thermal Spray Technologies, Inc. in Sun Prairie, Wis., engineers and applies thermal sprayed coatings for a variety of equipment components. These coatings provide corrosion protection, protect from wear and abrasion, restore and repair components, and more. Thermal spraying is used in a wide variety of applications, including aerospace, automotive, biomedical, oil and gas, electronics, and food processing to increase component life and value, decrease machinery down time, and improve performance.

Thermal spraying utilizes a heat source to melt material and propel it toward a prepared surface by expanding process gasses. Most of the material sprayed at Thermal Spray Technologies is stainless steel or another chromium-bearing material. A by-product of the spray chromium is the pollutant hexavalent chromium. Thermal Spray Technologies was in compliance with the pre-existing hexavalent chromium limits of 52 micrograms per cubic meter of air (52 µg/m³). But when OSHA lowered the hexavalent chromium permissible exposure limit (PEL) by a factor of 10, to an eight-hour, time-weighted average exposure limit of five micrograms of Cr(VI) per cubic meter of air (5 µg/m³), management realized there was no way they could meet the new regulation with their existing media filtration source capture system.

**Case Study**

BY JOE TOPMILLER, TECHNICAL AIR FILTRATION MANAGER, UNITED AIR SPECIALISTS, CINCINNATI, OHIO

**New Dust Collection System Puts Air Quality Levels Below OSHA’s Hexavalent Chromium Cr(VI) Action Level**

Thermal Spray Technologies robotic flame spray booth UAS SFC 80 cartridge dust collector for the two flame spray booths.

Close-up of a slotted inlet source capture hood.
case study

In keeping with Thermal Spray Technologies’ environmental responsibility credo to reduce the burden on the environment, the company made the commitment to rework all of its dust/fume collection equipment to be in complete compliance with the new OSHA Cr(VI) regulation—even though the installation of engineered controls, including air filtration equipment, was not required until May 30, 2010. In the interim, the regulation requires companies to follow a set of procedures that include ongoing employee testing and wearing protective clothing. Thermal Spray wanted to bypass these interim requirements as quickly as possible and make their work environment safe and comfortable.

Working as a team with United Air Specialists’ (UAS) local rep company, Summit Filtration, Thermal Spray Technologies identified a need to improve source capture and significantly increase airflow velocity at all 11 of its spray booths. Two robotic thermal “flame spray” booths needed particular attention because that process generates more fumes than the others due to powder characteristics, flame spray rates, and the fact that each robot has two flame spray guns. These two booths do not require an acoustical enclosure because of the low noise levels associated with flame spray. The absence of an overall enclosure makes source capture that much more important. To meet the new OSHA Cr(VI) air quality standard, a larger dust collection system was needed along with better source capture.

Using UAS air pollution control equipment, Summit Filtration and Thermal Spray Technologies set out to improve and rework the existing system to accomplish the following:

- Put the company ahead of the curve by immediately installing the necessary engineering controls and air filtration equipment to meet or exceed the new 5 µg/m³ (PEL) requirement and the 2.5 µg/m³ action level (AL).
- Significantly improve dust/fume collection at the two low-velocity flame spray booths.
- Re-work the source capture hoods and ducting at all spray booths to achieve maximum air quality results.
- Repurpose existing dust/fume capture equipment where possible to save money.
- Quickly qualify through independent testing compliance with the new OSHA Cr(VI) air quality standard.

The OSHA action level (AL) is set at one-half of the PEL. Maintaining exposures below the AL provides increased assurance that employees will not be exposed to Cr(VI) at levels above the PEL because of exposure variations in the workplace. Employers can avoid additional monitoring if the initial monitoring
Relocate the existing 40-cartridge dust collector to another booth to take a poor performing wet collector off line.

Retrofit all 11 booths with new slotted inlet source collection hoods and sheet metal air ducting. Slotting, which provides uniform exhaust air flow, is a method to quickly grab the fumes and pull them into the system. In thermal spraying, and with two robotic flame spray guns, fume generation is very high. Hence, the best solution is to grab the fumes as fast as possible and get them into the ducting.

“Our plant air is now significantly cleaner than before,” notes Daryl Crawmer, director of technology at Thermal Spray Technologies. “Our reworked system not only captures hexavalent chromium, but it captures everything better. We had to be able to protect our people and provide an environment that was below the new OSHA 2.5 µg/m$^3$ AL regulation.”

By being ahead of the curve in meeting this requirement, Crawmer notes that employees do not have to go through ongoing testing, nor do they have to wait until 2010 to have a cleaner working environment. “Independent tests have confirmed that we now operate our four-day, 11-hour shifts well below the 5 µg/m$^3$, Cr(VI) PEL and below the 2.5 µg/m$^3$ AL,” he noted.

Crawmer is also very proud that in taking this step the company continues to run a very green operation. “For several years we have not had a hazardous waste stream,” he said. “Everything we do in our operation is recycled.”