

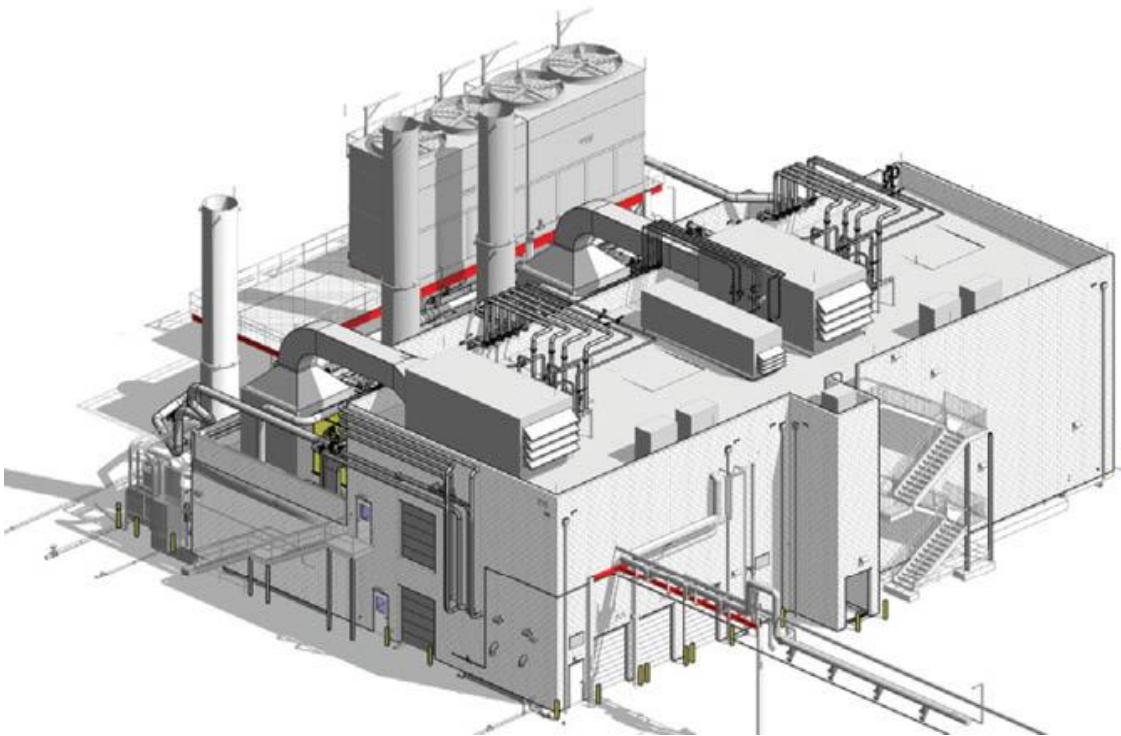
# Aerospace Lessons From The Automotive Industry

*By drawing from automotive successes, aerospace organizations can strengthen operations, adapt to innovation, and prepare for long-term industry shifts.*

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Outdated aerospace facilities push for innovative, automotive-inspired solutions.  
ALL PHOTOS COURTESY ACS

The correlation between the automotive and aerospace markets is stronger than many realize, offering a valuable learning opportunity for aerospace. The automotive industry's high demand and rapid advancements drive cutting-edge solutions – a model the aerospace industry can leverage as it faces growing pressures from geopolitical conflicts, achieving sustainability standards, and

increased global travel. Upgrading aging aerospace facilities, however, requires new approaches. The solutions of the past won't meet today's objectives.

The challenges the aerospace industry faces are unique but not without precedent. With overlapping technologies and deeply connected customer needs, the aerospace and automotive industries are kin. The fast pace and high volume of the automotive industry enable the industry's advancements, methodologies, and innovations to serve as a roadmap for aerospace facilities while driving down costs. This forward-facing approach can accelerate aerospace research and development (R&D), cutting years off testing and trials.

Aerospace is on the brink of significant transformations, with advancements in supersonic and hypersonic capabilities, expanded drone applications, alternative energy, and automation. The automotive sector's experience with these technologies offers aerospace a path forward based on proven, measurable results.

## A perfect storm

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Pushing aerospace innovation and accelerating the need for change is a perfect storm of geopolitical conflicts, supply chain disruptions, sustainability initiatives, and a focus on alternative energy solutions. The rapid obsolescence of aerospace facilities, many decades old and ill-equipped for today's technological and market demands, compounds these pressures. With slow iteration, aerospace's technological obsolescence significantly impacts aircraft design, maintenance, and operation of their related systems.



Synchronizing integration test stands for an aerospace parts manufacturer.

A key driver of transformation is the growing demand for air travel, spanning commercial, defense, logistics, and private sectors. Also, globalization has reshaped customer expectations, supply chain constraints continue to disrupt aerospace operations, and conflicts in Ukraine and Israel affect the aerospace industry. The results are rising costs, logistical bottlenecks, and evolving regulations,

making sustaining efficiency and competitiveness increasingly difficult. At the same time, global interconnectivity offers opportunities for collaboration, with aerospace primed to benefit from diverse expertise and cross-industry partnerships.

Technological advancements are accelerating, particularly in alternative energy solutions. Sustainability mandates and consumer expectations motivate the transition to greener aviation. Programs like [Horizon Europe](#) and the [U.S. Federal Sustainability Plan](#) emphasize the urgency of decarbonization. The automotive industry's rapid advance toward [net-zero emissions](#) puts mounting pressure on aerospace to follow suit as its share of global CO2 emissions will grow as the automotive sector's share declines.

Sustainable aviation fuel (SAF) is emerging as a key solution, offering a drop-in alternative to conventional jet fuel with significantly lower emissions. Electrification is also gaining traction, with innovations in propulsion systems, battery technology, and power distribution supporting efficiency and sustainability.

The rise of electric vertical take-off and landing (eVTOL) aircraft exemplifies the shift toward next-generation mobility. eVTOL are powered by electric motors controlled by computer systems wholly autonomous or piloted. Projected for [exponential growth](#), organizations adopting solutions to speed up their time to market gain a serious competitive advantage.

Yet, aerospace's aging infrastructure makes integration with modern technology and production capabilities difficult and a fundamental barrier to progress. An organization with a facility ill-equipped to handle rising technologies and throughput needs won't keep up with its customer needs, let alone the competition.

## Unique industry challenges

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The aerospace industry is experiencing rapid expansion and innovation, bringing complex challenges for research and development testing facilities. Navigating costs, supply



Batteries and hydrogen are powering the future of automotive and aerospace industries.

chains, and evolving technologies requires a strategic approach to ensure long-term viability.

**Challenge 1:** Calibration to today's costs, supply, and technology. Advanced technologies complicate the costs of raw materials, dedicated equipment, and accessing skilled labor. Add unexpected supply chain disruptions to the mix, and aerospace organizations must constantly recalibrate their production plans and resource allocation.

**Challenge 2:** Rate of certification and changing regulations. Certification of aerospace products is a time-consuming and intricate process hinged on stringent safety and performance standards. This is especially relevant in the electric vehicle (EV) market, where regulations are yet to be implemented. Achieving regulatory approval can significantly impact the time to market for new aircraft and related technologies. New technologies, such as electric propulsion or autonomous systems, don't fit into the FAA's existing certification processes, requiring evaluation and structuring of those processes.

**Challenge 3:** Throughput demands. Aerospace facilities can't keep up with the growth of commercial and defense demand. Heightened demand combined with global inflation suggests further demand pressures are approaching.

**Challenge 4:** The complexity and fragility of aerospace test cells. The sensitivity of aircraft components is amplified by the intricate design and complex nature of their environment, making them difficult to design. Designing and maintaining testing facilities that can accommodate their diverse and specialized testing requirements demands a standard of precision and accuracy legacy equipment and systems can't meet. Lack of precision leads to failures within production or testing, leading to delays, increased costs, safety risks, and tarnished reputations.



Engineers optimize motor systems for seamlessly integrating energy-saving technologies in aerospace and automotive industries.

## Eight vital areas where aerospace can learn from automotive

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The automotive industry's rapid production cycles and innovation offer valuable lessons for aerospace, particularly in testing and manufacturing. Aerospace can enhance efficiency, safety, and resilience by adopting these proven strategies.

1. ***An inside-out approach focusing on core capabilities first, emphasizing front-end planning that defines the acceptance criteria.*** When testing requirements and product goals drive a facility design and build focused on centralized aerospace testing needs, enabling a modular design facilitates the flexible assembly of components.
2. ***Safety and compliance standards based on industry knowledge.*** In particular, recommissioning or retrofitting aging aerospace test buildings poses significant safety challenges. Meeting safety standards that also incorporate new technologies exacerbates that hurdle. Automotive safety standards can inform aerospace about new technologies while showcasing adaptable safety protocols.
3. ***Data collection and analysis to empower decision-making at every level.*** The automotive industry has pioneered software and systems that strategically break down data and deliver real-time analysis to operators and engineers upon test completion. These real-time insights arm aerospace R&D with the reports they need to make immediate, informed decisions. Aerospace can adapt the technologies developed by automakers to enhance aircraft maintenance with predictive analytics, reduce downtime, and improve reliability.
4. ***Capable storage, power, and utilities.*** Adapting safety, power, and storage solutions will be significant as the need for alternative energy solutions grows. The automotive industry has made significant strides in effective, cost-efficient, and safe energy storage, power, and utilities that address throughput needs. The industry has also embraced power regeneration to recycle waste energy, greatly reducing storage and equipment operation costs.
5. ***Heightened efficiency and throughput for testing and production.*** Lean manufacturing principles and customized equipment solutions adapted from the automotive sector can streamline similar processes in aerospace, minimizing waste and optimizing workflow without compromising quality.
6. ***Systems integration solutions.*** Seamlessly integrated systems guarantee testing processes function efficiently and safely while accelerating time to market without sacrificing quality. Support from a dedicated systems integration expert ensures these systems are built on subject matter expertise with broad market exposure to varying technologies and industry applications, disciplined project management, and application knowledge.
7. ***Equipment solutions future-proofed for continuous growth.*** Automakers embrace adaptable, modular manufacturing tools to accommodate new production and R&D goals. Aerospace organizations investing in flexible, scalable equipment solutions can adapt their systems similarly.
8. ***Ongoing sustainability practices.*** Auto manufacturers increasingly use eco-friendly materials, processes, and energy solutions meeting industry and customer standards and cost and efficiency parameters. Following their lead, aerospace can also reduce the environmental impact of aircraft by exploring material and manufacturing processes from automotive experts aligned with similar technologies.

By drawing from automotive successes, aerospace organizations can strengthen operations, adapt to innovation, and prepare for long-term industry shifts.

## Moving forward

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Preparation and planning are key to navigating the aerospace industry's perfect storm. By benefiting from the automotive industry's experience, aerospace organizations can develop a strategic roadmap to modernize their facilities to tackle evolving production and testing goals. Inevitably, both industries will continue to adapt to new events and technologies, as will their challenges. Continuous learning is the only way to stay on top of these changes. With its faster innovation cycles, the automotive sector can remain a model for aerospace on how to address future challenges using the knowledge it gains from optimizing performance in automotive to drive advancements in aerospace.

## About the Author

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