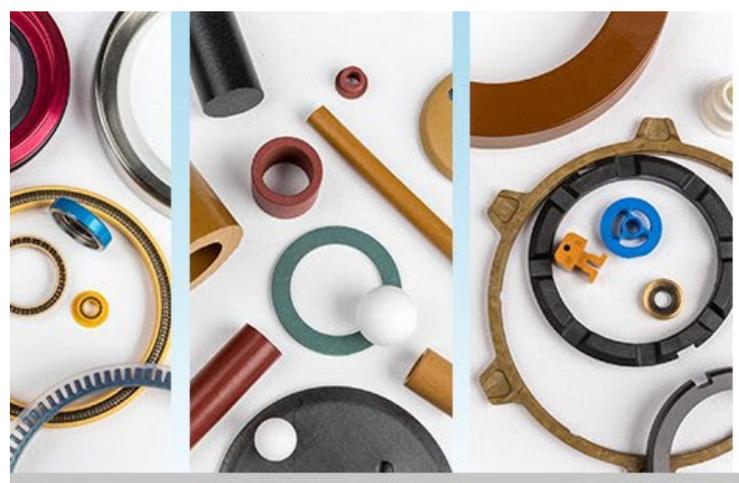
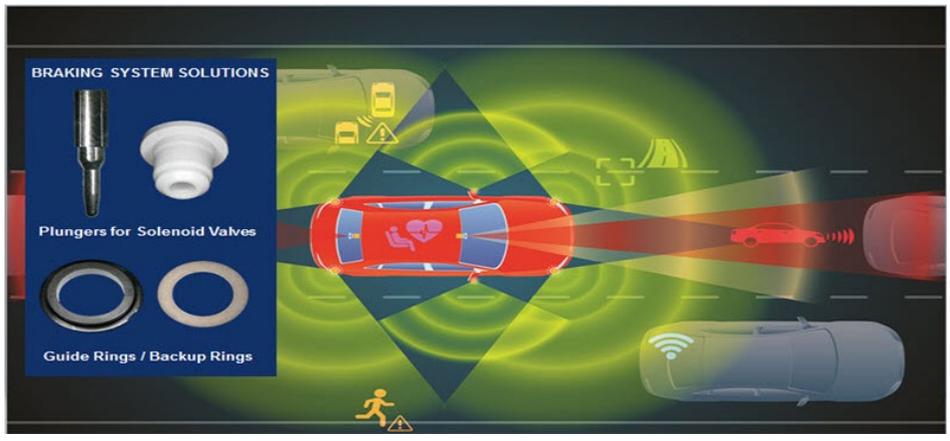


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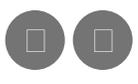
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Step on the Brakes! Stop Here for “Active Safety” Polymer Materials & Processes in Brake System Applications

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Your Source for Designing Critical Parts in Core Systems:

Autonomous driving, fuel efficiency and electric driving – three mega trends that are converging on the automotive industry and are likely to forever change it. The global market for [Autonomous Vehicles](#), for one, is expected to grow from USD 3.6 billion in 2015 to an over 26.2% CAGR to 2027. While electric vehicles may have been only one percent of new car sales in 2017 (2.8 million compared to 1.5 billion oil-fueled cars on the road), they are expected to reach 36 million by 2025 and comprise 30% of vehicles by 2040, says [IHS Markit](#).

No one can exactly predict what the future holds for these and other trends in automotive; however, some things are a given such as the need for reliability and safety in automotive braking solutions. Each day, we rely on braking systems to work properly especially with more severe weather conditions that are occurring throughout the world now where brake lines are more apt to fail. Functionality and active safety features like electronic stability control (ESC), anti-lock braking systems (ABS), and brake assist play a critical role to reduce and avoid collisions. If one part fails, it can result in a complete failure of the entire system. With current global trends moving toward electrification and autonomous driving, advanced technology in automotive braking solutions is becoming even more important. For component suppliers, OEMs, and their consumers, zero failures per million devices (0 ppm) is an absolute must.

A Break-Out Session On International Brakes

Most brakes leverage a hydraulic unit for actuation; the ESC/hydraulic unit operates when the car needs to brake, even when the driver has not pushed the pedal at all (aka active safety). These systems work the same in the U.S., Europe and Asia.

However, what about other modes of transportation such as motorcycles? Typically, these two-wheelers have not been required to include active safety braking systems as standard equipment. Safety though has become increasingly a pressing factor, making ABS an effective technology to ensure stability and reduce accidents. One interesting trend in Asia not seen in many other regions relates to [government requirements](#) for two-wheel vehicles over 125cc to be equipped with ABS/ESC systems, which is being driven by the large numbers of two-wheelers in India and other countries. These downsized ESC systems are smaller than those for a car and, hence, require extremely small parts – another challenge for manufacturers. This is where high-performance plastics such as solenoid

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valves and guide rings/backup rings from Saint-Gobain Seals come to the rescue.

Driving Safety and Value With The Power of Plastics

High-performance plastics such as PEEK or PTFE are increasingly being used over conventional metal options in automotive applications due to being resistant to almost all fluids and withstanding higher operating pressures and temperatures. Adoption of high-performance plastics in the industry is expected to achieve a [6.2% CAGR until 2024](#), when it is projected to reach \$3.05 billion according to Frost & Sullivan.

Following are three major advantages of high-performance plastics over metal that are driving its value in braking systems:

1. Performance – high performance plastics are increasingly replacing conventional metal parts, because they often offer better performance. With a number of small parts often required to move in high frequency and speed in automotive braking systems, the lighter the parts, the more responsive the system.
2. Price – plastic parts are often less expensive than conventional metal. The American Society of Mechanical Engineers estimates that, in general, companies in automotive and other industries, can save [25% to 50%](#) by converting to plastic parts.
3. Processing - while metal parts require multiple steps, plastics can be manufactured in one injection molded process, saving time and, often, money. As a result, OEMs can often consolidate components and get designs to market faster.

Critical Polymer Parts for Critical Braking Applications

Due to the above benefits in using polymer products, automotive manufacturers are seeking businesses that not only provide these solutions but also have the expertise in processing and design engineering with these materials. For many years, Saint-Gobain Seals has been a strategic development partner to automotive leaders in need of high performance plastic components. Their dedicated thermoplastic product line, [Meldin® polymer material](#), focuses on reducing wear, being lighter weight, and a providing a high level of precision in demanding environments such as with braking systems. Their solutions offer less hysteresis (or lag) in helping to

control pressure in the brake system, preventing wheels from locking up and maintaining stability.

Safety features such as ESC systems are equipped with their plungers for solenoid valves and guide rings/backup rings in hydraulic units where the pressure created by the pump is directed by multiple valves. The business also provides spring packages, plugs, pipes, and retainers in master cylinder and brake boosters that help drivers more easily push brake pedals to come to a faster stop as well as sleeves, clips and brake assists that allow drivers to receive greater brake pressure, even if they have not pushed the pedal hard enough. Their [ball joint liners](#) provide both active safety and driving comfort.

Addressing Unique Braking Requirements

One of Saint-Gobain Seals' most unique and successful projects that was recently developed with a customer in the active safety space related to equipping solenoid valves in brake systems with plastic parts and very low leakage requirements. The business provided extremely tiny parts used in the solenoid valves, required to seal the digital braking system. The size made these critical parts difficult to injection mold, and very few companies had the capability and knowledge to properly manufacture them. In addition to a thorough optical examination by camera systems, the parts were 100% tested on automated systems installed at the Saint-Gobain Seals' plant to ensure the sealing function.

What factors should OEMs or Tier 1s or 2s look for in a partner for plastic parts for braking systems? Following are four important considerations:

1. Experience and proven capabilities – with the critical nature of braking systems, suppliers need to understand specific requirements and be able to work with companies to address them.
2. The highest-quality, high-performance polymers – with the need for reliability and aggressive nature of braking fluids, parts need to leverage high-end, high-performance polymers—like PEEK, PAI, PPS.
3. 0 ppm and 100% quality assurance – with zero room for error in critical parts for braking systems, quality is essential.
4. A single source and true partner – flexibility and the ability to handle all aspects of production can help OEMs to get higher quality parts, faster, often at a better price.

Due to their close partnership with key automotive manufacturers, Saint-Gobain Seals has been able to work on emerging challenges and be at the forefront of many trends driving the industry such as electric and autonomous vehicles.

Plug In For The Right Critical Polymer Part

With the popularity of the Tesla Model 3 commanding attention in 2018, 2019 seems to be a year of even more interesting developments in the world of EV. About 10 new plug-in cars will debut this year. Saint-Gobain Seals has been working to help their automotive partners in this market, developing high-tech polymer materials and components to be used in braking systems in addition to sealing solutions for battery cooling. The electrical vehicle market is not new to the business though since they have supplied fitting rings, spring seats, collector pipes, and magnet support for the [brake system in the Renault ZOE](#), which has been ranked as the best-selling all-electric car in Europe in 2015 and 2016. The parts were custom-built using multi-cavity tools and dedicated injection-molding at their plant in Spain and tested in a unit that recreates sensations produced by the car's brake pedals.

Fitting into the Future Of Self-Driving Cars

A key challenge in developing autonomous driving vehicles is making the car "think" for the individual, as the driver should not be actively pressing the accelerator or brake. With parts at Saint-Gobain Seals already being used for active safety and performing autonomously on slippery roads, they are a natural fit for this space. They also address the challenges and rigors of being used more frequently in autonomous cars (with no manual braking on the driver's part) and are currently being used by OEMs in Europe in state-of-the-art systems.

For more than 30 years, Saint-Gobain Seals has been a reliable partner to Tier 1 and Tier 2 companies and OEMs, including ZH, Continental, and Bosch. The business offers a complete range of services from engineering to part design in co-development, tool design, tool construction, injection molding, testing and material compounding. As they use high-quality PEEK, PAI or PPS as the foundation of their Meldin® high-performance thermoplastic product, they can tailor-make compounds with specific fillers to reach OEM mechanical and chemical wear resistance requirements. Every part manufactured for braking systems is automatically sent through a

state-of-the art optical machine that photographically measures important dimensions and ensures exact specifications. Additionally, they use 100% functional, fully-automated testing for digital valve parts in brake systems to ensure 0 ppm leakage failure, and digitally store statistical evaluation of test data.

With the speedy pace of [automotive technology](#), no one knows exactly how far or which direction the industry will move in the future. With Saint-Gobain Seals' proven experience, partnerships with leaders, and commitment to quality and safety, they will definitely be there along for the thrilling ride to guide and solve. [Contact their experts](#) if you need help!

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