

Vacuum Metallizing Electrical Problems

Published now and again

by MIDWEST TUNGSTEN SERVICE

There are problems in the metallizing chamber that may be electrical, but not be immediately recognized as such. We would like to review some problems and highlight the electrical aspects.

A filament such as our #141Z, requires approximately 25 amps each to achieve a temperature of 1100 C. Current must be uniformly distributed to each filament, otherwise we have problems. One is an inconsistent evaporation of material from filament to filament; e.g. some filaments are balled with leftover evaporant and some are fired dry. Some filaments may have a short lifespan. Looking into the chamber as the filaments are firing, all filaments should light up simultaneously and evenly. If filaments begin to light at one end only or light up in sequence along the buss bar, you have a problem. If filaments light intermittently or irregularly at various points along the bar, you should check the stand-off bars to review how they are made and how they clamp. Well designed, well maintained tungsten stand-off bars yield uniform contact.

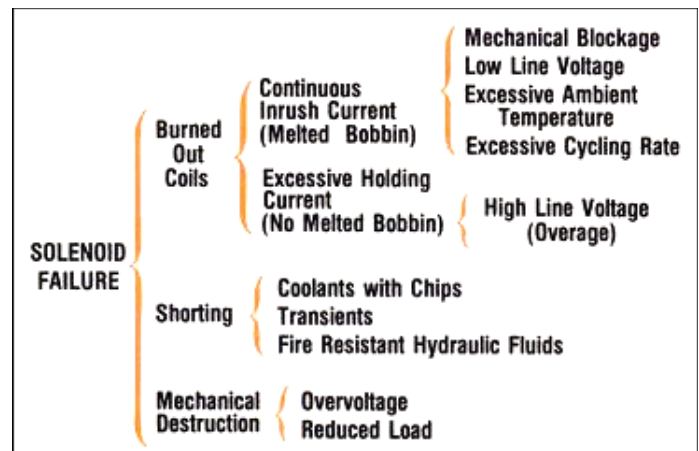
Solution: Correct a lack of uniform lighting by loop the buss bar. Rather than bringing in power from one end of the bar and having it travel to the other end, bring power in from both ends. To correct intermittent lighting, see our TIPS on STAND-OFF BARS for help with design and positioning of standoffs.

Evaporating different metals may require different filaments and temperatures. More power may be necessary. If upgrading the power supply, this is a good time to examine the power controls also for proper operation and to assure they can handle the higher power levels.

Solution: The kVA is usually noted on a plate inside the back of the control panel: check it out. Have your electrician check out the wiring. If you need more power, there are people available to handle the problem at a reasonable cost.

Electrical controls. Many companies turn to automation for uniformity of system operation. Occasionally the system fails to complete the automatic cycle. Valves

are opened and closed with an air cylinder of some type. This cylinder is activated by a solenoid which converts electrical current to mechanical motion. Solenoids have close voltage tolerances. A solenoid may not operate properly if there is above 10% variation in the voltage. Such variations are the result of a spike in line voltage, or a voltage drop on a long electrical run. Solenoids are also subject to mechanical failure and burnout.



Solution: Monitor line voltage fluctuations during a working day. Check solenoids for signs of damage. See chart.

Excessive pump time is a problem that may be caused by an electrical misadventure. Usually this is a problem with a bad analog timer or analog controller on the diffusion pump cooling system. Fine particles magnetically attracted to contact points will throw the unit off. There is also the possibility of maladjustment or physical damage to the temperature control. If the unit is tilted or hit sharply, it may need to be readjusted or replaced. Readjustment is easy if you are knowledgeable in this area.

Solution: Use a pyrometer to verify temperatures. Check analog controllers for proper function. Consider upgrading to digital controllers.

The same kind of a problem can be experienced with all analog timers and controllers in the system. The relays and contact points are frequent failure points. Consider upgrading to digital timers and controllers throughout the system. An additional benefit is that digital controllers offer greater accuracy and tighter control of temperature.

IF YOU NEED MORE INFORMATION, DO NOT HESITATE TO CONTACT US.

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