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NewTech Industrial Corporation

Golden Gate Bridge uses NEUTEK® Extractor/Dryers®

It's one of the biggest paint jobs in the word—and probably the toughest. Keeping the structural steel and wire cables of San Francisco's Golden Gate Bridge covered with a protective coating of its distinctive international orange paint is a monumental job for the permanent crew of the painters, ironworkers, and operating engineers.

It's a job that, practically speaking, never ends. The total length of the bridge, including the approaches, is 8,981 feet, or 1.7 miles. The length of the suspension span, both main and side spans, is 1.2 miles. Each of the two main cables is 7,650 feet long. The towers are 746 feet above the water. It all has to be painted, every square food.

Like all paint job, big or small, surface preparation is the key to quality. Golden Gate painters use a compressed-air-operated abrasive blasting system to remove oxidized, loose and chipped paint prior to applying a new coat. In a typical operation, surfaces are blasted in the morning, weather permitting, and painted with a primer base coat in the afternoon.

Getting The Most Value From Compressed Air

Compressed air is a cost-effective power source for many industrial applications. However, it requires treatment before use because ambient air contains contaminants that are drawn into the compressor. Dirt and dust, liquid water and water vapor find their way to compressed air lines and seriously affect the performance of air-operated tools by causing sticky valves, rust and corrosion, air leaks, and pressure drops. In the Golden Gate painting operation, water and oil droplets in the air line not only reduced the nozzle pressure of the blasters, they also mix with the abrasive medium to produce a sticky, rough surface that dose not allow the paint to adhere properly.

“Keeping the compressed-air-operated blasting equipment running in top condition requires that the air be treated at the point of use, just before it reaches the hand-held blasters,” said Rich Kastan, Golden Gate Bridge Chief Operating Engineer.

The biggest culprit is water. Atmospheric air entering a compressor always contains water vapor, particularly at a location like the Golden Gate. When air is compressed it is heated. While compression concentrates the water vapor, the higher temperature air has a greater capacity to hold it. When compressed air travels downstream to tools and equipment it cools, condensing the vapor into water droplets. Without some type of in-line treatment, water reaches equipment.

To help overcome the problem, Golden Gate operating engineers installed a NEUTEK air filtration system, manufactured by NEUTEK Corporation, Port Orange, Florida, at the point of use of the blaster to reduce the percentage content of water and oil in the air. The filtration system is used in conjunction with a cooling tower at the compressor end of the airline.

At the Golden Gate Bridge, compressed air for the painting operation is generated by a combination of from six to eight Ingersoll-Rand 600 compressors to produce compressed air at point of use of 120 PSIG. The air is first routed through a cooling tower consisting of 12 rows of 6-inch diameter, 30ft. long tubing. “As the air travels back and forth through this cooling tower, water vapor condenses and drops out of the air, “Kasten said.

Form the tower, the air travels in a 6-inch line up the SI pylon at the southern end of the bridge to the roadway level and then runs to the north anchorage, across the entire length of the bridge. Along that run there are T connectors with knock-off and twist-off and twist-grip fittings installed each 50 feet so that maintenance personnel can tap into the line at convenient intervals. Three-inch lines are connected to the Ts and run to the filtration system. The blasters are connected to the downstream side of the filtration system.

The system is made up of five NUETEK Model 180 Extractor/Dryers, mounted semi-permanently on the bridge structure. The Extractor/Dryers features a three-chambered filtration system that removes water and contaminants without the need for an additional power source. In the filter's first chamber, a coalescing effect occurs as compressed air passes through a polypropylene cartridge mesh filter that causes the compressed air to change direction, knocking out larger water droplets. The second chamber is a quiet zone with a honeycomb base where the water droplets collect for drainage. In the third chamber, air passes through a wire-supported 5-micron filter cartridge where any remaining moisture is vaporized and contaminants are trapped. The Extractor/Dryer can remove as much as 95 percent of the water in the line, with nearly all of the remainder converted to harmless water vapor. Airflow capacity of the Model 180 is 500 SCFM with a maximum pressure of 150 PSIG. Dew points rang from 10° F to 35° F at atmosphere.

Portability And Easy Maintenance

The semi-permanent mounting of the Extractor/Dryers on the bridge structure is a unique aspect of the Golden Gate operation. They are held in place with special brackets designed by the operating engineering department. The Extractor/Dryers can be moved to a new location easily by removing a pin and bolt that holds them securely in the bracket. When one section of the bridge has been cleaned for painting the Extractor/Dryers are simply moved to the next section where they are connected by a "bull hose" to the blasters.

"The Extractor/Dryers replaced vertical air traps that were previously installed throughout the bridge structure", said Rich Kastan, Chief Operating Engineer. Air enters the top of these traps and travels through a central tube where the moisture condenses and drops to the bottom of the vessel. Treated air exits through a valve on the side of the unit. While the vertical air traps where effective at removing moisture at the point of use, they weighed 200-300 pounds and were cumbersome to move.

“The air traps were considered pressure vessels, as well,” Kastan said. “They had to be inspected and certified on a regular basis.”

How do the smaller, more portable Extractor/Dryers stand up to the weather conditions on the bridge? Quite well, according to Kastan. The aluminum canisters that hold the filter elements have proven to be highly resistant to the salt air and high wind that constantly buffets the bridge.

“We have a regularly scheduled preventative maintenance program for the filtration systems that includes an inspection in place. We also bring them to the shop every four to six months to clean or replace the filter elements and steam clean the inside of the canisters,” Kastan said. The Golden Gate maintenance staff also stocks spare Extractor/Dryers that are used to replace the units removed from the bridge.

“Maintenance is quick so we’re usually able to replace the units right away,” Kastan said. “The only modification we’ve made is using stainless steel bolts with an anti-seize compound to resist corrosion caused by the salt air.”

Kastan said that currently there are four paint crews working, two on inside scaffolding and on outside scaffolding.

“Keeping the supply of compressed air running cleanly to the blasters is helping us to meet our painting schedules,” he said.

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NEUTEK® *CORPORATION*

We Make Compressed Air Work®

Manke Lumber Company

POINT-OF-USE COMPRESSED AIR EXTRACTOR-DRYER HELPS REDUCE MAINTENANCE COSTS AT NORTH WEST LUMBER MILL

Compressed air as a power source in industrial applications has the unique advantage of a high power-to-weight or power-to-volume ratio. But keeping compressed-air-operated equipment running with unnecessary downtime required attention to the condition of the air, particularly its moisture, as it reaches the point of use.

At Manke Lumber Company in Sumner, Washington, the installation of a compressed air filtration system has helped the company reduce maintenance costs and add an extra margin of safety to a critical production operation.

Manke Lumber Company operates a large sawmill in East Sumner and a second mil in Tacoma, cutting dimensional raw lumber from logs. After the lumber is sawed into useable sizes it must be seasoned by drying in a kin. Prior to drying, the lumber is stacked into units that vary in size according to the size of the stock. For example, a unit can range from 8 boards across and 16 boards high for 2” X 6” stock to 6 boards across and 7 high for 4” X 6” stock. Length runs to 24”. During the unit stacking operation, 5/8” X 1 1/2” and 1/4” X 1 1/2” wooden stickers, or separators are placed between each row of green lumber so that hot air can pass between each row and dry the unit evenly.

When the lumber is dry, it is processed through a de-sticker machine to remove the wooden separators. In the de-sticking operation, fried lumber units are loaded onto a roll case and tipped to a 45◦ angle on a tilt hoist. The tilt hoist than runs the unit to the top of the hoist where the top row of lumber slides off and the sticker fall to a conveyor belt below. The lumber itself falls to a conveyor belt below. The lumber itself falls to

a chain deck where it is takes to a stacking machine. When the first lumber unit has had the separators removed, the tilt hoist operator depresses a foot pedal that engages the hoist mechanism to lift another unit to the top of the hoist.

Air And Water Make Bad Mix

The de-sticker machine is run by a 5 hp Worthington air compressor connected to the machine by a 150’ overhead air line. The long distance between the compressor and the hoist caused water vapor to condense, creating a dangerous operating condition.

In most industrial compressed air applications, liquid water is an unavoidable problem. It’s a matter of physics. Compressing ambient room air to 100 PSI, for example, increases the trapped humidity about eight times. If ambient humidity is above 12.5 percent, the air saturates a line pressure, and subsequent cooling forms liquid water.

Moisture in the air can rust and corrode pipes and valves resulting in a loss of pressure at the point of use, plus water leaches our additives in air line lubricants causing accelerated wear of pneumatically-operated components.

“The moisture created the biggest problem during the winter months,” said Steve Perovich, Manke Lumber Maintenance Supervisor. “The water would freeze and lock up an air valve on one of the clutches that controlled the tilt hoist. The sticking valve would cause the hoist to run out of control, often breaking the operating chains and loading arm bolts resulting in unnecessary maintenance downtime.”

Extractor/Dryer Reduces Maintenance Costs

To remedy the problem, the maintenance crew installed a compressed air filtration system at the pint of use in the air line that feeds the de-sticking machine.

The system, a NUETEK Model NT-107 Extractor/Dryer, manufactured by NewTech Industrial Corporation, Port Orange, Florida, features a three-stage filtration system that

removes water and contaminants without the need for an additional power source. In the filter's first stage, a coalescing effect occurs as compressed air passes through a polypropylene cartridge mesh filer that causes the compressed air to change direction, knocking out water larger droplets. The second stage is a quiet zone with a honeycomb base where the water droplets collect for drainage. In the third stage, air passes through a wire-supported 5 micron fiber filter cartridge where any remaining moisture is vaporized and contaminants are trapped. The Extractor/Dryer can remove as much as 95 percent of the water in the line, with nearly all of the remainder converted to harmless water vapor.

Airflow capacity is 50 SCFM with a maximum pressure rating of 250PSIG. Dew points rang from 10◦ F to 35◦ F at atmosphere. At Manke Lumber, compressed air used in de-sticking operation is 100 PSIG regulated to 8-PSIG.

The NUETEK filtration systems, along with a re-design of the hoist brake so that if air pressure drops suddenly a spring activated mechanism automatically engages the brake so stop the hoist, has eliminated the problem, and the costs associated with it.

"The maintenance requirement for the Extractor/Dryer itself is minimal," Perovich said. "An oiler on the maintenance staff is responsible for checking filter operation, and that consists chiefly of making sure the week drain is operating properly."

When filter elements need to be replaced, the Extractor/Dryer does not have to be removed from the line. Maintenance personnel simply loosen the top bolts, remove the corner bolts and then side out the used filter elements. The entire operation takes only a few minutes.

Adding A Larger System

Based on the performance of the initial air filtration system, Manke Lumber is installing a larger,

second unit that feeds valves that control a variety of air cylinders, kickers, and log stops.

“When we get more water than oil in the line, the valves start kicking,” Perovich said. “When that happens, we have to either pull the tops of the valves and ‘unstick’ them by pulling up on the plunger, or pump extra oil into the line to free them up.”

This unit, a NUETEK Model 110 Extractor/Dryer has a 3/4” intel and will be installed in a line that runs from a 200 HP and 100 HP Sulair compressors.

“This system has just been installed and we are evaluating its performance,” Perovich said. “The Dryer –Extractors are the only compressed air conditioners that we use, and we’ve been satisfied that a solution as simple as these systems has helped reduce our maintenance costs.”