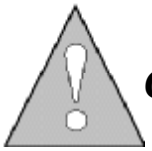
SECTION G5: TROUBLESHOOTING



CAUTION!

Regular inspection of all guards, protective devices, point of operation safeguarding systems and mechanically loaded components is recommended. Component devices or guarding which show signs of wear, fatigue (cracks, distortion), or damage of any type should be replaced immediately.

Problem: Runner tail too long or too short
Cause: Incorrect nozzle temperature balance

The heat balance between the nozzle and the tooling, (nozzle seat), must be correct and relatively consistent for proper system operation.

Nozzle heat balance

During a cycle, molten alloy is pumped from the gooseneck, through the nozzle and into the tool cavity. The tool remains on the nozzle sufficiently long for the alloy to solidify in the cavity and runner. The alloy also freezes slightly into the nozzle before the moving mechanism retracts. When the moving mechanism retracts, this small section of solidified alloy is pulled out of the nozzle. This is referred to as the "tail" of the runner. The length of this tail indicates whether the nozzle is running "cool", "hot" or at the correct temperature. (See "length of runner tail" below.) After the tool is retracted from the nozzle, only a small section of solidified alloy remains in the nozzle.

Heat balance refers to the optimum operating temperature of the system. This temperature is attained by balancing the temperatures of the tool and the nozzle by controlling the time they are in contact with each other, the torch temperature, the coolant and the time delay between cycles.

Adjusting the nozzle heater

The nozzle heater should be adjusted so a soft, blue flame envelops the nozzle. The flame should be aimed towards the base of the nozzle. The torch temperature can then be considered "fixed". The melt pot temperature is also fixed and should be set at 435° C (815° F). As the tooling is water cooled, the coolant supply should be of consistent temperature and flow.

Correct operating temperature

At the beginning of a cycle, the nozzle is hot, and the tool is relatively cool. As soon as the tool comes in contact with the nozzle and an injection takes place, the tool warms up and the nozzle cools down. When the tool retracts from the nozzle, the nozzle heats up, (from conducted heat from the melt pot and the heat of the nozzle heater), and once the hot component is ejected, the tool cools down.

When the system has been cycled 30 - 40 times, an equilibrium temperature will be reached. At this time, several runners should be examined to determine if the system is operating at the correct temperature.

Length of runner tail

The tail on the runner should be between 1 and 2 mm (.040 and .080 inch) long. A "cold" system will have a long tail on the runner. A "hot" system will have a short, or no, tail on the runner.

There are several problems associated with having the runner tail too long or too short.

A cold system

A long runner tail will tend to scrape across the nozzle seat as the component is ejected from the fixed tool. Alloy will build up on the top portion of the nozzle seat and prevent the fixed tool from seating on the nozzle properly. This condition usually results in flash between the nozzle and the seat on the bottom side of the nozzle.

If this "cold" condition is very bad, short shots can result. The small portion of solidified zinc in the nozzle after the tool has been retracted may not have sufficient time, (or heat), to melt before the next cycle. The nozzle becomes clogged with solidified zinc.

To correct a cold condition

1. Check the nozzle heater flame. Be sure a breeze is not blowing on the flame, and it is set correctly. Adjust the torch if necessary or guard the machine from breezes.

2. Cycle the system until the system has reached operating temperature. Check the length of the runner tail. If the tail length is correct, continue. If the tail length is still long, check the tool temperature. The tool should be warm to the touch, but not hot enough to burn. If the tool is too cold, reduce the coolant flow to the tooling. If the tooling temperature is set properly, lower the injection time (to a minimum of approximately 8/100's of a second). Also lower the next timer (Delay Mechanism Retract) to a minimum of 5/100's of a second. If this does not solve the problem, increase the time between cycles (Recycle Time) to allow the nozzle more time to warm up.

A hot system

A short runner tail presents less of a problem than a long tail on the runner. In the extreme case, the alloy can be "sucked back" out of the cavity because the alloy does not solidify in the nozzle at all. The alloy is injected and as the plunger retracts, the alloy is drawn back out of the cavity and runner. However, even if the condition is not bad enough to allow suck back, a short tail condition can cause flashing on the nozzle. If the tool is retracted and the alloy has not solidified into the nozzle, some molten alloy can end up on the nozzle seat or nozzle tip. During the next cycle, the tool will not seal correctly on the nozzle, resulting in flash.

To correct a hot condition

The nozzle heater should be checked to ensure it is not set too "hot". The flame should be soft and blue in colour. The "on nozzle" time can be increased to allow the tail to freeze sufficiently far into the nozzle.

Problem: Alarm push button illuminates, and the system will not cycle.
Cause: A Cable Processor Module or machine switch has failed to open

Switch failure

To determine which switch has failed to open, use the operator interface module in conjunction with the electrical connection diagram found in Section K: Machine Reference Drawings.

To look at the status of a switch, first detemine which input corresponds to the switch. Inputs corresponding to the switches are identified on the electrical connection diagram as I:0/input number (i.e. I:0/5). Using the Allen-Bradley Data Table Access Module, press [shift], [I], [Enter]. Sixteen bits will be displayed on the LCD. The rightmost bit is input 0, the next bit is input 1, etc., up to input 15, the leftmost bit. A switch is open if its corresponding input display is 0 and is closed if the input is 1.

Once identified, adjust or repair the failed switch. Reset the alarm by pressing the Alarm illuminated push button.

Note: When the Alarm light illuminates, do not immediately reset the alarm by pushing the Alarm illuminated push button. Doing so will remove the alarm before the cause can be identified. Resetting the alarm before identifying and correcting the cause may pose safety problems, (for instance, the Cable-In-Place switch may be stuck closed. Resetting the alarm before correcting the stuck switch problem may allow an injection to take place without a cable in the tool).

System operational problems

- Control power on
- Auto mode selected
- Nozzle heater on

Problems	Possible causes and solutions
- the control power will not come on.	- there is no power to the Control On switch. - check the time switch setting. - check the main breaker - is it on? - are the fuses O.K.? - is the melt pot turned on?
- the melt pot will not heat up.	- is the melt pot element connected? - is the melt pot turned on? - is the thermocouple for the melt pot control connected and operating properly? - check the condition of the heating element, the contactor and the time switch setting.
- the system will not cycle.	- the Cable Processor Module Closed switch is not closing. -check for debris between the tool faces. -check the switch setting. - the machine is in “stuck switch”. -check using the operator interface module.
- the system starts to cycle, the Cable Processor Module advances onto the nozzle, but then the cycle stops.	- the Moving Mechanism Advanced limit switch did not close. -debris is on the nozzle or nozzle seat, and must be removed. - the Mechanism Advanced limit switch is out of adjustment -check the switch and reset it.
- the system cycles completely but will not inject.	- the Cable-In-Place switch did not close. -adjust the switch according to instructions.

- “short shot”.	- the injection fill gap is not set properly. -set the fill gap to 0.030 to 0.050 inches (0.8 to 1.2 mm). - the injection time is too short. -adjust the injection time to the time on the original timer pressure chart. - the melt pot temperature is too low. -check the temperature with a separate temperature indicator. - the plunger is “tight” in the injection unit -remove the plunger and clean it according to the manual. - the injection pressure is too low. -adjust the injection pressure to the pressure on the original timer pressure setting chart. - the melt pot level is too low. -replenish the alloy. - the cable upset is set too far back in the cavity and is choking off the gate. -position the upset cable properly in the cavity.
- zinc is “flashing” between the nozzle and the nozzle seat.	- the nozzle alignment is poor. -check the alignment using tissue and adjust if necessary. - the nozzle is damaged. -replace the nozzle or lap it if the damage is minor. - the nozzle seat is damaged. -lap the nozzle seat. - the torch is too hot. -adjust the flame so it is “soft” and aimed at the base of the nozzle.

- zinc is building up on top of the nozzle.	- the runner “tail” is too long and is scraping on the nozzle seat as the part is ejected from the fixed tool. -to decrease the length of the tail, decrease the “on nozzle” time, increase the torch temperature, increase the cycle rate (to allow the nozzle to warm up between cycles), or decrease the coolant flow. - a breeze or draft is blowing the torch flame -close doors or windows or put up a barricade.
- the part is porous, pull-off is low, or there is a small hole where the runner breaks off from the termination.	- these are all indications that alloy is being injected into the cavity and then “sucked back” out of the cavity. -increase the injection time. -check the melt pot temperature with a separate temperature indicator to ensure it is not too hot. -check the coolant flow.
- there is alloy “flashing” between the tool faces.	- the Cable Processor Module Closed switch is not set correctly and an injection is taking place despite the tool faces being held apart by debris or a strand of cable. -clean the tool faces thoroughly and set the Cable Processor Module Closed switch according to the instructions.
- runners are breaking off and dropping onto the fixed tool.	- the termination is sticking in the movable tool slightly, momentarily lifting the termination out of the fixed tool and weakening the runner attachment. -check an assembly for drag marks on the movable tool side and polish the tool to eliminate the drag. - the ejector advance time is too short -increase the ejector advance time.

- the terminations are sticking on the ejector pins (the part goes up and back down with the ejector pins).

- the ejector pins are set too high and are protruding into the termination, and the termination is shrinking onto the pins.
  -adjust the ejector pin height so that the pins are flush with the cavity.

- alloy is flashing around ejector pins.
  -fit new pins to eliminate the flash.