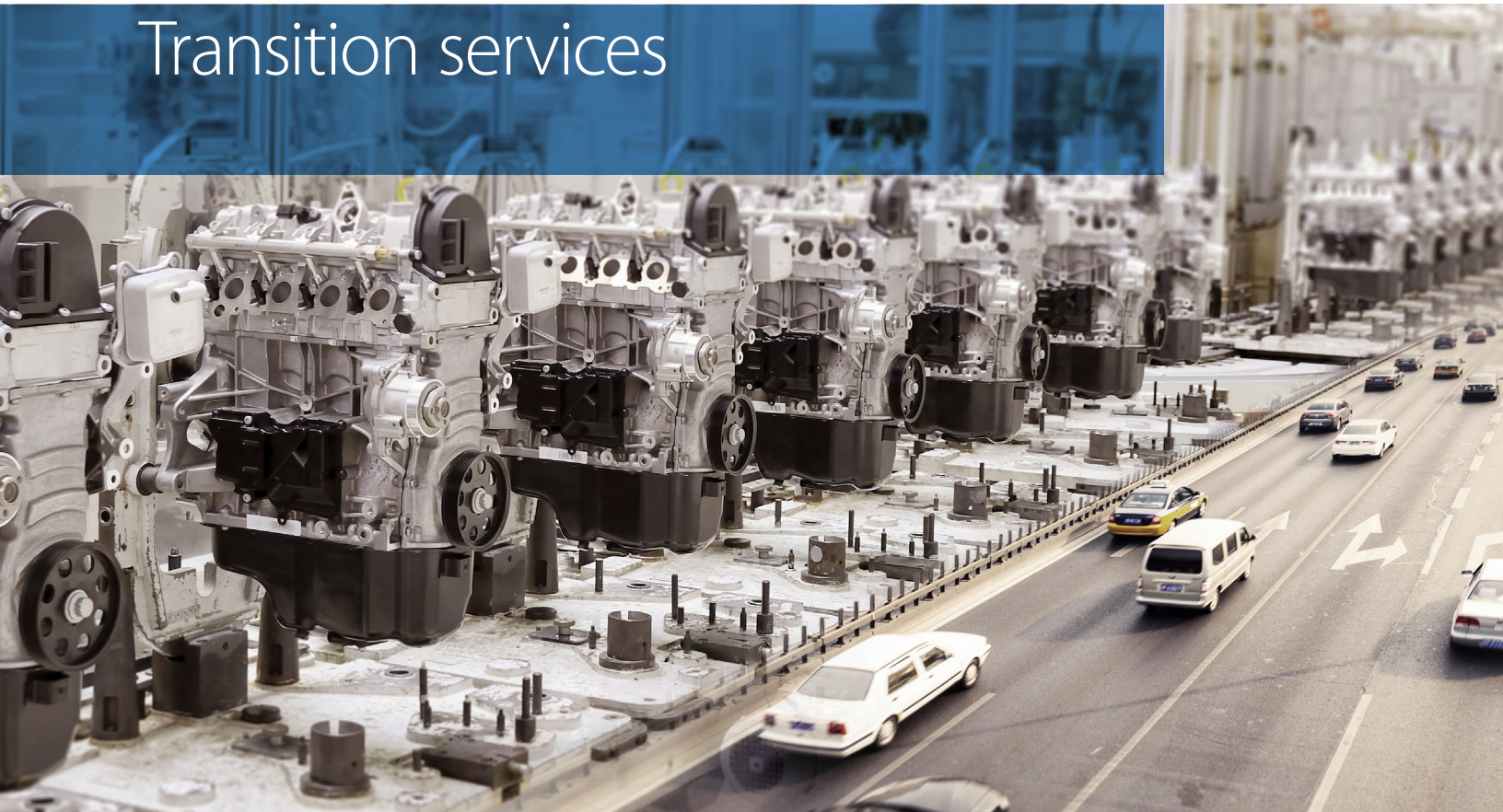


# Production to Aftermarket:

Transition services



# Production to Aftermarket: Transition Services

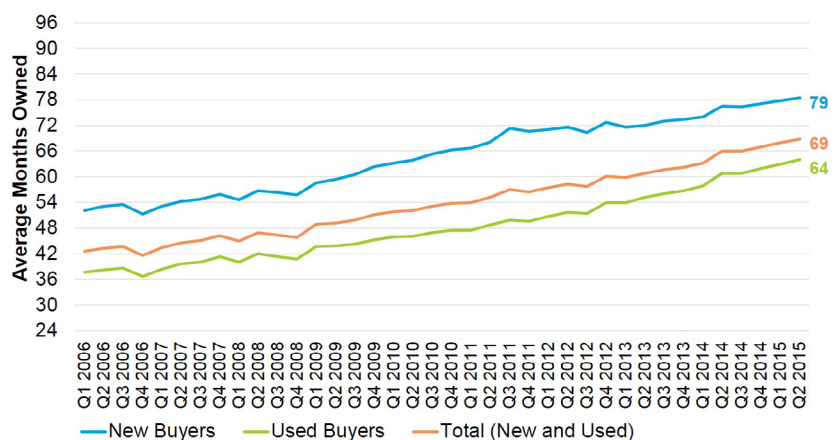
## Risk With Changing Landscape

The U.S. automotive aftermarket is a \$240 billion business that many automakers rely on to strengthen their bottom line. While new car sales continue to deliver slim profit margins, aftermarket sales generate up to one-half of profits for major automakers while accounting for only one-third of total revenue. Superior customer and aftermarket service is critical to maintaining customer satisfaction and brand loyalty, thereby driving new vehicle sales. There are very few experiences that negatively impact customer loyalty more than waiting for powertrain parts while a vehicle is not operational. This makes excellence in aftermarket sales and service an integral piece of the OE value proposition and an attractive growth opportunity.

However, there are currently a number of market forces that may impact the ability of automotive companies to maintain a high level of customer service and maximize aftermarket profitability. The increasing age of light vehicles on the road, recovered sales volumes affecting production capacity, and new technology introductions to meet fuel efficiency targets are likely to negatively impact the automotive industry's ability to satisfy customer demand for high quality replacement components and systems.

## Changes in consumer behaviour

Average length of ownership trend



Source: IHS Automotive  
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## Vehicle Age on the Rise

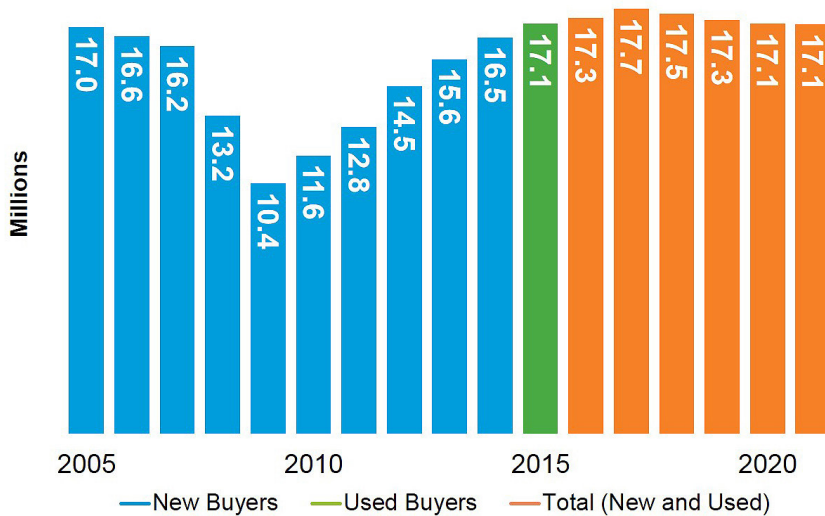
There are more than 257 million vehicles on the road today. In 2014, new vehicle registrations outpaced scrappage by more than 42 percent and analysts do not see this trend reversing any time soon. As a result, the average age of all operational light vehicles in the U.S. has climbed to 11.5 years. Consumers are looking to own their vehicles longer, which will require a longer service life, and therefore a higher level of aftermarket services to maintain the aging vehicle fleet.

## Growing Demand for New Vehicles

Vehicle demand in North America has recovered to pre-recession levels. However, industry capacity has been slow to ramp-up, and may never return to pre-2008 levels. During the past five years, U.S. light vehicle demand has increased by more than 5 million units. Looking forward, most analysts agree that vehicle production will level off at approximately 17.5 million units. In addition, there are 53 new vehicle launches planned for 2019. To support the production for these new models while meeting increased demand, automakers are forced to carefully look at manufacturing strategy and find strategies to free capacity as quickly as possible for production programs.

## US LV Sales

Pent-Up demand declines and affordability impacts towards 2020



IHS Center for Automotive Research Management Briefing Seminars August 2015

### Legislation Impacting Innovation

Corporate Average Fuel Economy (CAFE) standards were first enacted in 1975 by the federal government to reduce oil consumption through fuel economy regulations for vehicles produced for sale in the United States.

In 2012, new CAFE regulations for model year 2017-2025 vehicles were finalized. This introduced the most stringent emission and fuel economy reduction the automotive industry has experienced to date. Frequently referenced by the 54.5 mpg fuel economy target, the legislation requires automakers to achieve specific emission and fuel economy requirements across their vehicle fleets. As a result, vehicle manufacturers in the U.S. have turned to new innovative

technologies, including light weighting, alternative fuels and new innovative powertrains, to improve vehicle fuel economy while reducing emissions and maintaining (or even improving) performance. The rapid implementation of new technologies, combined with continuous improvements to meet challenging legislative targets leads to shorter program lifecycles for powertrain systems.

### The Aftermarket Challenge

Combining an aging vehicle fleet, increased demand for new vehicles, new model launches, and legislation increasing the speed of change within the industry, automakers are facing a pinch point in terms of their ability to supply the aftermarket parts

their customers demand. Coupled with increasingly extended warranty offerings, these variables are leaving OEs with significant challenges in predicting the required service parts to support Powertrain programs over the full service life. The supply and demand dynamic has been altered from historical norms, putting OEs in a precarious position in supporting their aftermarket requirements, often resulting in critical part shortages. As OEs experience a dwindling inventory of legacy components and systems, manufacturing capacity and capability for these items often no longer exist, which impacts the ability to effectively service vehicles.

Although suppliers play a critical role in the automotive industry by engineering and manufacturing many vehicle components and systems, a number of key vehicle assemblies are still developed and produced in-house by the automakers. With limited manufacturing capacity, today's automakers are facing the critical challenge to balance the manufacturing of new products for future vehicles and legacy products for aftermarket and service. As Tier 1's increasingly move into powertrain assembly value-add manufacturing activities, they are beginning to encounter the same constraints.

	Automaker responsibility	Supplier responsibility
Body panels		
Interior components		
Chassis components		
Engine 3 Cs		
Other engine parts		
Transmission case, gear machining		
Other transmission components		
Axles		

Vehicle manufacturers are forced to balance legacy programs with new programs at an increasing rate. Priority of new program launches often causes OEs to model expected service demand, run all (or some derivative) of these requirements, and make the decision to retool or remove manufacturing lines of legacy products to meet demand for new products. This decision seems logical to meet growing consumer demand for new vehicles as well as legislative requirements. However, with production of legacy products no longer an option, it leaves the automakers' aftermarket group vulnerable to part shortages and/or inventory carrying costs associated with demand modeling errors.

As a result, vehicle manufacturers are facing an increasingly complex demand modeling exercise to estimate future inventory needs for service life. The traditional production to service

strategy of running a final service run within the manufacturing facility and scrapping tooling may no longer be the appropriate way to handle aftermarket requirements. The success or failure of this strategy depends largely on the accuracy of demand estimation which is significantly impacted by difficult to predict variables. The result of these forecasting errors are non-trivial re-launch investments to remedy critical part shortages. Automakers are forced to redesign, resource, retool and revalidate components for low-volume service. To accomplish this, automakers face a number of challenges:

- Redesign – Components will often need to be redesigned from the original high-volume manufacturing process to meet the design requirements of a new low-volume manufacturing process.

- Complexity – A product is made up of many different components and variations based on the packaging for various vehicle configurations. This complexity drives a unique approach to engineering, sourcing and validation for limited run components.
- Sourcing – As the demand for new vehicles continues to be strong, suppliers are operating at capacity developing original equipment parts. As a result, most suppliers do not have the interest or capability to manufacture aftermarket components in low volumes. Increasingly, OE's are making the decision to retool or remove manufacturing lines of legacy products and relaunch these programs with new suppliers, whom are uniquely qualified to produce lower volume runs.

### Challenges and Considerations for Production to Aftermarket Transition Services

Understanding the challenges related to end-of-life manufacturing can assist automakers in better preparing for and handling the challenges around aftermarket service of components and assemblies for the aging vehicle fleet. Following are best practices that should be considered.

End-of-Life Challenge	Production to Aftermarket Consideration
Scoping the size of the issue	Gather and analyze relevant information, including component inventory, component failure rate, existing supply chain and timing of "demand humps" for vehicle service.
Component redesign	Allocate significant resources to validate or redesign replacement components to ensure legacy designs are the best option for low-volume production.
Cross-functional team	Create a cross-functional team, including purchasing, engineering, design, quality and finance to develop and lead the process to design, source and manufacture the replacement part
Complex problem solving	Identify best practices and manage the complexities and demand of designing and producing replacement components.
Inadequate stock of replacement components	Map the value stream of servicing assemblies including internal and external remanufacturing resources; identify hidden stakeholders; and identify responsibilities for service supply elements to determine when inventory or each component will be depleted.
Resourcing required	In addition to using traditional component suppliers, identify new vendors – prototype manufacturers, machining specialists and tooling houses dedicated to low- or mid-range volumes.

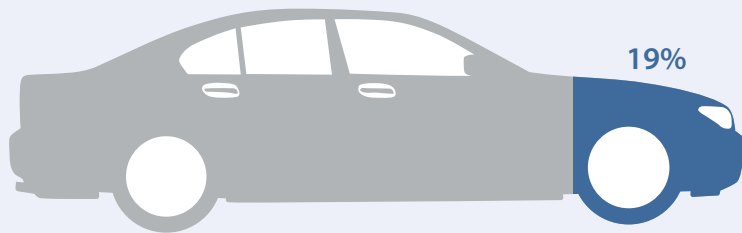
## Case Study

### Putting Best Practices in Place with Automotive Transmissions

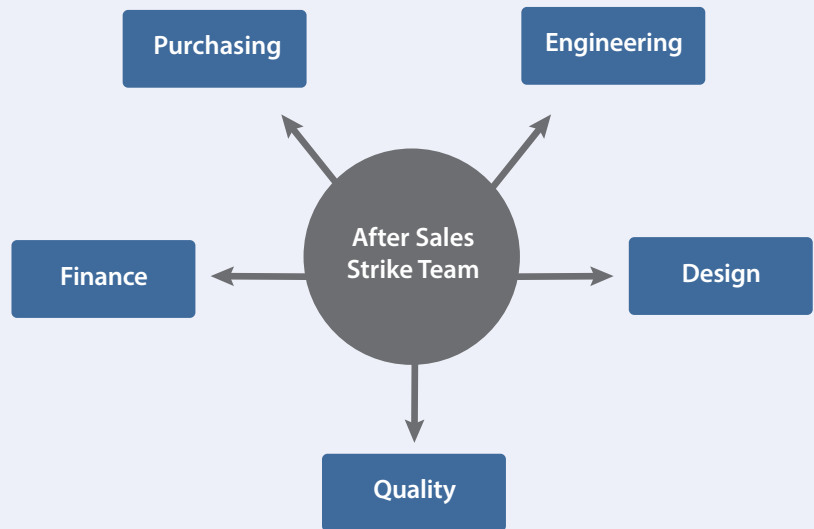
As one of the few components largely manufactured by automakers, transmissions are a fitting example of the growing challenge. The industry is experiencing significant transition in transmission technology to meet the impending CAFE legislation. During the past 10 years, four- and five-speed transmission penetration has dropped from 93 percent in light trucks and cars to less than 10 percent. In comparison, eight and nine-speed transmissions are on the rise.

As a result of this transition, automakers have been forced to remove or retool the legacy manufacturing lines to make space for the new, in-demand, transmission technologies.

Today approximately 50 million vehicles on the road feature four- and five-speed transmissions and the average life of a transmission is 8-10 years. This results in substantial demand of replacement transmission components for the next five years.



**19% of vehicles on the road today have a 4- or 5-speed transmission**



In one case, faced with these market pressures, a major OEM found it did not have the transmission parts inventory to meet the current and future service demand. The OEM made it a priority to develop a solution and prevent the risk of declining aftermarket business or worse, of alienating brand loyal customers.

To mitigate the problem and ensure the automaker could continue to service vehicles with 4- and 5-speed transmissions that are no longer in

production, Ricardo established an aftermarket strike team of subject matter experts to audit the situation, identify a solution, design the components, source the materials and launched the product. This unique team approach allowed Ricardo to improve cost reduction opportunity identification, identify and prevent risks early in the project and accelerate problem resolution.

Throughout the project there were numerous challenges the Ricardo team faced while developing a solution that was both technically sound and affordable.

- Lack of required information – In many cases the requirements to replicate complex parts were missing key pieces of information due to rapid plant closure and poor data

retention processes. To overcome this obstacle, Ricardo worked with suppliers, key OEM contacts, legacy part samples and subject matter experts to assemble and verify part requirements for new suppliers to produce service parts for on-time delivery.

- Obsolete processes – For many of the parts and systems assessed, the legacy processes were either no longer widely used in the supply base, unsuitable for low-volume production, or required significant investment to replace scrapped legacy tools. The Ricardo team worked collaboratively with key stakeholders at the OEM to identify and propose alternative processes for review and approval. For example, in the case of valve body covers where the legacy dies were scrapped when the legacy supplier went bankrupt, a new casting methodology was proposed and approved that reduced the tooling cost by hundreds of thousands of dollars.

Additionally, the unique cross-functional Ricardo team leveraged several best practices to mitigate cost and develop high quality replacement transmissions, including a commodity-based sourcing strategy. In order to maximize buying power on low volume, highly complex components, Ricardo looked to combine similar components into a single request for quote (RFQ) creating total volumes that appeal to more suppliers. The team used its

sourcing experience and selection matrix to assess each RFQ by the total package cost, supplier quality/track record, technical viability and lead-time. This methodology allowed the ability to identify and recommend low cost, capable suppliers.

Throughout the project, the Ricardo team remained aligned with the OEM through continuous communication and was able to assist in creating a solution for developing replacement transmissions for the automakers aftermarket activities.

### Conclusion - Avoiding the Aftermarket Crunch

The boundary conditions used to estimate aftermarket inventory are rapidly changing, due to constrained production capacity, increased vehicle sales, increased vehicle life, and a high volume of new product and technology launches. Vehicle manufacturers face a strong challenge to ensure profitability and consumer satisfaction.

To ensure automakers are prepared in terms of aftermarket inventories, it is critical that they audit their current state, implement a traceability program and leverage low-volume product development best practices. An automaker's continued aftermarket profits hinge on the ability to identify the inventory shortage and create a solution before it becomes a costly issue.

### 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, Performance Products, Environmental Consulting, Ricardo Strategic Consulting, Ricardo Software and Ricardo Knowledge.

For more information on Ricardo's strategic consulting solution e-mail [strategy@ricardo.com](mailto:strategy@ricardo.com).



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