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MAGAZINE

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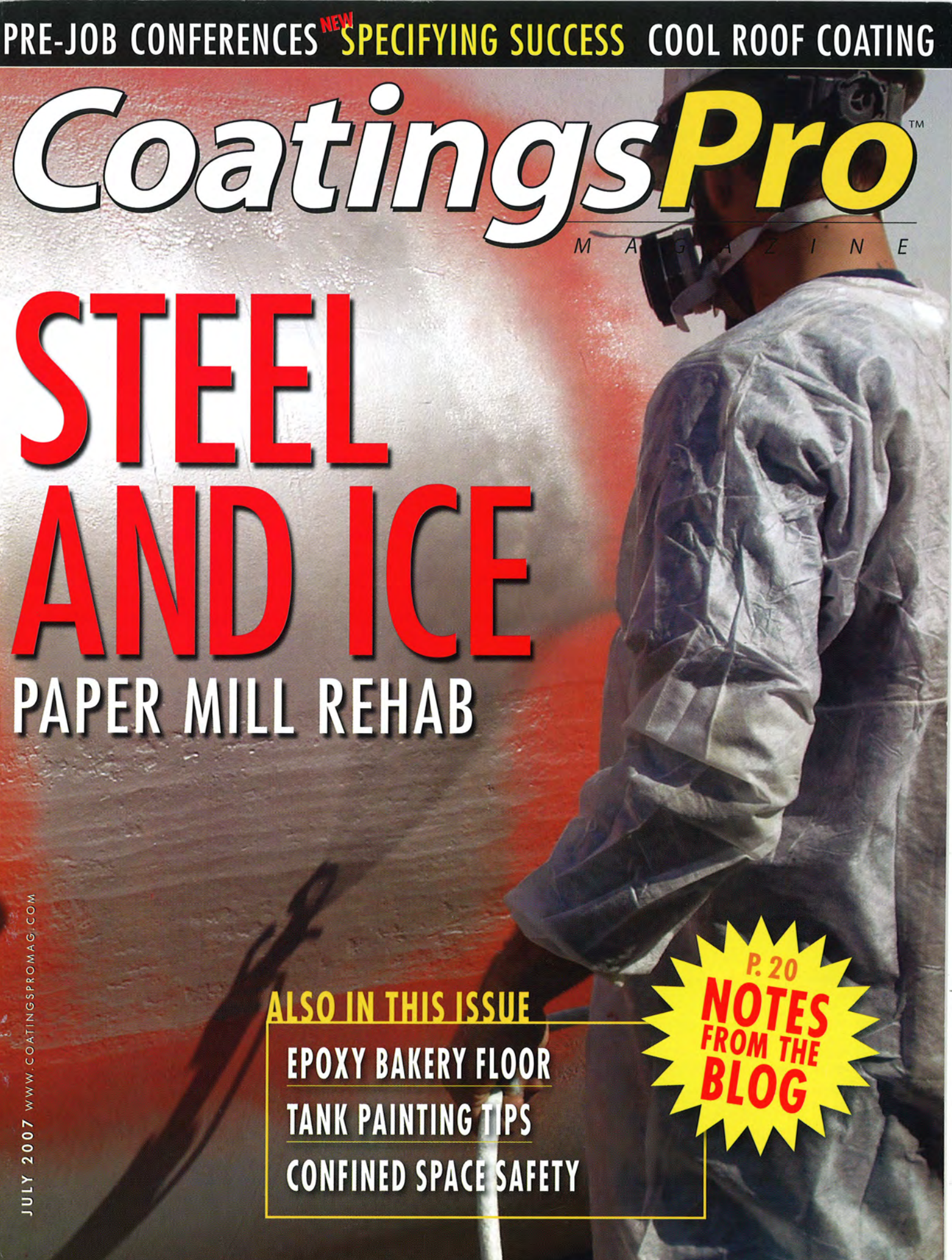

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Applying coatings high above a fast moving river is all in a day's work when a crew tackles the job of coating a paper manufacturing plant's steel penstock and stacks.

NEVER AGAIN

54 NEVER AGAIN: A CHICKEN PROCESSING PLANT NIGHTMARE

Faced with rusted steel ceilings and cracked concrete floors, a minor rehab project turns into a major nightmare for a Georgia coatings crew.

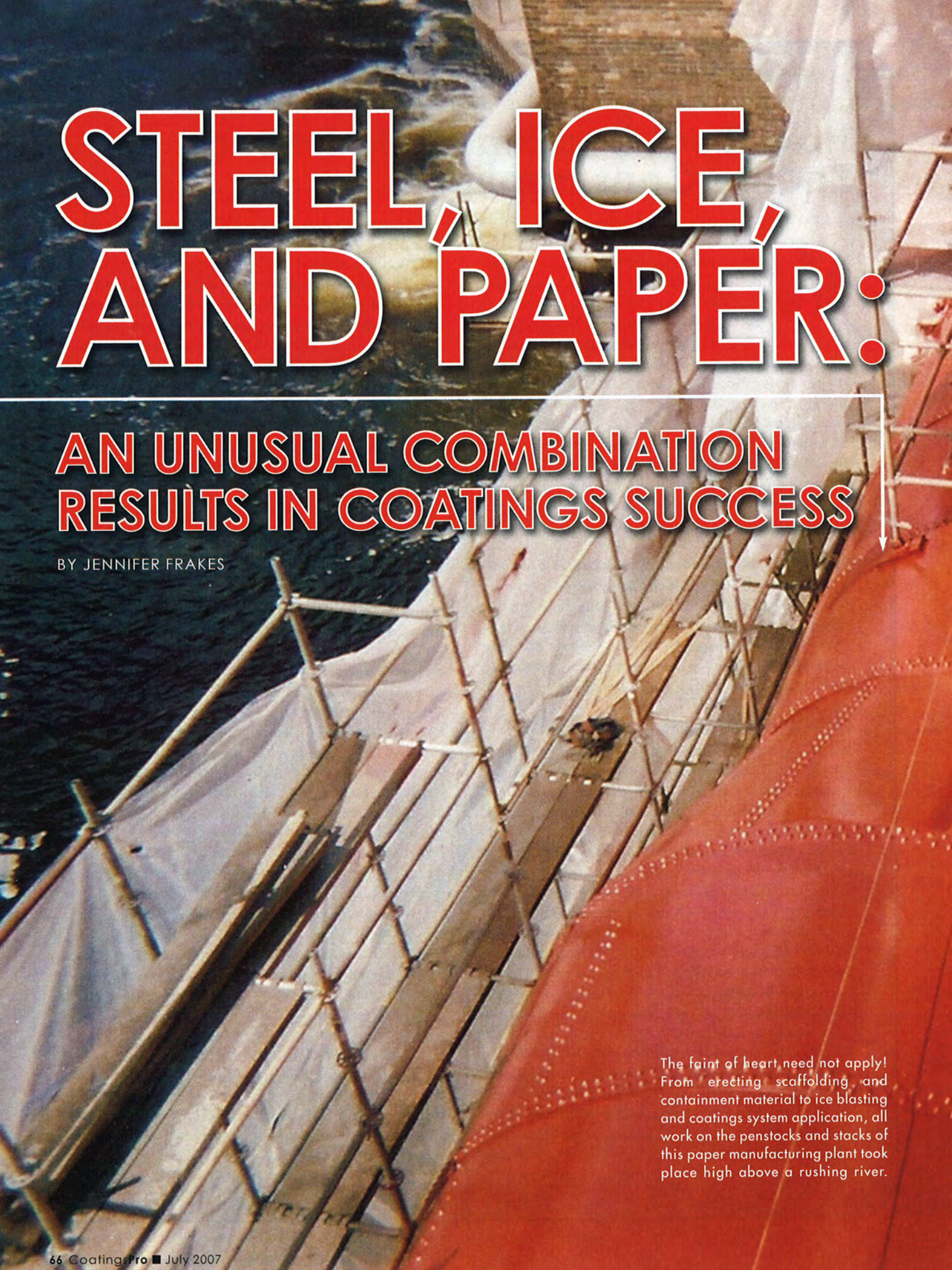
ON THE COVER ■ Suspended on scaffolding high above the dam gates of a rushing river, the coatings crew from Precision Ice Blast first used an environmentally friendly ice blasting process to clean and prep a paper mill's steel penstock and stack in preparation for the application of an epoxy primer and urethane topcoat.

— Photo courtesy of Precision Ice Blast

STEEL, ICE, AND PAPER:

AN UNUSUAL COMBINATION RESULTS IN COATINGS SUCCESS

BY JENNIFER FRAKES



The faint of heart need not apply! From erecting scaffolding and containment material to ice blasting and coatings system application, all work on the penstocks and stacks of this paper manufacturing plant took place high above a rushing river.

APPLYING COATINGS high above a fast-moving river sounds dangerous — and more than a little nerve-wracking. But it's all in a day's work for Precision Iceblast Corporation (PIC) of Wallace, Michigan.

When the owner of a paper manufacturing plant contacted PIC for a quote, PIC's Keith Boye was enthusiastic about the project. "We had performed numerous jobs at this plant over the years, including painting tanks and some coating work inside the facility." As their name suggests, Precision Iceblast Corp specializes in using dry ice pellets to clean and prep substrates for coating. "We were confident in our ability to do this new job from start to finish," says Boye. The job was a big one: recoat the penstock and stacks of the hydraulic turbines that power the paper manufacturing plant.

A penstock is an intake tube that funnels water from a river to hydraulic turbines. As the water rotates the turbines, water

WE HAD TO PLACE PLANKS OVER OPENINGS AND THEN LAY THE PLASTIC CONTAINMENT MATERIAL OVER THE PLANKS IN ORDER TO CATCH ANY DEBRIS AND LOOSE PAINT THAT WAS REMOVED.

flow energy is converted to electricity. The energy provides the power to run the paper manufacturing plant. This particular penstock was 250 feet by 16 feet in diameter and the stacks were each 40 feet high and five feet in diameter.

Being able to complete all aspects of the job was essential, as the scope of work was quite comprehensive. Before any surface preparation and coating application could take place, a scaffold had to be constructed around the penstock and its two stacks. Containment material then needed to be placed around the scaffolding. Once the scaffolding and containment were completed, the next step was surface preparation. Finally, a moisture-cured primer and topcoat needed to be applied to the penstock and its stacks. And don't forget that the entire process was to take place high above the dam gates on a rushing river.

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www.precision-iceblast.com

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According to Matt Peterson, the PIC project manager assigned to the job, a crew of five worked on all stages of the project, which took seven weeks from scaffold construction to applying the moisture-cured topcoat.

PIC rented Quick Erect Scaffolding (QES) from Patent Construction Systems to use on the job. QES scaffolding is a modular scaffolding system made of galvanized steel that is quick and simple to construct. Posts and horizontal pieces are the principal components of this scaffold system, and the connecting hardware is permanently set in place. Each of the posts is fitted with rings that are welded in place at regular intervals. These rings have eight openings, thereby allowing the horizontal pieces to be attached at various angles for specific project requirements. QES is often used on irregular structures or areas with restricted entry, such as paper and pulp plants.

"We constructed the QES scaffolding ourselves, following all OSHA safety standards and requirements. Scaffolding was tied in where necessary and our guys were secured with safety harnesses and lanyards," says Peterson.

Once the scaffolding was constructed around the penstock and stacks, the scaffold system was wrapped in 6-mil-thick plastic sheeting that was heavy, non-breathable, and reinforced

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with embedded string. Containment was important on this job, since any failed paint or other debris needed to be kept from falling into the river below.

In addition to constructing scaffolding, PIC also had to place two-feet-by-six-feet planks underneath the penstock. "There are openings underneath the penstock, between the pillars, that look directly down to the river. We had to place planks over these openings and then lay the plastic containment material over the planks in order to catch any debris and loose paint that was removed," says Peterson.

PIC employees accessed the penstock and stacks for blasting and painting from the scaffolding, planking, and the roof of the penstock. "Our compressors were parked on the street on the west side of the facility and placed in such a way that traffic flow would not be interrupted. Our blasting units and ice were placed on the rooftop above the penstock. The materials were lowered onto the roof with a crane," explains Boye.

With the scaffolding and containment in place, PIC was ready to begin cleaning and prepping the steel substrate, which was covered in dirt, failing paint, mildew, and fungus. The state of the substrate was not surprising considering the moist natural environment surrounding the structures.

PIC specializes in using high velocity streams of dry ice to clean, strip, and prepare surfaces for painting. The system

TOP RIGHT ▶ The PIC crew constructed the QES scaffolding themselves. QES is simple and easy to construct and is often used in areas with irregular surfaces and angles. Once the scaffold was in place, the crew wrapped it in heavy, non-breathable plastic to contain debris. Two-feet-by-six feet planks were placed underneath the penstock and were covered with the plastic containment material as well. These measures ensured that failed paint and debris would not fall into the water below. **BELOW** ▼ Using the ice-blasting cleaning and surface preparation technology, all failed paint, dirt, mildew, and fungus were removed from the penstock and stacks. The high velocity stream of CO_2 pellets vaporize back into the environment, thus eliminating the possibility of cleaning and surface prep media falling into the river.

JOB AT A GLANCE

PROJECT:

Coat the penstock and stacks of a paper manufacturing plant with a moisture-tolerant coating system

COATINGS CONTRACTOR:

Precision Iceblast Corporation
N3908 Highway 41
Wallace, MI 49893
(906) 864-2421
www.precision-iceblast.com

SIZE OF CREW:

A 5-person crew worked on the various stages of the project

SUBSTRATE CONDITION:

The steel substrate of the penstock and stacks were covered in dirt, failing paint, mildew, and fungus

SIZE OF THE PROJECT:

The penstock was 250' X 16' in diameter; the stacks were each 40' X 5' in diameter

DURATION OF THE PROJECT:

7 weeks

MATERIALS/PROCESS:

- Construct scaffolding around the penstock and its two stacks
- Wrap heavy plastic containment material around the scaffolding
- Dry ice blast using Sullair 750/250 compressors, 25' of hose, and blasting gun to clean and prep the steel substrate
- Spray-apply 5 - 6 mil-thick, moisture-cured epoxy primer onto penstock and both stacks using Graco Speed Flow 8900 with Titan XL gun and 1517 tip
- Spray-apply 2-mil-thick Corothane topcoat onto penstock and both stacks using Graco Speed Flow 8900 with Titan XL gun and 1517 tip

UNUSUAL FACTORS:

- The entire process took place above the dam gates on a rushing river
- The crew high-pressure blasted and painted from scaffolding that was constructed on uneven surfaces in a limited space
- A 6' X 8' scaffold tower was constructed on top of the penstock in order to ice blast and paint the two stacks

SAFETY CONSIDERATIONS:

- Working on scaffolding above a river necessitated that employees used fall protection, including five point safety harnesses
- Crew also wore hard hats, steel toe shoes, safety glasses, and earplugs
- The OSHA-compliant scaffolding was tied in to the steel substrate where necessary

ABOVE ▲ The PIC crew took all necessary safety precautions during this job. While constructing the scaffolding, all OSHA safety standards were followed, including tying in where necessary. Employees used full fall protection gear, including five-point harnesses. During high-pressure blasting and coating application, hard hats, steel toed shoes, safety glasses, and ear plugs were worn.

requires a liquid carbon dioxide (CO_2) supply, a pelletizer (the machine that turns the liquid CO_2 into blasting pellets), blasting unit, compressor, and dryer system to operate. When the pellets are blasted on the surface, the dry ice molecules penetrate deep into the pores, profiles, and grooves in the substrate. When the molecules make contact with the innermost surface, they expand to 800 times their size. By this means, any and all possible debris and contaminants are removed.

"Although the process is very thorough, it is completely non-abrasive," explains Boye. Ice blasting can be used simply for cleaning surfaces or for a combination of cleaning and surface preparation. The difference lies in the amount of pressure coming from the compressor.

Adjusting the pressure allows for everything from cleaning to stripping off existing paint. When cleaning a surface, typically a 100 psi compressor is used. For surface prep, a 300 psi compressor is a more appropriate choice. "You don't want to prep a surface at 100 psi — you won't get rid of all failed paint," says Boye.

Since the penstock and stacks needed both cleaning and surface preparation, PIC used Sullair 750/250 compressors. These high-powered, specialized compressors allow the ice blasting to be performed at 300 psi. All dirt, scale, and failed paint were blasted from the surface, leaving a clean substrate for coating.

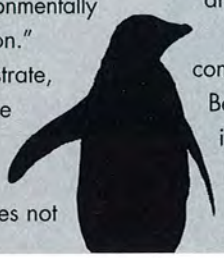
"The dry ice pellets used were high density and the ice blast-

ENVIRONMENTALLY CONSCIOUS SURFACE PREP

Ice blasting is a relatively new technology that some consider a modern alternative to other forms of surface preparation, including chemical cleaning, sandblasting, water blasting, steam cleaning, and manual scrubbing and scraping.

According to Keith Boye, of Precision Iceblast Corporation (PIC), "Ice blasting is the most environmentally safe method for cleaning and surface preparation."

Once the dry ice hits the surface of a substrate, it vaporizes and returns to its natural state in the atmosphere —CO_2. This means that there is no waste to clean up besides what is removed from the surface itself. Ice blasting does not use any chemicals or hazardous materials that must be disposed of according to local, state, and federal environmental protection laws. Ice blasting is non-toxic and non-conductive. Because there are no harmful emissions or chemicals used, it is safe for use around employees, equipment, and products.



Ice blasting is FDA Food Grade certified and upon contact will kill bacteria, mold, mildew, and fungus. Because CO_2 contributes to moisture reduction, using ice blasting in surface preparation can aid in hindering the future growth of bacteria. Ice blasting also meets EPA, FDA, and USDA guidelines.

ing units were our own PIC 56 high pressure units. The PIC 56 is completely pneumatic and is capable of blasting at 50-300 psi. The unit is 32.5-inches by 28-inches by 20-inches and the hopper holds about 80 pounds of ice," says Boye. "The system, without any modifications, consists of the blasting unit, a 25-foot length of hose, a blasting gun, and 50 feet of one-inch air line."

IT'S GOOD TO BE GREEN

With the river directly below the work area, keeping contaminants out of the water was vital. As such, according to Boye, ice blasting presented the team with the best option. The dry ice pellets used to blast the substrate vaporize into the environment, eliminating the concern of the surface prep media making its way into the water. (For more information about ice blasting and the environment, please see sidebar).

"Our process also eliminated disposing of hazardous material. The amount of paint and scale that were removed was very minimal so waste generation was extremely minimal. There was hardly any mess created with the ice blasting. If another form of surface preparation had been used, a much more comprehensive containment system would have been necessary," states Boye. Considering the over-the-water location and the limited space on which to work, this could have proven a very difficult task.

Another factor taken into consideration while working on the penstock and stacks was the existence of mildew and fungus. Ice blasting kills all bacteria and other microorganisms, thus increasing the longevity and adherence of the coating system. Ice blasting also leaves the substrate dry, which was very important in this case, given the site's close proximity to the river, which creates a perennially moist environment. With the substrate dry from the surface prep process itself, the coating application began immediately upon the completion of the ice blasting.

Because of the moist, humid environment, the crew divided the penstock into four sections. Each section was blasted and painted before moving on to the next section. If they had ice blasted the entire penstock and then gone back and coated the structure, moisture would have had the chance to

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ABOVE ▲ In a naturally moist environment, a moisture-cured coating system is the right choice. These coatings actually pull moisture out of the environment in order to properly cure. Both the primer and the topcoat applied to the penstock and its stacks are extremely moisture tolerant. **INSET** ▲ Because ice blasting leaves the substrate dry, the coating application began immediately upon the completion of the surface preparation.

accumulate, thus affecting the adherence of the coating system.

The environment also played a large factor in the choice of coating systems. It was imperative that a moisture-cured primer and topcoat be applied to the penstock and the two stacks.

One coat of red Sherwin-Williams Duraplate MT Epoxy primer was applied to the penstock and stacks at a thickness of five to six mils. This moisture tolerant coating has a low dew point and is designed for application in moist areas. After the primer was applied, one coat of gray Sherwin-Williams Corothane was sprayed on each section at a thickness of two mils. This topcoat is also specially designed to cure and perform in high humidity areas. Both the primer and topcoat were applied using the Graco Speed Flow 8900 and a Titan XL gun with a 1517 tip.

"These types of coatings actually pull the moisture out of the environment in order to cure properly. They are the perfect choice for painting structures that are constantly exposed to moisture and humidity," explains Boye.

RISING TO THE CHALLENGE

High elevation (over a rushing river) and high-pressure blasting created serious safety concerns for the PIC crew. Because of these conditions, employees used full fall protection gear including five-point harnesses. They also donned hard hats, steel toe shoes, safety glasses, and earplugs. Face shields are unnecessary for ice blasting.

While the weather seldom slowed the job down and there weren't any unusual time constraints on the project, Boye points out that there were plenty of challenging conditions. "Erecting scaffolding in front of a dam gate with running water and on uneven surfaces with very little room to work was pretty challenging," says Boye. "Access was a bit difficult at times."

The penstock stacks added another dimension of challenge. "We had to construct a six-foot by eight-foot scaffold tower on top of the penstock in order to ice blast and paint the stacks," explains Peterson.

Peterson also points out that staging all the equipment on the roof of the penstock added another unique dimension to the project. "Before we put the equipment on the roof, we put plywood down over the entire area. We then rented a crane to put the equipment and materials on the roof — it became our staging area."

Although each part of the job presented certain challenges, Boye feels that PIC rose to the occasion. "The combination of ice blasting and moisture cured coatings were the right fit for this job," he says. "We were able to keep contaminants out of the water and the surrounding environment with minimal containment. We cleaned and prepped the steel for optimal coating adherence. Overall, it was a successful job." CP