

Q: Our company needs extra spot welding capacity because production is increasing. We have an old spot welding machine in storage that has not run in years. Should I try to get it going or buy a new one?

A: As with many things in life, “it all depends.”

Spot welding machines are among the most durable of production machines and the “three Rs” of machine maintenance can easily be applied — repair, retrofit, or rebuild.

That being said, some brands of spot welding machines are better than others and an old, light-duty machine may not be worth fixing.

To begin finding the answer to your question, check to see if your machine is suitable for the anticipated welding application. As an example, if you need to weld two pieces of 12-gauge mild steel, a little 10-kVA foot-operated rocker arm machine is not going to get the job done properly.

Charts are readily available listing various combinations of amperage (heat) and pressure (forging force) required for welding various material thickness combinations. Hopefully your machine has enough capacity to achieve a “Class A” weld, which optimizes strength and appearance by using proper force, high amperage, and short weld time.

Also, if your application involves projection welding, such as resistance welding nuts or studs, an air-operated vertical action “press-type” welding machine with the proper diameter cylinder is the way to go. A rocker arm spot welding machine, although typically less expensive, applies weld force with a rocking action and will not “set down” the projections evenly.

And speaking of rocker arm spot welding machines, be wary of installing longer arms if the existing arms are too short to reach all the welds on your deepest part. Because the spot welding electrode tips are typically on the “wrong” end of the air-operated fulcrum mechanism, increasing the arm length robs the machine of weld force capability.

As an example, one representative heavy-duty rocker arm spot welding machine built to RWMA Size 3 specifications can produce 2250 lb of weld force at 80 lb/in.² of incoming air pressure with an 18-in. throat depth, whereas extending the throat to 36 in. reduces the maximum available force to 1150 lb, a loss of more than a half-ton of forging capability.

Likewise, as the throat depth or vertical shut height (gap) between arms is increased, the available welding amps at the

tips will decrease due to the larger secondary loop. In other words, a spot welding machine with an 18-in. throat depth will produce significantly more amps than the same machine with 36-in. arms installed.

The same rocker arm spot welding machine spec sheet referenced in our example shows that a 50-kVA machine with 18-in. arms installed produces 22,100 secondary amps at full power settings, whereas the same machine with a 36-in. throat produces 15,700 A. This could be the difference between making a good or bad weld.

Once you’ve determined that your welding machine in storage is suitable for the application, examine its condition. Many older resistance spot welding machines are built better than new ones, so a heavy-duty resistance welding machine that’s 20–40 years old should not be ruled out.

A “veteran” American-made spot welding machine built to RWMA specifications is often superior to some of the light-duty imported machines on the market today. However, if the welding machine is more than 10–15 years old, it would probably benefit from being retrofitted with a new control that includes all the latest features — Figs. 1, 2.

Virtually all spot welding machine controls sold today have fully programmable functions, such as pulsation and upslope, that were once expensive options. If you’re trying to weld heavy material thicknesses and/or coated steel, those two options are often a big help in achieving good welds. Also, these days it’s advisable to convert spot welding machines from mechanical contactors or mercury-filled ignitrons to modern SCR contactors. Just be sure to dispose of the ignitrons properly and legally.

And if you want to greatly improve the safety of the machine, a spot welding machine control is now available with a “soft touch” safety feature that senses if something nonmetallic is between the tips, such as a finger, and retracts the tips before weld force is applied. This protects your operator from serious finger injury and also includes the ability to dress your electrodes under low force.

Once you’ve gotten a retrofit welding machine control on order, if needed, it’s time to address the condition of the machine itself. Resistance welding machines are relatively simple to fix if you understand the basics of electricity, pneumatics, and mechanics.

Here are the systems to check as you inspect and repair the machine as

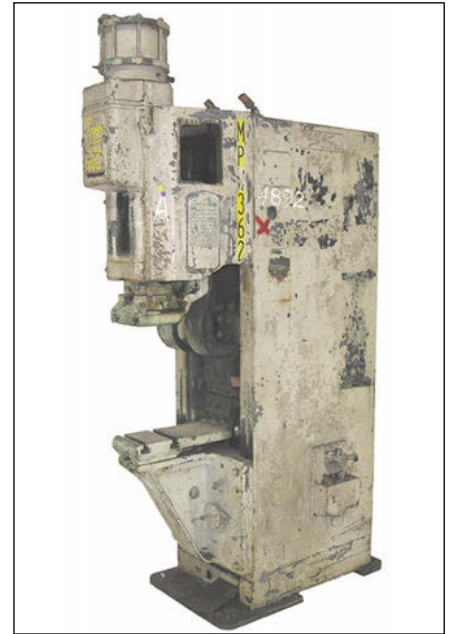


Fig. 1 — Example of a heavy-duty press-type combination spot and projection welding machine suitable for rebuilding.



Fig. 2 — The same press-type welding machine after being stripped and rebuilt to like-new specifications, including the installation of a new control with programmable functions.

needed or go through the process to completely strip and rebuild the machine.

Welding Transformer: The Heart of the Machine

Spot welding machine transformers have no moving parts and often run for



Fig. 3 — A press-type resistance welding machine ram that needs to be repaired.

decades if not abused. Abuse includes overheating due to excessive duty cycle operation, lack of adequate water flow, and internal water saturation due to water leaks or condensation.

If your welding transformer is water-cooled, check to make sure the small-diameter internal copper water cooling tubes are not clogged, crushed, or leaking. If the machine has been run on city or well water, minerals can accumulate over the years just like excessive cholesterol clogs our arteries. Chemicals are available to clear clogs in water cooling lines, but sometimes the transformer needs to be disassembled so the water lines can be replaced.

Shorted-out spot welding machine transformers can be rebuilt, but it's best to send them to a specialist rather than your local electric motor repair shop.

Secondary Connections

Spot welding machines are designed to generate heat at the weld zone due to the resistance of the material being welded, but every other source of resistance — from the transformer out to the electrodes (tips) — should be minimized. This is significant because the welding transformer converts the incoming power of 220 or 440 V into extremely low secondary voltage, typically only 6–8 V, that “pushes” the high welding amperage through the welding machine's secondary circuit. Any form of unwanted resistance in the loop restricts the flow of welding current to the work.

Although it's a lot of work, disassembling the welding machine's copper secondary loop connections and removing the accumulated oxide is a task that should be done annually.

If a connection in the welding machine secondary has gotten loose and arced out over time, the contacting surfaces will need to be remachined flat and smooth. Various conductive pastes are available that are designed to improve conductivity and reduce oxidation by coating the mating surfaces prior to reassembly. For the ultimate in conductivity, secondary connections can also be silver plated.

If the flexible copper shunts that conduct electricity from the transformer to the moving part of the welding machine have broken copper sheets or show arcing at the connecting surfaces, they should be replaced. Replacement shunts are not extremely expensive and are usually the weakest link in conducting the necessary high welding current through the secondary.

Pneumatic System

As the metal reaches the molten state during the spot welding process, delivery of consistent force and fast forging follow-up is critical to good weld quality. Most spot welding machines used in production are air-operated, so check the air system for smooth operation. Air cylinders are simple to repair and relatively inexpensive to replace, so don't ignore those important components.

Also, check to make sure there is a working filter, regulator, lubricator (FRL), and gauge installed on the incoming air supply. Restriction of air to the welding machine through a clogged FRL can cause poor follow-up during the weld. This results in excessive metal expulsion (flash), reduced electrode life, and inconsistent weld quality. If in doubt, replace the FRL.

Mechanical System

On rocker arm spot welding machines, check for worn pivot points and replace

bearings as needed. An easy way to check for problems is to grab the arm out at the end and shake it from side to side. There should not be much slack.

On vertical press type spot welding machines, you can check the ram mechanism for wear with a similar side-to-side and front-to-rear method, but on machines with roller rams, it's also advisable to remove the sheet metal that typically covers the ram area and look for wear on the ways and/or rollers — Fig. 3. Roller bearings can seize up and wear the ways. Once again, these mechanisms are relatively simple to repair.

The old-style “quill” press welding machine rams typically seen on U.S.-made machines from the 1940s and some machines being imported today are often metal on metal and can be more challenging to repair if lubrication has been ignored over the years and wear is heavy. Rather than spending money to repair one of these rams, it might be time to scrap the machine and use the proceeds to buy a new one.

That's the saving grace of old spot welding machines — most of them are loaded with copper and, if salvaged properly, can provide a nice down payment on another machine.

And, as always, an experienced spot welding machine dealer can help guide your decision-making process and provide the needed material to get your old spot welding machine back into production. ♦

TOM SNOW is CEO, T.J. Snow Co., Inc., Chattanooga, Tenn., a member company of the RWMA, a permanent AWS standing committee. Send your comments and questions to Tom Snow at TomSnow@tjsnow.com, or mail to Tom Snow, c/o Welding Journal, 8669 Doral Blvd., Ste. 130, Doral, FL 33166.



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