Carbon Fiber and Super Plastic Aluminum Formed Panel Decklid Manufacturing Development for the Ford GT

Rama Koganti
Ford Motor Company

Paul Bennett
Mayflower Vehicle Systems

Abstract

This report summarizes the manufacturing and assembly processes of the lightweight rear decklid for the Ford GT. The rear decklid assembly primarily consists of a superplastic formed aluminum outers (Left and Right Quarters and a stamped header) and a unidirectional carbon fiber inner that are adhesively bonded and roll-hemmed together. The outer portion of the decklid is an assembly of four pieces, the superformed aluminum rear quarter panels and engine cover, and a stamped aluminum header. These four pieces are resistance spot welded together using spot welding gun. The carbon fiber inner is a one-piece autoclaved part.

There are several Ford first technologies incorporated into the decklid. The rear quarter panels and engine cover were superplastic formed based on the complexity, deep draws, and fine feature lines needed. Adhesive bonding is used extensively in the rear decklid and throughout the vehicle in general. The adhesive provides enhanced stiffness and quality to the decklid assembly needed to achieve vehicle performance targets. Roll hemming of the aluminum outer to the carbon fiber inner is also a new technology being used on the Ford GT. The roll hemmer uses a programmable robotic arm with a steel roller attached that traces the perimeter of the part hemming as it goes instead of a traditional straight hem which requires dedicated fixturing for each part. The carbon fiber inner is used for added stiffness and clearly for the significant weight savings. Dimensional data of carbon fiber and aluminum decklid assemblies will be presented