Jewelry Making Tips

Soldering Tips

A few easy to follow fundamental procedures to assure a neat, strong, and uniform joint.

1. **FITTING** - The strongest joints are produced with the closest fitting members. Make sure surfaces are smooth, free from burrs, fit snugly.
2. **CLEANING** - Parts must be thoroughly cleaned. Remove all oxides, dirt, and grease by buffing, sanding, or pickling.
3. **FLUXING** - Cover all of the joint to protect the metal against oxidation, thereby aiding the flow of the solder. To reduce the amount of cleaning after soldering, it is advisable to flux the entire piece.
4. **JIGGING** - Secure proper alignment of parts and prevent their movement during the heating process. A jig should be made of as light a gauge material as possible and with as little contact area as possible. Use a poor heat conductor to avoid the loss of heat (DO NOT use copper or aluminum). When joining different thicknesses of metal, preheat the heavier piece first to avoid overheating the smaller one.
5. **HEATING** - Use a soft flame and slowly, uniformly heat the joint and surrounding metal before soldering. Continue heating until the joint shows a dull red color. Use the color of the work to judge the temperature. Concentrate the flame along the joint. Do not let the material get to a bright salmon red. Let the heat of the parts to be joined flow the solder. Do not try to flow the solder with the flame from the torch.

First visible red	900є F	Cherry red	1400є F
Dull red	1200є F	Bright salmon red	1600є F

Buffing & Polishing Tips

Do not overcharge a new buff. Gently brush the polishing compound against the wheel face until it is uniformly coated. Add more compound from time to time if necessary.

Clean a used wheel buff before you recharge it. Simply hold a buff rake or old file against the edge of the wheel for a few minutes while it is running. This will eliminate excess compound. It is a good idea to clean your buff when it begins to become "shiny" from an overabundance of polishing compounds.

Do not mix compounds on the same buff. Contaminated buffs will NEVER give the desired result. Tripoli on a rouge buff will simply scratch a high polished piece.

Keep your buffing area clean. Debris can get on your buffs and contaminate them and produce undesirable results.

Keep a large supply of buffs on hand. You can use them for various compounds and prevent contamination.

Hold the workpiece below the center of the buff. This will keep the piece you are polishing from being pulled from your hands by the spinning motion of the wheel.

Do not use excessive pressure. Excessive pressure does not mean batter polishing. The buffing wheels spin at high speeds. Too mush pressure can mar the workpiece or overwork the motor.

Move the piece around when polishing. Move the piece side to side in a downward motion. Holding an item in place too long can cause streaks, blending problems, lessens the chance of buffing a "groove" in the piece. When a groove appears, the buff will have to be raked .

Always secure small items or chains. Use a flat piece of wood or a dowel. It can be dangerous to hold items that are too small to buff.

Protect your fingers when buffing. Contact with a high speed buff can make items very hot. Use finger cots, "Finger Pro Tape" or other items.

Metal Melting Temperatures & Wax Weight Conversion

Alloy/Metal	Melting Temperature (ϵF)	Ration of Metal to Wax
Gold 10KY	1665	13 to 1
Gold 10KW	1925	13 to 1
Gold 14KY	1615	14 to 1
Gold 14KW	1825	14 to 1
Gold 18KY	1700	16 to 1
Gold 18KW	1730	16 to 1
Gold 24K	1945	19.3 to 1
Silver (.999)	1761	10.5 to 1
Silver (.925)	1640	10.4 to 1
Palladium	2831	12.2 to 1
Platinum (pure)	3310	21.5 to 1
Platinum (15% Iridium)	3310	21.6 to 1
Platinum (10% Indium)	3250	21.5 to 1
Platinum (5% Indium)	3235	21.5 to 1

Troy/Metric System

1 grain	=	0.0648 grams
1 gram	=	15.4324 grains
1 gram	=	0.643 pennyweights
1 gram	=	0.03215 troy ounces
1.55517 grams	=	1 pennyweight
28.3495 grams	=	1 avoirdupois ounce
31.10348 grams	=	1 troy ounce
1 kilogram	=	32.15076 troy ounces
1 pennyweight	=	24 grains
1 pennyweight	=	0.05 troy ounces
20 pennyweights	=	480 grains
20 pennyweights	=	1 troy ounce
14.583 troy ounces	=	1 avoirdupois pound
1 troy ounce	=	1.09714 avoirdupois ounce

Burnout Cycles

The following are suggested burnout cycles for wax elimination when using either manual or electronically controlled furnaces:
Select the proper cycle according to the size of the flask.

5 Hour Cycle	8 Hour Cycle	12 Hour Cycle
For flasks measuring up to 2-1/2" x 2-1/2" with the oven preheated to 300єF	For flasks measuring up to 3-1/2" x 4" with the oven preheated to 300єF	For flasks measuring up to 4" x 8" with the oven preheated to 300єF
1 hour @ 300є F 1 hour @ 700є F 2 hours @ 1350є F 1 hour @ * - See note below	2 hours @ 300є F 2 hours @ 700є F 3 hours @ 1350є F 1 hour @ * - See note below	2 hours @ 300є F 2 hours @ 600є F 2 hours @ 900є F 4 hours @ 1350є F 2 hour @ * - See note below

* - During the last adjustment, the temperature should be set so that the flasks are at the correct temperature for casting. For example: flask temperature for ladies' or filigree rings should be 900 to 1000єF. Flask temperature for mens rings should be 700 to 900єF.

Alloying Gold

1) Weigh metals carefully in the proportions listing in gold alloying tables (the large the amount prepared, the more accurate the karat of the resulting gold alloy will be).
2) Pickle all metals to make sure they are all thoroughly cleaned.
3) Mix the metals, except the gold, in a crucible fluxed with borax.
4) Melt the metals with a reducing flame (starting with the highest melting point metal). Do not bring the metal to a boil and stir constantly with a carbon stirring rod.
5) Keep the metal molten and add the fine gold.
6) Pour the molten gold alloy into an ingot mold or depression formed in a charcoal block.

If the resulting gold alloy is brittle when later worked, this will indicate impurities. Streaks of color will indicate that the alloy was not mixed properly and may have to be remelting and remixed with a carbon stirring rod.

Raising to a Karat

((K1 - K2) x W) / (24 - K1) = Amount of pure gold to add

1) Weigh the gold you want to raise (W).
2) Subtract the starting karat (K2) from the desired karat (K1).
3) Multiply the result of step 2 by the starting weight, W.
4) Subtract the desired karat (K1) from 24 (for 24 karat).
5) Divide the result of step 3 by the result of step 4.
6) You now have the amount of 24K gold you need to add to your original karat gold to raise it.

Ex. How much 24K gold do you have to add to 7 grams of 10K gold to raise it to 14K?

((14 - 10) x 7) / (24 - 14) = 2.8 grams of 24K gold.

Lowering to a Karat

((W x K1) - (W x K2)) / K2 = amount of alloy you need to add to lower the karat of gold.

1) Weigh the gold to be lowered (W).
2) Multiply this weight, W by its karat (K1).
3) Multiply the starting weight, W by the desired karat (K2).
4) Subtract the result of step 3 from the result of step 2.
5) Divide the result of step 4 by the desired karat (K2).
6) You now know how much alloy to add to your gold to lower its karat.

Ex. How much alloy do you need to add to 6 grams of 18K to make it 10K?

((6 x 18) - (6 x 10)) / 10 = 4.8 grams of alloy.

Ring Size Equivalents

United States size	Avg. diameter in inches	Length in inches	British equivalent	French equivalent	German equivalent	Japanese equivalent	Swiss equivalent
000	.390	---	---	---	---	---	---
00	.422	---	---	---	---	---	---
0	.454	1.429	---	---	---	---	---
1/2	---	---	A	---	---	---	---
3/4	---	---	A-1/2	---	---	---	---
1	.487	1.528	B	---	---	1	---
1-1/4	---	---	B-1/2	---	---	---	---
1-1/2	.503	---	C	---	---	---	---
1-3/4	---	---	C-1/2	---	---	---	---
2	.520	1.632	D	41-1/2	13-1/2	2	1-1/2
2-1/4	---	---	D-1/2	---	---	---	---
2-1/2	.536	---	E	42-3/4	13-3/4	3	2-3/4
2-3/4	---	---	E-1/2	---	---	---	---
3	.553	1.735	F	44	14	4	4
3-1/8	---	---	F-1/2	---	---	---	---
3-3/8	---	---	G	45-1/4	---	5	5-1/4
3-1/2	.569	---		---	14-1/2	---	---
3-5/8	---	---	G-1/2	---	---	6	---
3-3/4	---	---	H	46-1/2	---	---	6-1/2
4	.585	1.835	H-1/2	---	15	7	---
4-1/4	---	---	I	47-3/4	---	---	7-3/4
4-1/2	.601	---	I-1/2	---	15-1/4	8	---
4-5/8	---	---	J	49	---	---	9
5	.618	1.943	J-1/2	---	15-3/4	9	---

United States size	Avg. diameter in inches	Length in inches	British equivalent	French equivalent	German equivalent	Japanese equivalent	Swiss equivalent
5-1/8	---	---	K	50	---	---	10
5-3/8	---	---	K-1/2	---	---	10	---
5-1/2	.634	---	L	51-3/4	16	---	11-3/4
5-7/8	---	---	L-1/2	---	---	---	---
6	.650	2.045	M	52-3/4	16-1/2	12	12-3/4
6-1/4	---	---	M-1/2	---	---	---	---
6-1/2	.666	---	N	54	---	13	14
6-3/4	---	---	N-1/2	---	17	---	---
7	.683	2.15	O	55-1/4	17-1/4	14	15-1/4
7-1/4	---	---	O-1/2	---	---	---	---
7-1/2	.699	---	P	56-1/2	---	15	16-1/2
7-3/4	---	---	P-1/2	---	---	---	---
8	.716	2.25	Q	57-3/4	18	16	17-3/4
8-1/4	---	---	Q-1/2	---	---	---	---
8-1/2	.732	---	---	---	---	17	---
8-5/8	---	---	R	59	---	---	19
8-7/8	---	---	R-1/2	---	---	---	---
9	.748	2.35	---	---	19	18	---
9-1/8	---	---	S	60-1/4	---	---	20-1/4
9-3/8	---	---	S-1/2	---	---	---	---
9-1/2	.764	---	---	---	19-1/2	19	---
9-5/8	---	---	T	61-1/2	---	---	21-1/2
10	.781	2.46	T-1/2	---	20	20	---
10-1/4	---	---	U	62-3/4	---	21	22-3/4
10-1/2	.797	---	U-1/2	---	20-1/4	22	---
United States size	Avg. diameter in inches	Length in inches	British equivalent	French equivalent	German equivalent	Japanese equivalent	Swiss equivalent
10-5/8	---	---	V	63	---	---	23-3/4
11	.814	2.56	V-1/2	---	20-3/4	23	---
11-1/8	---	---	W	65	---	---	25
11-3/8	---	---	W-1/2	---	---	---	---
11-1/2	.830	---	---	---	21	24	---
11-5/8	---	---	X	66-1/4	---	---	26-1/4
11-7/8	---	---	X-1/2	---	---	---	---
12	.846	2.63	Y	67-1/2	21-1/4	25	27-1/2
12-1/4	---	---	Y-1/2	---	---	---	---
12-1/2	.862	---	Z	68-3/4	21-3/4	26	28-3/4
12-5/8	---	---	Z-1/2	---	---	---	---
13	.879	2.76	---	---	22	27	---

ROLLING MILL TIPS

ROLLING MILL CARE

1. ALWAYS bolt down your rolling mill to a heavy bench or table top for stability.
2. When the rolling mill is not in use, it is a good idea to apply a thin coating of oil to the rollers.
3. Keep from touching the rollers. Oils and acids from your body can damage the rollers leaving behind tiny pits.
4. DO NOT over exert pressure on the rollers.
5. Try to use the center of the rollers. This will ensure even pressure on the rollers giving them a longer life.
6. DO NOT roll ferrous metals such as iron or steel through the mill.
7. ALWAYS release pressure on rollers after you have completed your job.

PROCEDURE FOR ROLLING

1. Anneal the piece of sheet or ingot, pickle it, and rinse it with clean water.
2. Feed the metal into the mill, applying snug (but not overpowering) pressure on rollers.
3. After rolling the metal through the mill, flip the piece end to end before you roll it through again. You will get a more even roll.
4. Before passing the metal through the rollers, lower the rollers until you have a snug fit (as in step 2).
5. If the metal becomes too hard to roll, it must be annealed again. Then roll the piece through the rollers, repeating as necessary until the desired thickness is achieved.
6. When rolling silver sheet it may be necessary to anneal the sheet after rolling it from 3.0mm to 1.0mm in thickness. For 14kt gold the annealing may be necessary after rolling from 3.0mm to 2.0mm.

TROUBLESHOOTING

1. PROBLEM - It takes all your strength to turn the handle.
   CAUSE - The sheet being rolled is too thick.
   SOLUTION - You need to start with a thinner sheet. You can over-stress the mill and damage the mechanism.
2. PROBLEM - The sheet is being pulled to one side.
   CAUSE - The rollers are uneven.
   SOLUTION - Be sure that even pressure is being applied to both sides of the mill.
3. PROBLEM - The edges of the metal is cracking.
   CAUSE - The ingot is not uniform in shape or the metal was rolled too much without annealing.
   SOLUTION - Remove the part of the metal with the crack (by sawing), anneal, and then hammer out the metal around the missing section until the edges are even. Anneal again and re-roll.
4. PROBLEM - The surface of the metal is flaking and/or cracking.
   CAUSE - When the metal was poured, the ingot mold was cold -or- there may be too much old metal in the ingot -or- the ingot was annealed to much -or- there may be foreign material in the ingot
   SOLUTION - Melt the ingot and reform it in the ingot mold. Roll it out again. If the problem persists, it may be necessary to refine the metal before your use it again.
5. PROBLEM - When wire is rolled out, it is wavy or bent.
   CAUSE - There was not enough tension applied to the free end of the wire.
   SOLUTION - Hold the free end of the wire tight with one hand.
6. PROBLEM - When rolling sheet, it comes out distorted, uneven, or wavy
   CAUSE - Too much pressure is being exerted by the rollers.

SOLUTION - Remove the sheet, anneal it, plannish the distorted sections, and re-roll. Apply less pressure on the rollers.

7. PROBLEM - When rolling sheet, it buckles.
   CAUSE - Sheet was pushed through rollers after flipping end to end without annealing.
   SOLUTION - Remove sheet, anneal and re-roll.

ULTRASONIC CARE

- Keep the tank clean. Debris reduces the life of your machine and can cut down on the efficiency of the ultrasonic waves.
- Keep the outside of the ultrasonic clean. Ultrasonic solutions can corrode the non-stainless housing of the machines. Moisture can also get into the seams of the housing and attack the electronics inside.
- Never let anything touch the bottom your tank. Use a mesh basket or wire ring rack to suspend item in the cleaning solution. Items vibrated by ultrasonic waves when resting on the tank floor can wear "pinholes" in the tank. Solution can leak through and damage the electronics. When cleaning large items, place a piece of plastic on the bottom of the tank as a barrier to the tank.
- Never let the level of the ultrasonic solution drop below 1-1/2" form the top of the tank. A low level of solution can cause damage to the transducers (the components that produce the ultrasonic waves).
- Take care when emptying the ultrasonic tank. If the unit has a drain, use it! If there is no drain, make sure the unit is unplugged when pouring the solution into the sink, etc. Wipe down the exterior of the unit if anything spills.
- Never put flammable or volatile chemicals in an ultrasonic. In addition to the ultrasonic waves, heat is produced by the action.
- Keep the work area around your ultrasonic clean and clutter-free. This will minimize spills. Water and electricity do not mix.
- Be safe and keep electrical cords and plugs in good shape. Frays and shorts don't mix with water.
- Be aware. Ultrasonic action can raise the temperature of solution over 120ϵF.
- You must use some sort of cleaning solution in an ultrasonic. Water and ultrasonic waves do little.
- Change the ultrasonic solution frequently. Cleaning solutions can go bad with age and use.

Common Soldering Problems and Their Causes

The Solder Will Not Flow

The surface of the metal is not clean
The tip of your torch is too small
Not enough heat has been applied to the metal
The wrong spot on the metal was heated
Too much flux has been applied to the joint

The Solder "Balls Up"

There is not enough solder
The area arond the solder joint has not been heated enough
The solder has been heated too much

The Solder Runs Away From The Joint

The metal is not clean
There is not enough flux
The torch tip is too large
Uneven heat has been applied to the metal around the solder joint
The torch tip is producing too much heat

There Are Pits In The Solder Seam

The solder is not clean
The solder joint received too much heat
The metal is not clean
The alloy of the solder has broken down after being heated multiple times from different solderings

The Solder Joint Has Gaps

The metal is not clean
The solder is not clean
The to pieces being soldered do not fit together properly

The Solder Flows Unevenly

The metal is dirty

INGOT MOLD TIPS

The ingot mold should be lubricated. This can be done with petroleum jelly (Vaseline), oil or soot.

The ingot mold must be heated. If you are using oil as a lubricant, heat the mold until the oil smokes.

When pouring molten metal into the mold, pour it in a single even flow.

You should let the red glow of the metal fade before removing and quenching the ingot.

SAFETY HINTS:

The hot ingot mold should be placed on a non-flammable surface. A pan of sand or an empty cast iron skillet are suggestions. NEVER place the hot ingot on your bench top directly.

Use goggles, heat resistant gloves and tongs when handling hot crucibles, and ingot molds. You will be dealing with temperatures well in excess of 1000єF.

Also, DO NOT quench your ingot in a plastic or equally "soft" container. A metal bucket is preferable since it will not melt if it should come in contact with a hot ingot.

CRUCIBLE GLAZING

Instead of lining your clay crucible with asbestos, it is suggested that the crucible be glazed with borax.

- Heat the crucible in a burnout oven at 1100єF for 10 minutes
- Place the hot crucible on a heat resistant surface

- Next take a torch and adjust the flame as if you were going to melt metal and heat the interior surfaces of the crucible until red hot
- Apply the borax
- Again torch the crucible as before until red hot
- All glazed areas will have a shiny appearance