The Evolution of Production: Making Silver Goods Before and After the Industrial Revolution

Secondary (Grades 9–12)

Objective

Students will discuss and analyze the impact of the Industrial Revolution on the production and consumption of silver goods in America.

Connecticut State Standards Addressed

Visual Arts
4A: Analyze and interpret artworks in terms of form, cultural and historical context, and purpose.
5A: Research and analyze historic meaning and purpose in varied works of art.
5C: Defend personal interpretations using reasoned argument.
6B: Compare the process of creation used in the visual arts with the process of creation used in other arts and non-arts disciplines.

Social Studies
HS 1.1: Demonstrate an understanding of significant events and themes in United States history.

Procedures in Brief

Students will compare the process of producing silver objects before and after the Industrial Revolution as shown through Paul Revere II’s work during the 1760s and 1770s and the mechanics of mass production prominent in the late nineteenth century. Students will evaluate the differences between these two processes and derive inferences about the influence of the Industrial Revolution on the creation, consumption, and value of silver goods.

Time Frame

Allot two 45-minute class periods for this lesson.

Materials Needed

- Diagram of Individual Parts of a Tankard+
- Museum’s Teacher Resource for this object
- Notes on The Making of an Eighteenth-Century Tankard
Students’ Prior Knowledge

This lesson will be most successful if students have become familiar with Paul Revere II—as both a patriot and a silversmith—and the colonial era during which he lived and worked (see Teacher Resource). Students’ familiarity with the technological advancements and immigrant labor force prevalent during the Gilded Age and the Industrial Revolution is recommended.

Teacher Preparation

Teachers are encouraged to read the museum’s Teacher Resource on the object for more information concerning its maker, the historical and artistic context in which it was produced, and the artistic style it demonstrates. Sample questions for guided looking are provided to promote students’ careful visual investigation of the object and to foster classroom dialogue. Teachers should carefully review the information articulated below.

The Making of an Eighteenth-Century Tankard

PREPARATION
Since pure silver was too soft for utilitarian use, colonial silversmiths often began the process of producing a silver object by ensuring the durability of their material. By heating silver to its melting point to remove any impurities and subsequently adding another metal such as copper, these craftsmen created a more resilient alloy that ensured the product’s durability.

PRODUCTION
Working to produce this cylindrical-shaped tankard, Paul Revere II and his workshop would have begun by planishing a single silver ingot into a thin sheet of metal and then raising it to the desired shape. Raising means hammering in concentric circles to guarantee that the thickness of the material remains uniform. This process required the metal to be heated repeatedly to increase its plasticity, a process known as annealing. Having been extruded through a mold, decorative bands were then soldered onto the body of the tankard in specific locations, including its top, base, and middle. Its handle was likely raised into a curvilinear shape then soldered to the body, as were its cast scrolled thumb piece and decorative heart terminal. To create a domed lid, Revere and his team hammered heated silver into a round mold; the lid was
later hinged to the body. The object’s unique pinecone **finial** was cast in a mold then screwed to the top. Once the body was assembled, Revere **engraved** the tankard using sharp tools such as burins and roulettes to create the ornamental **armorials** and monograms on the body and handle. To complete the production of this tankard, Revere utilized **burnishing** tools and other abrasives to soften the edges of his design, specifically the engraving, creating a mirror like finish.

**Procedures**

**Opening**
Begin by projecting Paul Revere II’s *Tankard*, c. 1760–74 for all students to view. Give them ample time to look at the object and make initial observations. Using the questions for guided looking (see *Teacher Resource*), facilitate a five-minute visual analysis of the tankard. Focus the students’ responses on the object’s **form** and material. They should then speculate as to its utilitarian function and the possible time period during which it was created. Encourage students to cite visual evidence to support their conclusions.

Establish for the class that the object is a **tankard**, a tall one-handled drinking vessel, often with a hinged lid, traditionally used in the Colonies for ceremonial drinking. It was made by the famous American patriot and silversmith Paul Revere II in the years preceding the American Revolution (c. 1760–74). Tell students that today they will act as historians as they investigate the visual qualities of the object to determine its manner of construction. They will then discover how advancements in technology during the mid-nineteenth-century Industrial Revolution impacted the production and consumption of silver objects such as the tankard.

**Core**

**DAY ONE**

1) Divide the class into groups of two to four students and distribute copies of the *Tankard Analysis* graphic organizer (see *Appendix*). Each student should receive at least two copies of the handout.

2) In column one, ask students to sketch the various sections of the tankard and provide an accompanying description for each part. Their written responses should include as much descriptive language as possible (i.e., straight, thin horizontal bands; intricately engraved crest with shield and surrounding decorative foliage). Students will complete the graphic organizer for the time being by noting the location of their selected portions of the object in column two. They should leave the final column blank until further instruction has been given.

3) When students have finished recording their observations, cultivate a classroom discussion by asking the groups to share their results. Consider posing the following question: After your visual investigation, how many individual pieces do you believe Revere’s tankard is made of? Students should provide visual evidence leading to their conclusions. As a class, arrive at a consensus as to approximately how many pieces comprise the tankard.

4) Distribute the diagram entitled *Individual Parts of a Tankard* (see *Appendix*) and review the various components that comprise the tankard in question. Students should concurrently fill in the third column of the *Tankard Analysis* graphic organizer using the art terminology presented.
5) Returning to their groups, ask students to predict how much time it might have taken to make the tankard, how much it might have cost in the eighteenth century, and what method of production (man versus machine) might have been employed. The groups should record their reasoning and decisions then appoint a representative to share their conclusions with the entire class. Again, visual evidence from the projected image should support every argument presented.

6) In addressing the posed questions, begin by describing the tankard’s method of production as outlined in *The Making of an Eighteenth-Century Tankard* (see *Teacher Preparation*). Be sure to define vocabulary terms for students (see *Just Jargon*). Follow by distributing the *Tankard Worksheet* (see *Appendix*) to students, noting the information listed at the top, especially how much time it took Paul Revere II to produce this tankard and how much it cost. Ask students to work with their respective groups to complete the remainder of the worksheet. If time allows, discuss students’ responses.

**Homework**

Read and annotate the article “From the Shop to the Manufactory: Silver and Industry, 1800–1970,” which discusses the mechanization of the production of silver goods (see *Appendix*). Identify the sections of students’ textbooks concerning the Industrial Revolution, mass production, or related topics for them to read and take notes on in preparation for day two of this lesson.

**DAY TWO**

1) Project Paul Revere II’s *Tankard* for all students to view. Ask them to take out their homework from the previous evening and initiate a classroom dialogue around the changes in silver production and consumption that occurred as a result of the mechanization developed during the Industrial Revolution as described in their reading. Some items of note from the article are:

Mechanical Processes that Supplemented and/or Supplanted Handcrafted Techniques:

- Cutting and soldering rolled (flattened) sheets of silver versus raising from an ingot;
- Beading and piercing using a gadroon mill;
- Spinning on a lathe;
- Drop-press stamping;
- Engine turning or machine engraving;
- Electroplating; and
- Automation of processes such as buffing, polishing, and soldering.

Impact of New Mechanical Processes on Producers and Consumers:

- Increased production of goods due to new, efficient fabrication techniques;
- Lower production costs led to lower prices for consumers and subsequent widespread use of silver goods;
- Cultivation of new aesthetics based on machine-produced techniques (e.g., textured surfaces, variation of exuberant ornamentation); and
- Differentiation and specialization of tasks in workforce.
2) Using the same groups as the previous lesson, ask students to return their focus to the projected image of the tankard. Distribute the What If? worksheet to all students (see Appendix). Have them complete this handout, imagining that the Revere tankard was produced during the Industrial Revolution. Students should consider how mechanically produced tankards from the late 1800s might differ from handcrafted colonial tankards in terms of cost, value, fabrication, and consumption. Discuss students’ responses as a class.

**Closure**
Conclude by returning to the projected image of Paul Revere II’s Tankard, c. 1760–74. Ask students to answer the following questions: Do you see this object differently now than you did at the beginning of this lesson? If so, how? Convey to the class that works of art often contain layers of meaning and symbolism—social, artistic, and historical—that encourage viewers to rethink their initial reactions and observations. In the case of the tankard, one sees how objects can serve as a visual representation of the adaptation of new technologies.

Ask students to write a response to the following questions as an exit slip to be turned in at the end of the day: How did mass production during the Industrial Revolution impact the manufacture and consumption of silver goods? Do you view this democratization of silver as positive or negative? Defend your position.

**Extension Activities**
1) Brainstorm a list, individually or in small groups, of other major industries that were affected by the Industrial Revolution.

2) Compose an essay evaluating the impact of the Industrial Revolution on business and/or labor conditions during the late nineteenth century.

3) Research one of the major labor organizations of the Industrial Revolution (i.e., AFL, Knights of Labor), focusing on their main objectives and tactics. Be prepared to share your discoveries with the class.

**Just Jargon**

**Alloy:** A combination of two or more metals. In the production of silver objects, craftsmen often added copper to melted silver to create a more resilient material.

**Annealing:** Substantially heating a metal then cooling it in order to soften the material in preparation for further work such as shaping.

**Armorial:** Coat of arms.

**Body:** The main section of a three-dimensional work of art.

**Burnish:** To smooth a hard surface, particularly of metal or stone, to produce a polished finish.

**Cast:** Shaped by pouring molten metal into a mold and letting it harden.

**Concentric:** Sharing a common center.

**Curvilinear:** Surrounded, or formed, by curved lines.
Engrave: To scratch a design onto the surface of an object or plate using a sharp tool. Names, initials, family crests, and monograms along with naturalistic motifs and animals were often engraved on colonial American silver. Revere was known for his engraving skills.

Extrude: To form a shape by forcing material through a die, a metal device with a surface having a relief design used to impress that design onto, in this case, softened (heated) silver.

Finial: An ornament that terminates in a spire or pinnacle. Sculpted or molded, on furniture and architecture, this decorative element often reflects naturalistic motifs such as the pinecone represented here.

Form: A shape that exists in three dimensions. For example, a square is a flat shape and has two dimensions (height and weight), but a cube is a form and has three dimensions (height, width, and depth).

Ingot: A mass of metal cast into a convenient shape—generally a rectangle—to create a more workable surface for raising the material into the desired form.

Planish: To smooth metal, particularly an ingot, by hammering it on an anvil to prepare it for raising.

Raising: Shaping a malleable metal by hammering it around a domed model to extend it from an ingot or sheet to a hollow form.

Soldering: Joining pieces of metal by melting an alloy that fuses the individual elements together.

Tankard: Tall one-handled drinking vessel, either with or without a hinged lid, that held cider or ale. Colonists commonly used tankards for communal drinking at social gatherings.

Terminal: An ornamental feature placed where the lower handle meets the body of the tankard.

Web Resources for Deeper Exploration

Art Dictionary
http://artlex.com/

Production of Silver Goods
http://www.youtube.com/watch?v=1WVg9XgbtUw (video)
http://www.youtube.com/watch?v=4j0Cjuft9Mc (video)

The Basics of Silversmithing
http://www.history.org/almanack/life/trades/tradesil.cfm
http://www.history.org/history/teaching/silsmith.cfm

The Industrial Revolution
https://www.msu.edu/user/brownlow/indrev.htm
http://yale.edu/ynhti/curriculum/units/1981/2/81.02.06.x.html

Additional web resources can be found in the Teacher Resource for this object.
References


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Appendix
# Tankard Analysis

## Sketch a Section

Make a quick sketch of one part of the tankard (i.e., the handle). Describe how this element looks using as much descriptive language as possible. Repeat until all portions of the tankard have been addressed.

## Location

Where is this piece located on the object?

## Technical Name

*Leave this section blank. Your teacher will provide this information at a later time.*
Individual Parts of a Tankard

- Finial
- Domed Top
- Scrolled Thumbpiece & Hinge
- Handle
- Heart Terminal
- Decorative Bands
- Body
- Armorial
Tankard Worksheet

Produced by: Paul Revere II
Year Completed: c. 1760–74
Material: Silver
Approximate Time Taken to Produce: Several months.
Cost for Tankard in Eighteenth-Century: Approximately 12 English pounds or $18.50*
Modern Equivalent of Price Charged: Approximately $2200
Purchased by: Captain Nehemiah Skillings

Work with your group to answer the following questions based upon your visual investigation of the object, your previous discussions with your classmates, and the information provided by your instructor. Be sure to cite visual evidence to defend your arguments.

1) What skills do you think Paul Revere II needed to possess in order to create this tankard? Consider how long it would have taken him to develop such talents.

2) Why do you think it took Revere and his workshop so long to make this tankard?

3) Why do you think it cost so much to produce?
4) Based on your knowledge of its manner of production and price, what demographic of the population do you think could afford to buy a tankard like this in the 1760s or 1770s? What clientele was Revere serving?

5) Why do you think Captain Skillings was willing to purchase the tankard at such a high price? What does this object tell us about its owner’s character and identity?

6) Why would Captain Skillings commission his family crest to be engraved on the tankard? What message does this convey about his social status and values?

7) What does this tankard say about those who could not afford one?

* To give this price context, the yearly income of several occupations during the colonial era is listed here: merchant (1,707 pounds), lawyers (846 pounds), apothecaries (657), chandlers or candle-makers (347), goldsmiths (166), and cabinetmakers (131). For a goldsmith, purchasing this tankard would have cost him roughly 7% of his yearly earnings.
Silver in American Life

Selections from the Mabel Brady Garvan and Other Collections at Yale University

Edited by Barbara McLean Ward & Gerald W. R. Ward

An Exhibition
Organized by the Yale University Art Gallery
and The American Federation of Arts
‘From the Shop to the Manufactory’
Silver and Industry, 1800-1970

Stephen K. Victor

Before the end of the eighteenth century, silversmiths began to adopt mechanical processes to supplement and substitute for certain handcrafting techniques. The use of mechanical and industrial processes would affect the manufacture of silver in several important ways between 1800 and the present. Both the style of silver objects and the patterns of consumption of silver goods would undergo major changes with the shift from shop to factory production. The development of factory production techniques would also transform the working methods and conditions of the silversmith.

Mechanization took place because of the benefits it could provide. For the silversmith, any reduction in the amount of labor or materials that go into a piece of silverware means a decrease in cost. Those savings result in greater profits for the maker or lower prices for the consumer, and, in turn, a much wider use of silver goods. Provided quality is maintained, both the maker and user of silver objects stand to benefit from mechanization. Those benefits remained unquestioned for almost a century until an appreciation of the special virtues of hand wrought silver appeared.1

The earliest mechanical advances introduced into silversmithing did not require the use of power sources other than manual effort and did not demand a shop organization beyond the traditional one of master, journeyman, and apprentice. After the early nineteenth century, the application of water or steam power became increasingly widespread as more powerful machines were put to use. As shops grew into large manufacturing concerns, the increase in the number of workers permitted the efficiency of specialization.

Some of the effects of technological development can be seen in the silver objects manufactured with the aid of new techniques. Indeed, the objects themselves are primary documents of the adaptation of these techniques, which revolutionized the way silver was both shaped and decorated, and gradually came to exert a strong influence on style and taste. While many of these processes were developed specifically for silver, techniques evolved for shaping and forming other metals were often equally applicable to this extremely malleable and ductile substance.

One of the earliest and most important innovations in silver manufacture was the production of flat sheets of silver by rolling (Figs. 18 and 19). Rolled sheets of silver were available in England by the middle of the eighteenth century.2 The use of rolled sheet silver is apparent in this country by about 1790, but it may have been available as early as the 1730s.3 The octagonal and cut-corner rectangular forms and smooth surfaces popular in the Queen Anne style of the early eighteenth century were more readily produced from sheets of silver than by raising from an ingot. Signs of construction by cutting and soldering rather than by raising can be seen, for example, in the octagonal pepper box (158) made by William Cowell, Sr., of Boston in about 1710-1720.

Other evidence suggests that the use of this new process spread quickly in America. Joseph Richardson of Philadelphia is involved in correspondence about “rowlers for a dating mill” in 1760; his comments indicate that he had used such a mill previously.4 In 1789 the American Bullion and Refining Office advertised to sell “flatted metals,” presumably sheets of silver and gold, to goldsmiths.5

Figure 16
(1) Stamping the trimmings; (2) safe where dies are kept; (3) rolling the plates. (From Randolph T. Percy, "Among the Silversmiths," Antiques, vol. 3, no. 31 [December 1938]: 44.)
School & Teacher Programs

Wadsworth Atheneum Museum of Art
By the late eighteenth century forms were commonly produced by soldering pieces cut from thin sheet silver, a process equally well suited to the clean lines of the new neoclassical style (172). In addition to saving the time and effort of raising a form from an ingot, the cutting and soldering technique produced a smooth surface without planishing, the tedious hammering out of dents. Even for those forms still produced by raising, starting with a uniform blank of rolled silver rather than an ingot saved the silversmith considerable effort.

A technique closely related to roll-flattening of silver produced beading, pierced strips, and more complicated relief ornament (Fig. 18). Appearing in the late eighteenth century, beading and pierced galleries are characteristic of silver from the Philadelphia area (32). The frequency of beaded edging on Philadelphia silver of this period hints that a machine for producing such ornament was used. This "gadroon mill," as it was sometimes called, would have employed either a roller or a press to form beading and other ornament by pressing appropriately shaped dies onto a very thin sheet of silver. Charles F. Montgomery has suggested that pierced banding was made by a Philadelphia firm and sold to others in the same region, and there is evidence that the same company that was supplying sheet silver in 1789 was trying to purchase a piercing press. It is not clear whether this press used rollers or was a stamping press. In either case it would have pressed shaped dies onto sheet silver; some such machine was probably in use in Philadelphia by that time.

Various kinds of mechanically produced banding and ornament are also found on silver of the late Federal or Empire period, in the characteristic neoclassical style of the time. The teapot by William Heyer (178), the presentation urn by Fletcher and Gardiner (73), and the inkstand by Harvey Lewis (177) are punctuated with stamped or rolled ornament. The types of ornamental banding found in this period include Greek key, egg and dart, lattice, leaves—laurel, oak, olive, or grape—and many other designs. Each of these patterns required a separate die or set of dies for pressing the ornament. Since very thin silver was customarily used for these trimmings, fine resolution of detail could be obtained, even with moderate pressure. The indentations behind the pattern were filled with silver solder to support the design in the thin metal. The mills and probably the dies used in them were imported from England.

The use of banding on silver and plated goods continued to increase all through the Victorian period, as may be seen in the Gorham water pitcher (49) and soup tureen (184) and in the tilting water set (52) made by Simpson, Hall, Miller, and Company. These strips were not only decorative but functional; as we shall see below, decorative banding was used to hide joints in hollow ware formed in parts.

The shaping of curved silver forms by spinning on a lathe was another important innovation in silverware production. In spinning (Fig. 20), a circular blank of metal is held in a lathe against a wooden pattern or chuck. As the metal
turns, pressure is gradually applied to it with a burnisher, forcing the metal to conform to the shape of the wooden pattern. This technique was adopted quite early by manufacturers of Britannia ware; the date of its first use in the American silver industry is not known. Since the pattern had to be removed after the piece was spun, spun forms were usually limited to simple, open-ended shapes. No fluting or gadrooning was possible, since spinning demands a smooth circular path for the burnishing tool. In spite of these limitations, spinning was widely used because of the great ease of the process compared to raising by hammer.

The use of a pattern yielded great uniformity, essential to an industrialized process. Closed shapes were often made by soldering together several spun pieces; the joints were hidden by decorative banding (Fig. 19), a practice probably responsible for the horizontal emphasis of much Victorian silver. For example, the Gorham Renaissance revival water pitcher (49) and the Tiffany Etruscan pitchers (182) have bodies formed by spinning and have a definite horizontal feel.

Another new technique that rapidly produced dish-shaped forms was the pressing or stamping of metal with large dies (Fig. 19). The pressure was applied either gradually, by means of a screw, or suddenly, in a drop press. Forms made in this way need not be round and may be fluted or otherwise irregular. Although stamping requires less labor than spinning, the machinery and dies used in stamping are quite expensive. The process of stamping was used very early, perhaps as early as 1851, for forming the bowls of silver spoons.

Rolling and stamping were used not only for shaping silver and forming decorative bands, but also for surface ornamentation. A shallow pattern could be applied rather easily to a flat sheet of silver, or to the base metal in the case of electroplate, by rolling; a pattern on a relief die was transferred to the flat metal as it rolled under the die (Fig. 18). By stamping a piece of silver with a series of dies of increasing depth, an imitation of repousse work could also be accomplished by machine, although the high cost of making dies seems to have prevented the widespread use of this kind of deep ornamentation. Drop stamping could also be used to impress a surface pattern, even on shaped metal.

Another kind of surface decoration produced by machine, one very popular on silver and silverplate in the last part of the nineteenth century, was the satin finish, a stipple or matte surface applied by a device consisting of rotating jointed steel wires (Fig. 21). As the object to be satin-finished was held against the moving wires, their ends struck the surface in rapid succession, producing a very fine stippling. In plated goods, the “finish” was applied before the plating. The contrast between the bright sheen of burnished silver and the matte surface of satin finish provides the interesting textural variety of much Victorian silver (182) and silverplate.

Yet another sort of surface ornament, often used in the same period, was engine turning or machine engraving (Fig. 22). Engine turning is a process by which a geometric pattern is scratched on the surface of a metal object; again, in the case of plated ware the design is incised before plating. The object to be engraved is attached to a device that moves it up and down and back and forth, following the pattern of a template, until a large number of lines are scratched by a stationary engraving tool. The lines may be straight or wavy depending on the form of the template. Reed & Barton sent their wares from their shop in Taunton, Massachusetts, to Boston for engine turning until they installed their own machine in about 1860. With engine turning an overall engraved pattern is produced on the surface of an object with considerable precision and speed. Some engine turning is rather stiff, but the best of it yields complex patterns that add considerable life to the object. Sometimes engine turning was combined with hand engraving to produce more complex effects (48).

All of these methods of decoration used in the Victorian period, and later in the twentieth century, provided a substitute for the traditional forms of ornamentation applied by hand, such as engraving, chasing, and repousse. The newer techniques required far less labor and yielded a highly ornamented form at a moderate price. They were used especially in conjunction with plated goods meant to be sold at low prices. The taste for an exuberance of ornament, indeed an emphasis on decoration often to the neglect of form, may be seen as a hallmark of late nineteenth-century American design and is undoubtedly related to the development of the mechanical processes of rolling, stamping, and engine turning to produce inexpensive ornament.
The industry of electroplating metals with silver was established in the United States in the 1840s, soon after the initial development of the technique in England. The process relies on an electric current to transfer atoms of silver from a solution to the object to be silver-plated. Most of the early electroplated ware in this country was made with Britannia metal as a base; thus it was natural for the Britannia companies, such as Reed & Barton (Fig. 21), to become the first major American producers of silver-plated ware. Indeed, these companies offered the same products either plated or unplated into the 1880s. The techniques for spinning, stamping, and casting Britannia and silver were so similar that silver forms could be imitated rather easily in Britannia and hence in silver-plated wares. The cost of silver-plated goods was considerably lower than that of sterling, and the use of electroplate became widespread.

The lower cost of plated goods made them available to many who could never afford silver before. “Formerly the costliness of solid plate confined the luxury of a beautiful and well-furnished table to the wealthy; but since the advent of electroplated ware, almost any one may possess needed articles of table furniture having the most elegant of modern designs and being equal in appearance to the solid silver ware.”

Although electroplated flatware was widely produced by the early 1850s, the increased labor costs and silver shortages accompanying the Civil War made silver-plated hollow ware a desirable and affordable commodity. Consumers were presumably pleased to have electroplated ware with “all the splendor and durability of the best plate, at about one-fourth the cost.” By 1859 United States production of plated ware had surpassed that of solid silver, and in 1869 about three times as much plated ware as solid, in dollar value, was produced. Given the lower cost of individual items of plated ware, the larger production value indicates a prodigious use of electroplate—$8.14 million in 1869 when the population was about 39 million, or 21 cents worth of plated goods per person in a year when the best plated teaspoons cost about six cents.

The history of silver manufacture is a history of increasing distribution and use of silver goods. In 1810, the value of total manufactures of gold and silver, including jewelry,
was $1.07 million; by 1859 silver and plated ware production was $26.11 million.\textsuperscript{23} That growth has continued to the present, with some decline during the Depression; the industry produced $377.40 million worth of hollow and flat ware, including silver, in 1972.\textsuperscript{24}

Part of the increase in the use of silver in the latter nineteenth century is undoubtedly due to the ready source of silver in the mines of the West. The great silver discoveries of the Comstock Lode and elsewhere were being exploited by the 1870s.\textsuperscript{25} New sources of silver, new techniques of mining and refining, and the declining demand for silver as a basis for European monies all combined to lower the price of the metal. The traditional preciousness and scarcity of silver aided the growth of silverware consumption in the latter nineteenth century. Lower silver prices encouraged those who previously could afford only plated goods to acquire tableware of more fashionable solid silver. To meet the enlarged demand for solid silver, factory methods were rapidly adopted, and silversmiths increasingly became silver manufacturers.\textsuperscript{26} By 1899 the value of solid silverware produced in the United States again surpassed that of plated goods and remained ahead until after 1914.\textsuperscript{28} Total production of silverware continued to grow, and by 1937 Americans manufactured and used about half the world production of silver goods.

Production and distribution on this scale would not have been possible with the limited manufacturing and marketing techniques of the colonial or Federal periods; the small population and the status of silver as a luxury item in the eighteenth century provided little or no incentive for the development of mass-production techniques. But with the burgeoning of both population and demand, silver manufacturers entered the realm of modern industrial production, with its characteristic large size, widespread use of power machinery, and extensive specialization.

A certain degree of specialization had existed in silversmiths’ shops even in the colonial period, when journeymen and apprentices performed some of the more menial tasks. A larger shop could, of course, operate with more specialization than a smaller one. Certain early nineteenth-century firms employed many craftsmen and used them to perform specialized tasks. For example, by 1815 Fletcher and Gardiner had a shop or factory consisting of sixteen apprentices, probably four journeymen, and two burnishers.\textsuperscript{29} The economic benefits of specialization had been known since the days of Adam Smith,\textsuperscript{30} and the larger manufacturers had begun to take advantage of this knowledge during the mid-nineteenth century. Reed & Barton’s factory, producing Britannia and electroplated wares, had achieved a high degree of specialization before the Civil War. It had groups of folders, solderers, polishers, platers, spinners, and burnishers, each with a foreman and separate working areas or rooms (Fig. 21).\textsuperscript{31}

Certain manufacturers reaped the benefits of specialization by producing only a small range of silver objects. For example, when Jabez Gorham began manufacturing silverware in 1831, his production consisted largely of silver spoons and other small wares.\textsuperscript{32} Thus a few workers could devote their energies to making a few items that had a large market. Another possible reason for specialized production like Gorham’s was the fact that different types of machinery and tools are used for flatware than for hollow ware. By limiting production to flatware, Gorham was able to keep its investment down.

The adaptation of machinery to the production of silver goods meant that less skilled workers could be employed in some parts of the manufacturing process, although great skill was still needed in others. For example, a skilled diesinker had to make the dies for stamping ornamental banding or for drop-stamping spoons. Once the dies were made, however, a less skilled operator could run the rolling press or drop-stamper to produce large quantities of a given item.

The different skills and degrees of skill required for various operations also encouraged specialization within the factory, just as it had between masters and apprentices in the traditional silversmith’s shop. By the 1870s, twelve distinct trades were exercised by the 450 employees of the Gorham factory, including flatware making, designing, die-cutting, pattern-making, stamping, molding, embossing, engraving, chasing, plating, burnishing, and polishing.\textsuperscript{33} The differentiation and specialization of tasks encouraged manufacturers to hire women to perform certain tasks such as burnishing, engraving, and chasing. Women at Tiffany & Company’s shop in the 1880s were paid the same wages as men but worked in a separate room.\textsuperscript{34}
The cost of the increasingly complex and expensive machinery and dies and the diversity of skills needed to produce silver made it possible for larger firms to be advantageous. Some silver and electroplate manufacturing firms were formed through mergers in 1987, 26 but by 1899 they had declined to 169, to rise slightly in this century, to 179 in 1929 and 189 in 1972. Those same companies employed 1,010 persons in 1869, 12,605 in 1899, 15,735 in 1929, and 11,100 in 1972. Thus the size of individual companies increased dramatically in the latter years of the nineteenth century to take advantage of the economies of scale, permitting them to acquire the best and most specialized machinery and to employ staffs of specialists.

The principal technological developments of the industry in the twentieth century have been in the direction of automation. Automatic buffing, polishing, and soldering machines were introduced at International Silver in the 1920s. Since these machines are set up to operate on certain shapes, their use has made the production of a smaller range of products advantageous. Plating is another area in which automation now plays an important part; racks of unplated objects hanging from a moving belt are carried from tank to tank where they are dipped, on command from a programmed control panel, in various cleaning and plating baths for certain predetermined times. 27 The manufacturer derives no benefit from his large and specialized production unless his goods can be sold. The eighteenth-century American silversmith normally sold his goods at his own shop. 28 If a shop was to produce large quantities of a single item, a means of distributing those goods was needed. Thus, with the increase in the size of a manufacturer, one finds a corresponding development of marketing methods. At first, Ihez Sokham sold most of his products either to peddlers or to retailers in Boston. 29 By the 1850s, many silver manufacturers were producing catalogues of their goods. Retailers could order by mail or by telegraph; orders came to the New England manufacturers from the Midwest and West. 30 The combination of catalogues and salesmen’s visits to jewelers has retained the principal method of distribution; wholesalers are seldom used in the silverware industry and not extensively in the plated goods industry. 31

The shift of silver production from “the ... shop to ... the manufactory” 32 over the last two hundred years is closely related to changes in the role of silver in American life, as well as to the evolution of style and taste in silver. The most striking development is the vastly increased consumption of silverware, amounting to a virtual democratization of silver. Silver maintained its luster as a precious metal while simultaneously becoming available to a broader public, as the discovery of massive new sources for the metal and new manufacturing techniques combined to produce less expensive wares. Many of those goods were not solid silver, of course, but silverplated; still, they had the appearance of the more expensive article. Since the late nineteenth century, the middle classes have been able to have a sense of the luxury or at least to create the image of the luxury of silver at a moderate cost.

Associated with the increased production and consumption of silver is the emergence of a new set of aesthetic principles based on the virtues of the machine-produced silver object. The techniques of mass production encouraged new attitudes toward ornament, the quality of surfaces, and standardization, influencing both style and taste. The increased emphasis on variety of ornament and surface texture described above is typical of the effect on design of the fresh possibilities introduced by machine techniques. In satisfying the new taste for ornament, silversmiths drew their inspiration from a wide range of sources: “All beauty is akin... All... accumulations of grace and beauty, may be useful to those whose business it is to cover with grace and beauty the tables of mankind. ... All that ancient art, tradition, and literature have of elegant, grotesque, orious, as well as all that modern life has to suggest of striking and novel here you behold it, in brilliant silver and burnished gold.” 33

Standardization and the related quantity of production were held up as signs of the progress of the times, as commentators of the period belittled the small production of earlier silversmiths and the lack of uniformity of their work: “It is a literal truth that four thousand men, working in
scattered shops by ancient methods, could not accomplish more than four hundred men who work under one roof and one direction, aided by modern machinery; nor could the work be hammered out by these scattered mechanics bear a moment’s comparison with the uniformity of perfection produced by a well-regulated manufactory.” Although most of the changes accompanying industrialization eliminated the evidence of the craftsman’s hand in the finished object, Americans of the Victorian age seemed little concerned; labor being saved and greater quantities of goods were available to a greater number. The vision of the silversmith as a craftsman guided by his muse and his art seems not to have figured greatly in the nineteenth century’s appreciation of beauty. The idealization of the craftsman gained currency only with the Arts and Crafts movement as the century drew to a close.

The mechanization of silver-making meant that the role of the machine constantly expanded, while that of the craftsman declined. One may bemoan the loss of craftsmanship in industrialization, but in doing so one must realize that without mechanical aids to production silver would have remained a perquisite of the very rich and played a much smaller part in American life.

1. The Marrett line of the Gorham Manufacturing Company (31) and the silver of the Arts and Crafts movement (34) are examples of that renewed appreciation. It is not clear whether these represent a reaction to the quality of industrial design or a willingness to pay for handwork as a sign of wealth.


9. “The Manufacture of Silverseware,” Scientific American 36, no. 19 (14 May 1877): 240, reports that Tiffany & Company made ornamental banding by rolling strips of silver between engraved rolls. No mention is made of filing with a file in this article, perhaps because thicker strips could not be rolled with the heavier machinery of the Victorian period.

10. Britannia is a tin alloy better adapted to making thin sheets and to spinning than pewter, to which it is similar. The Taunton Britannia Company spun its forms as early as 1812, according to George S. Gibbs, The Whitehorne of Taunton (Cambridge, Massachusetts: Harvard University Press, 1942), p. 74. The technique is readily adaptable to silver because of its great ductility. Gorham Manufacturing Company’s use of spinning lathes occasioned no notice as a novelty in 1868; see “Silver and Silver Plate,” Harper’s New Monthly Magazine 57, no. 330 (September 1868): 446.

11. A sectional chuck that collapsed for removal from a closed form was developed in 1870. See Gibb, Whitehorne, p. 166.


13. The screw press technique was used by Robert Crossman for forming Britannia in 1827; see Gibb, Whitehorne, pp. 313-314. Drop forming was established by the same company in 1830 (ibid., pp. 40-41).

What If?

Imagine Revere’s tankard was produced in 1880 rather than the late 1700s. What are the most likely answers to the following questions? Be sure to provide visual evidence from the object itself or defend your claim(s) by referencing “From the Shop to the Manufactory: Silver and Industry, 1800–1970.”

1) What skills and/or tools do you think were needed for a worker to create this tankard? Consider how long it would have taken him to develop such talents.

2) How long do you think it took to produce the tankard? Why do you think it took this amount of time?

3) How much do you think it cost to produce this tankard in relation to a handcrafted piece?
4) Based on your knowledge of its possible manner of production and price, what demographic of the population do you think could afford to buy a tankard like this in the 1880s? How large was the clientele for this object in comparison to colonial times?

5) Why do you think people would purchase this mechanically-produced tankard over a hand-crafted piece? What does your answer reveal about the consumer population of the 1880s? What would the Skillings family have preferred?

6) How does the way the silver tankard was produced in 1880 change its worth or value? Has the art of craftsmanship been lost?
Tankard, c. 1760–74
Paul Revere II (1735–1818)
American, Boston, Massachusetts
Gift of Harold C. Lovell, Jr. and Lulu K. Lovell,
In Memory of Harold C. Lovell, Sr., 2000.7.1
From the collection of the Wadsworth Atheneum
Museum of Art, Hartford, CT.