

# They went “to larn ‘em”<sup>1</sup>: British glassmakers help to establish Japan’s first western-style glassworks, 1874–1883

Sally E. Haden<sup>1</sup>

Private Researcher

Manuscript received 5 September 2011

Manuscript accepted 14 June 2012

*This paper reviews the attempts to make glass at Shinagawa, Japan in the late 19th century with the aid of four British glass makers. This factory attempted to manufacture window glass until 1883 when British influence ceased at Shinagawa. Although ultimately unsuccessful its influence was felt in the subsequent successful development of flat glass manufacture in Japan.*

## 1. Introduction

During the mid-Victorian period four British glassmakers were invited to Japan to assist in the establishment of that country’s first western-style glassworks, between 1874 and 1883. This factory at Shinagawa on the southern edge of Tokyo sowed the seed for Japan’s modern glass industry, using British technology, assistance and skills.

One of these four men was my great grandfather, James Speed. My generation of the family had only the barest of information about him, that he went to Japan as a glassmaker ‘to larn ‘em’ (an old colloquial way of saying ‘to teach them’). When I made enquiries at Broadfield House Glass Museum in Stourbridge, I was delighted to be introduced to historian Akiko Inoue Osumi of Tokyo, an expert on the history of this glassworks. She gave me a copy of a signed portrait of my ancestor which had been retained by the family of one of his Japanese students (Figure 1).

Inspired by my first photo of my great grandfather and by Ms Osumi’s research,<sup>(1,2)</sup> I began examining British records for the background of these four intrepid glassmakers. This paper presents some conclusions about this glassworks’ manufacture of window glass until 1883 when British influence ceased at Shinagawa. The many other aspects of the history of this factory are being reserved for a later occasion.

## 2. Outline history of glassmaking at Shinagawa

The glassworks, under the name Kogyosha, was established in 1873 by some Japanese businessmen hoping to profit from the manufacture of Japan’s first sheet window glass,<sup>2</sup> with British assistance.



Figure 1. This portrait of James Speed was retained by Shimada Magoichi, one of his students. Shimada’s son wrote on it ‘Meiji 12–16 (1879–83), Shinagawa Glassworks, Mr James Speed, British, my father’s teacher.’ Reprinted by courtesy of the Shimada family

When the factory made serious losses, the government bought it in 1876, renaming it Shinagawa

have been imported from France by Chance Brothers in 1832 and soon taken up by Pilkingtons and other large window glassmakers in Britain. It consisted of blowing a sphere of glass, swinging the sphere into a pit to lengthen it into a cylinder, then letting it cool before it was slit and reheated to fall into a large flat sheet. No machinery was used in its production. By 1850 it had overtaken all other methods of mass-produced window glass in Britain and by the date of its introduction into Japan in 1873 it was quite well established.

<sup>1</sup> Email haden.sally@gmail.com

Presented during the International Conference on the Chemistry of Glasses and Glass-Forming Melts, Oxford, September 2011

<sup>2</sup> The window glass at Shinagawa was of the type technically known as ‘sheet’ glass. It was made by the ‘German’ method generally believed to

Glass Works and adjusting its purpose. Under nationalisation sheet glass was still an important aim but flint glass and instruction in all types of western glassmaking were introduced. However, because the viability of the factory depended on successful sheet glass, the continual failure to make any forced the government to sell it off in 1884. British influence ceased with the departure of the last British instructor in 1883.

In the next phase, as the Shinagawa Glass Company, the glassworks made mainly beer bottles, using a Siemens tank and German expertise. But although bottles brought in the factory's first profits, a variety of problems caused closure in 1892. There was another attempt at sheet glass in 1900–1901, but in 1908 the works became a pharmaceutical factory and no further glass was made there.

The British glassmakers were not recruited as a team or consecutively. Thomas Walton was employed by Kogyosha but stayed on into the nationalized phase, leaving in 1878. James Speed took over from him in 1879, remaining for four years, while two men, a crucible-maker and a glass-engraver and cutter, were each employed for different lengths of time between 1877 and 1882.

### 3. Why did Japan want western-type glassmaking?

For more than two centuries Japan had been closed to the rest of the world, a feudal society with a simple economy. The forced opening of the country by western powers in the 1850s exposed the Japanese people to everything that the industrial revolution had to offer. A political revolution followed, bringing in the Meiji government from 1868 and a program of very rapid modernisation. In a great desire for everything western, a large delegation of Meiji government officials - the Iwakura Mission - set out for America, Britain and Europe in 1871 to investigate and learn from not only western political, economic and educational institutions but also several specific industries. One of those was window glassmaking.

As the Mission was to comment after its return home nearly two years later, glass in Japan was revered; it was believed to be too costly for ordinary use and too expensive to manufacture, whereas in the West glass was used 'even in the cottage of the poorest farm labourer'.<sup>(3)</sup> Japanese tables were laid with pottery not glass, and building construction was too flimsy to take windows. Much Japanese glassmaking was limited to high status craft objects such as beads. After studying glassmaking in various western factories, the Iwakura Mission argued that it would be perfectly possible to make glass economically at home; certainly it was desirable, they said, because dependence on glass imports was damaging

the economy.<sup>(4)</sup> Between 1868 and 1873 sheet glass imports had multiplied tenfold.<sup>(5)</sup>

Meanwhile, many western-style buildings were being constructed across Japan using brick and window glass, for example railway stations, factories and civic buildings. British architect-engineer Thomas J. Waters was leading the way with prestigious developments such as the Osaka Mint of 1869 and the Ginza reconstruction of 1872. He gave instruction in brick manufacture and used large amounts of imported window glass (which would have often arrived broken). He must have had many conversations with western and Japanese people about how the country desperately needed its own window glass factory.

Flint glass manufacture was also desired by this rapidly westernizing country - scientific and optical glass, domestic items for the table or for lighting, and particularly red signal glass for ships.

### 4. Preparations

It was probably towards the end of 1872 that the two principal founders of Japan's first window glass factory began to make their plans, having heard about sheet glassmaking from British mining engineer Erasmus H.M. Gower. Murai Miyonosuke and Niwa Masatsune were the household stewards of an important court family, that of Prince Sanjo who held a top position in the Meiji government. They asked Gower to write to England for estimates and drawings through the British international trader Jardine Matheson & Co at its Yokohama office, asking the latter to act as brokers for the company. Then with Sanjo's backing, capital was raised from local British financiers and a company prospectus was drawn up.<sup>(2)</sup>

However, sheet glass was technically difficult to manufacture; even for an experienced glassblower, the manipulation of the large cylinder was difficult and it was only with great skill, from years of practice, that imperfections could be avoided. Jardine Matheson's associates in London replied to Gower's request that, in the opinion of their 'qualified informants' in St Helens, the scheme as proposed was impossible.<sup>(6)</sup> The time it would take to train Japanese glassblowers would cost the new company a great deal of money, more than the London associates believed could possibly be available for the project. London warned its Yokohama associates against involvement in such 'questionable transactions'.<sup>(7)</sup>

But Kogyosha's investors were not to be put off;

<sup>3</sup> Although the volumes were not published until 1878, after Kogyosha had failed, the Iwakura Mission's findings and opinions were probably known and debated in Japan from the date of its return home in early 1873. They must have been discussed in political circles and reported in the newspapers.

they engaged Waters to design a glasshouse<sup>4</sup> and Gower to find domestic sources of quartz and silica.<sup>(5)</sup> In April 1873 Waters went to England where it appears he spent time with his uncle Albert Robinson, a civil engineer, sourcing machinery, firebricks, fireclay and castings which were soon shipped to Yokohama through Bristol. It may have been they who engaged the first British instructor: a founding company document dated August 1873 included the name Thomas Walton.<sup>(2)</sup>

## 5. Thomas Walton's appointment

Although according to his contract Walton was appointed as a 'glass manufacturer' at Japan's first window glass plant, British records show him, like all four of the foreign assistants, to be firmly embedded in *flint* glassmaking, quite a different branch of the industry. Extensive research into his family history shows no link with any type of window glass, even though the Waltons had made or manufactured glass across Britain since at least 1800. Working under his father and uncles in several different family owned factories, through several bankruptcies and fresh starts, he must have obtained much experience of the management of glasshouses. By his own later account of himself, he knew about constructing furnaces.<sup>(10)</sup> It must have been this knowledge and his wide experience which made him suitable for Shinagawa. Moreover, by the 1870s, as a resident of Manchester with its thriving flint glass industry,<sup>5</sup> he would have been familiar with the latest techniques and furnaces. Besides, flint glassmaking was probably already being considered for a later stage of the Kogyosha glassworks.

But there may have been another reason why he, rather than a *sheet* glass maker or manufacturer, was selected. Japan wanted to modernise but not under the control of any imperialistic nation. It was only too aware of the damage inflicted on its neighbour China by European countries and so it was looking for independent experts, people who would be free to work in Japan for a few years on short, strict contracts and then return home. So although the Iwakura Mission made very close enquiries with companies like Chance Brothers near Birmingham,<sup>(3)</sup> it is unlikely that big glassmakers were invited to invest directly or to send a team of their own employees. In any case, such companies were probably too busy researching and improving at home to want to take manufacturing risks abroad, or to spare any of their own much-prized, highly skilled workers.

Under these circumstances Walton would have

been ideal - independent, knowing how to run a modest glassworks and construct and maintain furnaces, and happy to give instruction then return home again. His brothers and cousins could keep the Walton glass factories in hand while he was away.<sup>6</sup> There is even evidence to suggest that the family assisted with items required at Shinagawa;<sup>7</sup> certainly the family knew Speed, the man who followed on from Walton in Japan. Speed had been a manager at one of their Scottish flint glass enterprises.<sup>8</sup> Thomas Walton may have recommended him to the Japanese.

However, it seems inconceivable that either Walton or Speed, as supervisors and instructors of *sheet* glassmaking in Japan but yet from *flint* glass backgrounds, would have left home without appropriate experience. The birth records of Speed's children show that he moved from Scotland to near Chance's factory early in 1873 and remained there until 1879. Perhaps as a result of Chance's 1872 meeting with the Iwakura Mission, the company agreed to provide some instruction. Shortly after Speed's arrival in Japan a local newspaper reported that he was 'more sophisticated in terms of manufacturing technique than his predecessor'.<sup>(11)</sup> It is possible that Chance gave him some thorough experience. Speed was living close to Chance's factory for six or seven years before going to Japan, whereas Walton had a much shorter time to prepare, whether in Lancashire or elsewhere. Research in Chance Brothers' archives may help to resolve issues about the recruitment and training of both Speed and Walton.

## 6. Start-up, nationalisation and closure

By the time Walton arrived in Japan in September 1874, the sheet glasshouse designed by Waters was underway but incomplete. He had to confront many serious issues with crucibles and ventilation. On top of this he suffered great personal loss when his wife and five young children were drowned at sea en route to join him in 1875.<sup>9</sup> The start of manufacture was delayed until nearly a year after his arrival, during which time Walton constructed a small sheet glass furnace. Records describe it as rectangular, direct-combustion and set with six pots, capacity 240 kg each.<sup>(1)</sup> It is the only furnace found in the archives

<sup>4</sup>In fact while he was away, the family's most successful and long-lasting flint glassworks was established in Newton-le-Willows near Manchester by his brother Richard. They ran it together after Thomas's return, only closing in 1903. For the history of this company, see the forum on <http://newton-le-willows.com>.

<sup>7</sup>Jardine Matheson's Journal shows a payment of £200.00 sent to London for R. Walton in October 1875.<sup>(9)</sup> Thomas had a brother Richard Walton, and a cousin Richard Walton, both glass manufacturers in Lancashire.

<sup>8</sup>The West Lothian Flint Glass Works at Bathgate, Scotland, was operated by the Waltons from at least 1871 to at least 1874. Speed worked there from about 1867-1872.

<sup>9</sup>Early on the morning of 22nd February 1875, the fast China liner SS. Hong Kong hit a rock off Socotra near the Horn of Africa. Although many of the passengers were saved as the ship foundered, Jane Walton and her five young children drowned when their lifeboat capsized.<sup>(12)</sup>

<sup>4</sup>Waters' role in the design of this glasshouse is not always acknowledged but Jardine Matheson's accounts prove his involvement with Kogyosha.<sup>(8)</sup>  
<sup>5</sup>Although window glass was never made in Manchester itself, flint glassmaking was very important. All kinds of domestic and industrial items were made, including ships' signal glass which was wanted in Japan.

so far, but its size probably fits with the modest production estimates given in Kogyosha's company prospectus – 180 kg per week.<sup>(2)</sup>

Exactly how sheet manufacture proceeded over the next year does not seem to have been recorded but there can be no doubt that it proved too difficult. The company incurred some very large debts and had to be sold. Prince Sanjo, apparently unaware of the extent of the problems, was personally and politically embarrassed by its failure. The government bought the glassworks in 1876 in a bid to save his reputation,<sup>(2)</sup> but also because by now it was adopting a policy of fostering certain key industries. Coming under the direction of the Ministry of Industry and re-named the Shinagawa Glass Works, the project was recapitalised and its purpose modified. Now, in addition to sheet, the factory was to make flint glass and to instruct Japanese glassmakers in a range of western techniques.

Walton stayed on for a further two years, constructing a flint furnace in a second glasshouse, for ships' signal glass and a variety of flint ware. He went home in 1878. Elijah Skidmore of Stourbridge (crucible maker), Speed of Scotland (flint glassmaker) and Hauptman of Newcastle Upon Tyne (Bohemian glass engraver and cutter) were engaged in overlapping phases from 1877 onwards, all to provide instruction. In 1880 Shinagawa had seventy-five apprentices;<sup>(2)</sup> at Japan's Second Industrial Exposition in 1881 it displayed 268 items including chimneys, bottles, domestic tableware and scientific apparatus.<sup>(1)</sup>

But sheet glass, revived under Speed with new furnaces built in 1881,<sup>(5)</sup> continued to fail. In the absence of sheet glass profits, flint glass could not bring in sufficient revenue to make the glassworks viable, even though ships' signal glass was a success. By the closure of the government's plant in 1883, all the British men had left.

## 7. Shinagawa veterans

British glassmaking influence passed to a small private flint glassworks in Osaka. This was popularly known as 'Little Shinagawa' because it employed many Shinagawa veterans including Speed's student Shimada (see Figure 1). Skidmore taught there for at least a year before returning home, and Speed too, although for a shorter time.

Shimada went on to found a glassmaking business in Osaka which stayed in his family for three generations; he had some brief success with sheet glass. The modern company Toyo-Sasaki Glass<sup>(13)</sup> traces its history back to Shimada and Speed's instruction. Iwaki Tasujiro, another Shinagawa trainee, also had some short-lived success with sheet glass when he bought the Shinagawa glassworks in 1900, but he found it far too expensive to produce.

Japan's first viable sheet glass factory was estab-

lished by Iwasaki Toshiya, an associate of Shimada. With Belgian expertise, he founded Asahi Glass not far from Osaka; by 1910 production was at 4% of domestic glass needs.<sup>(5)</sup> Japan's modern sheet glass industry was born at last.

## 8. Why did sheet glass manufacture at Shinagawa fail?

There are several possible reasons for the failure to produce sheet glass at Shinagawa, amongst them perhaps being the curious design of the sheet glasshouse, seen in Figure 2. In Britain by this date the traditional brick cone, in use since the 18th century, had been abandoned. From about 1850 new glasshouses had been built in a rectangular shape, often similar to the second (flint) glasshouse constructed at Shinagawa, seen as the left of the two buildings in Figure 3.

In the opinion of Professor Neil Jackson, historian of British architecture and its influence upon Japan, this 'polygonal building with a centrally-placed chimney, a segmental, two-tiered pitched roof and a louvred clerestorey', composed entirely of 'flat planes and straight lines' might have been a design compromise between what inexperienced Japanese brick makers and bricklayers could manage, and the traditional circular cone.<sup>(14)</sup>

In contrast, the second (flint) glasshouse which was finished only two years later was a very different, much more pragmatic construction. Part of it can be seen in Figure 3, the left of the two buildings. Its rectangular shape, much more in keeping with contemporary new glasshouses in Britain, would not have been particularly difficult for immature Japanese building skills.

This paper proposes that the unusual and attractive appearance of Waters' sheet glasshouse suggests the hand of an architect who had been commissioned to produce something impressive, and who had been paid well to do it.<sup>10</sup> Perhaps Waters' striking design reflects some of his and the nation's great zeal for modernisation. The image at Figure 2 is one example of many tourist photographs sold in the early Meiji period to advertise Japan's leap forward.<sup>11</sup> Furthermore, the full photograph is clearly as much about the railway line as it is the glassworks, setting the latter a few hundred meters in the distance. This was the newly constructed line from Tokyo to Yokohama of which Japan would then have been very proud.

But there may have been flaws in Waters' design, highlighted perhaps by the difficulties which Walton is known to have had with ventilation. The chimney does not appear to be big enough to provide suf-

<sup>10</sup> Amongst the first few of Jardine Matheson's transactions on behalf of the glassworks is an unspecified payment of \$2,436.55 to Waters in January 1874.<sup>(6)</sup>

<sup>11</sup> It appeared in an album entitled 'Photographic album of the landmarks in Tokyo, the Great Japan'.

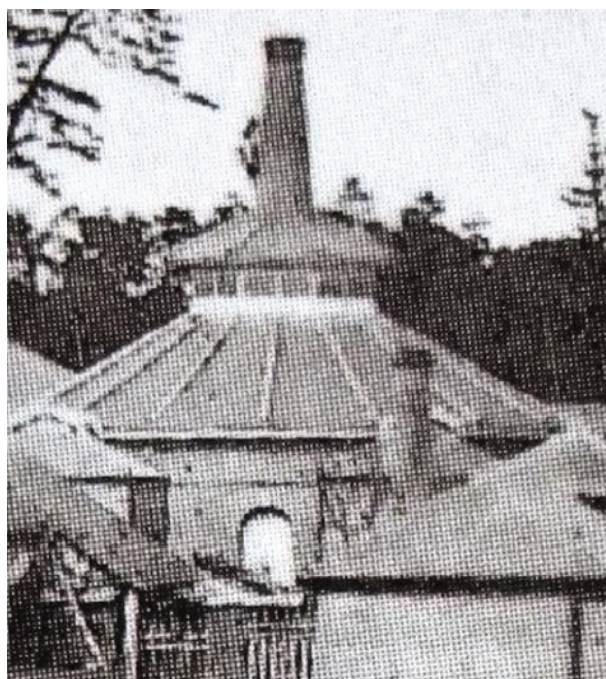


Figure 2. The Shinagawa Glass Works beside the new railway line from Tokyo to Yokohama (the Tōkaidō line) about 1881, with detail showing the sheet glasshouse designed by Thomas J. Waters. The flint glasshouse is to its left at the back of the site. 'Dai-Nippon Zenkoku Meisho Ichiran Shashin-Cho' (Photographic Album or Collection of Japanese Views) Reprinted by courtesy of Ozawa Takeshi

efficient draught, perhaps making it difficult to work the furnace successfully.

### 9. Conclusion: pride, prestige, failure and success

Pride in a factory building is not enough to bring about manufacturing success. Sheet glass was difficult to make and a relatively new technology in



Figure 3. Glasshouse buildings photographed in 1962, just before demolition. The flint glasshouse is the left of the two buildings. In 1877 it had a chimney which was 24 m in height, with a diameter of 6.6 m at the base and 2.42 m at the top. (This chimney is visible in the full photograph in Figure 2.) The ventilation on the roofs here may be a 20th century addition. Reprinted by courtesy of Meijimura Museum

the West. As Niwa and Murai were advised from St Helens at the beginning, its manufacture was very costly to establish because of the amount of training workers would require.<sup>12</sup> It must be remembered that this type of sheet glass was made without machinery so a great deal of manual skill and experience was required. As Chaiklin says when discussing the development of Japanese glassmaking, it was not until later, when the process of glassmaking was shifted from hand to machine, that the country's glass industry gained any momentum.<sup>(5)</sup>

Chaiklin comments elsewhere that 'Glass production was...a vital part of the new face the Meiji Government wished to present to the world'.<sup>(15)</sup> The history of sheet glass at Shinagawa outlined in this paper hints at how expensive that new face was. Waters' state-of-the-art glasshouse design, fit for Japan's new era, was impressive in appearance but possibly costly to build and it may not have functioned as well as it might. However, although Kogyosha's founders may in this, and other ways, have acted incautiously in the pursuit of profit, the time required rapid thinking, innovation and risk.

Industrial enterprise, whether it is private or nationalised, is always a gamble; all the more so for a new nation. But starting out with the help of Brit-

<sup>12</sup> Jardine Matheson's London associates reported that '...even in this country three or four years are required for... [the] instruction [of sheet glassblowers]. The making of the pots is a most tedious operation requiring months of labour and special skill and even after getting out all the plant, it would probably take a year to set up the works before Glass could be manufactured.'<sup>(6)</sup>

ish and other western expertise, the Japanese glass industry overcame its problems in a remarkably short time. Forty years after the first idea for the glassworks at Shinagawa, it had transformed itself from a small, high value and craft based industry to a full-scale one which used industrial techniques to mass produce affordable glass for homes, shipping, industry and building construction.

The glassworks at Shinagawa played a very important role in this development. The four British instructors helped to give Japan its first concerted taste of a western-style industrial glass factory and they transmitted skills which would be important for the subsequent development of all sectors of the country's modern glass industry. That industry became so strong that in recent years one of Japan's major companies was able to buy Pilkington, by then a global leader in flat glass; Nippon Sheet Glass bought the St Helens company in 2006 in a bid to engage in the international market. But the British glass industry still had something it could offer Japan. NSG appointed Pilkington's chief executive Stuart Chambers to assist its transition into world wide production. Interviewed by the Liverpool Daily Post before leaving for his new post in Tokyo, Chambers unconsciously echoed the work of the four British glassmakers who went to Japan 'to larn 'em' nearly one hundred and thirty years earlier - he said he was going 'to teach the St Helens way of business in the Land of the Rising Sun'.<sup>(16)</sup>

### Acknowledgements

The author would like to thank Roger Dodsworth of Broadfield House glass museum in Stourbridge

for his introduction to Akiko Inoue Osumi of Tokyo, and Akiko herself for her painstaking study of Japanese archives. Thanks are also due to Dr Meg Viviers of Armidale, New South Wales, Australia for information on the Waters family and to Professor Neil Jackson of Liverpool for his advice on the glassworks' buildings.

### References

1. Inoue, A. British influence on the Shinagawa Glassworks - Japan's first industrial glass factory. *Ann. 16th Congr., AIHV*, London 2003.
2. Inoue, A. Kogyosha and Shinagawa Glassworks (1) - The Establishment of the First Western-style Glassworks in Japan. *Glass, J. Assoc. Glass Art Stud.*, 2009, **53**, 10-31.
3. *The Iwakura Embassy 1871-73*. The Japan Documents 2002, **Vol. II**, 155.
4. *The Iwakura Embassy 1871-73*. The Japan Documents 2002, **Vol. III**, 194-5.
5. Chaiklin, M. A Miracle of industry: the struggle to produce sheet glass in modernising Japan. *Building a Modern Japan: Science, Technology and Medicine in the Meiji Era and Beyond*. Edited by M. Low, Basingstoke, 2005, pp. 161-81.
6. JM/B6/10, letter No. 13940, Jardine Matheson archive, University of Cambridge.
7. *Ibid*, letters No. 10 and 14.
8. JM/A2/81, *Jardine Matheson & Co. Journal*, May 1870-April 1874, Jardine Matheson archive, University of Cambridge.
9. JM/A2/82-83, *Jardine Matheson & Co. Journal*, May 1874-Sept 1876, Jardine Matheson archive, University of Cambridge.
10. *Newton-in-Makerfield: Its History with Some Account of Its People*. Edited by J. H. Lane, Newton-le-Willows, 1916, **Vol. 2**, 163.
11. *Japan Weekly Mail*, 12 Sept. 1874, p.739.
12. *The Times*, London, 27 Feb. 1875.
13. <http://www.sasaki.co.jp/e/company/history.html>, accessed 20 August 2011.
14. Jackson, N. Thomas James Waters (1842-1898): Bibles and Bricks in Bakumatsu and Early-Meiji Japan. In *Britain and Japan: Biographical Portraits*. Edited by H. Cortazzi, Global Oriental, 2010, **Vol. VII**, 469-86.
15. Chaiklin, M. *A World Without Windows: Glass Production in the Modernization of Meiji Japan*. Association of Asian Studies Annual Conference, New York, 27-30 Mar. 2003.
16. *Liverpool Daily Post*, 28th May 2008.