Patricia
Loughin
Room 18

The

ALAN WOOD

Steel Company Production Story

Employee-Family
Open House
May 19-20, 1959

WELCOME TO ALAN WOOD!

We extend to you a friendly welcome to our plant!

Our origin dates back to 1826, but we are proudest of our modern day improvements in equipment and technique. We take pride in having over 3700 employees with our company.

Alan Wood Steel Company is one of the twenty-five fully integrated steel companies in the country. The history of our company is presented in brief on the next page. On the succeeding pages is told the steps in the story of steel's producton, from crude ore at our New Jersey Mines to the shipping of quality steel, iron, coke and finished products. The last chapter is devoted to the story of Iron Powder, newest product in the Alan Wood production story.

We hope you will enjoy your visit, and find the story of steel production interesting.

Sincerely,

Harleston R. Wood,
President

HISTORY OF ALAN WOOD

The first of the Wood family to engage in iron making in America was James Wood, who in 1792 established a smithy near Hickorytown, Pennsylvania. In 1826, James Wood and his son Alan leased a small water mill at Wooddale near Wilmington, Delaware, for rolling iron plates from purchased bar-iron. The enterprise was moved to Conshohocken, Pennsylvania, in 1832, the employees of the Company moving with the business. In 1857, Alan Wood formed a partnership, known as Alan Wood & Company, establishing the Schuylkill Iron Works in Conshohocken. The partnership was incorporated in 1885. In 1901, a new company was formed under the name Alan Wood Iron & Steel Company, principal owners of which were Howard Wood and Richard Wood, Alan's son and grandson, respectively. Open hearths and a blooming mill were constructed on their present sites at Ivy Rock to produce the blooms to be rolled into sheets at Schuylkill Iron Works.

In 1911, the Company absorbed Richard Heckscher & Sons Co., which had a blast furnace on the west side of the Schuylkill River. A second furnace was built in 1912, and a third furnace in 1920 — the original old one being abandoned in 1925.

The 84" plate mill was built in 1914, and the first two batteries of coke ovens together with a by-product plant were constructed in 1918 by Rainey-Wood Coke Company, jointly owned with W. J. Rainey, Inc. A third battery of coke ovens was constructed in 1929.

In January, 1929, an agreement was effected between Koppers Company, W. J. Rainey, Inc., and Alan Wood Iron & Steel Company under which a new company, Alan Wood Steel Company, was formed.

The two ore mines in New Jersey were operated under lease from Warren Pipe & Foundry Co. from 1929. These were purchased outright in 1941.

In 1946, the Wood family purchased from Koppers Co. their common shares as well as from Mr. J. H. Hillman, Jr. a portion of the Common stock which he had acquired from W. J. Rainey, Inc. In January 1948, a recapitalization was effected, through a merger of Rainey-Wood Coke Company (previously a wholly-owned subsidiary), into Alan Wood Steel Company.

The Company in 1948 started construction of a 30" Continuous Hot Strip Mill, which commenced commercial production in January, 1950. Also in 1950, the rated annual ingot capacity was increased from 550,000 to 625,000 tons by the addition of one new open hearth furnace.

Early in 1954, the Company started modernization of the 84" Plate Mill and the installation of the Cold Rolling Department which made possible a new line of products for the Company and had been a long-sought goal of the management.

During 1955, the Company purchased the locker, shelving and cabinet business of Penn Metals Company, in Philadelphia and formed the Penco Metal Products Division. This division moved to our new modern plant at Oaks, Pennsylvania in 1957.

A further program for expansion in 1957 increased the ingot capacity to 800,000 net tons. The installation of the Iron Powder Plant, completed in April 1959, provides additional diversification of the Company's operations.

Upper Merion and Plymouth Railroad Company, a wholly owned subsidiary of Alan Wood was organized in 1907. The Interstate Commerce Commission in 1923 classified the Railroad as a Class 2 common carrier and it operates as a switching railroad for several companies in the area.

The railroad also serves the company's operations located on both banks of the Schuylkill River. A railroad bridge was built across the river in 1910 to expedite the movement of raw materials to various departments.

MINING DIVISION

Aerial view of Scrub Oaks Mine, Dover, New Jersey.

Iron ore is one of the basic raw materials necessary in the manufacture of iron and steel. Alan Wood Steel Company derives nearly 60 per cent of its present ore supply from its own mines at Scrub Oaks, Dover, N. J. and Washington, Oxford, N. J. The mines have been operated by Alan Wood since 1929.

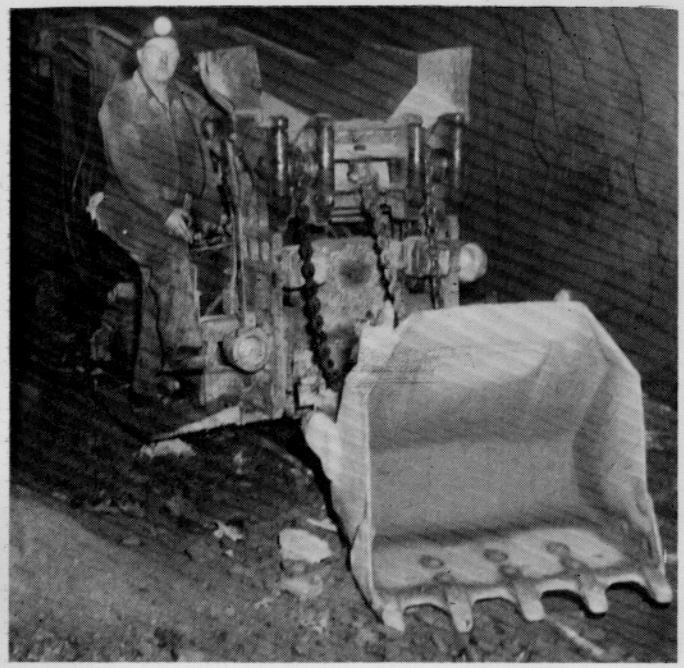
Most iron ore minerals are oxides, such as hematite, limonite and magnetite. The latter is being mined at Scrub Oaks, considered to be the largest known magnetite iron ore body in the State of New Jersey.

The Scrub Oaks Mine has a 3200 foot shaft which penetrates the earth at an angle of 55 degrees and levels extending out at 300 foot intervals. It has already been mined out down to the fifth level and active mining is now taking place on the 5th, 6th, 7th and 8th levels. Development work has been started on the 9th and 10th levels.

On each level a main drift or tunnel is run from the shaft to the ore body, and from this drift, raises or shafts are run to the level above. About 30 feet above the main level there is a sub-level, which is called the grizzly sub. The sub-level, runs along the footwall of the ore, and is kept about 75 feet in advance of the haulage drift. From the grizzly subs, 300 foot long shrinkage stopes are started with chutes located at 60 foot intervals. The ore body in each stope is undercut with stoper drills and pulled down into the grizzlies.

Development work for shrinkage, stoping includes a haulage level, driven into the footwall about 10 feet from the ore, and grizzly raises at 40 foot intervals. Stope preparatory work consists of a sub-level, 30 feet above the haulage level, driven in the ore at the footwall, short crosscuts from sub-level to grizzly chambers cut out over the tops of the chute raises, and, from each grizzly chamber, two draw raises put up to the ore. In beginning a stope, these draw raises are belled out and widened until they meet, and the ore is completely undercut. Then mining progresses by taking down successive slices from the back of the stope, drawing off only sufficient broken ore to leave convenient room for the miners.

The grizzlies, which are level consist of heavy steel billets six by eight inches laid over a raise and firmly locked in place. The bars are spaced 20 inches apart to allow much of the ore to fall through as it comes from the stope. Chunks too large to go through



The Eimco mucking machine used for loading the rock and ore into the tram cars.

the grizzly are broken up by hammer or blasting by the grizzlymen. The ore slips through the grizzlies into the chutes.

Chutes are of steel-lined timber construction, with undercut arc gates worked by double acting air cylinders. Cars are loaded in a minimum of time, and with little dangers of spills. The chutes are 4 foot 6 inches wide and about 3 feet 6 inches high in the clear.

Trolley locomotives haul the ore to the shaft in trains. The ore is crushed before hoisting. At the shaft the car dumps automatically into pockets above the crushers. The crushers in turn discharge into pockets directly over the shaft, from which it is automatically loaded into the skip car and hauled to the surface.

In the mill the ore is crushed and barren material cobbed out by running the ore over magnetic pulleys. Because the ore contains some martite, which is non-magnetic, a gravity system of concentration is also used. The crushing process is continued until the ore is reduced to fragments of about one-eighth inch diameter. It is then processed through magnetic separators, jigs and tables. The waste tailings are conveyed to the sand piles; the concentrates go by conveyor belt into railroad cars ready for shipment to the Blast Furnace.

A part of the concentrates at Scrub Oaks are processed on tables and a high grade concentrate is made for special purposes. Some of the high grade concentrates are dried and shipped to our iron powder plant for further treatment. The remainder of the high grade concentrate is shipped directly to customers.

The Washington Mine at Oxford, N. J., consists of two ore bodies. Washington No. 1 ore body is an old working, which pinched out at about the 15th level. Near it is located the Washington No. 2 ore body, which is now being worked. It is reached from the 15th level of the old shaft, which has been sunk to a depth of approximately 1500 feet at an angle of 69 degrees.

A different method of mining is employed here than is used at the Scrub Oaks Mine. The system is called "long hole drilling." Instead of blasting the ore down from the back of the stopes, holes up to 60 feet long are drilled in a ring pattern, radiating from a tunnel which has been driven above and parallel to the drift level. These rings of drill holes cut off slices of ore 6 feet thick, 30 feet wide and 60 feet long.

These huge blocks are then broken up and pulled through the grizzlies into chutes below where the ore is loaded into skips and hoisted to an ore pocket on the 15th level. It is dropped into a jaw crusher below this pocket which reduces the ore size to six inches diameter or less.

A conveyor belt then takes the ore to the main shaft of old No. 1 ore body, where it is hoisted in four-ton skips to the mill where all concentration of this relatively high grade ore is done magnetically. The ore is easily crushed and concentrated, resulting in a simplified and economical operation.

In addition to ore mined, a large tonnage of by-products such as sand, stone and grit for chickens and turkeys are produced and sold by the Sand and Stone Division.

A gramby self-dumping ore car, which carries the ore from the chute to the ore pocket, and drops into the crusher and broken into chunks for hoisting to the surface.

Quenching car receiving a load of hot coke, which is being pushed from an oven.

COKE AND CHEMICALS DEPARTMENT

The Coke and Chemicals Department of Alan Wood Steel Company produces foundry coke for sale to industrial users and a high grade metallurgical coke to supply our Blast Furnaces. Coke is essential in the metallurgy of iron making; it produces the carbon monoxide gas which releases oxygen from iron ore during the blast furnace process. It also performs the all important task of providing the heat necessary to keep the iron and slag in a molten state.

The operation of the coke plant involves the handling, unloading, processing and blending of approximately 2500 tons of bituminous coal daily, which is heated in the absence of air to form coke.

Coal is unloaded from railroad cars by the use of a rotary car dumper. Seventy-ton hopper cars are easily handled by this car dumper. After the car is clamped to the rails, the dumper is rotated through 120 degrees which permits the coal to be freely and automatically discharged from the car into a double track hopper.

From the car dumper, coal moves over a series of conveyor belts through a breaker building where the coal is broken into fine pieces; thence, it is conveyed to coal mixing bins. Various grades of coal are drawn separately from the mixing bins and blended before being put through the coal crusher which grinds and mixes it thoroughly. It is then conveyed to a large storage bin adjacent to the coke ovens.

Coal is transported from the storage bins by means of a 4-hopper larry car which measures the proper amount of coal and charges each oven.

There are 151 ovens arranged in three batteries. They are heated with coke oven gas which flows upward in vertical heating flues, with the direction of the heating gas being reversed and controlled by automatic timing machines. From 35% to 40% of gas distilled from the coal is returned to the coke ovens and used for maintaining the proper temperatures.

Each coke oven has a capacity of 11.2 tons of coal, which normally requires about 16 hours for converting into coke. This process for converting coal to coke is known as "destructive distillation of coal" whereby practically all of the volatile matter is distilled from the coal, leaving an end product of hot coke remaining in the ovens. It is then pushed out by means of a pushing machine into a quenching car and sprayed with water in a suitable prepared quenching station. After the coke has been quenched it is spread on a coke wharf to cool. Then it is conveyed through a screening station where it is graded and loaded according to size for its particular end use.

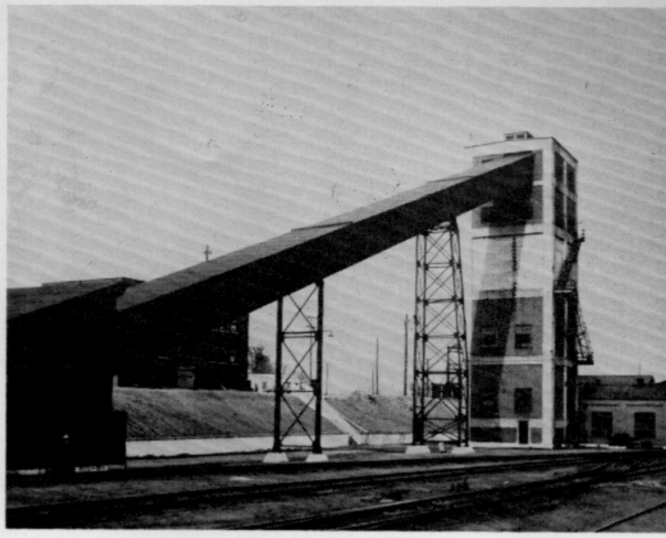
During the coke making process valuable coal chemicals are recovered, and as a result the chemical industry is supplied with a part of its essential raw materials.

At the top of each oven there is an outlet for the hot gas and vapors that form during the cooking process. These pipes lead to a large collector main which carries the gas and chemicals to the processing equipment.

As the gas leaves the oven it is sprayed with ammonia water which condenses some of the tar and ammonia from the gas into a liquid. The liquid travels along the gas main with the gas until it reaches a series of decanter tanks. Here the tar and ammonia water are separted by the difference in their specific gravity.

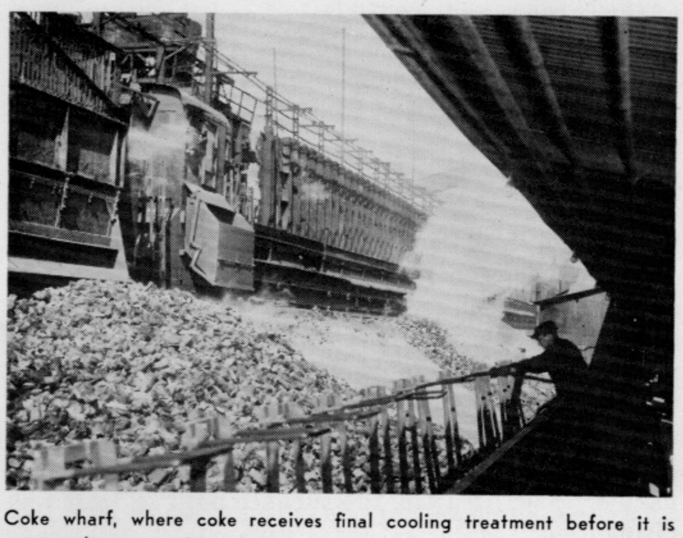
The gas passes around and between many cold water cooling tubes in what is known as primary gas coolers. Here an additional amount of tar and ammonia water is removed from the gas by condensation.

The gas, in conjunction with the ammonia recovered by distillation from the ammonia water, is bubbled through a dilute sulphuric acid solution in a piece of equipment known as a "saturator" where the ammonia forms small crystals of ammonium sulphate. These crystals are separated from the acid bath by drying in a centrifuge then additional acid removal and dehydration in an after-drier. The sulphuric acid bath in the saturator holds in solution the chemical known as pyridine, which is recovered by processing the acid bath.

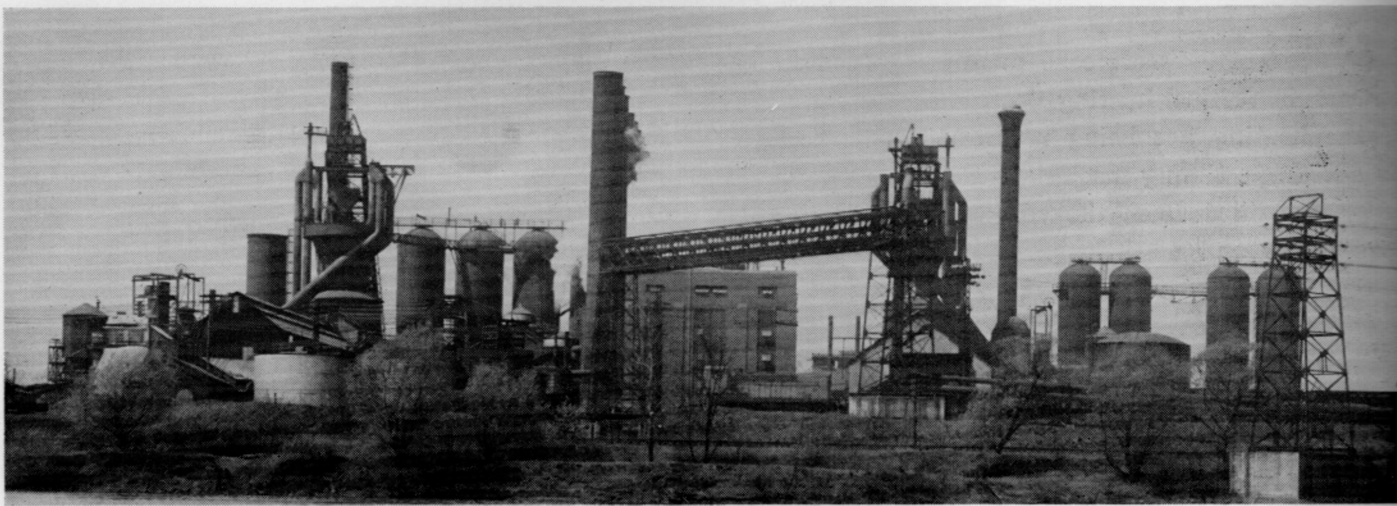


Coal conveyor at the Coke and Chemicals plant.

After the gas leaves the saturator it passes through a cooling tower where it is further cooled by water. During this process napthalene settles out of the water in the form of small yellow crystals. The gas after leaving this cooler is then passed through absorption towers where it is sprayed with a suitable grade of petroleum oil for the continuous recovery of "light oil" which is further refined into benzol, toluol, xylol and other solvents. These products, as well as coal tar derivatives, ammonium sulphate and pyridine go to our customers as a base raw material to be further processed into hundreds of useful materials and commodities.



Coke wharf, where coke receives final cooling treatment before it is conveyed to screening station.



View of Blast Furnace Department from Ivy Rock.

THE BLAST FURNACE STORY

The first step in the actual processing of iron ore into steel comes at the Blast Furnace department. Iron ore from our two New Jersey Mines, plus some purchased ore from various other mines throughout the country, is placed into these massive structures, along with limestone and coke, to remove most of the impurities. To promote combustion, a strong draft, or blast is supplied by blowing heated air into the lower part of the furnace.

Before we look into the entire process of making pig iron, let's trace the birth and development of the Alan Wood blast furnaces during the past century.

In 1849, the first blast furnace was erected at Swedeland. Production by the end of the Civil War had reached 600 tons monthly. In 1886, Richard Heckscher and Sons Company became the operators of the furnace and, in 1892, they added a second furnace with a capacity of 9,000 tons a month.

The Heckscher Company and Alan Wood Company were consolidated in December of 1911. The following year a third furnace was constructed to produce 15,000 tons of iron a month. Two years later, the original furnace, vintage 1849, was torn down.

The emergency of World War I created new demands for iron. To meet the demands, the so-called No. 3 Blast Furnace was started in 1917 and rushed to completion in little more than a year. Cessation of hostilities in the latter part of 1918, accompanied by a sharp decrease in orders for pig iron, delayed the lighting of this furnace until January 8, 1920. In 1928, the furnace built in 1892 was dismantled.

Through continuous improvement in production methods, efficient management and top-flight supervision, the 600 tons a month of the Civil War days grew until Alan Wood can more than double in a single day this production.

At Alan Wood there are two Blast Furnaces. The large cylindrical-type structures, approximately 95 feet high, and 20 feet in diameter, are lined with firebrick. Rows of water-cooled copper plates are evenly spaced throughout the brick lining.

The purpose of the Blast Furnaces are to produce molten iron from certain raw materials. As we mentioned in the first paragraph, various grades of iron ore are used to supply this iron content. About 60 per cent of the ore comes from our New Jersey mines, and the other 40 percent from other domestic and foreign sources.

Because the magnetic ore from our New Jersey mines is too fine to be used directly into the furnaces in large quantities, it must be processed by mixing it with powered anthracite coal and burned until it becomes a clinker-like mass called "sinter."

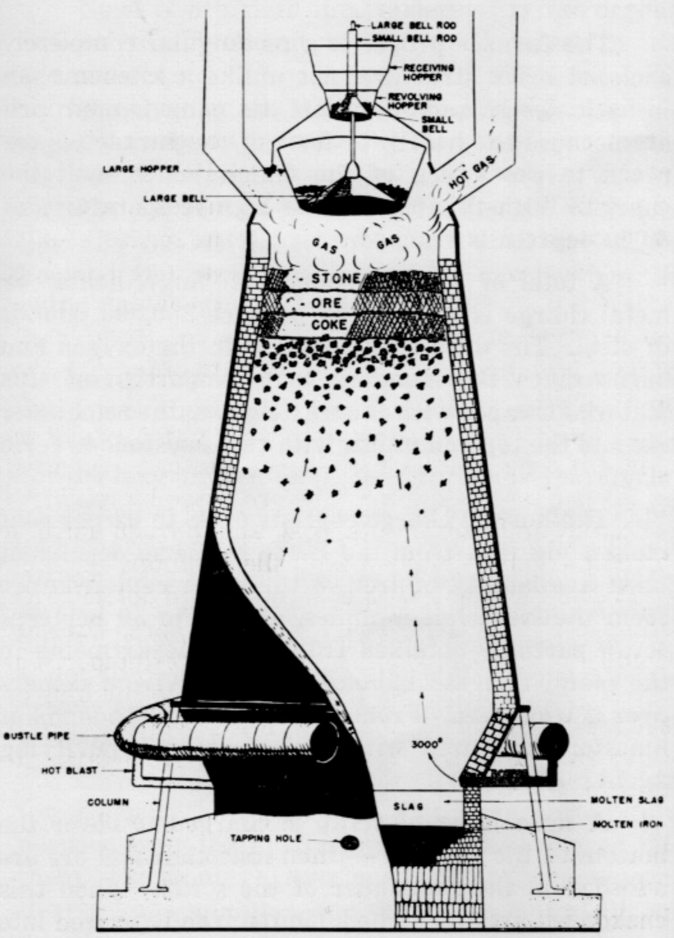
The sinter, along with coke, stone and dolomite are shipped to the blast furnace in hopper cars. Ores are dumped into the ore storage yard by car dumper. The ore is then transferred from the yard to the bins on the trestle by means of a new 15-ton overhead crane. Coke and stone are unloaded directly from cars into bins on the trestle.

A scale car in the stockhouse runs underneath the trestle bins and exact amounts of materials are weighed and dumped into a skip. The skip is a bucket like car operating on a steep rail incline from the stockhouse to the top of the furnace. As the loaded skip is hoisted, an identical skip on another track is lowered into the stackhouse. The loaded skip is dumped through a receiving hopper onto a small inverted-cone shaped bell at the bottom of the hopper. This revolving hopper automatically rotates to allow an even distribution of materials. The small bell is then discharged into a large hopper and bell. The large bell is then lowered and the material slides down into the furnace.

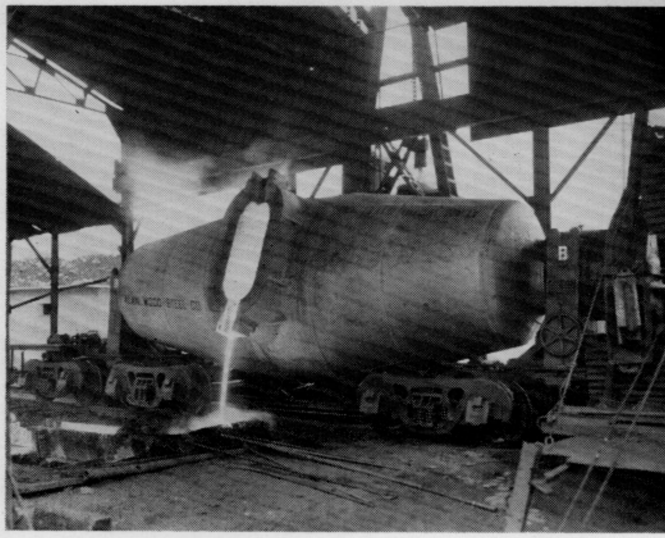
The bottom of the furnace reaches a temperature of about 3000 degrees Fahrenheit; ten times hotter than the top. Blasts of air, heated to 1100 degrees Fahrenheit are blown through the mixture from the bottom.

As the raw materials begin to melt and decrease in volume, they move toward the bottom of the furnace. With the increasing heat, more of the oxygen in the ore is burned out by the coke, and the limestone forms slag with the other impurities in the ore. The molten iron and slag finally trickle to the bottom of the furnace.

The complete cycle of a "batch" of material from the time it goes into the top and comes out at the bottom is 12 hours. However, the furnaces are continuously filled and are "tapped" every four hours yielding approximately 125 tons of white-hot molten metal from the furnaces six times a day.



Blast Furnace diagram.



Molten metal flows from modern brick lined mixer-type ladle into trough at pig casting machine.

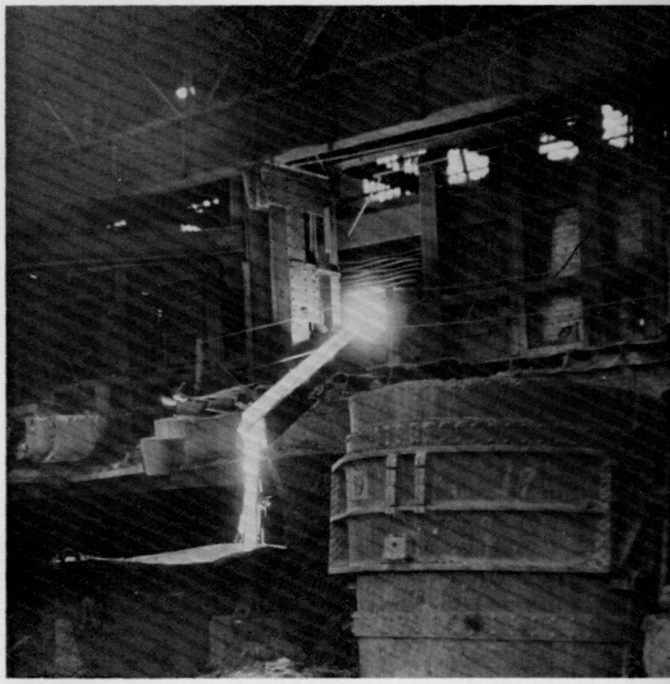
Final touches of "tapping" are both interesting and spectacular. The onlooker sees a clay plug, which was automatically inserted after the last "tap," drilled out. Then, by means of an oxygen torch, the metal hardened around the clay plug is burned open.

Out pours the iron in a storm of sparks flowing along clay-lined channels into 125-ton ladle cars to be delivered to the Open Hearth furnaces for conversion to steel. As the molten iron flows out, the slag, lighter in weight, follows and runs into other ladle cars, which take it to be dumped on slag piles.

Although the vast majority of the iron is used in our own Open Hearth Department directly by transferring the cars from one department to the other, some of the molten metal is poured from the ladle cars into small moulds, which are moving on a endless chain operation up an inclined track, and through a water spray bath, until the solidified "pig" drops into a car. Each pig weighs about 35 pounds. The pig iron is then piled for further Company use, or for shipment to surrounding foundries.

Another interesting phase of the operation is the vast quantities of gas produced. Daily a total of 125,000,000 cubic feet of gas collects at the top of the furnaces. About one-third of the gas is used to heat the huge stoves that supply the hot blast air to the blast furnaces. The remainder of the gas is cleaned and used in boilers to generate steam and electricity for use throughout the plant.

OPEN HEARTH DEPARTMENT



Slag runs from Open Hearth furnace into small ladle.

Continuing our story of Alan Wood Steel Company, we move to the Open Hearth Department. It is the very heart of our production, capable of turning out 800,000 tons of steel annually.

Shortly after the turn of the century, predecessors of Alan Wood Steel Company purchased the old Carey Farm at Ivy Rock and established the present plant. Five open hearth furnaces were built and the first heat of steel was tapped on June 1, 1903. Three more furnaces were added in 1905, the ninth in 1907.

Less than five years later, production reached 250,000 tons annually. In 1915, capacity was increased from 55 to 68 tons per furnace. Three new 80-ton furnaces were constructed in 1917, greatly expanding Alan Wood facilities for furnishing steel in World War I.

Today we have nine 140-ton basic open hearth furnaces, which turn out 200 per cent of First War volume.

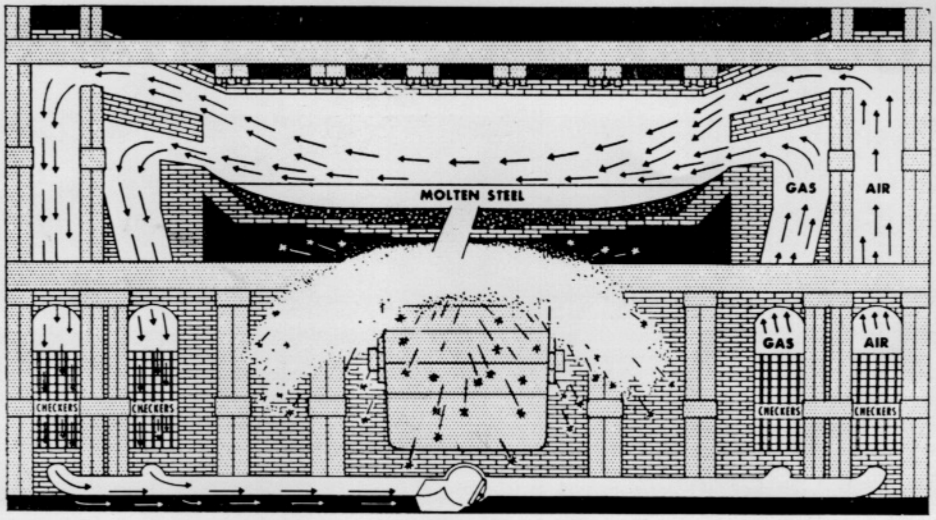
Alan Wood's Open Hearth furnaces are of the regenerative type, in which hot gases passing through checker chambers impart a part of their heat to the brick walls. From time to time — every eight to ten minutes — the flow of gases is reversed and cold air, on its way to the burners, passes through the hot checker chamber and is heated to 2400 degrees. This preheating of air is the secret of producing high temperatures in the furnaces. High temperatures are necessary when one realizes that pure iron melts at 2875 degrees Fahrenheit.

The furnace proper is a rectangular completely enclosed brick structure, not unlike a kitchen oven in basic design and operation. Its name is appropriate because the hearth or floor of the furnace is exposed to the sweep of the flames which melt the charge. With this portion the high temperatures of 3,000 degrees is reached.

A total of 325,000 pounds of "ingredients" or metal charge is required to produce 280,000 pounds of steel. The difference unites with the oxygen and burns much the same as coal. A portion of this material escapes with the waste gases, the remainder rises to the top and unites with the limestone to form slag.

The normal charge consists of 38 to 62 per cent molten pig iron from the Blast Furnace, dependent upon availability of iron, 3 to 10 per cent iron ore from the New Jersey mines, and 28 to 59 per cent scrap partially obtained from other departments in the plant, and the balance purchased from dealers over a wide area. From 12,000 to 16,000 pounds of limestone are used with each heat as a purifying agent.

A light layer of scrap is charged to cover the bottom of the furnace — then limestone and ore are added, and the remainder of the scrap. When this charge is partially melted, molten iron is poured into the furnace.



Sketch of Open Hearth Furnace.

Firing of the furnaces, is accomplished with fuel oil, and coke oven gas, through steam atomizing gun type burners. Temperature is automatically controlled between 190-200 degrees. Of course, the coke oven gas comes directly from our Coke Plant.

Steel is produced in a variety of types, dependent on the final end use of the product by the consumer.

Tapping of the hearth is one of the "jet age" aspects of the Alan Wood Steel Company. Before jet power entered the scene after World War II, experienced crewmen resorted to the use of a long bar and oxygen lance to let the steel out of the hearth, and then hurriedly took cover when the metal flowed into the ladles.

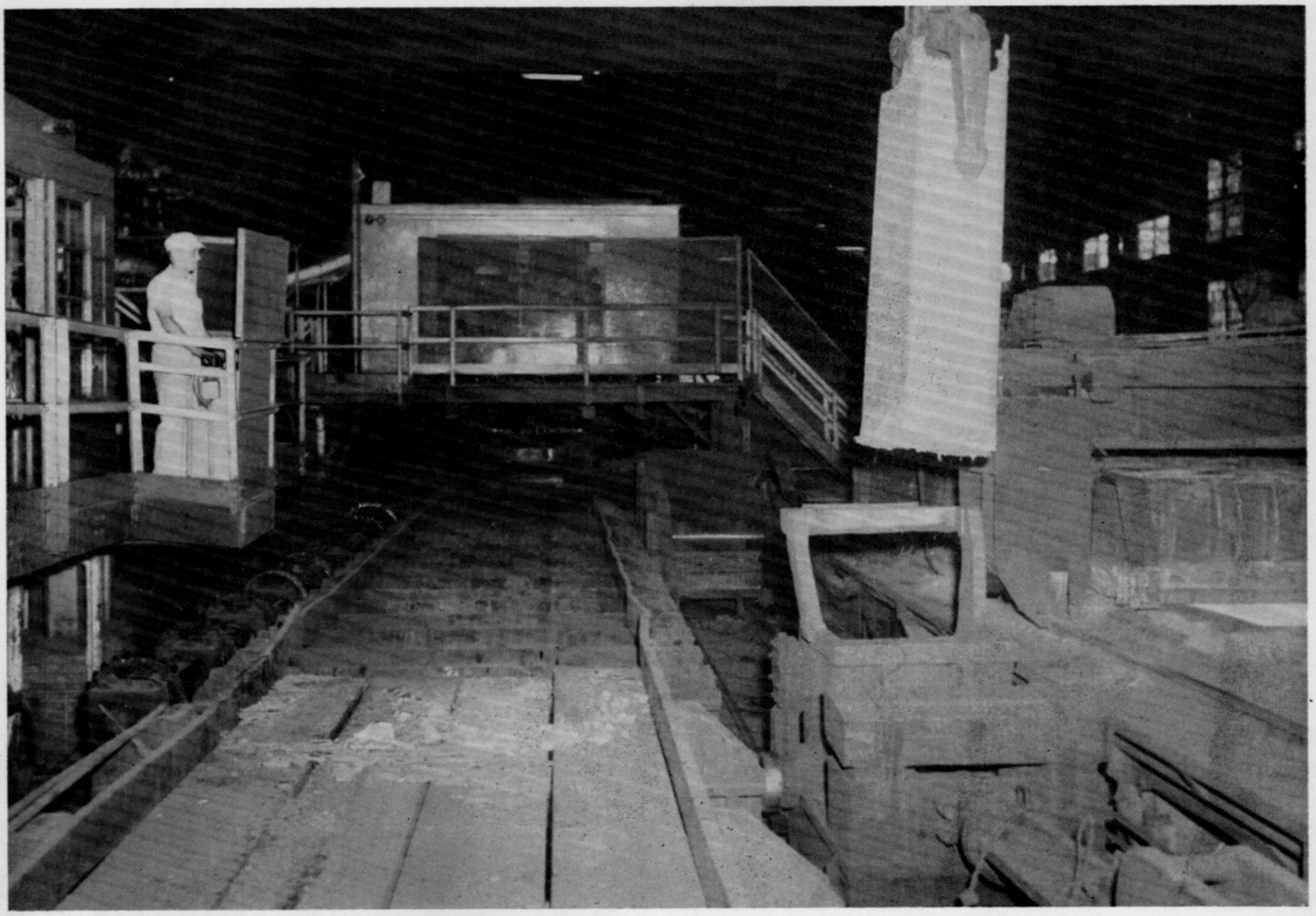
Always in the foreground to provide ideas for the greatest safety of the employees, Alan Wood Steel was among the first to adopt a method brand new to the industry — "jet tappers" as replacement for the long oxygen torch, used for many years.

The Jet Tapper consists of a two ounce explosive charge on the end of a cardboard pole. This is placed in the tap hole and set off by pressing a button located at a safe distance from the taphole. A simulated "explosion" of small metal fragments, moving about 10 times as fast as a rifle bullet, penetrates the crust. The hole is blown open and metal flows out in a clean stream.

Steel is caught in large brick lined ladles of 142-ton capacity. The ladle is then transported to a position over the moulds, and the steel poured into them. The moulds are stripped from the ingots when the steel has solidified, and the ingots sent to Blooming Mill for further processing.

Ingot from Open Hearth Department goes into Blooming Mill "soaking pit."

BLOOMING MILL DEPARTMENT



Ingot is removed from Soaking pits for rolling in Blooming Mill.

Less spectacular than the articles on the manufacture of basic iron and steel, which have been depicted in previous chapters, but equally important in the production of quality finished products, is the Blooming Mill story.

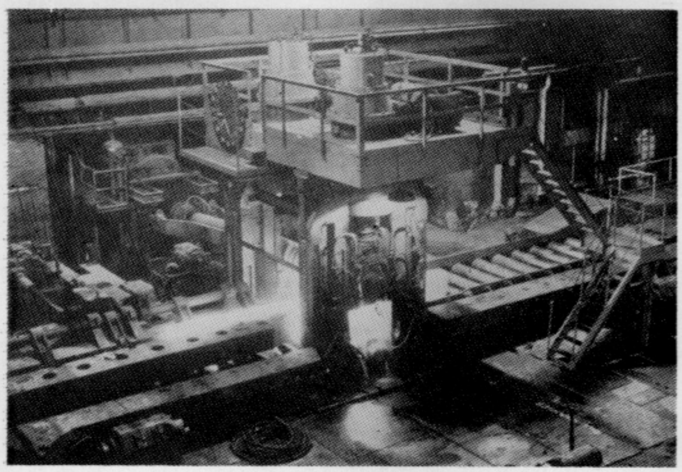
After 50 years of service, the original mill installed when the plant opened at Ivy Rock, was replaced in 1953 by a new 35-inch Mill. Other important improvements included modernization of the Amsler-Morton soaking pits, where the ingots are reheated prior to rolling, so that today, the Mill is capable of producing over 100 tons per hour—vastly greater than daily proluction in earlier times.

Ingots, weighing from 7,000 to 16,000 pounds are stripped of their moulds and delivered directly from the Open Hearth. They are placed into six rows of pits, and "soaked," or in the layman's language, heated, until they reach the proper temperature for rolling. "Soaking" time is determined by the size and weight of the ingot, as well as its temperature when placed in the pits.

Coke oven gas from our Swedeland plant, natural gas, and fuel oil, are used to provide heat. When the ingots reach a temperature of 2240 degrees Fahrenheit, they are retained automatically at this level until ready for rolling.

Three overhead electric "stiff-leg" cranes, with crab-like tongs, lift the ingots in and out of the pits. After removing hot ingots, they are placed in the ingot buggy and delivered to the Mill receiving table. The tongs are immersed in water to cool, thus providing maximum efficiency.

The 35-inch Blooming Mill has rolls of alloy steel, and is a reversing unit, with rolling speeds that vary and range up to 912 feet per minute. It is powered by a 3,500 horsepower motor.



35-inch Blooming Mill.

The Mill looks similar to an over-sized washing machine wringer, with the two revolving rolls gripping the ingot, passing it back and forth between them, and squeezing it thinner and longer. Passes may vary from 15 to 29 depending on the size of the slab desired in other departments.

Two men — the roller and manipulator — sit in the air-conditioned "pulpit" as it is known in the steel plant, directly behind the Mill, and just beyond the soaking pits. They operate the machinery necessary to produce the semi-finished slabs.

The roller, who is primarily responsible for meeting the specifications, is given a daily chart of all sizes of slabs desired by Alan Wood departments. He controls the distances between rolls by means of hand and foot controlers, and must constantly check each pass as it is made to assure the slab coming out of the Mill exactly as ordered on the chart.

The manipulator, also through use of controlers, moves the ingot from side to side, and turns it over when necessary by means of "fingers" on the left side guard. He then guides the ingot into the channel selected by the roller.

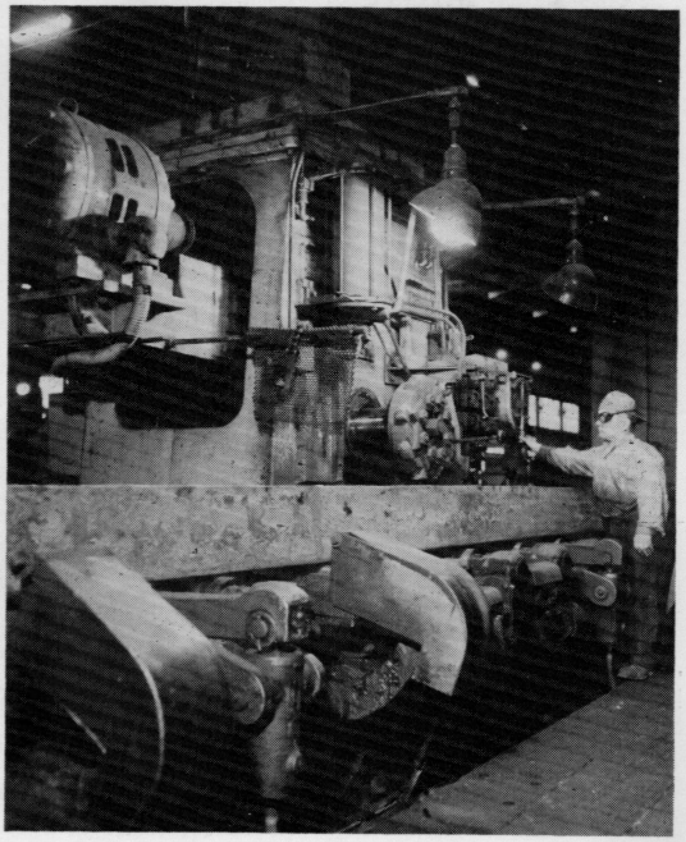
Water flows constantly over the rolls, both as the ingots pass back and forth, and when the rolls rotate solwly as they are cooling.

The slabs, or blooms and billets as they are sometimes called, are still red hot as they travel over the long runway to the hydraulic shears, where they are cut into lengths desired for use in the other Alan Wood departments.

The steam-driven shears develop a pressure of 550 pounds per square inch, and are powered to cut a slab with an end size of up to 200 square inches. Sheared lengths are measured automatically by a gauge designed in the plant. Crop ends are pushed off the table into scrap boxes.

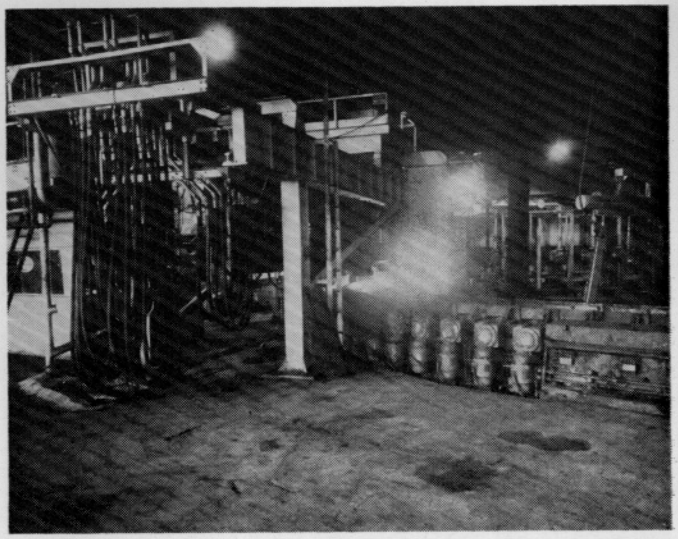
After being cut to specific sizes, the material may go directly to the plate or strip mills, or be kicked off into cradles and moved to another part of the Blooming Mill building, where hand or mechanical chipping removes any surface defects.

Although the number of employees required to operate the Blooming Mill efficiently is relatively few in comparison to other departments of the Alan Wood plant, these "middle-men" in the semi-finishing operation play an equally important role in production of highest quality steel as it passes from the primary to completion stages.



Billeting machine in the Blooming Mill.

PLATE MILL DEPARTMENT



General view of Rotary Furnace in the Plate Mill. Discharging arm is shown as it lifts slab from the furnace.

Complete modernization of the Plate Mill in 1954 was designed to provide maximum efficiency. Installation of new equipment and revamping of the old has resulted in making possible an increase of 20 per cent in plate capacity.

Two major features in the modernization are the new rotary furnace and extensive new shearing facilities. The furnace is the first of its type to ever be used in a Plate Mill operation. The new shears will insure greater accuracy in cutting, both in the length and width of plates.

For the purpose of a thorough understanding of the Plate Mill routine and a detailed description of the new machinery in operation, let's begin this department story with the arrival of slabs from the Blooming Mill, the starting point in this department's overall process.

A new slab yard enclosure was built at the Southwest end of the Plate Mill building to house an electrically operated magnetic gantry crane, which permits easier handling of the slabs as they are "scarfed," or in every day language, cleaned of defects. Another overhead crane then moves the slabs to the pallet type chain conveyor, which in turn carries them to the furnace intake door. There they are lifted by a oil hydraulicly operated charging boom and placed on the furnace hearth.

Well-balanced mechanisms permit the furnace hearth to rotate in a clock-wise direction at an even speed. When the slabs enter the furnace they are cold. The furnace is heated to 2425 degrees Fahrenheit, and as the slabs rotate they are heated and soaked until they are 2200 degrees. The furnace is able to heat up to 50 tons per hour.

There are 40 burners around the sides of the furnace designed to use either coke oven gas, natural gas or oil from outside sources. The greater number of burners in use at one time naturally produces more heat, resulting in a shorter span of time for processing the slabs.

After the slabs are properly heated, an automatically operated discharging arm or unloader boom lifts the red hot slabs from the hearth and places them on a table with revolving rollers. These carry the slabs to the roughing mill, where high pressure water removes the scale as they pass through the rolls.

The rolling mills themselves, are both 84 inches wide, and are 57 feet apart. The first, which we have

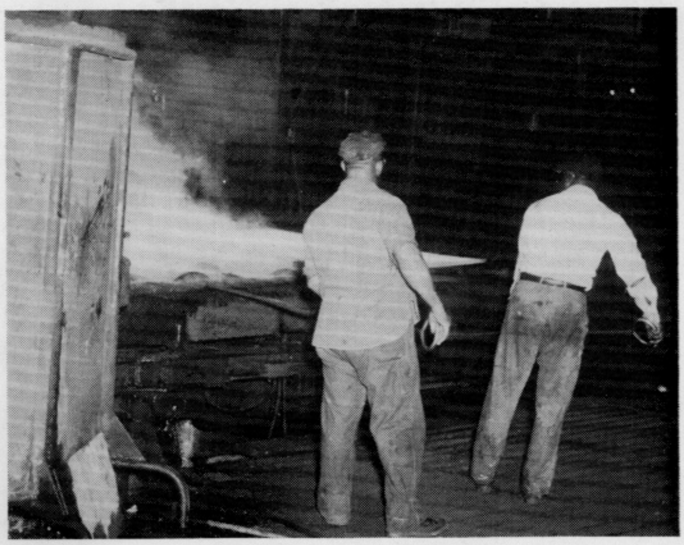


Plate is turned as it passes through the Rougher mill.

already mentioned is called the rougher, the second the finisher.

As in our previous story of the Blooming Mill, operators in the "pulpits" take over the rolling. By moving controlers, they pass the slab back and forth through the rolls, compressing it into a longer and wider plate on each pass, the rougher may make as many as 18 passes, the finisher, a fewer number.

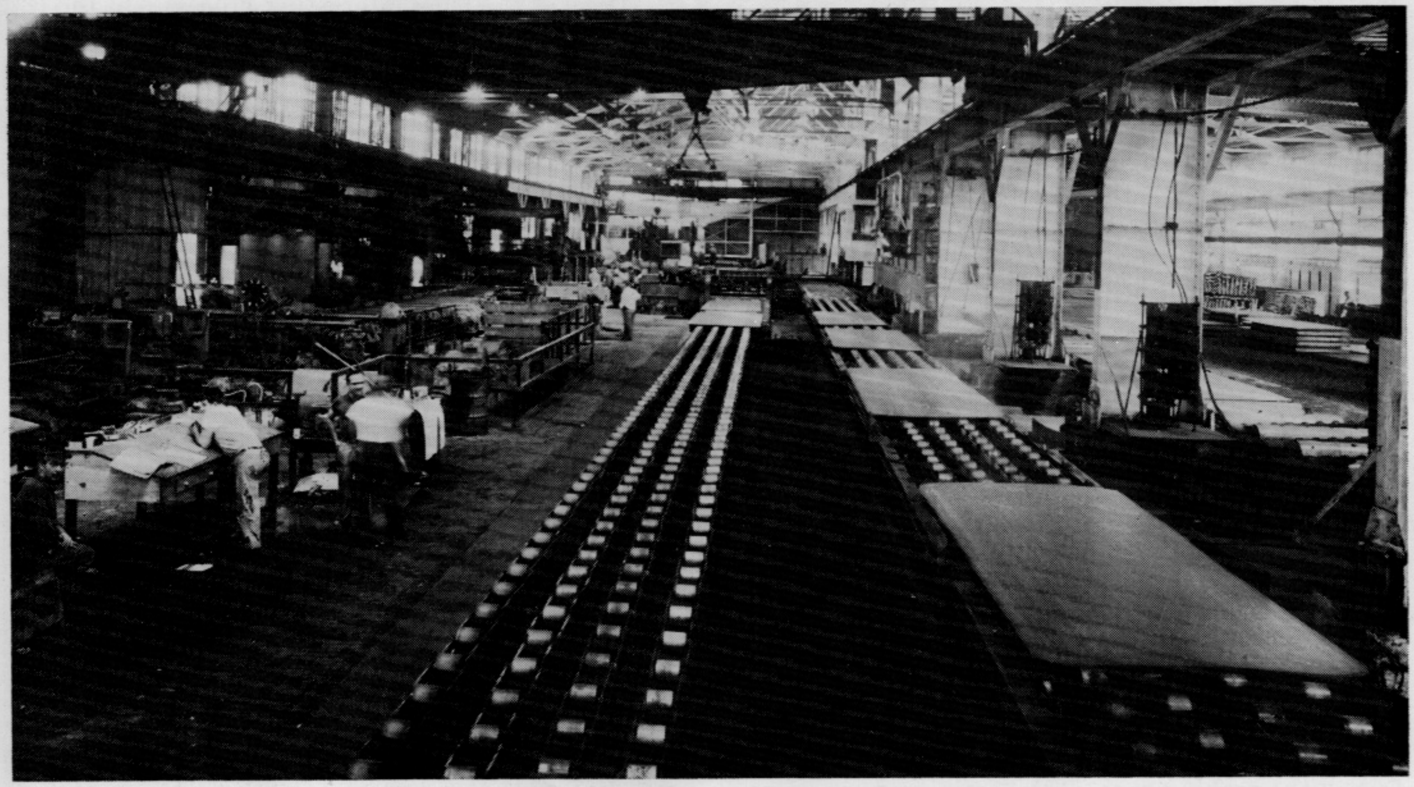
The finishing mill operator not only takes the slab after it has been through the rougher and complets the final rolling, but also, where desired, imprints any special patterns, such as Super-Diamond, as the plate makes its final pass through the mill. Water pressure completes the descaling process.

Roller conveyors carry the plate about 90 feet to the hot roller leveller. Here, either with or without a fine water spray, the plate is smoothed to the semi-finished stages. As the plate cools, it travels about 200 feet to the North end of the building. Transfer tables then move it aside, and onto tables which bring it back in the opposite direction.

A new cold roller leveller gives the final "finishing" touch to the surface of the plate on this return trip. Just beyond the leveller, experienced personnel measure and mark the plate for cutting sizes, and the order number is imprinted on the plates by means of white paint and machine cut stencils.

Now let us turn to the new shearing section of the Plate Mill. Massive new shears cut the ragged ends from the plate in the first step, and then the plate passes through new side or rotary shears. Here the plate is automatically trimmed to desired widths. Another set of cutting blades make the final trim to finished lengths. In every cutting operation, shear operators, who sit in "pulpits" manipulate the plates into positions, and the end and side guides are automatically adjusted.

After shearing, the plate moves to the shipping department, where overhead electric cranes lift and place it in a specified pile. Trucks drive directly into the shipping department, where the plate can be loaded, or it can be placed in a railroad car, which also can come inside the building.



Overall view of the Plate Mill. From left to right, partial view of the new shearing machinery; tables which carry the plates from the hot roll leveller to the North end of the Mill, and back through the cold roll leveller. Extreme right, a view of a part of the shipping department.

HOT STRIP MILL

Hot Strip Mill Furnace.

One of the most important post-war additions to the productive capacity of Alan Wood Steel Company is its 30-inch continuous Hot Rolled Strip Mill which was built at a cost of $9,000,000 and placed in operation in 1950. The Mill has a rated capacity of 240,000 tons per year.

The Hot Mill, designed to produce hot rolled strip over a range from 7 to 26⅝ inches in width, and from one-sixteenth inch to a half inch thick, so that Alan Wood has been able to have a vastly increased amount of finished steel. This utilizes the capacities of our Open Hearth and Blooming Mill Departments to supply the steel for further processing into strip or allied steel products.

Slabs, rolled in the Blooming Mill, are moved directly over a long runout-table, placed on a buggy and then put in storage for cooling. From here they are removed to the scarfing yard for further conditioning. They are then taken to a slab de-piler by a crane, they are fed onto the furnace charging table and then into furnace itself by means of a double ramrod pusher. This permits one or two slabs to be charged at the same time.

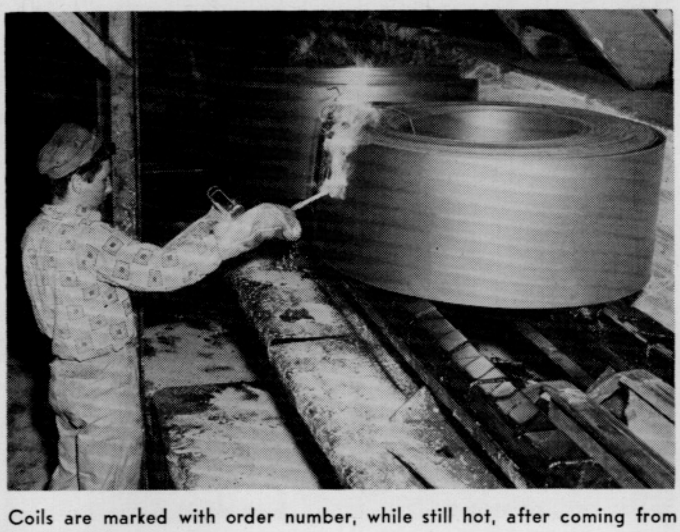
The furnace with its capacity of about 50 tons of slabs per hour, has a hearth 17 feet wide with lengths to 45 feet in the main heating zone, and 15 feet in the soaking zone. The heating zones are supplied with six combination burners on top and six or more on bottom, while eight burners over-fire the soaking zone. The furnace temperature obtained during the slab heating may go as high as 2650 degrees Fahrenheit.

The heated slabs are discharged from the furnace onto a motor driven mill approach table, which is 39 feet long. Starting from this point the slabs go through 11 different rolls, which include a descaling unit, a series of roughing mills, vertical edging stands, a secondary descaling unit, and into the finishing mill stands. As it passes through these numerous rolls, it becomes longer and thinner, and finally emerges as a thin ribbon of steel from the final set of rolls. Each successive roll runs at a faster speed than the previous one, so that by the time the slab comes from the final one, it is moving more rapidly than man could run alongside of it.

As the steel strip leaves the finishing stand, it is conveyed to a cooling bed. The heavier gauge ranges are taken to a shear to be cut in lengths, while the lighter gauges are conveyed to pin type coilers, and the coils are still red hot when taken from these coiling machines. During their movement to the storage area, numbers are placed on them for orders or stock piling.

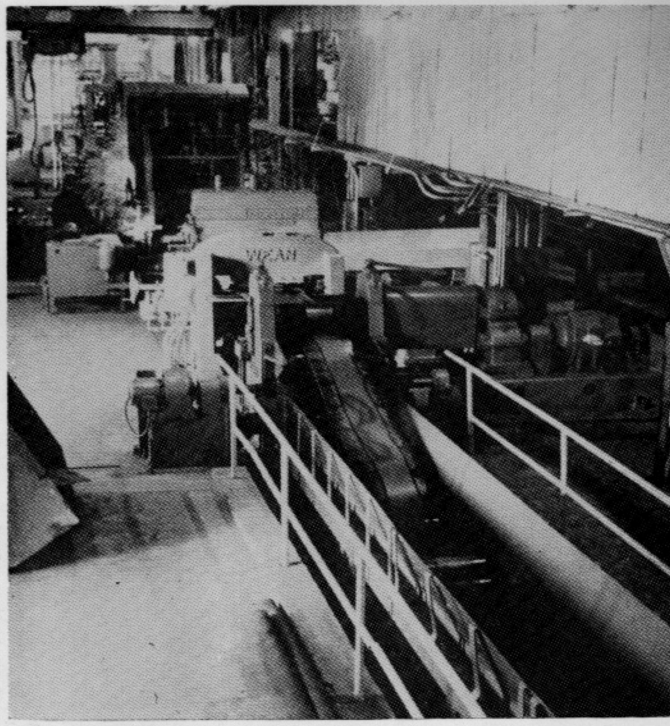
One of the most interesting processes at the end of the hot mill line is the new $2,500,000 continuous cascade type pickler. This is one of the most modern types, capable of handling steel six to 26½ inches wide at a speed of more than 300 per minute. All of the steel to be used in the new Cold Mill is put through the "pickling" process.

The coils are moved by overhead crane to the pickle line, where they are fed through scale breaking process, and then joined by means of a special electric welding machine into one continuous strip. The coil is then processed through four 70-foot long



Coils are marked with order number, while still hot, after coming from the Hot Strip coiler.

Coil of steel passing through the pickling operation. Electric welding operation to make a continuous process is shown in background.



pickle tanks filled with sulphuric acid, which is used as the medium for cleansing the steel.

After passing through the tanks of acid the coil leaves the pickling tanks and is subjected to a cold water spray, and then submerged in a hot water bath to remove the residual matter from the strip surface. It is dried by means of hot air, cut to the desired coil length on the conventional down shear, and recoiled in an up-coiler. Anti-rust oil is applied to the strip as it is recoiled. Side trimming shears of the rotary type are also available for trimming edges of coils.

COLD ROLLED MILL

Another major step in our expansion program, begun shortly after World War II, was achieved when the new modern $7,000,00 Cold Rolled Mill went into production in 1955.

The Cold Rolled Mill, built on land adjacent to the Company's Hot Rolled Strip Mill, was begun in the Spring of 1954 and operations started as scheduled shortly after the first of the New Year. Its annual capacity is estimated at 168,000 tons of cold rolled strip and sheet, representing a further processing of products from our $9,000,000 Hot Strip Mill department.

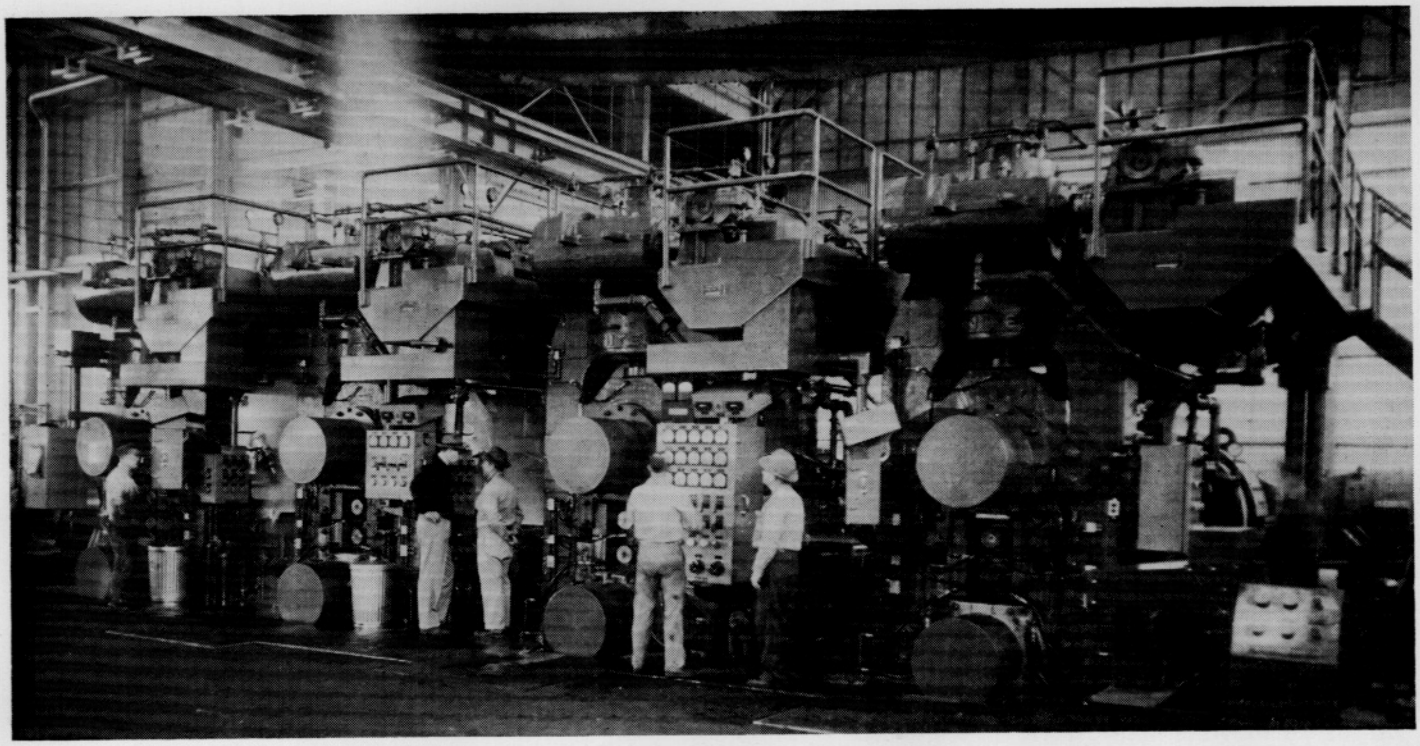
The coils from the pickle department are brought by high lift truck to the approach table of the Cold Rolled Mill, which is capable of handling coils up to 60 inches in diameter with a maximum weight of 18,000 pounds. It can handle up to 50 tons per hour and has a record turn of 688.67 tons in an eight hour run.

The four-stand-four high Mill, one of the most modern in the Steel Industry today, runs at a speed of nearly 30 miles per hour, as the coils are unwound and travel through the Mill.

The front end of the coil is automatically placed in the roller cradle, and then threaded between successive rolls, the guides are closed, the roll opening adjusted and the rolls set to the desired speed. The reel at the delivery end of the mill automatically grabs the front end of the coil as it comes out of the final stand by means of a belt wrapper.

Under the watchful eye of the mill operator, electrically operated and scientifically tested machinery is set to desired gauge before the steel begins to pass through the Mill. An electronic radiation gauge continuously checks the thickness of the strip, which can be reduced to the thinness of three sheets of newspaper. The strip is held under high tension, not only throughout the run through the 90-foot mill, but also as it is rewound into a coil.

Speed control of the Cold Mill, with its total of 6,150 Horsepower is of major importance in providing the proper gauge and, therefore, must meet with very particular requirements. Another important control on reduction of the steel and power consumption is proper lubrication of the strip by which the external angle of friction is reduced between the strip and the rolls. The greater the reductions the higher are the requirements of the lubricants. To obtain the highest degree of efficiency a very fine solvable oil solution is used and it is stored in two 12,000 gallon tanks situated under the mill. These tanks are constantly checked and filters keep the oil clean as it keeps passing back and forth in use.

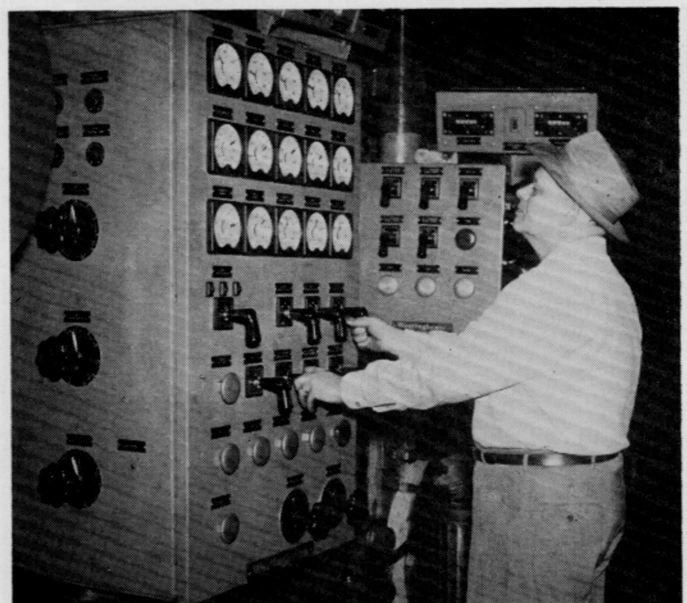


Cold Tandem mill.

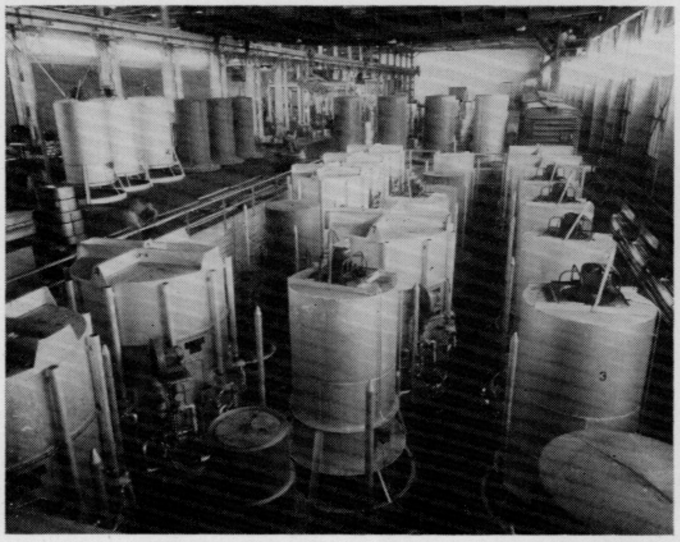
The reduction process in the Cold Mill and the Hot Strip Mill, at first glance, seem much alike. There is however, a marked difference. When hot rolling, the metal is not subject to much tensile pull, compared to cold rolling during which tension in the strip is essential. To further illustrate the importance of tension, the gauge of the steel is definitely controlled by tension applied. Furthermore, the gauge is heavier at lower speeds than when the Mill reaches 2225 feet per minute.

In Cold Rolling the steel, there are three different surfaces implanted as the coils pass through the four-stand mill. According to customer specifications the rolls will be produced in dull, bright or luster finish. The first classification is used most often where the steel is to be covered with a coat of paint or be severely drawn.

The heavy cold reduction more than doubles the length of the coils as they pass through the Mill and has a tendency to distort the grain of the steel, resulting in an increase in the tensile strength and hardness. To soften the coils, they are then placed in large annealing furnaces where they are heated to about 1300 degrees Fahrenheit. These large furnaces, where four or five coils are heated at the same



Modern instrument board which controls operations of the Cold Tandem Mill.



Overall view of the Cold Mill annealing furnaces, in the foreground, coils are piled ready to have the intercover placed over them, while in background, furnaces are over intercovers.

time, are shown in a picture accompanying this story and present a more accurate idea of their size than mere words can portray. After the piles of coils are built up, the covers are placed over them, and they are completely filled with gas to remove all of the oxygen, which prevents oxidation and discoloration of the steel.

The annealing process completed, the coils are once more soft and pliable, and ready for the final processing in one of the two Temper Mills. Here the steel receives its levelling finish, although the passage through these Mills creates only a minute fraction of an inch change in the gauge. As the coils go through the Temper Mill it is coated with a rust preventive oil, and is ready to be sheared into pieces or remain as large coils according to customers' specifications.

The final operation involves automatic shearing machines, which slit the coils into narrow ribbon widths as narrow as 1 inch, or as wide as 25½ inches and up to 15,000 feet in length, being close to three miles long; and the Hallden Shear, which cuts the long coils into shorter sheets.

Although we have stressed in the story of the Cold Mill many features which are most important in production, it is not possible in this article to go into detail and describe all of the necessary and extensive auxiliary equipment. Mention should be made, however, of the large maintenance and roll dressing department, the material handling equipment, including the massive overhead cranes, and the elaborate heating and water and fuel supply systems for the Cold Mill operation.

OUR PENCO DIVISION

Our Penco Division is located in a modern, completely air-conditioned and humidity-controlled plant at Oaks, Pennsylvania. Penco moved to these facilities, located about 10 miles from the steelworks, in 1957.

The division traces its history to one of the earliest manufacturers of sheet metal products, the Penn Metals Corporation of Pennsylvania which was founded in 1869. Alan Wood Steel Company acquired the steel fabricating department in 1955 and named it Penco Metal Products Division, later shortening the name to Penco Division.

Operations at Penco consist mainly of the fabrication of sheet metal for the manufacture of a complete line of steel storage equipment which includes lockers, cabinets, shelving and bookcase units. Approximately 80% of the steel used comes from Alan Wood's own mills.

Penco's largest volume product is lockers, of which it manufactures over 50 types and sizes. The lockers feature rigid, heavy gauge construction with modern design and practical features. Penco's lockers are used in school gymnasiums and corridors, industrial plants, clubs, hospitals and other institutions.

Steel shelving is also an important product, particularly since the introduction of the new "T-Line" boltless shelving in the fall of 1958. This line has many advanced design features. It can be assembled or disassembled in a few minutes, and rearranging the shelves can be done in only seconds. Penco also manufactures standard "Angle Line" shelving, and special shelving parts and types.

Penco's other products are for use in industry, institutions and offices. They include a wide range of wardrobe, storage or combination wardrobe-storage cabinets, desk high cabinets; and a new line of outstanding bookcase shelving.

Present production facilities include primarily machinery for forming sheet steel, such as shears, press brakes, spot welders, punch pressed and other miscellaneous equipment. There are four shears capable of cutting thicknesses up to three-sixteenths of an inch; 21 motor driven presses ranging in capaci-

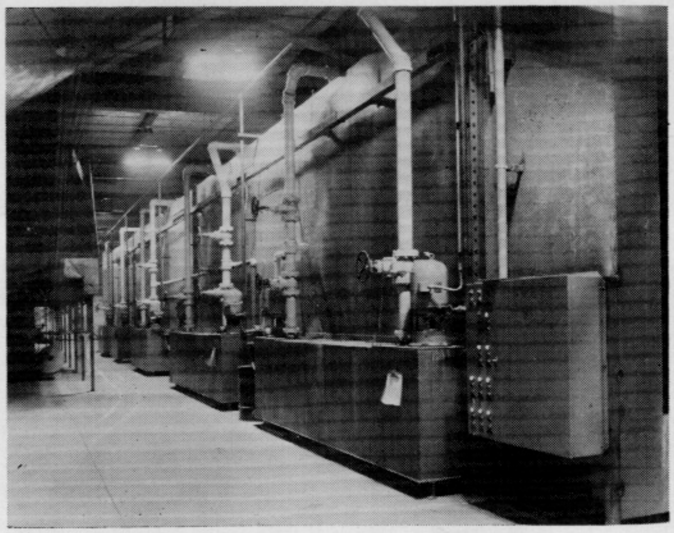
Our new Penco plant at Oaks, Pa.

ties between 20 and 150 tons; 16 motor driven press brakes ranging in capacity from 9 to 200 tons and in size from 4′0″ and 12′6″. One forming machine which contains 8 stands for rolling shapes. There is also an edge forming line which rounds the edges of steel used in exposed parts for safety. Welding equipment consists of 11 spotwelders and two arc welders of 200 ampere capacity. The production facilities are serviced by a 15-ton crane with 90-foot span, which travels the entire length of the 700-foot long building.

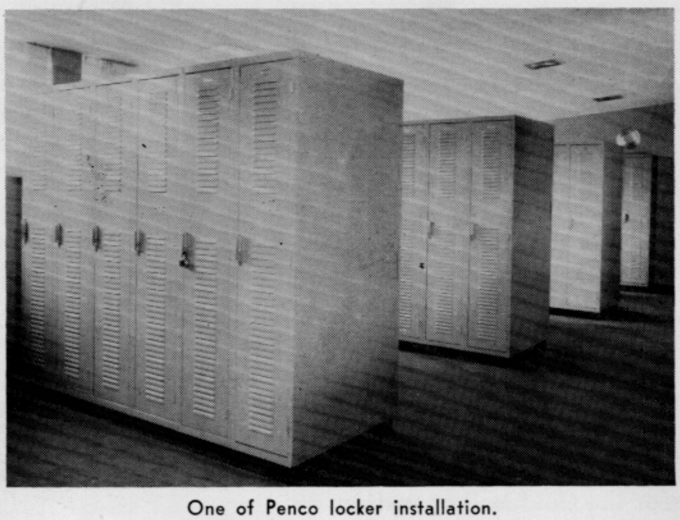
In addition to the fabricating machinery, Penco has one of the most modern painting facilities in the industry. The Ransburg Electrostatic Spraying Booth, the three-hand spray booths, and the proper ovens provide a durable baked-on enamel finish. The painting is accomplished by mounting the fabricated, unfinished part on an overhead revolving conveyor which carries it through spray washing, rinsing and phosphate coating, then through the drying ovens, then through the painting booths, and last through the baking ovens where the paint is baked for attractiveness and permanence. The phosphate undercoating assures a good bond between steel and paint and also resists rusting should the paint be scratched.

Penco's air-conditioned plant with dehumidified storage facilities, allows it to fabricate and then store unpainted parts. This allows quick delivery and reduces the inventory that would be required if the parts had to be painted immediately after manufacture.

In addition to this equipment, Penco Division also has its own machine shop. Here tools and dies are made and maintained to precision standards, which aids materially in consistently high quality production. The machine shop equipment includes surface grinders, pedestal grinders, lathes, shapers, drill presses, universal milling machine, die slotters, die filing machine, electric heat treating furnace and miscellaneous electric and hand tools.



5-stage washer tanks to clean material and phosphatize before painting.



One of Penco locker installation.

RESEARCH AT ALAN WOOD

The fact that a properly organized and executed research program is a good investment is now well recognized by American industry. Not many years ago, a company financed research organization was the exception, but today research plays a key part in the management of all progressive firms. It used to be common practice to camouflage the budget required to finance a research undertaking in order to avoid criticism by financial and management people. Today, these same institutions make investment decisions based in part on how highly they appraise a specific company's research effort. The growth of this understanding and appreciation of research can best be traced by research expenditures which grew from infinitesimal amounts before World War I to $1 billion in 1941 and $10 billion in 1957.

Alan Wood has carried out a research program over the years which has played an important part in developing our Company to its present level. For example, the new Iron Powder Plant is based on an extensive research project which was conducted partially by Alan Wood employees and partially by outside research contracts. To strengthen our research effort, a formal department was organized in January, 1958, under Robert A. Lubker, Director of Research and Development, with the objective of giving direction to the Company's growth and improving its profit margin.

A. G. Allten makes a rating of plastic coated steels for resistance to outdoor exposure.

Research is highlighted as a basic function in our Company Creed which states that "Research and Developement will be carried on to develop and improve products and methods to better serve the customers' needs." This in turn provides steadier employment for all of our personnel and improved profits for our shareholders.

The most important aspect of any research program is the people who do the work. Attractive laboratory buildings and fancy equipment are nice but are relatively unimportant compared to the caliber of research personnel employed.

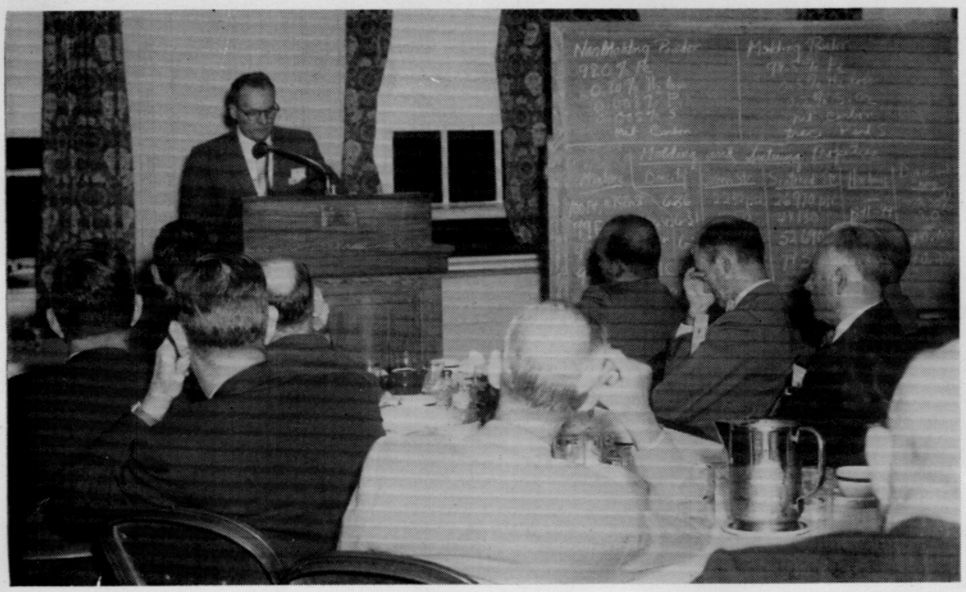
Mr. Lubker, Director of Research and Development, joined the Company in January, 1958. During the period 1942-46, he was associated with the Westinghouse Electric Corporation, East Pittsburgh, Pennsylvania. From 1946-58, Mr. Lubker was associated with the Armour Research Foundation, Chicago, Illinois. As Manager of the Metals Research Department, he headed a staff of 150 research people specializing in all aspects of metallurgical research.

Alfred G. Allten joined the department in June, 1958, as Research Metallurgist. He had been associated with the Crucible Steel Company of America for 18 years, attaining the position of Supervisor of the High Temperature Alloy Section.

Dr. Arthur B. Backensto joined the department in November, 1958, as Research Metallurgist. During the period 1949-55 he was associated with the sponsored research program in powder metallurgy at Rensselaer Polytechnic Institute. From 1955 to 1958, he was associated with Bendix Aviation in Troy, New York, as Metallurgical Engineer working on powder metal friction materials and filters.

Let us look at some of the specific functions performed by our Research and Development Department.

- To develop new products and processes and improve current products and processes.
- To suggest research projects and develop budgetary approval, including in each case an estimate of the money needed to achieve a research goal and the expected profit or savings, when and if the goal is reached.
- To direct and carry out research work on approved projects.
- To establish and operate research facilities as required.
- To provide technical assistance to other departments.
- To review technical and other literature to keep our Management informed on the latest developments in the steel and related industries.
- To advise management of possible areas for diversification.
- To participate in the activities of the various technical societies, including the American Iron and Steel Institute, in order to keep up to date on recent developments as well as to establish the prestige of our Company as a research and quality leader.
- To work closely with current and potential customers in order to develop products meeting their special requirements.
- To represent Alan Wood in scientific meetings with governmental and educational groups.
- To assist the Marketing Department in the introduction of new products.



"Pioneering in the Reduction of Iron Powder" was the subject of a talk given by R. A. Lubker, Director of Research and Development, at a meeting of the Engineers Club of Philadelphia.

- To work with the Marketing Department in establishing probable future demands of customers.
- To cooperate and participate in all technical matters throughout the Company upon request of any department.
- To provide a technical library service for all departments through the corporate library in the Organization Planning Department.
- To utilize outside research facilities whenever such action benefits the Company from the standpoint of lower costs, availability of specialized personnel and equipment, and better service. In these cases, a member of the Research Department acts as contact to follow the work closely and to insure that the money spent produces a satisfactory return.

Although our Research and Developlment Department is comparatively new, it has already organized many formal research projects and while it is not necessary to go into all of the intricate details of the program, it is interesting to mention some of them because they will play an important part in the continued progress and expansion of Alan Wood Steel Company.

First of all, our R&D Department is emphasizing the development of a low cost, high yield strength steel. Promising results have been obtained with small additions of columbium to produce a steel which will be less expensive than Dynalloy and should open up new markets for our Company.

Another major project is the development of new markets for our iron powder. Specific plans include alloy powder, powder for high grade melting stock, rolling of powder into strip, use of our powder for high density parts, for pharmaceutical markets, etc.

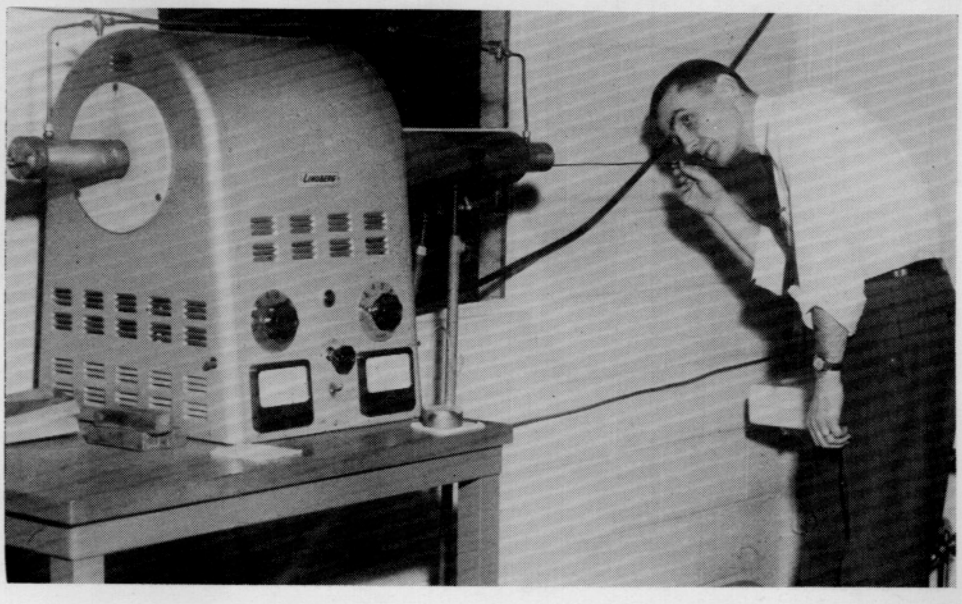
Work is also underway on the development of a plastic coated steel using a roller coater. Promising markets are metal furniture, radio and TV cabinets, automotive interiors, construction, household appliances, etc. This opens up the possibility of our producing a coated steel for a minimum capital expenditure. Such a product should also be useful to Penco Division for fabricating items with improved decorative appeal.

Our R&D Department is making an extensive study of the properties of Dynalloy and Danalloy.

Alan Wood has joined in the support of a study in the use of Electrical Furnaces for the Smelting of Iron Ore being made at Battelle Memorial Institute, Columbus, Ohio, and sponsored by thirty cooperating steel and electrical utility companies.

As a supplement to the work of the staff, a research laboratory is under construction in the basement and part of the first floor of the Schoolhouse. In the new operation, facilities are being provided for melting, heat treatment and metallography. These facilities will be ready in April. Many of the Iron Powder studies will be carried on in the new laboratory in the Iron Powder Plant.

Although in its infancy, our R&D Department has already set its sights on providing many new projects and improved ways of production that will provide better products to our customers, steadier work for our employees, and improved profits for our shareholders.



Dr. Backensto, inserting a sample into the Lindberg Laboratory furnace for sintering treatment.

IRON POWDER PLANT BEGINS PRODUCTION IN NEW MILL

Iron Powder production is under way in our new $3,500,000 plant, adjacent to our Steel Works Department, just about a year after the ground-breaking ceremonies on April 21, 1958. Several years of experimentation with a pilot plant were conducted at our Scrub Oaks Mine Division prior to construction of our modern plant at Ivy Rock. It is part of the Company's continuing program of planned growth for the future.

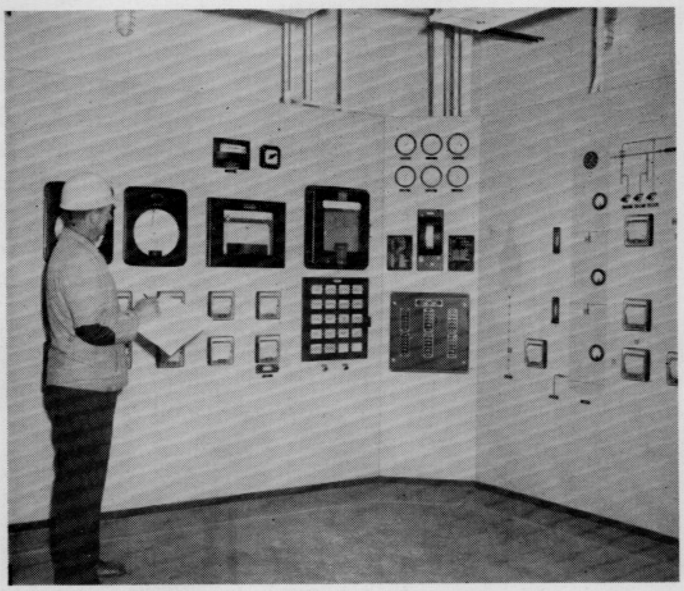
The plant is designed to produce 50 tons a day, or 18,000 tons a year of high-quality iron powder, and will be the second largest installation in the country for this purpose. The powder metallurgy industry is still relatively small when compared to other metal working processes. The use of iron powder, however, has increased rapidly and the industry's sales have grown 15-fold since 1945.

The Iron Powder Plant includes facilities for handling raw materials, facilities for the production of hydrogen, an "H-Iron" reducing section to convert the iron oxide to iron, and a processing section for finishing the reduced materials to marketable products.

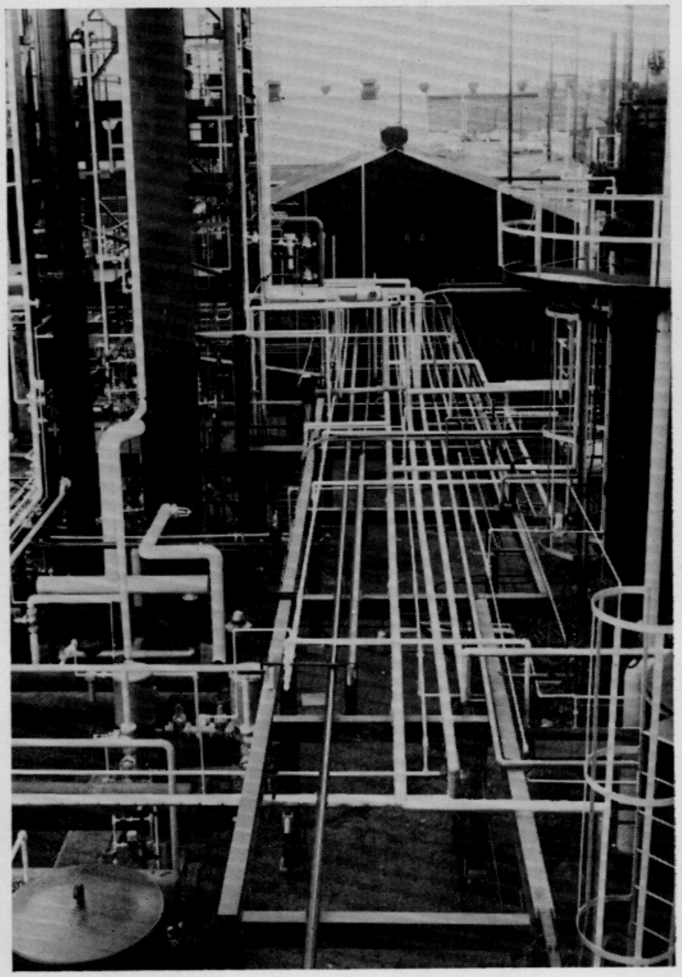
The plant is complete with railroad siding, facilities for motor truck shipments, transformer and switchgear station, water cooling tower, fire protection equipment, locker and wash rooms, office, and a powder metallurgy laboratory.

Raw materials such as concentrates from the Company's Scrub Oaks Mine and mill scale, together with coke-oven gas from the Company's coking facilities will be utilized in the process. Hydrogen necessary for the reduction process will be manufactured by the partial oxidation of the coke-oven gas. Undesirable gases such as carbon monoxide and carbon dioxide will be removed from the hydrogen.

Iron oxide, ground to about the size of a grain of sand, will be "piped" under pressure to the reducing tower pictured with this article. In this reducer the mill scale or ore concentrates will be con-

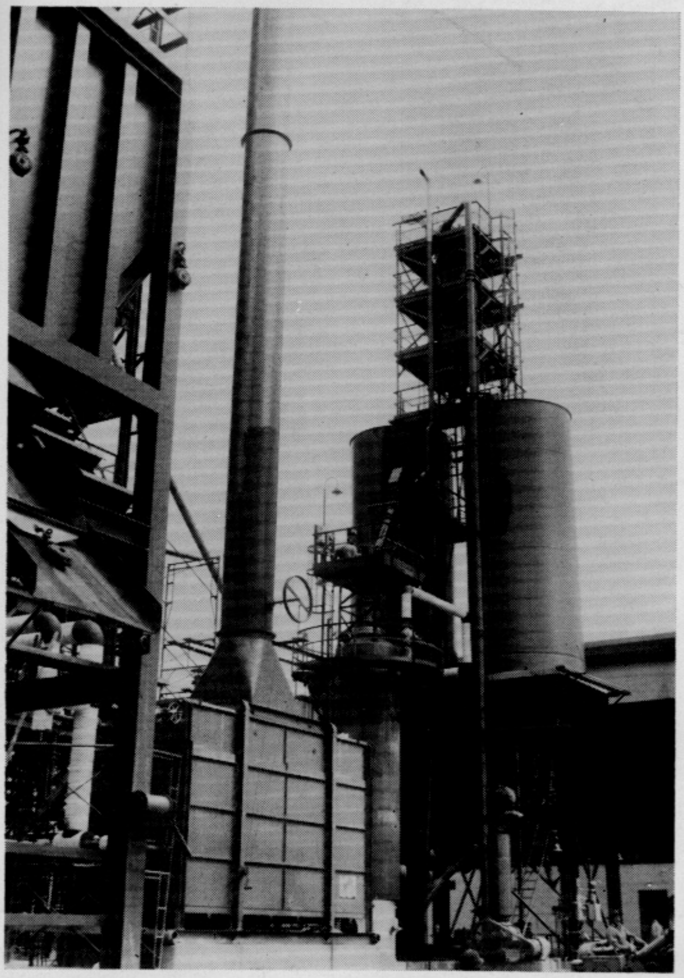


Stanley Wojtas, Control Boardman, checks readings in the panel board room of the Iron Powder plant.



Piping Runs in the Hydrogen Production units, which carry the various gases and liquids used at the Iron Powder plant.

verted from iron oxide to pure iron by removing the oxygen content. This will be accomplished by the introduction of hot hydrogen gas which combines with the oxygen present to form water vapor. In this reduction process the material remains in



Loading bin in the left side for melting stick briquettes. Heater with high stack in middle, used for preheating of hydrogen for reduction of ore. Ores, used as raw materials storage bins are on the right.

the solid state rather than being melted into pure iron. Hydrogen containing water vapor will then be removed from the reducer, dried and recirculated.

Very fine iron particles, now reduced to a pure state, will be transported to the finishing section. This powder will be kept in a closed system until final finishing, as it would burn instantly upon contact with air. In the finishing section, the reduced material will be rendered inactive and treated as required for the various applications by sintering, crushing, grinding, blending, mulling and screening. The finished product will be packed in bags, pails, drums or portable bins and shipped.

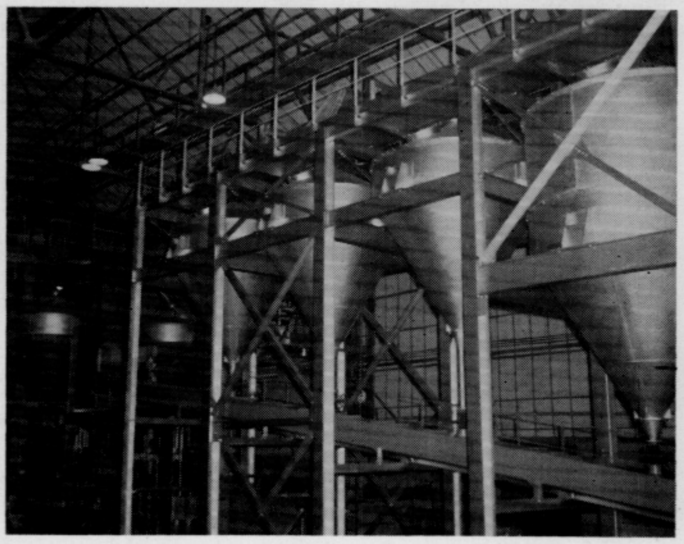
Iron powder has a variety of uses, but the larger tonnages presently go into the manufacture of molded mechanical and structural parts, welding rod coatings, metallic type friction materials, electrical cores and magnets, and for powder cutting and scarfing.

A mechanical part made of iron powder is manufactured by pouring the powder into a die and pressing it to shape. The part is then sintered (heated to a high temperature but one still below the melting point of the metal), which causes the particles to bond together and form material with strength approaching wrought metal of similar alloy. Savings in the use of metal powder parts result mainly from the elimination of expensive machining which is necessary when parts are made by normal manufacturing methods. Parts produced from metal powders can be made to close tolerances, with a material waste of less than 1%.

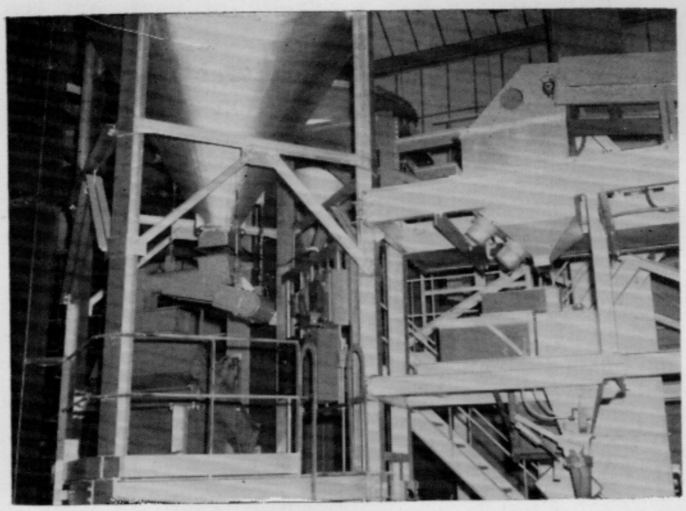
Metallurgists can do many things with powders that cannot be done with regular metals. For example, it is possible to control the porosity of parts to be used as self-lubricating bearings and filters. Also, metals and nonmetals can be pressed together to form various new combinations of materials.

Welding costs today are lowered by the higher welding speeds achieved through the use of iron powder coated welding rods. The welding industry looks toward these rods as a new and important step in its field.

Powder cutting and scarfing, a process in which iron powder is fed into an oxygen-cutting flame, is still another use. It is used to burn through high-temperature alloy steels, cast iron, certain refractories and concrete. In a relatively few years, pow-



Storage bins for the finished iron powder. Material flows from the bins onto the conveyor belt and is delivered to the packing equipment at the far end of the line.



Paper bag is attached to the packing machine in the middle of the photograph. Left is one of the tanks the iron powder passes through in the final processing procedure.

der cutting has earned an important place in mills, foundries, warehouses, fabricating plants and oil refineries.

Electrical cores made from iron powder find their largest usage in telephone, television, radar and radio. Iron powder magnetic parts are also used in small motors and generators.

Most of the molded metallic clutches and brakes employing iron powder are now used with heavy-duty transportation or materials-handling equipment, such as trucks, cranes, hoists, tractors and the like.

View of the Hydrogen Production equipment is shown in the foreground, with the reducer tower to the left. Finishing building is in the background.

Harlan P. Ross, President, Upper Merion and Plymouth Railroad, pays tribute to the work of Kline M. Geyer, seated, right, as he presents luggage to him on his retirement on April 1, 1959, as Secretary and Treasurer of the railroad. He had served 42 years with the company. Looking on is Earl R. Hostetter, UMP Vice-President.

Products of

ALAN WOOD STEEL COMPANY

IRON PRODUCTS

"Swede" Pig Iron

STEEL PRODUCTS

Plates (Sheared)

A. W. Dynalloy • (high strength steel)

Hot Rolled Sheets • Hot Rolled Strip

Cold Rolled Sheets • Cold Rolled Strip

ROLLED STEEL FLOOR PLATE

A. W. Algrip Abrasive

A. W. Super-Diamond Pattern

MINE PRODUCTS

Iron Ore Concentrates • Iron Powder

Crushed Stone • Sand and Engine Sand

COKE

Foundry, Industrial and Metallurgical

COAL CHEMICALS

Ammonium Sulphate • Benzol • Toluol

Xylol • Napthalene • Sodium Phenolate

Tar Bases (Pyridene) • Solvent Naptha

Crude Still Residue

PENCO METAL PRODUCTS DIVISION

Steel Cabinets, Lockers and Shelving