Launch Readiness:

Driving quality throughout the manufacturing supply chain

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The manufacturing industry is the backbone of the North American economy and continues to experience transformation as the region rebounds. Enhanced technologies with new innovations that improve processes are continually being introduced to the plant floor, driving improved efficiencies and future cost reductions. However, manufacturers continue to face the challenges of increasing costs in addition to retaining technical expertise for operational stability while delivering flexible manufacturing. In a changing landscape, even manufacturers with established quality programs and processes must take a fresh look at their resources and practices to ensure they can meet the demands under current conditions. This is especially important in an environment where quality issues already exist and fast resolution is needed.

Manufacturing landscape – unprecedented program launches

Looking closely at the near-term North American transportation industry uncovers a dynamic manufacturing scenario. Light-duty vehicle production reached nearly 20 million vehicles in 2015, and is now expected to plateau for the next five years. However, between 2017 and 2019 the industry will experience an unprecedented level of vehicle launches; approximately

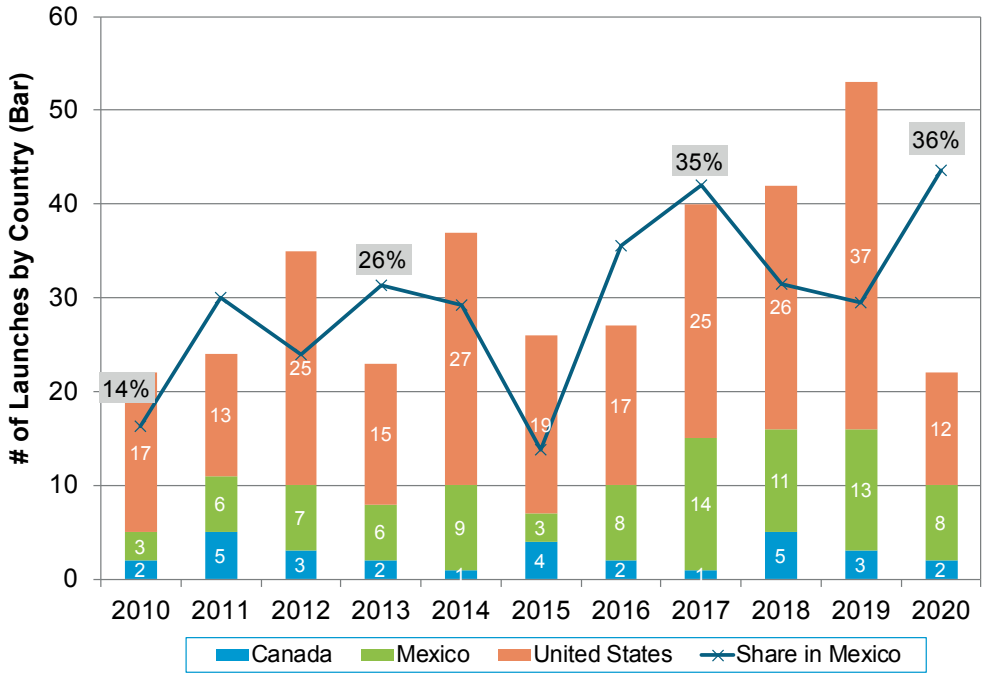


Figure 1: NAFTA program launches by country

Courtesy of IHS

135 program launches of various degrees within the region [Figure 1]. Additionally, the cadence of new vehicle introductions, redesigns and facelifts is condensing, and vehicle design and architecture continue to grow in complexity.

There are a number of factors that are driving this increase in new launch activity, including legislative requirements – such as the new corporate average fuel economy (CAFE) and crashworthiness standards – as well as the introduction of advanced technologies, such as driver assistance and infotainment systems. Legislation and technology, coupled with increased consumer demands, put additional pressures on the supply chain to deliver high-quality and high-functioning vehicles to market.

The commercial vehicle industry is also faced with similar conditions to deliver new products. This market continues to experience growth, with the compound average growth rate (CAGR) of the commercial vehicle industry predicted to be 2.2 percent through 2024 in the United States. Additionally, the industry is experiencing similar demands for new and advanced technologies. Building on the first medium- and heavy duty greenhouse gas (GHG) emission and Phase-1 fuel economy standard, the Phase-2 standard would further reduce fuel consumption and carbon pollution with a target of cutting GHG emissions by one billion metric tons. This continues to drive the introduction of new lightweighting and advanced powertrain technologies in commercial vehicles.

All of these factors add to the challenging manufacturing environment of the entire vehicle development value chain. Future profitability of vehicle manufacturers is heavily reliant on the ability to achieve projected target production numbers and launch cadence without quality issues.

Suppliers must have the right resources, placing a priority on manufacturing efficiencies and quality management to ensure they meet the timelines, gate reviews and, ultimately, ramp-to-launch timings.

Cost of quality

Quality is a highly visible issue within the transportation industry, as the number and scope of recalls have steadily climbed in recent years. In 2014, the North American automotive industry experienced 63 million vehicle recalls [National Highway Traffic Safety Administration (NHTSA)], the highest level on record. The financial impact of these recalls is estimated to be between one and three percent of the total automaker revenues and up to one percent of supplier revenues. The Tier-1 suppliers face further financial repercussions of these quality issues, as they must increase their current production to meet additional service requirements of consumers. Many suppliers are currently operating at peak capacity, and must pay their employees overtime rates to meet these unexpected volume demands.

The less visible cost of quality throughout the supply chain is hidden within the unexpected additional costs due to launch delays, OEM engineering changes or warranty related issues. These risks must be managed by both the automakers and their supply chain to achieve first-time quality while facing an increased number of new vehicle launches – and it is likely that the existing operations, including the internal processes, may require a new approach. Under these conditions, they should consider assessments and the implementation of improved process methods. Additionally, by establishing internal manufacturing process controls throughout the life of the program, suppliers can ensure the trust and confidence of their OEM customers, creating a stronger relationship into the future.

An approach to quality product launch management

Increased product launches and supply chain pressures will likely result in a number of quality issues within the automotive and commercial vehicle markets. Often, automakers and suppliers struggle to manage first-time quality, which begins to erode confidence between the automaker and supplier. There are several strategies that companies can use to help eliminate this costly situation and mitigate risk associated with quality.

Quality strategy	Key consideration
Assessing or re-assessing the supply chain	Vehicle manufacturers and Tier-1 suppliers who want to get ahead of potential quality issues and take a more proactive approach to mitigating quality risks should consider conducting supplier assessments throughout the supply chain. Conduct an audit and validate suppliers who have both the ability to deliver a high-quality product and the appropriate assets to meet production quantities and timing. It should be noted that this assessment process can be implemented with current suppliers to identify issues or gaps that could interfere with a product launch. This provides the opportunity to proactively co-create solutions that will result in a smooth ramp to launch.
Proactively identifying and addressing potential issues	It is possible to identify critical plant-floor activities and milestones that could impact vehicle quality and launch timeliness before they become a problem. By collaborating throughout the supply chain and conducting a gap analysis, companies can work together to address these critical issues and develop proactive strategies to quickly avoid them.
Resolving issues with operational problem resolution	When a company is experiencing a quality issue, too often a hurried and haphazard process is implemented that focuses on the fix rather than the actual root cause of the issue. It may be that there is a lack of resources and a need for independent evaluation to resolve the issue by determining the root cause using a focused approach. A recommended best practice is to assemble a team that includes operational consulting and engineering experience to independently identify all of the potential issues that could be causing the quality problem. An action plan is then created, which includes how to evaluate and prioritize each scenario. Once the root cause has been identified with this action plan, a comprehensive solution can then be quickly implemented with confidence.

Assembling a specialized team

These quality strategies are best achieved by following a proven process with sound methodologies. Many issues can be prevented or resolved by assembling a specialized cross-functional team.

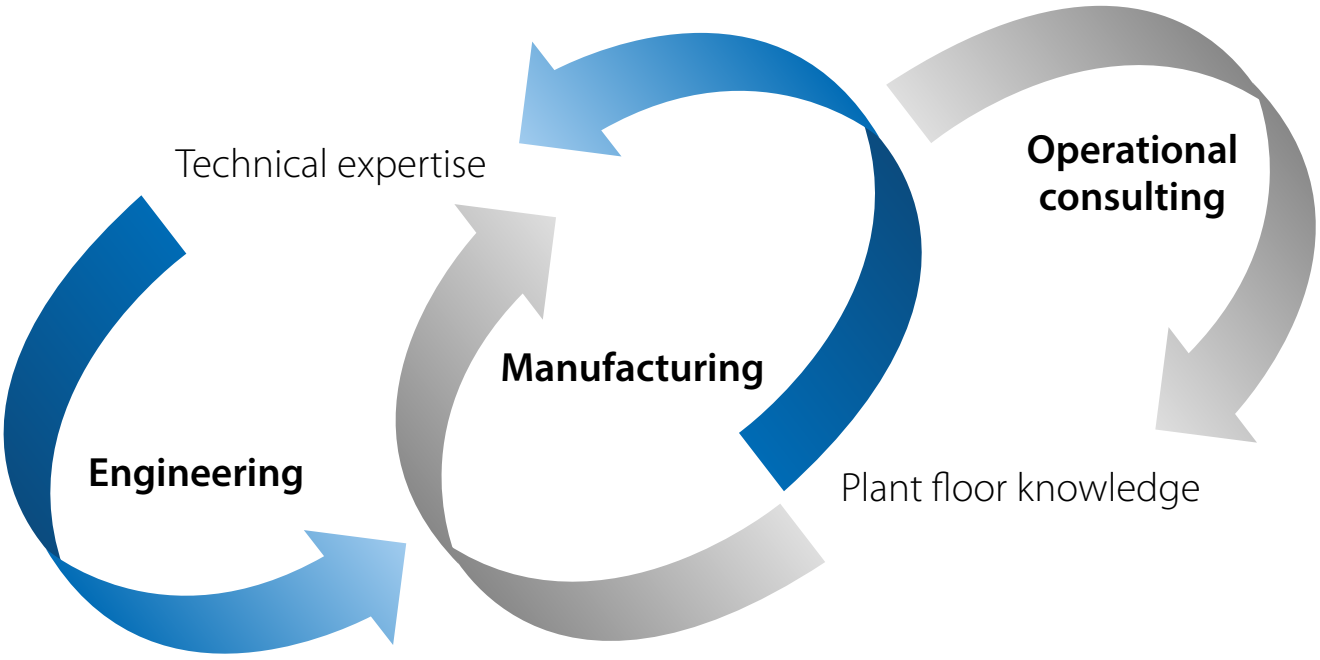


Figure 2: Assembling a cross-functional, experienced team is best practice to proactively prepare for a smooth ramp to launch and address quality issues.

Proven quality resolution methodology

This six-step quality resolution methodology can be quickly implemented by an experienced cross-functional team that includes operational, plant floor, product engineering and technical specialists, independent of the type of issue. When done correctly, this results in a timely solution that is more likely to mitigate future issues.

Step 1: Define the problem
First, debrief with both the vehicle manufacturer and supplier to review the product-part approval process (PPAP), control plans, product drawings, internal processes and plant floor work instructions to quickly identify the gaps that could be causing the quality issue.

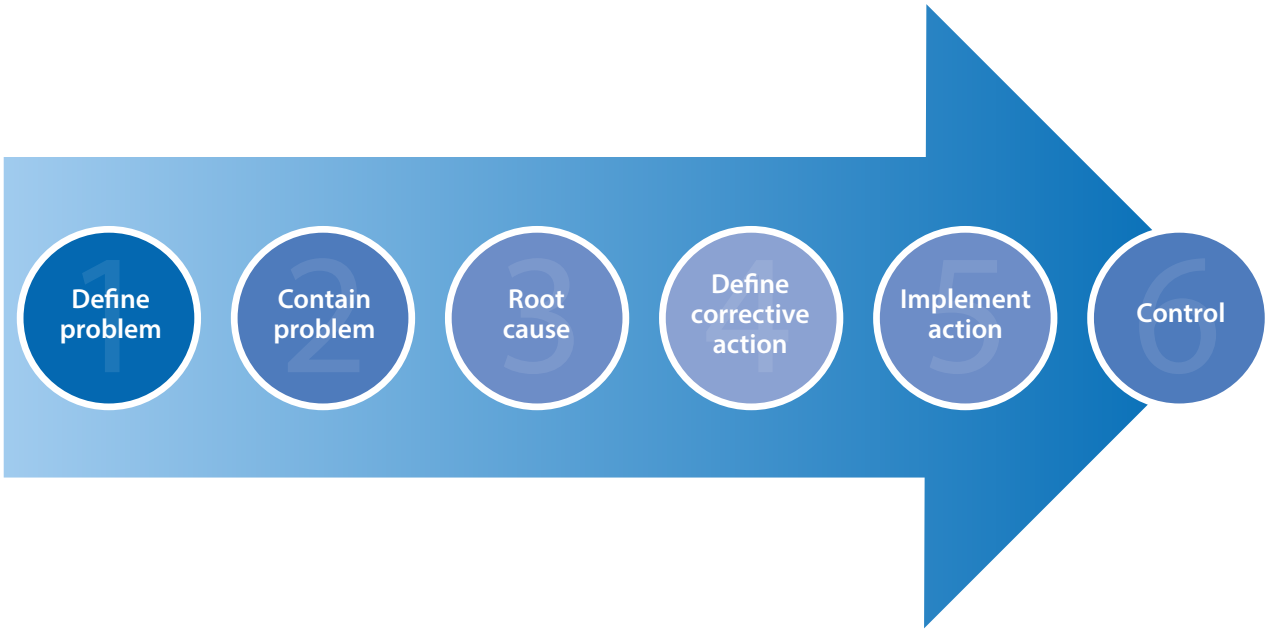
Step 2: Contain the problem
The gaps are then isolated in an action log and reviewed to determine the severity and frequency of impact of each one on the development and manufacturing process.

Step 3: Root-cause analysis
Based on an in-depth analysis, the root cause of the quality concern is identified and communicated within the manufacturing organization.

Step 4: Define corrective action
Once the root cause is communicated, the appropriate countermeasures are developed and prioritized within an action log.

Step 5: Implement action
The resolution team works with the manufacturing site to implement improvement actions to resolve the concern and provide coaching from a technical position.

Step 6: Control the process
Implement continual improvement action plans to monitor the success in achieving first-time quality.



Make quality a win

Product quality continues to be a top priority throughout the transportation industry. As the industry experiences higher levels of production and vehicle introductions, vehicle manufacturers and suppliers must be focused on delivering consistent quality throughout the supply chain. Quality becomes a critical factor to launch readiness, as it is key to ensuring that a program is on time and on budget. To achieve this, companies must take a proactive approach and leverage both internal and external resources to implement quality strategies that mitigate potential quality concerns.

Launch readiness focus

A leading provider of transportation engineering and consulting services, Ricardo offers a unique approach to product launch management. It is able to combine strategic collaboration with technical competencies and manufacturing capabilities to support companies at each stage of the program life cycle.

Strategic collaboration is led by operational experts who have many years of experience working in a plant-floor environment, transitioning from legacy to new technologies and processes. As the potential root causes of product quality issues are identified, engineers with a variety of specializations can be called upon to support troubleshooting and redesign where needed, including powertrain, system, controls, electrical and vehicle engineering. In some cases, niche manufacturing is needed and can be supplied as part of the integrated and holistic solution.

From facilitating the improvement of communication to implementing new processes, Ricardo has used its proven quality processes and methodologies to help multiple companies across the globe save money by preventing or mitigating the significant costs related to supply chain quality.

Why Ricardo?

Ricardo is a global strategic, technical and environmental consultancy. It also is a specialist niche manufacturer of high-performance products. The company employs more than 2,000 professional engineers, consultants and scientists who are committed to delivering outstanding projects focused on class-leading innovation in core product areas of engine, transmission, vehicle, hybrid and electrical systems, environmental forecasting and impact analysis.

Ricardo's services cover a range of market sectors including passenger car, commercial vehicle, rail, defense, motorsport, motorcycle, off-highway, marine, clean energy and power generation and government. Clients include the world's major transportation original equipment manufacturers, supply chain organizations, energy companies, financial institutions and government agencies.

Services include:

Technical consulting, strategic consulting, niche manufacturing, software and environmental consulting.

For more information on Ricardo's strategic consulting solution, e-mail **strategy@ricardo.com.**

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