

LINCOLN ELECTRIC FLUX MIXER BEARING HOUSING

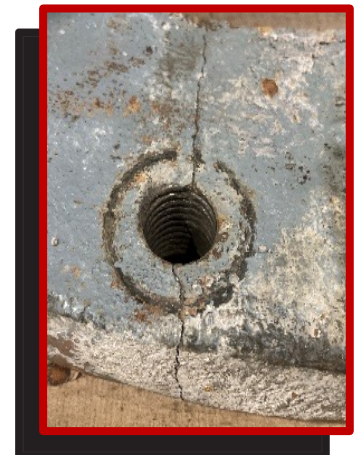
3D METAL PRINTING FACTORY FOR LARGE PARTS – REPLACING LEGACY PARTS

The Challenge

Stick electrodes are a significant part of Lincoln Electric's consumables business, and large mixers are a key piece of production equipment for manufacturing the stick electrode flux. Lincoln Electric's stick electrode plant in Cleveland, Ohio has seven flux mixers, with six in continuous production and a seventh rotated out of production for rebuild. The flux mixers are pre-World War II machinery which means repair and rebuilding is challenging as spare parts are not readily available.

In 2018, a program was initiated to redesign the flux mixers to make it easier and less time consuming to rebuild and to ensure Lincoln Electric could produce in-house all the spare parts needed for rebuilding. Individual parts were also redesigned for ease of machining, fabrication and assembly. However, while effective for most components, the redesign program was unable to address the manufacturing or sourcing of six large, steel castings: two each of a bearing housing, mixer blade, and side cover. If these parts need to be replaced they would have to be sourced either from the secondary market, an outside foundry, or machined from bar or billet stock. The latter two options have very high costs with long lead times, and it is increasingly difficult to locate components on the secondary market.

While performing routine maintenance on a flux mixer, maintenance engineers observed cracks radiating from the bolt mounting holes of a flux mixer bearing housing. If left alone, these cracks would likely lead to a catastrophic failure and significant unplanned downtime. Repairing cast steel is difficult and repairs are generally of inferior quality.



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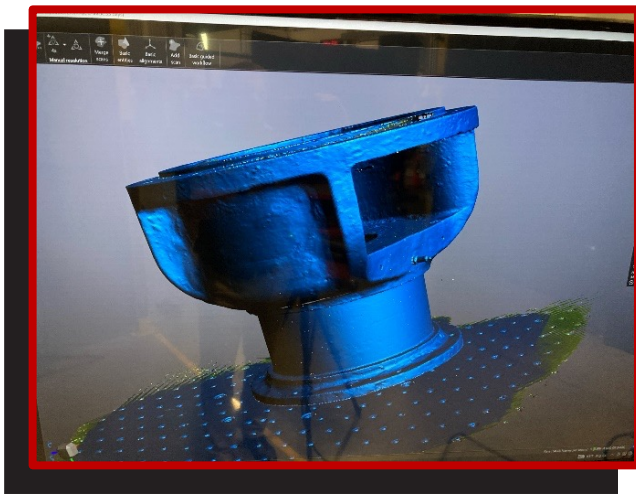
The Solution: Lincoln Electric Additive Solutions

Lincoln Electric addressed this challenge through its 3D metal printing solution. By utilizing North America's largest production capacity for both welding wire and 3D metal printing for large parts, Lincoln Electric Additive Solutions quickly reverse engineered and 3D printed a flux mixer bearing housing. In two weeks, the damaged part was 3D laser scanned, a CAD model was developed, and a new part was 3D printed.

The maintenance engineering team responsible for the flux mixers also took advantage of the design flexibility and increased mechanical properties of 3D printed metal to increase the access openings in the flux mixer bearing making it easier to set the bearing preload, which reduced installation time.

Lincoln Electric can now maintain a "digital inventory" rather than a physical inventory of parts. With a digital file on hand, a flux mixer bearing house can be quickly 3D printed anytime it is needed.

In all, this project was consider a resounding success for 3D metal printing: Additive Solutions delivered its internal customer a 3D printed mixer bearing housing at a lower cost and substantially shorter delivery time – and prevented unplanned down time.



Flux Mixer Bearing Housing
22 in. Diameter by 18 in. High
Low Carbon Steel - 625lbs.

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