



## **Challenge: Resolve Effect of High Heat on Exhaust Stacks**

### **Solution: Ceramic Coating and Vertical Integration**

To provide a part of the overall solution for EPA regulations, Lincoln Industries fabricates the exhaust tube, polishes, plates, ceramic coats and ships finished product to OEM assembly plants. From fabrication to shipping, the supply chain is managed by Lincoln Industries.

In 2006, Lincoln Industries was presented its largest project in company history—exhaust tubes for the heavy-truck industry. Triggered by a new EPA standard to lower emissions from heavy-duty trucks, Lincoln Industries had the job with one condition: find a solution to prevent the discoloration and blistering of chrome exhaust stacks caused by the high temperatures needed to reduce emissions.

The challenge was addressed by researching and developing ceramic coatings. When the project began in 2005, a ceramic coating that could be used internally to insulate the tube and pass all specifications was not available. Led by Process Technology Manager Todd Lewis, many different ceramic coatings were tested and tweaked until a suitable product was available.

The next challenge was applying the coating to a curved, exhaust tube with an inside diameter as small as five inches. Again, no application equipment existed for this project so custom equipment was designed by Lincoln Industries and a strategic supplier.

“The startup of a new line is difficult process,” said Area Leader Jerry Lukens. “Many people and departments were involved in the success of the project. It includes the people in polishing, plating, assembly, and shipping and receiving.”

Lukens said there were many early challenges for the startup of the ceramic line.

- Securing the equipment needed to apply the ceramic coating. Not only did equipment not exist for applying an internal ceramic coating, the coating is applied after plating. A process had to be developed to apply the coating without damaging the finish.
- Special spray nozzles that spray in a 360 degree pattern to cover the entire area of the tube had to be implemented.
- Material handling was also a challenge because the tubes are cured at high temperatures. Special carts that would stand up to the high heat had to be designed.

Lukens said, “Our people performed remarkably. Some were working seven days a week to meet demand. Our success and the success of this project is the result of many people and many departments working together to meet a unique challenge. It has laid the foundation for a great opportunity in the exhaust tube manufacturing business for many years in the future.”