The Illustrated Guide to Jewelry Making Tools:

More than 125 jewelry tools in 30 categories described – plus pros’ favorites!
If you like making jewelry, you like jewelry making tools. In *Jewelry Making Daily Presents: The Illustrated Guide to Jewelry Making Tools*, you’ll find everything you need to get started making your own handmade jewelry. Find out what basic tools are necessary or nice to have and what each one is designed to help you do better.

Don’t know the difference between a bench block, a mandrel and an anvil? We’ll clue you in. When do you use a ball peen hammer, a planishing hammer, and a chasing hammer? We’ll let you know – and tell you why one pro calls a well-formed planishing hammer his favorite jewelry making tool of all. Want to know what chain nose pliers and round nose pliers look like, or what kinds of other jewelry pliers are available? We’ll show you. Why is a pin vise or a tube cutter a handy thing to have? We’ll explain that and much more.

You’ll find this illustrated eBook a valuable reference if you’re just venturing into jewelry metalsmithing, and full of interesting comments from established jewelers even if you’re one yourself. Plus you can check out tools for more specialized techniques like stone setting, casting, or using metal clay, as well as lapidary tools for cabochon cutting, faceting, and gem carving – even the basics for beading!

It’s a great resource you can turn to anytime you go jewelry tool shopping or just want to enjoy thinking about every jewelry maker’s favorite topic: jewelry tools!

Merle White
Editorial Director, Interweave Gem & Jewelry Group
Although there are many ways to make jewelry, fabrication is one of the two most widely used methods; the other is casting. Fabricated jewelry is made directly from metal wire, tubing, and sheet. Metal is formed or shaped, sawn, and then joined by soldering or other connection methods. Finally it is polished, patinated, and the stones are set.

For fabricating jewelry or finishing jewelry work, you’ll work most comfortably at a jeweler’s bench. Although it is seen as furniture, the bench is actually a specialized and important tool designed for the many tasks of the working jeweler. Your bench top should be almost at eye level. Storage drawers, armrests that slide out from under the bench top, and a catch tray underneath the working area for filings, small pieces of metal, and stones are useful features. A bench pin attached to the front of the bench top is where most holding, filing, sanding, and sawing will be done. A good quality bench is well built of hardwood and will last a lifetime — or even several.

A supportive, comfortable, adjustable chair that allows the jeweler to sit correctly without straining is critical. Adjust chair height or bench height (by putting blocks under the legs if necessary) to suit your physical requirements. Get good general lighting as well as good task lighting and provide ventilation that draws or blows soldering and fluxing fumes away from your face and vents them outside. Once these general studio requirements have been met, you’ll want to begin the serious business of acquiring hand and mechanized tools for several metalworking processes.

Although seen as furniture, the bench is actually a specialized and important tool...
Hammers

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. A brief description of their uses follows.

Note: “Peen (or pein)” refers to the business face of the hammer. A “ball peen” is a ball-shaped face; a “cross-peen” is one that is at right angles to the handle.

FORMING DEFINED

Precious metals are ductile. Their shape can be altered by applying force, usually by striking directly or indirectly with a hammer, as the metal rests against a hard striking surface, such as iron or steel, or a soft one, such as wood or pitch. This process is called forming or forging, although the term forging is usually reserved for blacksmithing.

Shallow forming, such as repoussé, chasing, dapping, and stamping, moves the metal without cutting it, as when, for example, you convert a round disk into a half dome by dapping.

Repoussé and chasing are interchangeable terms — both are types of shallow forming that utilize steel punches to push metal up or down in a bed of pitch. The flat metal is stretched from a flat plane into relief. Repoussé pushes the metal forward from the back; chasing produces grooves or patterns from the front of a piece (intaglio).

Dapping creates shallow, half domes. Deep forming moves the metal into a different configuration, as when you flatten and curve a straight piece of heavy gauge square wire into a neck collar. Other tools used to stretch and shape metal are drawplates for wire and rolling mills for sheet.
UTILITY HAMMERS

BALL PEEN an all purpose hammer with one round, one half-domed face, for flattening and shaping metal, removing dents; can be used to drive chisels, punches, stamps. CHASING with one flat face for striking other tools (such as stamps) or planishing metal; one round face for forming and riveting. Handle has a bulbous end and a narrow neck for more bounce back and less strain on the wrist. GOLDSMITH’S with one flat and one cross peen head for riveting and other work. MALLETS have identical faces and can be made of plastic, rawhide, or metal. RIVETING with one round, one chisel-shaped face, for riveting, tacking, and lightweight forming.

PROFESSIONAL’S CHOICE

Andy Cooperman

“I have several ball peen hammers that I use for many, many tasks. I forge with the flat peen of a long-handled ball peen that I’ve had for years. I also use it to strike dapping punches and for general hammering as well. I use another old ball peen that belonged to my grandfather — it has a rusted and pitted surface — to lay down a base layer of texturing. I have filed the narrow cross peen of a small goldsmith’s or riveting style hammer to a knife edge and use this in texturing. Sometimes, I rivet with the flat side. I also grab a small planishing hammer that was in the very first bag of metal-smithing tools that I bought.”
The hammers I have used the most are three cross peen hammers with slightly different widths of the cross peen, and two raising hammers with different-sized faces. These five hammers allow me to create the large variety of forms I use in jewelry and sculpture. All of these hammers are now available from Allcraft.

**SILVERSMITHING HAMMERS**

**EMBOSSING** with two rounded, differently sized faces, for a variety of metalwork.

**FORMING** a heavy hammer with flat or domed faces, used to move metal.

**PLANISHING** with flat or convex faces, to smooth metal that has been worked by other hammers or to harden metal.

**RAISING** with two rectangular, blunt, or wedge-shaped cross peen faces, used to “raise” the metal from flat sheet to dimensional form by striking the outside of the form.

**TEXTURING** with machined or patterned faces, for striking texture directly onto metalwork.
PROFESSIONAL’S CHOICE

Bill Fretz

“A well-formed planishing hammer is my favorite metalsmithing tool. It can texture and form with the domed end, smooth rippled metal, raise small shapes and stretch it. Flip it over to the flat side and the hammering produces very refined shapes with just a hint of texturing. Hammer very lightly with overlapping blows and the previous marks will disappear. With different convex stakes it becomes the universal shaping tool. I am now using my HMR-1 planishing hammer because it is scaled for jewelry.”
MANDRELS, STAKES, & ANVILS

Mandrels and stakes are specialized anvil forms used as striking surfaces in jewelry making and hollowware forming. Jewelers who do a lot of deep forming use standard anvils; most use small table top versions of these classic shapes as well as bench blocks.

**BENCH BLOCKS**

Common jewelry anvil, most often a 3-4” square by 1” thick block of stainless steel for striking, hammering, and forming. Other shapes are available.

**MANDRELS**

Specialized jewelry anvils. Usually tapered, but may have flat surfaces that are stepped down the length of the taper. May have different cross section shapes depending on the use (round, oval, square, hexagonal, etc.). Usually made of steel or cast iron, may be made of wood to prevent damage to metal surfaces. Sizes and shapes specialized for rings, bracelets, neckpieces, or bezels.

**SINUSOIDAL STAKES**

Wavy tapered steel or nylon mandrels or stakes used for anticlastic forming, in which the metal is formed in two curves at right angles to each other.

**STAKES**

Specialized anvils in a wide variety of forms, used to make hollowware or jewelry. Stakes may have one head or be double ended. Most have an extension — the tang — that fits into a hole in an anvil, a hole in a tree stump, or into a metal bench tool socket, in order to hold the stake steady during use. Stakes without tangs are held in a vise during use.
DAPPING, PUNCHING, & COMPRESSION

Dapping and punching are a way to form domes, depressions, or other shapes in metal by stretching it in a specialized block, or against a surface that “gives” when the metal is struck. Wood or pitch are the usual materials used for this purpose. Punching moves the metal rather than cutting it, as a stamp would.

A rolling mill is used to change the thickness of metal sheet or ingots by compression. Patterns can also be transferred to metal in the mill. A drawplate is used to change the shape, thickness, or profile of wire by compression. Thick wire can be reduced in thickness by pulling it through smaller and smaller openings of the plate. As a result, the wire thins as well as lengthens.

CHASING/REPOUSSÉ PUNCHES square, rectangular, or round steel punches with one highly polished end; the polished ends may be of various shapes for various functions in repoussé and chasing. The other end is unpolished and is struck with a hammer during metal forming.

DAPPING BLOCK a polished steel cube with up to five depressions of various sizes per side, used to form domes or half rounds. Also available as a plate with depressions all on one side. Used with dapping punches. May be made of hardwood, with only one depression per side.

DAPPING PUNCHES cylindrical tools with one nearly round end matching the depressions in a dapping block. A metal disk is placed over the depression in the block, an appropriately sized punch placed over the disk, and the punch is struck with a hammer to form a dome.

DRAWPLATE a steel plate with graduated, tapering holes, used to reduce the diameter of precious metal wire by drawing through the plate from the larger side to the smaller one. Holes in a drawplate may contain tungsten carbide inserts for less friction and wear. Allows you to keep fewer gauges of wire stock on hand, or to use up short pieces of heavy gauge wire.

MICROFOLD BRAKE metal corrugator that creates a zigzag profile on thin-gauged metal sheet. Compresses sheet into tiny folds by way of specially engineered drums.

PITCH BOWL a heavy cast iron bowl about 9” in diameter, used to hold specially formulated “pitch,” a petroleum product. The pitch becomes viscous when heated, and is used to firmly hold metal being worked by repoussé or chasing methods. Bowl sits in a felt or leather ring, sand bag, or other holding device. It can be rotated to any direction during work. Metal is released from the pitch by reheating it to viscosity.

ROLLING MILL a small press that allows jewelers to reduce the thickness of metal sheet, roll sheet from ingots, emboss metal with patterns, or shape and pattern wire.
PLIERS

CHAIN NOSE tapered jaws that are flat inside and half round on the outside. Jaws may be extra long or curved. For loops and curves with a small radius.

CUTTERS OR NIPPERS pliers with a cutting edge that may be at the side or at the end of the jaws. Cutting edge may sever wire cleanly (flush cutters) so that one or both wire ends are flat, for a smooth fit; or they may cut wire so that there is a small peak or point where the wire was pinched during cutting.

FLAT NOSE jaws are flat inside and out and have squared ends. For angular bends, and for drawing or pulling.

ROUND NOSE both jaws are round, tapering from a point to a broader base. For making loops, coils, and curved bends.

SPECIALIZED hundreds of varieties available; including ring bending, looping, hole-punching, tube-cutting, rosary, bow opening, forming, and many others.

HINGE TYPES
There are three types of pliers hinge:

BOX JOINT HINGES, the most expensive, will not become loose over time.

PARALLEL ACTION JAWS keep pliers jaws parallel to each other (other pliers jaws open with a pincer movement).

RIVETED LAP JOINTS are less expensive and less durable than box joint, but provide greater leverage.

PROFESSIONAL’S CHOICE

Denise Peck

“I absolutely adore my Swanstrom ergonomic pliers set. They are so comfortable in my hands. The best tip I ever learned in jewelry school was to use two bent-nose pliers for opening and closing jump rings. Bent nose pliers allow you to firmly grasp both sides of the ring without obscuring the opening from view.”

Micki Lippe

"Ergonomic pliers from Allcraft. I also alter flat nose pliers by grinding the lower jaw into a soft curve. The pliers come with a sharp edge that mars the metal. If you round that edge they are much more useful. Chain nose pliers will not give you the larger, more gentle curve that can be accomplished with these."
CLAMPS & VISES

Fingers are cumbersome and lack the precision and the strength to hold or manipulate small jewelry components during operations such as drilling, bending, filing, or sanding. And overusing fingers and thumb to hold small pieces can lead to repetitive stress injuries, such as carpal tunnel or tendonitis. Pliers, vises, and ring clamps give you strength and accuracy, and save your hands. The inside surfaces of jewelry pliers jaws are polished smooth, without teeth, to prevent the marring of metal. Pliers are indispensable for an enormous number of operations and can be thought of as both a holding tool and a forming tool. As a result, there are enormous numbers of specialty pliers suitable for every category of jewelry work.

- **BENCH VISE** a tabletop vise with a clamp that may or may not swivel in several directions. For holding work during forming, filing, or finishing.
- **PIN VISE** a small hand tool with a collet in the jaws to hold wire or thin tubing for creating pin stems or earring posts.
- **RING (OR BENCH) CLAMP** a hardwood (usually) or plastic bullet-shaped clamp, with leather-faced flat jaws, used to hold rings or other small objects during filing or sanding. A wedge driven between the two halves of the clamp base closes the jaws and holds the work in place.
- **UNIVERSAL CLAMP** a clamp with a perforated metal face and adjustable jaws used to hold small objects during filing or sanding. Steel pins are inserted into the perforated top to secure work to the two halves of the clamp base so the adjustable jaws hold the work in place.
The process of forming often starts with cutting a shape from a sheet of metal. For very thin metal, this may be done with snips; however, snips can curl, twist, and deform the sheet. Most often cutting is done with a jeweler’s saw and blades. Simple holes are cut in metal with drill bits, by hand, or with a motorized tool. Depressions in the surface of metal are cut with burs or with gravers. Stamping cuts the surface — typically in a decorative pattern — unlike a punch, which merely moves the metal. Files are the first step in finishing metal, and come in a range of shapes and “cuts” from coarse to fine.
PROFESSIONAL’S CHOICE

Cynthia Eid

“My saw frame made by Lee Marshall of Knew Concepts is light and comfortable. It has a great blade-tensioning mechanism—no more need for pressing the saw frame between your chestbone and bench!”

ABOUT OUR EXPERTS

EVE ALFILÉ, located in Evanston, Illinois, is a fine jewelry designer known particularly for her knowledge of pearls and her educational programs. You can see more of her work at www.evejewelry.com.

NANCY ATTAWAY is a gem cutter and faceting instructor who collaborates with her husband Steve to create one-of-kind jewelry in their studio in Sandia Park, New Mexico. Steve, a gem carver and jeweler, has published numerous articles on gemstone polishing. You can see more of their work at www.attawaygems.com.

ANDY COOPERMAN is a jewelry artist, teacher, and writer working in Seattle, Washington. You can see more of his work at www.andycooperman.com.

CYNTHIA EID, from Massachusetts, is a respected jewelry artist, teacher, and co-author, with Betty Helen Longhi, of a forthcoming book about sheet metal forming titled Shellforming for Jewelers and Metalsmiths: Creative Paths to Form. You can see more of her work at www.cynthiaeid.com.

BILL FRETZ is a jewelry artist and tool designer in Maine. You can see his work and find out more about his tools at www.fretzdesign.com.

MICKI LIPPE is a highly regarded jewelry artist working in Seattle, Washington. As well as actively making and selling her own work, Lippe has taught metalsmithing and jewelry making classes, and small business workshops for jewelry makers. You can see more of her work at www.looselyhinged.com.

BETTY HELEN LONGHI is a North Carolina jewelry artist and sculptor working in precious and semi-precious metals. She is a noted teacher and co-author, with Cynthia Eid, on a forthcoming book about sheet metal forming titled Shellforming for Jewelers and Metalsmiths: Creative Paths to Form. You can see more of her work at www.fluidformsinmetal.com.

DENISE PECK is editor-in-chief of Step by Step Wire Jewelry magazine and senior editor of Lapidary Journal Jewelry Artist. She is the author of Wire Style: 50 Unique Jewelry Designs and 101 Wire Earrings. You can contact her at dpeck@interweave.com or at www.stepbystepwirejewelry.com.
FILE for removing and smoothing metal. Files come in a variety of sizes, shapes, and various "cuts." Cut number (from 00 to 6) indicates the coarseness of the file and relative cutting ability. The smaller the number, the coarser the file and the faster it cuts and removes metal. Hand files are usually about 6" long; most cut on both sides; some cut only on one side with a "safe" back and side (safe sides are uncut so they do not mark metal). Common cross section shapes include: half round, flat, barrette (flat on the cutting side, with a safe, tent-shaped back side), knife, triangular, crossing (each cut side with a different radius), and round. Hand files are inserted into wooden or plastic handles to protect the hand. Needle files are about one-quarter the width of hand files, and are available in most of the same shapes as hand files. Used for small components and delicate work. Cylindrical rotary files on a shaft can be used in a flex shaft motorized handpiece.

FILE CLEANER OR CARD is a brush with steel bristles used to clear file teeth of metal fragments. Clogged files cut much slower.

GRAVERS also called burnis are hard, tempered tool steel tool used to engrave lines on metal. The working end may be rectangular, square, diamond-shaped, triangular, oval, or round; each makes a different kind of cut in metal. They may be cut to engrave lines in a texture such as a Florentine finish. Gravers are also used to move metal over the edge of a stone in bead and pave setting. Gravers are inserted into wooden handles of various shapes that fit into the hand.

STAMPS can be square, rectangular, or round steel. The business end of the stamp may be shaped to mark metal in a variety of ways, with a karat mark, for example, or any decorative mark.
Drill Bits & Burs

Bits

Bits are high-speed steel, carbide, tungsten carbide, tungsten vanadium, or diamond cutting tools used with a motorized handpiece or drill press to drill holes in metal and soft stones. The smaller the drill number, the larger the drill diameter. Usually have a twisted cutting edge; pearl drill bits have a flat cutting face.

Burs

Burs are high-speed steel, carbide tungsten vanadium, or diamond cutting tools used with a motorized flexible shaft handpiece for removing metal, cutting seats, and rounding prongs during setting. Burs come in a variety of shapes — round or ball, bud, cone, inverted cone, stone setting (cone on top of a cylinder), cylinder, wheel, and concave (for prongs) — and a variety of sizes, from 1 to 34, with the largest size number representing the largest diameter (unlike drill bits).

About Our Experts

Gary Dawson is a custom design jeweler and owner of Goldworks Jewelry Arts Studio in Eugene, Oregon. You can see more of his work at www.goldworksart.com.

Christine Dhein is a well-known teacher, author, and jewelry artist as well as Assistant Director of the Revere Academy in San Francisco. You can see more of her work at www.christinedhein.com.

Michael M. Dyber, from New Hampshire, is an award-winning sculptor specializing in gemstone sculptures whose work is in the collections of several museums. You can see his work at www.dyber.net.
A torch is a device that mixes fuel (natural gas, propane, acetylene) with air/oxygen to produce intense heat. It is possible to fabricate jewelry using only cold connections such as rivets. However, almost all jewelers use some kind of torch for soldering, texturing (such as granulation and reticulation), and coloring metal. Torches are also used to heat metal for casting.

It is necessary to add oxygen — in ambient air or pure oxygen from a tank — to increase the heat of the flame. The addition of pure oxygen to the fuel (as compared to compressed air) increases the heat of the flame by approximately 1500º to 2000º (Fahrenheit) or by approximately 800º to 1100º (Celsius), and so may be preferred when casting or working with platinum. However, compressed air is readily available and less expensive and, when used with natural gas or propane, produces enough heat for most jewelry applications.

Once you decide to use either compressed air or oxygen, your torch, hoses, and regulator must be dedicated to that one fuel mix. You cannot switch from compressed air to oxygen without risk of explosion.

When gas is stored in a tank, you need a regulator to reduce the pressure of the gas as it comes into the supply line. Gas lines coming from a municipal source usually do not require a regulator. You’ll also need hoses to feed gas from the tank to the torch.

Torch tips are available in a variety of sizes for different applications. When using a torch, you’ll also need supplies such as metal solder, borax flux, pickling solution (a weak acid) to remove oxidation caused by the torch, a charcoal block, soldering pad, striker, and a third hand (or two) to hold the pieces you’re soldering.

Torches require volatile gases under pressure. Sudden leaks or careless handling can result in explosions, injury, or death. Follow all manufacturer instructions and safety precautions. Be sure tanks are maintained properly and are secured against falling. If you have any questions, do not hesitate to ask your gas or tool supplier for guidance. In addition, you are working with a very hot, open flame. Develop safe working practices to protect yourself against burns and other accidents.
THE ILLUSTRATED GUIDE TO JEWELRY MAKING TOOLS
SOLDERING

ANNEALING PAN filled with heat-reflective pumice; most rotate on ball bearings.
CHARCOAL BLOCK conserves heat during soldering, shortening the time necessary to heat an object to soldering temperature.
SOLDER PAD non-flammable work surface on which metal is heated with the torch. Most soldering pads are soft so that you can pin work to the surface, which prevents small parts from being blown out of place by the flame. Soldering pads should not be made of asbestos, which is a carcinogen.
TORCH TIPS determine the size of the flame produced. Different types of work demand different sizes of flame: small tips for small flames for small work; medium tip, medium flame for general soldering; large tips (often with multiple orifices, or openings) produce a large “bushy” flame for annealing, melting, and casting. Torch tips are numbered: the smaller the number, the smaller the orifice and the smaller the flame.
STRIKER tool that creates a spark to ignite torch gases.
THIRD HAND a pincer (or two) mounted on a heat-proof stand that may be used to hold objects during soldering.

PROFESSIONAL’S CHOICE
Christine Dhein

“The best torch for you is the torch best suited to the type of work you do. For most jobs, I use the Mecco Midget torch, which offers a lot of flexibility. I use it with propane and oxygen; however, natural gas and oxygen is cleaner, for those who have that option. This torch has a variety of torch tip sizes available, including very small tips for fine chain and other delicate operations. You can also use it without a tip to get a larger flame. I also like the way I can control the heat with a two-tank system, using a reducing, neutral, or sometimes oxidizing flame, adjusting the flame type to suit the job.”
SOLDERING AIDS
When using a torch, you’ll also need supplies such as metal solder, borax flux, pickling solution (a weak acid) to remove oxidation caused by the torch, a charcoal block, soldering pad, striker and a third hand (or two) to hold the pieces you’re soldering.

FUEL OPTIONS
ACETYLENE when combined with oxygen, produces the hottest flame, 5080°F (3232.2°C), when mixed with compressed air, 3848°F (2120°C). Does not burn clean; may leave blackened carbon deposits on jewelry. Use with a regulator specifically made for acetylene.

NATURAL GAS is readily available, liquefied in tanks or through municipal lines in many cities. Requires a regulator when stored in a tank under pressure; does not usually require a regulator when coming directly from city lines. Maximum temperature when mixed with compressed air, 3569°F (1962°C), with oxygen 5120°F (2826.6°C). Burns clean and does not leave a carbon stain on jewelry.

PROPANE is readily available and inexpensive at many gas stations. Requires a regulator. Maximum temperature when mixed with compressed air, 3497°F (1925°C). Burns clean and does not leave a carbon stain on jewelry.

PROFESSIONAL’S CHOICE
Micki Lippe
“Solder picks from Allcraft. Soooo much better than any others.”
PROFESSIONAL'S CHOICE
Eileen Quinn DelDuca

“A Rio Grande tungsten soldering pick for platinum is always near to use as a heat sink, to reposition a solder chip, even create texture in a fused piece.”

ABOUT OUR EXPERTS
EILEEN QUINN DELDUCA is a jewelry artist in New York. You can see more of her work at www.eileenquinngoldsmith.com.

JOHN DYER is an award-winning gemstone artist in Edina, Minnesota, whose innovative cutting can be seen at www.johndyergems.com.

HADAR JACOBSON works primarily in metal clay. She teaches workshops at her studio in Berkeley, California, and is the author of The Handbook of Metal Clay: Textures and Forms, and Silver and Bronze Clay: Movement and Mechanisms. You can see more of her work at www.artinsilver.com.

BETTY SUE KING is owner of The King's Ransom in Sausalito, California, which specializes in all types, sizes, shapes, and colors of pearls from around the world. Learn more about her at www.pearlgoddess.com.

SASHA SAMUELS is an award-winning jewelry artist and painter working in Seattle, Washington, Portland, Oregon, and Abruzzo, Italy. Samuels specializes in jewelry forms that fit the human body. You can see her jewelry work at www.sashasamuels.com.

BINDING WIRE available in steel or iron. Used to hold parts to be soldered and to wrap charcoal soldering blocks to prevent cracking.

FLUX a liquid or paste that promotes the flow of solder by preventing or reducing the development of oxidation during soldering, which can inhibit solder flow. By preventing the buildup of oxidation, flux can also reduce cleanup time. The most common flux is boric acid.

PICKLE liquid or dry, mild acid used to remove surface oxidation from jewelry after soldering.

PICKLE POT a small, electrically heated, covered pot used to heat and hold pickle. Many jewelers use a small crockpot for this function.

SOLDER special metals formulated to be compatible with precious metals, but which melt at lower temperatures, used to join pieces together. Available in paste or sheet form.

SOLDER PICK thin, needlelike, heat-resistant tool used to position solder during the soldering operation. Made of niobium, tungsten, or titanium.
POLISHING & FINISHING

The final step in jewelry making is finishing. Finishing may include texturing a surface as well as polishing. Finishing may be done by hand, with sanding and polishing sticks, with a flexible shaft motor tool, or with a dedicated polishing machine.

HAND FINISHING

**BURNISHER** a small hand tool with a steel or tungsten carbide tip that is used to push down and polish bezels, or burnish (polish by rubbing metal on metal) prongs or other areas on a piece of jewelry.

**SANDING STICKS** flat wood tools fitted with a variety of grits of sandpaper, for use in addition to or instead of files. Reusable plastic sanding sticks allow jewelers to replace sandpaper without replacing the stick. Sanding tools also include small drum sanders that fit the flex shaft motorized handpiece.

**STONES** small stone blocks used to abrade away solder, scratches, and file marks. Usually used wet.
FINISHING

MOTORIZED FINISHING

BRUSHES: bristle brushes are used with compounds to reach difficult areas that buffs cannot reach; brass and steel wire brushes are used to texture or clean surfaces.

BUFFS: made of muslin (for most polishing compounds and applications), hard felt (for a high polish), or leather (for final polishing). They range in diameter from 2-6". (Wheels used with flex shaft motor tools can be smaller.)

FINISHING COMPOUND: a combination of abrasives and binder commonly in bar form. There is a wide variety of compounds for different purposes and metals.

POLISHING MACHINE: consists of a motor (1/2 to 1/3 horsepower) with one or two tapered spindles to hold polishing buffs and brushes, and a dust collection cabinet.

KNOW YOUR COMPOUNDS

BOBBING COMPOUND OR TRIPOLI is used after filing and sanding for marks left by those tools.

ROUGE: for final finishing. Different colors of rouge are used for different metals: red for gold, silver, brass, copper; green for white gold, platinum, or nickel; black for silver; yellow for platinum or stainless steel; and white for niobium or titanium.

PROFESSIONAL’S CHOICE

Christine Dhein

“I rarely polish. I prefer a satin finish. I use a brass brush, 4/0 extra fine steel wool, or 3M radial bristle brushes to achieve my final finishes.”

Betty Helen Longhi

“My favorite polishing tool is a Red Wing two-speed motor that I purchased from Allcraft in 1960. In 48 years it has only needed one bearing replaced and is still going strong!”
CASTING

One of the most time-honored ways to make jewelry is through lost wax casting. In this process, a model, or pattern, of the jewelry piece is made in wax — by building up drops of melted wax, by carving the design from a block of wax, or by using a combination of the two techniques. The pattern is encased in a plasterlike material called investment and placed in a burnout oven (kiln). At high temperatures, the wax melts and runs out an opening left in the plaster, leaving a hollow spot in the investment. (This is why the process is called lost wax.) Molten metal is then forced into the hollow mold by pouring, vacuum casting, or centrifugal casting. The hot plaster is shattered by plunging into water; this releases the metal replica of the wax model. The rough casting is then cleaned up and polished.

Casting your own waxes takes space and special equipment. Investing a wax pattern properly and casting metal into the investment mold take practice, but the process is simple. Investment is a powdery white, high-temperature, silica-based plaster. Because it contains silica dust, always wear a respirator when mixing investment and when quenching. Casting molten silver and gold is dangerous only if you get careless or do not take proper safety precautions. Take a class or two before casting on your own. Platinum group metals require special conditions for casting; take wax models to a professional specializing in platinum. When removed from the kiln, a metal casting is oxidized from the heat and may have a bit of a rough surface. Sprues must be sawn off, the surface filed and polished, and stones set. In fact, you need many of the same skills and equipment to clean up a rough casting that you do to fabricate jewelry.

**BURNOUT OVEN** a high temperature kiln used to melt wax out of the investment and to heat flasks to casting temperature. Should be programmable as temperature must be ramped up and down in stages. Vent kilns properly so that fumes are removed from the shop. Kiln temperatures reach more than 1000º F; follow all manufacturer’s safety instructions, and use proper safety equipment.

**CASTING GRAIN** granules of the metal of your choice. (When casting you need, on average, twice as much metal as will be in the finished piece; the extra metal will create the sprue. This metal can be reused, but reused gold must be mixed, half and half, with new metal.)

**CENTRIFUGAL CASTER** used to throw molten metal into the flask after burnout. Traditional “broken arm” casters have a crucible containing the molten metal and the flask at one end; weights to balance the weight of the flask and crucible are at the other. A powerful spring operates the caster.

**FLASKS** stainless steel cylinders in various lengths and diameters into which the model is placed. Investment is poured around the model, which is mounted by its sprue into a sprue base.

**SCALES** a small one for weighing waxes and metal casting grain; an old baby scale for weighing investment.

**SPRIE BASE** a rubber base that fits temporarily on the bottom of the flask. The sprue on the jewelry piece is inserted into a clay-filled cone in the center of the base, and the base is snapped onto the flask. Investment is poured into the flask; after it hardens, the sprue base is removed, revealing only the tip of the sprue in the investment.

**TORCH** an oxy-acetylene with multiple orifice tip, or oxy-propane with single flame tip, to produce a large, high-temperature reducing (oxygen poor) flame to melt metal quickly. Oxy-natural gas with a multiple orifice tip can be used for small amounts (less than 5 ounces) of metal.

**VACUUM CASTING/INVESTING MACHINES** used to draw air bubbles from liquid investment after the model has been invested. Some vacuum machines can also be used for casting; ideal for casting larger pieces and small sculpture.
WAX CARVING

Wax working goes hand-in-hand with casting, although the equipment is simple and inexpensive — heat and steel tools are used to build up or carve a wax specially formulated for jewelry work. Because wax models can be cast and even cleaned up and polished professionally — for a fee — you don’t have to invest in the other equipment if you don’t want to.

**ALCOHOL LAMP** used to heat wax working tools which are then applied to wax, melting it.

**WAX** several different kinds are specially formulated for lost wax: build-up wax used to add wax to a pattern, hard carving wax to be cut with a knife or burs, water soluble wax for making the armature for domed or filigree mountings (dissolves in water and is removed before casting). Wax comes in various thicknesses of sheet, and shapes and gauges of wire for “fabricating” from wax; build-up wax can be added to this, or these pieces can be added to carving wax with heat. Commercial wax patterns are available; alter them to suit your needs. Sprue wax wires are attached to the model and will, when the model is burned out, form the exit channel for the melting wax.

**WAX BURS** cutting tools used with a flexible shaft tool; particularly useful for working in hard wax.

**WAX FILES** specialized files used to shape and finish wax models. The teeth are much coarser teeth than metal file teeth.

**WAX MANDREL** unlike tapered steel ring mandrels, wax mandrels have flat, stepped sections on which to work, and are fixed to a stand so the work can be rotated. (Spray with a release agent to prevent wax from sticking.) Flat pieces can be worked on a sheet of glass sprayed with a release agent; dimensional pieces can be worked over an appropriately shaped block of water soluble wax which is dissolved away before casting.

**WAX WORKING PEN** a wax working tool that is kept hot electrically in place of dental type tools and an alcohol lamp. Choose one with variable temperature and several different tips.

**WAX WORKING TOOLS** steel tools that look like dentists’ instruments, with differently shaped points for building up, scraping, and scoring wax. A good craft knife is used for carving hard wax.

**PROFESSIONAL’S CHOICE**

**Sasha Samuels**

“My favorite wax tool is an antique round shaving brush with stiff bristles that I use to dust away the ‘crumbs’ of wax on models I am carving. The best part is I have a finger puppet of a platypus installed on the handle end. It adds levity to the workplace.”

**Gary Dawson**

“Miniature dividers, acquired from Allcraft, in New York, New York, are nominated as my most useful wax carving tools, although they are not actually carving tools. I use them to lay out each and every stage of reduction in a carving to insure that I am making even reductions and my carving is balanced. I don’t know how I ever made anything prior to owning them. I now rely on them heavily for every project. Another favorite is one of my little secrets . . . a simple pin vise holding a broken #3 saw blade. I use this to carve (well, pierce) waxes to create decorative relief.”
METAL CLAY

Metal clays consist of metal powder suspended in an organic binder; when fired in a kiln, the binder evaporates, leaving behind pure metal. The clays, which have a texture similar to polymer clay, can be rolled, folded, textured, sculpted. They shrink from 10 to 50 percent, depending on the manufacturer and type of clay, and have a lighter density than a cast piece of the same size; however, the fired clays generally finish the same way as metal jewelry made by other techniques.

PROFESSIONAL’S CHOICE

Hadar Jacobson

“Since I’ve started working with copper and bronze clay, I’ve switched to Paragon’s FireFly kiln (although Paragon’s customer service leaves a lot to be desired). The steel box fills the whole space and the distribution of heat is even. It is brick, and since it’s a top loader, the heating elements are on four sides rather than three, so the kiln holds the heat better, without leak. This makes it possible to fire bronze and copper clay in multiple layers with full sintering. As far as I know, it’s also the cheapest kiln on the market.”

BRASS BRUSHES AND BURNISHERS for polishing and smoothing metal surfaces.

CUTTERS cookie cutter-like tools to cut consistent shapes from metal clay; also craft knives and thin, flexible metal sheets.

FIRING SUPPLIES metal clays from different manufacturers may have firing processes that require different supplies. These may include activated charcoal, firing pans, protective gloves, tongs (for removing hot items from the kiln), and fire bricks on which to rest hot pans or items.

KILN for processing metal clays must be able to reach and sustain temperatures of between 260°C/500°F and 990°C/1814°F depending on the type of metal clay used. A simple kiln may achieve only one temperature; others may allow you to program a slow ramp up to maximum temperature. Some load from the front, some from the top. Some types of metal clay can be fired with special torch setups or on a gas stove top.

METAL CLAY available in silver, 22K gold, bronze, copper, and steel. Comes in blocks and/or thin sheet form, depending on the manufacturer. Slip sold in syringes and jars.

ROLLERS to flatten clay to consistent thickness.

SCULPTING TOOLS any tools used for modeling ceramic clay will work; awls for piercing; files for detailing hardened clay before firing. Forming material (such as cork clay) is available for shaping beads and other hollow forms.

SHRINKAGE RULER to determine the amount of shrinkage you can expect after firing.

TUMBLERS AND SHOT tumble polishing compacts the metal and burnishes it at the same time. Use stainless steel shot or plastic pellets embedded with abrasive. The shot and abrasive pellets come in a variety of sizes and shapes; choose a combination of shapes and sizes to reach all parts of the jewelry. Tumblers can be rotary or vibratory; use rotary for shot, vibratory for abrasive-embedded plastic. Stainless steel tumbling shot, although it costs more, is recommended over carbon because it doesn’t rust.
STONE SETTING

Gem materials incorporated into jewelry can be held in place by glue, but they are traditionally set using strips of metal called bezels, or small “claws” of metal called prongs. Bead, pave, and channel setting are all advanced types of setting; there are jewelers who specialize in pave. Bezel setting involves soldering very thin strips of metal in the precise outline of the stone to a backing; sometimes there is no backing, only a thin edge on which the stone sits within the bezel. The stone is placed in the bezel, and the bezel is rolled over the edge of the stone with a burnisher. Setting gem materials (which are usually faceted) in prongs entails cutting a “seat” in the prongs on which the girdle of the stone will rest, cleaning up the little splinters of metal this can cause, setting the stone in the seat, and pushing the prongs over the stone with pliers. The prong is then filed and polished.

PROFESSIONAL’S CHOICE

Eve Alfillé

“A vital component of my setting style involves bezel setting. A lot of this I have done with a curved burnisher, by hand, taking pride in my hand strength. But after years of this, especially applying full strength to 14K gold bezels, I developed a bad case of carpal tunnel, and figured out that the hammer is a better way to go, whether for silver, 14K, 18K, or palladium and platinum.”

BURNISHER a smooth-faced, curved or straight, finger-shaped tool, set in a handle, used to push bezels down and burnish them.

BURS, BUD flame-shaped burs used to cut holes into metal as part of the process of pave setting.

BURS, CUP hollowed burs used to round and shape a prong that has been pushed over the stone giving it a finished appearance.

BURS, HART knife-edged burs used to undercut a channel, creating a smooth groove to hold stones during channel setting. Also used to cut and shape seats in prongs.

BURS, STONE SETTING burs with flat sides and conical points. These thin the inside of a prong down evenly (so that it can be pushed safely over a stone) and produce a level seat on which the stone rests; an uneven seat can cause the stone to break when the prong is pushed over.

FILE, BARRETTE a metal file, used to finish prong edges, with teeth on only one face; other faces are smooth so they don’t cut or scratch the stone.

GRAVERS used to raise beads of metal over a stone in pave and bead setting.

PLIERS, NEEDLE NOSE OR FLAT NOSE preferred by some jewelers over “setting” pliers for setting stones; usually the jaws are ground to the shape favored by the setter.

PLIERS, SETTING special pliers in a variety of configurations used to push prongs down without damaging stones.

RECIROCATING HAMMER HANDPIECE used with the motorized flex shaft tool instead of a burnisher for setting and channel setting.
ALCOHOL LAMP with a cup in which to melt the dop wax.

CABBING UNIT for rough-shaping the stone; with either silicon carbide or diamond wheels (silicon carbide is cheaper, diamond wheels last longer). Usually has several wheels or belts on the one unit so that you can move from one procedure to the next.

DOP WAX AND STICKS special wax used to hold rough gem materials to the dop stick (as simple as a piece of doweling); provides an easy way to hold the stone while cutting and polishing.

RUST PROHIBITIVE added to the water used to cool the wheels and saw blades to prevent them from rusting.

SANDING WHEELS for shaping and prepolishing; in a selection of coarse (100-180), medium (600), and fine (1200) grits. Wheels with foam backing or diamond-impregnated rubber wheels.

SAW, 10-INCH SLAB used to cut large chunks of rough into slabs; must have a water source to cool the stone during cutting and keep the dust down.

SAW, 6-INCH TRIM for cutting small pieces of rough; for trimming rough shapes out of slices or slabs; with a thin (0.025 or 0.032-inch) blade and water source.

SPOOL POLISHER made of phenolic resin; recommended to cut tough materials, such as star sapphire or jadeite.

POLISHING COMPOUNDS cerium oxide, tin oxide, or diamond for polishing.

POLISHING DISKS OR WHEELS may be impregnated with fine abrasives for finishing; plain wheels or disks (such as leather) allow you to use an abrasive of your choice (one abrasive per wheel).

WHEEL DRESSER with a single point or in a bar shape; to “true up” silicon carbide wheels as they become worn during cutting.

CABOCHON CUTTING

There are two traditional forms of gem cutting: cabochon cutting and faceting. Gem cutters may practice both forms of cutting or only one; they may combine both techniques in the production of a single stone. A third form, gem carving, is more difficult but attracts those who want a challenge. The tools are different for each type of cutting, although there may be some overlap.

Cabbing creates flat-bottomed, domed stones, usually, though not always, from translucent or opaque materials. The shape of the stone-to-be is marked on a cut or purchased slice (slab) of rough using a metal or plastic template. The stone shape is then cut out with a small trim saw. This rough shape is mounted on a piece of doweling called a dop stick using dop wax; the cutter holds the dop stick while pressing the stone to the grinding wheel. The stone is rounded, domed, and polished with a grinding machine using a variety of wheels of different grits.
**THE ILLUSTRATED GUIDE TO JEWELRY MAKING TOOLS**

**SPECIALTIES**

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**FACETING & CARVING**

Faceting is the process of placing facets—small flat faces—on a piece of transparent faceting rough. It is done with a faceting machine which usually comes with a selection of dops, a transfer block, and one index gear that will allow you to cut stones with 4-fold or 8-fold symmetry. You can add other index gears as you go along. The machine holds the stone at precise angles against flat laps of different types used at different stages.

Gem carvers must be artists as well as craftspersons. Because carving is an individual art form, there are few off-the-shelf supplies that suit everyone. Carvers may use faceting and/or cabbing equipment and saws to perform their work. But after that, most work with hand tools.

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**PROFESSIONAL'S CHOICE**

**Nancy Attaway**

“My current favorite lap is the Batt polishing lap, invented by Jon (Gearloose) Rolfe of Maine, which is composed of tin and other secret ingredients. It is the most amazing polishing lap I own and use, and has enabled me to polish some difficult gem materials—emerald and kunzite, for example. The sintered grinding laps from Inland Diamond Products Company of Michigan are also very good. These laps, in 325-grit, 600-grit, and 1,200-grit, are expensive but will remain sharp forever; they don’t just have diamond on the top surface, they have the diamonds throughout the lap.

“A little known polishing tool are the 3M Trizac cerium laps and belts. These do a great job on quartz and opal, yet they do not seem to be in widespread use.”

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**PROFESSIONAL'S CHOICE**

**John Dyer**

“My favorite tool is my Ultra Tec faceting machine. It is the basis for many of the things I do, and while I often do branch out with other equipment, either purchased or made by us, it is one of the things that I use the most. Over the years, I have had to use other kinds of faceting machines for various reasons and I have yet to find one that is as good or as versatile as my Ultra Tec.”

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**PROFESSIONAL'S CHOICE**

**Michael Dyber**

“I would say my favorite machine is my lathe, for it will make all my tooling and machinery for my creative process.”

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**ALCOHOL LAMP, DOP STICKS, DOP WAX** for cabochon cutting.

**BITS, DIAMOND** a variety of shapes and sizes; most carvers modify them to suit their particular style of work.

**CALIPERS, DIAL** to measure stones in millimeters.

**FLEXIBLE SHAFT TOOL** must be fitted with an air and water supply to keep the dust out of the flex shaft motor and out of the carver’s lungs.

**GRINDER** a small grinding unit is used for preforming, or grinding out the rough shape of the finished stone.

**LAP, DIAMOND** flat disk impregnated with a selection of medium (600) and fine (1200) mesh; for stones higher than 8 on the Mohs hardness scale, extra-fine (3000) mesh. If you do not use a trim saw and cabbing unit to preform rough you will also need a coarse diamond lap (80 to 180 mesh).

**LAPS, LUCITE POLISHING** to use with cerium oxide polishing compound for quartz, beryl, opal, and stones of similar hardness.

**LAP, TIN POLISHING** to use with 50,000 mesh diamond compound for polishing garnet, tourmaline, and stones of similar hardness.

**SAW, 4 TO 6-INCH TRIM** for trimming and preforming faceting rough; fitted with very thin blade (0.012-inch or thinner) to prevent wasting the often expensive rough with a water source such as a drip tank.
**BEADING**

Bead stringing can be as simple or as complex as you choose. A string of beads consists of beads, a cord, knots, and a fastener, if necessary. Whether or not you knot between beads depends on the weight of the cord, the look you want, and the protection you want to give the beads, as knotting prevents beads from rubbing against each other — delicate pearls can wear through the nacre at the drill hole after years of wear; soft turquoise can be scoured by metal spacers.

**PROFESSIONAL’S CHOICE**

Betty Sue King

“My favorite beading tool is my pearl drill that I purchased in Japan 25 years ago. It comes with various sizes of heads that hold the pearls in place for drilling. Some strands of pearls have tiny holes that are difficult to begin and end stringing. Drilling the holes slightly bigger takes care of this problem.”

**BEAD BOARD** a board that is covered with a napped material to keep the beads from rolling around too freely, and lipped to prevent the beads from rolling off the table; boards usually have several shallow grooves across the top and a broad open area below; loose beads go into the broad area; the grooves are used to arrange your beads in order.

**CLEAR NAIL POLISH** to stiffen silk so that it can be run back through beads.

**CORD** tigertail, nylon-encased twisted wire, used for heavy or abrasive beads; monofilament (fishing line), less stiff but less durable than tigertail, also used for heavy beads; nylon thread, for glass, plastic, or stone beads, used when knotting is necessary or desired; and, silk, the classic, used for pearls. Depending on the size of the drill hole in the bead, beads can also be strung on leather cord, cotton curtain cord, metallic, multi-colored, or plain white crochet cotton, knotting worsted. Cord comes in a variety of colors to complement or contrast the colors of the beads.

**CRIMPS** small rings that are crushed with pliers to hold silk or nylon cord in place.

**FINDINGS** a selection of clasps, bead tips, crimps, separators, to finish off the strand.

**FLEXIBLE NEEDLES** sizes #10 and #6 for most work.

**HEAT** a lighter or matches to melt the ends of nylon cord to hold it in place.

**SCISSORS** preferably those with very sharp tips that have no finger holes and are held in the palm of the hand.

**SPECIALTY PLIERS** include bead-crimping, split-ring opening, bead knotting, and coiling.

**STORAGE** a selection of zip-lock plastic bags (available from most hobby stores) or a small cabinet with many drawers in which to store loose beads and findings, and thread so that it stays clean and undamaged.

**THIRD HAND** essentially tweezers on a stand; used to hold a strand while the stringer is using both hands to tie knots.

**TWEEZERS** with a sharp, fine point to tie and untie knots.
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