To meet the increasing demands for improved fuel economy, increased performance and reduced emissions, we are a high volume producer of electro-hydraulic control valves and solenoids used in such applications as:

- Cam phasing / Variable valve timing (VVT)
- Variable pump control
- Piston cooling jet
- Cylinder deactivation
- Cam profile switching
- Exhaust aftertreatment
- Fuel delivery
- Variable turbochargers
- HCCI
- Transmission and drivetrain
- Automanual transmissions (AMT)
- Dual clutch transmissions (DCT)
- AWD / Torque vectoring
- Start / Stop transmission technology
- Advanced suspension

At HUSCO Automotive, we engineer and manufacture custom products for OEMs worldwide. Our product range includes a wide spectrum of electro-hydraulic solenoid valves and solenoids that are used as actuators. We produce solenoid valves in both low and high pressure configurations.

We have experience with a wide range of flows and fluids including engine oil, damper fluid, power steering, ATF, gasoline, diesel, water, urea and others. HUSCO valve products include on/off, proportional pressure and flow control valves as well as combinations of these valves in manifolds with filtration for complete system solutions.
### HUSCO Automotive

HUSCO Automotive is focused on providing cutting-edge technology and engineering expertise from product development through production. Our modeling and simulation expertise provides initial insight into production performance capabilities and allows us to optimize designs for unique performance requirements. Using these tools, we are able to work closely with the customer on “what if” scenarios as they develop their systems.

Our modeling capabilities, in conjunction with our test labs, allow us to develop and evaluate robust solutions that meet the increasing demands of the automotive industry. Our on-site testing capabilities include a wide range of performance and durability stands, data acquisition equipment, contamination testing and environmental chambers.

<table>
<thead>
<tr>
<th>MAGNETIC FINITE ELEMENT ANALYSIS (FEA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>To predict and optimize solenoid performance, 2D and 3D modeling is used. The analysis provides valuable information on eddy currents, temperature effects, frequency response, static forces and magnetic effects.</td>
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<thead>
<tr>
<th>STRUCTURAL FINITE ELEMENT ANALYSIS (FEA)</th>
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<tbody>
<tr>
<td>Both 2D and 3D structural analysis is used to predict static and dynamic loading in addition to any deformation due to forces, pressures and assembly processes.</td>
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<thead>
<tr>
<th>DYNAMIC SYSTEM SIMULATION</th>
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<tbody>
<tr>
<td>Dynamic simulation is used to verify performance, conduct sensitivity analysis, determine frequency response, analyze stability and evaluate “what if” scenarios. The simulation is a function of dynamic, hydraulic, thermal and electrical inputs. It can also be used to develop and test control algorithms.</td>
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<tr>
<th>COMPUTATIONAL FLUID DYNAMICS (CFD)</th>
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</thead>
<tbody>
<tr>
<td>CFD is used to predict microscopic hydraulic behavior of components and systems including flow forces, pressure drops, flow rates and effective series restrictions. Used in both 2D and 3D, it allows us to validate analysis and optimize designs.</td>
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<tr>
<th>MULTI-BODY DYNAMICS</th>
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<tbody>
<tr>
<td>Predicting 3D motion of multi-body systems and mechanisms, this software is used in conjunction with dynamic system models to evaluate the entire system performance. In complex systems, it replaces time-consuming analysis techniques.</td>
</tr>
</tbody>
</table>
The APQP process forms the foundation of our manufacturing philosophy and is used to ensure that robust and reliable solutions are identified for every aspect of a new product introduction. Even after our products and processes have exceeded pre-production requirements, our engineering and manufacturing teams continue to perform product and process durability studies. We use this ongoing information to refine and update our product and process FMEA’s and to optimize our existing and future designs.

**PLAN AND DESIGN**

The team captures the customer’s system design intent by working with their engineering and manufacturing team to establish ideal design and process solutions. This information is used to define the product specification and establish preliminary product and process assumptions. Historic warranty, quality and durability information is also reviewed.

**PRODUCT DESIGN & DEVELOPMENT VERIFICATION**

Transform the collaborative inputs from the plan and define stage into a product design solution which is optimized through joint FMEAs, material reviews, cross functional design reviews, technical specifications, etc.

**PROCESS DESIGN & DEVELOPMENT VERIFICATION**

The APQP process is the foundation of our manufacturing philosophy that ensures robust and reliable solutions are identified for every aspect of a new product introduction. Even after our products and processes have exceeded customer requirements, our engineering and manufacturing teams continue to perform studies. We use this ongoing information to refine and update our product and process FMEAs and optimize existing and future designs.

**PRODUCT & PROCESS VALIDATION**

Using our own state-of-the-art environmental chambers and durability test stands complemented by outside laboratories (as required), our product solutions are exercised over all operational and environmental extremes defined by our customer. Capable production equipment is validated using production intent components, pre-production control plans, shop floor operators, etc. Results from these pre-production runs further validate the processes, run-at-rate requirements and provide hands on training for our operators. Our design and manufacturing engineers also participate in the ‘run-at-rate’ experience.

**LAUNCH, FEEDBACK, ASSESSMENT & CORRECTIVE ACTION**

PPAP sign-off is not the finish line. Our production cells provide ongoing opportunities for improvement and serve as learning centers for our design, manufacturing and quality engineers. Performance and quality metrics from each cell are used as drivers for our Six Sigma analysis. Coupled with customer feedback and ongoing product durability and reliability testing, we identify improvement opportunities across product and process. We work closely with our customers to re-engage our APQP process as appropriate for the introduction of these improvements.

Each program is regularly reviewed by our senior management team. HUSCO Automotive’s senior managers have all been program leaders over the course of their careers and are active participants in the APQP process.
HUSCO Automotive continues to expand its production capabilities around the world. We have production facilities located in North America, Europe, India and China. We currently have partners in South America, Korea, Australia and Japan.

In addition to providing production on several continents, these plants are fully staffed with supplier development resources and have been focal points for global sourcing, insuring a globally competitive supply base.

Manufacturing processes data and final test results are monitored and controlled on-line using automated testing and Statistical Process Control (SPC). We also maintain extensive quality labs for inspection and analysis at all locations.
WHO WE ARE

The **HUSCO Automotive** story began in 1983 when Agustin Ramirez, Jr. was assigned to develop a strategic plan for **HUSCO International**, a subsidiary of AMCA. Ramirez recognized the tremendous growth potential that could be unlocked by separating **HUSCO** from AMCA and allowing the company to market its products to other major OEM’s of off-highway equipment. This conclusion ultimately led Ramirez to lead a management buyout of **HUSCO** in 1985. Over the subsequent twenty-five years, **HUSCO** grew from a niche North American supplier into an industry leader with manufacturing facilities across North America, Europe, China, and India.

**HUSCO**’s first automotive project was an advanced suspension system application for the Mercedes CL, SL and S-Class automobiles which commenced serial production in 1999. Although **HUSCO Automotive** began with the Mercedes Active Body Control (ABC) suspension system, the business has since evolved to include a broad product portfolio with applications including cam phasing, cylinder deactivation, variable engine oil pump controls, convertible top controls, diesel emission controls and many more. Today, **HUSCO Automotive** is an industry leader renowned for its ability to design and manufacture technically demanding products faster than the competition and to do so with near perfect quality. **HUSCO Automotive** is focused on providing products that enable next-generation automobiles with improved fuel efficiency and reduced emissions without sacrificing driving performance.

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GREEN BUSINESS OF THE YEAR AWARD

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