

Regions/ Countries	2012	2013	2014	2015	2016
Hong-Kong	53,909	57,549	62,200	58,800	46,200
Bangladesh	43,400	42,500	51,900	54,800	44,400
Syria	44,000	43,100	39,700	39,700	39,700
Lebanon	37,500	37,500	40,300	40,700	37,800
Palestine	36,600	35,800	35,800	35,800	35,800
Sri Lanka	9,500	12,000	15,500	17,000	34,900
Iraq	120,000	117,500	87,700	49,200	24,800
Jordan	23,000	29,000	23,800	22,800	20,500
Brunei	20,000	19,600	24,000	17,000	16,200
Laos	7,000	9,000	14,700	14,600	10,900
Nepal	5,600	5,500	8,300	5,900	9,300
New Caledonia	11,987	10,888	10,910	9,974	9,279
Cambodia	3,400	3,400	4,100	6,100	6,300
Tukmenistan	4,700	4,700	4,800	4,800	5,000
Azerbaijan	15,000	22,700	25,200	10,500	4,200
Tahiti	4,000	3,500	3,900	3,400	3,800
Yemen	4,100	4,000	4,600	5,600	3,600
Myanmar	3,100	3,000	1,800	1,800	2,300
Tadjikistan	6,300	6,290	6,400	6,400	2,300
Kirghizistan	4,800	4,800	4,800	4,800	2,000
Mongolia	2,290	2,200	1,600	1,000	1,700
AFRICA	1,569,463	1,653,587	1,717,921	1,549,556	1,314,463
South Africa	623,921	650,745	644,504	617,749	547,406
Egypt	286,300	283,000	349,100	332,100	264,100
Morocco	130,306	120,755	122,060	131,910	163,110
Algeria	255,167	304,854	292,100	215,400	96,600
Tunisia	49,000	47,000	50,900	48,500	50,800
Libya	29,000	45,000	45,000	54,100	46,400
Reunion	24,949	24,233	25,757	27,697	29,547
Nigeria	50,000	52,000	53,900	20,000	23,000
Mauritius	9,500	10,200	10,600	10,000	11,000
Kenya	9,500	13,000	13,500	14,100	10,600
Botswana	6,600	6,900	7,400	7,500	8,100
Ghana	14,500	13,600	13,000	4,800	7,400
Angola	28,000	29,000	35,700	18,000	7,300
Senegal	6,000	6,000	6,800	5,800	6,600
Ivory Coast	7,500	6,000	6,400	7,100	6,400
Tanzania	6,000	6,700	5,800	5,200	4,500
Cameroon	3,400	4,400	4,400	4,200	4,200
Uganda	4,500	5,000	4,900	3,100	4,000
Malawi	1,500	1,540	1,700	1,900	3,900
Sudan	3,500	2,500	3,000	3,600	3,400
Zambia	3,500	4,000	4,000	3,400	3,200
Gabon	5,500	5,500	4,900	3,300	3,000
Burkina Faso	800	1,100	900	1,400	2,300
Congo Kinshasa	3,000	2,400	2,400	3,100	2,300
Zimbabwe	4,400	5,000	5,800	2,500	2,200
Madagascar	2,200	2,200	2,600	2,300	1,400
Burundi	510	530	400	400	1,100
Liberia	410	430	400	400	600
All Countries	82,129,138	85,606,136	88,338,098	89,684,608	93,856,388

Trends in the Automotive Industry and How They Affect Fastener Suppliers

by Laurence Claus

Perhaps with the exception of the consumer electronics industry, no other high profile industry seems to embody and embrace change as much as the automotive industry. In fact, new car buyers have come to rely on the fact that the new model year will bring exciting new changes and innovations. And although it may take several years to launch a specific new model into the market, the automotive OEMS stagger releases in such a way that they are consistently releasing new models and complete model refreshers every year. As such, suppliers to automotive OEMs and their vast Tier network must be always vigilant and striving to keep up-to-date with industry advancements.

This article will explore five trends in the automotive marketplace. With respect to fastener suppliers several of these trends could have a significant direct impact on the types and quantities of both traditional and innovative new fastener designs, while others may only have a slight or little impact on fastener sales. In either case, however, companies either well established or wishing to break into the largest single fastener market worldwide should pay close attention because these trends are harbingers for what might be coming in the future.

Trend 1: Lightweighting

The single most significant trend in the world automobile industry is lightweighting. Regardless of the region, enhanced pressure to reduce weight to gain gas efficiency, reduce emissions, and to increase performance is universal. In fact, the two largest automobile markets, North America and Europe have increasingly seen more and more governmental regulation and restrictions. Take for example the United States' Corporate Average Fuel Economy (CAFÉ) requirements. They continue to increase each year and have a very significant milestone to hit by 2025. In that year, new CAFÉ requirements of almost 55 miles per gallon will go into effect, almost double the requirement when enacted in 2009 by the Obama Administration.

Efforts in lightweighting address all aspects of the vehicle and are leading to some interesting challenges for designers and suppliers alike. Methods that are commonly being employed include downsizing, replacement, or introduction of existing components with lightweight materials.

Downsizing involves the idea of taking weight out by reducing size or simplifying a component by eliminating parts. Many examples of downsizing exist. These examples illustrate both the need for increased numbers of new innovative fasteners, and the reduction of many traditional fasteners or joining techniques. Several examples of downsizing that impact fasteners are:

- Reducing the nominal size of a traditional fastener while increasing its strength- so, for example, a designer might reduce a M8 Property Class 8.8 fastener to a M6 Property Class 10.9 fastener.
- Reducing size or length through fastener performance- many new innovative fasteners are designed for optimal performance in specific materials allowing the utilization of either smaller diameters or shorter length fasteners, when compared with traditional fasteners.
- New materials, such as high strength and ultra-high strength steel allow significant reductions in sheet thickness. This impacts the fasteners because these new high strength materials are often not conducive to traditional fastening methods. Therefore, purveyors of new fastening technologies that provide fastening solutions for these ultra-high strength steels clearly have a future competitive edge.

The other, and perhaps more lucrative, direction that OEMs are taking to lightweighting is to incorporate new, lightweight materials or blended, hybrid uses of materials. This philosophy is being used throughout the vehicle where both the car's structure and components are consistently being redesigned to incorporate lower weight components. Several examples of lightweight material usage include:

- The best example of using lightweight materials is probably with today's design of body structures, often referred to as "body-in-white". In former days everything was made of steel and predominantly spot welded together. The emerging designs are hybrid structures using a combination of different materials; mild steel, high strength steel, aluminum, magnesium, and carbon fiber reinforced composites. Although these hybrid structures are lighter in weight and, often, provide enhanced strength or stiffness, the mixed material usage creates a significant design issue as joining these materials can be a challenge. Therefore, purveyors of new technology aimed at addressing this type of joining will have a future advantage in fastener sales for these purposes.



Additionally, this trend in mixed material body structures has led to a significant increase in the use of adhesives. Although it varies from vehicle to vehicle, what formerly was a small, very niche market, has exploded to one that is significant and continues to grow. This increase in adhesive usage will likely have the effect of ultimately reducing the need for mechanical fasteners. There is, however, solace for suppliers of mechanical fasteners, in that areas where structural strength and integrity are necessary, require joining strengths greater than most adhesives can supply alone and so are designed to be used with mechanical joining means.

- As lightweight materials evolve and are better understood, they are increasingly replacing components made of heavier materials. Although this is occurring with many different components, it is becoming more common with fasteners. More and more fasteners are being converted to aluminum, even when relatively high strength is required.



Trend 2: Powertrain

Again, in an effort to reduce weight and optimize fuel economy, significant development has gone into powertrain innovations. Several of the more recent trends include:

- Smaller displacement engines with greater output. Naturally, the smaller or more compact the engine the lighter weight it will be. The loss of displacement, however, is being replaced with auxiliary sources of power such as turbo and superchargers. The opportunity this provides fastener sources is the need for more complex, specialty engineered parts and parts made from exotic materials that can maintain performance when exposed to high heat levels.
- Transmissions with ever increasing numbers of gears. When I first started driving, the standard transmission design was four or maybe five forward gears. In the last ten years it has become commonplace to have six gears and recently almost every car maker is releasing vehicles with eight, nine, or ten forward gears. These many gear



transmissions provide more gear ratio options and thus provide added fuel economy. Although they likely will not have a significant impact on fasteners, the greater number of components and moving parts may open up opportunities for additional fasteners to be utilized in their design.

- Many cars today are equipped with a “start-stop” feature which momentarily shuts the vehicle off when it comes to a complete stop, such as at a stop signal. When it is time to resume travel, the engine automatically starts back up, with no inconvenience or delay to the driver. This feature saves fuel. These systems, however, are complicated and require constant monitoring that the vehicle will be able to restart after shutting down. These systems, being add-ons, require fasteners and are, therefore, a new opportunity for fastener sources.

Trend 3: Safety Systems

In the event of an accident, automobiles are becoming safer to drive and more survivable. For years designers have been improving on and adding airbag technology, so that many vehicles are equipped with multiple airbags that protect the occupants from almost any type or direction of collision. In the same way, safety belt usage is today a mandate in most countries and has also seen marked technological improvements over the years.

Besides these two traditional safety systems, today’s automobiles are including more and more safety technology. In the United States, by 2018 every new vehicle sold will be required to have a rear view camera. This is a coveted safety device, particularly by older drivers, that allows the driver to see what is immediately behind. Automobiles are also now commonly equipped with radars, cameras, computer, and sensor systems that automatically apply braking in the event of an imminent collision, provide blind spot warnings, lane keep protection (prevent wandering out of the lane), stability control, traction control, and anti-skid braking.

As safety systems mature they will not only be a luxury option on premium vehicles but evolve to a standard item on all vehicles. This is what happened with seat belts, air bags, and ABS brakes. As these newer systems are utilized over a broader range of vehicles, it will open the door to fastener suppliers for greater volumes and new innovation.

Trend 4: Electronics

The number of electronic gadgets and systems has been steadily increasing. Although this has opened the door to many new technologies and conveniences that were previously not thought possible, it has raised new challenges. In particular, the traditional twelve volt electric architecture may simply not be sufficient to run everything on a modern day automobile. A number of years ago, there was much talk and activity exerted in transitioning to a 42 volt architecture. To date this has not happened and is unlikely to any time soon. However, the problems that a 42 volt system would have solved have not gone away, and probably have increased to some degree. Therefore, whether there is a rebirth of the push

to a 42 volt system or something new on the horizon, the trend for increased electrical power consumption in automobiles is not abating. New technologies will have to be developed soon related to power storage and energy management, and when they are, it will provide opportunities for all that have been at the forefront and participated in the development, including suppliers of fasteners.

Trend 5: Autonomous Vehicles

Autonomous vehicles have often been in the headlines in the last year. Several large technology companies, including Uber and Google, have been experimenting with this technology. For many traditional and older individuals, the very idea of an autonomous car is right out of science fiction. However, as these technology companies that are experimenting with these vehicles have shown, the technology is there to be successful. Surely it is not perfected and ready for prime time, as witnessed by incidents of autonomous cars being involved in accidents or being “bullied” off the road, but many thousands of successful hours have actually been logged to date.

It is highly unlikely that this technology will catch on or even find any kind of broad utilization in the near future, but it is a trend that is worth watching. Autonomous vehicles would open the doors to several new paradigms and likely change the way society views the automobile. This could have a significant impact on how society views transportation and ultimately on the future of car companies and their suppliers.

Summary

The automotive industry is an exciting place to be at the moment. New technology driven by customer demand and regulatory fiat provide an unprecedented number of opportunities for automotive suppliers of all types including those that make and supply fasteners. Success, however, will rarely just fall in your lap and requires staying tuned into the trends and evolving technology and proactively moving towards it. Those suppliers that are at the forefront of these trends with enabling fastening solutions will find themselves in the lead of the race for future success and health. Therefore, staying abreast of and pursuing new technology and trends in the automotive industry is imperative for the future health of automotive fastener suppliers. ▣

