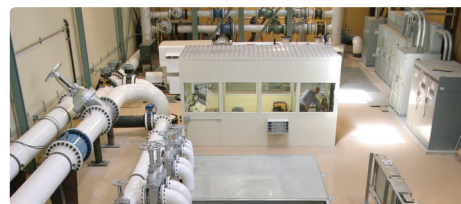


PUMP Test REPORT

PROVEN RESULTS FOR ENGINEERED UPGRADES

APRIL 2015



Performance and Critical Speed Testing

Hydro's Test Lab worked with a major pipeline transmission company to validate the performance and mechanical operability of a remanufactured Bingham pump. In addition, the customer was interested in identifying any critical speeds the pump may be subject to over a range of operational speeds. By identifying the critical speed in a controlled test environment, the customer is able to avoid operating the pump at or near the critical speed thereby ensuring safe pumping conditions.

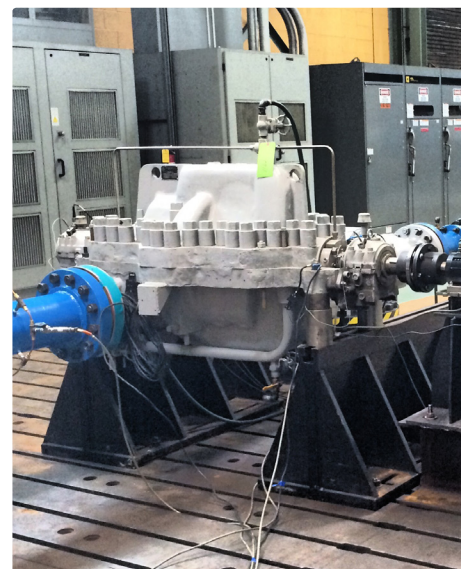
In the field, the pump is driven by a Variable Frequency Drive (VFD), which regulates the pump's speed in an effort to reduce power consumption and wear on the pumping system during times of lower pumping demand. If a critical speed was present below the maximum pump speed, the pump would be subject to damaging resonant vibrations as it passes through or operates within 10% of the critical speed. The critical speed was discovered at approximately 3100 RPM. In the field, the operators can use this information to avoid this damaging critical speed during operation.

The pumping industry has made vast improvements over the years in material and engineering upgrades. However, hydraulic performance enhancements have not kept pace with mechanical upgrades and modifications. Hydro remains independent of the constraints that can be imposed by relying on existing hydraulic designs and manufacturers' predicted performance curves. To better meet our customer's needs, Hydro's Test Lab now offers critical speed testing for our customers.



Testing doesn't interrupt our business. It is our business.

INDUSTRY	Oil & Gas
MANUFACTURER	Bingham
TYPE	Multistage, Axially Split, Between Bearings Pump (BB3)
MODEL	MSD
SIZE	6x8-11B
STAGES	5
IMP. DIA. (IN.)	10.625



This test was performed within days of receiving the pump from the customer, allowing a swift turnaround time needed to ensure minimal downtime for the customer.

PTR1504