Twin Sheet Blow Molded Automotive Fuel System

Molder: Inergy Automotive

Moldmaker: confidential

Material Supplier: Lyondell Basell

Designer: Inergy Automotive

OEM: BMW of North America, LLC

Supporting Documentation:

TSBM Product Sheet
TSBM presentation

Product Description

This automotive fuel system is the first commercial application of an innovative new process. In this product, the fuel system components are integrated inside the fuel tank during blow molding.

Integration of components reduces the environmental impact of the fuel system by reducing the fuel vapor emissions. Integration allows optimum placement of large components such as baffles, fuel gage and fuel reservoir without the need to introduce these through a tank opening. This results in higher tank capacity and improved tank performance.

Why is the product innovative?

Twin Sheet Blow molding is a revolutionary process enabling plastic fuel systems with reduced environmental impact and improved system performance at a competitive price. Twin-sheet blow molding is adapted from conventional continuous extrusion blow molding. A circular multi-layer parison is cut into two sheets at the die exit. Fuel system components are loaded into a movable central core. Each sheet is then extruded between a mold half and the central core. In the first closing phase, the mold is clamped to the central core and each sheet is inflated to form a tank half. Next, central core actions attach components to the inside of the formed tank halves. After forming and attaching, the empty core is retracted and the mold is closed fully to join the formed sheets. A completed fuel system is produced in the cycle time typically used to blow mold a fuel tank shell. Environmental regulations strictly limit the evaporative losses of fuel from automobiles. An automotive fuel tank has a complex geometry adapted to the vehicle environment. While the tank is of course a container to store fuel, it contains a multitude of components to dispense, vent, fill, and gage the fuel. In a conventional plastic fuel system, holes are bored into the tank shell and valves and ports are welded to the tank exterior. Each component attachment is a source of evaporative fuel emissions. Twin sheet blow molding eliminates external component attachments and the associated evaporative emissions. In Twin Sheet Blow Molding, components are integrated using one of two innovative methodologies. Internal welding is used to attach small components which will fuse to HDPE. Internal rivet snapping is used to mechanically attach larger components or dissimilar materials. Components including valves, reservoirs, clips, baffles and gages have been attached to the inside of the tank using these methods. Twin Sheet Blow Molding component integration provides design freedom. While external components require clearance to vehicle elements or tank radii, internal components can be placed flexibly and optimally to improve tank performance. Optimal positioning can improve tank capacity. One optimally located vent valve can replace two or more external valves. BMW 7 series 2009 fuel tank is the first commercial application of twin sheet blow molding. Twin Sheet Blow Molding reduced the design complexity from two shells to one. Twelve welded components were reduced to just 2. The tank capacity was increased from 77 liters to 82 liters while reducing part weight. The evaporative fuel emissions were reduced from 180mg hydrocarbon/day to just 36mg/day for the complete system. The advantages of Twin Sheet Blow Molding can be leveraged on all fuel systems. Twin Sheet Blow Molding is the gateway to the fuel system of tomorrow.