

HUBBARD BLAST FURNACE

by

CLIFFORD L. HARMON

The morning of April 9, 1960 the Operating & Maintenance forces at Hubbard Blast Furnace got the orders to blow out the Furnace, not to bank it for start-up at some future date. That morning was the last day for the Whistle to blow for change of shifts and to see the glow of the hot slag lighting up the evening sky. There was something in the air that said "this was the end of an era". I must ask myself when and where did these Blast Furnaces start. I suppose the first Blast Furnaces were small Hillside Furnaces scattered across Eastern Ohio and Western Pennsylvania. One of these Furnaces can be seen north of Clarion, Pennsylvania. These small Furnaces were close to Coal, Wood and native ore and probably along a flowing stream to operate the Bellows to provide the blast of air to accelerate combustion. These Furnaces were small but they did produce Pig Iron which was needed in this Frontier Country. I am sure these many small furnaces were soon replaced with a few larger ones and the coal and native ores and wood gave way to Coke from the BeeHive Ovens from Western Pennsylvania and the Ore from the mines in Minnesota. Andrews and Hitchcock Iron Company had such holdings of Melrose and Montrose Ores. Both of these ores along with the BeeHive Coke were used in the Hubbard Furnace. The Furnaces of this area made Pig Iron to fit the needs of the Customers. These were Merchant Pig Iron Smelters and they furnished Pig Iron to Cast Iron Pipe, radiator and Sanitary Manufacturers that made Bath tubs and Toilet bowls, all to the customers Specifications. There Customers remelted the Pig Iron in Cupalos for casting their products.

Andrews and Hitchcock Iron Company was purchased by the Youngstown Sheet and Tube Company and the two Furnaces were either replaced or brought up to state of the art at that time. Coalburg Dam was built and the Lake provided adequate cooling water for the Furnace cooling and water for the boilers. The Lake also supplied water for the New York Central Locomotives.

Between the turn of the Century and World War I Gas and Electric Welding was introduced into the Manufacturing Industries and this lowered the demand for Pig Iron. Then came Seamless Pipe Mills which used high quality Steel rounds. These changes in the Industry set the stage for the introduction of some other use for Pig Iron. In 1929 Youngstown Sheet and Tube Company contacted the Valley Mould and Iron Company of Sharpsville, Pennsylvania. The result of those meetings found Valley Mould building the present Ingot Mould Factory and they found a ready source of Hot Metal from the Hubbard Blast Furnace. This Union of Valley Mould and Youngstown Sheet and Tube was timely. Valley Mould cast the Moulds with Hubbard Furnace Hot Metal. Valley Mould set the Metallurgical quality they needed and Youngstown Sheet and Tube was kept alert to its raw Materials to maintain saleable Hot Metal. After the advent of the Hot and Cold Strip Mills in the early thirties and the trade demanded bigger coils of Steel strip so this created the need for larger Moulds. Valley Mould made them from Sheet and Tube Hot Metal so both industries flourished before and for a long time after World

War II. One might wonder how one small Blast Furnace could furnish so much Molten Metal. The answer was instead of raw Ore of low Iron content much of the Burden now was Taconite Pellets made of high content of available iron and all uniform in size to aid the smooth operation of the Furnace. Of course the good Coke helped to smother operation of the Furnace, too. The Furnace was improved about World War II and once again brought up to state of the art at that time. So Valley Mould continued to get Hot Metal from Hubbard Furnace until 1961. The Machine that formerly cast Pigs for the Merchant trade was now used little, only for off analysis casts, not suitable for the Valley Mould Company.

In as much that the Valley Mould found another supplier it still remained that Their Foundry was on Youngstown Sheet and Tube land. So the Valley Mould bought the Blast Furnace and all of the property where the plants stood. Youngstown Sheet and Tube Company owned the ore, coke and stone in the Ore Yard so they loaded 2,500 cars of the aggregate and shipped it to Campbell and Brier Hill Blast Furnaces.

Valley Mould then decided to Scrap the Furnace and all of the buildings and equipment. They called in J.D. Fowler Company of Youngstown, Ohio to do the dismantling and smoothing up of the grounds. This seemed a terrible end to a facility that had served for almost a hundred years. Some of the Machinery was massive, the Blowing Engines and the Ore Bridge were a couple of well engineered machines that operated well to the end. Even though the equipment was old it has been kept in good operating order all through the life of the Furnace.

The thing that sparked me to write this Thumb Nail History of the Hubbard Furnace was when the girl that read the meters on our home asked me where I had worked and I replied "at the Furnace"---she gave me a blank stare and said "the Furnace". Yes, it was situated at the east end of Drummond Avenue, across North Main Street, across the Creek Bridge between there and the Valley Mould Company along the creek where it had been a going entity since 1867. Just to recap the story, Hubbard Furnace was one of the oldest Public Works in Trumbull County. It was started in 1867 and was in almost continuous operation until it was shut down in 1961. Of course with many modifications and replacements over the years. There were really two Furnaces but during the Depression the #2 Furnace was torn down but the Stock House and Cast House remained in use.

The other day I talked with one of the Ore Bridge Operators and he told me that his Father was a Top-Filler when they used Barrows rather than the present day Skip Buckets. Many of the Labor Force came from Europe and made their contribution to the success of the Furnace. We who worked at the Furnace miss the fine relationship that existed between management and the labor force. Of course there were some strikes and they were always settled. The men returned to work and we were always able to get saleable iron to the Valley Mould on time.

By the time I got around to write this little bit of Local History at least a dozen more Blast Furnaces, several Coke Ovens and Rolling Mills for all types of products and

their supporting Shops and Utilities were torn down and the Work Force scattered. This was the end of most of the Iron and Steel producing facilities in Mahoning and Trumbull Counties.

It was 50 years ago when we moved to this area. It was a valley of active Steel Mills turning out tons of good products, both flat, rolled and tubular goods. Over the past 15 years we have witnessed the demise of the Major Steel producers and fabricators in the valley. The mills furnished steel for our automobile industry, conduit pipe plus large diameter pipe for cross-country pipe lines as well as high quality Oil Country pipe. Much of the capacity was diverted to the war effort in World War II. Now those mills that were backbone of the economy of the Valley are being leveled with dynamite and cutting torches. The personnel have been either retired or separated to search for other work. Some of these workers have been absorbed in the General Motors plants in the area. Others have been retrained for jobs that do not exist here. What a change, now Youngstown State University is the largest employer in the city.

This truly is the end of an era.

Clifford L. Harmon
351 Prescott St.
Hubbard, Ohio 44425

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HUBBARD BLAST FURNACE

FURNACE #1

Annual capacity 204,000 tons
Diameter at hearth 15'-6"
Height of furnace 79'-3"
Cubical content of furnace 15,775
Wind blown per minute, 35,000 cu. ft. to 38,686 Cu. ft.

This furnace has four Juilan Kennedy two pass stoves; size 2280" dia. x 83"0" high to top of dome using 2 Bradshaw burners and 2 Freyn burners for heating. Blowing equipment for this furnace consists of 2 Mesta cross-compound blowing engines used one at a time; size 48x84x84x60 which have a blowing capacity of 667 cu. ft. of air per revolution and the maximum allowed speed is 60 R.P.M. The blowing tubs are equipped

with 16" Iverson plate valves. Each engine exhausts into its own individual Schutte-Keerting multiple jet condenser creating an average vacuum of 26.5". These Engines are rated at 3500 H.P. at a boiler pressure of 150# per sq. in. The Skip is double and is operated by one double Otis steam hoisting engine rated at 75 H.P.; size of this engine is 14"x14"x14". Stock is delivered to one electric driver Scale Car of Hoover-Mason type and of 25,000# capacity, equipped with a Streeter Amet dial scale from the stock bins of which there are ten in number; three coke, two limestone and five ore and miscellaneous located directly over center line of Scale Car tracks. This car then delivers the stock to skip buckets which are of 100 cu ft. capacity. Top is of the double hopper revolving type. Revolving mechanism is operated using oil as the hydraulic medium, 650# per sq. in. by means of hydraulic cylinders. This pressure is furnished by three Dean reciprocating hydraulic pumps; size 10"x2 1/2"x12", 25 H.P. each, located in the Blowing Engine Room, two 12" accumulators are used as a balance in this hydraulic system. The bells on the furnace are also hydraulically operated by the same system that revolves the hopper. The large bell, which is 10 feet in diameter, is held closed by the hydraulic pressure and opened by gravity. The small bell, which is 4 feet in diameter, is held closed by counterweights and opened by hydraulic pressure. The Furnace has a McKeep Gas Washer, the skip angle is 69Degree30", the stock-lice is charted by use of a Freyn Automatic Gauge Rod. Two Leschen cables 1 1/4" diameter x 310' are used for the Skip Cars. The Cast-house has one 5 ton Brown Hoist electric traveling crane. The Slag from this furnace is run into hard slag pits and loaded into standard gauge cars by one electric caterpillar type Marion Model 37 shovel with a bucket capacity of 1 2/3 yards.

Ladle Equipment: 10-40 ton open type lades and 7 standard gauge trucks for same.

Ore Yard: The Ore yard is 10'0" wide x 600'0" long: the distance from Ore yard floor to the bottom chord of the bridge is 90'0" and the maximum ore pile is 70'0". The bridge is of the Hyle and Patterson type with a capacity of ten tons and a span of 225'0". The height of the Shear leg from the top of rail to top of trolley rail is 61'11" and height of pier leg is 82'11". The capacity of the bucket is 10 tons and it is of the Heyl & Patterson type. The two holding lines for this bucket are 1 1/8" diameter x 116' long. The closing line is 1 1/8" diameter x 330'0" long. The bridge is propelled by four 35 H.P. motors with 16 wheel drive on each end of the bridge (100 1/1 drive). This bridge transfers the ore from the stock pile to one 50 ton Atlas, electric driven, larry car which in turn distributes it to the stock bins. This bridge is equipped with the Heyl & Patterson safety clamping arrangement. The Bridge was erected in 1923. The bridge also handles a Robins Car Shakeout for unloading aggregate from Standard gauge cars.

Pig Casting Machine: One Uhling Pig Casting machine built by Hey & Patterson, electric driven, double strand length from center to center of prockets is 140'. This machine carries 592 moulds. The molten iron is transferred from the ladies directly to the pouring trough by one 40 Ton stationary tilting hoist built by Alliance Machine Co. The ladle house is equipped with one Alliance double hoist electric crane. Capacity of large hoist is 75 tons and the capacity of the auxiliary hoist is 40 tons. Cables on the tilting hoist are two 1 1/4"x 380' each, one right and one left lay. The reason for the right and left lay

cables is to eliminate twisting of the tilting device. On the 75 ton hoist there are two ¼” x 236’ each. On the 40 ton hoist one 7/8” x 340’ cable is used, Leschen Cables preferred.

Shop Equipment:

Blacksmith Shop: One forge using cold blast main blast for blowing, and one 600# steam hammer.

Machine Shop: One 14” x 12’ electric driven lathe
One 24” x 20’ electric driven lathe
One 80 ton arbor Press
One 24” electric driven shaper
One vertical Baker electric driven drill press
One Acme electric driven bolt machine, 3” capacity
One 19” power hack saw
One Double Stone electric driven Grinding wheel.

Pipe Shop: One 6” capacity electric driven Cox Pipe Machine

Carpenter Shop: One electric driven band saw
One electric driven rip saw

Water Filtration and Softening Plant, Consists of one Permuttit Water Softener size 9’x17’1” having a capacity of 683 gallons of treated water per minute. Standpipe water is pumped through the two pressure filters size 8’x12’ having a capacity of 600 gallons per minute, by one Delaval centrifugal booster pump, motor driven, having a capacity of 600 gallons per minute, into one steel storage tank having a capacity of 25,000 gallons. The water then flows by gravity into one Cochrane open feed water heater located in the Blowing Engine room and having a capacity of 25,000 gallons of water per hour and is finally pumped into the Boilers by boiler food pumps which are also located in the Blowing Engine Room.

Boiler House; The Boiler House consists of 1 – 475 H.P. Class F Sterling water tube boiler equipped with common aspirating type burners, and 6 –600 H.PO. Sterling, Class S, water tube boilers equipped with common aspirating burners making a total of 4075 boiler horsepower, steam pressure 155.

Fire Protection: Consists of 4 fire plugs, 3 using booster pump pressure at 90# per sq. inch and 2800 gallons per minute, and one using 40# pressure from the Standpipe. In addition there is a manifold with three connections in the Blowing Engine Room. An auxiliary line is across Little Yankee Run so City water can be connected for fire protection in the Powers house area.

Electric Power Equipment: Consists of one 2000 K.I. Westinghouse Turbo Generating unit which generated A.C. power for the furnace. This unit is tied in with the Ohio

Edison Co. and there is a constant interchange of power. The turbine exhausts into one Holander barometric condenser which has a capacity of 35,000# of steam per hour. The vacuum pump for this unit is steam engine driven with size of 12"x36"20". The air and is equipped with Iverson patent valve plates. The turbine is rated at 2700H.P.

One cross compound valve engine built by Wm. Ted Company, sizes 17"x33"x36" and rated H.P. 600. This engine is original D.C. power house equipment at the Campbell works and was set up at Hubbard Furnace in 1924. This unit is working, is non-condensing and exhausts into the atmosphere. This unit is used as a source of auxiliary D.C. Power.

One motor Generator set, Westinghouse, 300K.W. D.C., driven by 3 phase 60 cycle, 2200 volt A.C. motor.

One motor generator set, General Electric, 500 K.W. D. C., driven by 3 phase, 60 cycle, 2200 volt A.C. motor.

Boiler Feed Pumps; Two Delaval, steam turbine driven centrifugal pumps with a capacity of 500 gallons per minute each. Turbines are rated at 100 h.p. each and exhaust into the feed water heater.

One reciprocating boiler food pump built by Laidlaw Dun Gordon: size 14"x19"x18" with a capacity of 250 gallons per minute and rated at 30 H.P. each. It exhaust into the feed water heater. The Boiler Feed Water pumps take their water from the Cochrane Feed Water heater at an average temperature of 210 degree F and deliver it to the Boilers.

Original Hubbard Furnace acreage 248.94
Original Coalburg acreage 594.16

January 25, 1961