



Melt shop building with one wall cleaned and painted and another being cleaned, and (below) after cleaning and painting.

CLEANING A STEEL



Introduction and Setting
Mini-steel mills provide a specialty application of industrial cleaning with pressurized water. At first glance, you might think that this is hot, dirty work and there are not too many mills around the U.S. There are more than you think because the behemoth steel mills have given way to back-yard, neighborhood mills that make new shapes out of recycled scrap.

Mini-steel mills co-exist peacefully and quietly with their community neighbors. Steel making is a basic resource of any country. It provides good paying jobs. And yes, they are dangerous. Mills that recycle steel are part of waste management of any community. They bring value-added products to “throw-away” items.

The Central Texas steel mill in this story is no exception. It is located on “Steel Mill” road, near an Interstate. Its forte is providing the reinforcing bars (rebars) that go into highway construction. The Texas steel facility uses state-of-the-art technology to maximize efficiency, quality, and safety. It is one of the largest recyclers in the state of Texas. Today, the facility is capable of producing over 750,000 tons of steel per year, in a wide assortment of sections and grades.

When I was first asked to tour the mill by Skip Wayland, of Frontier Construction Products (www.fcp.tx.com), and Rick Watson, of Surface Maintenance of San Antonio (SURMAC), I wasn’t sure what to expect. My last experience with a mini-mill was Bayou Steel in LaPlace Louisiana.

I couldn’t visualize where the “steel mill” was located. When we arrived, I found that I had driven by this mill many, many times on the nearby interstate. I had looked at this mill. It is surrounded by trees, but I had never noticed it. It remains a tribute to the effort that this company makes to blend in with the neighborhood.

The mill was shut for maintenance when we visited. We surveyed a difficult situation for cleaning. The metal building had sides that would vibrate, rather than be stiff. The building was about 12 stories high. Many of the exterior areas had very limited access because there were conveyers and vents attached to the walls. Some of the walls remained constantly hot. We wondered if the water could impact on the surface long enough to remove the coating. The metal sides were “ribbed” so that automated heads would not get close to the surface.

The steel company wanted a method that would not impact the neighbors. They wanted to refresh the building, make it look nice, and to match the new large addition to

the mill. They wanted to harmonize the color into the environment.

The new addition would be a different color so the paint had to match. Additionally, fresh cleaning and paint would give a good mental impression to the workers. All the work was to be done on the exterior. Eventually, all the buildings and tanks on the site were cleaned and painted.

The mill has asked to remain anonymous. However, there are statements on their website that summarize why I was really impressed with the cleanliness of the site and why this project could go so well. The mill is a charter member of the Governor’s “Clean Industries 2000” program. “We’re a family of individuals working toward a single goal: to get it right for you. The Texas steel facility is a team of professionals with over 50 years of steel making experience. That makes us one of the world’s leading mini-mills. We take an extraordinary amount of pride in our work. We go the extra mile to ensure your satisfaction.”

Watson describes this mini-mill cleaning project as a series of challenges to be solved.

MINI-MILL

“When You’re Hot,
You’re Hot!”

by Lydia Frenzel, Ph.D.

Back side of the plant before (left) and after (right) cleaning and painting. Addition at left is under construction.





View of the completed project. Approximately 140,000 sq ft of surface was cleaned and painted to match the new addition (at right, with white stripe).

Heat

This work was started in July, 2005, of course, the coolest time in Texas. They had heat from the mill and from the weather. Heat stroke and exhaustion were real possibilities.

There was always at least one arc furnace going. The waterjetters constantly had to watch out for vehicles loaded with hot slag on their way to the cooling site. Hoses and equipment had to be out of the way.

The main building was approximately 12 stories (120 ft) high, 150 ft wide, and about 700–800 ft long. The total square footage was about 140,000 sq ft.

The rolling mill, capable of 3000 ft/min finishing speeds, is fed from a 140 ton/hr gas fired furnace and

is equipped for optimum flexibility and operational efficiency. Some areas of the walls were always hot. There were two exhaust vents at the back of the main building that radiated 340–400 F at all times. The workers had to walk by on a catwalk. When the building was shut down for maintenance, the pressure washers really went to work in those areas. SURMAC became very proficient during these short windows of opportunity.

Operation

The mill remained in operation. The latent heat from the mill, plus the weather, made the wall temperature at least 130–150 F at all times.

Cleaning with Pressurized Water

This was metal siding with ribs. The current coating was adhered GalvAlume. This is like an anodized aluminum-zinc coating on steel. It really cuts down on corrosion and is an integral part of the substrate. The challenge was to clean the coating without removing the coating.

SURMAC applied Eldorado Solutions ACL-622 Acid Cleaner and let it set. (www.eldoradochem.com) SURMAC then used 5000 psi with a rotary jet at 12 gpm. The acidity helped to get the old rust off. This cleaning agent really cleaned off the dust and stuck-on debris that had built up over time.

All of the work was done with manually held guns. They couldn't use any remote controlled or large flat-head rotary brushes because of the vents, piping, and ribs on the sides.

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The big trailer rig was on the ground. They had 400 feet of hose on the main line and manifold to various workers. They used customer supplied mains water.

SURMAC was prepared to collect water from the ground but mostly it evaporated before it hit the ground. The building was dry pretty quick.

Rigging-Access

All of the ceilings were being replaced while the pressure washer crews were on-site. They had to tie off scaffolding on beams. Much of the

work on one side was done on 130 foot man-lifts. On the back side, SURMAC rigged special swing staging to be able to reach the walls. It was a rigging nightmare.

Roofing

SURMAC is noted for their roof repair work. Corrosion in steel mills is a major problem. They used special tape to repair the roof of the mill where corrosion had eaten holes. Special care had to be taken that absolutely NO water got through the roof. If moisture hits the hot

pots in the main mill, it instantly steams and explodes.

SURMAC put in special foam at the edge of the building roof to keep out rain. Special tape was installed along the roof line. Working at the edge of the roof is fairly dangerous.

Coatings

Several commercial paints had been tested over the prior year to see which one would adhere (stick) to the GalvAlume. The original coloration was close to a canary yellow after it was cleaned. Fox Industries (www.foxind.com) FX-509 Rust Inhibitive Coating was very compatible. Fox matched the color—Walnut Brown—of the new construction.

One very nice feature of the FX-509 was that it was green when freshly applied and then changed color as it dried. This made it easy to see exactly where the paint had been applied and cut down on re-work. It bonded very well.

Saturdays and Sundays were painting days. They did the work without one complaint of overspray on cars. The parking lot holds about a thousand cars and is within 400 feet of the building. Cars were moved as necessary. SURMAC had originally thought that they could roll the paint. The ribbed structure excluded that plan. They ended up using airless spray with multi-guns, about four guns on a four gpm delivery system.

Timing

SURMAC really hit some speed records as they got into the project. They got started and within the first week were told, "Big Wigs" are coming for an inspection tour. "How much can you have ready?" They ended up cleaning and painting the main building in less than 25 days.

This required close cooperation between the pressure washing, the painting, the scaffolding, and the mill workers. Watson says "Our six guys are like 20 guys on a normal crew." They worked 7 days a week, at least 12 hours a day.



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Cleaning the Drain System

The customer was so satisfied that they asked SURMAC to look at some other problems that could be solved with pressurized water systems.

They blasted the gutter system on the roof with 20,000 psi. The gutter system had been filled with ash from the mill that had hardened in place during rain storms and was clogged. The mill had tried to use jack hammers in the past—it didn't work.

SURMAC used a rotary nozzle on the roof system at 20,000 psi. This system just ate up the hardened ash.

On the downspouts, SURMAC used 15,000 psi with a sewer nozzle, designed by Boatman Industries, to clear the lines. They were able to feed the nozzle through the downspouts. It was long and arduous process. This was the first time in years that the drain system had worked.

They had to run hoses and worked within a few feet of a live high voltage electrical system. To say that the safety personnel of the mill worked

hand-in-hand with the cleaning crew is an understatement.

As they cleaned the gutters, they discovered just how much of the gutters had corroded away. SURMAC had to repair the gutter system as they went.

Safety

The mill safety people were with the cleaning crew all during the day. They checked everything. They rode around the plant. There wasn't a single accident. This was very scary work.

Conclusion

SURMAC was originally just going to do the main mill. The mill was so happy with the work and the results that SURMAC ended up cleaning most every tank and structure on-site, including the bag house, a giant filtration building.

With the additional work, the cleaning project was about 60 days long. With the gutter system now open and the rain sealed out, the mill has one person continually monitoring the roof for corrosion and adding tape systems.

You couldn't tell the new construction from the old. The building blended more closely with the country side.

Except for the sewer nozzles, this project didn't take any specialized equipment. It did take someone who could think outside the box and solve the mechanical/staging obstacles ahead of time. The solution required close cooperation between the coatings supplier, the cleaning crew, and the mill personnel.

Watson says that "Not only were there no incidents during the project, there was NO lost time from this project. They were able to continue functioning on a normal schedule. Cooperation and communications were excellent. Overall, it worked out really, really well." He would be ready to do it again.

Lydia Frenzel, Ph.D. is executive director of the Advisory Council. She is an industry resource and works as a proactive advocate for emerging technology. She shares her knowledge and experience through custom courses, educational modules, and presentations. Ⓞ

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