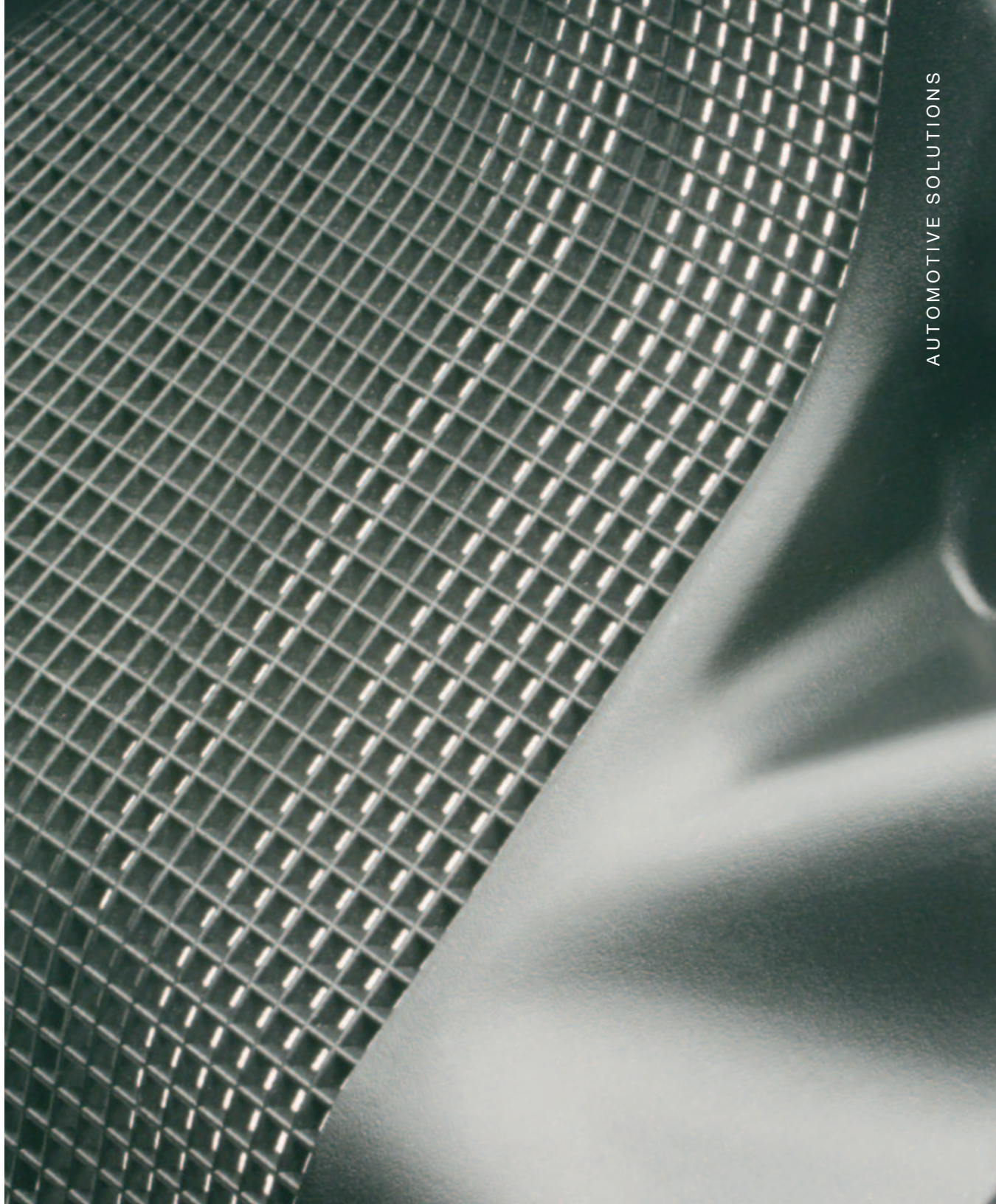




**CASCADE**  
engineering  
*shaping ideas in plastics™*



AUTOMOTIVE SOLUTIONS



# DRIVING IDEAS

With extensive experience providing innovative solutions to complex problems in acoustics, material selection and design through manufacturing, Cascade Engineering has the capabilities to tackle even the toughest challenges. Whether you need an advantage in weight, acoustics, cost, strength, durability, performance or all of the above, our team has the resources to help find the right solution. From initial design and material development to final part delivery, we can handle the entire process, and add value every step of the way.

## ACOUSTICS SOLUTIONS

Cascade Engineering responds to acoustical automotive challenges with unique solutions. From design and material development to full production, we have the capabilities to meet and exceed your toughest requirements, whether your acoustic challenges lie in the engine, powertrain area or front of dash. Our processes and material options enable us to make everything from design-dependent lightweight dashmats to heavy duty barriers. In addition to dashmats, Cascade Engineering also makes covers for HVAC, engines, solenoids and manifolds. Through our injection molding process, we are able to provide:

- Increased sealing efficiency with precisely designed pass-through areas to minimize sound leaks
- Greater ability to maintain tight barrier tolerances to minimize sound leaks
- Variable wall stock to increase or decrease mass according to specific vehicle needs



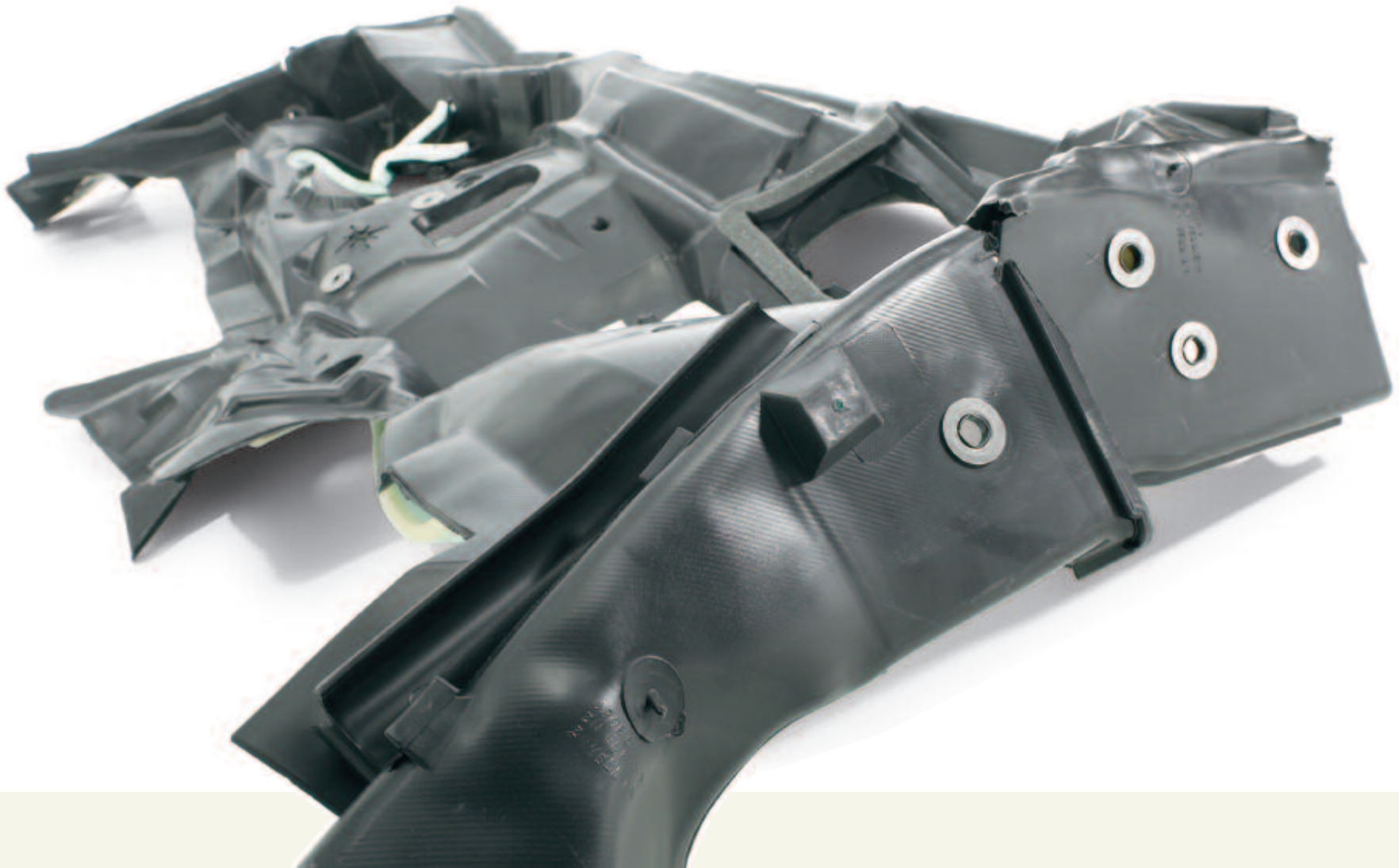
Part integration allows us to provide mold-in options such as wiring channels, fasteners, cowl sides, cowl tops and sealing features to reduce the total system cost by eliminating separate parts. There are several additional opportunities for part integration, including:

- Ease of installation at assembly plants
- Steering column boot
- Electrical wire management
- Module pockets
- Mechanical cable management
- Insert-molded compression grommets
- Mechanical foam attachments
- Hush panel attachments
- Dead pedal
- Energy management foam replacement
- Installation aids, such as hinges, ribs and assist handles

Through our injection molding expertise, we utilize a controlled-mass design process in combination with the improved sealing efficiency and new TPO (Thermoplastic Olefin) formulations to create a lighter part with excellent acoustic performance. Customizing our formulations also allows us to optimize part stiffness for specific needs. And our variable mass technology allows us to apply TPO in varying thicknesses throughout the product, giving extra thickness only where needed, which increases the acoustical properties while decreasing the cost.

All of our TPOs are both in-process and post-consumer recyclable, and our mechanical, non-adhesive decoupler attachments allow for easier separation when it comes time to recycle.

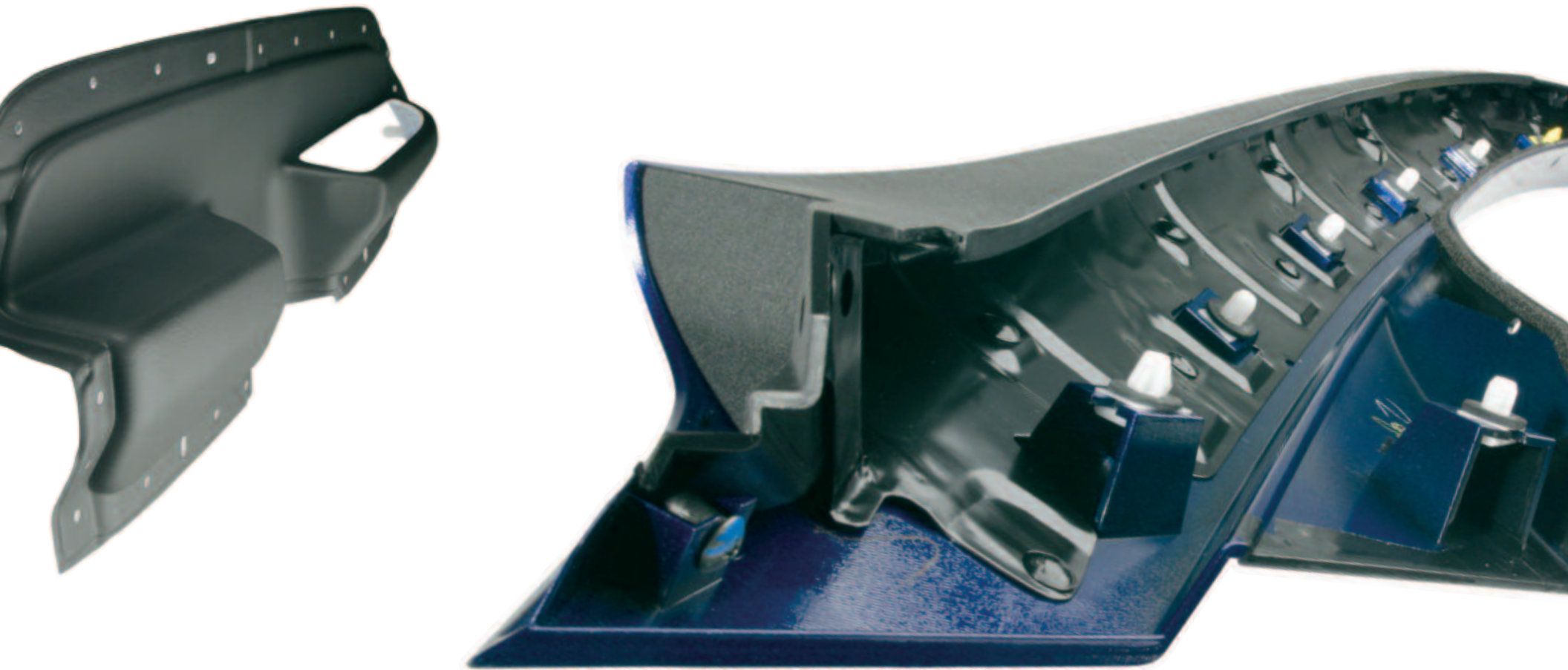
In addition to our traditional injection molded acoustic solutions, we will be launching new interior dashmat technologies. Our "next generation dashmats" will address the market need for "super" lightweight products, with both dissipative and barrier properties.





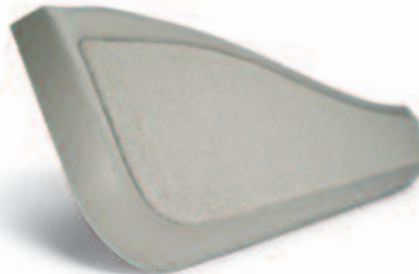
## INTERIOR/EXTERIOR TRIM SOLUTIONS

Cascade Engineering Automotive Trim Solutions specializes in the design and molding of interior and exterior automotive trim components and assemblies, door panels and components. We are equipped to manufacture and assemble both large and small automotive parts and assemblies. Our production technology includes two-shot injection, gas-assisted injection, advanced complex assemblies and JIT/MRP production planning as well as rapid prototyping. Combined with our unique manufacturing technology capabilities, such as VAVE Emphasis-Design and APLS, we are able to offer a range of services unmatched by our competition.





Cascade Engineering continually strives to minimize secondary operations by performing these processes within the molding machine. Our ability to apply in-mold technologies and work with materials such as nanocomposites can result in time and cost savings and better performance in many areas of a vehicle, including Class A exterior parts, non-painted exterior parts, interior surface parts and under-the-hood parts. For example, explore what Cascade Engineering has done to our customers' components, such as air-bag doors, seatbacks, map pockets and other interior trim components to solve complex customer problems. In-mold technology can be used for small inserts, such as grommets and bolts, or larger components such as film, fabric, vinyl or labels. This technology helps to eliminate warp and to fully pack complex parts. Cascade Engineering has experience in all these areas. High-pressure injection molding equipment is utilized for in-mold technologies to achieve a soft touch, as another alternative to the vacuum wrapping process, another capability Cascade Engineering utilizes for production of soft touch vinyl wrapped interior door panel skins.



Our capabilities have also expanded to offer the use of nanocomposites in the production of seatbacks and map pockets. This breakthrough technology creates a more lightweight product while increasing structural integrity and reducing the overall manufacturing process time. This process provides for better aesthetics and reduced manufacturing costs.

Our interior and exterior automotive trim experience encompasses many areas of the vehicle. From decorative exterior trim such as A, B and C pillars to side moldings and bumper fascias, to interior trim including IP components, floor consoles, seating components, hard trim and door panels, as well as switches and levers.



## CHASSIS & POWERTRAIN SOLUTIONS

Utilizing injection molding as well as 3-D suction blow molding, Cascade Engineering provides lighter-weight components used under the hood in chassis and powertrain applications for diesel and turbocharged engines, throttle body covers and charge air coolers. One solution we have provided is a charge air cooler tube used in diesel vehicle applications that Cascade Engineering first brought to market in North America, which replaces the steel tubes previously used. This eliminates multiple parts at the automotive assembly plants, thus reducing complexity and providing a simpler operation for the assembly plant. This part integration makes assembly easier, lowers weight and total cost and improves performance and sealing capacity. In the dual-layer suction blow molding process, Cascade Engineering utilizes different materials to give both rigidity and flexibility where needed.

Key benefits and features of our chassis and powertrain solutions include:

- Utilization of traditional clamping methods for connection and development of next-generation streamlined systems
- Material development for product application
- Part integration for ease of installation at assembly plant
- Part interface
- Full design engineering of technical products that provide intellectual properties
- Lower total cost
- Improved acoustics
- Improved sealing efficiency
- Product validation capabilities
- Utilization of engineering grade resins
- Ability to use products in extreme temperature conditions
- Co-extrusion suction blow molding technology
- Future direction of engineering development of new technical features for parts and operations reduction at assembly



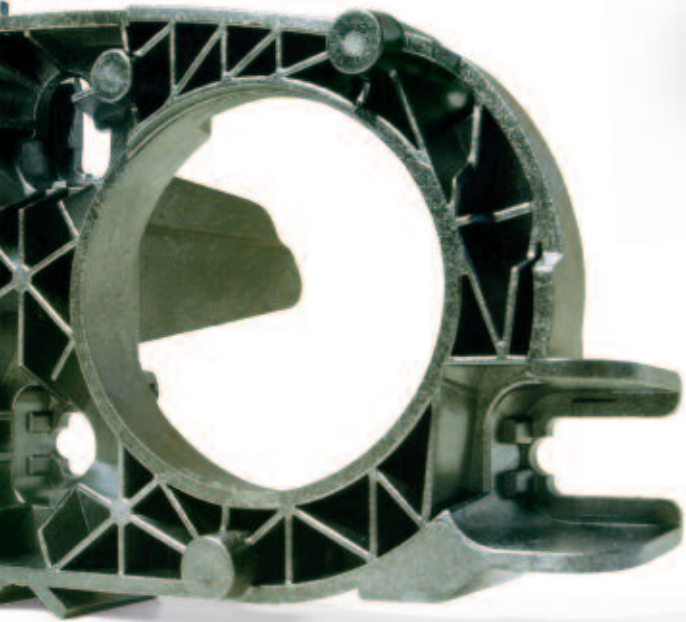
These provide solutions for components such as:

- Charge air cooler tubes for turbo diesel vehicles connecting engine side to charge air cooler unit
- Charge air cooler tubes for turbo charge naturally aspirated vehicles
- Air induction tubes for naturally aspirated vehicles
- Fuel fillers
- Coolant tubes
- Oil fluid tubes
- Transmission fluid tubes
- HVAC hoses
- Exhaust system hoses
- Emissions system hoses



## CASCADE ENGINEERING EUROPE

As a low cost developer and producer of high-quality injection molded plastic parts and assemblies, Cascade Engineering Europe (CEE) is a significant part of our European automotive offering. As an interior and exterior automotive trim full-service supplier, CEE designs and manufactures air ducts and louvers, instrument panel and door trim components and headlamp housings, as well as precision electrical, mechanical and seating components for the automotive industry. With capabilities that include an in-house tool shop, program management, tooling design and tool building, product design as well as injection molding and complex assemblies, Cascade Engineering Europe offers services from part design through production. A full range of secondary operations and capabilities is also offered, from simple to complex assembly, pad printing and CAD expertise, including Catia, Pro-E, IDEAS and Unigraphics.



Integrating mold-making capabilities into our manufacturing processes was a very important step for us to improve the service we provide to our customers. With our internal tool shop, we are capable of fulfilling our customers' expectations and producing high-quality tooling and development faster than ever. Our integrated design and manufacturing system covers every segment of the tool-making process from CAD data transmission through CNC manufacturing. Our point-to-point file transfer capability ensures prompt and secure data transmission with our clients in Europe and the United States. Other key benefits of CEE include multilingual operations, co-location experience, direct interfacing with tier-one suppliers and OEMs and the ability to cost-effectively and JIT ship within Western, Central and Eastern Europe.

## CHINA

By utilizing our alliance with Starlite Company we are delivering product to Asia in a response to our European customers' needs. Working through our Eastern European facility and joint ventures, we look towards the future to continually expand our global offerings.



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At Cascade Engineering, we provide innovative solutions to the increasingly difficult challenges faced by the automotive industry. We accomplish this through a marriage of technological advancements and strong personal and corporate relationships, both of which are built on a commitment to bringing a better future one step closer for the automotive industry. We look forward to the opportunity to create solutions that make sense for you, your customers and your bottom line.