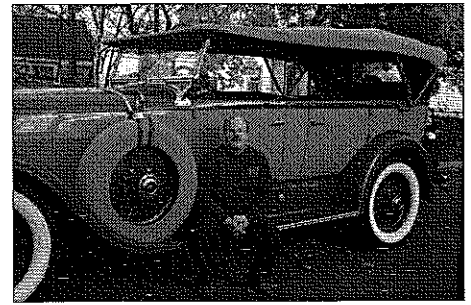


# Welding Cast Iron

## Repairing a Brittle Metal

By Chris Wantuck



If you put ten people in a room who are familiar with auto restoration, who do their own work, or who are professionals and discuss the challenges of restoration, the topic of repairing cast iron is likely to come up. Tasks such as straightening body panels, paint work, or even reproducing ornamental pieces during a restoration are fairly common and usually can be overcome, but mention a cracked or broken cast iron part and shivers are likely to resonate through your body. Cast iron, a ferrous metal containing approximately 95 percent iron with the remainder being alloys such as silicon and carbon is often used for many vintage auto parts. It can be cast well into shape, is easily machined, is ideal for high heat situations (like exhaust manifolds) and even has good compression qualities. Cast iron, however, doesn't do well under tension and is brittle. Repair a crack in a cast iron part using conventional welding techniques and the crack is likely to reappear when the part is put back into service, usually under some sort of stress or load. The desire in repairing cast iron is to join the cracked surface and prevent further cracking from occurring.

This article focuses on the repair of a Lincoln model L cast iron water pump, but it also applies to repairing cast iron in general. While disassembling and separating the front and rear halves of the water pump, the flange surface of the rear half broke. This probably occurred because too much pressure was exerted just on one side of the flange. In hindsight, a better way would have been to first soak the shaft and bearing/packing areas and then gently press on the shaft and impeller to separate the halves. Rebuilding this water pump now just got significantly more difficult.

Repair of the water pump's cast iron flange was brought to the attention of a previous acquaintance, Cecil Muggy, a retired metallurgist from the Boeing Company. Years ago, Cecil was consultant for soldering and repairing the aged (1920s vintage) aluminum body on another project. Muggyweld, a specialty welding supply offers a line of welding and soldering products for difficult problems such as this cast iron water pump housing. They offer two grades of electric arc welding rods, #72 for heated affected cast iron that would be used on exhaust manifolds (also referred to as dirty cast iron) and the #77 for "clean" cast iron which can be machined. Repairing dirty cast

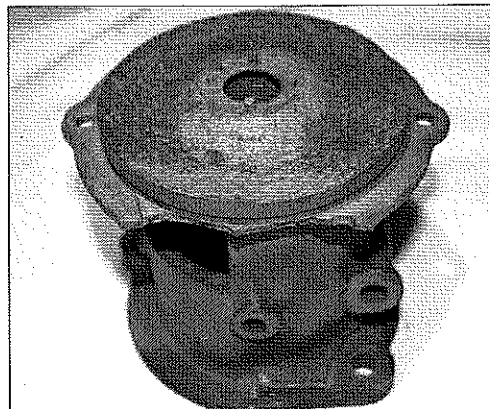
iron using the #72 rod is performed first and can be "topped" over with a few passes of the #77 rod. Only the #77 rod can be machined or ground which is useful when finishing an exhaust manifold before being porcelain coated. Their claim is that their cast iron rod has 300 percent more elasticity than standard nickel arc welding rod. It is this elasticity that works to prevent further cracking. They also claim that preheating of the area to be repaired was not necessary, though experiences varied here.

Before trying to weld the water pump, an old marine cast iron manifold was retrieved from the junk yard for practice welds and several cuts were made and Vee'd out. Using an electric arc welder at about 90 amps, negative polarity, and a back stitch method, the rod penetrated the scrap manifold well. In one small area, a crack appeared across the stitch where there were two different thicknesses. Going over the area again corrected the crack. This is where some preheating may have prevented this from occurring. Otherwise the #77 rod would solve the problem. The water pump housing and flange pieces were bead blasted and a thick aluminum plate jig was fabricated to bolt and hold the flange pieces.

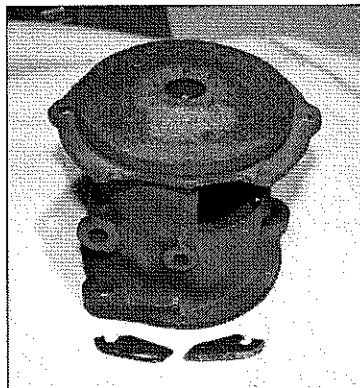
Again, using the back stitch method, short welds were applied on both sides of the broken flanges. Afterward, the welds were machined using pneumatic and Dremel carbide grinders. Also, the cast iron rod was used to fill in heavily corroded areas around the water pipe flanges.

Repairing cast iron has historically been difficult, however, these welding products may offer solutions to once un-repairable parts like the bottom edges of cylinder blocks that cracked from water freezing. Muggyweld offers many products to include a special low temperature solder for things like pot metal repair. Don't confuse or write off this soldering rod as the typical flea market "beer can" product. Their

website offers a great deal more than can be explained here and includes valuable video tutorials. Cecil has fully retired and turned the reigns of the company over to his son, Mike. Company information: Muggyweld, PO Box 11927, Olympia WA 98508-1927. Phone: 866-684-4993. Website: [www.muggyweld.com](http://www.muggyweld.com).

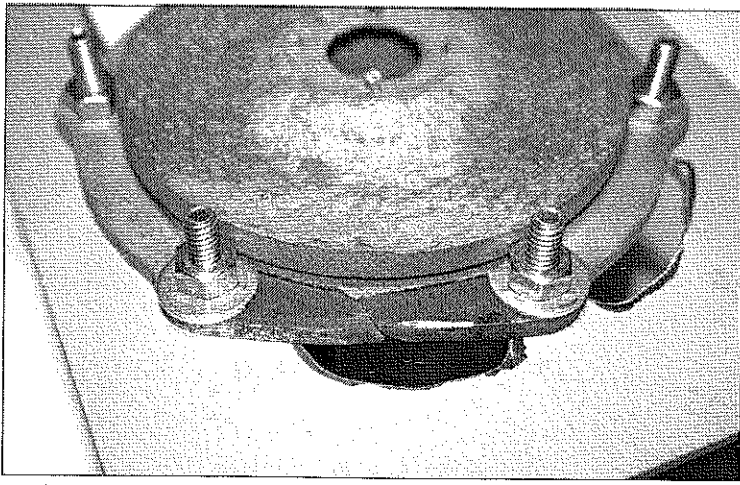


*Water Pump cast iron part, bead blasted, showing the broken flange area.*

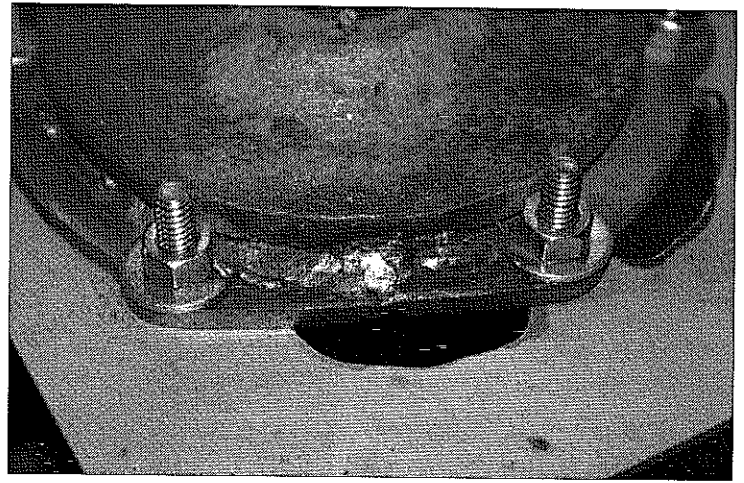


*Water pump cast iron part, bead blasted, showing the broken area and two broken pieces.*

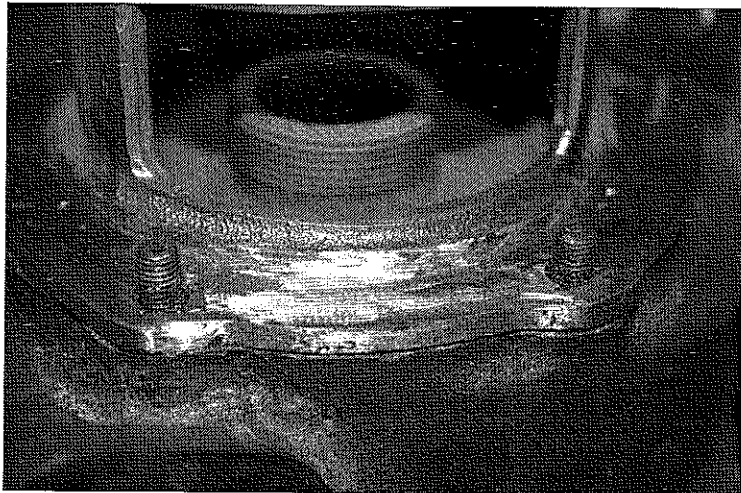




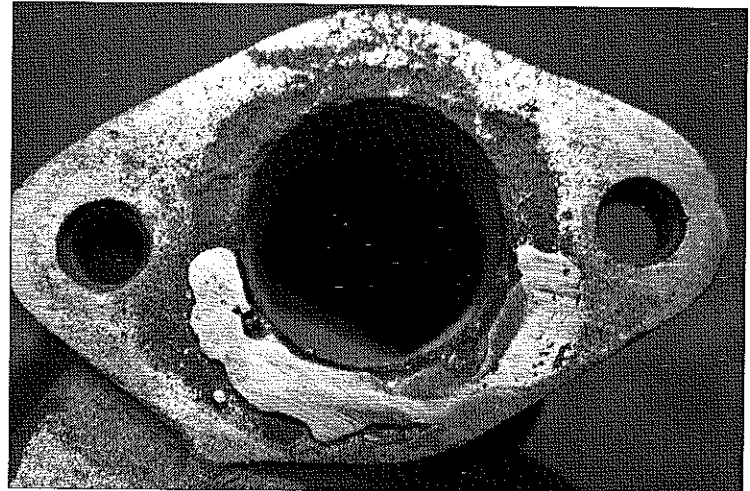
*Water pump cast iron part bolted with a thick aluminum plate as a holding jig.*



*First welding passes are completed on both sides using the #77 welding rod. Aluminum plate is unbolted and the remaining flange area is repaired*



*Repaired flange surface is machined, ground, and fitted to the water pump housing.*



*Corroded surfaces of the water pump's pipe outlet flange are filled in using the #77 welding rod.*

A section of one of the restoration shops at the Nethercutt Museum, Sylmar, CA

Photo courtesy of Bob Turnquist

