Dry Ice Cleaning for Weld Lines

AUTOMOTIVE WELD LINE CASE STUDY

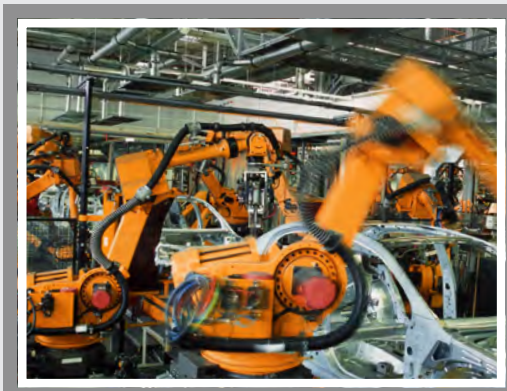
BETTER WELDS = LESS SCRAP AND DOWNTIME

COMPANY
Maclellan Integrated Services

APPLICATION
Robot & weld line cleaning

COLD JET SYSTEM
Aero 40

BENEFITS
- Savings of $2,956 per station per week
- Labor hours reduced from 7.2 to 0.5 per robot
- $153,712 in annual savings over the traditional method of cleaning (for 38 robot cleanings per week)
- ROI is 344 robot cleanings or 2.3 months



"WE ARE ABLE TO DO 2-3 TIMES THE NUMBER OF JOBS AND THE OUTCOME IS BETTER... ALSO WE CAN MEET THE KAIZEN 'SHARED COST REDUCTION' NOW USING COLD JET AND STILL MAKE GOOD MARGINS ON THE JOB... LASTLY WE KEEP FINDING MORE APPLICATIONS WHICH CREATED MORE BUSINESS FOR US WITH THE SAME CUSTOMER"

THE SITUATION

Weld slag, spatter, resin, smoke, oil and dampering adhesive build up on production equipment. This causes misalignment and can prevent the proximity switch from firing in the appropriate spot. The robot stops welding – or welds incorrectly – creating scrap and causing equipment failure and production downtime.

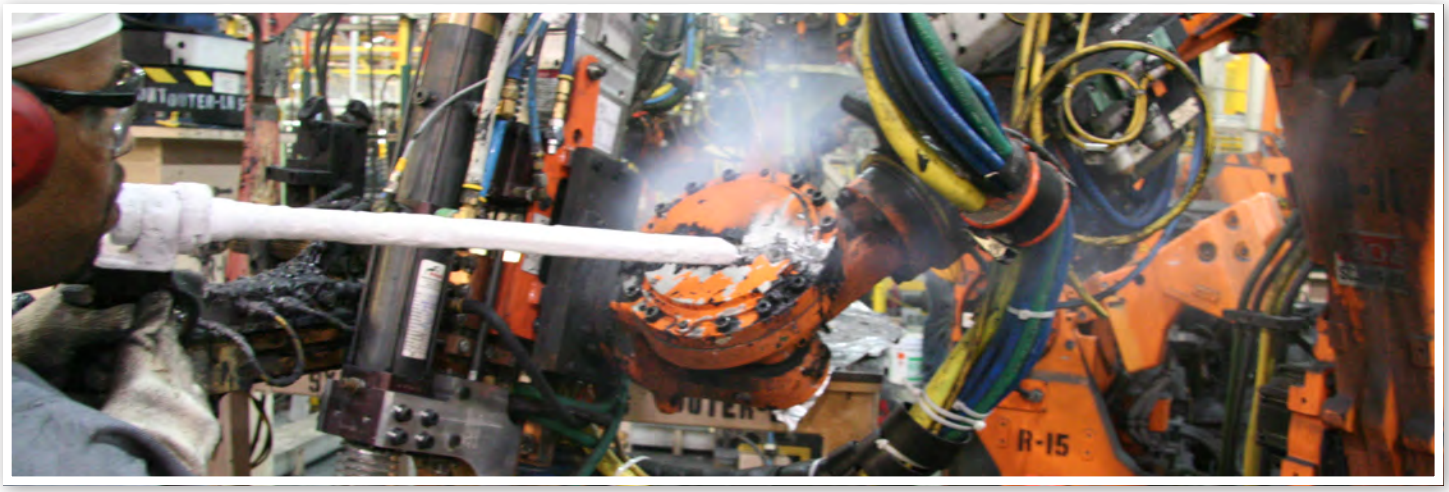
Traditional cleaning methods to remove weld spatter and slag from welding jigs, cells and robots – such as using a hammer and chisel – can damage the weld line equipment and ultimately lead to increased downtime.

Cold Jet dry ice cleaning systems provide an effective, economical and delicate removal solution for slag and spatter build up. Cold Jet's dry ice cleaning systems use non-abrasive media in the form of recycled CO_2 pellets that won't damage surfaces. The combination of dry ice cleaning's kinetic energy and thermal effects break the connection between the dirt and surface, lifting away contaminants. Unlike blasting with other media, dry ice cleaning does not leave behind any secondary waste, because the dry ice particles sublimate on impact – converting from a solid to a gas. Dry ice cleaning is safe and nontoxic, does not create downstream contamination and reduces exposure to dangerous chemical cleaning agents.

"We are able to do 2-3 times the number of jobs with dry ice cleaning and the outcome is better," said Steve Foster with Maclellan Integrated Services. "We can also meet the kaizen 'shared cost reduction' now using Cold Jet and still make good margins on the job. Lastly, we keep finding more applications for Cold Jet dry ice cleaning systems, ultimately creating additional business for us with the same customer."

THE PROBLEM

Modern development tools, simultaneous engineering and effective experimentation are equally important in high-modern injection molding. With 100 machines, the



"WE OFTEN AVOID CLEANING UNTIL THERE'S A PROBLEM OR THE ROBOT FIXTURE BREAKS... THIS WILL REALLY SAVE US TIME AND LABOR COSTS... I PLAN TO DEVELOP A PREVENTIVE MAINTENANCE PROGRAM BASED ON COLD JET."

company produces around 3,000 different products. There was one step in the work process that was still done manually: the cleaning of the injection molds.

"Clean tools are a must for the product quality," explains Dieter Stais, product manager of Marquardt for Riethem-Weilheim. "Contaminants cause damaged parts and waste. Therefore we clean in fixed cycles."

For manual cleaning, the tools needed to be removed, installed and aligned again. That's why they had a production downtime of four hours. In addition, the cleaning was not guaranteed, reliable and became staff related. It could also not be excluded, as the mechanical cleaning could lead to damage or increased wear on the tools. This process needed to be optimized.

THE SOLUTION

Using Cold Jet's Aero 40 single-hose dry ice cleaning system resulted in the following benefits when compared to hammering and chiseling:

- Reduced required labor from 4 workers to 1.
- Reduced labor time by up to 69%.
- Reduced cleaning costs by up to 60%.
- Drastically reduced equipment damage (though photoeyes and proximity sensors should not be deliberately or directly blasted).
- Dramatically decreased labor intensity because it is safer and more ergonomic for the worker, thus improving overall worker morale.
- Eliminated the use of chemical solvents, thus improving worker safety from the non-use of caustic chemicals.
- Eliminated secondary waste streams because dry ice is solid CO_2, which quickly sublimates and disappears upon contact with the surface being cleaned.

ROI / Cost Justification:

- Savings of $2,956 per station per week.
- Labor hours reduced from 7.2 to 0.5 per robot.
- $153,712 in annual savings over the traditional method of cleaning (for 38 robot cleanings per week).
- ROI is 344 robot cleanings or 2.3 months.

Industry Overview

Cold Jet
the force of nature

WELD LINE

Better Welds = Less Scrap and Downtime

Weld slag, spatter, resin, smoke, oil and dampering adhesive builds up on production equipment. This causes misalignment and can prevent the proximity switch from firing in the appropriate spot. The robot stops welding or welds incorrectly, creating scrap and causing equipment failure and production downtime. "No contact" dry ice blasting provides an effective and economical removal solution for slag and spatter build up.

KEY BENEFITS

- **Reduce scrap rates**
- **Reduce fixture repair**
- **Reduce replacement costs**
- **Environmentally responsible**
- **Minimize downtime**
- **Maximize tooling life**
- **No secondary waste**
- **Non-abrasive; won't damage sensors**
- **Clean online; no cool down required**
- **Replaces ineffective and costly labor intensive cleaning methods**

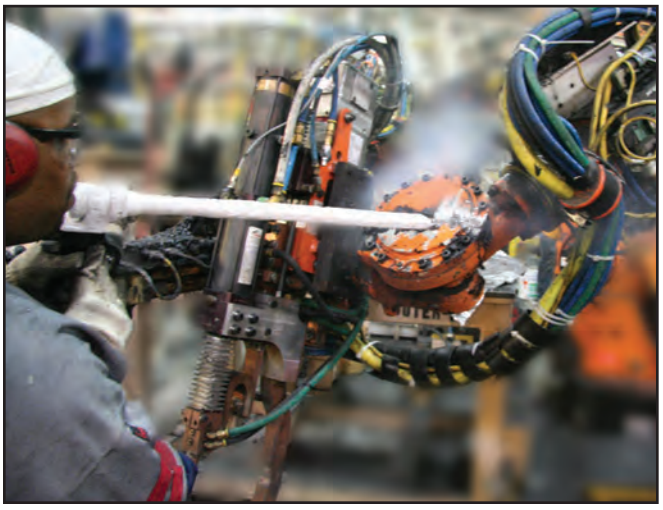
APPLICATIONS

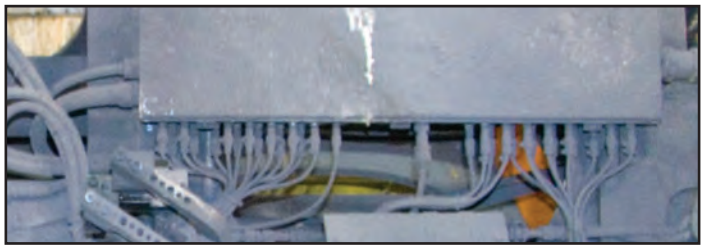
Diamond Plate
Fixture
Robot Joint
Shuttle Jig
Transfer Case
Trunnions
Weld Table

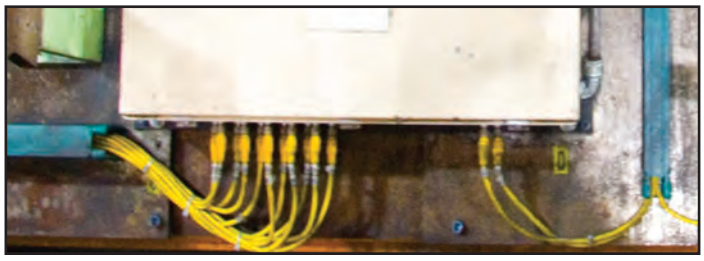
Join industry leaders already benefiting from Cold Jet dry ice cleaning systems.

HONDA
The Power of Dreams

Ford







Industry Overview

Cold Jet
the force of nature

FACILITY MAINTENANCE

Reduce cleaning time and production line disruptions

Dirt, soot, grease and oil buildup in production facilities causes machinery to function improperly and can create an unsafe working environment. Effective cleaning extends the life of electric motors, reducing or eliminating costly repairs, replacement or rental programs. However, manual cleaning is often delayed to prevent production line shutdown. Dry ice cleaning provides a quick, safe and economical solution that allows equipment to be cleaned in-place without disassembly or cool down.

KEY BENEFITS

- **Reduce cleaning downtime**
- **Environmentally responsible**
- **No secondary waste**
- **Eliminate wear and tear**
- **Non-abrasive process**
- **Clean in-place; no cool down required**
- **Enhances Total Productive Maintenance (TPM) programs**

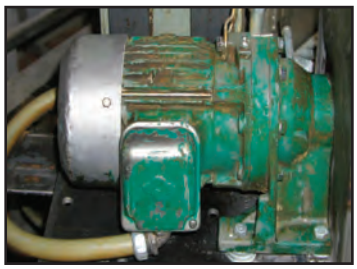
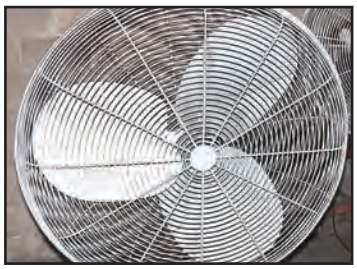
APPLICATIONS

Cooling Fan
Conveyor
Forklift

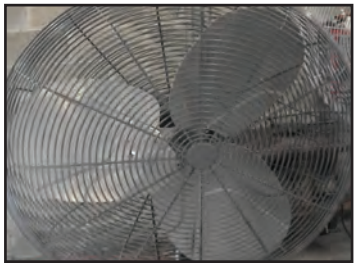
General Equipment & Facility
Motor / Electrical Box
Pipes and Hoses

Join industry leaders already benefiting from Cold Jet dry ice cleaning systems.

Hallmark OWENS-ILLINOIS P&G






Industry Overview

Cold Jet
the force of nature

AUTOMOTIVE

Reduce cleaning time by as much as 70%

Cold Jet dry ice cleaning has helped automotive companies cut their mold buildup cleaning costs by as much as $50,000 per year. Cold Jet's non-abrasive dry ice cleaning systems easily remove excess grease, sludge, sealant and weld slag from equipment. Dry ice blast cleaning is faster and more effective than traditional cleaning methods, in part, because it does not generate any secondary waste or leave any residual blasting media to clean up or dispose of.

KEY BENEFITS

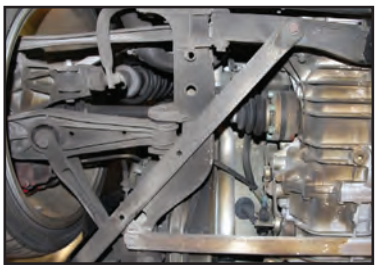
- **Reduce labor cost**
- **Reduce scrap**
- **Increase productivity**
- **Increase operator safety**
- **Non-abrasive process**
- **No secondary waste stream**
- **Environmentally responsible**

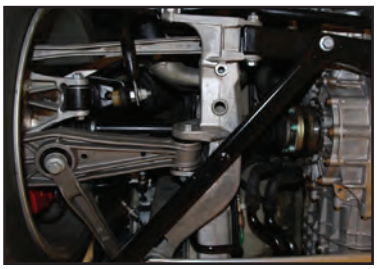
APPLICATIONS

Blow Mold
Compression Mold
Core Box
E-coat
Injection Mold
Paint Hook
Permanent Aluminum Mold
Transmission Housing
Urethane Mold
Weld Line

Join industry leaders already benefiting from Cold Jet dry ice cleaning systems.

BMW · Ford · GM General Motors · GOODYEAR We discover. You explore. · HONDA





Americas + 1800 337 9423 EMEA +32 (0) 13 53 95 47 Germany +49 (0) 6551 9606-0 Asia-Pacific +81 (0)3 6869 2665
www.coldjet.com www.icetechworld.com

Industry Overview

Cold Jet®
the force of nature

FOOD PROCESSING & PACKAGING

Less time, water and waste = Increased production and profit

Food processing and packaging equipment gets dirty with grease, wax, proteins, seasonings, crumbs, glue and other build-up. This prevents the equipment from operating at peak efficiency. Unfortunately, traditional manual cleaning methods are time consuming, ineffective and usually involve significant amounts of water and resulting waste. Dry ice blast cleaning offers a superior cleaning process that can reduce cleaning time by up to 80%, eliminate secondary waste and result in a significant reduction in overall cleaning costs.

KEY BENEFITS

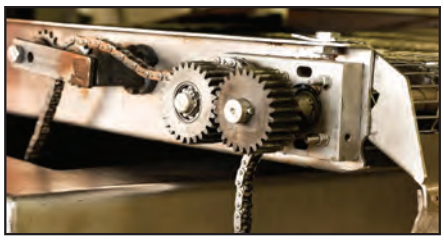
- **Reduce cleaning time**
- **No secondary waste**
- **Reduce water and sanitation costs**
- **Clean hot and online**
- **Non-abrasive; will not damage equipment**
- **Eliminate relubrication**
- **Reduce production downtime**
- **Food grade dry ice approved by FDA**
- **Dry ice cleaning has been effectively used in AIB inspected facilities**
- **Environmentally responsible process**

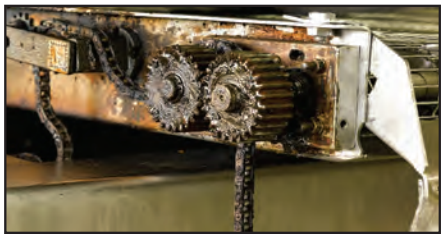
APPLICATIONS

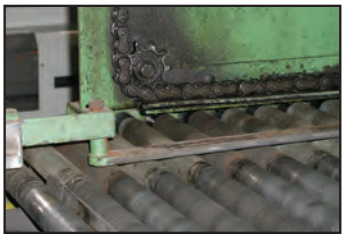
Bagger
Conveyor
Electrical Components & Motors
Food Mold
Labeler & Gluer
Mixer
Oven
Pack-off Table
Palletizer
Proof Box Grid
Radial Feeder (Ishida Weigher)
Slicers & Divider

Join industry leaders already benefiting from Cold Jet dry ice cleaning systems.

Coca-Cola · Frito Lay "food for the fun of it!" · Kroger · Sara Lee







Americas + 1800 337 9423 EMEA +32 (0) 13 53 95 47 Germany +49 (0) 6551 9606-0 Asia-Pacific +81 (0)3 6869 2665
www.coldjet.com www.icetechworld.com

Industry Overview

Red-D-Arc Blasterentals

Cold Jet.

POWER GENERATION

Peak performance with less outage time

Power generation professionals know one key to peak performance is clean electrical equipment. However, the demand to keep the equipment running often leads to deferred cleaning and maintenance, reduced efficiency and, in some cases, outages caused by flashover.

Dry ice blasting provides a non-conductive, environmentally responsible cleaning process that allows equipment to be cleaned in-place, without cool down or disassembly. In addition, the outage time typically needed for cleaning can be reduced up to 65%.

KEY BENEFITS

- **Reduce catastrophic failure**
- **Improve megohm readings**
- **Increase polarization indices**
- **Improve thermal dissipation**
- **Reduce outage time for cleaning by 65%**
- **Eliminate secondary waste**
- **Clean in-place; no cool down or disassembly**
- **Non-conductive**
- **Non-abrasive**
- **Environmentally responsible**

APPLICATIONS

AC/DC Motor
Circuit Breaker
Compressors & Generator
Field Frame
Insulator
Rotor
Substation Isolators and Bushing
Stator
Switch Gear
Transformer
Turbine

Join industry leaders already benefiting from Cold Jet dry ice cleaning systems.

CO2LDSWEEP DRY ICE BLASTING Solutions

GE Energy

ONTARIOPOWER GENERATION

Pratt & Whitney A United Technologies Company

SIEMENS

Industry Overview

Red-D-Arc Blasterentals

Cold Jet.

ENGINEERED WOOD

Increased safety and effectiveness = More profitability

Most cleaning processes utilize angle grinders which can be time consuming and dangerous and require cleaners to work within the machines, in close proximity to hot residues and dust. In addition, this manual cleaning method is ineffective due to unreachable areas of the machine where parts simply do not get cleaned. Dry ice cleaning provides a fast, safe and economical alternative to traditional cleaning methods.

KEY BENEFITS

- **Eliminate secondary waste**
- **Reduce downtime**
- **Clean in-place; no cool down required**
- **Reduce labor costs**
- **Non-abrasive process**
- **Reduce fire hazard**
- **Increase employee safety**

APPLICATIONS

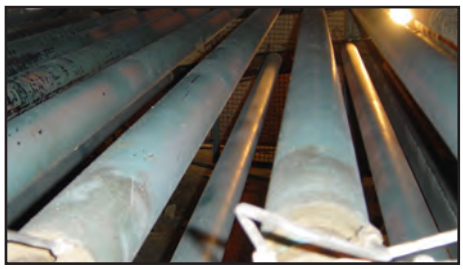
Dryer
Finger Joint Blade Holder
Glue Applicator
OSB Press
Peeler / Lathe
Pitch & Resin Removal
Sanding Belt
Ventilation Blades
Wet Scrubber

Join industry leaders already benefiting from Cold Jet dry ice cleaning systems.

Norbord®

TrusJoist™ Weyerhaeuser

UMD Duluth Natural Resources Research Institute



Industry Overview

Red-D-Arc Blasterentals

Cold Jet

OIL AND GAS

For non-destructive testing, inspection and surface preparation

Dry ice cleaning is an innovative cleaning technology that can save both time and money in the oil and gas industry. It is similar to other types of media blasting but utilizes recycled CO_2 in the form of solid dry ice particles as the cleaning media. Dry ice is a soft media and non-abrasive on many surfaces so it can be used to effectively clean delicate components and equipment without damage. Because it is a dry clean, it can be used around electronics and other sensitive components where cleaning with water or other solvents would normally be problematic. As the ultimate clean-in-place tool, dry ice minimizes disassembly and pre-job preparation time – and because the dry ice turns into gas upon contact with the substrate, cleanup time and disposal costs are reduced and foreign grit contamination to sensitive moving parts is eliminated.

KEY BENEFITS

- **Faster, better clean**
- **No secondary waste stream**
- **No damage to refractory**
- **No acidic damage or caustic etching**

APPLICATIONS

Convection section or re-boiler
Fin-fan
Heat exchanger
Interior & exterior wall cleaning
Pipeline
Production equipment
Reactor screen
Rotating equipment
Surface preparation of pressure vessels
Shell side tube bundle
Sulfur removal

Join industry leaders already benefiting from Cold Jet dry ice cleaning systems.

GE
EXXON
Shell
Mobil

Industry Overview

Red-D-Arc Blasterentals

Cold Jet

FOUNDRY

Reduce cleaning time = Less downtime

A major issue for the foundry and forging industries is the downtime caused when cleaning permanent aluminum molds, core box vents, semi-solid castings and die casting machines. Typical manual cleaning methods require cool down, disassembly, unproductive hours of messy hand cleaning or bead blast cleaning and then reassembly. In addition, most traditional cleaning methods are not fully effective and often result in damage to the part or equipment.

Dry ice cleaning offers significant improvement in cleaning times (up to 60%) as well as reduction of damage to equipment and resulting scrap product. Dry ice blast cleaning allows for a non-conductive, in-place method to clean parts and even touch-up cleaning is safe and easy.

KEY BENEFITS

- **Reduce production downtime**
- **Eliminate mold disassembly**
- **Clean better, hot and in-place**
- **Eliminate waste disposal cost**
- **Increase production time**
- **Non-abrasive, no damage to tooling**
- **Environmentally responsible**
- **Delivers superior as-cast inish**

APPLICATIONS

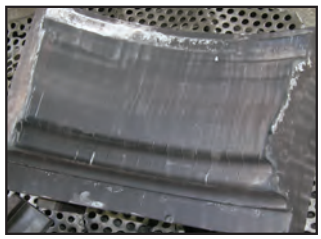
Conveyor
Core Box and Vent
Die Cast Tooling
General Equipment & Facility
General Part Cleaning
Permanent Aluminum Mold
Refractory Coating
Remove Resins & Release Agents
Semi-solid Casting / Forging
Shell Core Mold

Join industry leaders already benefiting from Cold Jet dry ice cleaning systems.

ALCOA

GKN Automotive

nemak



Red-D-Arc Blasterentals

Cold Jet
the force of nature

Available at reddarc.eu

reddarc.eu

Civil War Monument

HISTORICAL RESTORATION CASE STUDY

DRY ICE CLEANING REMOVES 136 YEARS OF DIRT IN HALF THE TIME AND AT HALF THE COST

COMPANY
Hightstown (New Jersey) Historic Preservation Commission

APPLICATION
Remove 136 years of dirt and grime from an Italian marble Civil War monument

COLD JET SYSTEM
Aero 40

BENEFITS
By eliminating time spent on containment and disposal of secondary waste, workers were able to clean the historic monument using dry ice technology in less than half the time and cost it would take using alternate methods.

Delicate historic details were preserved because of the adjustable blast pressure.

"BY USING DRY ICE BLAST CLEANING THROUGH USCLEANBLAST.COM, THE HIGHTSTOWN HISTORIC PRESERVATION COMMISSION WAS ABLE TO RESTORE THE 1875 CIVIL WAR MONUMENT TO ITS ORIGINAL GLORY. AS A RESULT, THIS TOWN ASSET CAN BE ENJOYED AND APPRECIATED BY LOCAL CITIZENS IN THE WAY IT WAS MEANT TO BE SEEN."

THE SITUATION

The Hightstown Historic Preservation Commission (HHPC) from the Borough of Hightstown, New Jersey was overseeing a $1.7 million streetscape project funded by the American Recovery and Reinvestment Act. Restoring a Civil War memorial was part of the project. The monument was erected in 1875, and is engraved with the names of 35 local soldiers who died in the United States Great Rebellion. The 23-foot high obelisk is carved from unpolished white Italian marble and rests upon a large block of American granite in tribute to the local heroic volunteers. Beneath the monument, resting upon granite blocks, are four Confederate Parrot guns known as the Brooke-type cannon.

THE PROBLEM

As part of the overall streetscape project, the HHPC wanted to restore this monument to its original state in preparation for the 150th anniversary of the Civil War. The monument had never been cleaned since being erected in 1875. It sits in a triangular park between two streets, and was coated with 136 years of traffic grime, minerals and dirt. In fact, the granite eagle at the top of the monument, once white, was completely black.

"This monument had never been properly cleaned since 1875," said Daniel Buriak, project leader for the HHPC. "It had been hosed off or power washed to no avail, because of centuries of grime."

The architect had originally specified the project for soda blasting. This method would have not only been abrasive to this historic structure, but would have required additional containment, costing more money.

The detailing on the monument was a big concern. The great seals of the United States, New Jersey and Mercer County are chiseled into the white marble above tablets bearing soldiers' names. The front exhibits full size carvings of a Springfield rifle, a sword and standard. In addition, the marble eagle sitting on top of the monument has very delicate wings. Many areas on the monument – some carved as thin as 1/8" – caused concern for those in charge of this restoration.

CS.2017.08.08

"IN ORDER TO PRESERVE THE EAGLE'S WINGS, THE NAMES CARVED INTO THE MARBLE AND THE VERY THIN DETAILS LIKE THE STRAP ON THE GUN, I HAD TO ADJUST THE PRESSURE. EVERYTHING CAME OUT GREAT."

"We were very worried about the potential of damaging the structure during cleaning," said Buriak.

USCleanBlast.com, the contractor on the job, suggested that the HHPC, which had originally considered soda blasting, instead try dry ice cleaning. USCleanBlast.com, uses Cold Jet systems to clean many of their historic projects and knew that the method would be safer and gentler on this detailed structure.

THE SOLUTION

After USCleanBlast.com was able to convince the restoration team that they would benefit most from dry ice cleaning, the project moved forward. Cold Jet's dry ice cleaning system uses non-abrasive media in the form of recycled CO_2 pellets that won't damage surfaces. The dry ice media, blasted using pressurized air at user-controlled speeds, sublimates upon impact with the surface being cleaned, lifting away dirt and contaminants safely, without leaving behind any secondary waste.

"While the architect had first asked for soda blasting, we knew it would cost twice as much," said Bobbi Monacelli, owner of USCleanBlast.com. "With dry ice cleaning there is no secondary waste and no extra setup to contain any contaminates. In addition, with the historic details on this monument, we felt that dry ice cleaning would be the right answer."

THE RESULTS

Using the Cold Jet Aero 40, Tom Monacelli, field supervisor at USCleanBlast.com, was able to successfully clean the monument's old white carved surfaces. The dry ice cleaning easily lifted contaminates without leaving behind any secondary waste.

"In order to preserve the eagle's wings, the names carved into the marble and the very thin details like the strap on the gun, I had to adjust the pressure. Everything came out great," he said.

Most of the structure took only one pass to clean off. Where there was green moss or algae, a second pass completely cleaned it off.

"Of course, I was extremely nervous," said Buriak, "but we couldn't be happier with how it turned out. It was interesting that when it was being done, it almost looked like the monument was being spray painted white – that is how black it was in sections.

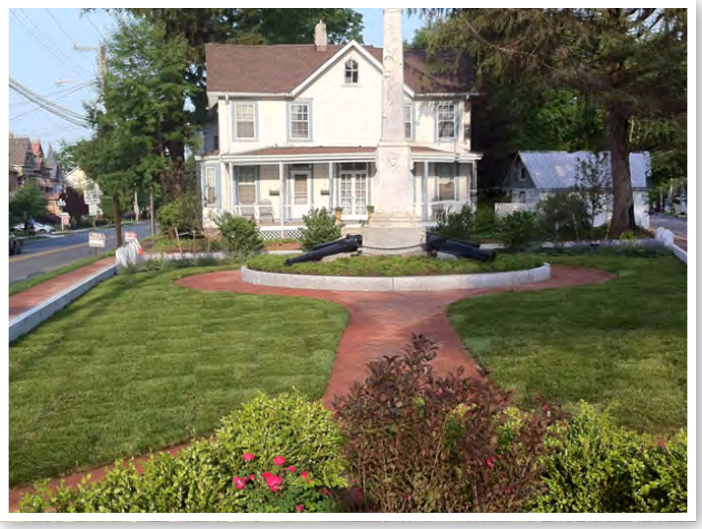
"USCleanBlast.com was very careful while cleaning this structure. They began the project by analyzing the state of the monument and then were very sensitive in the way they applied pressure. Where carvings were detailed – the rifle trigger, for instance, or the small pieces like the Seal of New Jersey which had faces with eyes, or the names carved on the sides of the monument – they backed off pressure to prevent erosion. Sections of the monument had old damage and cracks, but they lightly touched those areas so as not to cause further damage. It is now cleaned up nearly to its original linen white state, which is what we really hoped for."

"I went into this project thinking we would use soda blasting," said Buriak. "But when we used dry ice cleaning we didn't have to cordon off anything, put up scaffolding, cover other

areas, and there was no debris flying around. There was literally no mess. It was wonderful because this monument was part of a very large construction project and there was a lot going on with adding landscaping, granite walls and brick walkways to the park. If we would have had to contain the soda or sand, it would have been a complicated, longer process. So a fringe benefit to dry ice cleaning was that it was so clean and executed so easily. This is something I had not even considered at the beginning of the project but that I came to really appreciate."

With dry ice cleaning, the cost of the monument restoration was $7,000, instead of the $16,000 quoted for soda blasting, allowing the HHPC to apply that money saved in other areas of their streetscape project. The dry ice cleaning was done in one and a half days, with two workers, and the extra day was only needed because a boom lift needed to be obtained to comfortably reach the eagle. This was done in less than half of the time and manpower it would have taken to use soda blasting.

"The best part was that the dry ice cleaning cost half as much as the soda blasting," said Tom Monacelli. "With soda blasting, I would have needed to hire union scaffold workers to erect and envelope the scaffolding, I would have needed to put negative air on the monument and at the end would have needed to perform the cleanup – doubling the price and length of the job. With dry ice technology, we cleaned the monument and were done."



Cold Jet Dry Ice Blasting Equipment is available for rent from Red-D-Arc Welderentals. Visit reddarc.eu for more details.

Red-D-Arc Blasterentals

'Rising' Sculpture Rejuvenated After Cleaning

Cold Jet the force of nature

reddarc.eu

HISTORICAL RESTORATION CASE STUDY

Dry ice used to successfully clean delicate and expensive work of art

COMPANY
EcoJet Inc. Dry Ice Blasting

APPLICATION
General Maintenance, Sculpture Cleaning

COLD JET SYSTEM
Aero Series

BENEFITS
Dry ice used to successfully clean delicate and expensive sculpture.

"Using the Aero 40 HP with dry ice pellets worked very well for this project. Cleaning this sculpture demonstrated how delicate – yet aggressive – this process can be just by varying nozzle type, nozzle length and pressure."

THE SITUATION

One of China's most influential contemporary artists, Zhang Huan, advocates protection for the environment through much of his work and 'Rising', the famous sculpture on University Avenue in Toronto, is no different. The polished stainless steel sculpture is comprised of countless doves – the international symbol of world peace – and a twisted tree branch that resembles the body of a dragon, thus drawing an analogy to the fragile conditions facing the planet. The large-scale, outdoor piece of art measures about 20 meters by 20 meters and weighs approximately 22 tons.

The sculpture was installed approximately one year ago and the city dust and airborne pollutants have taken their toll on the original shine of the exterior. The sidewalk dust, exhaust soot, brake dust, tire rubber and acid rain of Toronto's busy University Avenue have collected on the sculpture and also on the 40 foot glass wall that sits directly above the sculpture. When it rains, all of these contaminants are washed down on top of the sculpture, leaving behind unsightly streaks. 'Rising' was in desperate need of cleaning and it was important to find a cleaning method that would neither damage the $5 million dollar piece of art nor leave behind any streaking or debris residue.

THE PROBLEM

The site developers considered having the sculpture cleaned by hand but this would mean that workers would have to climb on the sculpture in order to effectively clean every area and, when considering the delicacy and value of the sculpture, this was a risk they were not willing to take. They also considered power washing but knew that the water would only displace the dirt and leave behind a residue. They decided that dry ice cleaning would be the best option to effectively clean the sculpture.

THE SOLUTION

EcoJet Inc. Dry Ice Blasting is a dry ice cleaning contractor based in the greater Toronto area, serving the province of Ontario and beyond and specializes in restoration and

BEFORE

AFTER

remediation as well as cleaning in the general manufacturing, food processing, aircraft, foundry, marine and power generation industries. Mike McGraw, owner of EcoJet Inc. Dry Ice Blasting, suggested using Cold Jet dry ice cleaning equipment to clean the sculpture.

Cold Jet's dry ice cleaning systems use non-abrasive media in the form of recycled CO_2 pellets that won't damage surfaces. The combination of dry ice cleaning's kinetic energy and thermal effects break the connection between the dirt and surface, lifting away contaminants. Unlike blasting with other media, dry ice cleaning does not leave behind any secondary waste, because the dry ice particles sublimate on impact – converting from a solid to a gas. Dry ice cleaning is safe and non-toxic, does not create downstream contamination and reduces exposure to dangerous chemical cleaning agents.

"The applications, industries and possibilities are endless with dry ice cleaning," said McGraw. "And Cold Jet products are not only the best in the business, but their customer support has been indispensable to us."

EcoJet Inc. Dry Ice Blasting used a Cold Jet Aero 40 HP with a variety of nozzle types and lengths to successfully clean the sculpture. The dry ice cleaning easily lifted contaminants without leaving behind any secondary waste or residue. A 5E0175, 312V2 and modified 312V2 nozzle were all used and it took approximately 5 days and 3,200 pounds of dry ice to clean the sculpture. In addition to dry ice, a polishing solution was also used in order to remove all of the staining and oxidation.

"Using the Aero 40 HP with dry ice pellets worked very well for this project," said McGraw. "Cleaning this sculpture demonstrated how delicate – yet aggressive – this process can be just by varying nozzle type, nozzle length and pressure."

'Rising' has been brought back to 'like new' condition and EcoJet Inc. Dry Ice Blasting has signed on to perform biannual cleanings of the sculpture.

"The applications, industries and possibilities are endless with dry ice cleaning. And Cold Jet products are not only the best in the business, but their customer support has been indispensable to us."

Electric Motor Cleaning & Energy Management

Red-D-Arc Blasterentals

Cold Jet

ELECTRIC MOTOR CASE STUDY

CLEANING ELECTRICAL MOTORS WITH DRY ICE

COMPANY
Motor Techniques, Inc.
Dry Ice Blasting Technologies
a division of Houston-Johnson

APPLICATION
Electric Motors

COLD JET SYSTEM
Aero Series

BENEFITS
The Cold Jet systems can clean on and around hydraulic power units and electrical power and distribution components and minimize the disposal of hazardous wastes. When pertaining to general maintenance and facilities cleaning, cleaning time can be reduced up to 80% with Cold Jet dry ice cleaning.

"WITH THE FLEXIBILITY TO QUICKLY RESTORE AND RECONDITION VARIOUS SIZES AND TYPES OF INDUSTRIAL EQUIPMENT AND MACHINERY WITH COLD JET DRY ICE CLEANING, WE MINIMIZE THE COSTLY DOWNTIME AND DISRUPTION GENERALLY ASSOCIATED WITH INDUSTRIAL CLEANING."

THE SITUATION

Manufacturers and service providers are feeling the effect of today's energy expense and price increases. In the vast majority of industries, energy management has no traditional place on the organizational chart, in job descriptions or in performance outcomes. Most decision makers believe the solution to the problem is to find the lowest available energy prices.

Electric motors account for up to 80% of all available electric energy used by an industrial site. They also waste up to 50% of electric energy due to inefficient motor optimization. Some reasons for these inefficiencies include: high ambient temperatures, unbalanced voltage, improper loading, inadequate ventilation, misalignment, vibrations, improper lubrication, defective drive components and most importantly, contamination.

Contamination is a surface coating that causes electric motors to run hotter than normal. By design, electric motors have cooling fans that draw air over the external shell. If not properly cleaned, contamination will build up over time and clog and defect the motor's ability to cool itself and run at ambient temperature. Hot, contaminated motors running in these conditions increase the amount of energy and thus, increase the cost the motor needs to operate.

"When dirt, soot, grease and oil build up in production facilities over time, machinery can begin to overheat and function improperly, leading to potential failure and creating an unsafe working environment," said Greg Battle, President and CEO of Motor Techniques, Inc. "A clean electric motor runs cooler and also uses less energy than a dirty one. In order to fully decontaminate an electric motor and increase motor optimization, it must be thoroughly cleaned."

THE PROBLEM

The most common way to clean electric motors is to take them out of service and clean manually with rags and industrial solvents. To avoid this interruption in production, cleaning is often delayed extensively, which leads to an inefficient motor and/or eventual motor failure.

BEFORE

AFTER

Most of the industrial solvents used have a very low flash point, creating a fire hazard and possible outages. They also emit unhealthy fumes and the manual application of the solvents leaves secondary debris such as lint and cloth on the motor surfaces.

Additional methods of motor cleaning include soda blasting, walnut shell blasting and pressure washing or steam cleaning. Soda and shell blasting can be too abrasive for the motors and require a system shutdown. Pressure washing or steam cleaning the electrical system of a hot, running motor can create a highly dangerous situation. These methods are also time intensive and leave behind debris.

THE SOLUTION

Dry Ice Blasting Technologies (DIBT), a division of Houston-Johnson, Inc. (HJI), is a leading provider of dry ice cleaning services. Motor Techniques, Inc. (MTI) specializes in tracking and monitoring motor performance. Both companies are certified minority business enterprises and bring years of expertise in helping customers realize operational efficiencies while reducing energy costs. DIBT and MTI, in cooperation with each other, established a joint venture company, Conservation Solutions. Conservation Solutions provides methods to locate, analyze and improve performance of industrial electric motor systems, restoring them to peak performance, with minimal disruption to client operations.

Conservation Solutions was the first to recommend Cold Jet dry ice cleaning for motors. They have discovered an overall cost savings – with both electricity usage and man hours – when using dry ice versus alternative methods.

Cold Jet dry ice cleaning provides a quick, safe, non-toxic and economical cleaning solution for facilities, industrial equipment, machinery, machine tools and assembly line equipment. It has met the Electrical Industry's challenge of operating efficiency and uptime because dry ice cleaning can restore both rotating and stationary electrical equipment to peak performance with dramatically shorter outages.

Dry ice cleaning cleans in-place without major disassembly or cool down and is non-abrasive, non-conductive and non-corrosive. It is a completely dry and clean process as it does not use water. The cleaning media, dry ice, sublimates upon impact, disappearing without adding secondary waste. The only waste is the material being removed. The Cold Jet systems can clean on and around hydraulic power units and electrical power and distribution components and minimize the disposal of hazardous wastes. When pertaining to general maintenance and facilities cleaning, cleaning time can be reduced up to 80% with Cold Jet dry ice cleaning.

"With the flexibility to quickly restore and recondition various sizes and types of industrial equipment and machinery with Cold Jet dry ice cleaning, we minimize the costly downtime and disruption generally associated with industrial cleaning," said Derek Bland, Vice President of New Business Development for Houston-Johnson, Inc. and DIBT.

THE RESULTS

Conservation Solutions has analyzed multiple projects before and after the use of dry ice cleaning in order to gauge the effectiveness and overall time and cost savings. The cost savings for using dry ice can be figured in Mega-watts and man hours. In order to obtain their results, they used a CSI 510 non-contact infrared scanner gauge that measures the detection of contaminated hot motors. The scanner measures 0-1600 degrees within 99% accuracy. They

measure the load (energy required for a particular job) before and after cleaning. A Mega-watt has a standard flat cost to the facility and using less Mega-watts to clean results in a direct savings to the company. The savings are instant and can be calculated as soon as the cleaning is complete and verified by the gauges. Alternative methods are much slower and require excessive man hours for secondary clean up.

SUCCESSFUL SOLUTION FOR AUTOMOTIVE MANUFACTURER

An automotive manufacturer in Michigan had a bank of five 300 horsepower motors, each totaling $100k to run each year. In order to decrease their annual spend, they reached out to Conservation Solutions. After disassembly, two inches of contamination was discovered on each motor that had built up over time and from lack of regular cleaning and maintenance. Cold Jet dry ice cleaning was used to remove the surface contamination and then a putty knife was used to clean the inside of the motor cap surface. The contamination on the inner and outer cap weighed a total of 2.7 lbs. After implementing regular cleaning with dry ice, there was an instant energy savings of 42% for the company.

COLD JET DRY ICE CLEANING WAS USED TO REMOVE THE SURFACE CONTAMINATION ON A FAN COVER AT AN AUTOMOTIVE MANUFACTURER IN MICHIGAN. AFTER IMPLEMENTING REGULAR CLEANING WITH DRY ICE, THERE WAS AN INSTANT ENERGY SAVINGS OF 42% FOR THE COMPANY.

PROVEN RESULTS FOR INDUSTRIAL DRY CLEANER

An industrial dry cleaning company had a major problem with contamination because the motors were subjected to dirt, water and wet lint daily. An analysis by Conservation Solutions found the average motor temperature was reduced by 27 degrees after utilizing Cold Jet dry ice cleaning, thus resulting in a cutback of 30-40% on their energy bill.

ADDITIONAL BENEFITS FOR CLEANING MOTORS REGULARLY INCLUDE:

- DoE Energy credits
- Energy Star certification
- Significant reduction in utility bills
- Increased motor life
- More reliable motor system operation
- Fewer production interruptions
- Increased belt and coupling life

This cleaning method can also help toward eliminating defects, reducing overall cost and achieving certification for Six Sigma or Kaizen programs. Dry ice cleaning is fast and effective and addresses the need for quick results when capturing raw before-and-after data for these programs.

Using dry Ice cleaning instead of traditional industrial cleaning systems restores optimal operating conditions quickly, protects equipment longevity and minimizes disruptions to productivity. This results in an overall increase in energy efficiency, conservation and sustainability.

For more information on DoE Energy credits, please visit:

www.energy.gov/savings

www.energystar.gov/industry