Alcoa 120 Year Pop-Up Museum
Provided by NAPHA
June 18, 2022

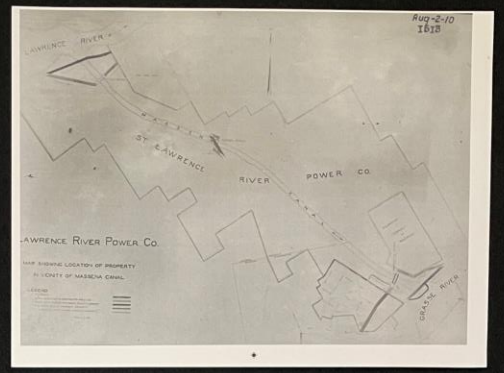
- Canal & Powerhouse
- Charles Hall Invention, Early Products, Early Plants (pre-Massena)
- Aluminum Smelting & Massena Siphon Cruce Invention
- Potline Technologies at Massena Over the Years
- Aluminum Wire & Cable
- Pine Grove Neighborhood Development
- Electrical Conductor Products
- Rolling Mills – 26” Mill
- Extrusions, Rod & Bar, Downstream Products
- Ingot, Forgings, Massena Direct Chill Casting Invention
- Aluminum Workers
- 25 Year Club Pictures

Canal & Powerhouse

May 1896 the State of New York issued a charter to the St. Lawrence Power Company to build a canal connecting the St. Lawrence and Grasse Rivers, taking advantage of about 20 ft of head between the two.

Ground was broken in August 1897. By 1898 there were 10 steam shovels in operation. By 1899 water was allowed into the canal starting at the north end, enabling use of hydraulic dredges.

The completed canal was 16,200 feet long with an average water depth of 18 feet. Some excavations through ridges required cuts of 100 feet.



The original powerhouse, begun in 1897, was producing electricity by 1902.

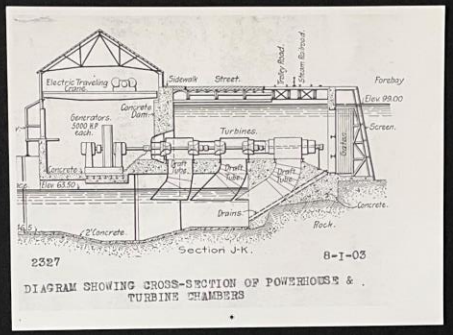
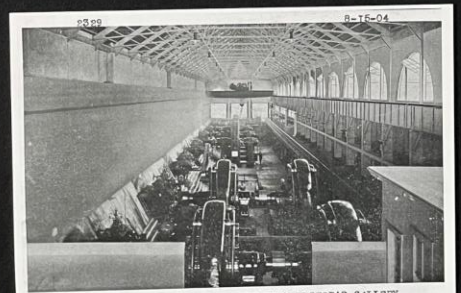


DIAGRAM SHOWING CROSS-SECTION OF POWERHOUSE & TURBINE CHAMBERS

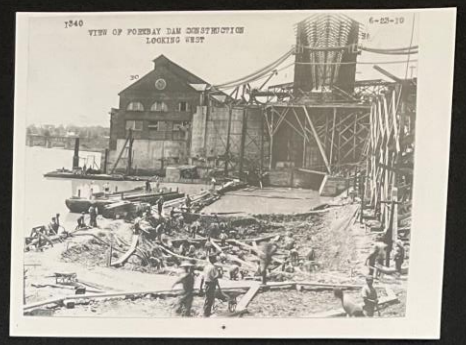


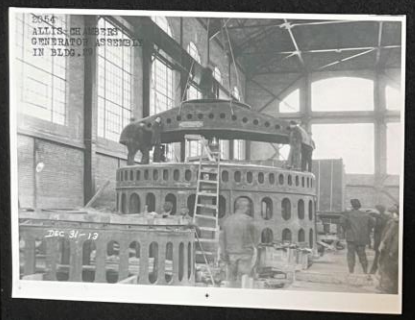
INTERIOR OF POWER HOUSE FROM VISTOR'S GALLERY

May 1902 the Pittsburgh Reduction Co. (PRC) completed a Power Agreement with St. Lawrence Power Company and started building their plant.

In 1907 PRC changes their name to "Alumium Company of America"

In 1909 ALCOA begins dredging more of the canal in anticipation of more power. Alcoa would build the second powerhouse 1912-1914.





Alcoa operated the Powerhouse until its shutdown in 1959.

Probably the most hazardous task was clearing ice buildup at the canal intake at the St. Lawrence River. Several men died at this task. Note the detonator at the feet of the "Intake Ice Fighting Crew".

See the employee preparing explosives at the moment of detonation in the background!

Canal & Powerhouse

Charles Hall Invention, Early Products, Early Plants

The new aluminum smelting process invented by Charles Martin Hall introduced two new challenges to early ALCOA; they would need to generate a market and encourage manufacturers to use this new aluminum, and they would need to increase production to cut costs through economies of scale.

WearEver cookware was the method through which these challenges were met. WearEver Cookware helped aluminum consumption by introducing one of the first widely accepted and available aluminum-based consumer products of their time.

In 1912, the United States Marine Corps who would adopt WearEver aluminum utensils as their standard issue utensils.

Wikipedia

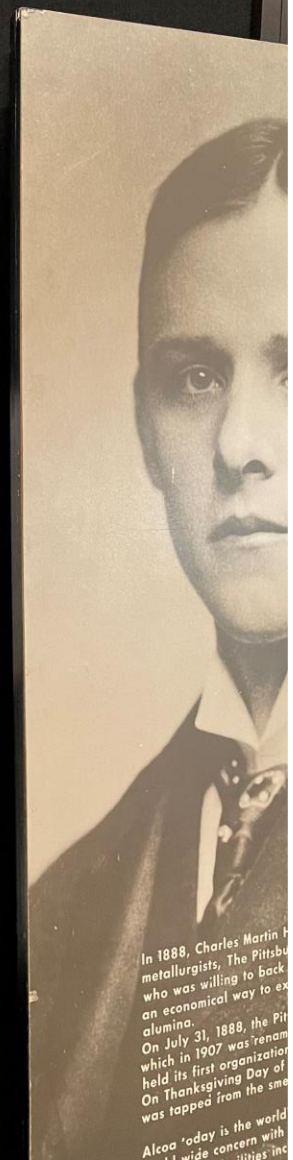
From the mid-1890's into the first decade of the twentieth century, the fastest growing application of aluminum was in cooking utensils. Aluminum was best known (often only known) to the public through kitchenware.

The New Kensington PA plant spearheaded the development of kitchenware. Although never produced at the Massena Plant, it was sold by local businesses.

G. D Smith "From Monopoly to Competition" p. 84, 87-91

In 1934 Alcoa introduced a revolutionary new line of aluminum alloy giftware and domestic items designed by American pioneer industrial designer Lurelle Guild. Called Kensington Ware, these relatively expensive, slick, machine-age objects were an Art Deco style with cast brass accents. They represent an important American contribution to modern design and decorative arts. The Kensington plant ceased production around 1970.

Wikipedia



The aluminum smelting process consumes a carbon anode:

$$(2)Al_2O_3 + (3)C \Rightarrow (4)Al + (3)CO_2$$

The Carbon Plant mixes coke and pitch to form the anode. This "green" anode is then baked to form a solid block of carbon. A conductor rod is then attached. In the smelting pot, the rodded anode conducts DC current through a molten alumina/electrolyte to the cathode (which is the pot shell) and drives the reduction reaction you see above.


ALCOA
120
mary Eldridge

Massena and the Siphon Cruce

From the earliest aluminum smelting plants through the 1920's metal was "tapped" out of a smelting pot by opening a hole in the side of the pot shell and draining the aluminum. This led to frequent accidents and injury when the tapping plug went astray. In addition, turbulence involved in pouring an open stream of metal lead to inclusions of dross (aluminum oxide) in

Smelting & Siphon Cruce

Massena and the Siphon Cruce

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Personnel at Massena invented the "quiet transfer" method of siphoning metal from one container to another. Molten metal is sucked up through the intake end under the metal line, and discharged into a receiving vessel, also under the metal line. This enabled less turbulent transfer of molten metal and thus less oxidation of the metal.

Like Direct Chill Casting, this process is unique to aluminum production and cannot be done with heavier molten metal such as steel or copper. The inspiration for this invention was not likely from the metals industry. The inspiration might have been, we can imagine, from someone in Massena draining their pool!

The siphon cruce is one of the more recognizable images from the aluminum industry. It is a frequently used stock photo that accompanies news articles on aluminum, like the picture from the Wall Street Journal below (12/19/2020). Next time you see this, tell your family and friends that siphoning molten aluminum was invented in Massena!

1,944,733

UNITED STATES PATENT OFFICE

1,944,733

SIPHONING METAL

Victor C. Doerschuk and Erwin G. Schoeffel, Massena, N. Y., assignors to Aluminum Company of America, Pittsburgh, Pa., a corporation of Pennsylvania

Application October 22, 1932. Serial No. 639,106

19 Claims. (Cl. 266—38)

This invention relates to the transfer of molten metal from one container to another, such as from a reduction furnace to a pouring crucible, and it particularly relates to the quiet transfer of metal by means of certain improved methods and apparatus.

In transferring molten metals from one container to another in an open stream, difficulty is always encountered in keeping the metal free from oxidation. This is particularly true in the case of easily oxidizable metals, such as aluminum, which oxidizes quite rapidly at temperatures above its melting point. In the production and preparation of such metals a series of transfers is usually involved, and the turbulence resulting from the discharge of an open stream of metal leads to the inclusion of considerable quantities of dross or oxidation product therein at each transfer. Furthermore, mechanical difficulties of an equally troublesome nature are frequently encountered in the open transfer of molten metals, and especially in the removal of molten aluminum from reduction pots, which in the past

away of a modified form of part of the apparatus shown in Fig. 1.

Referring to the drawing, in which like reference numerals are used to designate like parts, a siphon, generally designated by the numeral 1, is shown which comprises a body, preferably tubular in form, with its center portion 2 substantially U-shaped. This siphon is preferably made of heat-resisting cast iron. The discharge end 3 and the intake end 4 of the siphon are, in the preferred embodiment of our invention, provided with thickened walls to increase their heat capacity and prolong their life, and to produce other results which will hereinafter appear. The siphon ends 3 and 4 may be formed integrally with the center portion 2 as shown in Fig. 1. Frequently, however, it is preferable to have the siphon ends detachable from the center portion in order that they may be readily cleaned or replaced, and in such case a siphon of the form shown in Fig. 2, having suitable flange joints 5 or connections of other suitable form provided between the center portion of the siphon body

Jan. 23, 1934. V. C. DOERSCHUK ET AL 1,944,733

SIPHONING METAL

Filed Oct. 22, 1932

Fig. 1.

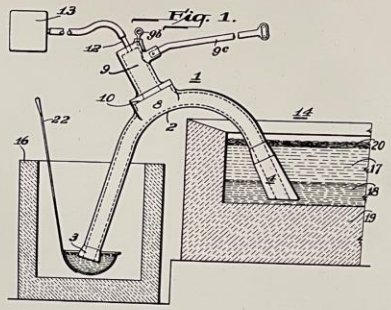
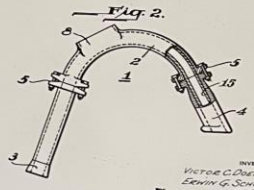
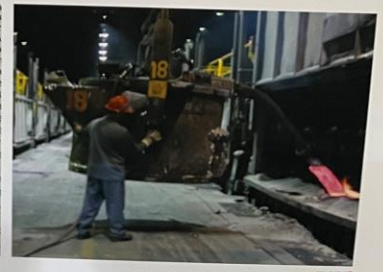


Fig. 2.



INVENTORS
VICTOR C. DOERSCHUK
ERWIN G. SCHOEFFEL
BY
ATTORNEY.

Soaring demand pushed up prices 40% from their May lows.




Massena and the Siphon Cruce
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UNITED STATES PATENT OFFICE
1,944,733
Jan. 23, 1934.
Fig. 1.
Fig. 2.
Soaring demand pushed up prices 40% from their May lows.
Aluminum Smelters
Play
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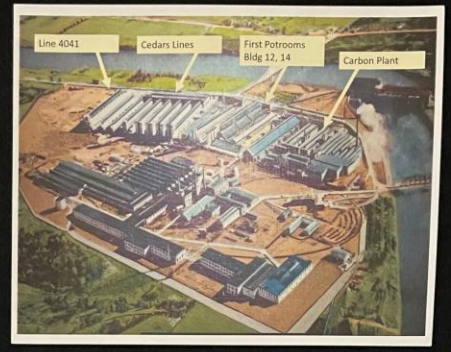
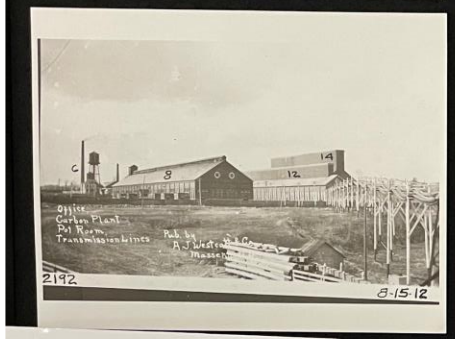
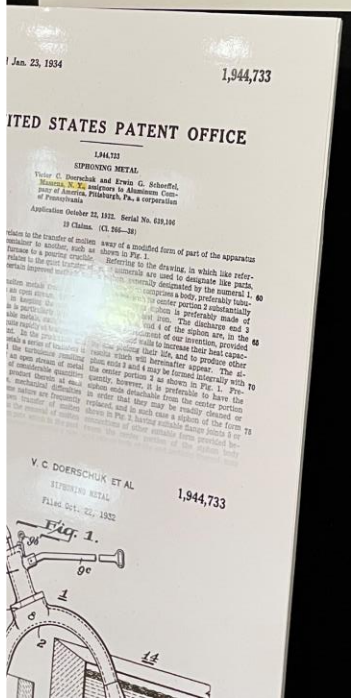
Massena Operations Aluminum Pot Operation

Over its history Massena Operations has operated 6 different aluminum pot designs. Initially the Hall Pot was installed in 1903 and produced approximately 120 lbs/pot-day. Over the years the aluminum pot design increased in efficiency and physical size with the current P-225 pot producing 3,775 lbs/pot-day.

At its peak in the 1950's, the plant was operating 1,000 pots over 10 potlines. The size and impact on the national production of primary aluminum over the years is best represented by the fact that in the 1930's the plant produced approximately 35% of all the aluminum produced in the U.S.



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V. C. DOERSCHUK ET AL 1,944,733

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Fig. 1.

Potline Technologies at Massena

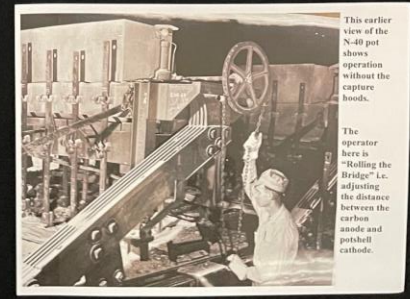

St. Lawrence smelting plant 1941 – early 1970's

Defense Production Corporation plant with three N-40 type potlines

N-40 Potline
Wet scrubber potroom emission controls installed in 1951-52

N-40 Potline
New ductwork and pot hoods capture emissions and send them to the scrubber.

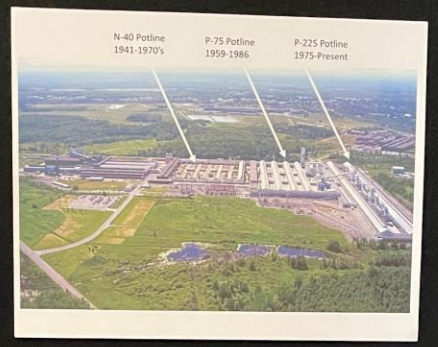
N-40 Potline
Another view of the pot hoods, used to direct gasses to the ductwork.



This earlier view of the N-40 pot shows operation without the capture hoods.

The operator here is "Rolling the Bridge" i.e. adjusting the distance between the carbon anode and potshell cathode.

Potline Technologies at Massena



Aluminum Wire & Cable

Massena Wire Mill, Bldg #1, ca. 1910

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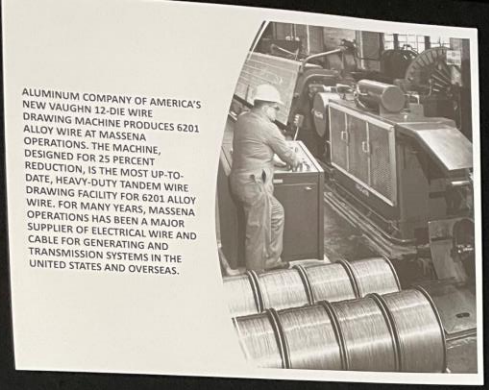

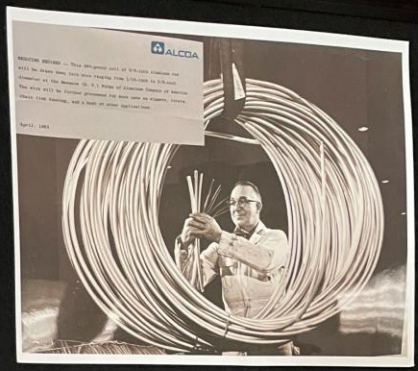

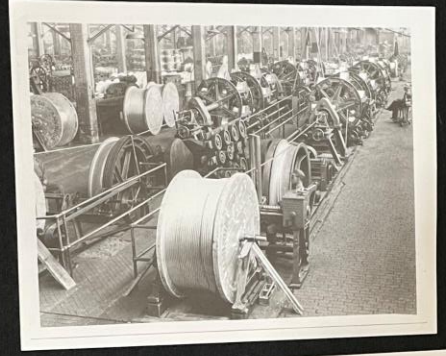

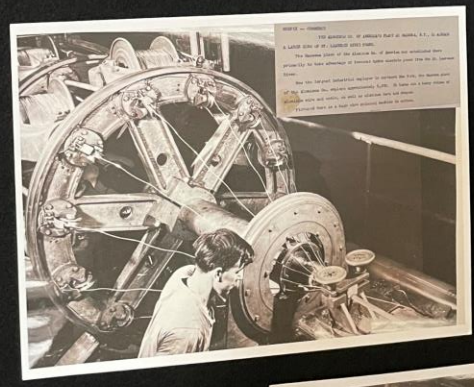

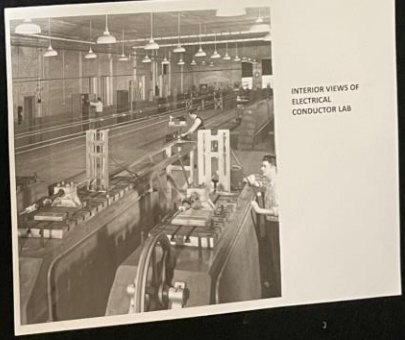

INTERIOR VIEWS OF ELECTRICAL CONDUCTOR LAB


ALCOA
ALUMINUM
ALUMINUM COMPANY OF AMERICA

Play

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ALCOA
ALCOA
ALUMINUM
ALUMINUM COMPANY OF AMERICA

Pine Grove Development

ALUMINUM COMPANY OF AMERICA

Massena's Mammoth Industry Giving Employment to Twenty-five Hundred Men with a Weekly Payroll of Thirty-six Thousand Dollars

Massena Observer of October 7, 1915 highlights the large employment, and the need for housing, addressed by an ALCOA real estate development subsidiary called Pine Grove Reality. Quality houses were sold to employees at cost.

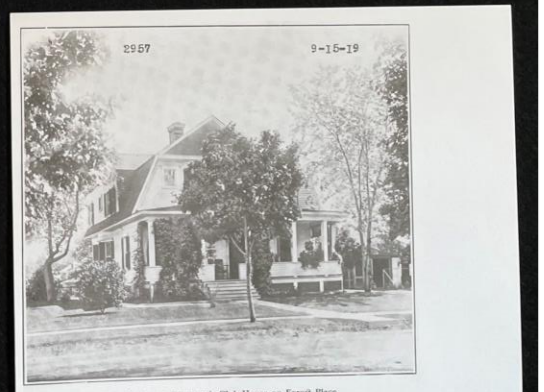
The initial "Kreusler House" constructions in Pine Grove aimed to be comfortably modern, affordable lodging for workmen, with "not a clapboard to be used in any of them." While the five-room buildings varied in appearance on the outside, the interior layouts were largely uniform throughout the 105 residences, constructed at a total cost of roughly $200,000. Workmen rented the units for $6 monthly.

Pine Grove's Forest Place was designed with homes for ALCOA's early executives, as well as its Clubhouse, established in 1905 at 10 Forest Place.

The Clubhouse was suspended in 1909 and was used as a single residence until 1915, when it was reopened under the supervision of a Mrs. Williams.

In 1920, a separate residence known as the Allen House was slated to become the new Engineer's Clubhouse. The building was remodeled and furnished but never opened. The Forest Place Clubhouse remained open until 1930, when its furnishings were sold to employees and once again rented to an individual, Percy Brown.

By 1942, the building was again rented as a Clubhouse to a group of 'technical men,' with a stated capacity of 11. Records indicate the ALCOA Clubhouse would remain at 10 Forest Place through the 1940s.

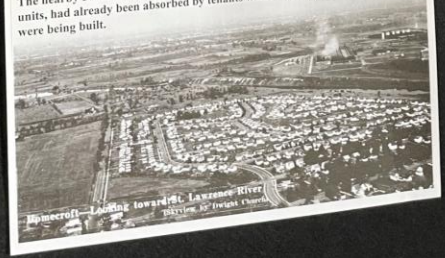


The Aluminum Company's Club House on Forest Place

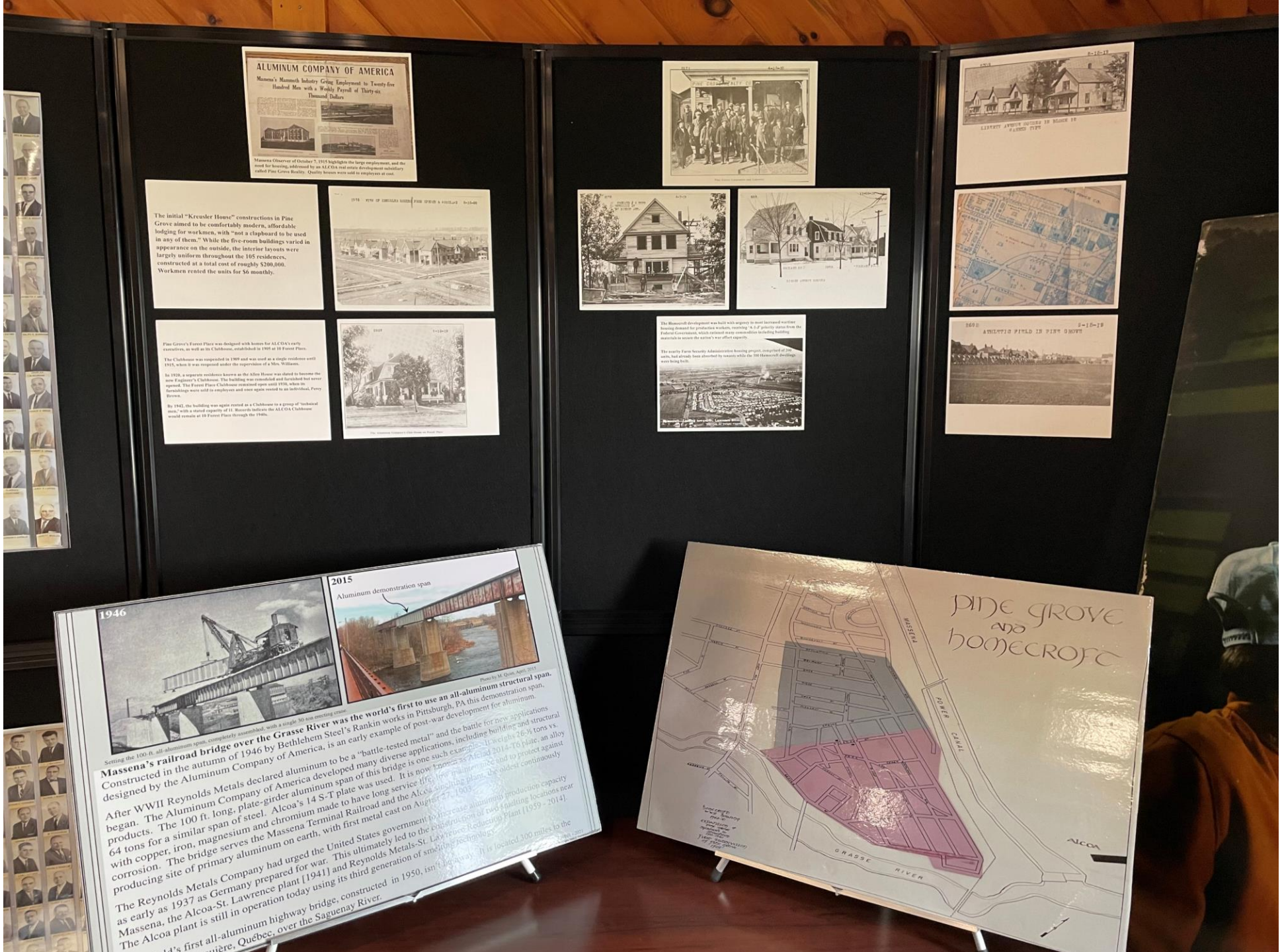
Pine Grove Carpenters and Laborers

The Homecroft development was built with urgency to meet increased wartime housing demand for production workers, receiving 'A-1-J' priority status from the Federal Government, which rationed many commodities including building materials to secure the nation's war effort capacity.

The nearby Farm Security Administration housing project, comprised of 200 units, had already been absorbed by tenants while the 300 Homecroft dwellings were being built.



Homecroft—Looking towards the Lawrence River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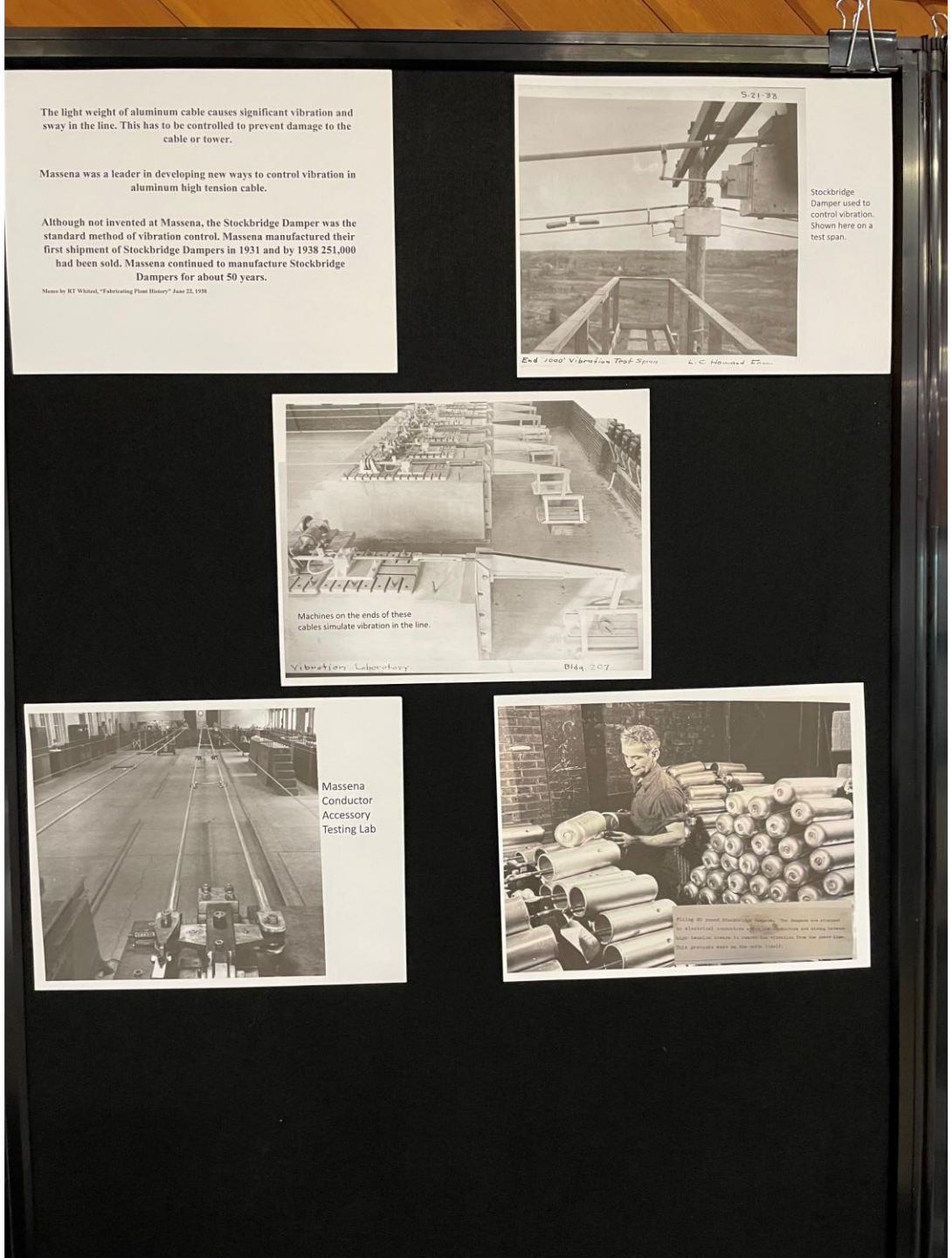
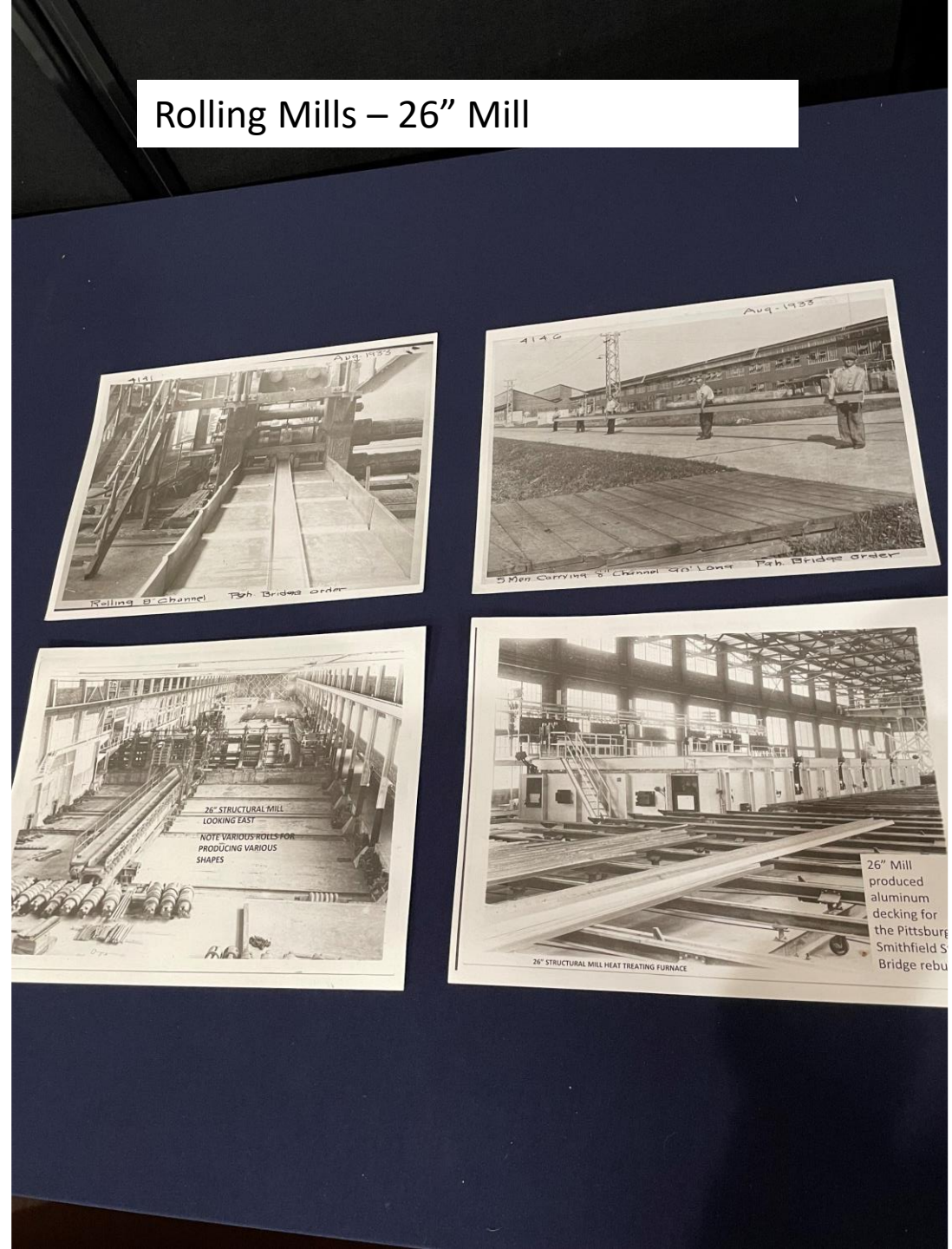
ATHLETIC FIELD IN PINE GROVE
1946
2015
Aluminum demonstration span
Photo by M. Quinn, April 2015
Setting the 100-ft. all-aluminum span, completely assembled, with a single 30-ton erecting crane.
Massena's railroad bridge over the Grasse River was the world's first to use an all-aluminum structural span.
Constructed in the autumn of 1946 by Bethlehem Steel's Rankin works in Pittsburgh, PA this demonstration span, designed by the Aluminum Company of America, is an early example of post-war development for aluminum.
After WWII Reynolds Metals declared aluminum to be a "battle-tested metal" and the battle for new applications began. The Aluminum Company of America developed many diverse applications, including building and structural products. The 100 ft. long, plate-girder aluminum span of this bridge is one such example. It weighs 26½ tons vs. 64 tons for a similar span of steel. Alcoa's 14 S-T plate was used. It is now known as Alclad 2014-T6 plate, an alloy with copper, iron, magnesium and chromium made to have long service life, low maintenance and to protect against corrosion. The bridge serves the Massena Terminal Railroad and the Alcoa smelting plant, the oldest continuously producing site of primary aluminum on earth, with first metal cast on August 1, 1903.
The Reynolds Metals Company had urged the United States government to increase aluminum production capacity as early as 1937 as Germany prepared for war. This ultimately led to the construction of two smelting locations near Massena, the Alcoa-St. Lawrence plant [1941] and Reynolds Metals-St. Lawrence Reduction Plant [1959 - 2014].
The Alcoa plant is still in operation today using its third generation of smelting technology.
It is located 300 miles to the
d's first all-aluminum highway bridge, constructed in 1950, isn't
ière, Québec, over the Saguenay River.
PINE GROVE and HOMECROFT
POWER CANAL
GRASSE RIVER
Alcoa

Electrical Conductor Products




Alcoa Electrical
Conductor Products


AIR VIEW, ALUMINUM COMPANY OF AMERICA, MASSENA, N. Y.
Bldg 123 Blooming Mill (1929)
Bldg 131 26" Structural Mill (1929)
Mills are rolling units that convert cast bars into suitable round rolled sizes for further fabrication of wire, rod & bar products. In the manufacture of aluminum cable for example, they roll 6"x6" cast bars into 3/8" round rod.
Wire Drawing Machines reduce the diameter of aluminum wire.
Stranding Machines take the wire and strand it into cable.
All of these machines were used extensively at Massena from 1904 to the mid 1990's.
26" Structural Mill in Operation

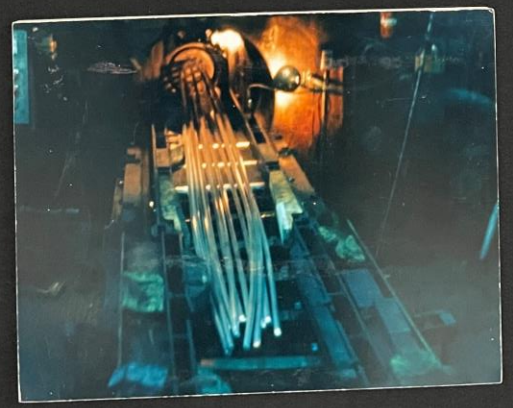

Rolling Mills – 26" Mill
Aug-1933
Rolling B Channel Pgh Bridge order
Aug-1933
5 Men Carrying 8" Channel 90' Long Pgh. Bridge order
26" STRUCTURAL MILL LOOKING EAST
NOTE VARIOUS ROLLS FOR PRODUCING VARIOUS SHAPES
26" STRUCTURAL MILL HEAT TREATING FURNACE
26" Mill produced aluminum decking for the Pittsburg Smithfield S Bridge rebu


Aluminum Rod & Bar

Extrusions, Rod & Bar, Downstream Products

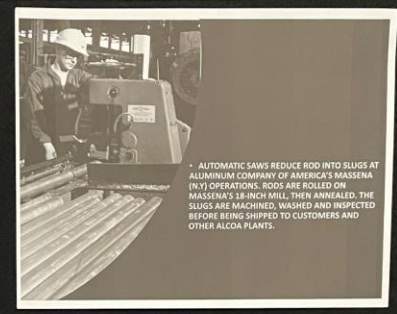
The first aluminum extrusions were done at Massena operations in 1902–1904 by J.W. Hoopes (inventor of ACSR) to try to produce conductor wire by a vertical-extrusion process. This proved unsuccessful, but his experiences led the way for extrusion to be used for other products. The equipment was moved to the New Kensington, Pennsylvania works, where commercial extruded shapes were available after several years of experimentation.

As the product size and extrusion pressures increased, the extrusion process was changed to use a horizontal press. Massena's first extrusion press was a 5000-ton press installed in the 1950's. In early 1970's a larger 6500-ton press was installed. By the end of the 1970's all Massena's rod and bar mills, except for the 12" Continuous Mill, had been removed.



The extrusion presses are located next to the Casthouse and are now operated by Arconic. Extrusion imparts stresses to the metal. From here, they are taken to the Area 1 Fabricating Plant (also operated by Arconic) where the approximately 56-foot rod and bar are "cold worked" by stretching, pulling through a die, and heat treated. The resulting aluminum rod and bar has highly refined metallurgical properties.

Massena Rod and Bar Mill circa 1950's

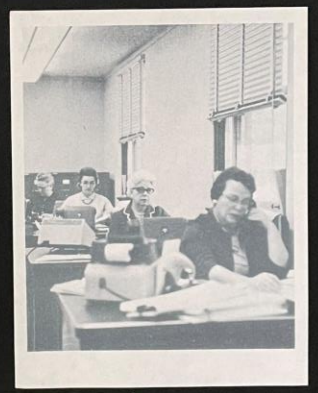


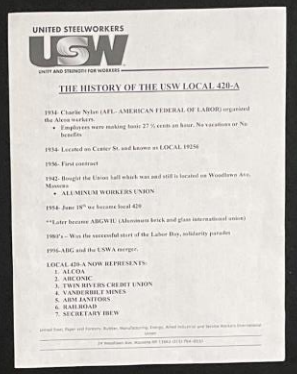
• AUTOMATIC SAWS REDUCE ROD INTO SLUGS AT ALUMINUM COMPANY OF AMERICA'S MASSENA (N.Y) OPERATIONS. RODS ARE ROLLED ON MASSENA'S 18-INCH MILL, THEN ANNEALED. THE SLUGS ARE MACHINED, WASHED AND INSPECTED BEFORE BEING SHIPPED TO CUSTOMERS AND OTHER ALCOA PLANTS.


Massena Rod & Bar
Used by Other Manufacturers
To Make Parts Like these
Massena Aluminum is Important in
the Global Supply Chain
Xylophone Bar
Customers take the rod and bar and machine or forge it into various products.
Massena is very important in the supply chain for these downstream products.
Play
0:32 / 2:04

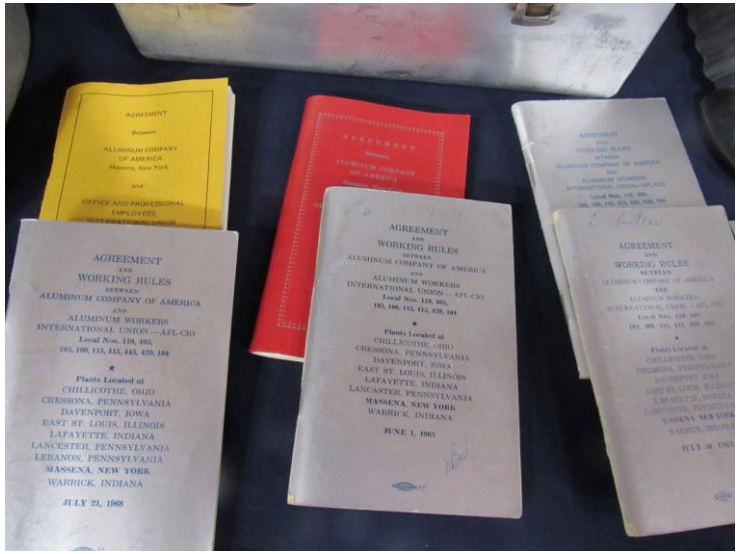

Ingot, Forging, Direct Chill Casting

Aluminum Workers






ALCOA


AGREEMENT
AND
WORKING RULES
BETWEEN
ALUMINUM COMPANY OF AMERICA
AND
ALUMINUM WORKERS
INTERNATIONAL UNION — AFL-CIO
Local Nos. 110, 805,
105, 100, 115, 415, 445, 420, 104
Plants Located at
CHILLICOTHE, OHIO
CRESSONA, PENNSYLVANIA
DAVENPORT, IOWA
EAST ST. LOUIS, ILLINOIS
LAFAYETTE, INDIANA
LANCESTER, PENNSYLVANIA
LEBANON, PENNSYLVANIA
MASSENA, NEW YORK
WARRICK, INDIANA
JULY 21, 1968
AGREEMENT
AND
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AND
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105, 100, 115, 415, 420, 104
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LAFAYETTE, INDIANA
LANCASTER, PENNSYLVANIA
MASSENA, NEW YORK
WARRICK, INDIANA
JUNE 1, 1965


ALCOA

NAPHA

NATIONAL ALUMINUM PRODUCTION HERITAGE ASSOCIATION

Our Mission is the preservation of artifacts and history, related to production and products of the early aluminum industry for interpretive display, for a broad audience to understand our nation's industrial heritage.

We exist to educate and *remind our* *our individual communities national and global significance every day,* thro and large artifacts/displays.

We get there thro tract collection and placement, interpretive signs, website, library presentations, et

In the 1980's Massena donated a P-75 pot to the Pittsburgh History and Landmarks Foundation. It was put on displa in a tourist area for 30 years. When the new owners of the property decided to scrap it, NAPHA got funding from Alcoa and the Hunt Foundati and coordinated its relocation to New Kensington PA. It is now an In ustrial Art display at a new Voodoo Brewery franchise.

During decommissioning of the Forge Shop, NAPHA partnered with Arconic to set aside a vintage helve trip hammer made by Bradley Mfg. Co. of Syracuse. The design dates to 1875. It was donated to the St. Lawrence Power & Equipment Museum.

During decommissioning of the 12" Continuous Mill, NAPHA partnered with Arconic to set aside one of the 14 reducing stands. This mill was installed in 1943 in coordination with US Government as part of the war effort. It was in use from 1943 – 2000.

This piece is part of our Arsenal of Democracy collection. Its display would be a tribute to veterans of all the major wars during its operation.

Currently on display inside the Arconic Fabricating Plant, it would make a great art/history piece in the community.

Siphoning metal into crucibles was developed in Massena in 1930's to make it easier and safer to remove molten aluminum from smelting pots. This easily recognizable aluminum production equipment can be cleaned, painted and put on display in the community with the story on how it was developed in Massena.

NAPHA is working on restorations, digitization of documents, and displays such as the one here.

Joseph Savoca and Massena's 25-Year Club pictures

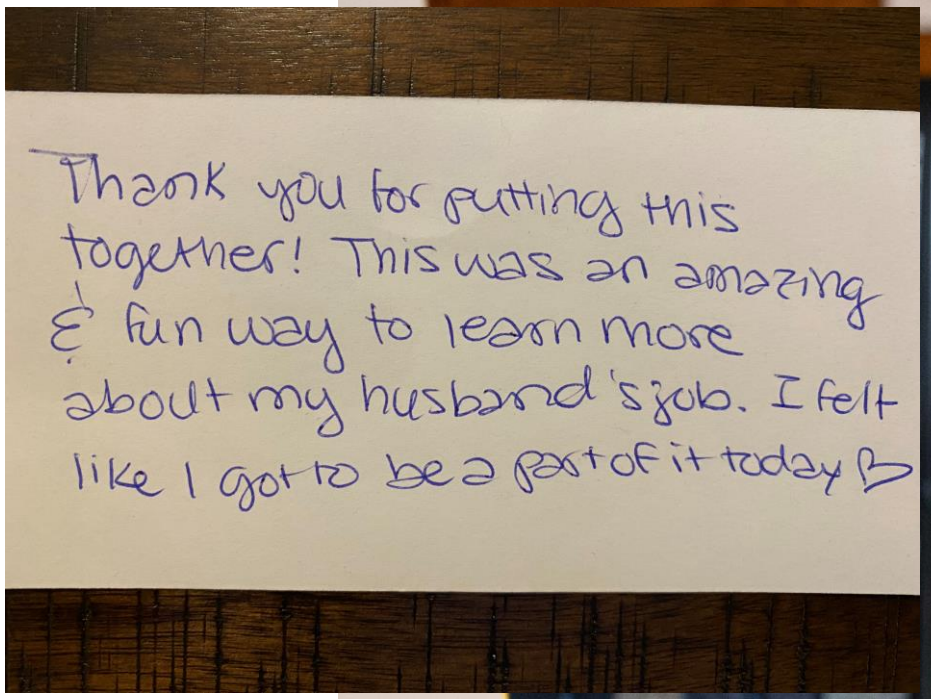
If you have any items or mementos from Alcoa, Reynolds or GM, please consider donating these to NAPHA for their preservation.

Special Thanks for This Museum Display:

Mark Southwick	Alcoa Retiree MAS
Randy Peets	Massena Museum
Steve Lindsay	Alcoa Retiree TEN
Joseph Savoca	Community Volunteer
Trudi Burnor	United Steelworkers
Kevin Kitzman	Alcoa

And our Partners and Sponsors:

ARCONIC · Alcoa · New York State Museum · St Lawrence County Historical Association · Celine C. Philibert Memorial Culture Centre & Museum · Roy A Hunt Foundation · CARLISLE LAW FIRM, P.C.


Thank you for putting this together! This was an amazing & fun way to learn more about my husband's job. I felt like I got to be a part of it today :)

MASSENA CASTHOUSE
MASSENA CASTHOUSE


Welcome
REYNOLDS METALS CO.
ST. LAWRENCE PLANT
SAMSUNG


ALCOA
ALUMINUM