

# **POWER NOTES:**

## **Wire and Ratings**

### **AMPERAGE**

### **VOLTAGE**

### **HEAT RESISTANCE**

**The Problem:** We have all had a mold or a die stop heating. Examining the electrical box near the mold or die reveals that the wires are burned off. Sometimes we find the cause is not at the box but at the mold where the wires are burned off the heaters. These are common problems with heated dies, heat seal bars, and heated platens.

**The Cause:** Not using the appropriate type of wire for the job.

**The Solution:** Wire has several electrical ratings with which we must be concerned: Voltage, amperage, and heat resistance. Voltage ratings are very important concerns because we need to have wire with insulation capable of handling the required voltage. Most wire used in our industry is rated at 300 or 600 volts. When heaters are wired in series on a higher voltage often we forget that the voltage on the wire can be twice that of the voltage on the heater. In an application of the two 120 volt heaters in series, on 240 volts, the maximum voltage could be twice the 120 volts or 240 volts; there is not a problem because the wire would be rated for 300 volts. But if you have two 240 volt heaters in series on 480 volts, the wire on the 240 volt heaters would have to be rated for 600 volts rather than 300 volts otherwise the wires could short to ground or between themselves due to the lower rated insulation on the wires. Amperage rating is also very important. Most wire is rated at a stated amount of amperage at room temperature (30 Deg.C). If the ambient temperature is raised to 90C, which can happen near a machine with a heat seal bar, the amperage rating or current carrying capacity of the wire is reduced greatly and burned off wires can result. Why? The higher heat altered the wire from being a current carrying device to one that resists carrying current.

Heat resistance rating is an important factor in determining the type of wire to be used in a particular application. Heaters routinely generate temperatures of 200 Deg.C or more. Therefore, consideration must be given to plating copper or iron wire with nickel, which results in greater heat resistance. Our next concern is the need for wire covering that can withstand temperatures up to 500 Deg.C. There are several coverings available that are capable of handling these temperatures. Two examples are TGGT, rated to 200 Deg.C and MGT, rated to 450 Deg.C. These coverings are each rated to 600 volts. Our final concern is that the current carrying of the wire is still rated at room temperature (30 Deg.C) and must be de-rated based on the temperature to which the wire is exposed. Therefore, a high temperature 14-gauge wire rated at 75 amps at 30 Deg.C may not be able to handle any more that 30 amps at 200 Deg.C. Wires burn off heaters if they are

under rated in amperage and heat resistance. Power Modules has developed charts that can help you properly size amperage to heat resistance.

As we can see, trouble can be avoided by paying close attention to the three ratings on wire: voltage, amperage, and heat resistance. Properly selected wire will reduce downtime, extend equipment life and reduce or eliminate defective packaging.

Power Modules Inc., carries a wide range of wire to satisfy all your needs. In addition, we have the knowledge to match the appropriate wire to your equipment. PMI has the solutions to keep you running and productive.