

Materials and Advanced Engineering of the 2005 Ford GT High Performance Sports Car

Matthew J. Zaluzec

Materials Research and Advanced Engineering, Ford Motor Company

Abstract

The 2005 Ford GT is a high performance vehicle based on a hybrid aluminum space frame and aluminum body in white architecture. In order to preserve the original styling of the Lemans winning 1966 Ford GT40 vehicle, a host of new and innovative technologies were employed in the design, development and manufacture of the production Ford GT vehicle. The hybrid aluminum space frame consists of 35 detailed aluminum extrusions, 5 complex castings, 4 semi solid formed nodes and conventionally stamped aluminum panels. Automated MIG welding was the primary joining technology used to assemble the hybrid space frame extrusions to castings. The application of friction stir welding was used on an extruded aluminum tunnel, providing enhanced mechanical properties and improved stiffness. The aluminum body in white (BIW) made extensive use of super plastic formed aluminum body panels including fenders, rear deck and doors. High strength 2 part structural epoxy adhesives were used to supplement mechanical fasteners providing additional torsional and bending stiffness and NVH (noise, vibration and harshness) benefits to both the space frame and body system. Mechanically fastening the BIW to the space frame was accomplished using machinable self-locating aluminum rivnuts, a unique and cost effective method for attaching body panels to a space frame. Finally, the development of lightweight closures, including a 2 piece super plastic formed door and a lightweight aluminum carbon fiber rear deck were used to reduce overall vehicle weight. This presentation will focus on the materials, manufacturing, joining and assembly of the Ford GT Super Car.