How To Build and Operate A Miller Table

By Gary Weishaupt

Introduction

The original Miller Table was patented back in the late 1800's and was in fact only part of a complicated fine gold recovery system that consisted of the separation plane and then a series of amalgamation plates that used mercury, which have gone to the wayside in this century. However the initial concept of running slurry down an inclined plane allowing gravity and friction to separate gold from the lighter materials is still alive and well.

In it's simplest form a modern Miller Table is just a flat piece of material set at a relatively shallow slope where you deposit heavily concentrated material washed by an extremely thin layer of low velocity water. In some ways it's akin to running a completely bare sluice and in fact most sluices can be operated as a Miller Table if your entrainment mat can be removed to reveal the aluminum bottom.

In scientific terms I suppose one of these devices would be called a gravity separation unit since they operate on the principal of stratification and gravity settlement where the lighter materials are moved away from the heavier materials faster by the action of water flow. They are sometimes called 'Gravity Tables' or 'Flowing Film Concentrators'. Despite their simplicity these tables are capable of separating extremely fine gold from black sands, gold so fine that it can't be seen with the naked eye until it's brushed into small piles. For a home built table I imagine that the finest material recoverable is in the 250 to 300-mesh range. The finest sieve I have is a 200-mesh screen and a tremendous amount of the material I collect with my small tables easily passes this classification so maybe I'm to conservative in my estimate but I'm not sure that I'd recognize 400-mesh material if I saw it. Maybe I need to buy some more sieves.

One of the remarkable things of using even a small table is that you can keep running the same sample of sands repeatedly over and over again and they keep revealing more and more gold each time and each run has a finer gradient of particles until you reach a point where you need magnification to observe the results. Just just using a longer table if you have the space for one can accelerate this process. The largest I've ever built was 5-feet long by 18-inches wide and it was remarkable to watch in operation as you could see the gold particles spread out along the entire length in a gradient of particle sizes and colors until towards the bottom the board was pitch black.

Performance

I've used all types of the various 'pan' or 'bowl' motorized rotary separators and a couple of the 'water-column' separators and a few of the 'spiral' separators over the years and in my personal opinion even the best of the lot don't do a very good job of collecting the finest of the finest gold until you get into the commercial level of equipment which most of us can't afford. Even then the best commercial equipment usually utilizes some form or aspects of the Miller table sometimes incorporated into a vibratory (shaker) table type piece of gear.

As far as I know only Angus MacKirk is making a sophisticated Table that some of us small time miners could possibly cost justify but even it sells for around $1500 which is a little expensive for people like myself who have a marginal site we're working. The 'Orofino' is shown in the snapshot below.

Figure 1

MacKirk markets this device as a shaker table but it's basically just a glorified Miller Table but from what I've read it works very well and was designed specifically for the smalltime operators. Even though it is relatively expensive a lot of what you're paying for is the speed of operation compared to rotary separation devices.

Tables in general are far faster and much easier to operate than rotary pans or spiral bucket type separators so this is another reason I switched over to tables about 10 years ago. They are simple, virtually foolproof, easy and economical to build, take up very little space, are lightweight, compact and easily transportable. They also happen to work extremely well even when used by beginners but as you gain experience using one it is remarkable the amount of material that can be processed in very little time compared to other methods.

There is always an ongoing war of words on the discussion boards between those who advocate rotary bowl or spiral separators and those who favor tables but real world trials have proven that sands taken from any of the so-called spiral pans or bowls and then run down a Miller Table always produce even more gold and the tables operate at a far faster production speed.

Some people prefer the bowls and some people prefer the tables so the choice is pretty much an individual thing. In the long haul almost any process works if you give it enough time.

Table Fabrication

Introduction

Most people who build a Miller Table at home use wood as the basic material for not only the framework but also the table platform itself. There is nothing wrong with using wood but over a long period of time wooden tables will eventually begin to warp or bow. For this reason one has to take special precautions to insure that all wood components are extremely well sealed and totally waterproofed.

Steel and aluminum can also be used for the bed as well as the frame but the cost of fabrication is normally slightly higher than wood.

A composite system is also feasible where wood is used in conjunction with aluminum and a more modern composite system might include a resin table bed (DuPont Corian) with aluminum frame but the cost will go up even more but the final results will be much better.

There will always be certain cost effectiveness factors that go into the fabrication of any piece of prospecting gear and countless compromises that need to be taken in order to balance the available budget with anticipated equipment performance. Sometimes starting the cheapest possible piece of gear to begin with enables us to gain experience and make more informed decisions about what we need when the time comes to upgrade.

The real secret of any Miller Table is in the relative flatness and texture of what I call the ‘bed’ of the table. That’s the big flat plane that the water runs down. The texture of this bed can actually be modified to suit the specific consistency and conformation of the material that’s being run so in some respects tables have to be custom tailored for each unique material in order to be most effective. However even a fairly poorly tailored table is extremely effective compared to other alternatives.

Table Size

Miller tables can come in all types of different sizes but for most of us small time operators a large production table might be 24-inches wide by 48-inches long while a semi-production table might only be 18-inches wide by 36-inches long. Tables in this size range are designed to process rather large quantities of concentrates that have been accumulated over days or even weeks of time. A very effective table however for occasional use in working down the concentrates accumulated on a daily basis can be

very small. The one we'll be building is 8-inches wide by 24-inches long because it can be used for backpacking.

Plywood Composite Table Fabrication

The first table we'll build in this article is what I call a composite table because we're going to use plywood as the table bed but surround it with an aluminum frame instead of using wood, which is more common.

The ideal material if you're using wood for a Miller Table is Maple since it is hard and has a very dense grain. Right from the mill Maple is so tight that it requires almost no filling in order to have an almost glass-like surface. Unfortunately Maple is sometimes hard to find so the next best material would be Mahogany or Ash but both have a rather open and porous grain and require a lot of sealing and filling in order to have smooth surfaces. All I could find at the local Home Depot was Ash so this is the material we'll be using.

The heart of a Miller Table is what I call the 'bed', which forms the surface of the table. This is the big flat piece of material we'll be washing our concentrates down. As mentioned earlier the 'texture' of this bed can vary depending on what characteristics the source material exhibits. Sometimes an extremely smooth and slick bed is needed and on other occasions a bed having a lot of 'tooth' or roughness might be needed. For this project we'll be building a bed that suits 'average' conditions since it's a table we'll be using at a variety of different sites.

The first step is to cut the material for the bed to the size that we want to use. In most cases we end up having to buy far more material than we intend to use so I try to cut it up into sections that I can make more tables out of in the future. I usually build about 6 tables every year for friends or replacements for my old tables that have seen better days.

Marine plywood is the best material to use if you can find it in your locality otherwise any cabinet grade material will work. Half-inch is okay for tables up to around 16-inches wide then it's a good idea to move up to 5/8-inch stock and for tables wider than 24-inches 3/4-inch material will hold up better over time.

If you're planning on building a shaker table always use 3/4-inch material regardless of the bed size as you'll be adding more attachments and accessories that will need the thicker material to accommodate screws.

Figure 2

We found a good piece of precut half-inch thick ash plywood that was 24”x48” at Home Depot and then I cut off a segment that was 8”x24” for our project leaving us with another segment that was 24”x40” and then I cut off another 16” segment leaving us with a large 24”x24” piece for another larger table as seen in Figure 2.

All woods no matter how dense the grain need to be sealed and for a sealer I still rely on the time-tested ‘Bulls Eye’ Shellac made by Zinsser. Shellac is one of the few sealers that does not contain wax as part of the curing agent and it dries extremely fast. I normally put at least four coats of sealer on the substrate sanding between each coat before filling the grain.

Even after sealing, porous woods with open grain like ash need to be ‘filled’ in order to have a nice smooth surface after sanding. You can buy all types of wood fillers at almost any lumberyard or home improvement center. For this project I used mahogany filler so that the grain of the wood would show up better in the photographs.

The objective of filling the grain is to create a wood surface that is about as smooth and flat as a piece of glass. More often than not the filling process has to be done in steps or stages where you seal, sand, fill and sand some more and then repeat the entire process all over again until you have a surface that is as smooth as a baby’s bottom.

Figure 3

When applying the filler the objective is to fill the grain by rubbing the filler across the direction of the grain with a course weave rag or a large putty knife. Once the filler is dry you can start sanding it down to obtain a nice smooth surface.

By the way always let everything dry about twice as long as the product labels say as I've found manufacturers claims to be very optimistic with respect to curing times.

Figure 3 shows the board after the filler has been rubbed down into the grain. This is a fairly thick coat but filler is very soft and easy to sand.

A wadded up piece of burlap or other course fabric is the best material to use as an applicator for the filler. If the grain is really deep or the tabletop is really large I sometimes just spread the filler using a drywall trowel and scrape off the excess with the edge of the blade.

If you try to take a shortcut and skip the filling and smoothing process your finished table will never perform as well as it could so a little extra time spent in preparation will pay big dividends down the road.

Since there is a lot of wasted time spent in waiting for sealers, fillers and paints to cure it's sometimes effective to build several tables at one time. That way you can still be working on one table while waiting for another one to dry out.

Figure 4

Figure 4 illustrates the board after being filled and final sanded. As you can see about 99% of the filler has been sanded away and all that remains is the material that was embedded in the open grain of the wood. Now we have a completely flat and smooth surface to work with as we go forward. I normally add to more coats of shellac over the filler to insure that the surface is completely sealed.

When dealing with plywood it is vitally important to seal the edges and the underside of the board as well. For this operation I normally use a urethane product since I'm not going to be covering over it with other chemicals. I'll mask off the top surface and spray all of the sides and underside with at least three coats of urethane until I'm sure that the board has been completely sealed from possible water intrusion. Basically what we're trying to create is a waterproof piece of plywood.

The Frame

Once we have a nice flat and smooth bed to work with its time to design a frame that will go around it to prevent the water from just overflowing over the edges.

You can use 1x2 for wood for the frame sides, which is typical on home built tables, but I've found that aluminum angle sections are actually cheaper and more effective.

For this particular table we're using 1"x1"x1/16" aluminum angles, which you can buy at almost any hardware store or home-improvement center. For a larger table you might want to use larger angles.

Figure 5

Figure 5 shows the sections of angles we've cut for the frame. You really don't need any fancy tools to do this. Some type of square with a 45-degree leg, a cheap hacksaw and a felt marker are the basic tools. Hand files are good for fine tuning the joints and de-burring the edges but a sanding block will also work.

Notice that for the edging at the lower end of the table I'm using a piece of 1/2-inch angle so the water can run off of the 1/2-inch plywood surface with no interference. This piece really isn't necessary but it allows me to help insure that I can get all four edges completely waterproofed.

Figure 6 shows the table, as the frame is being trial fit. The mitered joints should fit as tightly as possible since these side rails form part of the waterproofing system for the plywood bed.

Figure 6

Many people choose to paint the table bed at this stage of fabrication but I prefer to do the painting last, as the preparation of the surface is the single most important aspect of the unit.

Lately I've begun to use more and more of the new generation adhesives for all of my projects and fewer screws and rivets. For this particular project I decided to use a new product from 'Weldbond' called 'More Than Great Glue'. This is one of those new age adhesives that can bond almost any material and in this case we're binding the aluminum frame angles to the table and also using the glue as final sealer that will fill any gaps that exist between the frame and the edge of the plywood.

Figure 7 shows the table as we're bonding the fame together. Notice that I will deliberately allow the adhesive to ooze up out of the joint as seen in this snapshot. The excess glue will be wiped away before it starts to cure to form a very small bevel around the extremely edges of the table.

If you don't completely trust these new adhesives you can also add a few small 1/4-inch screws through the angles from the underside. Be sure to use a stop on the drill bit so you don't accidentally drill all the way through the table bed.

Figure 7

This same framing technique can be adopted for use on any type of table as seen in the mockup shown in Figure 8 using a sheet of aluminum for the bed.

Figure 8

Paints and Painting

I used ‘Krylon’ brand ‘Chalkboard’ paint on the table used for this article but there are numerous brands out there and they all work relatively well. I used to use ‘Bondo’ brand black automotive primer as it has a nice ‘tooth’ to it and I actually prefer it to the so-called chalkboard paints but I have to admit that it doesn’t hold up as well over a long period of time. I may go back to it again as I wasn’t to impressed with the product I used for this article.

I am planning on experimenting with some of the new ‘Camouflage’ paints that are on the market now. These paints are supposedly completely waterproof, have a nice flat toothy texture and come in various shades of green, which some people prefer over the black color background.

Almost all of these ‘flat-drying’ types of paints have a higher than average ‘solids’ content so they do need to be very well shaken and also shaken often while in use. The best results will be achieved if you apply the paint in very thin layers and sand with 320 or 400-grit paper between coats. You might need to spray as many as six or seven coats to get a nice smooth finish. Do not use steel wool in any step of the operation as the wool contains oil as a rust preventative.

Also keep in mind that not all sealers and paints are actually ‘sandable’ to begin with and those that contain acrylic or latex binders cannot be sanded since they tend to just roll up or form globs that clog up the sandpaper and create gouges in the finished surfaces. Always test your finish material on scraps before you commit to using them on your final product. It the product is not easily and cleanly sandable don’t use it.

To get the ‘perfect’ surface finish you can do a final sanding with 600-grit paper or rub the surface with super-fine ‘rottenstone’ (pumice) powder available at most good wood finishing or gunsmith supply stores. Often I’ll just use one of the foam backed (fine) abrasive pads to give the surface a final ‘tooth’. You can experiment with some scrap pieces to work up the surface texture that best suit your particular needs as gold/sand mixtures vary from region to region.

Needless to say dust will be your worse enemy while painting so try to set up in a spot where you have at least a little control over the environment.

I can guarantee that the Shellac/Bondo Primer process works but if you want to brew up your own concoction of sealers and finishes you need to cut up some test specimens of your wood and apply the sealer and paint and then soak it underwater in a bucket for about a week. If the finish material is still in good shape after that period of time then you’ve usually got a good combination of finishes you can rely on.

Alternative Surfaces

You can skip the time consuming agony of preparing a wood table bed by finding a surface material that is already nice and flat and smooth to begin with.

Using some old original slate chalkboard is of course the ultimate solution but I haven't found any of that material in salvage yards in about the last 15 years. In fact I understand that schools are buying up old slate boards as fast as they appear on the market place. Even the teachers appreciate good materials. Architectural salvage yards are a good place to search for old school boards and modern slate scrap pieces can be found at a lot of custom kitchen countertop fabrication shops.

Garage sales are also good places to look for materials.

My entire family has a standing order to buy up any and all old chalkboards they run across at yard sales. Sometimes we find some of the very old children's blackboards that are actually made from real slate.

Figure 9

Figure 9 shows some of our typical finds. The small board on the left is a modern product and the chalkboard material is some kind of resin coated Masonite. The large board on the right is one of those good ones made with real slate manufactured back in the forties. We got both for ten-dollars one day.

We also buy every ‘Corian’ cutting board we can find as long as the surface is in halfway decent shape. Corian is great stuff to work with as you can use regular carpentry tools to cut it or route it and the surface can be sanded to have almost any texture imaginable from glass smooth to very rough. Corian is perhaps the best material to use if you want to go a few steps further and build a real Shaker Table, which is another project we’ll be writing about in the future.

Old Formica counter tops also make good material for Miller Tables as the surface can be sanded if you’re careful and don’t go to deep. You can also adhere various types of floor tiles to some plywood but finding good tile is hard to do.

There is also the possibility of using any of the various rubber sheet goods on the market. Smooth rubber makes an excellent table surface that seems to be ideal for holding on to very fine gold. It is perhaps the best surface material you can use but it’s very hard to find and somewhat expensive since you have to buy relatively thick material in order to get a good flat surface once it’s bonded to a substrate. Over the years I found that the material sold through Tandy Leather outlets called ‘Poundo Boards’ worked extremely well. This material is a high grade of rubber that comes in 1/4-inch thickness and several sheet sizes including 12”x24” which is perfect for a good little table as well as 35”x35” that would be nice for a large shaker table.

A piece of this material is shown in Figure 10 below.

Figure 10

To make a table using one of these precut pieces of rubber you can just glue it to a solid plywood substrate using rubber cement applied with a small paint roller. Place another sheet of plywood on top and press it down with a lot of weights and you end up with a really good surface. An added advantage is that one side of this material is very slick while the other side has some tooth to it so you have a choice between two different surfaces.

Another choice for a rubberized table is to use 90-mil EPDM shower pan material or the self-adhesive backed Bituthene waterproofing membrane that comes is rolls available at builder supply outlets. These both are relatively thin material so you need to roll them down to a nice smooth substrate using a laminate roller.

If you're starting to get more serious about Miller Tables you can always buy real slate or soapstone slabs from almost any cabinet top fabricator but you'll have to pay between fifty and eighty dollars a square foot for the material. In some cases, depending on your volume of material this can be money well spent.

This article however is about very low-budget tables.

As mentioned earlier I prefer to wait until the frame is finally attached and sealant has cured to do the final surface painting and Figure 11 shows the table ready for the next stage of work.

Figure 11

After a few water tests I was not happy with the surface texture of the Krylon chalkboard paint so in the end I sanded it down and re-sprayed the table with five coats of the Bondo brand black metal primer. You can't see the difference in the pictures but the Bondo primer has a much more aggressive tooth than the chalkboard paint. It's also easier to sand so I can better fine-tune the surface if needed.

At this stage where the surface paint has been applied it's a good idea to make some type of protective cover to keep the surface clean and free from contamination with oils, including oil from your fingers. Any contamination or small scratches in the surface will make smooth gold recovery almost impossible.

I generally buy some of the material sold in fabric shops that's a quilted cotton or foam core covered with cotton matt on each side. I think it's used in making quilts. Cut this to fit inside the table frame and then cut a piece of relatively stiff cardboard or even thin plywood to cover the blanket and keep everything in place with some big rubber bands. More tables are ruined from being stored or mishandled than from being used.

The next thing to do is add a water supply and some type of legs or stand for the table.

Water Supply System

I suggest that you wait until the table is completely finished before beginning to design the water supply and the mounts needed to attach it the table. You can do some water flow tests on the surface prior to deciding how best to approach the design of you system as the amount and velocity of water needed will depend on the size of the table, it's surface texture, the consistency of your concentrates and the amount of slope needed to best separate your particular cons.

Most tables are fed by a spray bar and many readers already have a lot of experience with building spray bars for their high-bankers but for a Miller Table or a Shaker Table what we really want to build is what I call a 'Flow Bar'.

What we need is a perforated tube supplying water to the table at much lower velocity than what we'd build for a power sluice. An outlet velocity of around 1 to 2 fps is usually pretty good compared to the 10 to 15 fps we'd be using for a power sluice. This doesn't mean that we want a tube that just drips water. We need a uniform gravity flow from the flow bar without excessive velocity that will just blast the material down the table surface. Most small to medium sized tables can get by with just 2 to 5 gallons of water per minute. A typical hose bib supplies around 10gpm at most houses and in fact most people design their water supply system for the table to run off the backyard garden hose and throttle the flow using the gate valve on the bib.

If you want a more portable system and something that's easy to use in the garage most folks buy a small pump and run the table in re-circulation mode using a cat liter box or other small plastic tub as the water reservoir.

If you want to take the table into the field you'll need a very small bilge pump. Something with a capacity of around 300 to 350 gallons per hour would work just fine. A pump this small will run all day from a little motorcycle battery.

For an A/C pump you can investigate using a pump from an evaporative cooler, landscape type fountain, aquarium pump or a very small sump pump. The landscape fountain pumps work very well and are easy to find at almost any home improvement center.

The tube size you finally end up using will depend largely on how much pressure you have at the hose bib or pump outlet. Most house water systems operate with about 35psi of pressure so 1/2-inch PVC tubing will work just fine. A bilge pump like the Rule or Johnson can also use 1/2-inch tubing as well. Smaller pumps that operate at low pressure will require that you use 3/8 or even 1/4-inch copper tubing. Using a low-pressure system is not a bad thing for a Miller Table as long as you can get the overall volume of water you need to operate whatever size table you decide to build.

For this particular table we're using 1/2-inch PVC and for most bars I start by drilling 7/64-inch holes spaced about 1/2-inch apart. There really isn't any magic to drilling tubing but you'll get much more even flow if you do the drilling work in a drill press so that the 'angle' of each hole is identical. If you drill a bar with a hand drill you'll understand what I'm talking about as far as the angle thing goes. Plastic is cheap so do a lot of experimentation if you haven't built bars before.

The rule of thumb for spray bars is to have the total area of all of the drilled holes to be slightly less than the area of the inside diameter of the tubing you're using. For instance if we're using 1/2-inch tubing that has an internal cross sectional area of .196 square inches we'd need 13 holes at 9/64" diameter, 16 holes at 1/8" diameter or 21 holes at 7/64" diameter. This rule insures that you won't lose any pressure in the bar. Since the bar for this table is very short and we only want one row of holes we drilled it with 13 holes at 9/64" diameter spaced 1/2" apart.

To layout the drilling pattern on the tubing you can use a scrap section of angle as a straightedge. Lay the tubing in the 'Vee' of the angle and mark a straight line down the length of tube. I use the fine tipped 'Stabillo' permanent markers but any type of pen that will mark plastic works just fine.

If you system will be outdoors for long periods of time you might consider using CPVC tubing, normally gray colored, since it resists ultraviolet rays.

For hoses use the cheap black poly flexible hose sold anywhere you normally find bilge pumps since it is extremely lightweight and won't tend to pull your table around as heavier rubber hoses do.

Figure 12

If you want two rows of holes you scribe two parallel lines about 3/16” apart but for tables a single row of holes works best.

Mark the center of the tubing and then take a rolled up piece of sandpaper or a plastic ring to wrap around the tube and scribe transverse lines at the hole spacing you’ve decided to use. It’s best to make the last hole position on each end of the tube at least 1/2” away from the inside edges of the table.

Figure 13 shows the arrangement of marking the hole locations. Notice that we have also marked the position of the inside edges of the table at the extreme ends of tubing.

I set this tube up for two rows of holes just in case I wanted to add a second series at a later date but only drilled one row and found that it worked well.

Figure 13

For bar mounting brackets I just cut two short segments from the remnants of our 1”x1” aluminum angles and bolted them to the frame of the table in a position so that the bottom of the flow tube would be 3/4” above the table surface. Keeping the bar low prevents splashing and aids in forcing the water to fan out faster after it exits the bar.

Figure 14 shows the parts we’re using for the mounts. The two sections of angle will attach to the side rails of the table and then the stainless steel tube clamps will hold the tubing to the mounts.

About 90% of the work that goes into a Miller Table is trying to arrive at an overall design concept, especially the mounts, that is economical, easy, fast and effective to implement. I don’t think I’ve ever built two that are exactly alike as each one, even after all of these years, is still an ‘experiment’.

Figure 14

Figure 15 shows the mounts and flow bar in position at the head of the table bed.

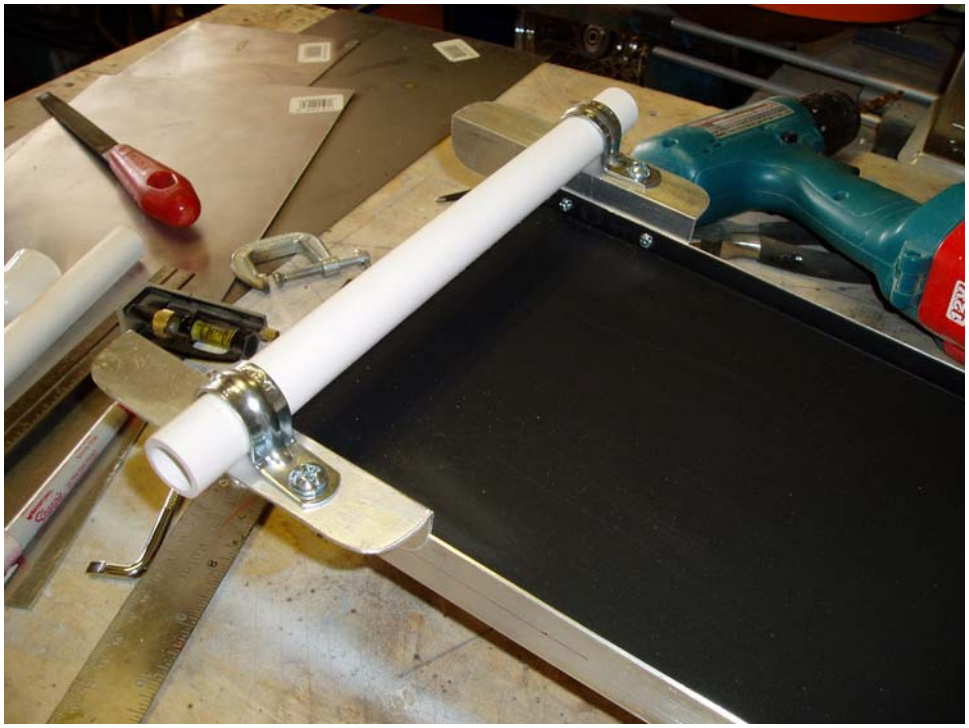

Figure 15

I typically drill the mounting holes for the tube clamps significantly oversize and try to oval-out the holes in the clamps so that I can adjust the position of the bar fore and aft if needed.

All that remains is to finish up the flow tube and for this all we need is a pipe cap, an elbow and a hose fitting.

Figure 16

None of the fittings except the hose connector will need to be glued in place, as the water pressure is so low that the fittings are generally held in place just from a friction fit.

I usually set up the flow tubes so that the hose adapter can be put on either end of the tube so that it's closest to the pump source.

Support Stand or Legs

To be honest I almost never actually build a stand or add legs to a table so I can't really be of much help in this respect. You can search the various discussion boards and get some excellent ideas for frames, stands or legs. I usually just sit my tables on top of my sluice stands or prop them up with improvised risers made from boxes or cans I have laying around in the garage.

Just bending some aluminum strap stock and then bolting them to the table frame as shown in Figure 17 can make a simple set of legs.

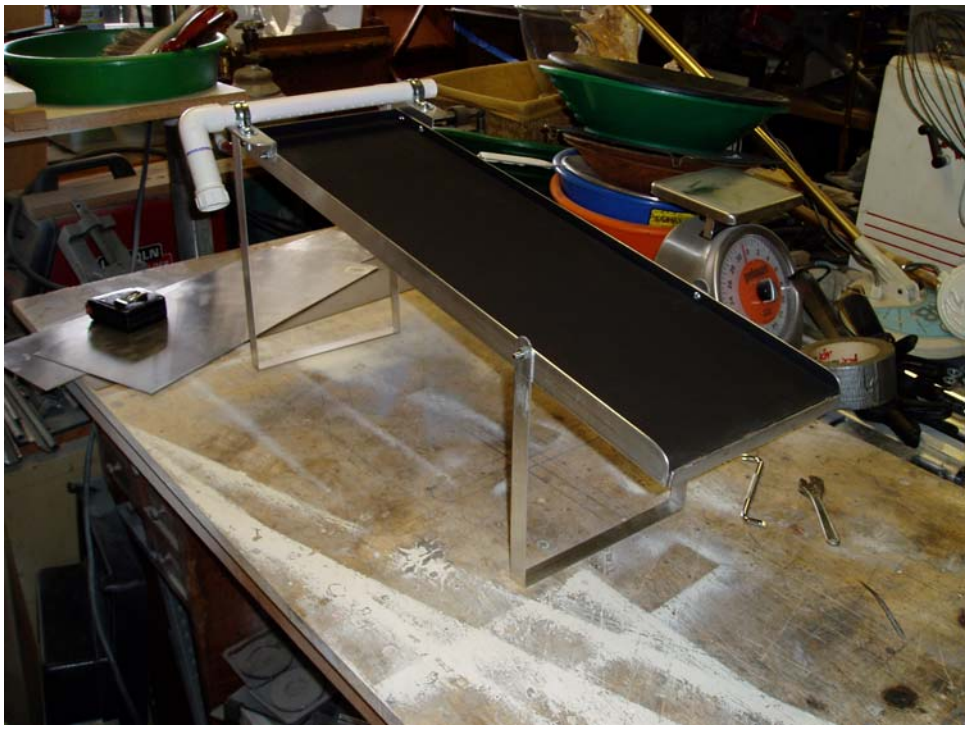

Figure 17

Notice that the water supply inlet elbow points downwards. This helps to prevent kinks developing in the water hose. If you don't have a valve on your water supply line you can add one to the section of vertical tubing near the hose adapter.

Using the Table

Each Miller Table operator will eventually develop their own unique technique for using the device and many of the techniques a person comes up with depends on the size of the table that they build.

Some people prefer to just feed the table continuously in a static manner while others prefer to 'work' the table by hand as they feed it material. I personally like to be able to work the table as I'm feeding it material and that's why I normally don't put them in a stand or add leveling legs to the frame.

A new table will require a certain amount of 'breaking-in' before the surface of the bed begins to develop just the right amount of tooth. You can speed up the process by running large amounts of fine quartz plaster sand down the chute.

You can also 'burnish' the surface by rubbing it with a relatively course cloth wrapped around a rubber sanding block. Most tables get better with age as long as the surface of the bed doesn't get scratched or gouged.

As mentioned earlier 90% of the tables effectiveness comes back to how much care you took in preparing the bed surface to insure that it was as flat and even as humanly possible. Another 5% comes from how smooth and uniform you get your water flow running. The water should ideally look like a solid piece of 1/8" thick glass laid over the bed surface.

Theoretically you're only supposed to feed what a lot of people call 'super-concentrates' down a Miller Table. These are concentrates that have been separately classified down into various grades of particle size by repeatedly running them through a poop chute or cleanup sluice. As you gain experience you'll find that you can run some pretty course and crappy material down a table and still get excellent results.

For the best results however I strongly recommend that you don't bother running anything much coarser than material that has been screened to at least 20-mesh and screening down to 50-mesh is much to be preferred.

If you're working an area where the gold is always finer than 100-mesh then it'll pay to classify your source concentrates down to that level.

I have two poop-chutes. One is 60-inches long and the other is 48-inches but it's been years since I actually used them as I switched over to just using my regular sluices stripped down to the ribbed rubber mat as my primary concentration devices. Using the sluice allows me to concentrate a huge amount of material in very little time. Running 10-gallons an hour is easy to do and if you stack your classifiers at the discharge you can get two or three cuts in a single run of material.

You'll usually have to make some spacers for the classifiers otherwise the interstitial spaces will get impacted with excess material since they nest to close together.

I personally tend to accumulate a lot of raw concentrates over the summer and then try to do batch processing during the winter so often I'll be running three sluices all set up on saw horses in the backyard creating classified concentrates. When it gets really cold I'll move to the next procedure in the garage where I can stay warm and run a propane heater and use the Miller Tables in recirc mode.

No matter how many times I process material I never throw away the 'dregs' as I figure that someday new technology will come along that makes reworking them feasible.

This bring me to another subject and that is whether it is better to work with wet material or dry material with respect to Miller Tables specifically.

First of all I want to say that I always dry my concentrates for storage purposes. I use a thing called a 'bakers' rack that I bought at a garage sale that has about 30 slots in it that hold metal trays about 1" deep by 2 feet wide by 3 feet long. By spreading my concentrates out on the sheets I can air-dry about 7 cubic feet of material every week. When I run out of room in the rack I use some of those large shallow metal pans sold in

automotive stores as drip pans to put under our old clunkers that leak oil. I have these things sitting around everywhere there is sunlight.
Wet concentrates weigh a lot, begin to get slimy and stink over time and take up a lot of space. Dry concentrates smell nice, are relatively lighter in weight and take less space to store.

I learned about mining in Nevada where almost all of our work was done 'dry' so I'm just more comfortable dealing with dry materials as a result of those early experiences. I have no problems doing classification work in a dry mode except at the work site and then I'll always perform wet classification. What I call secondary classification does not require that source materials be thoroughly washed. This is just my personal technique and I do prefer to feed dry material to the Miller Table as it eliminates what I call 'globbing' or 'clumping' that can occur if you're feeding wet materials. Dry source materials can be 'sprinkled' onto the table feed area in very fine layers. Try it both ways.

Everybody has to develop their own secondary and tertiary recovery procedures to suit their own unique requirements and personal temperaments.

Working the Table

Unlike other separation and recovery devices a Miller Table can be 'worked' if you want to take more time in your separation process and go for that very last spec of color in your concentrates.

Most users work the material as it's being fed by using a Sable hair paintbrush to spread the black sands around a wee bit as they're working their way down the table. The blond and red sands usually wash away immediately. Sometimes you can also use a small squeeze bottle of water to add a little extra washing action in an area where the black sand seems more stubborn that normal. Occasionally you can lift either end of the table to increase or slow down the flow to aid in better distributing the sands. Working the concentrates to maximize gold recovery will come with experience.

Always keep a sucker bottle handy and snuffer-up the larger specs of gold as they begin to appear, as you'll be surprised by how large some of the flakes are that have been missed in earlier concentration phases.

You can re-run your concentrates as many times as you have patience for, but usually you'll get about 90% of the gold, including the super-fine material, in a single pass even on a less than perfect table. The remaining 10% missed on the first pass will be so fine that you actually won't be able to see it without magnification. In fact a significant amount of the gold collected on the first pass will be to small to see with the naked eye.

When I'm working with material that contains a lot of minus 300-mesh particles I wear a pair of magnifiers along the line of those used by watchmakers as shown in Figure 18 that follows.

Figure 18

You really can't see the small individual specs until you start to brush them up into groups.

Sometime I'll let material dry on the table and then do a final cleanup as seen in the picture with the glasses. Even after the table looks clean under magnification you can still take a lens cloth and wipe off gold powder that's so fine as to be near unrecoverable without using chemicals.

Figure 19 shows a pan full of materials that I've been brushing gold into from the table surface over the weekend and if you look closely you can see the microscopically fine dust that has been accumulating only because my fingers covered portions of the pan.

As mentioned earlier some of this dust is so fine that you really can't even brush it into small piles.

This is the level of recovery that's possible from using a Miller Table but first of all you've got to find the gold to begin with. Also keep in mind that a lot of good claims don't contain any gold this fine to begin with so if you're not recovering down to this level it doesn't necessarily mean that your table isn't working properly. Very seldom do I see material this small and in this quantity but this particular run was from a one quart batch of super concentrated tailings a friend had left over from running his bowl this summer.

Figure 19

This may look like a lot of gold when it's all fanned out like this but it only weighed in at 36.4 grains in the end. Like they say though, "It all adds up over the long run of things".

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Happy Prospecting,

Gary