RESISTANCE SEAM WELDING OF STAINLESS STEEL

- A Case Study*

An on-going programme to reduce waste and costs undertaken by M/s. Walker Manufacturing, USA, led to a reengineering of the process for manufacturing catalytic converter shells which increased productivity by 50% and reduced scrap rate to 1% and a coolant previously used was eliminated.

INTRODUCTION

Full of expensive metal and formed to a precision shape, the stainless steel shell cannot afford to leak. And even though it is a "no-show" part, it must be scratch free. These are some of the challenges to produce a quality catalytic converter shell. Originally, catalytic converter shells were produced on a gas tungsten arc mill. The shells were formed from coil-fed 409 stainless steel into a tubular shape, notched for the cut-off process and welded with the GTAW process. They were then cut to a specified length, sized to a final shape and the shell edges deburred. It was a labour-intensive process.

Two people were needed for the welding mill, two people to wash each part of the coolant used in the cutting process and four people to check length, shape and deburr the shell. Deburring both ends of the component was crucial and often required 100% inspection. Tooling changeover and replacement of deburring brushes required extensive time. There was also a recurring problem with the welding operation. At times a pinhole leak developed when the arc was initiated with the GTAW process. This was an important quality issue because hot exhaust gases should not leak from the shell. With leak problems and burrs, scrap rates approached 3%.

New Design Streamlines Operation

To solve these problems and improve the operation, a mash seam resistance welding system was developed by Newcor Bay City Division, U.S.A. The system automatically takes a flat stock stainless steel blank, forms it into a shell, seam welds it and then sizes it to the final dimensions.

How it Works

Flat Type 409 stainless steel blanks ranging in thickness from 1.4 to 3 mm (0.05 to 0.12 in.) are loaded on a stacker at one end of the welding machine. The blank is picked up by suction cups and placed on a conveyor that moves it through the shell forming area. The blank is then formed into a shell shape overlapping the edges so it can next be resistance seam welded. It is then polished by a process that rolls the weld flat and reduces its height to within 15% of the metal's original thickness. It is placed into a station for forming its final size and shape to a tolerance of +0.020 in. (0.5 mm). The whole operation gives a stronger weld, the right shape and, cosmetically, a more attractive part.

Big Improvements

Scrap rates were reduced to 1% and the 2300-2500 parts produced in an eight-hour shift represent a 50% increase in productivity. Mash seam welding eliminated the deburring process and the coolant that was previously needed. Tooling changeover now takes only 30 minutes. Overall, quality is up, costs are down, and inventory and shipping schedules are more controllable. ❑

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