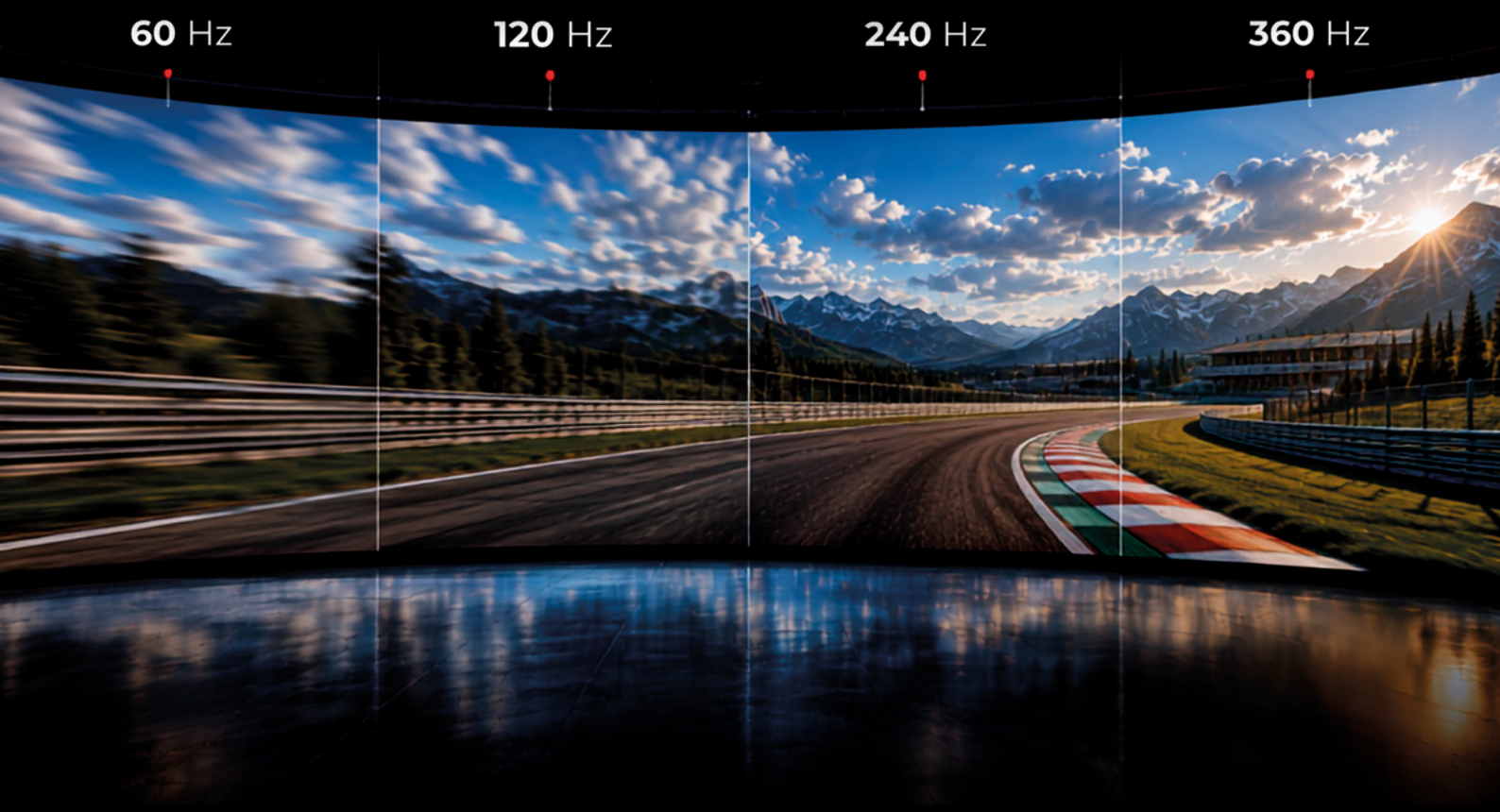
ANTYCIP

HIGH FRAME RATE *DISPLAY*

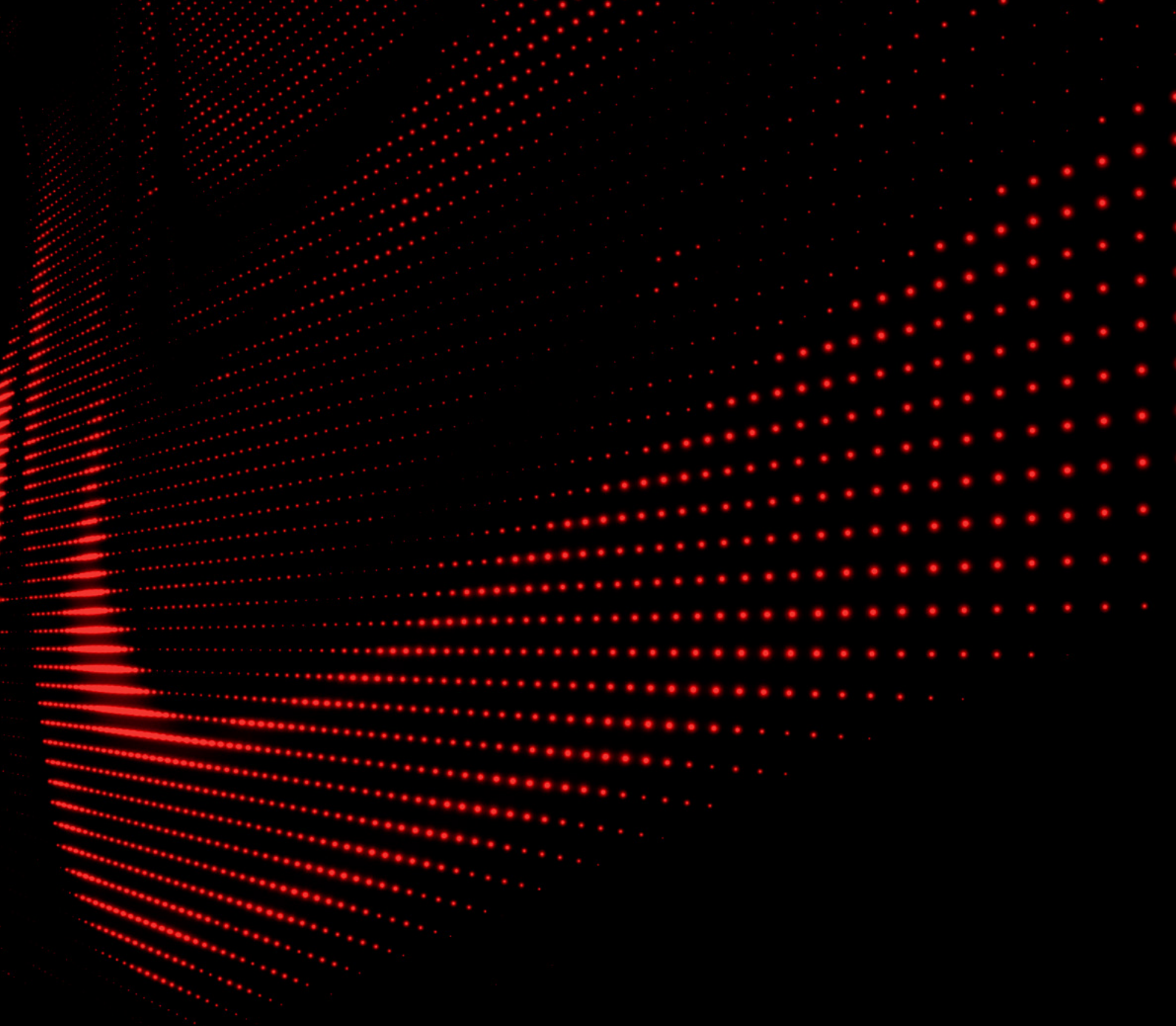


Engineering-Grade Simulation and VR Beyond the 60Hz Benchmark

Delivering smoother motion, tighter synchronisation, and genuine multi-user collaboration for the most demanding simulation and VR environments

See the future

ST Engineering



WHY HIGH *FRAME RATE*?

60Hz has long been treated as a ceiling for real-time visual systems: the frame rate at which motion looked acceptably smooth, and beyond which further investment seemed unnecessary. It became a default because, for many years, it was simply the practical limit of the hardware available, not because it represented the point at which a simulation stopped improving.

For the engineering-grade simulation and VR work we deliver, 60Hz is not a ceiling. It is only a starting point. As GPUs, displays and synchronisation hardware have matured, the frame rates that were once reserved for the most exotic research installations are now realistic specifications for production simulation environments, and the engineering benefits scale with them.

WHAT *FRAME RATE* MEANS IN PRACTICE

Frame rate is simply how many new images are shown to the viewer each second, measured in frames per second (FPS). Shown quickly enough, that sequence of still images is perceived by the brain as continuous, smooth motion rather than a series of individual pictures, which is why the frame rate a system can sustain has such a direct impact on how convincing the experience feels.

Monoscopic simulations typically target a minimum of 60 FPS, with more demanding, fast-moving content often requiring 120 FPS or even 240 FPS to stay smooth.

Active Stereoscopic VR displays need at least 120Hz overall, so that each eye still receives its own 60Hz. That requirement rises further as soon as more than one user needs an independently corrected viewpoint in the same session.

Below roughly 90 FPS, VR headsets become increasingly likely to cause disorientation, nausea, and other discomfort for the user, and the lower the frame rate falls beneath that point, the worse those effects tend to become.

Hitting these targets reliably is as much a synchronisation problem as a raw-performance one. Software-level distributed rendering can keep separate, networked image generators aligned, but for professional simulation and VR work that software-level synchronisation is typically paired with hardware-level synchronisation on specialist graphics cards, giving a more dependable result than software synchronisation alone.

WHERE THIS *MATTERS*

The demand for higher frame rates is not confined to one industry or one type of project. It shows up wherever **real-time visual fidelity**, **multi-user collaboration**, or **tightly synchronised motion feedback** matter. In other words, wherever the accuracy of what an engineer sees and feels has a direct bearing on the validity of the test:

Automotive and motorsport engineering

Defence

Aerospace

Research applications

OUR *SCOPE*

Antycip works across the full range of this demand, from entry-level systems through to the most demanding high-end HFR and VR deployments.

Our scope covers simulation and VR as a whole, rather than being limited to professional AV (Audio-Visual) installation, a distinction that matters because it shapes how a project is engineered from the outset rather than assembled from off-the-shelf AV components.

THE ENGINEERING CASE FOR HFR

High Frame Rate (HFR) specifically means systems operating at 120Hz and above. Reaching that level is not simply a matter of pushing the same pipeline harder: **it surfaces a set of engineering requirements across both driving simulation and multi-user Extended Reality (XR) collaboration that only become visible once a project moves past what a standard 60Hz pipeline was designed to carry.**

KEY ENGINEERING REQUIREMENTS

Reduced motion blur.

On fast-moving detail, track edges, mirrors, other vehicles, image quality is the first thing to suffer as frame rate drops. This is exactly the visual information that starts to smear and lose definition at lower refresh rates, and it is often the detail an engineer is relying on most.

Better peripheral detail.

A driver judges speed and closing distance mostly from the edges of vision, not the centre of the field of view. That peripheral information is exactly what degrades first at low frame rates, so preserving it at higher frame rates directly improves the realism of speed and distance perception.

Tighter synchronisation between image and motion platform.

Any mismatch between what is seen and what is felt is where simulator sickness comes from, and it breaks the illusion of the simulated environment. Higher frame rates give the motion system a finer-grained, more current picture to synchronise against.

Reliable synchronisation across viewpoints.

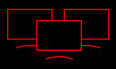
As more engineers join a single shared VR/XR session, each additional viewpoint adds its own synchronisation demand, one that a standard 60Hz pipeline was not designed to carry. HFR gives the system the headroom to keep every viewpoint aligned as sessions scale up.

Longer comfortable session times.

A well-synchronised, High Frame Rate environment is less fatiguing for an engineer running repeated test iterations over a long working session, which in turn supports more testing within the same working day

WHAT WE OFFER
DISPLAY AND COMPUTE

This capability is delivered across four layers, designed as one connected system rather than assembled from separate components sourced independently.



DISPLAY HARDWARE (LED AND STEREO PROJECTION)

Display hardware is the layer visible to the end user, and it is available across a broad performance range to suit different project requirements and budgets:

- LED displays are validated up to 360Hz, with 480Hz demonstrated in VR-specific use cases, giving projects headroom to specify performance ahead of current requirements as they scale.
- Stereo projection is available at native 4K, up to 360Hz, delivered, for example, to the University of Liverpool, one of the highest performance configurations of its kind.
- Projected 4K native displays delivering 240Hz for the ultimate monoscopic frame rate is available from leading manufacturers. This can be further enhanced with pixel shifting on IG, taking advantage of the application working with the hardware to offer a perceived 8K at 240Hz to the user's eyes.
- For Driver-in-the-Loop (DIL) simulation on projection, we have delivered without hardware synchronisation. For LED, synchronisation is always handled in hardware.

GPU (GRAPHICS PROCESSING UNIT) COMPUTE

Display performance is only ever as good as the compute feeding it, which is why GPU compute is treated as its own engineered layer rather than an incidental spec line:

- The latest generation of GPU compute, sourced from leading manufacturers, drives the render pipeline behind the display layer.
- Keeping pace with the latest generation of compute matters because HFR content is only as smooth as the rendering feeding it; a display capable of 360Hz is only useful if the GPU layer can keep up, without it, the headline refresh rate on a datasheet never translates into a usable experience.

MULTI-USER VR/XR COLLABORATION

› Several engineers can work together in the same live, dynamically computed 3D environment in real time, each with their own independent, correctly rendered viewpoint.

› This supports joint design review, shared testing sessions and collaborative decision-making, so that a design question can be resolved by the whole team looking at the same environment simultaneously rather than comparing notes afterwards.

SYSTEMS INTEGRATION

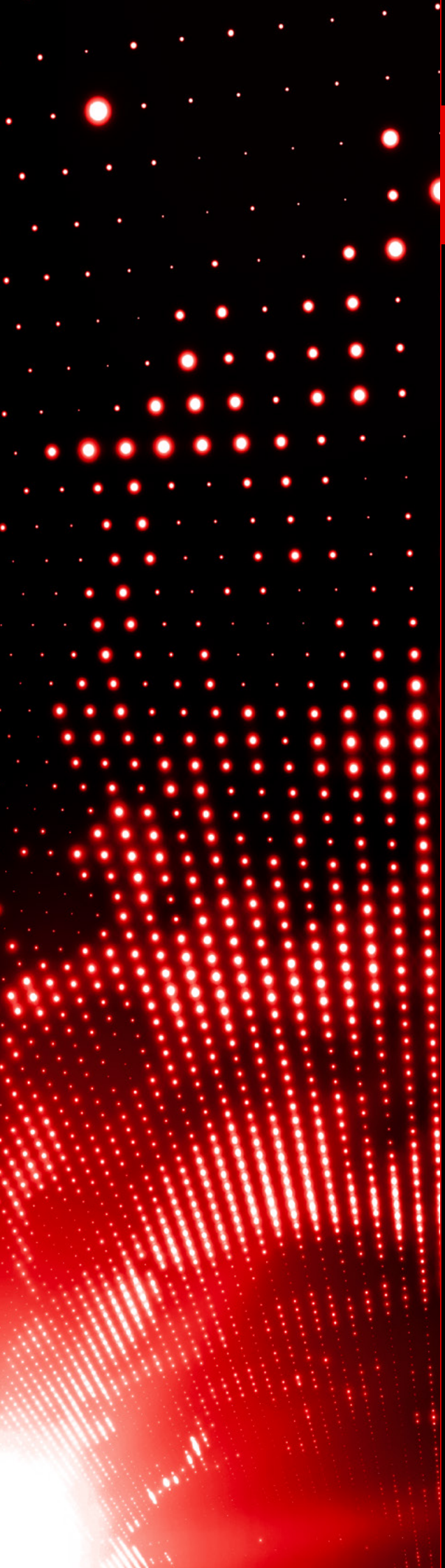
Systems integration is the one least visible to a customer walking into a demo room, and the one that determines whether everything else works together:

› Synchronisation, genlock, and bandwidth are engineered together, not sourced as separate parts.

› Genlock is the hardware-level, daisy-chained synchronisation across projectors that keeps every frame aligned and prevents visual tearing, critical for both 3D and multi-view setups.

› Some providers use consumer-grade cards with software synchronisation over the network instead of hardware genlock. This is a cost-effective approach, but it carries a tearing risk that hardware-level genlock avoids.

› This integration work, synchronisation, genlock, and bandwidth across very high pixel counts, is the hard part of the whole system. The display itself is the visible part, but it is not where the real engineering challenge sits; it is the part a customer only notices when it is missing.



WHY ANTYCIP IS DIFFERENT?

Our experience with HFR spans both simulation and VR, across systems of varying scale and complexity. At Antycip:

+ **We bring close to thirty years of expertise in simulation and VR.** That heritage means HFR delivery is built on an established base of engineering knowledge, not a capability assembled for a single project.

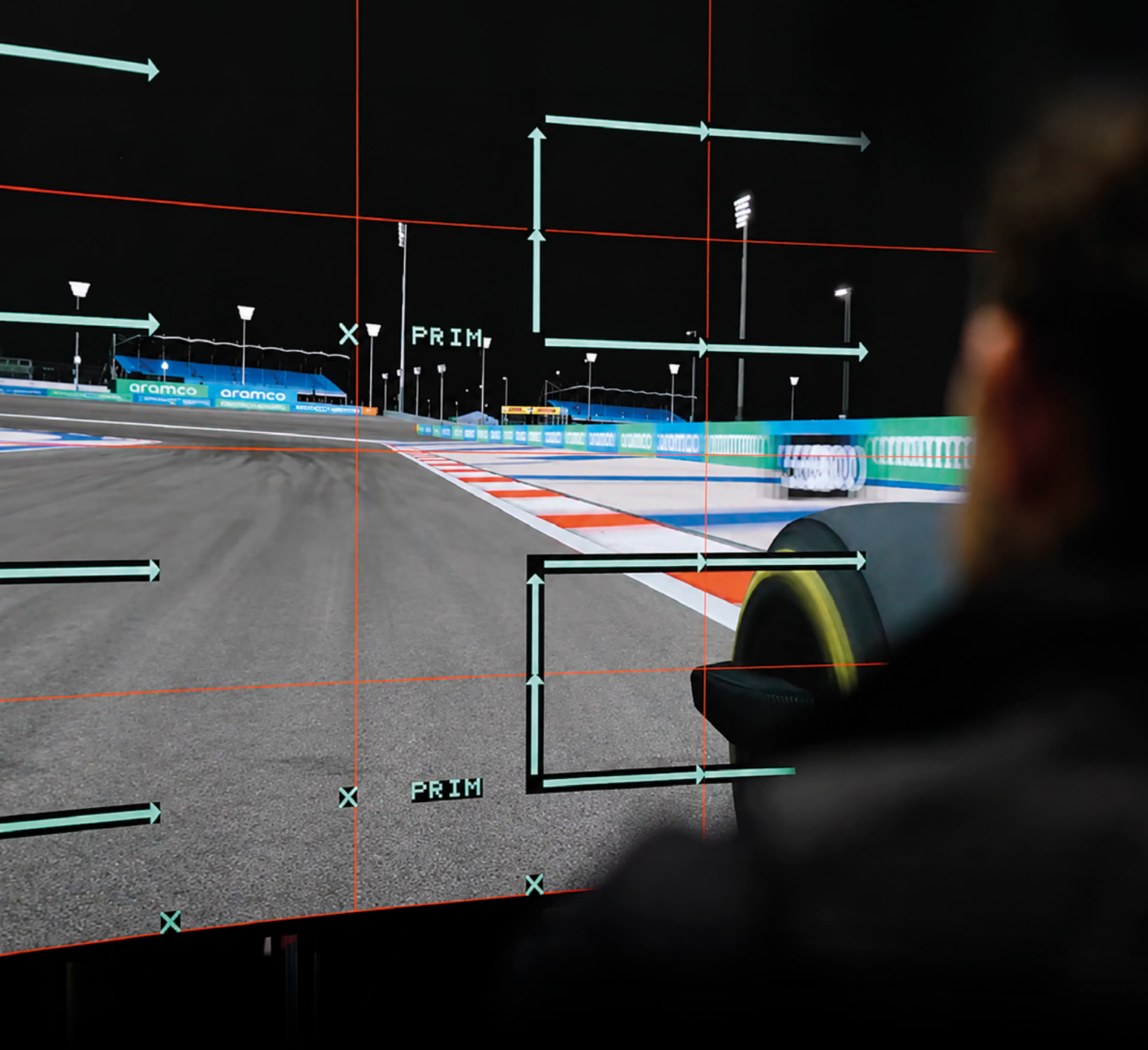
+ **We understand real-time rendering software from our own heritage.** Rather than approaching it as a third-party integration exercise, we use this knowledge to shape how a system is specified from the outset, bringing software and hardware choices together.

+ **We cover simulation and VR as a whole, not just professional AV.** This broader expertise shapes how every layer of a project is engineered and integrated.

+ **We retain our independence in the supply chain.** We assess the price, performance and hardware requirements of each solution and select the appropriate technologies, rather than being tied to a single manufacturer. This means the specification is driven by the project's requirements.

+ **We maintain up-to-date knowledge of the leading HFR hardware and manufacturers.** With a relatively small number of specialist manufacturers continually advancing their technologies, our independent view helps us identify and specify the right solution for each application.

+ **We support 350+ customers across a wide range of sectors,** including some publicly visible names in automotive.



The following examples illustrate this offer in real deployments, rather than as abstract capability claims:

- **University of Liverpool.** Delivered native 4K stereo projection at 360Hz, one of the highest performance configurations of its kind, demonstrating the display hardware and systems integration layers working together in practice.
- **Motorsport.** These simulations are used to test and optimise a vehicle's setup on a virtual circuit ahead of a race, cutting down physical track time, an engineering tool, not a driver training tool. This is the core motorsport framing for how the four-layer delivery model is applied in practice.
- **Automotive development more broadly.** The same principle extends beyond motorsport to earlier, cost-effective, repeatable evaluation before physical build, the same HFR and VR capability applied earlier in the design and testing cycle.

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