DUSTHOG

Case Study

Thermal Spray

New Dust Collection System Puts Air Quality Levels Below Osha's Hexavalent Chromium Cr(VI) Exposure Limit

Thermal Spray Technologies, Inc., in Sun Prairie, Wisconsin, engineers and applies thermal sprayed coatings for a variety of equipment components to 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.

Focus:
Thermal Spray Technologies, Inc.

Challenge:
Comply with OSHA's Cr(VI) exposure limit ahead of required deadline

Solution:
New DustHog® SFC Collector and reworked source capture hoods/ducting

Impact:

- Air quality improved to below OSHA's new permissible exposure limit and below the new action level
- Cost savings
- Environmentally friendly work space

Challenge

Thermal spray 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 (Cr(VI)). Thermal Spray Technologies was in compliance with the pre-existing Cr(VI) limits of 52 µg/m^3. But when OSHA lowered the Cr(VI) permissible exposure limit (PEL) by a factor of 10, to an eight-hour time weighted average exposure limit of 5µg/m^3 of Cr(VI), management realized there was no way they could meet the new regulation with their existing media filtration source capture system.

According to Thermal Spray Technologies' Environmental Responsibility credo, the company "remains in a mode of constant improvement in our efforts to reduce our burden on the environment." To be true to this statement, the company made the commitment to re-work all of its dust/fume collection equipment to be in complete compliance with the new OSHA Cr(VI) regulation.

Working as a team with a UAS, now Parker Hannifin representative, Thermal Spray Technologies determined 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.

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A Parker representative and Thermal Spray Technologies set out to improve and re-work 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 5µg/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.
- Re-purpose 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 determines that the AL is less than 2.5µg/m³.*

Solution

After a thorough review of the existing dust/fume collection system for the 11 spray booths along with the company's desired end-result requirements, the local Parker representative recommended the following:

- Install a new 80-cartridge SFC 80-4 downflow collector for the two low-velocity robotic flame spray booths. With 99.999% efficiency, cartridge dust collectors are ideal for the collection of Cr(VI) dust/fumes. Coupled with an effective source capture system, they do the best job of capturing contaminants using the least amount of CFM.
- 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.

Slotted inlet source capture collection hoods provide uniform exhaust air flow.

Impact

"Our plant air," notes Daryl Crawmer, Director of Technology, Thermal Spray Technologies, "is significantly cleaner than before. Our re-worked system not only captures hexavalent chromium, it captures everything better. We had to be able to protect our people and provide an environment that was below the new OSHA 2.5µg/m³ AL regulation. By being ahead of the curve in meeting this requirement, our 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 5µg/m³ Cr(VI) PEL and below the 2.5µg/m³ AL.

"We are also very proud that in taking this step we continue to be a very green operation. Right now, and for several years, we have not had a hazardous waste stream. Everything we do in our operation is recycled."

Robotic flame spray booth

PH1810-027

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