



## Motorized Electrode Lifter Slashes Steel Furnace Downtime by 85%

Downtime for maintenance is a standard part of production. It helps to ensure reliable equipment performance. However, it still means that for some period of time, you are not making product, but instead are generating cost. Thus, reducing downtime provides a favorable payback, because it allows quick resumption of production. When the same solution that reduces downtime also enhances operator safety, the decision to implement is easy!



**Custom 70,000 lb capacity grab has four legs that open and close on a circular-plate electrode simultaneously, ensuring that equal pressure is applied to the entire outside diameter.**

Nucor Steel was trying to reduce maintenance downtime on its electric steel furnaces. The maintenance involved removal of the bottom electrode, a 120 inch diameter circular steel plate. Through the course of furnace operation, the plate sustains a significant amount of wear during the melting process, and must be replaced every eight weeks. The plate is part of a complex assembly that enables current to flow through the scrap metal charge, causing it to melt.

The old method for retrieving the bottom electrode plate was to push it hydraulically up in the air, then retrieve it with a mechanically activated clamp device. This work was very complicated and time consuming, depending on the thickness and wear pattern of the electrode. It usually took up to an hour of operator time just to hook up to the electrode. Nucor also had some bad experiences in removing the plate with the original lifting device that further extended downtime by 6 to 8 hours.



**Lifting grab is designed to withstand high temperatures inside electric steel furnace. Its legs are operated remotely as the grab secures and lifts bottom electrode in furnace without human intervention.**

Bushman AvonTec, a Milwaukee-based custom manufacturer of handling and positioning equipment, accepted this unique challenge. It helped Nucor Steel design a motorized grab that can be lowered into the hot furnace to securely grab the plate for lifting, regardless of the furnace temperature and electrode characteristics. The electrode can now be changed in about an hour, without human intervention.

Bushman's 70,000-lb capacity grab has four legs that open and close on the circular plate simultaneously, ensuring that equal pressure is applied to the entire outside diameter. The grab is lowered into the furnace by an overhead crane, and the legs are operated remotely. Special wear bars that can withstand the high temperatures are attached to the top and bottom of each of four sliders; these wear surfaces allow the four legs to extend and retract easily.

A drive system that includes a brake motor and double reduction gearboxes eliminates the potential for back drive in case the plate or grab contacts obstacles during lifting. A low-speed, high-torque clutch is used to prevent the drive system from being damaged during the clamping process.

The first time this lifter was put into service, Nucor Steel saved up to 8 hours in removing the electrode plate and performing needed maintenance, while providing for a safer operation. In addition, from a bottom-line standpoint, the company was able to start generating cash more quickly!