Tech-Clarity

Tech-Clarity Perspective:

How Top Auto Companies Realize Innovation and Manage Complexity

Digitalization Drives Innovation and Program Performance in the Automotive Industry

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***This summary is an abbreviated version of the report and does not contain the full content. A link to download the full report is available on the Tech-Clarity website, www.tech-clarity.com.**

If you have difficulty obtaining a copy of the report, please contact the author at jim.brown@tech-clarity.com.

Executive Overview

The global automotive and transportation industry is experiencing a tremendous rejuvenation. The market is alive and sales and profits are growing. Within the last few years, automotive manufacturing has entered an age of innovation and witnessed unprecedented introduction of new models and advanced technologies to meet the challenge of doubling fuel economy and halving emissions.

In parallel with the booming auto market is a growing level of product development complexity. This increased complexity results from a variety of factors ranging from advanced materials for vehicle lightweighting to the increased role of software in product innovation and product performance. Some like to say today's cars are like computers driving around on wheels with over tens of million lines of code – but that's a huge understatement. Today's automobiles are an intricate orchestration of mechanical, sensors, controls, and software and are increasingly interacting with other vehicles and their surroundings. The resulting complexity is immense.

Top-performing automotive companies are going beyond today's best practices in manufacturing and leveraging digitalization to realize innovation.

How is the industry responding? Tech-Clarity analyzed survey data and reviewed automotive executive presentations to determine how automakers and suppliers address complexity and take advantage of the industry renaissance. We found that top-performing companies are going beyond today's best practices in manufacturing and leveraging digitalization to realize innovation. These companies have transformed their vehicle development processes to take greater advantage of digital product models and simulation, leading to growth and profitability.

Specifically, our research shows that Top Performers in the automotive industry are:

- Continuing their lead in collaboration and concurrent design
- Expanding their use of digital product models to optimize products early in design and better validate mechanical, electrical, and software systems
- Expanding their ability to synchronize and integrate design and manufacturing

To support these initiatives, Top Performers are leveraging digitalization to:

- Use more integrated, holistic PLM capabilities that allow early, model-driven systems optimization
- Integrate systems across the lifecycle to align and share design data from concept through production

Conclusion

The automotive and transportation industry is in a growth cycle. Volumes and profitability are strong for most in the industry. But the auto industry is facing unprecedented complexity due to growth, aggressive introduction of new models, regulatory pressure to improve fuel economy and safety, and increasingly intelligent / connected vehicles. They are also exploring and adopting innovations ranging from new drive trains and materials to new manufacturing processes including additive manufacturing.

Leading OEMs and their supply chains are actively addressing complexity through increased digitalization of their innovation process.

Leading OEMs and their supply chains are actively addressing complexity through increased digitalization of their innovation process. Survey findings and presentation reviews uncover a few significant trends. Top Performers in the automotive industry leverage digitalization to collaborate more, design more concurrently, take simulation to the next level, and integrate manufacturing planning with design.

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Top Performers support their advanced practices and performance with leading technology approaches. In addition to PLM, they are much more likely to use simulation and MPM technologies. Leaders are taking simulation beyond best practices to the next level. They are incorporating advanced techniques like model/software/hardware-in-the-loop to validate system behavior, and using test results to "close the loop" on simulations and improve their ability to predict vehicle behavior early in design.

Recommendations

Based on industry experience and research for this report, Tech-Clarity offers the following recommendations:

- Recognize and address increased automotive industry complexity. Vehicles and the business of developing and producing them has become much more complex.
- Adopt best practices and technology for concurrent design and collaboration to support globally dispersed production and supply chain activities.
- Adopt (and go beyond) best practices in critical areas like simulation, expanding them to a systems level and adopting new approaches including

model/software/hardware in the loop that allow better understanding and validation of systems behavior early and throughout design.

- Enhance manufacturing connectivity, leveraging digitalization to model products, predict their behavior, and streamline their production. Use MPM to plan production for multiple variants across lines and ramp up production faster and with fewer errors.
- Support best practices with enabling technologies including a more holistic, systems-driven approach to product development that leverages digitalization to improve collaboration, simulation, and MPM. Look for modular, integrated solutions that support digital product models starting at early concepts that can be expanded upon and detailed out during design, encouraging reuse and eliminating inefficient and error-prone handoffs and recreation of data.

About the Research

For this report, Tech-Clarity analyzed responses from a 2012 web-based survey, filtering the responses to focus only on those that serve the automotive industry. In addition, researchers attended 2014 conference presentations where leaders from a number of automotive groups shared their strategies, approaches, and enabling technology.