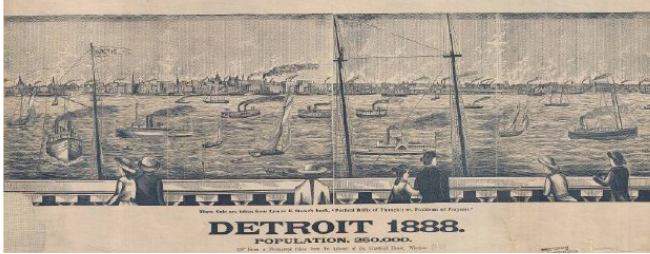


Where
the past
is present

DETROIT HISTORICAL SOCIETY

TEACHER RESOURCE LESSON PLAN

INDUSTRIAL DETROIT: FROM ORE TO OBJECT



INTRODUCTION

This lesson helps fourth grade students understand the life and culture in Detroit as it grew into one of the largest cities in the United States. Students will learn about the industrialization of Detroit, as well as the key symbols that still represent the city and its people today. The lesson includes a comprehensive background essay, a list of additional resources, and copies of worksheets and primary sources.

ESSENTIAL QUESTIONS

How did Detroiters turn raw, natural resources into finished products in the late 1800s?

LEARNING OBJECTIVES

Students will:

- Use primary sources to learn about the process of turning iron ore into cast iron stoves.
- Trace the movement of natural resources from the Upper Peninsula to Detroit.
- Summarize the process of turning iron ore into cast iron stoves in a visual display.

MI GLCES – GRADE FOUR SOCIAL STUDIES

H4 – History of Michigan Beyond Statehood

- 4-H3.0.1 - Use historical inquiry to investigate the development of Michigan's major economic activities from statehood to present.
- 4-H3.0.2 - Use primary and secondary sources to explain how migration and immigration affected and continue to affect the growth of Michigan.
- 4-H3.0.3 - Describe how the relationship between the location of natural resources and the location of industries (after 1837) affected and continues to affect the location and growth of Michigan cities.

COMMON CORE ANCHOR STANDARDS - ELA

Reading

- 1 - Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
- 9 - Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take.

Speaking and Listening

- 1 - Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.
- 2 - Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.

LESSON PLAN: INDUSTRIAL DETROIT: FROM ORE TO OBJECT

BACKGROUND ESSAY

By the 1860s, Detroit's transformation from frontier outpost to bustling metropolis was almost complete. In 1870, the city's population was 79,577. The city covered almost 13 square miles, and it ranked 18th in size in the United States. The city boasted over 14,000 homes, 52 churches, 24 public schools, and 14 hospitals and asylums. Detroit's streets were littered with horse-drawn streetcars. In 1886, streetcar lines covered 42 miles of streets in the city of Detroit. In 1893, the streetcar horses were replaced by new electric trolleys.

Immigration from foreign countries was beginning to peak. Nearly half of all Detroiters were born outside the United States, with the highest-percentage coming from Germany, Ireland, Poland and Canada.

Detroit's economy was booming. One of the largest industries in the 1870s was copper smelting. Raw copper ore was shipped from Michigan's Upper Peninsula to Detroit, where it was processed in factories. "Smelting" is the process of removing minerals and other contaminants from the ore in order to make pure metal.

The copper was then made into several products, like wire, pipes, jewelry and other items. By the 1880s, Detroit was also known for its iron foundries. In addition to refining the raw iron ore, several manufacturers melted the iron until it was a red hot liquid, and poured it into molds to make stoves, candle holders, tools, building facades and other products.

The Original "Big 3"

By the 1890s, Detroit had emerged as a center of heavy industry. The availability of iron ore in Michigan's Upper Peninsula and easy access to coal via the Great Lakes made Detroit an ideal place for factories. Manufacturers were building names for themselves and the city in three key industries: railroad cars, stoves and ship building.

The railroad helped jump start Detroit's

development, and Detroit became known for manufacturing railroad cars. It was the largest industry in Detroit in the 1890s. In 1892 several companies, including the Michigan Car Company, Peninsular Car Company, the Russel Wheel and Foundry Company and the Detroit Car Wheel Company merged to become the Michigan-Peninsular Car Company. The company made train wheels and frameworks for rail cars, as well as innovated on car design. In 1868, Detroitier William Davis patented the first refrigerator rail car. He sold the design to George H. Hammond, a Detroit meat packer, who built a set of cars to ship his meat to the east coast. It used ice harvested from the Great Lakes to keep it cool. Even railroad sleeper car innovator George Pullman manufactured his cars in Detroit in the 1870s.

In the middle of the 19th century, Detroiters had to purchase cast iron wood and kitchen stoves from upstate New York. It took a lot of time and a lot of money to ship stoves and repair parts to Detroit. In 1861, Jeremiah Dwyer,

an apprentice stove maker from Albany, New York, began dabbling in the manufacture of cast iron stoves in Detroit. By 1864, his Detroit Stove Company was making stoves that were noted across the country for their quality. By the 1870s, the company had grown so large that it changed its name to the Michigan Stove Company, and declared Detroit the "stove capital of the world."

They commemorated their title at the 1893 World's Columbian Exposition in Chicago with a monumental structure: the world's largest stove, which was a replica of their Garland wood stove that was carved from wood, weighed 15 tons and stood 25 feet tall. (The stove had been restored and erected at the Michigan State Fairgrounds in 1974. It burned to the ground in August 2011 when it was allegedly hit by lightning.) Other stove manufacturers in Detroit included the Peninsular Stove Company.



LESSON PLAN: INDUSTRIAL DETROIT: FROM ORE TO OBJECT

The availability of natural resources also made Detroit a shipbuilding center by the 1870s. Early entrepreneurs had built “dry docks” on the Detroit River in the 1850s. Dry docks were landings in a harbor next to a pier where ships were loaded and unloaded or repaired. Most had a series of gates to let water in and out. In 1879, the Detroit Dry Dock Company purchased a large shipyard in Wyandotte, Michigan and began building massive fresh water vessels. Factories that made marine engines, steam boilers, and ship parts sprung up all over the city. By 1905, Detroit shipbuilding companies were manufacturing nearly half of all ships – both freight and passenger – on the Great Lakes.

In addition to heavy industry, Detroit was also known for making a host of other consumer goods. Turning lumber from northern Michigan into boards was still an important industry, as well as making leather and fur goods and clothing, cigars and tobacco products, boots and shoes, soap and candles, seeds, and pharmaceuticals.

Dexter Ferry founded the D. M. Ferry & Co., a flower and vegetable seed producer, in Detroit in 1879. People can still buy seeds from the company today. Many common products and businesses that are familiar today got their start in the late 1800s, including Vernor’s ginger ale, Sander’s ice cream shops, Hudson’s department store, Stroh’s beer and Kresge 5 and 10 (now known as Kmart).

Detroiters were hard workers. The new industries required both skilled and unskilled workers. Many of the foreign-born immigrants found jobs in factories. Women would sew or make cigars, and men would work long hours in the factories. A normal work week was ten hours a day, six days a week. Most laborers earned about \$1.00 per day. The city also had many professional jobs. Hundreds of doctors, lawyers, dentists, barbers, merchants, and clerks worked in offices spread across the city.

Progressive Detroit

Hazen S. Pingree was a cobbler who moved to Detroit after serving in the Union Army during the Civil War. In Detroit, he quickly found success as a shoe manufacturer, and by the early 1880s he and partner, Charles H. Smith, were the largest shoe and boot manufacturer in the Midwest.

In the 1880s, Pingree was upset and angry by the corruption he saw in Detroit’s city government. He had a distrust of private companies that did business for the city, such as paving streets, building sewers and supplying electric and gas, which he felt were taking advantage of city contracts and charging exorbitant fees. Pingree ran for the office of Detroit mayor and was elected in 1889.



Pingree’s administration was known for fighting corruption in the city. He challenged the privately-owned electric and gas monopolies by creating municipally-owned competitors. His largest and most public struggle was against the private Detroit

City Railways. He felt they overcharged patrons and demanded they lower their fares to three-cents per ride. He even tried to create a competing municipally-owned streetcar company, but did not succeed because it was prohibited by the Michigan Constitution.

In 1893, Detroit and the country faced a severe economic depression. Pingree took action by creating public welfare programs and initiating public works projects for the unemployed which built new schools, parks, and public baths. In 1894, Pingree won national acclaim for his “potato patch plan.” He arranged for vacant city land, both public and private, to be converted to vegetable gardens that would provide food for the city’s poor. Pingree even funded part of the garden plan with his own money.

In 1896, Pingree was elected Governor of Michigan. He still had one year left as mayor of Detroit, and he intended to serve in both positions

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at the same time. However, the Michigan Supreme Court ruled that he could not hold two elected offices at once because it created a conflict of interest. As a result, Pingree resigned as mayor. During his four years as Michigan's governor, Pingree advocated for several reforms, including direct election of U.S. senators, an eight-hour workday and a regulated income tax.

Conclusion

Detroit at the turn of the 20th century was an exciting and overwhelming place. The city had grown from a mainly agrarian place to a bustling industrial city in less than 75 years. The population skyrocketed as foreign and native immigrants arrived in the city to work in the factories. Detroit grew faster than it could handle, and politicians like Hazen Pingree worked hard to ensure that the growth was regulated and fair, and that the citizens' interests were considered and protected.

With its three key industries – cast iron stoves, railroad cars, and marine engine and ship building – providing ideal infrastructure, Detroit was primed to take on the 20th century's newest industrial innovation, the horseless carriage. Although Detroit was not the only city building automobiles in the early 1900s, key innovators like Ransom Olds, Henry Ford and the Dodge Brothers ensured that 20th century Detroit would become known as the "Motor City."

MATERIALS USED:

Date Elements

- *Photo: Iron Ore*
- *Photo: Copper Mine*
- *Narrative: Life of an Iron Miner*
- *Photo: Great Lakes Freighter*
- *Photo: Loading Cargo*
- *arrative: Life of a Freighter Worker*
- *Diagram: Great Lakes Freighter*
- *Photo: Ore Refinery*
- *Photo: Detroit Stove Works Factory*
- *Photo: Detroit Stove Advertisement*
- *Narrative: Life of a Factory Worker*

Worksheet

- *Manufacturing Process Worksheet*

Poster board, markers, magazines, and other craft materials.

LESSON SEQUENCE:

1. Explain to the students that after the Civil War, Detroit became known for making items out of natural resources found in Michigan.
2. Ask students to brainstorm natural resources found in Michigan: iron, copper, lumber.
3. Explain that by the 1900s, Detroit was known as the stove capital of the world. Today, they will learn about the process of turning iron ore into stoves.
4. Break the students into 3 groups. Distribute the data elements as follows:
 - Group 1: *Photo: Iron Ore; Photo: Copper Mine; Narrative: Life of an Iron Miner*
 - Group 2: *Photo: Great Lakes Freighter; Photo: Loading Cargo; Narrative: Life of a Freighter Worker; Diagram: Great Lakes Freighter*
 - Group 3: *Photo: Ore Refinery; Photo: Detroit Stove Works Factory; Photo: Detroit Stove Advertisement; Narrative: Life of a Factory Worker*
5. Explain that each group will study and learn about one part of the process from taking iron ore and making it into iron. They should use information from their *Data Elements* and other relevant sources to complete *Manufacturing Process Worksheet*.
6. Once they have their worksheet completed, they should use the information to make a poster that explains how their part of the process works.
7. Once every group has finished their posters, they should present to the rest of the class, in order.
8. Hang the posters around the room.

LESSON PLAN: INDUSTRIAL DETROIT: FROM ORE TO OBJECT

ADDITIONAL RESOURCES

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Soo Locks Webcam. Soo Locks Boat Tours. 23 November 2011. <http://www.soolocks.com/cam.phtml>

TEACH Great Lakes. Great Lakes Information Network. 23 November 2011. <http://www.great-lakes.net/teach/>

Tilden Mine Tour. Hunt's Guide to Michigan's Upper Peninsula. 23 November 2011. http://hunts-upguide.com/ishpeming_tilden_mine_tour.html

For more information about the **Detroit Historical Society**, or to schedule a field trip to the **Detroit Historical Museum** or **Dossin Great Lakes Museum**, visit detroithistorical.org

MANUFACTURING PROCESS WORKSHEET

THE FIVE “W’S” AND AN “H” WORKSHEET

Use your Data Elements and this worksheet to write down the most important information about your part of the manufacturing process. Make sure you are as detailed as possible. You will use your answers to create a poster about your process.

WHAT part of the manufacturing process are you researching?

HOW does your part work? Describe the process in two or three sentences.

WHERE does your part take place in Michigan? List all the locations in which your process takes place.

WHEN does your part take place? Is your process first? Or last? How long does it take to complete?

WHO is involved in your part? Who are the workers? What do they do?

WHY is your part important? List all the reasons why you think your process is the most important.

Use this space to draw pictures of your process and make notes about how you want to design your poster.

PHOTO: IRON ORE



Metal, such as iron and copper, is mined from underground. It looks like chunks of rock, and it contains many different minerals and materials other than the metal.

This photo of raw iron ore is only about 60% iron. The remaining materials are other rocks and minerals.

PHOTO: COPPER MINE



Iron and copper ore are mined from the ground. Miners use pick axes, sledgehammers, and shovels to remove the ore from walls of rock. They then load the ore into bins that roll on tracks to the surface.

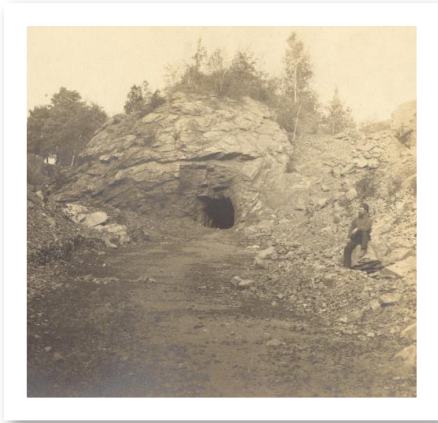
Photo courtesy of the Burton Historical Collection of the Detroit Public Library:
<http://quod.lib.umich.edu/d/dpa1ic/x-eb02m361/eb02m361.tif>

NARRATIVE: LIFE OF AN IRON MINER

Mining for iron was hard work. Miners often spent 10 to 12 hours a day in dark, damp, cold and dusty underground mines. A typical miner's day went something like this:

6 a.m.: Wake up, get dressed. Grab a lunch pail filled with a meat pasty, some coffee or tea, an apple and maybe a pickle, and walk down to the changing house at the mine.

6:30 a.m.: Change into mining gear, which includes thick long johns, trousers, a heavy shirt, a loose jacket, heavy boots and a helmet. The helmet has a candle attached, which is lit and works like a head lamp.



7:00 a.m.: Walk to the mine entrance, which is often a hole in the side of a hill or in the ground. Climb down a set of wooden and iron ladders until reaching the adit (the level ground that marks the entrance to the working mine area), which can be over 500 feet underground.

7:15 a.m.: Grab mining tools from the supply. They include a pick ax, shovel, chisel and sledge hammer, and climb down more ladders until reaching the active mining area.

7:30 a.m.: Knock big chunks of rock out of the side of the cave walls by swinging the pick axe and hammer to loosen the stone.

Then, use the chisel to wedge it out of the wall and the shovel to pick it up and put it in a large bin – like a wheelbarrow. The mine is cold and damp, and rock dust flies all around the room. The helmet candles and lanterns are the only light in the room.

12:00 p.m.: Join other miners in front of a small fire for lunch break. Heat the meat pasty on a shovel over the fire. Talk and joke with the other men.

1:00 p.m.: Return to work, hammering, chiseling and loading ore into wagon bins. Perhaps help other miners roll filled bins along tracks to the place they will be lifted to the surface.

7:00 p.m.: Leave the mine site and climb back up to the surface.

7:15 p.m.: Remove dirty clothes, which have turned black and red from all the dirt and dust. Scrub face, neck, hair, arms and body to remove the dirt and dust. Put on clean clothes and walk home.



Depending on the mine, a miner worked 10 to 12 hours a day, six days a week. In 1868, underground miners averaged \$52.50 pay for a month's work; surface workers averaged \$44.00 a month.

PHOTO: GREAT LAKES FREIGHTER



Freighters are long, big boats that carry ore and other cargo to ports in the Great Lakes. The freighter in the photo above has made a stop at the Rouge River port in Detroit. Crews are using cranes to unload its cargo, which is lumber from northern Michigan.

Photo courtesy of the Burton Historical Collection of the Detroit Public Library:

<http://quod.lib.umich.edu/d/dpa1ic/x-dpa0567/dpa0567.tif>

PHOTO: LOADING CARGO



At the docks in Marquette, Michigan, freighters “park” next to a structure that looks like a railroad bridge. Iron and copper ore is sent down the tracks and dumped into the freighter’s hold, which is reached through holes in the ship’s deck.

Photo courtesy of the Burton Historical Collection of the Detroit Public Library:

<http://quod.lib.umich.edu/d/dpa1ic/x-eb02m121/eb02m121.tif>

NARRATIVE: LIFE OF A FREIGHTER WORKER

I was walking along the C. & P. ore dock at Cleveland, Ohio, and there was the [freighter] Charlotte Graveraet Breitung alongside me, a wall of black steel rising way up above my head, exhaling steam. Though she was under five thousand gross tons, she looked like a continent. She was owned by Juliet-Graveraet Steamship Company, Cleveland.

This was my first day and my first ship. Maybe my last. I was filled with doubts and dismay. This was 1916, and I was 16. What did I know about being a deckhand?

I asked, "When do we go to work?"

Roy said, "Soon enough. But the first mate gives us a lot of time off when we have to work at night."

"Do we work at night too?"

Roy answered, "You don't think they tie the ship up at night, do you?" But he explained we only had to handle lines on the dock when in port or going through the Soo. "And once in a while haul groceries aboard, and maybe pull the hatches or stow the anchor chain. But there isn't much to do tonight, only finish putting on the hatch covers. They'll rinse her down in the morning."

"All right, fellows, get a move on." It was the second mate. "Get these hatches on her now."

I had seen it done many times before when I was a passenger, but now it was all different. Jim was saying, "You handle the dolly bar this time. It's more dangerous to work with the bridle. You can do it another time, when it's daylight. If you ever fell down the hold, you'd be a dead duck. Here, first you put the dolly bar in the socket at the rail – like this – then step clear of the cable,

outside the bight. Never inside. If anything ever let go, you want to be in the clear. Don't forget it!"

Jim ran over and helped Roy pull the light steel cable out until they could pull the rings of the bridle around the buttons on the hatch cover. He looked to see that everything was clear and no one was in the way, then he raised his hand and made the same winding motion the second mate used.

I looked toward the winch that pulled the hatch covers on. The watchman at the winch opened the steam valve the cable tightened. Boom, boom, boom – the telescoping steel hatch covers slid along the hatch coamings until they stopped suddenly with a bang that echoed through the empty vessel. At the same instant, Jim dropped his hand in a signal to the winch operator, who yanked the reverse level and shut off the steam. Jim and Roy snatched the rings of the bridle off the buttons and raced to the next hatch, Jim yelling, "All right, Slim, grab that dolly bar and run it up to the next hatch!"

In half an hour the hatches were closed, the pins were in, and we went aft to our room.

"We chipped paint and rust interminably. We spent days on end painting the cabins, the bulwarks, the cargo hold, the deck.

I was introduced to the joys of soogeying. Handling iron ore or coal, each time they are in port, these steamships are covered with dirt and grime. The condition is not permitted to last. The answer is soogey. No sooner do boats leave port than the rinsing down begins, clearing the decks of all loose ore or coal. The high-pressure hose scours thoroughly.

The cabins are soogeyed every two or three trips. Water is heated by putting the bucket under the end of a steam pipe until it boils. With a generous portion of gold dust added, and perhaps a little lye if the paintwork is very dirty, this corrosive solution is applied with brooms and washed off with the hose.

A deckhand wears rubber boots if he doesn't want the skin eaten off his feet. It is rough on the hands, too, but after a time your hands get hardened to it, even if it takes some of the paint off the ship.

When you get through a day's soogeying, the cabins are snow white. Everything gleams ... except the deckhands.

The Cravanette reached the Soo. This time the mate sent me down the ladder onto the lock wall to handle the lines. I enjoyed feeling important while the tourists at the locks watched me struggle, dragging the heavy steel cable to the bollard on the lock wall. When the ship was tied up in the lock, the mate told me to get back aboard if I didn't want to get left. The lock men would throw the lines off when the ship had risen to the Lake Superior level and was ready to go.

The whole operation took but forty-five minutes.

Fifteen hours later, the ship docked at Marquette, Michigan."

Excerpts reprinted from pages 15-32 of *Life on the Great Lakes: A Wheelsman's Story* by Fred W. Dutton, edited by William Donohue Ellis. Copyright © 1991 Wayne State University Press, with the permission of Wayne State University Press.

DIAGRAM: GREAT LAKES FREIGHTER

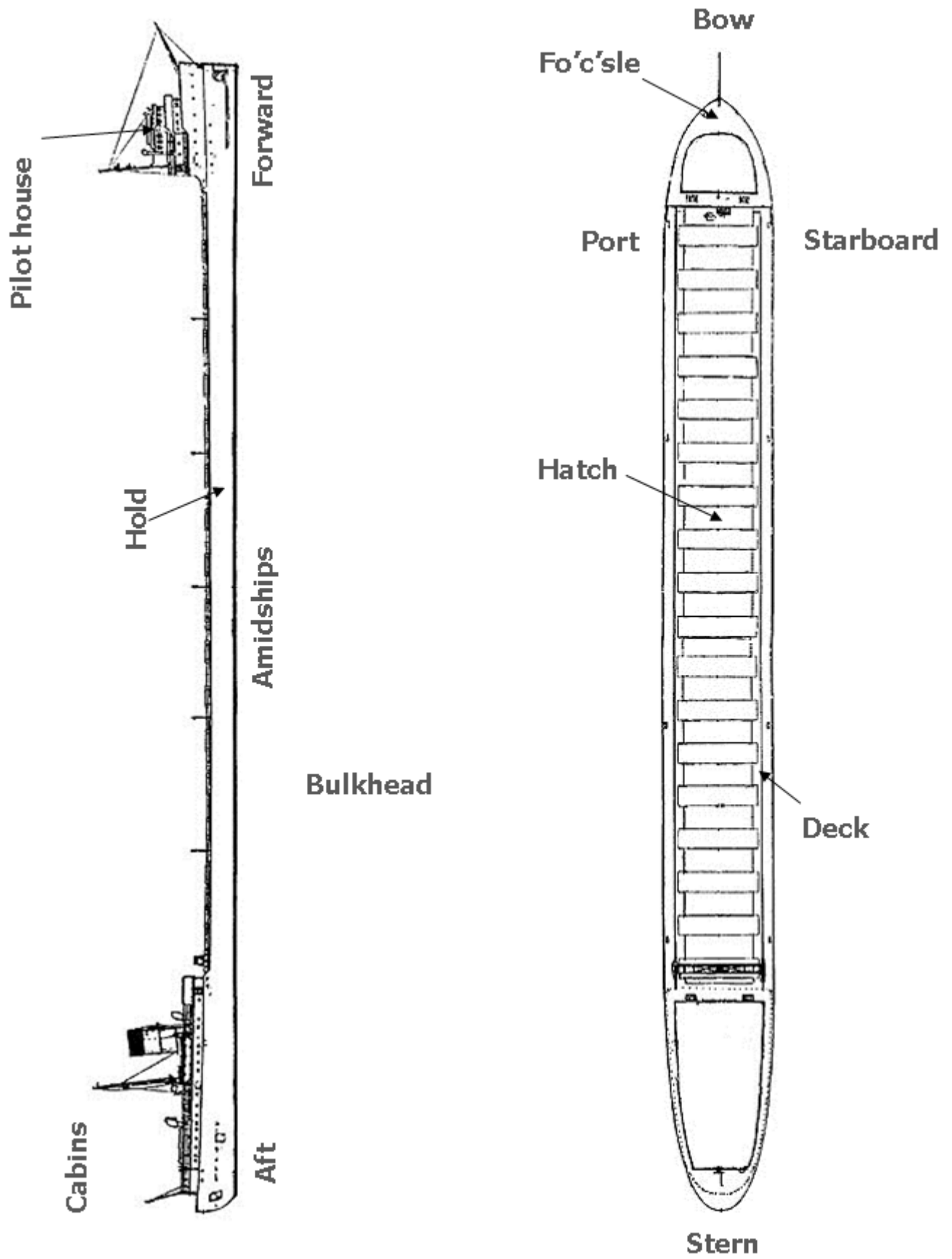


PHOTO: ORE REFINERY



Once all the extra minerals and materials are removed from the raw ore, only pure metal is left behind. In this photo, a factory worker pours hot liquid copper into molds at a foundry.

Photo courtesy of the Burton Historical Collection of the Detroit Public Library:
<http://quod.lib.umich.edu/d/dpa1ic/x-eb02m362/eb02m362.tif>

PHOTO: DETROIT STOVE WORKS FACTORY



The Detroit Stove Works foundry was a large maze of buildings. The process of turning iron ore into stoves involved melting the iron, making a mold, pouring the molten iron into the mold, waiting for it to cool and harden, removing the finished piece – called a “casting” – from the mold, cleaning and polishing the piece and assembling it with other casting to make a stove.

PHOTO: DETROIT STOVE ADVERTISEMENT



Don't
Stand over a
Red Hot Stove

Don't make yourself and your house uncomfortable this summer with a stove that radiates the heat. Get a Detroit Jewel Gas Range and enjoy the comfort of a range that concentrates heat—does the cooking without heating the house—cooks and then cools—and keeps the cook cool. The

DETROIT JEWEL GAS RANGE

Is always cool

It is the greatest promoter of kitchen comfort—the greatest saver of kitchen labor; it does anything that a coal range can do, and it is more economical.

“Cooking by Gas,” a valuable manual for housekeepers; contains about 200 new and original cooking recipes written especially for this pamphlet by Marion Harland, Mrs. M. J. Lincoln, Mrs. Helen Armstrong, M. L. Clarke, E. M. Colling and others; sent free. Mention THE LADIES' HOME JOURNAL.

DETROIT STOVE WORKS
Detroit, Mich.
Chicago, Ill.

Made in many styles.

A finished stove is made from several different castings, including stove walls, doors, and burners. Sometimes the stove factory cast decorations out of bronze and other metals which they attached to the stove through welding or soldering.

NARRATIVE: LIFE OF A FACTORY WORKER

Steps for making a stove out of raw iron:

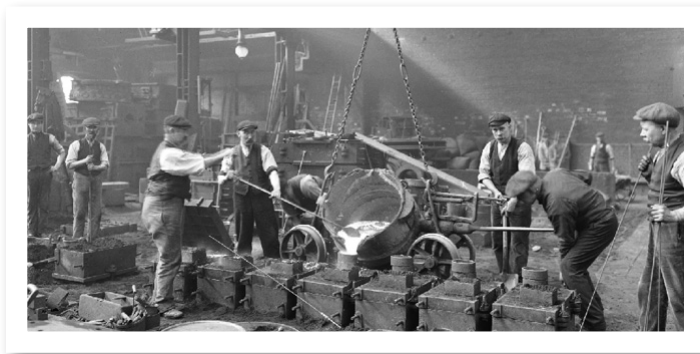
Step 1: Melting

The foundry worker placed iron into cauldron, which he then placed in a coal-heated furnace. If the iron ore had other minerals, rocks and other materials in it, they would melt the metal and add chemicals to remove everything but the pure iron. Once the iron was pure and melted to a red-hot liquid, it was ready to pour into a mold.



Step 2: Mold making

The process of pouring hot metal into a mold is called “casting.” Foundries that made products like stoves had to have a mold in which they would pour the molten iron. A mold is a pattern is made in the shape of a desired part. Molds could be made out of any material that wouldn’t melt from the heat of the red hot iron. The most common molds in iron foundries were made out of sand, because sand melts at a higher temperature than iron. Some molds were flat, resulting in castings with only one finished side. Some fancy goods like stoves often used two molds placed face to face, so that the casting would have two sides.



Step 3: Pouring

Molten iron was usually poured into a mold using a large ladle. Molds had small openings, or channels, in which the foundry worker would carefully pour the hot liquid metal. Iron cooled quickly when removed from the furnace, so it was important for the workers to move quickly, but safely.

Step 4: Removing from the mold

Once the iron cooled completely, it became a hard metal again. The workers carefully removed the finished piece from its mold. In addition to the intended object, the finished piece had extra pieces sticking out of it from the channels where the molten metal was poured. The factory worker had to saw or smash these extra pieces off the finished piece. They also used sandpaper to smooth out the areas where they removed the extra pieces.

Step 5: Finishing

Even with the extra pieces removed from the final product, sand or other bits of the mold may have stuck to the casting. The workers would blast the piece with sand in order to remove any extra material and give the piece a clean finish. If needed, they would also grind down rough areas, and polish the metal until it had a perfect finish.

Step 6: Assembling

Iron stoves were made up of several different pieces of cast iron. Once they were all made in the molds and cleaned and finished, workers would assemble the pieces to make a finished stove. Assembly involved metal screws and hinges, rivets and even some soldering and welding. (Soldering is when bits of iron are melted with a hot torch and used to “glue” two pieces together.)

