Unknown Transcultural Objects: Turned Ivory Works by the European Rose Engine Lathe in the Eighteenth-Century Qing Court

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Abstract This paper analyzes a group of rose engine lathe-turned ivory works from the original Qing court collection, which were previously unknown to museum curators and scholars. The transcultural messages carried by the lathe-turned ivory works and the role that lathe turning machinery in the Qing court played in artistic exchanges and in disseminating technical knowledge between eighteenth-century Europe and China are significant. The recent publication of the Imperial Household archives has made this research possible, and it has been the author's privilege to work with the National Palace Museum's digital archive of the collection and with colleagues in the Palace Museum, Beijing, to identify similar works in storage. The turned ivory works by European rose engine lathe in the eighteenth-century Qing court is an interesting and solid case study for the discussion of communication between the East and the West. This paper evaluates imperial archive documents, ivory art works made by European rose engine lathes in the imperial workshops, and the relevant practical techniques brought to the Qing court, to discuss the exchange of art and craftsmanship techniques between the East and the West during the period.

Since the sixteenth century, when a new sea route from Europe to Asia was navigated by Europeans, exotic goods flowed into China via ship cargoes: natural materials such as fragrances, minerals, and coral; artificial products including clocks and watches, glassware, enamelware; and scientific instruments such as telescopes. However, tools such as the lathe machine, which is the focus of this article, have attracted very little attention in previous studies of the material world during the early modern period. I have discussed elsewhere the transmission of the Western lathe and associated technology to the Qing court in the form of a few broader

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observations and suggestions for future research.[1] Yet, having crossed the ocean, the rose engine lathe, which has played an unnoticed role in the cultural exchanges between Europe and China, reveals an important transcultural dialogue in the eighteenth-century Qing court. The main focus of this paper is to consider how this tool and the relevant techniques and scientific knowledge it brought to the Qing court supported the imperial workshop's new presentation of ivory artwork with turning patterns. What role did the transcultural messages brought by the innovative rose engine lathe-turned ivory works and the lathe-turning machinery play in the Qing court? How did the introduction of Western lathes and related scientific knowledge and technology support creative production by replacing traditional carving with lathe-turning for making forms and patterns? In attempting to answer these questions, this essay will offer insights into the role of the emperors, the imperial household officials, the Jesuit missionaries, the lathe-turning manuals, and the craftsmen within the larger dynamics of art and technological exchange between East and West. In addition, what can this specific, short-lived (and unexpected) case of cultural exchange tell us about creativity in the ivory arts and the about the influence of related scientific knowledge, technology, and tools on the development of art production?[2]

The Exotic Works of Art from the West to the Qing court

European turned-ivory objects made by lathe did not appear in the late seventeenth-century Qing court before their import from Europe; however, such techniques had been very popular in Europe since the Renaissance, when the aristocrats of the Holy Roman Empire regarded lathe-turning as part of a princely education and an appropriate leisure time activity.[3] Indeed, fabulous ivory-turning works can be seen in most sixteenth- to seventeenth-century European princely collections. This is not to say that no lathe-turned works were made in China before this time. In fact, the lathe was used as a tool for furniture and for woodworking in general in many civilizations before this time. The case here highlights a powerful lathe machine (the

[1] Shih Ching-fei 施靜菲, "Ye shi bolaipin: Qinggong zhong de huashi xuanchuang 也是舶來品: 清宮中的花式鏇床 (Another Item from Over the Sea: Rose Engine Lathes at the Qing Court)," *Taida Journal of Art History* 32 (2012): 171–238. Gathering all available evidence and contextual data, the essay investigates the role that the Western lathe played in the Qing court and the evidence that it and related works of art supply for our understanding of artistic and technological exchange between East and West in the eighteenth century.

[2] The long history of Chinese ivory artworks can be traced back to the Neolithic period. While ivory is not a mainstream material in early Chinese art history, it was not until the seventeenth to early twentieth centuries that ivory artworks reached its high peak. One of the reasons for this may have been that the elephant tusks were greatly valued as diplomatic presents and imported via marine trade.

[3] Klaus Maurice, "The Princely Art of Turning on the Aesthetic Significance of the Natural Sciences and Technology," in *Gedrehte Kostbarkeiten: Turned Treasuries*, edited by Georg Laue, Klaus Maurice and Christiane Zeiller (Munich: Kunstkammer, 2004), 16–23.

rose engine) that appeared in the Holy Roman Empire during late sixteenth century. The rose engine is a specific kind of lathe that produced complicated patterns and forms on turned objects, and thus became a milestone of Renaissance technological and artistic achievement.[4]

Surprisingly, some precious European rose engine lathe turned objects are included in collections of the Qing court, now in the Palace Museum in Beijing and in the collection of the National Palace Museum in Taipei,[5] but they have never been fully explored. Among these lathe-turned works, is a pair of objects that especially attracted my attention because of their particular profile and patterns (Fig. 1). They are composed of several separate parts and jointed by screwing; the upper part has a tulip-like floral decoration that is jointed underneath by a sphere with six opening holes; inside the sphere, there is a Plato cube/hexahedron with an opening hole on each side containing a die that is nestled further inside. The middle and lower parts form one cylindrical openwork box and one roundel openwork box with various trumpet-form flowers on top. On its base, it is decorated with a delicate Spirograph openwork pattern and a rosette pattern. The style of these turned objects, which is similar to extant Southern German examples in the Kunstindustrimuseum, Copenhagen, and some private collections,[6] tells us that the objects were made in seventeenth-century Southern Germany in the Holy Roman Empire. An ivory object of very similar design containing the coat of arms of Duke Leopold of Lorraine (c. 1700) is mentioned by Klaus Maurice.[7] Other comparable double boxes were in the cabinet of the French turner and collector Nicolas Grollier Compte de Servière (1593–1686), who acquired an extensive group of turned objects that were later illustrated in a 1719 publication of copper engravings of his inventory.[8]

As mentioned above, there are two such pieces (seen as a pair) which, according to the records, were originally housed in one of the side halls attached to the

[4]For a brief history of lathe development, please refer to Klaus Maurice, *Sovereigns as Turners* (Zurich: Verlag Ineichen, 1985), 131–8.

[5]They were recently revealed by the author and my colleagues in the Palace Museum, Beijing. See the special issue of *Forbidden City Monthly* on ivory-turning at the Qing court. Liu Yue 劉岳, "Cong yi jian Qinggong yiliu de xiangya qiwu shuo qi 從一件清宮遺留的象牙器物說起 (Speaking about a Qing court ivory crafted object)," *The Forbidden City Monthly* 203 (12/2011): 40–56; Shih Ching-fei 施靜菲, "Ni suo bu zhidao de Guangdong xiangyaqiu 你所不知道的廣東象牙球 (Concentric Ivory Spheres from Canton)," *The Forbidden City Monthly* 203 (12/2011): 20–36.

[6]I would like to thank Dr. Jutta Kappel of the Staatliche Kunstsammlungen Dresden for the information through email communication. For private collections, see Georg Laue, Klaus Maurice and Christiane Zeiller, ed., *Gedrehte Kostbarkeiten: Turned Treasuries* (Munich: Kunstkammer, 2004), 28–9 and Sotheby's auction 2011, accessed December 12, 2015, http://www.sothebys.com/en/auctions/ecatalogue/2011/property-from-the-collections-of-lily-edmond-j-safra-n08822/lot.773.html

[7]Maurice, *Sovereigns as Turners*, 85.

[8]See Maurice, *Sovereigns as Turners*, nos. 115 and 117.

Fig. 1 Ivory box in the Forbidden city. Seventeenth century. The Palace Museum, Beijing

Yangxindian 養心殿 (Palace of Mental Cultivation) in the Forbidden City.[9] Most of these imported, turned objects were displayed in important imperial palaces as part of interior decorations. Recent building restoration projects in the Palace Museum, Beijing, allow us to imagine the possible original settings for such objects in the eighteenth-century Forbidden City. Objects of this kind were likely kept in wood-framed cases with glass covers, along with other decorative objects, where they could be admired and could ornament the palaces.[10]

In addition, with the accretion of understanding about the European lathe-turned tradition, we can now evaluate the provenance and technology of these turned objects and suggest that European objects of this sort were very likely brought as diplomatic gifts or local tributes to the Qing court during the seventeenth and eighteenth centuries. Archival sources from the Qing court and other available documents provide evidence of further potential avenues of transport for these turned objects into the court, and shed light on their likely functions there.[11]

Collection and Manufacture of Turned Objects in Sixteenth- and Seventeenth-Century Europe

As mentioned above, in sixteenth- and seventeenth-century Europe, lathe-turning was seen as part of a princely education and became popular as a suitable leisure activity for aristocratic men in the Holy Roman Empire, since the lathe was regarded as a kind of machine, the handling of which required knowledge of science and technology. Lathe-turning was thought to provide respite from busy governmental affairs and was seen as helpful in nurturing the virtue of patience.[12]

Ivory carving had a long history in Europe since the Middle Ages, when it served mainly religious purposes, for example in making shrine figurines and ritual vessels for churches.[13] Since the sixteenth century, lathes employed for ivory and wood turning became necessary equipment in the court of the Holy Roman Empire where

[9]The old inventory number of these two boxes is *Lu* 呂 no.3370, indicating that their original location is Tishun tang ji ge xianfang denchu 體順堂及各廂房等處 (Hall of Manifesting Obedience and other side chambers). See Committee for the Disposition of Qing's Imperial Possessions, ed., *Gugong wupin diancha baogao* 故宮物品點查報告 (*Palace Items Auditing Report*) (Beijing: Xianzhuang shuju, 2004).

[10]Wang Yi 萬依, Wang Shuqin 王樹卿, and Lu Yenzhen 陸燕貞, ed., *Gugong jingdian: Qinggong shenghuo tudian* 故宮经典:清宮生活图典 (Life in the Forbidden City of Qing dynasty) (Beijing: Zijin cheng chubanshe, 2007), 143, pl. 214.

[11]See the case study of wooden goblets in the Qing court. Ching-fei Shih, "The Wooden Hundred-layered Goblet from the Western Ocean," *Orientations* 48, no. 4 (2015): 60–4.

[12]Laue, "Turned Treasuries," 18–23.

[13]For general accounts on European ivory works, see Peter E. Lasko, ed., *Ivory: A History and Collection Guide* (London: Thames and Hudson, 1987). Richard H. Randall Jr., *Masterpieces of Ivory: from the Walters Art Gallery* (New York: Hudson Hills Press and Walters Art Gallery, 1985).

their popularity was underpinned by their role in demonstrating imperial intelligence.[14] Emperor Rudolph II (1552–1612), for instance, set up a turning workshop in Prague and one of his works is now housed in the National Museum of Denmark.[15] The philosophical understanding of lathe-turning was that it was an imitation of the creation of the cosmos, incorporating knowledge of mathematics, geometry, perspective, and advanced craftsmanship techniques. A master of lathe-turning was also, of course, emulating God, the first "turner" who created the world and turned the globe.[16] By extension, those who could control/work on the turning machine/lathe were also demonstrating its and hence, their own, ability to control the cosmos.[17]

Princely lathe-turning later spread into other regions in Europe outside the Holy Roman Empire, including France, Denmark, and Russia: the French king, Louis XV, is said to have been a good turner.[18] Many master turners were also employed in courts all over Europe, for instance, the famous turner Jakob Zeller (1581–1620) who worked at the court of Rudolph II in Prague was also invited to work at the Saxon court at Dresden and produced many extraordinary ivory pieces that perfectly combined carving and turning.[19] In addition to achievements of aesthetic value, the main focus of lathe-turning was to demonstrate a high degree of technical prowess and to produce curiosities, as has been pointed out by Arthur MacGregor.[20] Thus, elaborate lathe-turning enjoyed a period of long-term development, the pinnacle of which was reached when the technique shifted toward turned (machine-made art) as opposed to manually carved (hand-made art) objects.

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[14]Sato Nayoki 佐藤直樹, and Tanabe Mikinosuke 田辺幹之助, ed., ドレスデン国立美術館展-世界の鏡 (*Dresden: Spiegel der Welt: Die Staatlichen Kunstsammlungen Dresden in Japan*) (Tokyo: Nikkei Inc., 2005), 35–6; Arthur MacGregor, *Curiosity and Enlightenment: Collectors and Collections from the Sixteenth to the Nineteenth centuries* (New Haven: Yale University Press, 2007), 214.

[15]Rudolph II was Holy Roman Emperor (1576–1612), King of Hungary and Croatia (as Rudolf I, 1572–1608), King of Bohemia (1575–1608/1611), and Archduke of Austria (1576–1608). One of his lathe-turned works was kept in the *Kunstkammer* housed in the National Museum of Demark. Accessed November 7, 2011, http://www.kunstkammer.dk/AndetGB/genstande_andetGB.asp?ID=77.

[16]Horst Bredekamp, *The Lure of Antiquity and the Cult of the Machine: The Kunstkammer and the Evolution of Nature, Art and Technology*, trans. Allison Brown (Princeton: Markus Weiner Publishers, 1995), 37–45; Maurice, *Sovereigns as Turners*, 15–22.

[17]Wang Ching-ling 王靜靈, "Yuzhou he shijie de zhuzai: Tan Delesideng suocang Sakesen wanghou de duomianti xiangyataoqiu zhizuo 宇宙和世界的主宰-談德勒斯登所藏薩克森王侯的多面體象牙套球製作 (The Ruler of the Universe and World: The Ivory-crafted Geometrical Balls Produced and Collected by Saxon Kings and Princes in Dresden)," *The Forbidden City Monthly* 203 (12/2011): 57–67.

[18]MacGregor, *Curiosity and Enlightenment*, 215.

[19]For an example of such work, see Sato and Tanabe, ドレスデン国立美術館展-世界の鏡, 36.

[20]Arthur MacGregor, *Tradescant's Rarities: Essays on the Foundations of the Ashmolean Museum, 1683, with a catalogue of the surviving early collections* (Oxford: Clarendon Press, 1983), 289–90.

Advanced lathes for turning objects appeared in the courts, and by the second half of the sixteenth century rose engine lathe-turning gained in prominence. The rose engine was a particular type of machine that was used at the courts of Munich and Dresden from at least the end of the sixteenth century. According to Klaus Maurice, a rose engine lathe must have the following elements: "first, a continuous drive, second, mechanical setting and adjustment of the cutting tool, third, programme control, and fourth, like all the mobile and fixed parts of the lathe, the latter had to be metal."[21]

It makes use of a variety of special accessories in order to achieve the complicated Spirograph patterns (Fig. 2).[22] Accurate design in advance is usually required to set up the necessary mechanical parts, and the spindle, the headstock, and the carriage must be made of metal to ensure the precision of the work. In practice, the parts and the cutting tool rotate independently to turn the patterns as designed according to a pre-set program. For example, the lathe can produce complicated twisted rope patterns turned onto the flat surface of a round plate (Fig. 2). The principle is similar to that of the kaleidoscope ruler, with which extremely complicated patterns can be made through a pre-set design. The complicated products of the rose engine lathe fully exhibited the mature technique and great ability of the turner, which encouraged courts all over Europe to compete in making high quality turned works. Among these is a portrait lathe of a special kind, the lathe can have a pattern or portrait in relief turned as designed using the pre-set tools and program (Fig. 3). The most common example of this is the format of a box or a medal with medallion turned on the top, such as the portrait medallion of St. Petersburg, which shows Catherine the Great (1729–1796) as the Roman goddess Minerva on a medal (Fig. 4). It has also been suggested that ivory medallions turned on the lathe were sought-after *Kunstkammer* objects as it was incomprehensive that relief of such refined quality could have been crafted by a machine on such a fragile substance as ivory."[23] Indeed, the practice of using a portrait lathe is crucial to this discussion, as it was probably the main type of lathe employed at the eighteenth-century Qing court.

In late seventeenth- to eighteenth-century Europe, many handbooks/treaties on lathe-turning were published, for example, *L'art de tourner, ou de faire en perfection toutes sortes d'ouvrages au tour* by Charles Plumier (1646–1704) came out in the year of 1701, and *Manuel du Tourneur*, by L. E. Bergeron (1737–1805), was published first in 1792 and in a second edition in 1796. The treaties by Plumier are included in the book list in the library of the Beitang 北堂 (Northern church), a book collection that is based on the French Jesuit missionary library established from

[21]Maurice, *Sovereigns as Turners*, 134.

[22]Stuart King, "History of the Lathe: part two—continuous rotation," blog entry, posted March 22, 2008, accessed August 31, 2011, http://www.stuartking.co.uk/index.php/history-of-the-lathe-part-two-continuous-rotation/

[23]Laue, Maurice and Zeiller, *Gedrehte Kostbarkeiten: Turned Treasuries*, 77–8.

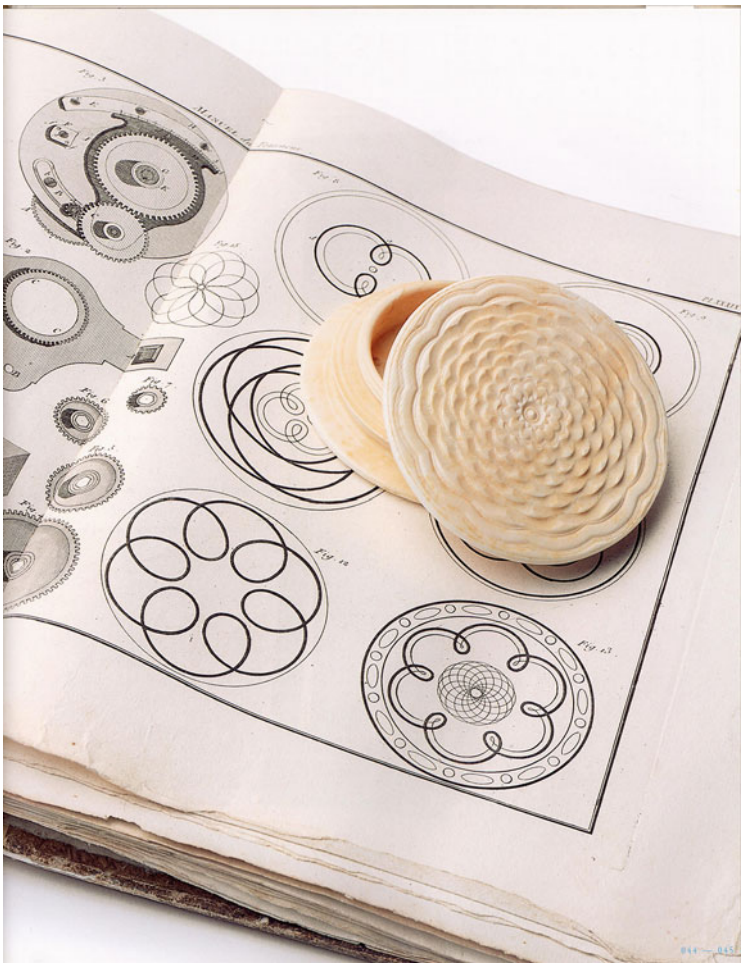
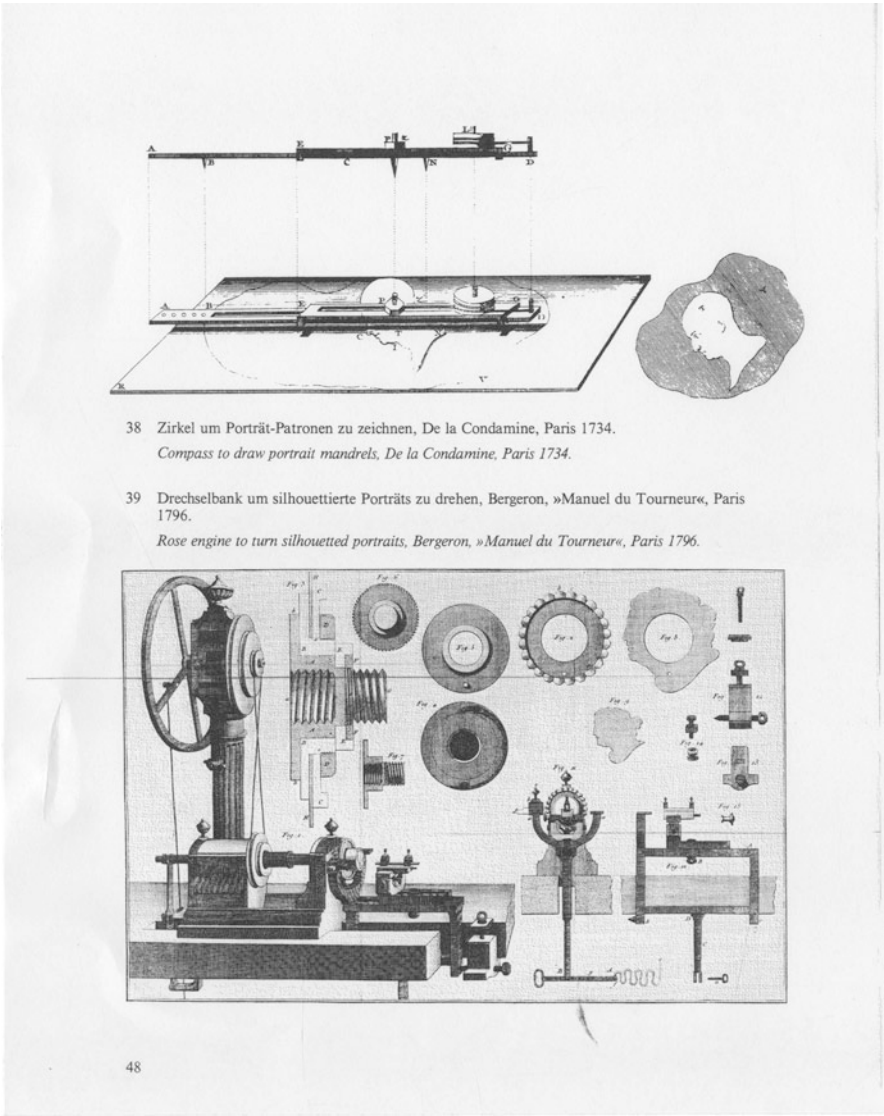


Fig. 2 The manual for the rose engine turning and the turned object. After Georg Laue, Klaus Maurice et al., *Turned Treasuries*, 45

the late seventeenth century onwards.[24] Copies of Plumier's books on lathe-turning found in China were likely consulted by the turner at the Qing court. According to the analysis by Maurice, "in the texts the machine always remains a luxury of the

[24]Lazarist Mission Press, *Catalogue of the Pei-T'ang Library* (Beijing: Guojia tushuguang chubanshe, 2008), 155, no. 578. Charles Plumier, *L'art de tourner, ou de faire en perfection toutes sortes d'ouvrages au tour* (Paris: Jean Jombert, 1701). For the history of *Beitang* Library, see Mao Ruifang 毛瑞芳, "'Beitang shumu': jilu xixue dongjian de zhongyao lishi wenxian《北堂書目》: 記錄西學東漸的重要歷史文獻 (The Importance of 'Beitang Shumu' for the History of Western Cultural Input into the East)," *Journal of Historiography* 4 (2007): 112–8.



38 Zirkel um Porträt-Patronen zu zeichnen, De la Condamine, Paris 1734.
Compass to draw portrait mandrels, De la Condamine, Paris 1734.

39 Drechselbank um silhouettierte Porträts zu drehen, Bergeron, »Manuel du Tourneur«, Paris 1796.
Rose engine to turn silhouetted portraits, Bergeron, »Manuel du Tourneur«, Paris 1796.

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Fig. 3 The Portrait Lathe in Bergeron, *Manuel of Tourneur,* Paris 1796. After Klaus Maurice, *Sovereigns as Turners*, Fig. 39

nobility which is never associated with a common handicraft," since the machine is described as an artificial instrument or a piece of equipment that outwits nature by making *objects d'art* more easily.[25]

[25]Maurice, *Sovereigns as Turners*, 103.

Fig. 4 Portrait medallion of St. Petersburg showing Empress Catherine the Great (1729–1796) as the Roman goddess Minerva on a medal. 1766. After Georg Laue, Klaus Maurice et al., *Turned Treasuries*, pl. 24

Transcultural Objects by the European Rose Engine Lathe in the Qing Court

The collection of lathe-turned ivory objects and European rose engine lathes in the Qing court, reveal the international communication that existed between the Qing court and Europe through Western diplomats and missionaries; it also suggests that in contrast to the imperial court of the previous dynasty, during the heyday of the Qing dynasty the Qing court encouraged relatively open and positive attitudes toward the introduction of Western objects and techniques.[26] The question of whether a turned object was made on an ordinary lathe or on a rose engine lathe, requires that we first examine a handful of extant round/cylindrical/oval ivory objects from the Qing court collection.

Some extant objects that were turned by rose engine lathes have been discovered in both the collections of the National Palace Museum in Taipei and the Palace Museum in Beijing.[27] For example, an ivory box housed in the Palace Museum, Beijing displays a plum blossom motif turned in relief on the top, outwardly turned rosette patterns on the bottom, and the petal pattern on the side of the box (Fig. 5), all of which are closely related to European objects turned on the rose engine.

This begs the question of how the Qing court imperial lathe-turning workshop appropriated the European rose engine into its production processes and transformed conventional designs into new looks. Let us first consider the objects that are most similar to European-style artifacts: The representation of the lid and the bottom of the

[26]This was different from attitudes during the preceding Ming dynasty, when, for instance, Emperor Wanli 萬曆 rejected an audience with the Jesuit missionary Matteo Ricci. See Chen Hui-Hung 陳慧宏, "Yesuhui jiaoshi Li Madou shidai de shijue wuxiang ji chuanbo wangluo 耶穌會教士利瑪竇時代的視覺物像及傳播網絡 (Visual Objects and Personal Interactions: Their Contexts as Described by the Jesuit Matteo Ricci (1552–1610))," *New History Journal* 21, no. 3 (2010): 55–123.

[27]Shih, "Ye shi bolaipin: Qinggong zhong de haushi xuanchuang," 171–238; Liu, "Cong yi jian Qinggong yiliu de xiangya qiwu shuo qi," 40–56.

bamboo-like tubular box in ivory is very close to objects turned by the European rose engine lathe; however, the choice of the bamboo pattern follows a traditional theme while the geometrical arc shape is fully consistent with the spiral-graphic style (Fig. 6).[28] This object can be regarded as one example of a successful integration of European style with traditional themes. But when we look more closely at the object, the uneven width of the bamboo joint pattern on the body and that of the spiral-graphic pattern on the base suggests that the turning execution might not have been perfect in this case.

Let us now consider the objects resulting from a more adventurous experimentation, which used the rose engine lathe to imitate traditional pictorial themes in turned relief. There is no doubt that the portrait engine was the most frequently used lathe for pictorial motifs. Indeed, the traces of lathe-turning in the pattern on the surface of the box are obvious to the eye (Fig. 5). However, successful works of boxes decorated with pictorial motifs were very rare, for it was still difficult to use the rose engine lathe to turn pictorial themes. The most successful ones in terms of technical mastery include the box with a motif of a dog on top and the box with a landscape on top and a poem on its bottom.[29] This group of turned pieces required a high level of technical skill in order to render complicated pictorial themes in relief, including a mountain, river and boat, and even the representation of Chinese characters. The contours of the scenery and figure, in addition to the poetry on the base, are turned onto the surface of the box and were perhaps followed by crisp polishing in low relief. The same features can be found on the portrait medallion in St. Petersburg (Fig. 4), mentioned above, which also shows the traces of turning in relief on the flat surface of the medal. Based on the layout of these ivory turned pieces containing painting-like decorative motifs, we can conclude that a specific portrait rose engine was definitely used (Fig. 2).

The third group is more heterogeneous since it is clear that during production rose engine turning was mixed with hand-carving or the addition of glued on hand-carved patterns. The ivory box here looks like an attempt to correct a failed experiment with rose engine turned ivory box production. One can see in the surface figure pattern that the low reliefs were carved manually (not mechanically) onto the flat surface of the box. By comparison, the low relief also looks as if it was glued to the surface (and not carved out of it).

The turned, round boxes exhibit the elegant southern Chinese tradition of bamboo and horn low-relief carving effects, which were popular in the seventeenth- to eighteenth-century Jiangnan area, while simultaneously displaying traces of rose engine lathe-turning. In most cases, the bottoms of the boxes are decorated with Western spiral-graphic rosette patterns while the surfaces and the interiors of the boxes are decorated with traditional auspicious patterns in low-relief turning. They combine traditional motifs and foreign decorative patterns, conventional materials and new mechanical techniques, exhibit Chinese and "Western Ocean" production

[28]Shih, "Ye shi bolaipin: Qinggong zhong de huashi xuanchuang," pl. 26B.

[29]Shih, "Ye shi bolaipin: Qinggong zhong de huashi xuanchuang," pl. 20 and 25.

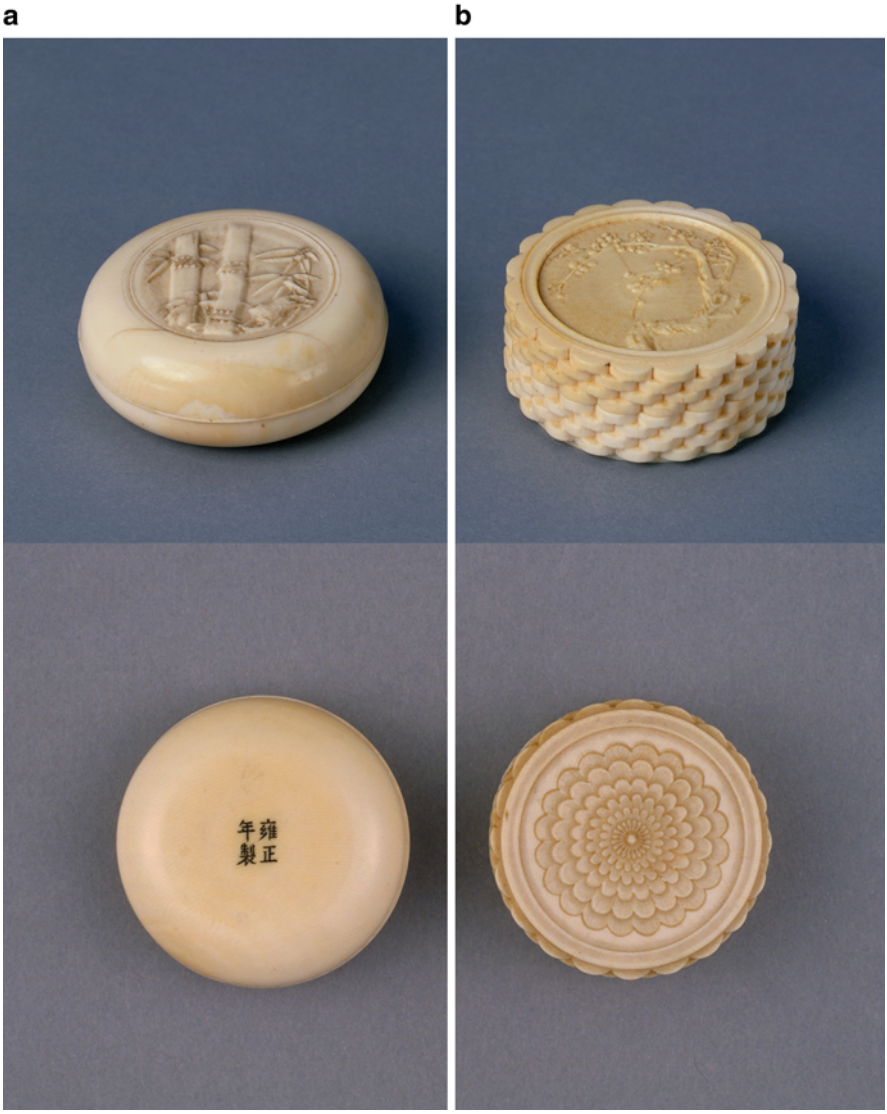

Fig. 5 Ivory box with plum blossom pattern. Eighteenth century. The Palace Museum, Beijing

practices and aesthetics, and are obvious transcultural objects in this sense. Yet, despite the attempts at technical development based on use of the rose engine lathe, no stable technical development was attained in the imperial workshops. There were not many successful works resulting from a merging of lathe-turning with traditional bamboo and horn carving. On the contrary, if one were to search more methodically

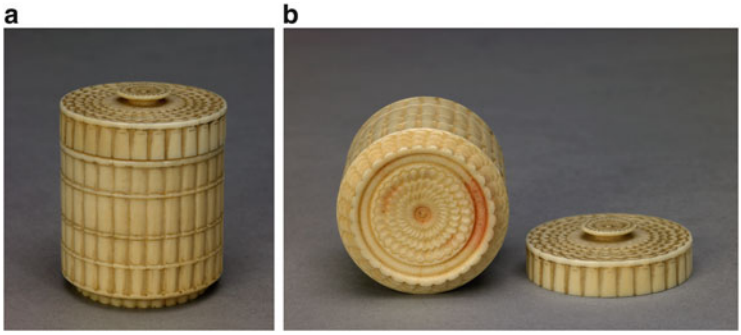

Fig. 6 Ivory box with bamboo joint design. Eighteenth century. The Palace Museum, Beijing

for the working traces of lathes, many more failed works would no doubt be revealed.[30]

Use of the European Rose Engine in the Qing Imperial Workshop

Due to the lack of evidence, we know very little about how the imperial artisans acquired the skill and techniques needed to operate the rose engine lathes in Yongzheng's 雍正 (r.1723–1736) court. What we do know is that there was an established turning workshop in the Imperial Household, and according to the documents, the turned objects in the Qing court were mainly produced in this Xuan zuo 鏇作 (lathe-turning workshop). In addition, it is reasonable to suggest that some of the objects that were similar to the imported turned pieces from the West were designed either as decorative objects for display and works of art, or as containers for daily use. For instance, the archive reveals that Emperor Yongzheng ordered the imperial workshops to make turned ivory box containers for balsam (*baersamu xiang* 巴爾薩木香), and the record of lathe-turning workshop for the third month of the seventh year of Yongzheng's reign in the Qing Imperial Household Archives, states: "make ten pieces of small ivory boxes for containing heat-avoiding balsam."[31]

[30]For instance, Liu, "Cong yijian Qinggong yiliu de xiangya qiwu shuo qi," 49. A similar ivory box is found in a private collection. Jia Yang 江揚, and Yang Xuejun 楊學軍, ed., *Shangyi shanfang cang Zhongguo xiangya diaoke* 尚藝山房藏中國象牙雕刻 (Chinese Ivory Carvings from the Appreciating Art Mountain Retreat Collection) (Suzhou: Guwu xuan chubanshe, 2011), 110.

[31]Orig."做避暑巴爾薩木香小象牙盒十件." "Xuan zuo 鏇作 (lathe-turning workshops), the third month of the seventh year of Yongzheng's reign," in *Qinggong neiwufu zaobanchu dangan zonghui* 清宮造務府造辦處檔案總匯 (*The compilation of the Qing Imperial Household Archives*), ed. Chinese University of Hong Kong, Art Museum (Beijing: Renmin chubanshe, 2005), vol. 3, 769. Balsam is one kind of ointment or essence, which was employed for placebo effect.

The heavy and large-sized material features of the rose engine lathe as a tool makes its movement across the ocean from Europe to China quite unexpected. Nonetheless, it is not just the objects turned by the rose engine lathe, but also the rose engine lathes themselves that were found in the Qing court, according to relevant archival records. As has been argued elsewhere, the rose engine lathes in the Qing court were most probably brought in as local officials' tributes from Guangdong or as gifts from Western missionaries.[32] The lathes were not mere collectibles or objects for display, they were practical tools for use in the imperial workshop. Indeed, there are many archival records from the Yongzheng period that record the use of lathes from the "Western Oceans" in making ivory artworks for the court, and there were specific people who were placed in charge of the management and working of the lathes. For instance, the record of Xuan zuo, the fifth month of the tenth year of Yongzheng's reign, in the Qing Imperial Household Archives, states:

> the order came from the Yuan Ming Yuan on the seventh day of this month, *siku* 司庫 (the treasurer) Changbao 常保 and Shuoling 首領 (the director) Samuha 薩木哈, passed the words and *taijian* 太監 (the eunuch) Changzhou 滄州 passed on the emperor's decree that "make some ivory boxes with good designs by employing the western lathe machines. That's all." Today *taijian* 太監 (the eunuch) Yang Wenjie 楊文杰 replied, *Yuanwailang* 員外郎 (the vice director) Manpi 滿毗 set up a plan to make ten pairs of ivory boxes in various styles.[33]

In addition, the existing related objects in the original collection of the Qing court and the description of lathes in textual sources suggest that the Western lathe in the Qing court was almost certainly the rose engine lathe, which required a complex of knowledge and techniques as well as a pre-set program in order to produce the specific patterns described above. The mechanical level of the rose engine lathe was higher than that of the ordinary lathe, and its introduction into the Qing court obviously provided a new stimulus and introduced new ideas to the practice of ivory working in the period, which was so different from previous ivory working based mainly on hand carving. The key advantages of the European rose engine lathe, which were its predictable working process and unpredictable result, according to Jutta Kappel,[34] influenced its handling in the Qing court.

The knowledge of geometry required for lathe-turning, for instance, is believed to have been brought to China in the middle of the seventeenth century. Examples of this include the translation of Euclid's *Elements of Geometry* in the *Da ce* 大測

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[32]Shih, "Ye shi bolaipin: Qinggong zhong de huashi xuanchuang," 185–6.

[33]Orig. "圓明園來帖稱本月初七日司庫常保首領薩木哈來說，太監滄州傳旨:著用西洋鏇床將好款式花紋象牙盒鏇做些。欽此。本日太監楊文杰回明， 員外郎滿毗擬試做各式象牙盒十對。記此." "Xuan zuo 鏇作 (lathe-turning workshops), the fifth month of the tenth year of Yongzheng's reign," in *Qinggong neiwufu zaobanchu dangan zonghui* 清宮內務府造辦處檔案總匯 (*The compilation of the Qing Imperial Household Archives*), ed. Chinese University of Hong Kong, Art Museum (Beijing: Renmin chubanshe, 2005), vol. 5, 394.

[34]Jutta Kappel, "Turned Ivory Works," in *Princely Splendor: The Dresden Court 1580–1620*, ed. Dirk Syndram and Antje Scherner (Milan: Staatliche Kunstsammlungen Dresden and Mondadori Eleca S.p.A., 2004), 176–97.

(Grand Measure) by Deng Yuhan 鄧玉函 (Johann Schreck, 1576–1630) (was included into the *Chongzhen lishu* 崇禎曆書, accomplished in 1629), which mentions the area of the surface of the spheroid, as well as the *Yu zhi shuli jingyun* 御製數理精蘊 (Imperial Key Concepts of Mathematics), which includes the Platonic solids and other relevant knowledge.[35] *Yu zhi shuli jingyun* 御製數理精蘊 (Imperial Key Concepts of Mathematics) was edited in 1713 after an edict by Emperor Kangxi 康熙 (r. 1662–1722) and was published in 1722. It collected the most important Western achievements in mathematics that had been brought to China. Emperor Kangxi started to embrace and study Western science after the debate on the standard national calendar, which gained fame as the "Chinese rite controversy" (*Liyi zhi zheng* 禮儀之爭). The missionary Nan Huiren 南懷仁 (Ferdinand Verbiest, 1623–1688), An Duo 安多 (Antoine Thomas, 1644–1709), Zhang Cheng 張誠 (Jean Francois Gerbeillon, 1654–1707), and Bai Jin 白晉 (Joachim Bouvet, 1656–1730) taught Emperor Kangxi about mathematics. The present Qing court collection still contains some relevant textbooks and teaching models from these lessons, including Kangxi's portable logarithm table in the collection of the National Palace Museum in Taipei,[36] and the wooden polyhedral model for geometry made for Kangxi in the Palace Museum in Beijing, which is very similar to the wooden polyhedral model used by Louis XV.[37] Although we do not have evidence to explore further whether Emperor Kangxi used his geometry knowledge to work on the rose engine lathe in the Qing court, it would not be surprising if he did engage in the same leisure activity as his European counterparts. According to archival records, which are dated to around the fifth to tenth years of Emperor Yongzheng's reign, lathe-turning reached its pinnacle in the Qing imperial workshops between 1727 and 1733; many ivory boxes were turned by one or several rose engines in Imperial Household workshops during this period.

As mentioned above, Emperor Yongzheng frequently ordered ivory boxes with Western-style patterns to be made on the Western lathes, and detailed descriptions of the making were included in these records. Relatively fewer orders from Emperor Qianlong's 乾隆 reign (r.1736–1796) have been discovered, however; and therefore, it is reasonable to believe that Emperor Yongzheng was particularly interested in the turned pattern that required the turning of the lathes from the "Western Oceans" in the Imperial Workshops and was perhaps curious about the geometry knowledge contained in the turned works. Nonetheless, the previously described emphasis on

[35]See Du Shiran 杜石然, and Han Qi 韓琦, "Shiqi, shiba shiji Faguo Yesuhuishi dui Zhongguo kexue de gongxian 十七、十八世紀法國耶穌會士對中國科學的貢獻 (The contribution to Chinese science of French Jesuit missionaries in the 17th and 18th centuries)," *Impact of Science on Society* 167 (1993): 55–64. For the history and various compilation of Chongzhen lishu, see Chu Ping-yi 祝平一, "Chongzhen lishu kao 〈《崇禎曆書》考〉 (The Chongzhen Almanc Test)," *Mingdai yanjiu* 11 (2008): 133–61.

[36]National Palace Museum, ed., *Kangxi dadi yu taiyang wang Luyi shisi tezhan* 康熙大帝與太陽王路易十四特展 (*Emperor Kangxi and the Sun King Louis XIV*) (Taipei: National Palace Museum, 2011), 78, pl. IB-26.

[37]Shih, "Ye shi bolaipin: Qinggong zhong de huashi xuanchuang," 191, pl. 28.

the nature of machines, which was to extend the reach of the physical ability of human beings in Renaissance and Enlightenment Europe, still seems to have been a distant concern for the Qing court products. Due to the lack of references, we are not in a position to judge whether the Qing emperors received information on the symbolic meanings encoded by European princes in the activity of lathe-turning and whether other aspects of the nature of the machine were understood or not at this stage. We do, however, know that the tools/machines, the human resources for turning, and the manuals from the West must have been imported into the Qing court, the heart of civilization in China, and inspired the set-up of the workshop for turning, which actually made turned pieces for the court. According to the archival records, continuous tributes of turned ivory works by embassies and Jesuit missionaries might have interested Emperor Qianlong in turned patterns. But when we compare Qianlong's curiosity to the strong interest in lathe-turning ivory during the Yongzheng period, it seems as though the rose engine lathe served more as a display object than a tool in the Qianlong period.[38] We know that when Emperor Qianlong asked the Western missionaries and the court turners of the Western lathe (*Xiyang xuanchuang zhi ren* 西洋鏇床之人) to check whether the Western rose engine lathes were still in working order and could turn patterns, he discovered that since the lathes had not been used for a long time some parts or accessories were missing, and he was advised to have the patterns hand-carved instead.[39] Thereafter, the short burst of glory enjoyed by rose engine lathe-turning reached an end, and during the eighteenth century relevant records were simply no longer available at the Qing court. In addition, the records suggest that the Qing court ivory carving technique had been developed to imitate the effects produced by the Western rose engine lathe, though no object has yet been found to further support this.

Conclusion

According to the materials we have seen thus far, we still do not know how and why the European rose engine lathes were brought into the Qing court. What we do know is that the desire for the lathes must have been great in order to bring such heavy, sizable machines overland and across the ocean from Europe to China during the late

[38]"Xuan zuo 鏇作 (lathe-turning workshop), the sixth month of the first year of Qianlong's reign," in *Qinggong neiwufu zaobanchu dangan zonghui* 清宮內務府造辦處檔案總匯 (*The compilation of the Qing Imperial Household Archives*), ed. by Chinese University of Hong Kong, Art Museum (Beijing: Renmin chubanshe, 2005).

[39]"Guangmu zuo 廣木作 (Canton wood workshops), the twelfth month of the forty-first year of Qianlong's reign," in *Qinggong neiwufu zaobanchu dangan zonghui* 清宮內務府造辦處檔案總匯 (*The compilation of the Qing Imperial Household Archives*), ed. Chinese University of Hong Kong, Art Museum (Beijing: Renmin chubanshe, 2005), vol. 39, 708.

seventeenth to eighteenth centuries. The advanced machine became an object in motion or an object with mobility, and it was succeeded by a series of transcultural dialogues between the Qing court and European courts, producing extraordinary transcultural results in a particular group of EurAsian objects—namely, rose engine lathe turned ivory works (Figs. 5 and 6). Although not many of the works made with these imported rose engine lathes can be truly deemed successful, the few examples that we do have reveal a transcultural exchange in terms of technology as well as aesthetics that was occurring during the heyday of the Qing empire's contact with the world. The extant records from the Kangxi period are unfortunately too scant to fully explain the situation. It is clear, however, that Emperor Yongzheng and Emperor Qianlong had an understanding of the basic structure of the Western rose engine lathe and the process of making a pre-set program to have patterns turned, for they actually ordered the court workshop to make turned ivory works or to make carved ivory works that imitated the turning patterns.

In addition, the use and the transformation of the Western rose engine lathe in the Qing imperial workshop are noteworthy for the adventurous experimentation in the use of the rose engine lathe, and for the fact that pre-designed pictorial patterns were turned during the Yongzheng period. While the patterns on most of the works are vague, there were also some successful works of integration that were carved with elaborate reliefs after turning, exhibiting the Qing imperial workshop's mastery of the rose engine lathe-turning technique. In the Qianlong period, the turned works made by the rose engine lathes almost disappeared, showing that there were problems with the handling of the lathe during that period. As noted in the archival records, the old Western rose engine lathes had not been used for a long time, and they were therefore no longer in working condition. Consequently, the previously turned patterns were carved by hand instead and the geometry and mechanics knowledge underlying the rose engine lathe was no longer used.

Ivory is an ideal material to work with because it is hard and strong but easy to cut. Among the varieties of ivory from different regions and eras, African ivory is of higher quality than Asian ivory, woolly mammoth, or other sources such as walrus or hippopotamus. This is still true today.[40] Although the long history of Chinese ivory artworks can be traced back to the Neolithic period, ivory was not a mainstream material in early Chinese art history, and it was not until the period between the seventeenth and early twentieth century that ivory artworks reached their peak. One reason for this late trajectory in the production of ivory works may be that elephant tusks were taken as diplomatic presents and were imported via marine trade.[41] Questions remain about the provenience of the ivory used in China at the time

[40]Guangdong ivory workshops and European ornamental turners' studios preferred African ivory.

[41]For instance, see the analysis of Dutch and Portuguese embassies to China in the seventeenth and eighteenth centuries. John Wills, *Embassies and Illusions: Dutch and Portuguese Envoys to K'ang-hsi* (Cambridge, Mass.: Harvard University Asia Center, 1984).

when the rose engine lathe was introduced. Did the import of African ivory (in addition to Asian ivory, which had long been used in China) begin from the seventeenth century and correlate with the introduction of the European rose engine machine? Does this question of material relate to technology? These are important questions that still need to be asked and answered, though there is currently a lack of satisfactory supporting references to clarify this issue.[42]

From the perspective of art history and material culture studies, innovation corresponded with the artisan, the patron, and the development of ideas, and it supported the techniques and tools for artworks. This paper has chosen to highlight the mobility of tool/European lathe machinery instead of the flow of luxury objects in the eighteenth-century maritime trade or the Jesuit missionary activities. This case study of unknown transcultural ivory objects in the eighteenth-century Qing court must open our eyes to the intensive exchange of art and techniques between the East and the West in the eighteenth century. In addition, this paper is part of a larger research project that aims to establish a contextual account of cultural exchange by shedding new light on the history of Chinese handicrafts made with new working tools from the West.

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[42]I would like to thank one of the reviewers and Prof. Monica Juneja for raising questions about the sources of material and the relation to technology.

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