LILLEY ASSOCIATES, INC.
CONSULTING

2017 Calendar Model Year

NAFTA Light Vehicle

Road Wheel and Spare Wheel Study

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11th Edition

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2017 Calendar Model Year

Introduction

This is the tenth edition of Lilley Associates, Inc.'s (LAI) NAFTA Light Vehicle Road Wheel Study. The study includes steel, aluminum and now carbon fiber wheels. Information is presented in three groups. The first data set presents each vehicle OEM and their combined aluminum and steel wheel usage. The second data set shows each supplier's market penetration, listed by the OEM's. The third data set shows the rim diameter distribution for all of the wheels in the group. Then the same data cuts are presented for aluminum wheels as a separate segment, and steel wheels as a separate segment.

For this 2015 Study, LAI continues with spare wheel information. It is presented in the same format as the road wheels. With the advent of run-flat tires, tire inflation kits, and more aluminum spares, the spare wheel segment has gained more importance in the market.

This information has been assembled from various industry sources and interviews with OEM and supplier companies. Every effort has been made to verify wheel sourcing, volumes and application rates. Variances will occur as production volumes fluctuate, wheel suppliers have production setbacks, wheel programs are re-sourced or sourcing information is not forthcoming or available.

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I would like to extend a special mention and thanks to **LMC** Automotive in Troy, Michigan for allowing LAI to use their vehicle forecast data in this study. It is most appreciated.

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Please Note

Comparisons made in this study refer to previous wheel studies conducted by Lilley Associates, Inc. unless otherwise noted.

Terms Of Use

Important data disclaimer for the 2017 study

In the past, any wheel business that could not be confirmed was deemed as "Unknown". However, since this is the eleventh study that LAI has completed, LAI feels confident in the following format:

- Business that LAI feels confident belongs to a certain supplier but has not been confirmed has a "–e" behind the suppliers name (i.e. Superior-e). This business is totaled separately from that of the confirmed data, so there are two data lines in the summaries for some companies and the reader will see this "–e" behind some supplier names in the database.

If the analyst is not comfortable with this assumption, just count the "–e" volume as Unknown (UNKN).

Information & Data Transfer

This Study is provided for the sole internal use of the purchasing company and is not to be distributed outside of the purchasing company in any part or format and/or by any means. If the purchasing company is a consulting company, the Study is sold on the basis that the purchasing consulting company will use it to support one client. Use by additional clients will require the purchase of an additional copy for each client.

Please contact Lilley Associates, Inc. if you have any questions regarding the use of this Study.

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About LMC Automotive

Known and respected worldwide for the quality of its global forecasting services and its highly responsive customer support, LMC Automotive is the premier supplier of automotive forecasts to an extensive client base of over four hundred car and truck makers, component manufacturers and suppliers, and financial and government institutions around the world.

LMC Automotive is part of the LMC group. LMC is the global leader in economic and business consultancy for the agribusiness sector. Founded in 1980, it is privately owned and headquartered in the UK, with further offices throughout the world. It provides market intelligence, analysis and advice to clients who include most of the major organisations around the world involved with agricultural commodities, foods, industrial materials, biofuels and their end-markets. Through its work on rubber and tyres, the company made an organic move into the automotive industry, setting up a dedicated automotive division and launching its first service in 1992. In 2001, LMC Automotive Forecasting Ltd was created and in 2004, it was purchased by its long-standing alliance partner, J. D. Power & Associates. Today, it is back home in the LMC group.

The size and variety of LMC Automotive's client base bears testimony to the quality of its services, its dedication to continuous product improvement and its unsurpassed client support.

LMC Automotive products include:

The Global Car & Truck Forecast. This entry-level service provides coverage of cars and trucks in one single publication together with sales and production forecasts going out seven years into the future, with indicative forecasts for ten and fifteen years. However, the core of the service is the associated database providing sales and production of Light Vehicles, the former by marque and the latter by model. The service includes introduction and run-out dates for all models.

The Automotive Production Forecasts. LMC Automotive's premium production forecasting services covering Europe, North America, South America and the Asia Pacific region and combined, making up the Global Automotive Production Forecast. Published both monthly and quarterly, forecasts are provided by manufacturer, make, model and model generation, platform and assembly plant, in monthly, quarterly and annual time slices. These forecasts are supplemented by concise monthly regional commentaries as well as detailed quarterly reports. The forecasts can be split further by bodystyle and number of doors.

The Automotive Sales Forecasts. Regional sales forecasts covering Europe, North America, South America and the Asia Pacific region which together make up the Global Automotive Sales Forecast. Building on macro-economic forecasts generated by our partner, the renowned Oxford Economics, as well as an examination of demographics, fiscal and regulatory influences, these services present seven-year forecasts at a global, regional, country, OEM, brand and model level for Light Vehicle demand. They also present an in-depth analysis of each OEM, reviewing its strategies, its current share of the market, overall and segment-by segment, and offering a roadmap for new model launches.

The Engine & Transmission Forecasts. These provide data and seven-year forecasts of powertrain use. For each model, forecasts are generated of the volumes of each engine and transmission combination that will be fitted, as well as the total demand for each engine and transmission. The services cover Europe, North America, South America and the Asia Pacific region, but can also be provided globally.

The Hybrid & Electric Vehicle Forecasts. LMC Automotive offers two services in this area, the Global Hybrid & Electric Vehicle Forecast and the US Hybrid & Electric Vehicle Forecast. The former, published twice-yearly, provides a model level forecast of demand for electrified passenger cars and light trucks in the world's most important vehicle markets with a time horizon of ten years (annually for seven years). These forecasts are provided by country, by manufacturer and by technology type, from mild hybrids through battery electric vehicles to fuel cell electric vehicles. The US service is broadly similar, but is published quarterly and benefits from hybrid and electric vehicle buyer demographic details and information related to consumer perceptions of hybrid and electric vehicle technology obtained from research

conducted by our alliance partner, J.D. Power & Associates.

The Emerging Market Reports. There are three automotive services specifically addressing the rapidly developing economies in Asia. They include the Market Trends Reports, published monthly and covering China, India and ASEAN, which monitor the latest developments in these areas; the Automotive Market Forecasts, published monthly and covering China and India and offering seven-year forecasts of sales, by segment, brand, group and fuel type and production by plant and model; and the China Luxury Vehicle Report, published quarterly which looks exclusively at the luxury end of the market and how this sector will grow over coming years.

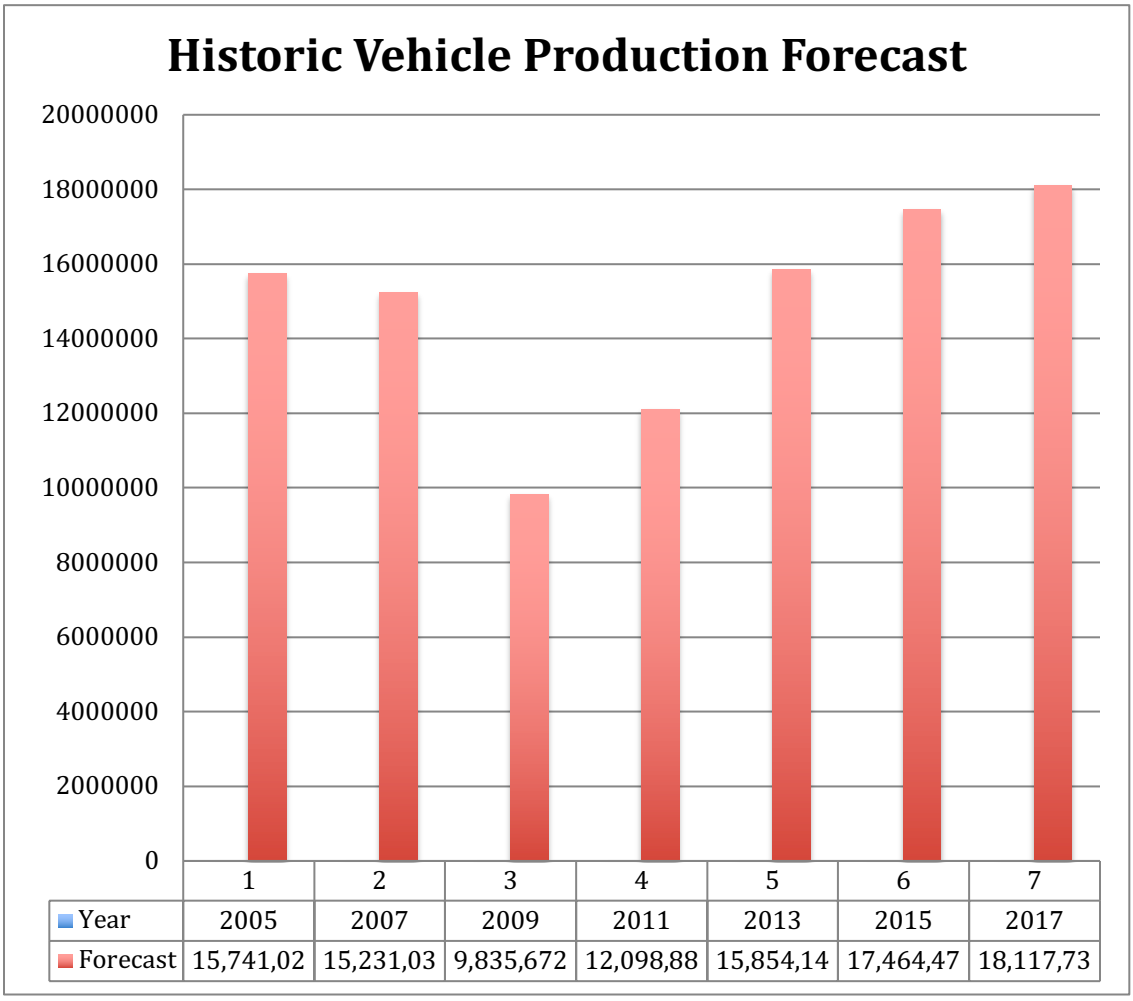
The Global Commercial Vehicle Forecast. This service, produced in association with ACT Research, provides the most comprehensive view of the current state of the medium (6-15t GVW) and heavy (15t+GVW) commercial vehicle sectors of the automotive industry together with detailed seven-year forecasts of sales and production provided in quarterly and annual timeslices.

In addition to the above services, LMC Automotive publishes multi-client studies, which offer comprehensive and systematic analysis of topical automotive industry subjects, as well as undertaking single-client consultancy based upon its forecasting activities, or, through its alliances with J.D. Power & Associates, Oxford Economics, Knibb Gormezano and Partners, on other client-generated subjects.

Study Results

The light vehicle aluminum wheel has only been available for the past 34 years or so. When ELM International first did an aluminum wheel study in 1992, the aluminum wheel share of the light vehicle market in North America was under 20%. Steel wheel share has declined almost every year since then except during the market collapse in 2008-9. With the market recovery and vehicle sales on the rise, aluminum and carbon fiber road wheel penetration for 2017 is 81.7%, leaving steel at 18.3%.

The light vehicle production forecast for 2017 is 18,117,737 for the NAFTA region from LMC (December '16 data). This is a dramatic increase from the vehicle production forecast of 9,835,672 units in the 2009 Study.



	1	2	3	4	5	6	7
Year	2005	2007	2009	2011	2013	2015	2017
Forecast	15,741,02	15,231,03	9,835,672	12,098,88	15,854,14	17,464,47	18,117,73

And the share of cars versus trucks got a little wider in 2017, with truck wheel usage at 63.22% of production against 36.78% for cars.

With the current exchange rates and more global manufacturers building vehicles where they sell them, many assembly plants are expanding. The southern US and Mexico are benefitting the most from new plant construction. This could change with the new U.S. president's administration stance on imports from Mexico

Aluminum Capacity In The NAFTA Region

LAI worked on a project for an aluminum wheel supplier in late 2012. One aspect of the study was shuttered aluminum casting capacity in the NAFTA region. This study covered a time span from the beginning of the aluminum wheel market (1980) to 2013. The client was looking at all of the plants they could identify. So some of the plants were very old that were closed but many were still capable of manufacturing quality wheels with competitive prices and volumes.

For the time mentioned, 21 plants had been closed and dismantled. Since 2004, the majority of those factories (16) have closed. This time frame coincides with the arrival of the Chinese wheel manufacturers in the North American market. In talking to a number of industry veterans, the average plant capacity was about %% million, so the US, Canada and Mexico have shuttered XXX million wheels of capacity in total. XXX million of those units have been in the last 9 years.

When the Chinese wheel manufacturers started to sell in North America, they had their teething problems with regard to how business and quality were addressed in the market. As they fixed these issues, their business grew rapidly, as they were offering very competitive pricing to gain share and experience. Now with the surging Chinese market, and the demand for aluminum wheels, many of the Chinese suppliers are keeping capacity for the home market verses jumping through the hoops of dealing with the parameters of selling in the North American market.

The take rate for aluminum wheels (car & truck) was 60.5% in the 2003 NAFTA Wheel Study. It has steadily risen to 81.7% in 2017. Let's call it a 21% increase in market share in 12 years. The NAFTA market uses 59.2 million aluminum wheels today. Many of the wheel suppliers in North America are running at capacity, and OEM's are asking for more. Steel usage is 13.2 million wheels with an 18.3% share.

North American Wheel Plant Capacities - Annual

Table deleted

Rim Size Migration

Wheel Rim diameter growth has slowed and now looks to be fairly stable. In the heyday of the truck market and the upsizing of rim diameters for cars, the entire wheel market went through a transformation. The majority of the size growth happened with aluminum wheels, as the steel wheel market is generally size limited to 18-inches due to steel's weight.

As an example, for all materials, in the 2005 Study, the total of all wheels at 20 inches and up was 666,654 out of 63,558,900 total wheel units. That equates to a 1% share. The size migration picked up some pace by 2011. 20-inch and up rims represented a 9.1% share with 4,447,676 wheels out of a total population of 49,109,618. Now in 2017, the share of 20 inch plus wheels is 16.2% with 11,704,531 out of a total population of 72,409,948 wheel units. These wheels are all aluminum except for about 25,000 22-inch steel wheels used as shipping wheels by GM.

Supplier Market Share

Comparisons in this section are made against the **total market**, as some companies make both steel and aluminum wheels.

1. Superior is back in first place this year. They have a 15.7% share of the entire market and a 19.2% share of the aluminum market.
2. Maxion Wheels eased into second place overall as they make both steel and aluminum wheels. Maxion now has a 12.6% of the overall market, with a 2.4% share of the aluminum market (including –e) but a commanding 59.7%

Supplier Company Overviews

Accuride - (www.accuridecorp.com) – Accuride has stayed with its strength of 1-ton steel light truck wheels. Their only light vehicle customer is GM.

Alcoa - (www.alcoa.com) – Alcoa has withdrawn from the light vehicle market.

Asahi-Tech – (http://www.asahitec.co.jp/english)
Works with Japanese vehicle manufacturers in Asia. The company received its first contract in North America with Honda on the redesigned Honda CR-V in 2016. The program was for 3 wheels and over one million units per year.

China plants have 5 lines with 5 million units aluminum capacity and Thailand with 1.5-million unit capacity. The company has both center & dual gate casting capacity. They promote their dual gate process for quicker aluminum cooling for stronger and lighter castings.

Wheel Finish & Design

What a difference two years makes. Since the 2015 NAFTA Light Vehicle Wheel Study was published, the amount of new and enhanced wheel finishes has just exploded. Not only finishes, but really enhanced and complex wheel designs, too. This all did start in the 2013 Study, to a certain degree. But now these finishes and designs are everywhere. The database coding has been upgraded in an effort to capture these new features. Some may not agree with everything that has been done, but a stake in the ground had to be pounded in somewhere.

Regular gloss paint is almost passé. There are now low-gloss, mid-gloss and even super high-gloss finishes available for the entire visible wheel surface. And of course, vehicle manufacturers want these new finishes in wheel pockets, too. Some of these finishes are similar to regular paints that have been used for years. Others take a lot of care to apply and have higher scrap rates, hence higher costs.