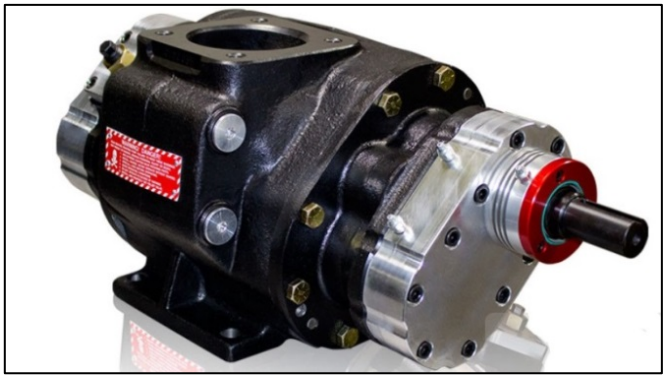
Using Heat and Pressure

(A best practice startup procedure for circulating asphalt)

Introduction:

This document covers the use of *heat and pressure* as a best practice for starting an asphalt system using a BearCat Pump. The paper will describe necessary equipment for the procedure and the reasoning for it. Finally, it will compare the *heat and pressure* method with common methods that include flushing with solvents or diesel, and/or reversing the pump to empty the pipes.



The problems with traditional methods of shut down:

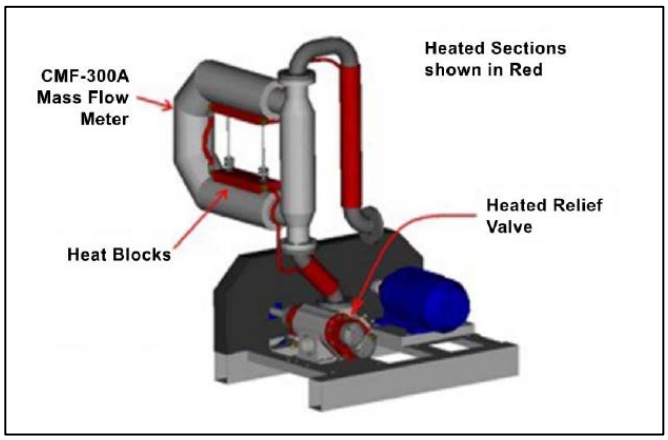
A common clean out method that includes reversing the pump to empty the pipes and flushing with diesel, can create significant problems. The primary reason this method is used can be best explained by observing a key detail in the picture below. Notice that the paint on the relief valve is still glossy. If it were getting heated, it would also brown and crack (like the outer body and screen box). Should the piping plug downstream, pressure can build to a dangerous level, *because the relief is frozen*!

The traditional solution here is to reverse the pump and/or flush with diesel. When using solvents to flush, bearings and seals are stripped of their lubricity, expediting wear and reducing efficiency.

Pipe walls coke faster when emptied, as the residual asphalt and solvent are now exposed to oxygen. As this happens on a regular basis, the piping system becomes restrictive, forcing the pump to either work harder or lose production efficiency.

Heat and Pressure Startup:

This method requires three key elements to work properly. Heat tracing of all components, *heated* relief valve on the pump, and a VFD to control the speed.



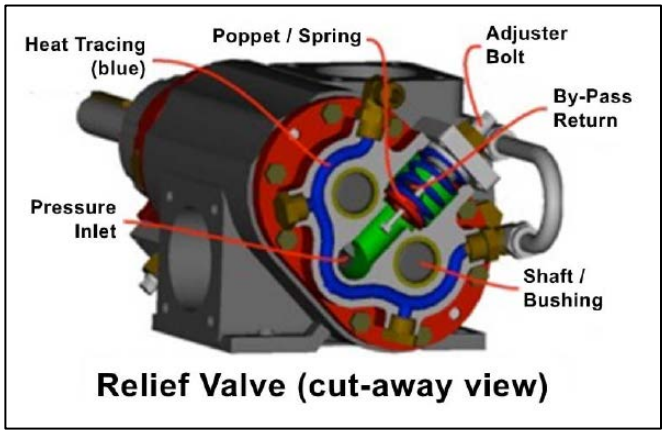
1. Heat Tracing and Insulation:

Pipes, pumps, valves, meters, etc. should all have some type of heat tracing (see diagram).

Note: Though not critical, insulation helps the pipe and/or component to get hotter quicker. It can also significantly reduce your heating bill, and will likely pay for itself in reduced energy cost.

2. Heated Relief Valve:

The heat-jacketed end plate (see diagram) insures that the asphalt left in the *relief valve inlet passage* liquefies before the pump thaws enough to rotate. In doing so, it not only insures that the pump relieves at its intended pressure setting, but it also becomes a valuable tool to the overall start-up procedure as we will discuss below.



3. Variable Frequency Drive (VFD):

The VFD allows the pump to operate at a low speed. Early in the heat up process, the pump (because it has a high amount of heat tracing) will be first to thaw. Once it is able turn, and even though the piping may still have slugs, it can operate at a slow speed producing 80 psi at a flow rate that is fully by-passing (within the *heated* relief valve). This pressure slowly pushes cold slugs that generally reside between components (such as a flange joints) downstream into heated sections. With this shift, the slug loses its resistance, and the flow starts to increase.

Note: Observing amperage from the VFD is a clear indicator of when the flow breaks free.

Summary:

Using *heat and pressure* for startup has numerous advantages over reverse and flush (with diesel). As we established above, shutting down and leaving the pipes full (of asphalt) prevents costly coke build up. When controlled by a VFD, and with fully heated relief valve, the pump can now produce the slow, steady pressure necessary to establish a timely flow.