Specialist Tools for Sash Window Making

From its first appearance towards the end of the 17th century right up to the present day, sash windows have been used in every sort of building. A walk round any British village, town or city makes clear the quantity of sash windows that have been manufactured over the last three centuries. For instance, in Bath alone in the period between 1720 and 1820, a rough calculation suggests that around 60,000 sashes were made (three for every working day!)

In order for a sash window to work easily and effectively, it is important that both the frame and the sash are made accurately. But also, in the days when workmen were paid by piece work, speed was of the essence.

When researching the history of the methods of making of sash windows, contemporary written sources such as Nicholson’s Practical Builder and Skaife’s Key to Civil Architecture are invaluable but there is another resource that it often overlooked – the tools that were used. Many tools still survive from the 18th century and many more changed little in form or use over the next 150 years; the study of these can give a detailed insight into how sash windows were made by hand.

Although from the late years of the 18th century, there were attempts to develop a variety of woodworking machinery, until the early years of the 20th century, the majority of sash windows were still made by hand. So it is not surprising that specialist tools were developed to assist in the making.

A sash window consists of two main parts, the cased frame or box and the sash itself. A third element, window shutters, is sometimes added but not necessarily and is not included in the scope of this article.

Making the frame or box

The construction of the sash frame is relatively simple with little in the way of joints and the majority of the tools used would have been those found in any joiner’s kit. Thomas Skaife, writing in 1774, states that “sash frames are a part of the business easily understood, and require but little merit in the execution.” though he does draw attention to the need to position the pulley block within 3 inches of the top or there will not be sufficient height for the weights.

The most complicated work in making the sash box is cutting out the sash pocket in the pulley stiles, through which the weights are reached. It is necessary to make both transverse and longitudinal cuts in a position that cannot be reached with general tools. A special chisel – the sash pocket chisel – was developed for this job, though the exact way it was intended to be used is still a matter of speculation. The basic use was to cut the fibres at the end of the pocket that could not be reached by a saw but it could also have been used for making the longitudinal cut at the side of the pocket. Sash pocket chisels come in two types, with a thick blade or with a thin. As with many tools, by the 19th century manufacturers were experimenting with improvements, and the sash pocket chisel was no exception. Ed. Preston & Sons (Birmingham, 1825–1934) produced an interchangeable blade version, first advertised in his 1914 catalogue as a “new form ... supplied with three different sizes of cutter blades…”

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3 Skaife, Thomas. A Key to Civil Architecture or the Universal British Builder. London, 1774
5 Skaife, Thomas. Ibid
6 The dates given in each case for toolmakers are the known working dates of the company.
Making the sash bars

In the earliest windows, up to the 1740s, the bars had sizeable ovolo profiles and were typically 1½" or even 2" wide. Making bars of this size presented less of a problem than the later thinner bars and there is no evidence of specialist tools prior to this date. The rebate would have been cut with a moving or standing fillister and the ovolo cut with a moulding plane that might well have also been used in other more general purpose joinery.

However, the difficulties of making the bars became more acute as fashion dictated thinner and thinner bars, which ultimately reached as little as 3/4" by the end of the 18th century and even as slender as 5/8" by the early years of the 19th century. The shaping and jointing of pieces of wood which were in general much thinner than those normally worked for such items as doors and panelling required specialist tools that enabled a speedy and accurate result for the joiner.

With the advent of the astragal and hollow mould in the 1760s, sash planes start to appear. It is difficult to cut this mould using the traditional hollows and rounds and the need for specialist planes became paramount.

Sticking boards

There were three methods of making the bars but one problem common to all was holding the bar whilst cutting. All evidence suggests that the bars and frames were made in short lengths – bars no longer than three feet or so were needed to make a sash. And as the different cuts are made, the bar becomes progressively more difficult to hold. The answer to this problem is the sticking board, the name derived from the traditional term for cutting or “sticking” a moulding.

The board would have been made by the craftsman out of whatever wood was to hand and would have been considered expendable; consequently virtually no provenanced sticking boards have been found. The only one that has an 18th century provenance that I am aware of is an American board found in the workshop of Samuel Wing, a cabinet and chair maker and carpenter of Sandwich, Massachusetts, which dates from around 1795 to 1810.

Fig. 2. Sticking board from Samuel Wing’s workshop. (Illustration courtesy of Old Sturbridge Village, MA.)

Designs for sticking boards were occasionally published in woodworking books and magazines; one example can be found in George Ellis’s Modern Practical Joinery.

Fig. 3. Design for a sticking board from Ellis’s Modern Practical Joinery.

Cutting the bars

The three ways in which a bar could be cut were the four cut method, the three cut method and the two cut method. Each required the use a different type of sticking board and a different specialist plane or planes.

The four cut method

Each bar is formed by four separate operations, two cuts to form the glazing rebate and two cuts to form the moulding. That sash planes were being produced to cut bars by this method throughout

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8 Ellis, George. Modern Practical Joinery. London, 1902
the period makes it clear that it remained in use during the whole time that sash windows were made by hand.

The sticking board used to make bars by this method had two separate positions, one to hold the bar whilst cutting the rebates and the other to hold the rebated bar whilst it is moulded.

Fig. 4. The first rebate for the glazing is cut using a sash fillister plane.

Fig. 5. The second rebate for the glazing cut with a sash fillister plane

The first two cuts for the glazing rebates are made using a sash fillister. This plane, developed about 1770, has a fence on arms to guide the plane from the inside edge of the sash bar (the edge that will be moulded). The bar is held in the outer position of the sticking board.

Fig. 6. A sash fillister by John Green (York, 1768–1808).

Fig. 7. Using a sash fillister plane. This plane by Greenslade (Bristol, 1828–1937) dates from the mid to late 19th century. It differs little from planes of an earlier date, the main differences being that it now has a nicker iron to prevent the wood tearing, the depth stop is mounted on the outside of the plane and the stems are capped with brass. Later versions sometimes also had an integral handle.

After cutting the rebates the bar is then moved to the inner position of the sticking board where it is held by slotting the glazing rebate into the recess. The moulding can then be cut using a sash plane. Sash planes are designed to be used with “spring”, that is, they are held at an angle to the work. The exact angle is often marked in the heel of the plane by a pair of right-angle intersecting scribed lines.

Fig. 8. The moulding is then “stuck” on one side of the bar with a sash plane. The bar is then turned over and the moulding stuck on the other side.

Fig. 9 right. A pair of sash planes by Christopher Gabriel (London, 1770–1822). From 1775 it became
normal to supply sash planes in pairs. There has been much debate about the reason; the most likely explanation is that one is set coarse for the major portion of the work with the No. 2 plane set fine for the finishing cut. The planes are marked 1 & 2 on the heel. This pair is also marked 5. This is an indication that it was intended to work on a 5/8” stock.

Fig. 10. Sticking a moulding.

The three cut method
Around 1800 edge-cutting astragal and hollow planes appeared, although the rebates were still cut using the sash fillister. These are two, three, or even sometimes four-ironed planes which cut down from the edge of the bar. With this method, although it is still necessary to hold the bar in a sticking board whilst cutting the glazing rebates, sticking the moulding can be carried out with the bar held in an ordinary bench vice.

Fig. 11. A twin-iron plane by Moir & Co. (Glasgow, 1836–75); a three-iron plane by Minzies (Glasgow, 1811–16); a four-iron plane by Nelson (London, 1805–52).

However, although in theory this method should be labour saving, with one cut replacing two, the difficulty of setting the irons with sufficient accuracy was considerable and as a normal type of sash plane was still needed for the rails and stiles, they did not appear to catch on and are not common. The majority of those known are by Scottish makers.

Fig. 12. Sticking the astragal and hollow moulding using and edge cutting plane held in a bench vice.

The two cut method
An alternative and possibly quicker method is to cut the mould and the rebate in one operation, working from the side of the bar. The plane used for this method is a stick & rebate plane and the
bar to be moulded is held in a sticking board with one holding position that is square to hold the bar for the first cut and one that has been profiled to fit the mould to hold the bar for the second cut. A favoured method in America, the Samuel Wing sticking board is of this type.

Fig. 13. The Samuel Wing sticking board showing the profiled holding position. (Illustration courtesy of Old Sturbridge Village, MA.)

Judged by the number of planes surviving it was not as popular in Great Britain, but not withstanding, many of the plane maker’s catalogues of the late 19th and early 20th century, such as Ed. Preston & Sons of Birmingham, Wm. Marples of Sheffield and Alex. Mathieson of Glasgow, list stick and rebate planes. An adjustable, or regulating, stick and rebate plane, which gives some variation in the size of the bar, was also available, though this too was more common in America that in Great Britain. These planes are made with two separate stocks held together with either metal or turned wooden screws.

Fig. 14. A pair of stick and rebate planes by Moir (Glasgow 1836–75) marked 1 and 2 and also 5/8 on the heel and an adjustable stick and rebate plane by Greenslade (Bristol, 1828–1937). This plane is also marked “Exhibition Medals, London, Dublin, Paris & Melbourne.” The Paris Exhibition was held in 1890 (the latest of these four) so this plane must date from after that date.

Scottish practice

There are two planes that are used only in 19th century Scottish practice. The glass check plough cuts both rebates at once, from the back edge of the bar. The surviving planes all date from the latter half of the century.

The other is the counter check plane. This is a moulding plane, usually with an adjustable fence, which cuts a tapering rebate in the meeting rails. This development gives a tighter and more weatherproof join between the two meeting rails, a reflection perhaps of the conditions to be found in Scotland.
Curved work

Windows with arched tops or bow fronted windows required their own specialist tools. Until around the mid-19th century, arch top sash windows were made used compassed moulding planes. Although planes continued in use after this date they were frequently replaced by sash shaves, the earlier made of wood, but from the 1880s onwards, metal shaves were more common. The advantage of a shave is that both right and left hand profiles can be included enabling the user to always work with the grain. They can also be used for a wider range of radii.

Fig. 17. Left: A counter check plane by D. Malloch & Son (Perth 1878–1913). Right: a glass check plough by Moir (Glasgow 1836–75).

Fig. 18 A pair of radiussed sash planes for curved work by John J. Harley (Liverpool, 1875–1922) and a boxwood sash shave by Chapple (Manchester, 1876–1881) with a blade that is sharpened on both sides to enable it to be used in either direction.

Fig. 19. Preston’s Improved Circular Sash Shave router from the 1909 Preston catalogue.

By the late 19th century, all the major plane makers were offering a wide variety of sash plane profiles and the other sash making planes, as can be seen from these extracts from the 1879 catalogue of Varvill & Sons of York and the 1899 catalogue of Alex. Mathieson & Sons of Glasgow.

Fig. 20. Sash plane profiles offered by Varvill & Sons (York, 1793-1904) in their 1879 catalogue.
Jointing the bars

Having formed the sash bar, the next process was assembling the sash. Not only do the sash bars have to be jointed to the stiles and rails, but they also have to be jointed at their intersections. Glass is a heavy material and sliding the sashes up and down also puts a strain on the joints. One of the more complex problems was to produce satisfactory joints between the elements. This in turn generated a number of specialist tools to simplify and speed this job.

There were three ways by which profiled bars could be jointed but one of these, the mason’s mitre, was seldom used in woodwork so only mitring and scribing will be discussed here.

Mitring

Of these two methods, this is the preferred as the bar is held from twisting. It is the method described by Skaife and by Nicholson. The mitre can be square, which is suitable for use with an ovolo mould, which has a flat at the apex, or it can be canted, i.e. tapered, back from the point of the bar, the type of mitre shown by Nicholson.

Scribing

The alternative method was that of scribing one member over another. It is most appropriate for use on ovolo moulded bars of reasonable thickness as these have sufficient depth not to rotate.

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9 Skaife, Thomas. Ibid
10 Nicholson, Peter. Ibid
scribing gouge, which has the handle extended to form a stop.

Fig. 25. A pair of ovolo sash planes with matching templet by C. Nurse & Co. Ltd., (London 1887-1937)

These are good quality templets as they have brass reinforcing at the ends. By the mid-19th century, sash planes were often supplied with matching templets.

To speed up the scribing method, a sash scribing plane could be used. These are reasonably common and could be used in a number of ways. The ends of a board could be profiled before being sawn up into the required width before the bars were moulded; alternatively, a group of moulded bars would be clamped together and the plane used to scribe the whole group together; or it could have been used in conjunction with a sash templet.

Fig. 26. A mitre templet held with a cramp ready for mitring as shown in Ellis².

Fig. 27. Two sash scribing templets with a sash scribing gouge. The “U” shaped templet is for use on the bars and the “L” shaped templet for use on stiles and rails.

Fig. 28. Diagram of a sash scribing plane in use on a moulded bar.

Fig. 29. A sash scribing plane by G. H. Buck (London, 1852-72)

² Ellis, George. *Ibid*
Reinforcing the joint

Whichever form of joint was used, traditionally it would be located and reinforced with a dowel. A specialist jig, known as a sash dowelling box, was frequently used to assist in this. For reasons not established, very few sash dowelling boxes were made commercially and it seems to have been an area where the sash window makers let their imagination run riot. There are numerous different designs and the majority are well made and finished, often of hardwood and with a variety of means of holding the bar.

Fig. 30. Three sash dowelling boxes of different designs.
A sash dowelling bit, a long, small diameter bit frequently sold with a square brass collar, was used with the sash dowelling box. These bits can be identified from standard bits by the square shoulder at the tang.

Fig. 31. A sash dowelling bit in use with a sash dowelling box.

Jointing to stiles and rails

The bars were jointed to the stiles and rails using a small mortice with a corresponding tenon in the bar. These mortices were smaller than those normally employed in carpentry and therefore required a specialised sash mortice chisel which is a narrow, medium weight chisel. The Ward & Payne catalogue of 1911\(^3\) lists ten sizes of sash mortice chisels from 1/8” to 3/4” in two qualities, cast steel best quality and London pattern with solid bolsters.

Other tools

A number of other tools were used in the making of sash windows, some exclusively for this work and some that are used in general joinery work.

Fig. 32. A sash mortice chisel by Ward, Sheffield, with a sash square by Moulson Bros., Sheffield.

Those in general use included mortice gauges, for marking both the mortice and the tenon before cutting, dowel plates (steel plates with holes of various sizes through which roughly sized dowels could be drawn so that the size exactly matched the hole formed by the sash dowelling bit) and draw bore pins, a round tapered steel pin used to “draw up”, i.e. tighten, mortice and tenon joints.

Sash square: A small brass and steel square used for setting out the mortices. After 1914, sash squares no longer appear in the tool manufacturer’s catalogues.

Sash saw: A back saw, slightly smaller than a tenon saw, listed in Smith’s Key\(^4\) in 1816 which gives the size as 14” and by Holtzapffel in Turning and Mechanical Manipulation, published in 1846\(^5\) who gives the size as 14”-16”, used for cutting tenons.

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\(^3\) Ward & Payne Illustrated Catalogue of Edge Tools, Spades, Shovels, etc. Sheffield, 1911
\(^4\) Smith, Joseph. Explanation or Key to the Various Manufactories of Sheffield. Sheffield 1816.
Cill plane: This is a plane the use of which is frequently misunderstood and mis-described. It forms the anti-capillary groove found at the angle between the sloping cill and the upstand in good quality timber cills. Even in the 18th century the need for this groove was well known and it is clearly shown in Nicholson\(^\text{16}\). To cut this groove without the use of a cill plane would be difficult.

Cill planes, like sash dowelling boxes, are frequently craftsman-made and so there is a wide variety of designs but the main characteristic is that the iron and wedge are set into a recess cut into the flat side of the plane. The plane cuts only at the nose and is only capable of cutting a small (approx. ¼") half-round. Occasionally versions are found with two irons set in opposite directions.

Commercially made versions are rare though two London firms are known to have produced these planes, C. Nurse & Co. and Colliers of Brixton, around 1900. Colliers gave their plane by the alternative name, “throating” plane.

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\(^{16}\) Nicholson, Peter. *Ibid*

\(^{17}\) Nicholson, Peter. *Ibid*
Fig. 36. Diagram of a Nurse style cill plane in use.

**Conclusion**

To make sash windows quickly and accurately needed specialist tools and from 1700 onwards the ever increasing demand for windows meant that these tools were developed. A study of the tools themselves and how they work can be helpful in discovering how the trade was carried out.

The dates of the tools can also be useful in dating the finished product. It is convenient that many tools are marked with the maker’s names, and reference to old catalogues and the specialist books that have been written about tool makers, in the case of planes the standard reference being *British Planemakers from 1700*[^18], can often establish a reasonably accurate date of manufacturer.

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I would like to dedicate this article to my late husband Mark, without whose skill and knowledge I could never have discovered so much about the specialist tools for sash window making.

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