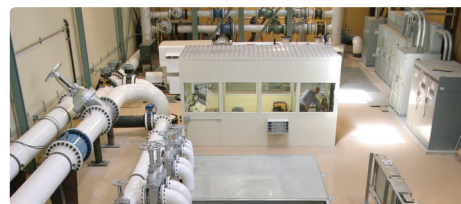


PUMP Test REPORT

PROVEN RESULTS FOR ENGINEERED UPGRADES

NOVEMBER 2014



Full Train Validation Test for Crude Oil Pipeline Pump

Hydro continued its support of the Oil & Gas industries earlier this month with a Full Train Validation Test of a remanufactured pump package for crude oil pipeline application. A Full Train Test validates not only the pump's hydraulic performance, but the mechanical operability of the pump, motor, coupling, baseplate, etc. This validation provides customers with confidence in future operation and assurance prior to installation on site.

A Certified Performance Test (CPT) and Net Positive Suction Head (NPSH) were performed in order to measure and establish the hydraulic performance of the pump. Using the known motor efficiency, a pump efficiency and overall system efficiency were established. Throughout testing, sound and vibration data were monitored and recorded continuously at 12 locations on the pump and motor. Waterfall and Bode plots were used to evaluate any existing sub-synchronous critical speeds. Mapping any existing critical speeds is crucial for any system, particularly those operated by Variable Frequency Drive (VFD) in which a multitude of load scenarios may be required of the pump. In this instance, Hydro's VFD was utilized to pinpoint the exact running speed required to meet the expected load and pressure conditions on site.



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

INDUSTRY	Oil & Gas
APPLICATION	Crude Oil
MANUFACTURER	Ingersoll-Rand
TYPE	Single Stage Horizontal Split Case
MODEL	-
SIZE	12x14-17FA
STAGES	1
IMP. DIA. (IN.)	-



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.

PTR1411