

Metalsmithing: An Introduction to Sawing, Piercing, Drilling, Filing, and Sanding

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Class Handout PDF:

<http://ga.crimsonkraken.com/metalSawing.html>

Gæira's Anvil:

<https://www.facebook.com/GaeirasAnvil>

<http://ga.crimsonkraken.com>

IDD Metalsmiths' Guild, Guild Founder

<https://www.facebook.com/groups/IDDMG>

Please join our Facebook group.

<http://iddmg.crimsonkraken.com>

Our resource website.

List of suggested tools and supplies

Beeswax or a unscented candle to lubricate the saw blades

Oil to lubricate drill bits

Paper (to draw designs and to write notes)

Ink Pen or Pencil (to write notes and draw designs)

Fine Felt tip pen (to draw designs on metal)

Masking Tape or Painters Tape (to tape down designs, these do not leave residue)

Fine Mist Aerosol Glue (to glue down design, avoid glue sticks or rubber cement)

Nail or scribe (to scratch/draw lines to saw and to dimple metal for drill holes)

* I have included links to product on Riogrande.com as visual examples of my suggestions.

There are a variety of 'brick and mortar' or online businesses where you can purchase your tools and supplies.

SAWING TOOLS

German Jeweler's Adjustable Saw Frame, 3 inches depth

<http://www.riogrande.com/Product/German-Jewelers-Adjustable-Saw-Frame/110039?Pos=6>

OR

German Jeweler's Adjustable Saw Frame, 4 inches depth (is the maximum to start with)

<http://www.riogrande.com/Product/german-jewelers-adjustable-saw-frame/110042>

As you gain experience you can get deeper saw frames in order to work on larger projects or to more easily saw a sheet of metal into smaller sections. This German manufactured saw frame is the industry standard and used by millions of jewelers and there are sizes up to 12" deep. The deeper the throat the more difficult it is to handle and control. To begin learning and to do many projects a 3" or 4" depth is easy to learn with, handle, and is multipurpose.

Throat depths RioGrande: 60mm (2-1/4"), 76mm (3"), 102mm (4"), 120mm (4-3/4"), 152mm (6")
<https://www.riogrande.com/category/tools-and-equipment/saw-blades-and-frames/german-saw-frames/>

V-Slot Bench Pin and Clamp: This is a portable and basic model and fits on tables up to 1 3/4" thick. if your table is thicker then you can purchase a C-clamp to use instead of the clamp that comes with the wood.

<http://www.riogrande.com/Product/V-Slot-Bench-Pin-and-Clamp/110010?Pos=1>

Laser Gold Saw Blade, Size: 1 [1-2 bundles of a dozen to start with]

<http://www.riogrande.com/Product/Laser-Gold-Saw-Blade/110308?Pos=1>

Laser Gold Saw Blade, Size 3/0 [minimum 3-4 dozen blades once you're comfortable]

<http://www.riogrande.com/Product/Laser-Gold-Saw-Blade/110305?Pos=1>

European Fine Center Punch

<http://www.riogrande.com/%28S%28vxgsoe55fia15d55ghe1qf24%29%29/Product/European-Fine-Center-Punch/113329?Pos=3>

[Unitec has a different model. You use this to hammer a divet onto the metal to be able to drill a hole.]

OR a Nail or scribe to hammer a divet onto the metal to be able to drill a hole.

<https://www.riogrande.com/Search/scribe>

Needle Files: Round and Half-Round #2 (this is medium)

[If possible ALSO get both in #0 (rough) and #4 (smooth)]

Examples of file shapes:

<http://media1.riogrande.com/Products/Images/Large/114004.jpg>

Round and Half-Round are the minimum to start learning with for needle files.

Half-Round is the minimum for Hand Files.

Economy Needle File Set, Swiss Cut #2 [very good price]

<http://www.riogrande.com/%28S%28vxgsoe55fia15d55ghe1qf24%29%29/Product/Economy-Needle-File-Set-Swiss-Cut-2/114257?Pos=5>

If possible ALSO get:

Economy Needle File Set, Swiss Cut #0

<http://www.riogrande.com/%28S%28vxgsoe55fia15d55ghe1qf24%29%29/Product/Economy-Needle-File-Set-Swiss-Cut-0/114258?Pos=2>

Grobet Half-Round Hand File, Swiss Cut #2

<http://www.riogrande.com/%28S%28vxgsoe55fia15d55ghe1qf24%29%29/Product/Grobet-Half-Round-Hand-File-Swiss-Cut-2/114315?Pos=2>

OR at Canadian Tire/Hardware Store

Mastercraft 6 Piece Needle File Set [Product #58-2804-0]

<http://www.canadiantire.ca/en/pdp/mastercraft-6-piece-needle-file-set-0582804p.html#.VLif7kqROSo>

[I don't know what roughness these are, you need medium.]

"Formerly marketed in the United States using the brand names Grobet-Swiss and Grobet-Vallorbe, Glardon-Vallorbe Swiss Made Precision Files..." (source: <http://www.ottofrei.com/Store/Files/>)

Mastercraft Half Round Bastard File

<http://www.canadiantire.ca/en/pdp/mastercraft-half-round-bastard-file-0582835p.html#.VLigB0qROSo>

[I don't know what roughness these are since it is not listed, you need medium.]

Mastercraft Waterproof Sandpaper, 9 x 11-in

<http://www.canadiantire.ca/en/pdp/mastercraft-waterproof-sandpaper-9-x-11-in-0542169p.html#.VLitwUqROSo>

Sandpapers for wood and metal are very different. Mastercraft sells wet/dry sandpaper for sanding cars and there is a variety pack. You need rough (180 and 220), medium (320 and 400), and fine (600). Suggested grits.

PLIERS and CUTTERS for Wire Work

Suggested Pliers to start with: Flat Nosed, Round Nose

Optional Additional Pliers: Compound Parallel Jaw Pliers and Chain Nose Pliers

Choose one or more Wire cutters (avoid Bevel Cut): Diagonal Cutters, End Cutters, and/or Oblique Cutters

see for details https://contenti.com/media/catalog/pdf/library/types_jewelry_pliers.pdf

> Look for padded handles, double-leaf springs, and either single or box joints

Hinge Styles: Lap Joint, Single Joint or Box Joint (Single and Box Joints are sturdier)

[See Page 6 for images showing the various styles mentioned here.]

Four-Jaw Pin Vise (A pin vice can be used to hold short wires or drill bits and burrs when you don't have a Dremel or Flex-Shaft motor.)

<https://www.riogrande.com/Product/four-jaw-pin-vise/113146>

High-Speed Steel Twist Drill, #71, 0.66mm [1 pack to start with from Rio Grande OR 2 individual ones at Unitec Inc., they need to make a hole large enough for a #1 saw blade to pass through.]

<http://www.riogrande.com/Product/High-Speed-Steel-Twist-Drill-71-066mm/349430?Pos=1>

Rawhide Mallet

<http://www.riogrande.com/Product/Rawhide-Mallets/112209?Pos=3>

Chasing Hammer

<http://www.riogrande.com/Product/Chasing-Hammer/112227?Pos=1>

Steel Bench Block, 4" x 4" x 3/4"

<http://www.riogrande.com/%28S%28vxgsoe55fia15d55ghe1qf24%29%29/Product/Steel-Bench-Block-4-x-4-x-3-4/112570?Pos=3>

All links to these sources can be found in the Bibliography

from Nicholson PDF #1 (page 4-6)

Coarseness: The number of teeth per inch length of the file. (bastard, second-cut and smooth)

Cut: The character of the file teeth with respect to the coarseness (bastard, second-cut and smooth.) A single-cut file has a single set of parallel, diagonal rows of teeth.

Single-cut files are often used with light pressure to produce a smooth surface finish or to put a keen edge on knives, shears or saws.

A double-cut file has two sets of diagonal rows of teeth. The second set of teeth is cut in the opposite diagonal direction, and on top of the first set. The first set of teeth is known as the overcut while the second is called the upcut. The upcut is finer

Bastard: File coarseness between "Coarse and Second Cut."

from Nicholson PDF #2 (page 101)

-Most American pattern files are available with 3 grades of cut: bastard-cut, second-cut and smooth-cut

-Swiss pattern files are available in seven cuts: No. 00, 0,1, 2, 3, 4, and 6

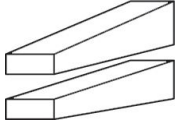
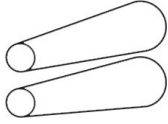
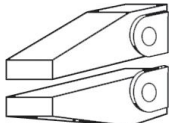
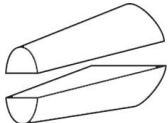
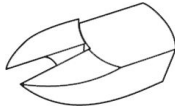
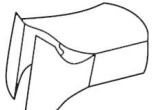



from Nicholson PDF #3 (page 111)

Single-cut

- Single set of parallel, diagonal rows of teeth
- Single-cut files are often used with light pressure to produce a smooth surface finish or to put a keen edge on knives, shears or saws

Double-cut

- 2 sets of diagonal rows of teeth
- Second set of teeth cut in opposite diagonal direction and on top of the first set
- First set of teeth is known as the overcut, second is known as upcut
- Upcut is finer than overcut
- Double-cut file is used with heavier pressure than the single-cut and removes material faster from the workpiece

Suggested Pliers to start with (*look for padded handles, lap or box joints, and double-leaf springs)		
Flat Nose Pliers*	Round Nose Pliers*	
		
Optional Additional Pliers:		
Compound Parallel Jaw Pliers	Chain Nose Pliers*	
		
Choose one or more cutters (avoid Bevel Cut)		
Diagonal Cutters*	End Cutters*	Oblique Cutters*
		
Lap Joint	Box Joint	
		
Artwork adapted from https://contenti.com/resources/library/types_jewelry_pliers and http://www.silversupplies.com/catalog/tools/pliers/		

B&S Gauge (Thickness/Thinness) Chart

B&S Gauge	Millimeters	Inches	B&S Gauge	Millimeters	Inches	B&S Gauge	Millimeters	Inches
1 ga	7.348 mm	.289"	11 ga	2.304 mm	.090"	21 ga	0.724 mm	.029"
2 ga	6.543 mm	.258"	12 ga	2.052 mm	.080"	22 ga	0.643 mm	.025"
3 ga	5.827 mm	.229"	13 ga	1.826 mm	.072"	23 ga	0.574 mm	.023"
4 ga	5.189 mm	.204"	14 ga	1.626 mm	.064"	24 ga	0.511 mm	.020"
5 ga	4.620 mm	.182"	15 ga	1.448 mm	.057"	25 ga	0.455 mm	.018"
6 ga	4.115 mm	.162"	16 ga	1.290 mm	.050"	26 ga	0.404 mm	.016"
7 ga	3.663 mm	.144"	17 ga	1.148 mm	.045"	27 ga	0.361 mm	.014"
8 ga	3.261 mm	.129"	18 ga	1.024 mm	.040"	28 ga	0.330 mm	.013"
9 ga	2.906 mm	.114"	19 ga	0.912 mm	.036"	29 ga	0.279 mm	.011"
10 ga	2.586 mm	.102"	20 ga	0.813 mm	.032"	30 ga	0.254 mm	.010"

Hand Files: Swiss & American Pattern

Teeth Per Inch (for Files)	Swiss Pattern: Full Size Files	Swiss Pattern: Needle Files	American Pattern: Hand Files
41	00		bastard cut (or medium-coarse)*
51	0		second cut**
64	1	0	
79	2	2	second cut (or medium-smooth)*
117	4	4	
173	6	6	smooth*

The grey boxes are the most used. For the Swiss only 6 of the 7 are shown (97 tpi for Escapement files).

* from NY Times article

**wonkeedonkeetools.co.uk's link states that Second Cut is equal to 0

Grit of Sandpaper Equivalent*	80X	180X	240X	280X	400X	500X	600X	800X	1000X	1200X
Discontinued Norton emery paper*	-	3	2	1	1/0	2/0	3/0	4/0	5/0	6/0

*<https://contenti.com/aluminum-oxide-emery-paper>

RESOURCES:

Importation UNITEC Import inc.

620 Cathcart, suite 721-723, Montréal (Québec) H3B 1M1

Tel.: 514-954-1225

Fax: 514-954-1226

<http://www.unitecinc.com/>

Jewelry and Art & Crafts Stores in Montreal (to be updated)

<http://iddmg.crimsonkraken.com/IDDMG-JewelryStores.htm>

Jewelry Suppliers outside of Montreal and mainly in the USA

<http://iddmg.crimsonkraken.com/IDDMG-JewelrySuppliers.html>

My Personal Tips and Suggestions for Sawing (JPG image)

<http://ga.crimsonkraken.com/metalSawing.html>

FILES:

Vallorbe Swiss Files: Tools for Jewellers

http://www.vallorbe.com/Download.php?f=documents/Catalogue_bijoutiers_q.pdf

Nicholson: The Guide to Files and Filing (14-page, PDF) [See pages 4-6 and 12-14 only] #1

<http://www.nicholsonstool.com/MagentoShare/media/documents/nicholson-guide-to-filing-2014.pdf>

Nicholson: Files, Saws and Multi-purpose Tools (50-page, PDF) [See pages 101, 108-109, 123-124, and 130 only] #2

<http://www.farnell.com/datasheets/50654.pdf>

Nicholson (56-page, PDF) [See pages 111 only] #3

http://www.apexhandtools.com/customer_service/pdf/NicholsonSect.pdf

Simonds: Facts on Files (32-page, PDF) [See pages: 15-18 only]

<http://www.simondsint.com/handfiles/HAND%20FILES%20PUBLICATIONS/File%20Facts.pdf>

Paulbudzik.com: Tools and Techniques

<http://paulbudzik.com/tools-techniques/index.html>

Facts on Files <http://paulbudzik.com/tools-techniques/Files/files.html>

Pin Rivets http://paulbudzik.com/tools-techniques/Pin%20Rivets/pin_rivets.html

What is a file's coarseness?

<http://www.wonkeedonkeetools.co.uk/files/what-is-a-file-s-coarseness/>

A brief history of files <http://www.wonkeedonkeetools.co.uk/files/a-brief-history-of-files>

Home Repair; How to Select the Correct File for Your Needs

By Edward R. Lipinski in the NY Times

<http://www.nytimes.com/1998/06/07/nyregion/home-repair-how-to-select-the-correct-file-for-your-needs.html>

Jeweler's 'piercing saw' by David A. Cushman logo

<http://www.dave-cushman.net/bee/piercingsaw.html>

Basic Tool Lists, Tutorials, Information:

Jewelry 101: How to use jump rings & crimp breads by Shannon Miller

<http://www.rebelcraftmedia.com/2014/09/jewelry-101-how-to-use-jump-rings-crimp-breads/>

Wire Sculpture Tools & Techniques:

<http://www.wire2craft.com/resource.html>

Misc. TOOL INFO.:

Style of Joint (for pliers and cutters)

<http://www.knipex.com/en/pliers-abc/basic-information-about-pliers/style-of-joints/>

Machine Shop Know-How [see Chapter 4 only]

by Frank M. Marlow, Illustrated by Pamela J. Tallman , ISBN-13 978-0-9759963-4-8

<http://www.metalartspress.com/books/machine-shop-know-how>

Machine Shop Essentials [see Chapters 1-3 only]

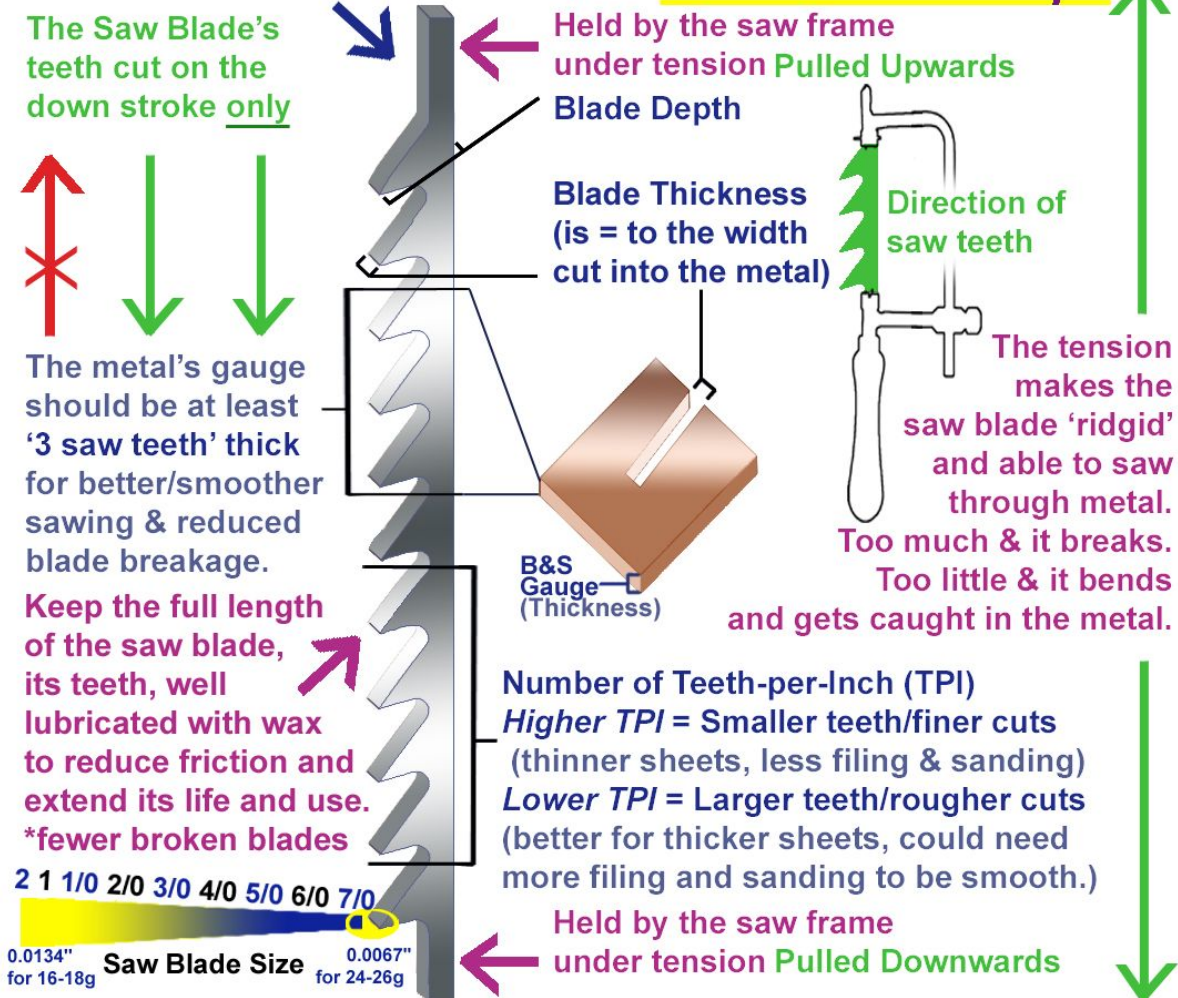
by Frank M. Marlow, Illustrated by Pamela J. Tallman, ISBN-13 978-0-9759963-3-1

<http://www.metalartspress.com/books/machine-shop-essentials>

Hand Tools (Contains extracts courtesy of A.N.T.A publication's and TAFE "Electrical trades -Tools & Equipment Pt 1")

<http://www.splashmaritime.com.au/Marops/data/text/Tooltex/Handtooltex.htm>

Saw Blade for a 'Jeweler's Saw' *Information & Tips*



- Gently hold the Jeweler's Saw in your dominate hand.
- The metal is held down & smoothly rotated/moved by your other hand.
- Use long, smooth & even strokes which use 60-90% length of the blade.
- Imagine you're a sewing machine, ONLY straight Up & Down movements.
- The saw blades are specifically designed to cut on the down stroke only. *Do not use:* quick/rough strokes, too much downward or forward force, no jerky or quick movements especially turning/twisting the saw or metal.
- Very little extra force is needed, the saw's weight does a lot of the work.
- A proper sawing technique greatly reduces the need to file and sand later.
- Keep the blade well lubricated with wax (beeswax or a paraffin candle), otherwise friction will build up heat, weaken the blade and it may break.
- Stay relaxed, breath evenly, use proper lighting, have good ventilation, use a very good quality dust mask, and a good chair with back support. *** ALWAYS wear Safety Eyeware!!! Above all enjoy yourself and have fun!

by Gæira Aggadóttir

GA.CrimsonKraken.com