

Maintenance

As with all manufacturing machinery, permanent mold casting machines must be properly maintained in order to yield their expected service life and the up time required to operate at a profit. Proper machine maintenance is an investment in future profit, not a burden. The following is an example of specific checkpoints for your HALL casting machine.

Check Daily:

1. Tilt Cylinders
 - 1.1. Check the joint at the cylinder rod eyes. Joints should be tight at all times. Tighten using a wrench on the wrench flats of the cylinder rod.
 - 1.2. Check and maintain cushion adjustments. The last one half inch of travel on each end of the stroke should take at least three seconds.
2. Ram cylinders
 - 2.1. Check the bolts that secure the ram slide into the ram cylinder rod end. These joints should be tight at all times
 - 2.2. Check the bolts that fasten the ram cylinders to the rear member of the machine. These joints should be tight at all times. Tighten bolts in a “criss-cross” pattern.
3. Ensure that all hoses are secured by the correct hose clamps and are not rubbing on any part of the machine.
4. Check all fittings and hoses for leaks. Tighten, repair, or replace as necessary. Fluid leaks are messy, can shorten pump life, and are a safety hazard.
5. Make sure all platens are clean and free of nicks and sharp edges.

Lubrication weekly:

1. Waybars or tiebars (if a waybar type machine)
 - 1.1. Ensure that waybars are clean and free of any dirt, grease, oil, and fused on aluminum. Use a solvent such as naphtha to de-grease as necessary.
 - 1.2. Apply a thin film of dry moly sulfide lubricant to the top, bottom, and working side of the waybars.
 - 1.3. Manually move the ram back and forth several times to ensure that the dry lubricant is evenly distributed. Never apply grease or oil to the waybars.
2. Tilt cylinders:
 - 2.1. Rod eye – one or two shots of high quality industrial grease
 - 2.2. Rear cylinder mount – one or two shots of high quality industrial grease
3. Trunnion bearings:
 - 3.1. One or two shots of high quality industrial grease

In order to reduce the probability of plant fires, hydraulic safety fluid has become the fluid of choice in most permanent mold casting operations. Hydraulic lines on permanent mold casting machines are usually close to sources of ignition such as molten metal and gas flames. Permanent mold casting machines experience hard usage and hydraulic lines can fail. If the hydraulic fluid is flammable, a fine spray of super heated oil striking an ignition source can start a fire.

The most common fire-resistant fluids in use are water glycol solutions. These fluids are normally composed of forty percent and sixty percent glycol. Fire resistance is good only if the water content remains within the specified range because the fluid resists fire by the snuffing action of the water. They lubricate efficiently up to 150°F and at pressures below 1500PSI depending on pump design. Continued use at temperatures high enough to cause rapid evaporation or boiling should not be permitted because the residue remaining after partial evaporation is flammable and does not provide the lubricity necessary for hydraulic components.

Check Daily:

1. Fluid level
 - 1.1. Check level with machine tilted down and ram open.
 - 1.2. Filter all new fluid with a five-micron filter as it added to the machine. New fluid does not meet the ISO cleanliness standards.
 - 1.3. Fill at designated filler strainer locations only.
2. Fluid temperature – fluid temperature should run at 140°F or less.
3. Fluid viscosity (water 40% - glycol 60% safety fluid only)
 - 3.1. Check fluid viscosity using a refractometer (follow refractometer instructions).
 - 3.2. Refractometer reading should be forty-three on the brix scale.
 - 3.3. If water must be added,
 - 3.3.1. Use only distilled deionized water.
 - 3.3.2. Mix water 75% with 20% new filtered water glycol safety fluid
 - 3.3.3. Add mixture to reservoir slowly through the filler breather with the pump running under no load.

Hydraulic filters:

Hydraulic filters should be changed monthly or ever 400 hours; which ever comes first.

Check monthly:

1. Fluid should be checked monthly by a laboratory.
 - 1.1. Lab analysis should include:
 - 1.1.1. Particle count
 - 1.1.2. Particle size
 - 1.1.3. Spectrographic or scanning electron microscope analysis
 - 1.1.4. Ph balance
 - 1.1.5. Viscosity
 - 1.2. Acceptable fluid contamination levels:
 - 1.2.1. ISO 4406 standards for particle size and count:
 - 1.2.1.1. 17/15/12 proportional tilt valve
 - 1.2.1.2. 18/16/13 directional control valves and vane/piston pumps
 - 1.2.1.3. 20/18/15 cylinders
 - 1.2.1.4. 20/18/15 new unused fluid

Note: explanation of ISO 4406

ISO Code	Particles/milliliters		
	≥ 2 Micrometer	≥ 5 Micrometers	≥ 15 Micrometers
19/17/17	5,000	1,300	160
18/16/13	2,500	640	80
17/15/12	1,300	320	40
16/14/12	640	160	40

FILTERS

Main system filters

Return	Zinga – SLE-10 Replace after first 50 hours every 250 hours thereafter
Cooler	Zinga –OZLE-03 Replace after first 50 hours and every 250 hours thereafter
Filler/breather	Zinga – SE-10 Replace annually