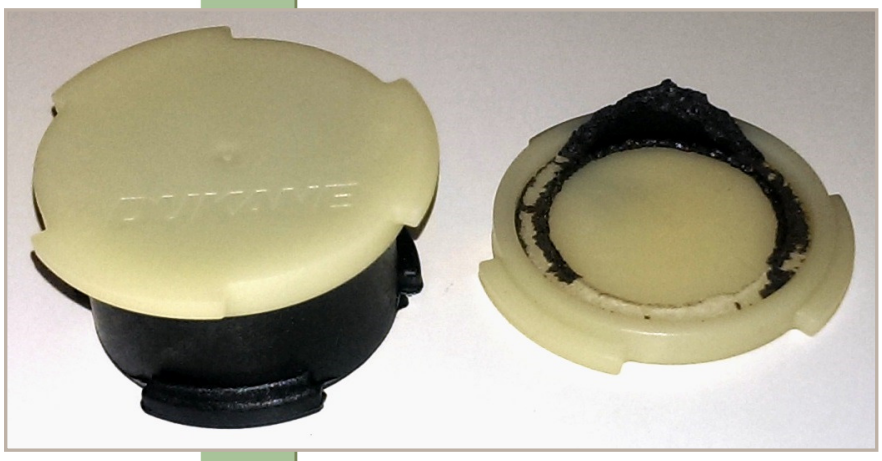
CASE STUDY

Laser Welding Feasibility Evaluation for American Axle & Manufacturing, Inc.



CUSTOMER

American Axle & Manufacturing (AAM) is a leading, global Tier-One automotive supplier of driveline and drivetrain systems and related components for light trucks, SUVs, passenger cars, crossover vehicles and commercial vehicles with a regionally cost competitive and operationally flexible global manufacturing, engineering and sourcing footprint.

CHALLENGE

Increasing complexity in part geometry makes traditional joining methods difficult to implement. Advanced applications demand challenging assembly geometry such as contoured joints and thin internal walls that must be leak tight with minimal flash, which inhibits the use of ultrasonic, vibration, or hot plate welding. Historically, such parts have been joined through the use of adhesives. However, adhesives can be a costly and time consuming joining process.

SOLUTION

Recognizing the growing need for a new joining solution, AAM enlisted EWI's expertise. Through a detailed technical analysis of new product developments, laser welding was identified as an ideal joining solution. However, laser welding is highly material dependent. AAM products operate in a high temperature environment exposed to dirt and oil. As such, a durable and strong plastic must be used, 15% glass filled Nylon in this case. In order to confidently plan for the use of laser welding in future products, a thorough assessment of weldability of their Nylon material was conducted.

RESULT

EWI conducted lab experiments using the standard test part developed by Dukane (ISTeP) which can be pull and leak tested. A 940nm diode laser was used and pressure, power, and speed were varied to estimate a processing window for the material. The results showed that the 15% glass filled Nylon produced a stronger joint with lower standard deviation than adhesives (when pull tested) and consistently tested well below the allowed leak rate at a wide range of settings, as long as sufficient pressure was applied to the assembly during welding. Subsequently, AAM is well positioned to implement laser welding in future applications.

EWI

1250 Arthur E. Adams Dr.
Columbus OH 43221
614.688.5000
ewi.org