



**POSTLE INDUSTRIES, INC.**

5500 West 164th St. • Cleveland, Ohio 44142

Fax: 216-265-9030 • Phone: 216-265-9000

E-Mail: [sparky@postle.com](mailto:sparky@postle.com)

Web Site: [www.postle.com](http://www.postle.com)

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# IDENTIFYING WIRE FEED WELDING PROBLEMS

by Jim Henry, Hardfacing Specialist

## *Learn How and Why Feeding Problems Can Influence Your Hardfacing Jobs*

Most reported problems with wire feed welding can be traced back to equipment issues. Even though Postle Industries is not in the equipment manufacturing business, we are very aware of the proper set up and operation of wire feed equipment used in the application of Hardfacing wires. Therefore, we feel it is important as members of the welding community to provide you with some guidelines and areas to check. Knowing some signs of equipment problems and taking steps to prevent them can minimize unnecessary downtime and prevent quality issues.

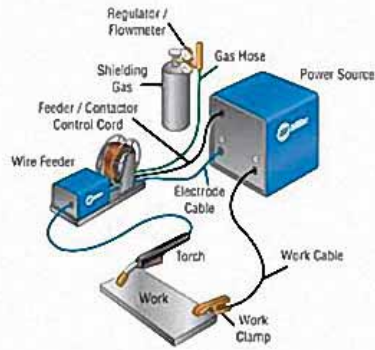


### Common Wire Feed Welding Issues:

- Overheating of the gun and cable
- Wire burn back into the tip
- Particles and wire shavings collecting in an around the drive rolls
- Erratic arc
- Wire wander at the tip
- Wire not feeding smoothly out of the tip and wire slippage
- Wire bird nesting
- Spatter build up in the nozzle
- Contact tip and liner not matched properly to the wire size

## Mechanical Problems

Feedability issues are more commonly caused by mechanical problems; let's start at the wire and spool holder, and work toward the tip.



**“Many feeding problems arise from damaged spools or coils”**

### Spools

Layer-level wound or random wound spools typically don't create problems but on rare occasions they can have small kinks created by being wound too tightly during the spooling process at the factory. More often, problems are seen on wire baskets near the center hubs kinking over the center basket wires. Plastic and fiber board spools have a smooth center diameter reducing or eliminating this type of problem.

It's even possible that the wire can be “cross wound.” This means that at the end of the spooling process or after using the wire when it has been rewound onto the spool, the wire has fed underneath itself causing drag as it comes off the spool.



PLASTIC SPOOLS & FIBER COILS



WIRE BASKET

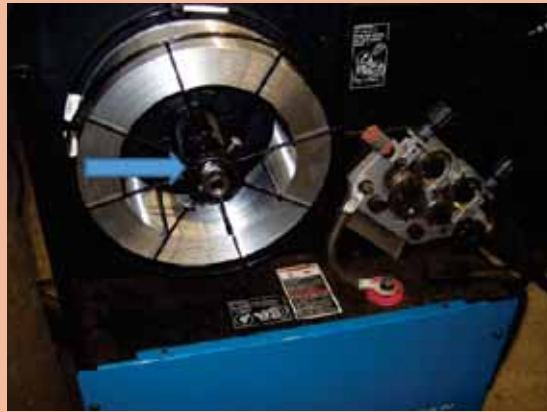


RANDOM WOUND

LAYER WOUND

### Spool holder tension or brake

- Too much tension can overload the wire feed motor and cause slipping in the drive rolls, possibly effecting smooth feedability, as well as the surface of the wire.
- Not enough tension can cause the spool to coast which removes the slight tension to the inlet guide. When the wire starts feeding again there is resistance caused by the take up of the loose wire jerking against the weight of the spool, potentially causing a hesitation of the smooth wire transfer. This could create an erratic arc and burn back to the tip.



**“Resist the temptation to tighten the tension or brake too tight”**

### Drums

If you suspect problems at the drum, consult the manufacturer or your supplier to make sure you are feeding from the drum properly. Check the wear of the inlet guide located at the top of the cone connected to the wire guide. If worn, it should be replaced. Some drums require a turntable while others require a no twist pack cone. Not all drums are packaged the same.



Gun  
Center  
Inlet-Outlet  
Inlet

### Drive Roll Assembly

Typical components are: drive roll pressure adjustment, inlet guide, wire guide securing bolt, drive gears, drive rolls, outlet guide, outlet guide (Gun) securing knob, pressure gear, drive roll fastening screws or knob and gear cover.



A



B

Inlet and outlet guides should be kept close to the drive rolls. Bird nesting and/or the wire wrapping around the drive rolls can occur if too much gap is allowed. Pictures A and B.



Too much pressure on the drive rolls can cause shavings and/or even alloy leakage from the wire core that will most likely enter the gun cable liners and in time cause problems. Deformation of the wire is another problem. Instead of having a wire that meets manufacture roundness specifications, an oval or deformed wire can drag in the liner or lock up in the contact tip.



**HIGH PRESSURE ON THE FEED ROLLS CAUSES CRIMPS ON THE WIRE SURFACE**

- Inlet guide, outlet guide and drive roll alignment are important for both a two roll or four roll feeder. The wire must feed on a straight line through this section. Misalignment can cause excess drag, rough erratic feeding or no feeding at all. A common way of checking alignment is to insert a new Tungsten (TIG) electrode into the inlet guide over the drive roll and into the outlet

guide. Set the pressure roll against the tungsten rod and then make alignment adjustments as necessary. Picture C.

- Be sure there is no groove worn in the inlet or outlet guides that can cause the wire to drag or hang up in. Rotate or replace if necessary.



C

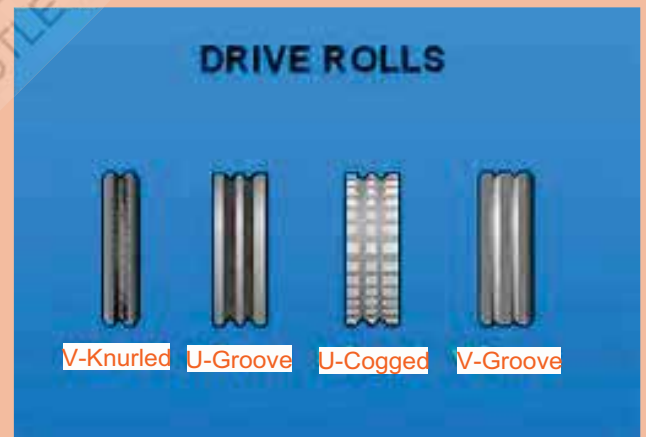
### Selecting the proper drive rolls

There are four commonly used drive roll designs. Be sure to use the proper drive roll size for the wire diameter being used.

1. **V-Knurled** - For a flux cored wire that has a hard shell. The many ridges on the sides of the V Grooves allow good gripping without applying too much drive roll pressure.

2. **U-Groove** - Especially recommended for soft-shell flux cored wires or solid aluminum wires. This design assures proper pressure on the wire without distortion.

3. **U-Cogged** - Cogged drive rolls can better grab some of the hardfacing wires that have a soft outer shell or very soft Aluminum. This allows less pressure and better feedability.



## SELECTION OF THE PROPER FEED ROLLS IS ESSENTIAL FOR PROBLEM FREE WELDING

4. **V-Groove** - Typically used for solid hard wires of .015 through 1/16". Used because they are basically easier to lineup for small diameter wires than a U-Groove and obtain proper pressure. Misaligned U-Groove rolls can easily distort the wire causing feeding problems beyond the drive rolls.

### Dirty or Worn Drive Rolls

Atmospheric particulate, wire lube and even wire filler alloy can build up in the grooves of the drive rolls. This can contribute to the wire slipping, poor feeding and even shaving or flaking of the wire surface. Periodic inspection and cleaning is recommended.

- Remove the rolls to allow for good cleaning of the grooves. A wire brush is commonly used.
- Inspect the roll groove for wear and check pressure needed for feeding to determine when to replace them.

length needed to the job. A 25' gun used in a 10' space creates many loops and kinks that can result in excess drag in the liner causing feeding issues. When using wires manufactured with a nickel strip, the use of a 10' gun or shorter is recommended.



### Wire Feeder Gear Ratios

Some feeders have the ability to change the gear ratios to compensate for different sized wires. Feeding issues can occur if the wrong gear combination is used for the required inches per minute.

### Gun and Cable Assembly

Welding guns are designed to allow the welder to easily apply the wire where he wants it, provided the gun is assembled correctly. There are many brands and different types of gas metal arc welding guns. Generally, with each type of welding gun there is some variation of a goose neck or pistol grip design used for the GMAW process. This article addresses feedability issues using a manual (semiautomatic) GMAW gun.

Typical components of a gun and cable provide gas flow, weld power and wire feeding. There can be upwards of 20 plus components of the gun assembly to be aware of including: trigger switch power connection, wire guide liner, components of the nozzle end, insulator, tip diffuser, contact tip, nozzle, etc.

These guns are typically rated between 150 to 750 amps. It is important to match the duty cycle of the gun to the job requirements to prevent overheating issues.

Standard gun lengths are typically between 10' to 25'. Match the gun

- Blow out the gun liner occasionally using dry air to prevent accumulation of dirt and metal particles. A good practice is to blow it out every 1 to 3 wire spool changes. This will depend on the surrounding work environment.
- Replace the liner when necessary, making sure it is sized properly to fit from the wire inlet end of the gun to the contact tip diffuser. Also be sure to match the diameter of the wire to be used.



- All connections should be tight. Often when the contact tip or connections are loose, an interruption in the current flow is created causing welding issues.

Worn or wrong size contact tips will cause poor wire feeding and unacceptable arc characteristics. Contact tips should be replaced when worn.



### Worn Contact Tip

- When using gas shielded wires spatter build up in the nozzle, may also cause poor feeding which in turn can cause burn back from arcing at the gas nozzle or contact tip.



### Oversize Contact Tip



### Burn Back To The Tip



### Spatter Build-up

## Weld wire and gases

- If everything is working fine initially, then after a change of wire or gas you started having problems; check replaced items first. Replace the wire or cylinder of gas with one you know to be good.
- Unconsumed wires exposed to humidity or a dirty environment for a prolonged period can experience feeding and arc stability problems. It is recommended to place the spool or coil of wire back in its plastic bag, preferably with a desiccant packet, and store in a dry environment while not being used.

## Weld Wire Lubrication

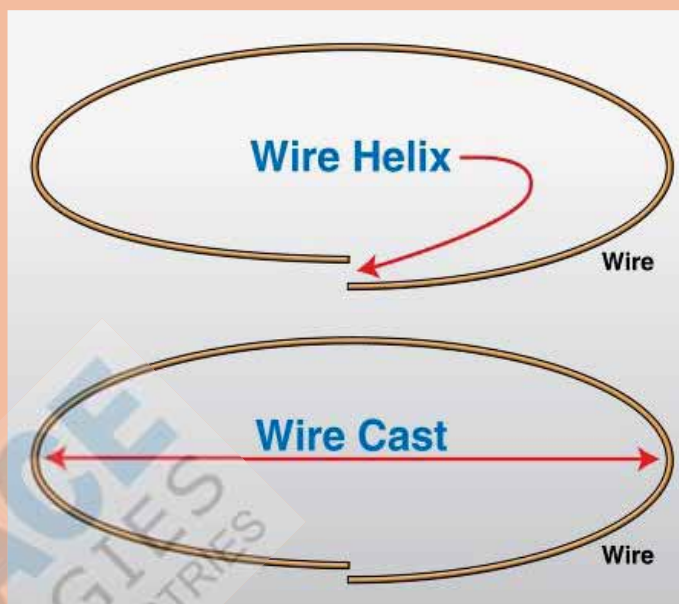
This is not typically an issue but it has been known to happen. Too

much lube on a wire can cause it to come off at the gun inlet and in the liner. The lube then builds up and chokes the feeding process. Wire feeding through a steel liner with too little lube on a steel sheath causes drag and feeding issues.

## Cast & Helix

Problems with cast and helix are rare but do occur. Too little cast or too much helix can cause drag in the gun liner, wire wander or both. To check cast, carefully unwrap wire from the spool, coil or drum. Be sure that you remove enough wire that when laid on the floor you have one complete circle meeting at the ends. The diameter of this wire circle is the cast and the rise off the floor of one end of the wire is the helix.

**"A regularly scheduled maintenance program will ensure fewer breakdowns and sounder weld deposits."**



## Quick review of maintenance steps

1. Check electrical connections. Ground clamp, cable conditions, tight connections.
2. Check spool tension, drive roll tension and wire condition.
3. For drum feedability issues make sure you are feeding wire in the manufacturers recommended way.
4. Check that drive rolls are properly selected, sized, clean and aligned.
5. Check that the welding gun being used meets the duty cycle limits of the job. Is the proper length and the right consumables for the wire being used.
6. Blow out the gun liners in accordance to usage and environment.
7. Check that the wire guide tubes, liners and contact tip are not worn and overused.
8. Set up a regular inspection and maintenance schedule based on usage and work environment.

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