

by Jimmy Myers, senior editor

Clearing the air

A Nova Scotia-based manufacturer solves air
quality issues with innovative tech



eld fumes can adversely affect the health of welders and anyone else breathing

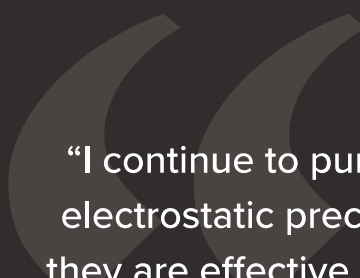
in the variety of toxic chemicals in a manufacturing facility's air, which includes everything from lead to manganese and carbon monoxide to arsenic and chromium. Manufacturers committed to protecting their employees seek ways to improve the quality of the air in their facilities, implementing technology that can drastically reduce the health risks associated with exposure to metalworking fumes from welding and laser and plasma cutting operations.

One such entity is Cherubini Metal Works Ltd., a company that fabricates large steel assemblies for bridges and buildings. Since 1967, Cherubini has been supplying its customers with cut, shaped, welded and pre-assembled steel for a variety of standard and custom designs. Recognized by Deloitte as one of Canada's best managed companies, Cherubini has built more than 150 bridges around the world as well as a myriad of

buildings and structures for customers in the transportation, mining, oil and gas, and renewable energy industries.

The company embarked on a new project at its 56,000-sq.-ft. facility in Eastern Passage, Nova Scotia. The challenge faced by the team at Cherubini centered on designing an air capture system for its large facility with no exhaust air to the outside. This was significant because when the company had multiple projects occurring, 15 to 20 welders could be welding simultaneously, producing smoke and fumes harmful to the welders and the other employees at the plant. Successfully capturing and cleaning the air was critical.

In most situations, a source capture system would be chosen, considering its effectiveness at capturing weld fumes before they enter a welder's breathing zone or the ambient air within a workspace. According to a Parker Hannifin [white paper](#), source capture systems "do the best job at capturing weld fume contaminants with the least amount of air volume requirement or cubic feet per minute (CFM). Source capture systems include ►



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*Renato Gasperetto, vice president,
Cherubini Metal Works Ltd.*



Parker Hannifin SmogHog devices are electrostatic precipitators (ESPs) that remove suspended particles from a gas or exhaust by applying a high-voltage electrostatic charge, which collects particles on charged plates.

articulated armatures, fume collection hoods, ducting, air cleaning, and air moving devices such as fans.”

The paper noted, however, that in “a large, open facility like Cherubini’s, with overhead cranes and large fabricated structural pieces, a source capture system was impractical.”

Winter temperatures in Nova Scotia can be brutal, so the Cherubini team determined that they would need to recirculate filtered air versus pulling in

and heating outside replacement air, which would be too costly.

THE RIGHT SOLUTION

Cherubini, of course, isn’t the first company of its kind to be confronted with the challenge of finding an effective facility air capture system. Many metalworking operations are located in large buildings that have open-air work environments, which makes fume, dust and mist collection a difficult task. Fortunately, two ambient air collection options are

available for these challenging work environments.

The first option involves a large central air change taking place within a facility. According to the white paper, these large collection systems “pull air out of the area, force it through a reverse pulse-jet cartridge dust collector, and then recirculate the air back into the facility.”

The second option is to utilize smaller units placed above the plant floor. These units are strategically distanced so they can move air in a uniform pattern,

filtering the suspended particles created by the welding process and recirculating clean air. One of the benefits of this system is that welders can move around and make their weldments without restriction.

Ultimately, the team chose to use smaller units and to recirculate air through the facility, as opposed to exhausting it outside. As mentioned, not only does this method provide employees with a safer environment, it also saves the company on energy costs. ▶



Cherubini Metal Works, a leading metal fabricator in Canada, has worked on bridge projects around the world, including the Vimy Memorial Bridge in Ottawa.



Multiple SmogHog units used to circulate air from unit to unit in a racetrack configuration.

HOGGING THE SMOG

The technology behind conquering Cherubini's weld fume issue was developed by Parker Hannifin. Specifically, Cherubini deployed multiple SmogHog units. These electrostatic precipitators (ESPs) are devices that remove suspended particles from a gas or exhaust by applying a high-voltage electrostatic charge, which collects particles on charged plates.

ESP filtration systems are commonly used for wet mist filtration. For some solutions, they are applied to weld fume applications when the part or

device being welded contains oil or coolant, which then becomes atomized and combined with the weld fume particle during the welding process. In this case, the ESP system outperforms the widely used dry filter media (cartridge) filtration technology because the atomized oil or coolant tends to stick to the cartridge media and quickly clog the media layers, which, in turn, reduces airflow through the cartridge, thus reducing weld fume removal efficiency.

To address the often high routine maintenance required when an ESP

is applied to weld fumes, SmogHog systems can be outfitted with self-cleaning wash systems that automatically clean the ESP filter cells, thereby providing extended service and continual high-efficiency filtration.

In addition to large contaminants, ESPs can also handle microscopic contaminants. Most shops have them running at all times, pulling in airborne particles from the workspace, filtering them out and recirculating clean air back into the plant.

According to the U.S. Environmental Protection Agency (EPA), ESPs are generally classified as dry or wet. A dry ESP utilizes vibration (rapping) to knock the collected particles from the plates into collection compartments, whereas a wet ESP uses a water rinse to remove the particles. The SmogHog is a wet ESP, and the EPA says the advantage with this unit is it has "no problems with rapping re-entrainment." Re-entrainment is an atmospheric event where contaminants exhausted from a ▶



This source capture SmogHog SG system is designed to keep workers safe while also keeping a facility in compliance with federal, state and local environmental standards.

Electrostatic precipitators are devices that remove suspended particles from a gas or exhaust by applying a high-voltage electrostatic charge, which collects particles on charged plates.

plume mix back into the original volume of air.

The adoption of the Clean Air Act in the 1970s drummed up new interest in wet ESP technology, which has been in use since the early 1900s. Many advancements in this technology have been realized in the last 50 years, such as corrosion-resistant industrial polymers in the housing units, polymeric electrostatic sections and lead-lined electrostatic sections.

Parker Hannifin reports that the SmogHog is 95 percent efficient on mist, smoke and fume removal, keeping factory air clean and in compliance with “even the strictest federal, state and local environmental standards and keep your workers safe.” And unlike barrier filters, which can plug and become ineffective, ESP technology ensures constant airflow.

BIG IMPACT

In the white paper, Renato Gasperetto, vice president of Cherubini, said the SmogHog units have been a reliable, cost-effective solution for all of the company’s plant facilities.

“I continue to purchase SmogHog electrostatic precipitators,” Gasperetto noted, “because they are effective and I am informed that they meet all local air quality and occupational health and safety requirements. And, because building heat is too expensive to waste.”

The SmogHog systems Cherubini chose have reliably recirculated clean air throughout the workspace and have diminished exhaust considerably. According to the paper, the exhaust makeup requirements have been reduced by up to 80 percent. The company is now saving thousands of dollars a year in heating costs and saving on downtime because maintenance to these units is minimal. For Cherubini, the winning combination is a total of 10 SmogHog SG-4S units, which can be cleaned by an automatic wash system. ■

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