



**HOT, COLD, WET OR DRY, GRAPHALLOY®
BEARINGS WORK WHEN OTHERS FAIL.**



GRAPHALLOY® - Crucial to Success of Pentane Pumps in Geothermal Power

Eliminates Galling in Low Lubricity Fluids

Pentane is a low lubricity, low boiling point liquid. Whenever there is an upset, pumps in pentane service risk galling. Because of the nature of this pumpage, GRAPHALLOY® wear parts are selected to provide a margin of safety and prevent galling.

Why Pentane in Geothermal?

Geothermal power generation must operate with whatever temperature is found in a particular well. Water and steam work well at high temperatures. At lower temperatures, a "binary system" may provide better efficiency.

In a binary system, the hot fluid from the geothermal source is used to heat a second, lower boiling point fluid (in this case, pentane) to convert it to gas and drive a turbine. The nature of pentane allows the whole cycle (fluid to gas, drive the power generation turbine, and condense to fluid) to take place efficiently at a lower temperature.

At this location, a binary system is being used to squeeze additional power from the hot condensate leaving a primary water/steam turbine. Using an additional set of heat exchangers this energy is captured to heat low boiling point pentane and to drive an additional turbine. The pentane system harnesses more of the energy brought out of the ground. Like getting something for nothing.

The Challenge

A major U.S. geothermal power plant experienced difficulties with their pentane feed pumps. The pumps are Goulds model 12RJHC-7 stage vertical can pumps. They have a shaft diameter of 1.5 inches with an 18 inch diameter suction can. Each pump is driven by a 125 HP, 1800 RPM electric motor.

Service Conditions:

Flow: 966 GPM

Total Developed Head: 476 Feet

Specific Gravity: 0.58 SG

Temperature: 123° F/51° C



Bearings: originally fitted with bronze bearings

The plant's pentane pumps were experiencing deflections on start-up and shut-down. This caused the rotating sleeves to come into contact with the bronze bearings. Because of pentane's poor lubricity, this can cause severe wear or galling and risks damage or seizing of the pumps.

The Solution

To eliminate this problem, the maintenance staff consulted with the engineers at Graphite Metallizing and converted the bowl and line shaft bearings to a GRAPHALLOY bronze grade. The upgrade was a relatively simple procedure allowing the pumps to return to service quickly. The pumps have been in operation without issues for over 3 years.