# TWO STEEL MILLS, BOTH ALIKE

ArcelorMittal plants in southeastern Pennsylvania share history and their future

by Roy Blanchard

Two steel mills, ArcelorMittal Coatesville and ArcelorMittal Conshohocken, both alike in fair Pennsylvania where we lay our scene, break from olden ways to lead new lives. The two steel mills are both alike in railroad ownership, each having its own shortline railroad for intra-plant switching, and interchange with the world beyond.

They are both alike, too, in that they have roots going back more than a century; one mill serves the other with steel slabs that the other forms into thin specialty plates and coils. This symbiotic relationship is unique within the industry and it would not work were it not for the cooperation and coordination between and among their in-plant roads and Norfolk Southern.

At a point just north of Conshohocken, 14 miles upstream on the Schuylkill River from Philadelphia, is the ArcelorMittal steel plate mill, with its own Upper Merion & Plymouth Railroad doing the intra-plant switching and interchange with Norfolk Southern. In Coatesville, 43 miles to the west, is ArcelorMittal's electric arc furnace steel slab and plate mill with its own Brandywine Valley Railroad doing the in-plant honors and making interchange with Norfolk Southern at Coatesville and (via the East Penn short line) with CSX at Wilmington, Del.

## A BRIEF HISTORY

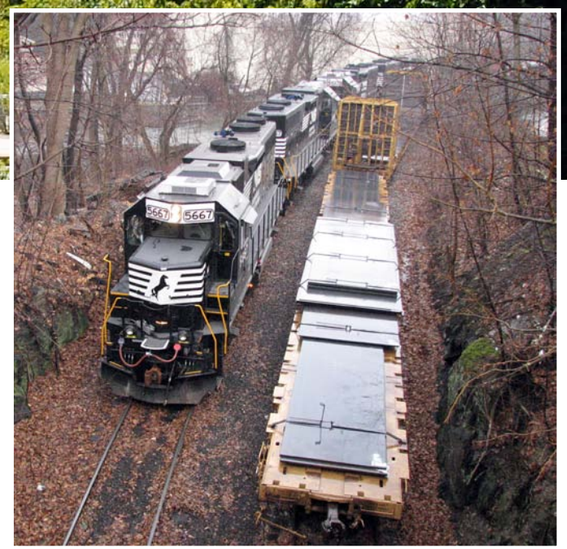
But when did the railroads begin? And how did they come together under ArcelorMittal's flag? In 1793 one Isaac Pennock established the Federal Slitting Mill on the Buck Run River. After learning the iron trade, he expanded his holdings by establishing the Brandywine Iron Works and Nail Factory on the banks of the Brandywine Creek in nearby Coatesville. He owned the mill until his death in 1824, at which time ownership passed to his eldest child, Rebecca. She had married Dr. Charles Lukens in 1813, and the latter became Isaac's partner, renaming the firm Pennock and Lukens in the bargain, though ownership remained with Rebecca's side of the family.

In 1817 Lukens was instrumental in converting the mill from a nail factory to charcoal iron plates and from there to applications in steam locomotion. Just prior to his death in 1825, Lukens turned the firm's operations over to his wife, making Rebecca Lukens the first woman in the U.S. to run such a large industrial enterprise. Over the next 100-plus years Rebecca Luken's company evolved into what was to become Lukens Steel and, eventually, ArcelorMittal. And therein hangs our tale.

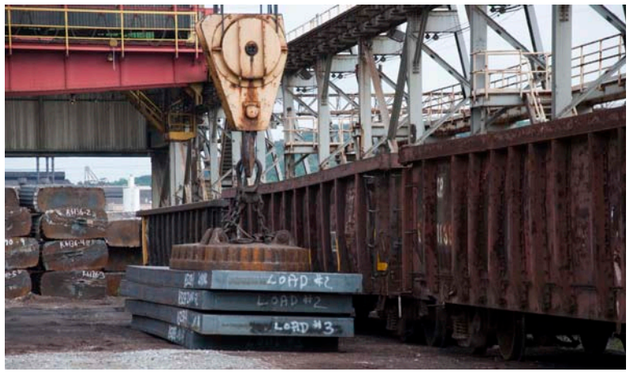
The Lukens Steel name has quite a distinguished pedigree. It was the first to produce iron boilerplates, first for the shipbuilding industry and then, logically, providing boilerplates for the new railroad industry's steam locomotives. By 1890 it had built the largest rolling mill for steel plates in the country: 120 inches wide. A quarter of the way into the 20th century, it again gained fame by building the largest plate mill in the world: 206 inches wide.

The new mill also brought major changes in the design of locomotive fireboxes. A print ad for Lukens' boilerplate steel featured a

**Abrams-based Norfolk Southern train H3A prepares to depart Coatesville after making its setoff and pickup at ArcelorMittal's former Luken's Steel plant on Sept. 1, 2008.** Michael S. Murray

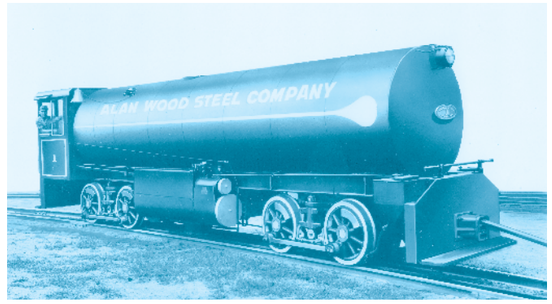


**A crew backs four GP38s to the end of a string of cars loaded with Arcelor-Mittal steel plates in Coatesville, Pa., so they can attach the rear marker on Jan. 13, 2007.** Jim Kusnierczyk



The Coatesville plant takes scrap metal from gondolas, melts it down, and rolls it into steel slabs, which the Conshohocken plant converts into specialty plates or steel coils. Roy Blanchard

Upper Merion & Plymouth SW-9 No. 9009 is one of four switchers in duty at the Conshohocken rolling mill. Roy Blanchard




Heisler Locomotive Works built Alan Wood Steel No. 1 in 1940 as a powerful, fireless locomotive able to negotiate the mill's tight curves and clearances. Lake Shore Railway Society

Union Pacific 4-8-2 with the copy line, "The benefit of a single sheet can be seen here. Seams where two plates are welded together are weak spots. The benefit of a single sheet is a reduction in seams, thus a less likely risk of failure."

Lukens plate also went into the battleship New Jersey, now (appropriately enough) permanently berthed and on display across the Delaware River from Philadelphia in Camden, N.J. The famed St. Louis Arch, "Gateway to the West," came from Lukens, as did the plates that made the 152 "tuning forks" or "trees" at the base of the world Trade Center's Towers 1 and 2 when it went up in 1969 (and the only parts left standing at the site after 9/11).

Companies that make steel for everything from Baldwin locomotives to atomic submarines (the Nautilus was another Lukens first) need a railroad to bring the raw materials in and take the finished goods out. Enter the Wilmington & Reading Railroad, which was chartered in 1870 and generally followed the Brandywine Creek bed. Seven years later it reorganized as the Wilmington & Northern. Philadelphia & Reading Rail Road leased it in 1898 and, in 1976, Conrail acquired it.

By 1981, Conrail had abandoned the line north of Coatesville and Conrail was looking for an operator for the 3.6-mile line segment between Coatesville and Modena (Southeastern Pennsylvania Transportation Authority and another short line assumed operations of the segment south of Modena). Lukens was the obvious choice. Thus was born the Brandywine Valley Railroad in 1982 and in 1990, shortly after Bethlehem Steel bought Lukens, it assumed control of the rest of the line to Wilmington, thus ensuring continued access to CSX.

But the period of growth was not to last. International Steel Group absorbed Bethlehem Steel in 2003 and pared Brandywine Valley back to its original 3 miles. The line to Wilmington saw a succession of operators before going to the East Penn Railway in 2005. Then ArcelorMittal bought International Steel in 2005.

Meanwhile back in Conshohocken in 1832, James Wood and his son, Alan, built a water-powered mill for rolling iron plates from bar iron. By 1911 the company had morphed into the Schuylkill Iron Works and acquired the Heckscher & Sons blast furnace operation across the river in Swedeland. The companies on both sides of the river combined as Alan Wood Steel Co. and by 1954 introduced a new line of cold-rolled products.

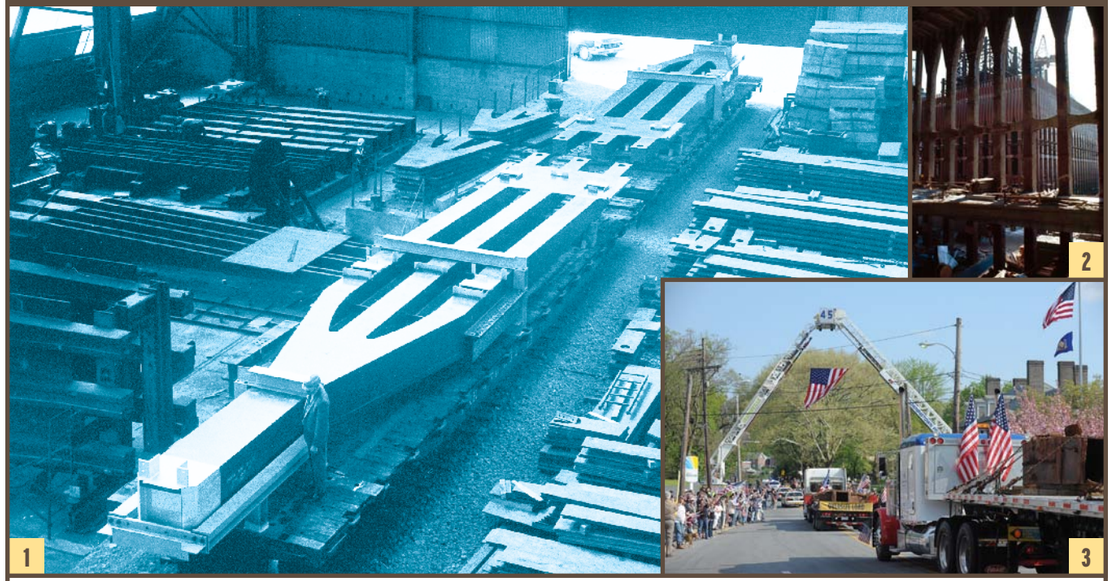
In the early 1960s, the Conshohocken rolling mills modernized. The company constructed two basic oxygen furnaces and removed the open-hearth furnaces. But the costs outweighed the benefits, and Alan Wood Steel filed for bankruptcy in 1977. The plant lay idle until Lukens bought it in 1978 and restarted operations in 1979. (The Lukens and Wood families shared common ancestry through marriage some generations earlier.) Lukens built yet another rolling mill here in 1994, a so-called "Steckel Mill" that is adaptable to stainless, alloy, and carbon products in both flat plate and coils as wide as 102 inches.

Just like the Coatesville facility, a railroad ran through the Conshohocken rolling mill. Only this railroad wasn't a spin-off. The Upper Merion & Plymouth was originally built in 1907 to serve the Alan Wood Steel mill exclusively. Its direct connection with the outside world was the Reading's Plymouth Branch, which traced its roots to 1836 and the Plymouth Railroad. That line served some 20 lime kilns operating along the route between Conshohocken and Cold Point, a stone's throw from today's intersection of the Pennsylvania Turnpike and its Northeast extension. The Wood family operated the Hickorytown Forge, among early industries in Plymouth Township, and a forerunner of the Alan Wood Steel Co. that is now ArcelorMittal Conshohocken.

Conrail absorbed the Reading at its 1976 start and ran the Plymouth Branch until the mid-'80s when it sold the bridge and the remains of the now-truncated Oreland Branch to the UM&P,

## FROM PRODUCTION TO MEMORIAL

**Artifacts of World Trade Centers 1 and 2, made from Lukens steel plates, will become the centerpiece of the proposed The National Iron & Steel Heritage Museum to be built in the Lukens Historic District on South First Avenue in Coatesville. The "trees" were donated by the Port Authority of New York and New Jersey as part of the two-state agency's disposition program to give steel salvaged from the World Trade Center to nonprofits that would use the steel in memorials of the 9/11 attacks. — *Roy Blanchard***




1. The steel plates arrive in Pittsburgh by Pennsylvania Railroad flatcar for assembly in the 1960s. 2. An interior view of the "trees" taken from what would become the lobby during World Trade Center construction. 3. Pieces of the supports come home to Coatesville April 14, 2010, to be part of a memorial at the Ntional Iron & Steel Heritage Museum. The Graystone Society

Brandywine Valley No. 1023 prepares to move steel plates from Coatesville to Conshohocken via NS on Sept. 1, 2010. Roy Blanchard

giving us today's configuration.

Over time, the UM&P withdrew to the present mill site, becoming essentially a steel road, connecting as it did the former Heckscher coke ovens and blast furnaces with the Alan Wood rolling mill via a bridge over the Schuylkill River. The railroad connected to the outside world with the Reading at Swedeland and Mill Road, just east of the plant. UM&P also had two Pennsy connections: at Ivy Rock (just north of Conshohocken) on the Schuylkill Valley line between Philadelphia and Pottsville, and at Hughes Park on the Trenton Cutoff. Total route miles? Five.

The Heckscher mills didn't fare nearly as well through the years and today its only redeeming features are the new Philadelphia Inquirer printing plant, a Lonza chemical manufacturing plant, and a receiver of wood treatment ingredients. Conrail absorbed both the Pennsy and Reading in 1976 and removed their redundancies. As a result, Pennsy's connection at Hughes Park is long gone, and its Schuylkill Valley line is now a bike trail linking Philadelphia and Valley Forge.

When Conrail split in 1999, Norfolk Southern took the Reading main line through Swedeland and became the sole Class I railroad connection with the UM&P. But NS did not get those three Swedeland customers. Because they are on old steel mill property, those companies retained UM&P as their carrier.

## TODAY'S STEEL OPERATIONS

In 2011, the UM&P and Brandywine Valley continue supporting their respective ArcelorMittal steel-making and fabricating operations. The Coatesville plant turns scrap steel into steel slabs that are then rolled out into steel plates to meet the customer's specifications. When a customer requires steel coils, or thin or very wide sheets, the Coatesville plant send slabs to Conshohocken for finishing.

ArcelorMittal buys steel scrap made of everything from shredded automobiles to flattened refrigerators from a third-party vendor, adds its own mill scrap, and compresses it into bales. The bales go into special bins on flatcars that a remote-control diesel switcher locomotive shoves into the furnace building, called the "melt shop." Next an electric "drone" (one of three ex-Alco S-1s with their prime movers taken out and powered by overhead trolley wires) couples up to the cut and pulls it through the melt shop, putting each load under a lifting magnet that feeds the electric arc furnaces.

An employee working the controls lowers the scrap to be melted (the "charge," in steel-making lingo) into a huge steel bowl lined with refractory material that does not lose its shape when heated. He or she then lowers three electrodes into the bowl and its contents, and turns on the power. The resulting electric arc heats the charge both by passing through it and by convection from that portion of the arc passing between the electrodes without going through the charge.

Once the temperature and chemistry are set (impurities out, carbon levels as needed), the charge becomes a "heat" and is poured into another rail car, this one carrying steel ladles that form the ingots used in the rolling mills. At Coatesville, the melt shop has an electric arc furnace that is capable of melting 165 tons of scrap per heat. The whole process will usually take 80-85 minutes from the tapping of one heat to the tapping of the next (the tap-to-tap time).

The drones shove the ingot cars out of the melt shop and cut off, then the plant switch crew takes the ingots to the rolling mill. At this stage, imagine the ingot is a lump of dough going into a piecrust and the rolling mill is your mother's rolling pin, making flat shapes out of round ones. The first rolling mill (the "strand caster") creates steel slabs that are 9 inches thick, 7 feet across and 12 feet, 4 inches long. A machine cuts these slabs to different sizes depending on the order before the slabs move on to the next step:


**Track authority in hand, NS H83 splits the signals at CP King as it rolls westward onto the Dale Secondary in December 2008. From here, it'll take Amtrak's Keystone Corridor to Coatesville.**

rolling out the final steel plate product to meet the individual customer's specs. And once again, the Brandywine Valley switch crew makes the move. Crews then load the final steel plate product onto in-plant Brandywine Valley flat cars for transport to the outbound loading area. Here they load the plate onto freight cars ranging from ordinary flats to mill gons to bulkhead flats to TTX flat cars, depending on the size, weight, and final destination of the load.

Next, the Norfolk Southern representative inspects the loads and authorizes their movement beyond. And so it is the Brandywine Valley makes its final move with the final product, to the NS interchange track, which is conveniently within the plant's limits and only a mile from Amtrak's former PRR Harrisburg-Philadelphia main line, and where NS enjoys the freight rights thanks to the 1999 Conrail split. Some of the day's loads will invariably be Brandywine Valley gons carrying steel slabs to feed the maw of the Conshohocken rolling mills for conversion into specialty plate or steel coils. (In a good year there can be 3,000 of these inter-plant moves.) Most of Brandywine Valley's fleet of 255 mill gons look exactly like what you'd expect: short, high-sided open-top freight cars. But there are 85 others that look nothing like your typical mill gons because they were built as ore cars for service in Canada and subsequently leased by Brandywine Valley's then-owner Lukens.

These cars were perfect because the steel slabs could be dropped directly into them without anybody having to get into the car to help position the slabs. The cars worked so well that, when they came off lease, Lukens bought the lot of them and they remain in service to this day.

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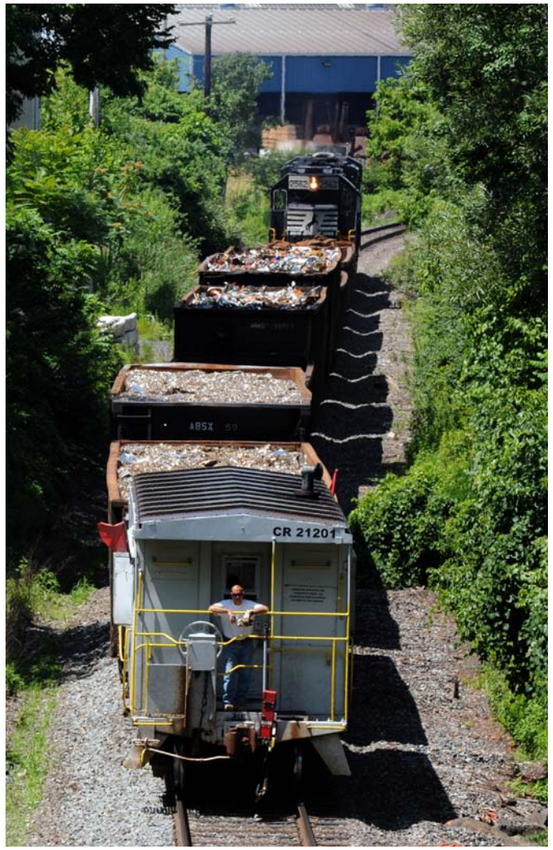
To view more photos of the QJs under restoration in China please visit our Web site, www.trainsmag.com




**H83 heads caboose-first on the Morrisville Connection toward CP King near Norristown, Pa., on July 17, 2009. Once there, it will proceed westward on the Dale Secondary.** Two photos, Michael S. Murray

## A TYPICAL DAY

The UM&P interchanges with NS across the Schuylkill River from the rolling mill, where it also serves its three non-steel customers. The crew begins the day's work dropping outbounds on the interchange track (partly funded through a state grant after Conrail pulled it out) and picking up the day's inbounds.

After doing the Swedeland work, the train heads back across the bridge to the steel mill, typically a reverse-move shove. Once off the bridge, the train swings south behind the plant, runs around the cut, pulls the slabs from Coatesville for further rolling to the front of the plant and spots them inside with a shove.

It's a pull from the plant when the final product is shipment-ready and a shove back to the loading area for transfer to outbound cars. UM&P crews then head across the river to the NS interchange and start all over again. The entire process includes a lot of back-and-forth at both Coatesville and Conshohocken, and looks on the surface to be pretty rote. But it isn't. Not only are the trains going back and forth at both plants, but so are rubber-tired material movers of every sort, front-end loaders, and trucks large and small.

The UM&P and Brandywine Valley are two excellent examples of how industry-owned railroads support their parent company's core operations. And the ArcelorMittal plants they serve are among the most modern in the industry — a large reason for their success. Yet the common thread throughout has been the perseverance and professionalism of the UM&P and Brandywine Valley. 1