6 trends in automotive design and manufacturing for the future

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The automotive industry continues to face challenges tied to supply chain disruptions and changing global demand. Combined with the uptick in electric vehicle sales and evolving regulations around environmental impacts, automakers are looking for ways to align production, profitability, and customer preference.

Here are six technology trends in the automotive industry that could help companies excel in the future.

1. Generative design

First up is generative automotive design, or the use of AI-driven 3D-modeling tools capable of optimizing part production to limit weight, reduce material use, and control costs. Instead of relying on teams of engineers to spend weeks or months designing and optimizing components, staff can provide generative design tools with current part specifications and intended goals, and then allow AI to create multiple design options.

Using a generative design approach also lets manufacturers iterate design options and refine the look and feel of new vehicles or update existing models. For example, once generative tools have produced a basic satisfactory design, the digital model can be used as the input for a human designer to apply more specific changes.
AMD Threadripper™ PRO processors can help increase the speed of this iteration. Equipped with multiple cores — 12 cores for the AMD Ryzen™ Threadripper™ PRO 5945WX, all the way to 64 cores in the AMD Ryzen™ Threadripper™ PRO 5995WX — the processors can create more iterations, more quickly, to help designers see what's working, what isn't, and what needs to change.

2. Digital twins

Once the initial automotive design phase is completed, design verification begins. Using both virtual and physical simulations, automakers test designs to assess the impact of specific variables. For example, tools such as Ansys Fluent are used to create virtual wind tunnels that calculate the amount of drag on vehicle parts, in turn allowing companies to optimize production.

In 2023, expect an uptick in the use of digital twins to combine real-world data with digital assessments. Put simply, a digital twin is an exact, virtual replica of a physical object, such as a car. This replica includes everything, including software, mechanical, and electronic systems, and is inextricably intertwined with the original. This means that when the physical vehicle is taken in for service or has parts replaced, the digital twin data is updated to match.

3. Additive manufacturing and CNC machining

Additive manufacturing, or 3D manufacturing, has been a part of automotive processes for several years. However, with the costs of additive technologies falling even as their

production speed increases, we'll see greater reliance on additive processes to create critical components in the future. The biggest benefit here? Minimal waste, since additive operations build components layer by layer.

But reduced waste is just the start. Automakers are now combining additive manufacturing processes with advanced CNC machining to optimize outputs. In practice, this means using what's known as multithreaded tool path optimization – algorithm-driven analysis of CNC machine functions that find the fastest path to parts creation. The AMD Threadripper™ PRO line of processors can further increase efficiency by reducing the amount of time required to create tool path optimizations.
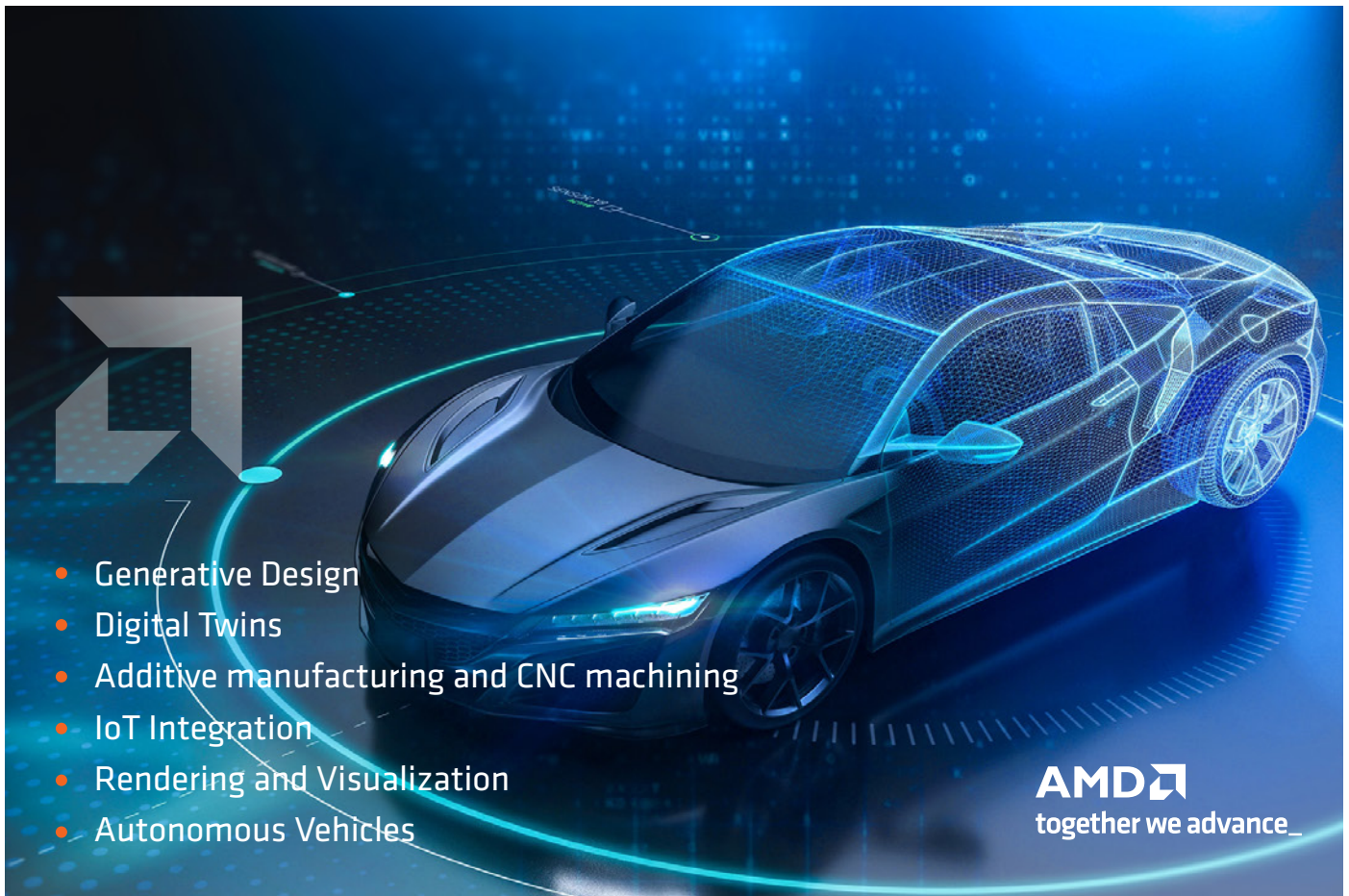
4. IoT integration

IoT, a.k.a. the Internet of Things, has been an industry buzzword for the past several years, but is now enjoying mainstream adoption. In part, this stems from consumer preference; drivers are willing to give up a measure of privacy if it means that vehicles can provide real-time data about driving habits, safety, and fuel optimization.

From a manufacturer's standpoint, IoT technologies offer a wealth of information about vehicle operations. This includes everything from safety data – such as the number of airbag deployments or issues with vehicle cameras – to performance data – such as stress on engine parts or the volume and type of vehicle emissions produced.

The biggest takeaway from this trend isn't the IoT devices themselves. Instead, it's about creating interoperable IoT frameworks that reliably deliver relevant data to manufacturers. The AMD Ryzen™ Embedded family of processors offer multiple power and performance options along with flexible IoT sets (including Ethernet) to help companies create comprehensive IoT gateways.

5. Rendering and Visualization

Digital rendering and visualization can happen at any stage in the vehicle development lifecycle. Internally, digital renderings might be used to help design teams further refine the look and feel of the vehicle. Externally, these visualizations may be used as early marketing materials to get customers excited about new vehicle designs. The key to effective rendering? High-frequency processor cores capable of handling both lightly-threaded and

- Generative Design
- Digital Twins
- Additive manufacturing and CNC machining
- IoT Integration
- Rendering and Visualization
- Autonomous Vehicles

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multithreaded tasks. For example, where the Intel Xeon W-3375 38-core processor scored 7.39 on Luxion Keyshot rendering, the AMD Ryzen™ Threadripper™ PRO 5995WX 64-core processor scored nearly double that at 14.75.

6. Autonomous vehicles

While self-driving cars likely won't make their mainstream debut in 2023, manufacturers should stay alert for developing legislation around these vehicles. Combined with the push for electric cars that include comprehensive "infotainment" systems, there's a sea change underway, and automakers must be prepared.

Effectively navigating this new market means building autonomous vehicle solutions that safe, reliable, and adaptable. The AMD Automotive (XA) platform can help power highly advanced automated driving (AD) modules that require high-speed data aggregation, pre-processing, and distribution (DAPD) along with compute acceleration.

Tackling trends head-on

While future changes in automobile technology may cover everything from design to production to user privacy, they share a common theme: They all require robust computing infrastructure. From multithreaded CPUs that empower generative design to blazing-fast GPUs that help to deliver digital twins and underpin customer personalization, companies equipped with the right technologies are ready to tackle these trends head-on.

Put simply? Staying ahead of the competition requires more high-powered computing solutions than ever before, with uncompromising power, uptime, security features, and connectivity. [AMD Ryzen™ Threadripper™PRO processors](#) and [AMD Radeon™ PRO Graphics](#) are optimal examples of these powerful chipsets, created [with design in mind](#), making them the perfect fit for automakers in 2023.