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Indian Institute of Gems & Jewellery
Jaipur

INDIAN INSTITUTE OF GEMS AND JEWELLERY JAIPUR



Jewellery Manufacturing Tools & Equipment



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Chapter-1

Introduction of Jewelling

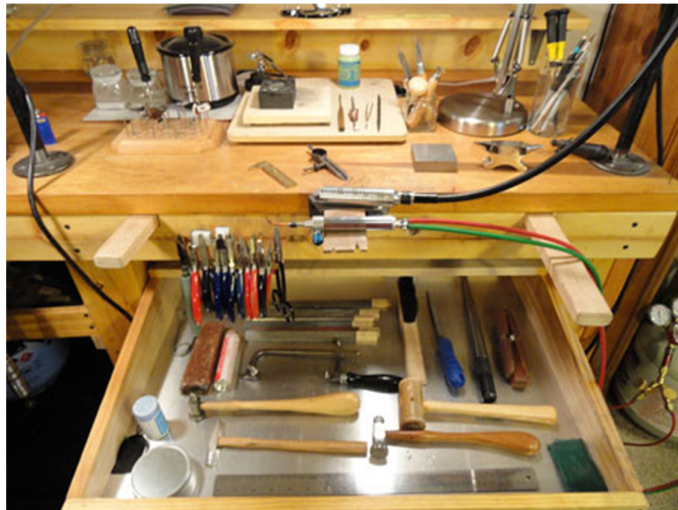
Jewelling

Jewellery consists of small decorative items worn for personal adornment, such as brooches, rings, necklaces, earrings, and bracelets. Jewellery may be attached to the body or the clothes, and the term is restricted to durable ornaments, excluding flowers for example. For many centuries metal, often combined with gemstones, has been the normal material for jewellery, but other materials such as shells and other plant materials may be used.

Jewellery manufacturing process includes most advanced technologies and dedicated research. Jewellery making is a very composite process undergoing a long and slow procedure making it tough from the initial point to concluding point. Each product undergoes a series of procedure before we get the net product as a beautiful jewellery product.

The natural jewellery components (stones, metals and accessories) will undergo multiple processes. Jewellery is unique and involves a lot of time and skill.

Different tools are used at different stages.



Chapter-2

Tool & Equipment

Files

Content

- Files Styles
- Swiss Files
- American Files
- Swiss Needle
- Escapement Files
- Swiss Escapement File Sets
- Riffilers

Files

Filing is an essential technique in jewellery making, and although simple in concept following proven practices combined with the right equipment and tools, ensures the job becomes a breeze.

Filing is used in jewellery making to remove excess metal, even out surfaces, smooth or to shape, form and texture pieces.



File Styles

Full Size Files	4" to 8" cut length (not including tangs). Should be secured in a handle for comfort. Used for removing material from large areas.
Habilis Files	8" to 9" overall length. Handles are thick and shaped for comfort. For in-between jobs, too big for needle files and too small for full size files.
Needle Files	4" to 6" overall length. Handles are knurled or covered with vinyl grips. Used for small surfaces and getting into tight areas.
Escapement Files	5" to 6" overall length. Length of cut is shorter than a typical needle file (1 1/2" to 2 1/2"). Also known as square handle needle files.
Rifflers	6" to 7" overall length. Uniquely shaped, curved profiles with double ends. For getting into tight areas, especially for filing curves.
Silversmith's Rifflers	7" overall length. Slightly larger than standard rifflers. Double ended. Available in a smaller range of shapes and cuts.
Valtitan Files	Available in Full and Needle File sizes. Specially hardened for working with platinum and stainless steel. Yellow tangs for easy identification.

Swiss Precision Files

The world's standard for quality and performance!

Swiss Precision Files are manufactured to precise production standards, using a combination of machine cutting and hand craftsmanship to produce the most accurate, best cutting and longest-lasting files in the world. They are made of the finest heat-tempered, chrome alloy steel and have the "right" feel, action and balance desired by all true craftsmen. Swiss Precision Files deliver superior performance on all metals. Files are measured in length from the point where the teeth begin to the end of the file. The handle section (tang) is not considered in the file length.

1. Barrette

Tapered in width and thickness, coming to a point. Only flat side is double cut, providing safe edge and top.



2. Barrette - Hot Die

Same as regular Barrette files except with ground backs, widely used in making and repairing extrusion dies. Double cut.



3. Checkering Pillar

Parallel in width and gently tapered in thickness. Overcut is parallel to file edges, and upcut is 90° to overcut. Double cut on top and bottom; both edges are safe. Useful for putting serrations on knife edges or for obtaining a checkered design similar to that found on a gun handgrip. Frequently used to create a coarse florentine finish; after initial cut, angle the file 45° or 90° and cut again.



4. Crochet

Tapered in width and gradually tapered in thickness. Used for filing junctions between flat and curved surfaces and for developing slots with rounded edges. Double cut top and bottom - both edges are single cut.



5. Crossing

Half-round on two sides with one side having a slightly larger radius than the other. Tapered in width and thickness. Cut and usable to the point. Used primarily for filing interior curved surfaces. The double radius allows filing at the junction of two curved surfaces or of a straight and curved surface. Double cut on both sides.



6. Equalling

Parallel in width and thickness. Used primarily for filing slots and corners. Double cut top and bottom, both edges are single cut.



7. Half-Round

Tapered in width and thickness, coming to a point. Double cut on both sides.



8. Half-Round Slim - Also known as Half-Round Ring

Tapered in width and thickness, coming to a point. Narrower than regular half-round so that it can be used for filing insides of holes and rings. Double cut on both sides.



9. Hand

Parallel in width and gently tapered in thickness for perfectly flat filing. Double cut top and bottom with one single-cut edge and one safe edge.



10. Knife-Edge

Tapered in width and thickness. Knife edge has the same thickness from point to shoulder. The included angle of the sharp edge is approximately 10° . Generally used to file in a slot or wedge-shaped opening. Curved knife edge allows easy filing in restricted areas. Double cut on both sides; top edge is safe while knife edge is single cut.



11. Pillar, Demi-Narrow

Pillar files are more narrow than hand files, yet also parallel in width and tapered in thickness to create perfectly flat filing. Double cut on the flat sides only, both edges are safe.



12. Pillar, Extra-Narrow

These very narrow files are parallel in width and tapered in thickness to create perfectly flat filing. Double cut on the flat sides only, both edges are safe.



13. Pillar, Narrow

Parallel in width and tapered in thickness. Double cut on the flat sides only, edges are safe.



14. Pillar, Regular

A general-purpose file used primarily for working on flat surfaces. Because pillar files are available in various widths, they are adaptable to filing in slots, keyways, splines and similar areas. Parallel in width and tapered in thickness to provide perfectly flat filing. Double cut top and bottom, both edges are safe.



15. Pippin

Tapered in width and thickness. Combines the cross sections of round and crossing files along with the edge of a knife file. For finish- ing the junction of two different curved surfaces and for opening slots when a "V" shape is required. Double cut on both sides; top and bottom edges are single cut.



16. Round, Parallel

Double cut over the entire surface. The 4" length is available in 1/16" and 1/8" diameters. The 6" length is available in 3/32", 1/8", 5/32" and 3/16" diameters.



17. Round, Tapered

Gradually tapered. Cut and workable to the point. Used where it is necessary to enlarge a hole or round off a radius. Double cut.



18. Square

Gradually tapered and double cut on all four sides. Cut and usable to the point. A general-purpose file.



19. Three-Square

Triangular profile. Gradually tapered, and cut workable to the point. Double cut on all three sides.



20. Warding

Parallel in thickness and tapered in width. Good for deburring. Double cut top and bottom, both edges are single cut.



American Files

Extremely durable and scientifically balanced, each file is the product of a long tradition of superior craftsmanship combined with the most advanced technology. Every file is heat-treated to exacting standards to provide top performance and long life. Files are unsurpassed in accuracy of shape and size. Handle section (tang) is not considered in file length.

1. Flat (End Tapered)

Universally used by all machinists, this file is recommended for fast stock removal where a smooth finish is not required. Double cut top and bottom; edges are single cut. Differs from the mill file in that it has a thicker cross section.



2. Half-Round

In addition to being widely used by machinists, this file is also popular in foundries where castings must be finished by filing. Rounded to approximately a third of a round on one side and double cut flat on the other. The round side is double cut as well except on all smooth and 6" second cut, which are single cut.



3. Hand

Similar to a flat file but tapered in thickness with one safe edge. This uncut edge allows filing of one surface without damaging an adjoining surface. Especially useful when filing up to a sharp corners. Double cut top and bottom. One edge single, the other is safe.



4. Mill

Used in machine shops as a general-purpose file and for draw filing, lathe work and finishing operations on hard materials. Often used in conjunction with a flat or hand file as a finishing file after the "hogging off" operation. Double cut on top and bottom, both edges are single cut.



5. Round

Designed for filing concave surfaces that have a smaller radius than a half-round file, enlarging round holes and making a corner radius. Tapered file is double cut.



6. Square

Perfectly square tapering toward the point. Used for enlarging slots, keyways, grooves and holes that have right angles and for filing flat surfaces. All four sides are double cut.



7. Three-Square

Triangular double cut file. Tapers toward the point and has sharp corners. Used to file acute internal angles that cannot be reached with rectangular files.



Swiss Needle

Files work in small areas. Finest quality files made. Made of the highest quality steel, machined and Swiss needle files are used precision finished for precision shape, accuracy and balance. Teeth are sharp and cross-cut, assuring even filing. Recommended for both soft and hard metals, including platinum. Also used for removing, smoothing and shaping plastic and wood. Round knurled handles to provide a sure grip. Length measurements include handle. Length 4" (10 cm) has cut portion of 13/4" (44 mm), Length 6 1/4" (16 cm) has cut portion, Length 5 1/2" (14 cm) has cut portion of 2 1/2" (64 mm), Length 7 3/4" (20 cm) has cut portion of 4 1/8" (105 mm).

1. Barrette

Tapered in width and thickness, coming to a point. Only flat side is cut, providing safe edge and top.



2. Crochet

Tapered in width and gradually tapered in thickness. Used for filing junctions between flat and curved surfaces and for developing slots with rounded edges.



3. Crossing

Half-round on two sides with one side having a larger radius than the other. Tapered in width and thickness. Cut and usable to the point. Used primarily for filing interior curved surfaces. The double radius allows filing at the junction of two curved surfaces or of a straight and curved surface.



4. Equalling

Parallel in width and thickness. Used primarily for filing slots and corners.



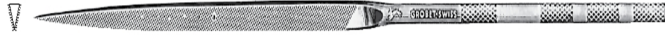
5. Half-Round

Tapered in width and thickness, coming to a point. Cut on both sides.



6. Knife-Edge

Tapered in width and thickness. Knife edge has the same thickness from point to shoulder. The included angle of the sharp edge is approximately 10°. Generally used to file in a slot or wedge-shaped opening. Curved knife edge allows easy filing in restricted areas.



7. Marking

Identical to half-round, but cut on round side only. Flat side is safe.



8. Oval

Oval shape, gradually tapered to tip. Cut and workable to the point. Used for filing interior curved surfaces.



9. Round

Gradually tapered. Cut and workable to the point. Used where it is necessary to enlarge a hole or round off a radius.



10. Square

Gradually tapered and cut on all four sides. Cut and usable to the point. A general-purpose file.



11. Three-Square

Gradually tapered and cut to the point.



12. Warding

Parallel in thickness and tapered in width. Good for deburring.



Each includes 12 of our most popular files in one cut.
14mm and 16mm come in a storage pouch.



Escapement Files

Swiss known as square-handled needle files, escapement files are used for filing even smaller items such as fine extrusion dies and Sometimes making fine repairs. Measure 14cm (5 1/2") long with 1 1/2" to 2 1/2" cut length.

1. Barrette

Tapered in width and thickness, coming to a point. Only flat side is cut, providing safe edge and top.



2. Barrette, Parallel

Same as Barrette (above) but with parallel sides.



3. Crossing

Half-round on two sides with one side having a slightly larger radius than the other. Tapered in width and thickness. Cut and usable to the point. Used primarily for filing interior curved surfaces. The double radius allows filing at the junction of two curved surfaces or of a straight and curved surface.



4. Equalling

Parallel in width and thickness. Used primarily for filing slots and corners.



5. Half-Round

Tapered in width and thickness, coming to a point. Cut on both sides.



6. Knife-Edge

Tapered in width and thickness. Knife edge has the same thickness from point to shoulder. The included angle of the sharp edge is approximately 10°. Generally used to file in a slot or wedge-shaped opening. Curved knife edge allows easy filing in restricted areas.



7. Round

Gradually tapered. Cut and workable to the point. Used where it is necessary to enlarge a hole or round off a radius.



8. Rounding Off

Cut on flat side only.



9. Square

Gradually tapered and cut on all four sides. Cut and usable to the point. A general-purpose file.



10. Three-Square

Gradually tapered and cut to the point.



11. Three-Square, Short and Slim

Cut on all three sides, tapered to a point.

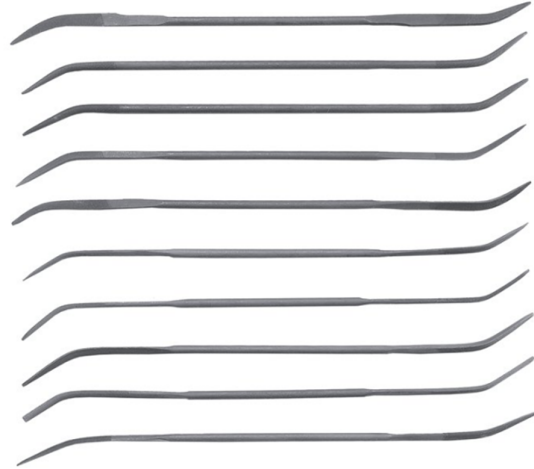


12. Swiss Escapement File Sets



Rifflers

Set of ten, conveniently shaped rifflers for hand-to-reach areas and for filing odd shapes. May be used for wax working in addition to metal. This medium cut set of double ended rifflers has easy-grip rounded handles. Made of hardened tool steel, rifflers measure 7" long and are supplied with vinyl pouch.



Chapter-3
Tool & Equipment
Hammers & Mallets

Hammers & Mallets

Hammers are the most basic of the metalsmith's tools. Without a hammer, you are not a smith.

Most hammers have two faces that are differently sized or shaped; mallets have identical faces. Most hammers have straight shafts; the exception is the chasing hammer. Most hammers can be used for several functions; some are specialized. The fundamental differences are this: there are hammers for striking metal and hammers for striking tools.



1. Goldsmith's Hammer

Well-balanced, polished steel hammer with flat and chisel faces for riveting, shaping and forming with Wooden handle.



2. Swiss-Style Riveting Hammer

Polished steel hammer with flat and chisel faces with Wooden handle.



3. Premium Chasing Hammers

Feature hardened flat face for striking chisels and chasing tools and ball-peen face for forming rivet heads and more. Well-balanced hardwood handles with oval grip and narrow shaft provide spring when striking, reducing vibration in your hand.



4. Economy Chasing Hammer

Has flat face for striking chasing tools and polished ball-peen face for hammering directly on metal. Wooden handle.



5. Riveting Hammers

Polished steel hammers with flat and chisel faces. Wooden handles.



6. Riveting Hammer

Made of hardened steel for solid striking force. One end flat, other chisel-shaped. Wooden handle. Head length: 80mm long. Face dimensions: 15mm square



7. Planishing Hammer

Domed Precision-ground and hardened steel hammer with polished face. Domed style has flat and slightly domed round faces. Solid ash handle.



8. Brass Head Mallets

Brass head will not mar steel surfaces. Wooden handles made of seasoned hickory to provide extra strength and durability.



9. Nylon Mallets

Nylon faced mallets non-marking and shock cushioned. Faces easily screw out for replacement. Handle is plastic with comfortable rubber grip.



10. K & D Mallets

Mallets supplied with one brass and one nylon face. Easily replaceable when worn. To change face, simply remove the threaded collar with wrench supplied, slip out worn face and insert new one. Well made hard-wood handles.



11. Dead Blow Mallets

Cast iron head filled with iron shot. As the mallet is struck, the shot moves forward immediately behind the blow, dampening the rebound and insuring that the force of the blow is transmitted solidly.



12. Rawhide Mallets

Used when care must be taken not to mar surface being struck. The mallet heads are constructed from tough rawhide with genuine hickory handles. Cylindrical hide coils are hydraulically compressed to assure uniform size and durability.



13. Plastic Mallet

Made of an ultra-high molecular- weight polyethylene which is non-porous, easily cleanable and prevents marring.

Durable hickory handle. Head length 3 7/8", face/head diameter 1 3/4, Measures 11 1/4" overall length. Weight 8 oz.



Chapter-4
Tool & Equipment
Saws-Frames & Blades

Saws-Frames & Blades

The jeweler's saw is a fundamental jewelry-making tool. It's one of the first and most important tools found on every jeweler's bench. That said, each jeweler has a different set of criteria for his or her saw at any given time. If you take a quick look at the Rio Tools catalog you'll see over two pages of jeweler's saw frames, and a veritable sea of saw blades.



Saw Blade Specifications

Blade size	Blade thickness	Blade depth	Teeth per inch	Recommended for: (B&S gauge)	Drill size for piercing
8/0	.0063"	.0126"	89.0	up to 26	80
7/0	.0067"	.0130"	84.0	24-26	80
6/0	.0070"	.0140"	76.0	24	79
5/0	.0080"	.0157"	71.0	22-24	78
4/0	.0086"	.0175"	66.0	22	77
3/0	.0095"	.0190"	61.0	22	76
2/0	.0103"	.0204"	56.0	20-22	75
1/0	.0110"	.0220"	53.5	18-22	73
1	.0120"	.0240"	51.0	18-20	71
2	.0134"	.0276"	43.0	16-18	70
3	.0140"	.0290"	40.5	16-18	68
4	.0150"	.0307"	38.0	16-18	67
5	.0158"	.0331"	35.5	16	65
6	.0173"	.0370"	33.0	14	58
7	.0189"	.0400"	30.5	12	57
8	.0197"	.0440"	28.0	12	55

See the chart above to determine the proper drill size for the blade you're using.



Saw Frames

1. Flat Saw Frames

High quality, adjustable, steel frames in four convenient sizes. Thumbscrews for quick tightening and loosening of saw blades. Hardened steel plates with serrated surfaces firmly hold blade. Holds saw blades up to 6" in length. The adjustable feature enables broken saw blades to be used. Comfortably shaped hardwood handles.



2. Flat Saw Frames with end screw

Same high quality as our flat frame with blade tensioning end screw to draw blade taut. Depth measures 2 1/4".



3. Square Saw frame

Square shaped steel frame with infinite adjustment for saw blades up to 6" in length. Wingnuts allow adjustment and tightening of saw blades. A knurled thumbscrew is used to adjust frame to blade length. Hardwood handle. Depth measures 3 1/4".



4. Deluxe Saw Frames

Unique saw frame has machined slots and tenons at both ends to grip saw blades quickly and easily with perfect alignment. Saw blade slips easily into slot and does not fall out or misalign as you tighten the large sturdy thumbscrew. The special blade gripping mechanism will not move or wobble during sawing, reducing blade breakage. Frame is made of black, laser-cut, high quality spring steel for easy tensioning. Handle is smooth natural wood.



Saw blades

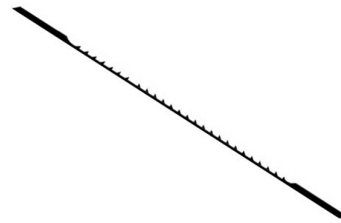
1. Pike Platinum Jeweler's Saw blades

These blades are tougher and more durable than standard jeweler's sawblades. Ideal for platinum because teeth stay sharper longer. Measure 5 1/4" (13cm) long.



2. Skip-Tooth Saw blade

Designed for smooth wax cutting. Teeth are widely spaced to prevent clogging. Measures 13cm (5 1/4") long. Sold by the dozen.



3. Spiral Saw blade

For cutting hard wax models. Teeth are spaced to prevent clogging. Circular design permits cutting in all directions. Measures 13cm (5 1/4") long. Sold by the dozen.



4. Diamond Saw blades

Consist of piano wire electroplated with diamond particles. Make quick work of sawing glass, ceramic and stones. Available in four grits. Fit standard jeweler's saw frames. Measure 5 3/8" long. Plated portion measures approx. 3" long. Sold individually.



5. "White Label" Piercing Saw blades.

High-quality saw blades made of a special alloy steel. Feature teeth that are uniform in size, shape and sharpness for fast, easy cutting. Can be used on both hand- and power-driven tools that have a blade clamping device. Measure 13cm (5 ¼") long.



6. SUPRA® Golden Piercing Saw blades

The world's finest saw blades at great prices! Extremely flexible straw-colored saw blades made of the finest steel using the latest technology. Cut straight and stay sharp. Can be used on both hand- and power-driven tools that have a blade clamping device. Measure 13cm (5 ¼") long. Sold by the gross.



7. ULTRA-Swiss™ Piercing Saw blades

Extremely flexible straw-colored sawblades made of a special steel alloy. Break less often and last much longer than ordinary sawblades, even under rough conditions. Have rounded backs for sawing curves with more control. Measure 13cm (5 ¼") long.

