king. But unlike others, the difference between winning and losing happens at hundreds of kilometres per hour. Therefore, on-track decisions must be taken by teams in seconds (if not less), while off-track, groundbreaking innovations fuel competitive advantage in its truest sense.

Today, every kind of motorsport organisation, from karting clubs that hothouse the next generation of world-class drivers to Formula One itself, deploys data-driven performance strategies to ensure theirs is the winning approach. Data streams in from across the ecosystem in real-time, forming an essential pool of intelligence.

Driver feedback and sophisticated on-board telemetrics inform engineering decisions and race strategies. At the other end of the spectrum, data from social media channels can be used to drive fan engagement and ultimately revenues.

Data has a profound impact on performance. Every decision must be made without error, risk and reward must be finely balanced, engines must be tuned precisely, and every conceivable environmental scenario must be modelled to ensure onboard systems can cope with any eventuality.

While basic telemetry has been used since the 1980s to stream live data from cars to pit teams, significant advances in engineering and IT have ushered in the dawn of big data. Combined, big data and motorsport are a marriage made in heaven since both are reliant on velocity to make a winning difference. In fact, it is precisely this ability to collect large volumes of data at speed that generates crucial competitive advantage.

So what are the technologies that we at Mercedes-AMG Petronas Motorsport use to give us a 'world-class advantage'? Let's take a look.





PROUD OF
OUR WINS.
DETERMINED
TO KEEP
WRITING
NEW HISTORY

If the evolution of motorsport is about cycles of development, leading teams must find every possible way to contract those cycles, speeding innovation without increasing risk.

Staying ahead of the pack will, quite literally, deliver more wins and more revenues. Increasing the operating budget means we can invest in future performance and deliver significant returns for our brand and those of our partners.

This is where data comes into its own. Understanding what generates or inhibits performance – at engineering, environmental and driver levels – and deploying those insights in the design and adaptation of new cars sits at the heart of motorsport success, and in particular ours at Mercedes-AMG Petronas Motorsport.

We undertake round upon round of reporting, improvements and testing, both in and out of race season to optimise every aspect of our performance. Consequently, data sits at the heart of everything. It eradicates uncertainty and replaces a ‘trial and error’ approach with clear improvement pathways backed by accurate data-powered decision-making; it enables us to have objective discussions based on facts rather than relying on subjective gut feel.

This ability to be agile and adaptable is directly reliant upon the way data is collected, stored, managed and used. With so many technical interdependencies impacting performance levels, neither latencies nor downtime can be tolerated in Formula One processes.

For this reason, there are three tech leaders who have become particularly important to us. They are Qualcomm, Tata Communications and Pure Storage, and each of them play a crucial role in supporting our ambitions.



TRANSFORMING DATA PERFORMANCE FOR A WINNING POSITION

Formula One innovation takes a lot of thinking about by a lot of smart minds.

As with many other industries, data is the life force of our operations and so many of our employees rely on it to be effective and efficient. At our headquarters, we have a wide range of users with different expectations and applications of data. A quick scan of the skills portfolio tells the story: designers are using CAD systems such as CATIA; engineers are running complex simulations; and administrators, executives and marketers are using standard office tools. In addition, business analysts use SAP and databases such as SQL.

The entire team is focused on working to a series of strict deadlines whereby, for example, a certain number of drawings have to be produced per week or the car will be late. Everyone in the factory is busy building next year's models. Typically, they're working 50 to 60-hour weeks and frequently more. There is absolutely no room for error; the car has to be in world-class condition at the first and every race.

One minute spent waiting for data to load is a minute less thinking time. When you have a team of specialists as large as ours, whose jobs all depend upon accessing the data we hold, you can soon see how even minimal delays add up to a significant erosion of decision-making time and productivity.

The combination of Qualcomm, Tata Communications and Pure Storage gives us a truly powerful advantage. Qualcomm is innovating its systems for transferring on-board data. We have been conducting field trials with them to test high-speed wireless download of vehicle sensor information using 802.11ad WiFi® technology in the 60 GHz band. The goal is to accelerate how quickly and efficiently data can be pulled from the vehicle, as well as help evaluate vehicle performance under extreme race conditions, helping to speed up assessments and spend less time in the pit lane.

During these trials, race engineers use both 5 GHz 802.11ac and Multi-gigabit 802.11ad WiFi, which operates in the millimeter wave (mmWave) 60 GHz band to gather data directly from our cars while they are in or near to the garage. The handover between the two modes happens automatically as radio conditions dictate throughput performance.

Let's shift the focus to Tata Communications. They bring eight-times faster trackside connectivity, greater bandwidth and lower latency to transfer race data live from every race location to and from our Brackley headquarters in the UK in less than one quarter of a second.

Finally, with its advanced All-Flash technology, Pure Storage underpins our data-driven innovation by storing, managing and serving up the data that Qualcomm and Tata have allowed us to collect and transfer. How? By making data available to the many workload intensive applications our engineers, analysts and race strategists use.

Pure Storage – the before and after.

Before we worked with Pure Storage, data was taking up to two minutes to load into applications before any work could be done. Costs, performance and the ability to service up-and-coming application workloads were beginning to put our existing storage technology in a precarious position. Since the implementation, the loading time has accelerated to a consistent seven seconds for the same data sets.

During 2015, pursuing a business vision aiming for excellence in every detail, we began a process of evaluating alternative spinning disk solutions as well as the newer All-Flash technology. Pure Storage's ability to radically condense data coupled with sophisticated data services that drive data performance made the choice an easy one. Not to mention the system was easily portable, meaning we'd be able to cut our trackside costs considerably.

In terms of protecting our investments, Pure Storage runs the Evergreen programme that removes the anxiety of the traditional storage renewal. It's an example of the simplicity you get with them and it addresses the typical concerns about future capacity, upgrades, maintenance and how much it will all cost us again. Instead of pondering those issues, we were able to immediately focus on getting the technology in the door and transforming the business as quickly as possible.

THE FAST TRACK TO SUPERCHARGING RACE PERFORMANCE

Since deploying this combination of Qualcomm, Tata Communications and Pure Storage technologies into our production environments, we have experienced game-changing performance improvements right across our operations.

Today almost all of our tech portfolio has been ported over to Pure Storage, including Microsoft SQL Server, Oracle databases, CATIA CAD/CAM, SAP, VMware servers, SharePoint and collaboration tools, such as Skype for Business.

So what are the benefits?

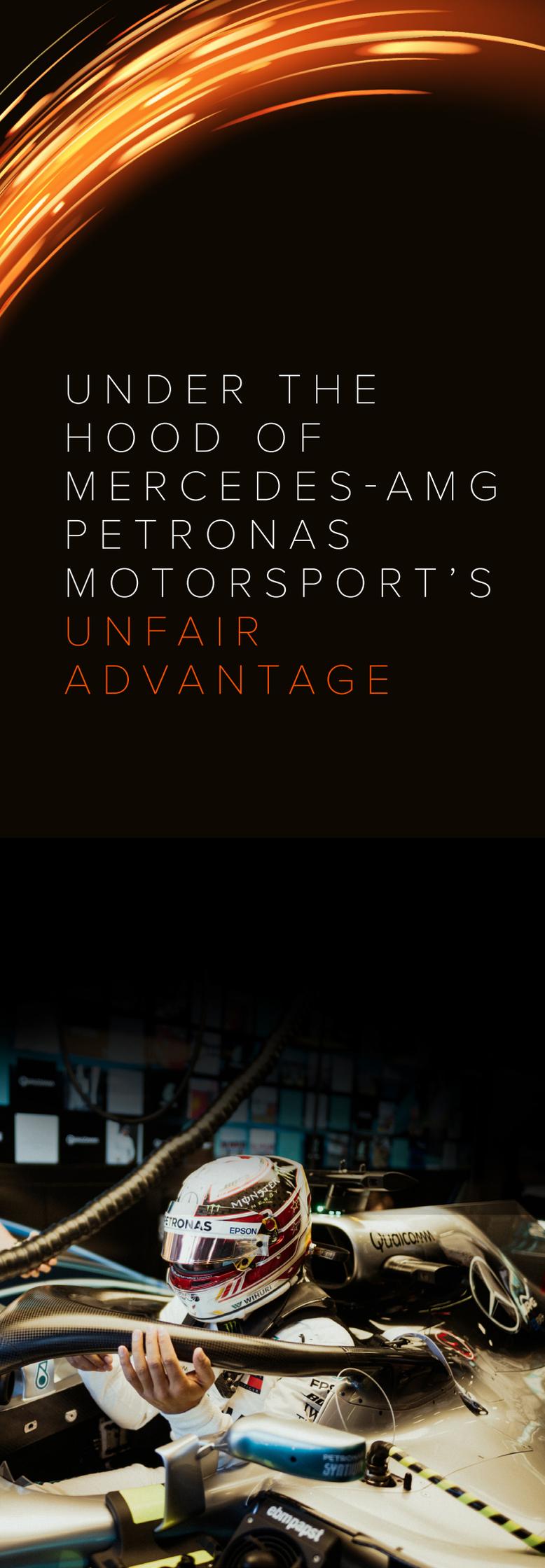
Having All-Flash storage in place has transformed back-office processes. For example, one frequent query to a SQL Server database used to take around 4.5 minutes to complete. Simply by moving the database to Pure Storage the execution time has dropped to just 13 seconds.

You might think that all the hard work is done before the race season commences. On the contrary, data storage plays just as crucial a role during trackside phases. From an engineering and innovation standpoint the transformative performance of Pure Storage has made a real difference to the improvements that can be made between sessions – during qualifying – for example.

The Mercedes-AMG W08 EQ Power+ cars are fitted with over 200 sensors each and can gather some 400 GB during each race weekend, a total of 9 TB across the season. Team engineers and designers use a two-phase process to download the data which formerly took seven minutes. With our new tech suite in place, including Pure Storage, that process now takes 2.5 minutes – equating to a 70% time saving.

Perhaps one of the most dominant influences on the team's performance is computational fluid dynamics (CFD). This capability allows a specific component of a car to be tested as if it's in race conditions, something that is incredibly useful in adapting the cars to each racing circuit throughout the season. However, CFD requires massive compute power and about 20 hours of processing time per simulation. However, by moving this application to Pure Storage, the team has been able to cut some components of this activity by up to 15%. As a consequence, more jobs can be performed in a week, without affecting the limit imposed upon the team by regulations.





UNDER THE
HOOD OF
MERCEDES-AMG
PETRONAS
MOTORSPORT'S
UNFAIR
ADVANTAGE

With data performance – and consequently car performance – improving, what exactly is it about the Pure Storage solution that gives Mercedes-AMG Petronas Motorsport such a durable competitive advantage so cost-effectively?

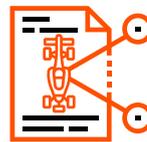
It comes down to these factors:



1. Designed for demanding workloads and environments



2. Proven to deliver around 10 times the efficiencies of other storage



3. Really easy to implement and run



4. Innovation is continuous

While those technical aspects of the Pure Storage solution are, to us, unbeatable, they only form one part of the story. The other equally important part is that Pure Storage delivers so much more than high-speed kit. They provide a complete solution to our data needs, managing and organising it in smart ways that power our mission critical business applications. They provide smart tools and services to help us understand how our storage is performing, so that we can continually optimise it to our very specific needs and our unique ecosystem of applications.

Combined, all of these benefits create a powerful partnership for success. To keep up to date with all the latest news on the Mercedes-AMG Petronas Motorsports “unfair advantage”, please follow the [Pure Pitwall showcase page](#).

Alternatively, why not get in touch at pdh@purestorage.com or **01784 614069**.



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The three words I'd use to describe Pure Storage are **simplicity, performance and support.**

By Matt Harris, Head of IT, Mercedes-AMG Petronas Motorsport

#UNFAIRADVANTAGE