CASE STUDY

ENGINEERING FOR COMPLIANCE

HDPE Fuel Tanks with Reduced Emissions

Challenge: Regulations from the California Air Resources Board (CARB) and the U.S. Environmental Protection Agency (EPA) limit the allowable permeation of fuel through plastic fuel tanks used in portable fuel containers and small-engine fuel tanks. These regulations impact lawn mowers, tractors, string trimmers, all-terrain vehicles, and numerous other products largely utilizing HDPE fuel tanks.

“...A LARGE NUMBER OF FUEL TANKS ACHIEVED COMPLIANCE WITH CURRENT CARB AND EPA PERMEATION REGULATIONS THANKS TO FLUORINATION BARRIER TREATMENT BY INHANCE TECHNOLOGIES.”

CHALLENGE

Regulatory compliance could not be met using solely HDPE for tank construction. This was a significant problem. HDPE had been widely used prior to the new regulations, as no other type of plastic provided the combination of required physical properties for the ease of blow-molding process-ability. With tooling already in place for molding HDPE, switching materials would add greatly to the costs and lead time of tank production. Manufacturers needed a way to enable HDPE tanks to meet compliance with the new regulatory demands.

PROCESS / COLLABORATION

Off-road and hand-held fuel tank molders and their OEM customers, seeking ways to enable continued use of HDPE, approached Inhance Technologies for assistance. Fluorination has long been known to significantly reduce the permeation of organic liquids through plastics. In the ‘80s and early ‘90s, regulations were established, fluorination was widely used on HDPE automotive fuel tanks to meet DOT fuel emission regulations. But a new process was needed to comply with the more stringent CARB regulations. Collaborative projects between Inhance engineers, tank molders and OEM companies were performed to develop the process conditions needed for compliance by numerous tank configurations. Since numerous factors can influence the efficacy of treatment, such as polymer grade, additives in compounds, and molding process, specific treatment conditions were defined for each type of tank.

RESULTS

In the Fluoro-Seal Process, plastic fuel tanks are treated with a reactive gas mixture under specific conditions of time and temperature. This treatment causes a chemical modification of polymer on the surface, creating a thin layer of highly fluorinated polymer with a structure approaching that of PTFE (Teflon®).
RESULTS

This thin layer of fluorocarbon polymer greatly reduces the dissolution and subsequent permeation of many organic substances.

“A large number of fuel tanks achieved compliance with current CARB and EPA permeation regulations thanks to fluorination barrier treatment by Inhance Technologies.,” said David Hutton, VP Sales at Inhance Technologies.

*Teflon is a registered trademark of DuPont

KEY BENEFITS

• Fluoro-Seal process greatly reduces dissolution and permeation of many organic substances
• Treated products achieve compliance with current CARB and EPA regulations.

APPLICATIONS

• Containers
• Fuel tanks
• Fuel additives
• Automotive lubricants
• Packaging
• Elastomer
• Medical components
• Solvents packaging
• Industrial chemicals
• Essential oils
• Electronic chemicals
• Household products
• Particle sensitive products
• Acetone
• Sealants
• Agricultural chemicals

ADDRESSABLE PACKAGING CONTENTS

• Agricultural chemicals
• Fuels / fuel additives
• Cleaners / degreasers
• Solvents
• Acetone
• D-Limonene
• Terpenes
• Essential oils
• Industrial chemicals
• Electronic chemicals

Reduces dissolution and permeation, which allows products to achieve regulatory compliance.

Inhance Technologies solutions can be applied in a number of industries to improve product performance and sustainability.