

BMW Gains Control of Arc-Welding Burnthrough Problems

The BMW Manufacturing Corp. plant in Greer, SC, produces some of BMW's most popular models, including the X5 Sports Activity Vehicle and the Z4 Roadster.

C-Post to Roof Weld Poses a Challenge

BMW torch-brazes some auto-body weld joints to seal against rain and wash water.

However, it could not use the process on the joint between the C-post and roof, because the high heat input from torch brazing would cause unacceptable distortion in the roof.

BMW engineers investigated GMA-brazing with silicon-bronze electrode using a pulsed inverter power supply, and found the process difficult to control, and with occasional burnthrough. It then experimented with silicon-bronze and mild-steel electrodes combined with the Surface Tension Transfer (STT) weld process, from Lincoln Electric Co., Cleveland, OH. Using STT short-circuit gas-metal-arc welding with a Lincoln L-56 mild-steel electrode eliminated burnthrough and distortion. Now BMW has expanded its use of STT to weld other X5 joints, including taillight housings and windshield frames. The STT process adjusts weld heat independent of wire-feed speed, making it ideal for welds that require low heat input in order to avoid burnthrough and distortion. It does so by applying a specialized pulsed-current profile that combines a coarse heat-control cycle with a fine heat-control cycle.

The Z4 Roadster

When it entered production of its Z4 roadster, consistent welding of windshield inner structural tubes to sheetmetal body panels challenged BMW engineers. BMW uses

conventional short-arc GMAW for most arc-welded joints. However, the windshield structural tube could not be conventionally GMA-welded to sheetmetal body panels with consistent penetration and strength. Welding hot enough to penetrate the tube burned through the sheetmetal, while welding cold enough to handle the sheetmetal often resulted in lack of penetration into the tube.

Having had success applying Lincoln's STT power supply to critical joints on its X5, BMW tried welding the Z4 tube-to-body joints with the STT, along with Lincoln 0.035-in. L-56 filler metal that BMW has used since the plant began production in 1994. Test results showed consistent penetration into the tube without burning through the sheetmetal.

BMW now STT welds the Z4 windshield post with consistent penetration and no burnthrough, and has expanded use of the STT power supply to weld other Z4 joints that require adequate penetration through three layers of sheet steel. MF