



MM Metals USA

By Jon Otto with Dan Shaw



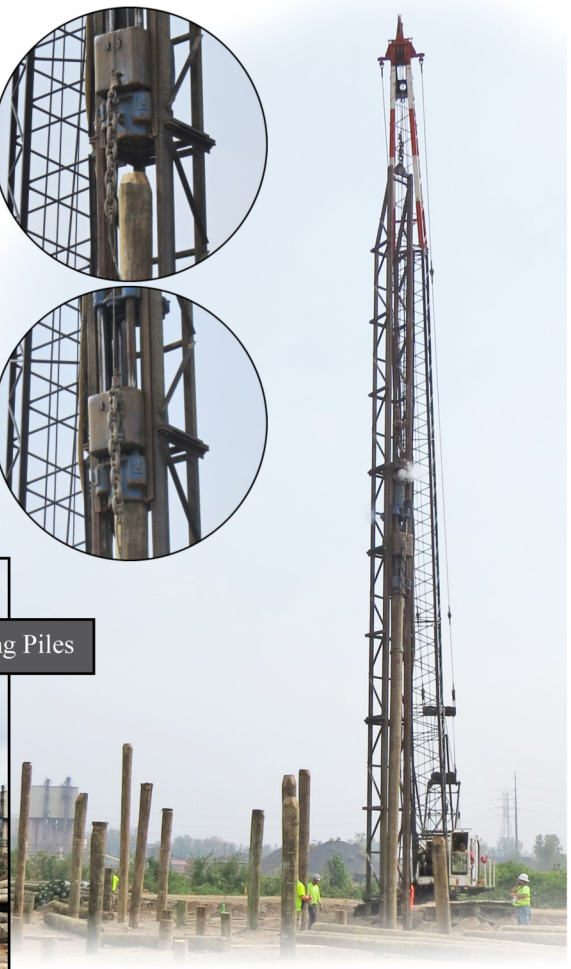
In late April of 2020, while our country and to a lesser degree, Penn Valley Constructors was still absorbing the initial shock of the coronavirus pandemic, we were contacted by MM Metals USA. They needed an experienced Design Build Contractor to help them finalize and value engineer the plans for their new metals plant and also handle the construction. The proposed plant consisted of a 10,000 square foot aluminum smelting building and a state of the art 21,512 square foot ferrochrome manufacturing building together with infrastructure. The project was to be constructed on a 5.4 acre lot in what was still at that time, the US Steel Industrial Park. This looked like a really nice job, right in our wheelhouse. Even better, the site is no more than 3 miles from our office. With numerous Covid inspired cancellations and postponements in the previous six weeks, it could not have come at a better time. We happily accepted MM Metal's invitation and dived into the design, budgeting and value engineering.

While this project came to us quickly, it was actually many years in its development. It involved the

development of an entirely new and patented process to manufacture a high purity metal alloy strategic for our domestic economy used in sectors such as aerospace and defense.



Driving Piles





The process, now in commercial use at MM Metals USA, uses equipment that was over 80% designed and manufactured in the USA and the company now employs over 50 skilled people locally.

A key element of the plan was the site located at the US Steel Industrial Park where in addition to its good outward traffic, literally a couple of traffic lights away from the whole US Interstate System, it has a deep water port and great rail connections.

Equally important was and is the infrastructure; plenty of water, unused high voltage electric and natural gas to power the furnaces, and nitrogen. These attributes made it the perfect location for what would be the only ferrochrome plant in the US and a facility unique to the world!

This was no simple job; both buildings had very heavy floor loads and equipment foundations. Both are tall and subject to heavy wind loads. These conditions create design challenges under any circumstances. At the MM

Metals site the design and later construction was further complicated by poor soils extending 50 feet below the proposed floor elevation and a layer of hardened slag left by old US Steel operations 8-10 feet deep covering a substantial portion of the Ferrochrome building footprint.

MM Metals had already retained our friends at Gilmore and Associates to do the civil and geotechnical work. For our part of the design; structural, architectural and mechanical we chose Leonard Busch and Associates as the PE for structural design, Steven C. Tiberio as the Architect and GnP as the mechanical engineers. MM Metals would handle the very substantial electrical design through Tri-M Electric who had started the original design. Brian Trabosh, our Chief Estimator, had previous experience in this type of heavy construction so for the initial stages of this job, he acted as both Project Manager and Estimator.





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The geotechnical design for this project called for tubular steel pilings to be filled with concrete going down 50-55 feet. This choice was made owing to the heavy floor loads and the need to penetrate the slag layer which was found under the Ferrochrome building and a small portion of the Aluminum building.

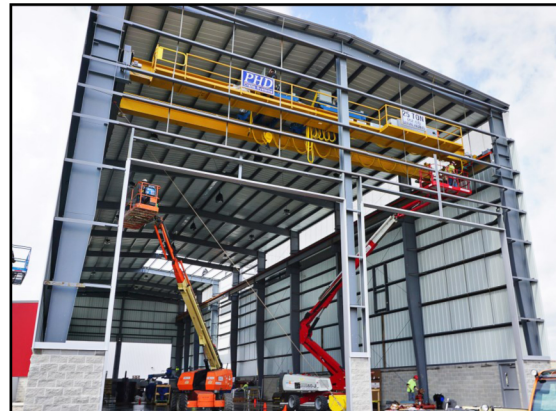
This was a very expensive system with prices coming in at well over \$1.5 million. One of our bidders suggested we consider changing to wood piles. This would entail predrilling through the very hard slag deposits and living with some breakage which is part of working with wood piles. Fortunately, the geotechnical team at Gilmore were willing to work with us on this redesign which ultimately yielded a savings to MM Metals of \$600,000.

Working closely with the MM Metals team, we accelerated the design and were able to have permit ready plans in July of 2020. The Township of Falls worked with us, allowing us to start foundations while the rest of the

permit was still under review. Since the Ferrochrome building was not only more complicated but rested entirely on the slag underlain area, we started with the Aluminum building piles soon followed by pile caps, grade beams and a deep pit to receive the Aluminum furnace.

With all of this work in place the ironworkers started tying the dense mats of reinforcing steel that gave the 10" and 12" slabs the strength needed to support the floor loads that ranged from 800 PSF to 2000 PSF. Starting bright and early on November 18th the entire slab consisting of nearly 600 cubic yards was pumped into place, screeded, vibrated and finished by a crew of twenty-two men (see opposite page).

After laying down plates to support the crane, we started erecting the 100 x 100 by 47' high clear span pre-engineered steel building. It was ready and waiting as it had been ordered and delivered early to avoid price



increases which by the summer of 2020 had started to run out of control on all steel products. Our erector did a masterful job with this building, constantly fighting the winds that blow freely in the flat alluvial plane that the US Steel Industrial Park occupies. Working in tandem with the masonry subcontractor, they had the shell building which included a walkable, translucent Resolite© roof enclosed on January 18th, 2021.

While the concrete, masonry and steel work were underway at the Aluminum building, we had started on the piles for the Ferrochrome building. The floor loads for this 13,600 square foot crane served building were even greater than those of the Aluminum building and it is flanked by two separate multistory specialty buildings, one for the 13.8 KV electrical center and the other for the 65' tall control tower. It required nearly twice as many piles all of which had to pass through the 8-10 foot layer of hardened slag.

The Ferrochrome building concrete installation was much more complicated than the Aluminum building. Not only were there multiple pits, foundations and imbeds to deal with, but electrical conduits had to be laced through the reinforcing steel on an almost daily basis.



Pouring molten Ferrochrome

It was winter now and tough going. Many afternoons we would have to cover our grade beams and pile caps in which only part of the reinforcing had been installed to protect it from the snow which fell freely in December, January and February of the 2020-2021 winter. It was a fight but everyone stepped up and we pressed our way through the concrete and started erecting the pre-



Silos being set

engineered steel building when the concrete was only about 60% finished, this allowed us to start on the conventional wing buildings which eventually would be clad with insulated metal panels. (note red siding)

By the beginning of April, the Ferrochrome building and its wings were closed in and the extensive interior mechanical, electrical and rigging work could commence. Machinery, conveyors, furnaces, tanks, refractory brick and silos came from all over the US and beyond. Our subcontractors had to work hand in glove with the riggers to finish around the machinery as it was installed.

By May of 2021, just a little over a year after we met MM Metals, our work was substantially complete. We only had to wait for the completion of the scales and for the riggers to finish setting the silos so the heavy traffic would be off the site and we could install the finished pavement. This was achieved in August of 2021.

For More Information:

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