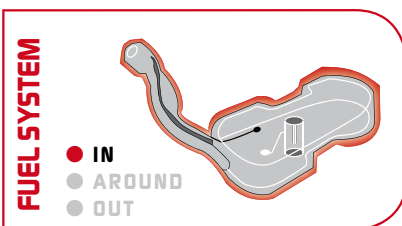
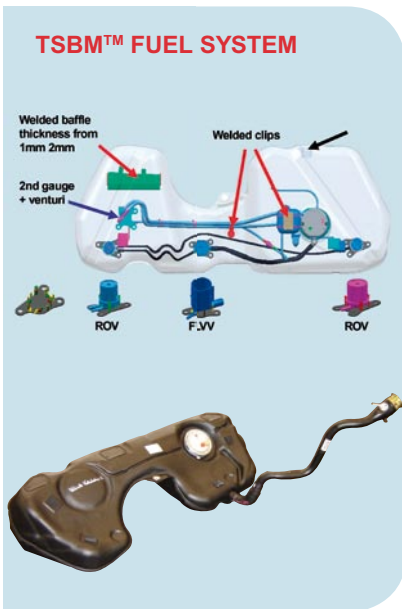
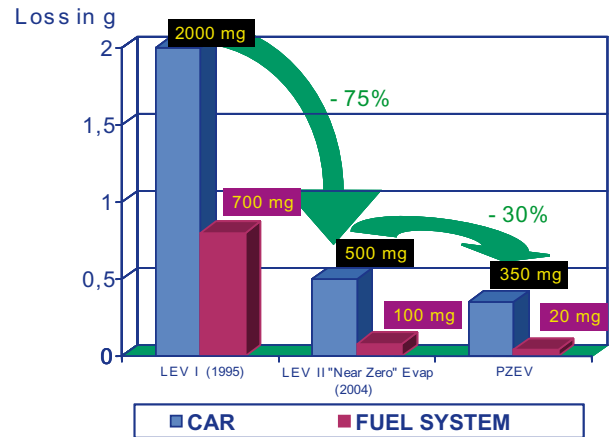
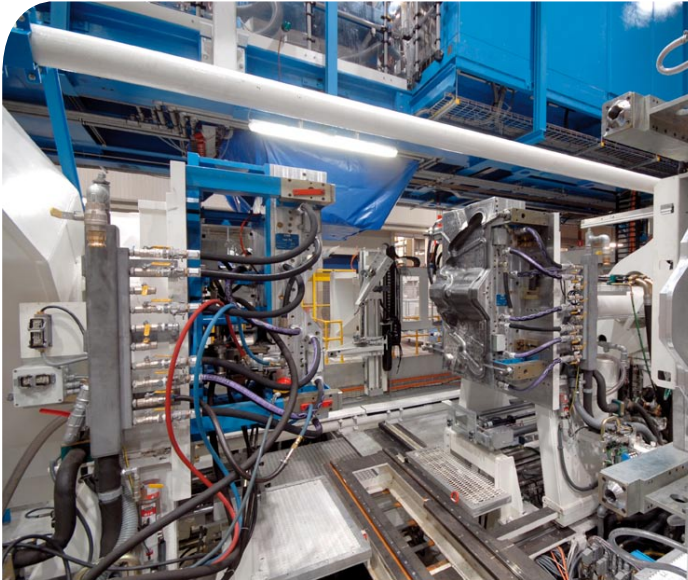


A REVOLUTIONARY PROCESS FOR LOW EMISSIONS FUEL SYSTEM PRODUCTION



Environmental regulations like LEVII and PZEV are forcing OEMs to increase the number of vehicles which meet low emission requirements on the North American market. The race is on between automotive industry suppliers to design and manufacture environmentally cost effective solutions.

Emission standards are requirements that set specific limits to the amount of pollutants that can be released into the environment. Many emission standards focus on regulating pollutants released by automobiles and other powered vehicles but they can also regulate emissions from industry. Automotive suppliers have to adapt their current products and production processes to these new regulations. Design and production of low permeation fuel systems is a major challenge.

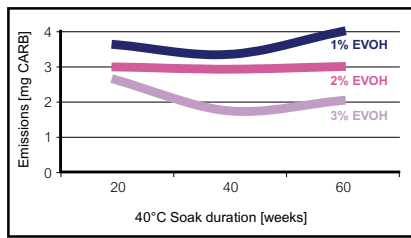
Currently, vehicles sold in the United States must meet «Tier II» standards for low evaporative hydrocarbon (HC) emissions.

Among the various variations of Tier II, there are Low Emission Vehicle (LEVII) and even more stringent: Partial Zero Emissions Vehicle (PZEV). The progression towards larger PZEV volumes has led to new production process development.

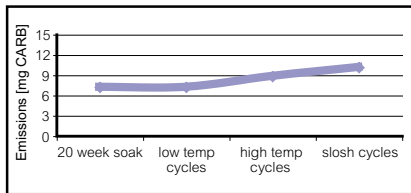
It is the time to rethink the entire manufacturing process itself in order to adapt to these stringent regulations and to offer car manufacturers a solution to meet the new requirements.

INERGY with its Twin Sheet Blow Molding (TSBM™) process is a pioneer in the field of plastic LEVII / PZEV fuel systems.

PERMEABILITY TEST (Tank Shell)



DURABILITY TEST (System Assembly)



SLED TEST

Impact Energy	4,000 J
Conditions	-40°C; +20°C; +65°C
Filling level	90% of usable volume

RIVET SNAPPING



WELDING



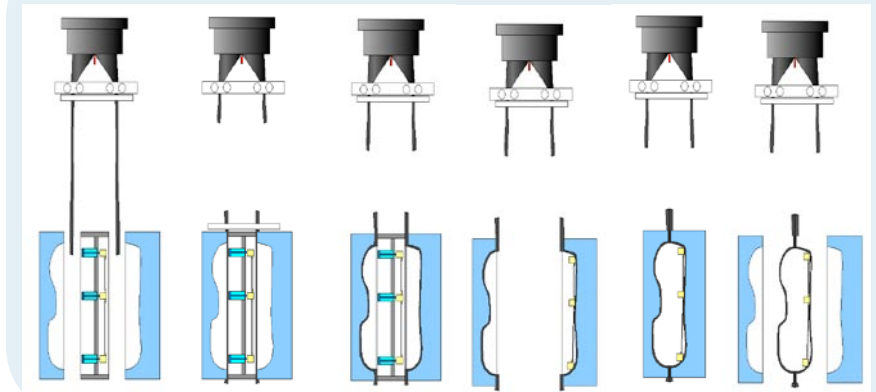
KEY FEATURES

- > **Process** that combines the integration possibilities of Half-Shell processes with the advantages of the Blow-Molding process.
- > **Generation** of two sheets from the circular co-extruded parison at the die exit.
- > **Cutting** of both sheets at desired length and positioning of these sheets between the mold and central core.
- > **First closing** phase upon the central core (integration of the components).
- > **Intermediate** opening and withdrawal of the central core.
- > **Mold re-closing** and finalization of the blowing cycle.

BENEFITS

- > **Low permeation system:**
 - Minimum number of orifices to reduce emissions.
 - Meet US-emission requirements (LEVII and PZEV) with an integrated architecture based fuel system.
- > **Integration of large components** inside the fuel tank during the blow molding process (baffle, gauge, valves,...) allowing new architecture possibilities.
- > **Optimization** of the fuel tank volume.
- > **Optimization** of system performance linked to increased design freedom.
- > **New functions integration** (liquid trap, bottom fuel module,...).
- > **Simplified** finishing lines.
- > **Reduction** of bill of materials.

TSBM PROCESS



TECHNICAL SPECIFICATIONS

- > **Central core:** 2 attachment techniques can be used for component integration: rivet snapping and welding.
- > **Cycle time similar** to the most advanced blow molding process.
- > **Sled test** passed without leakage after impact.
- > **Burst test** passed at 2bar minimum (up to 4bar).
- > **Permeability** <10mg CARB for tank shell and one sender closing.
- > **Fire test** ECE-R34 passed.
- > **Patented** process.