



## **WESTPOWER'S HYDRAULIC RE-RATE & RE-ENGINEERED PUMPS OPTIMIZE PERFORMANCE**

### **KEY FACTS**

**LOCATION** | Alberta

**PROJECT OBJECTIVE** | Re-rate pumps to accommodate new pipeline process requirements.

**SERVICE TYPE** | Engineering, Pump Re-rate, Repair, Reliability, Performance & Efficiency Enhancements

**BENEFITS** | Hydraulic engineering re-design resulted in pumps operating at optimal design conditions.

Westpower was awarded a re-rate project for a major pipeline client, to re-rate 3 spare pumps based on the customer's new pipeline process requirements. The entire project took 24 weeks from start to delivery. Westpower's stringent hydraulic design practices allowed for the pumps to be supplied without factory testing, which drastically reduced the project lead time and cost.

The advantages of a hydraulic re-rate were shorter lead times when compared to purchasing new equipment as well as cost savings due to this solution being a drop-in replacement requiring no modifications to the client's existing system. It allowed the client to obtain peak hydraulic efficiency, reduce energy consumption and maximize the life of their equipment.

## CUSTOMIZED HYDRAULICS

The customized hydraulic re-design resulted in a 17% reduction in BEP flow rate (550 m<sup>3</sup>/h - 460 m<sup>3</sup>/h), and a 45% reduction in MCSF (340 m<sup>3</sup>/h - 185 m<sup>3</sup>/h). Lowering the minimum flow rate to where conditions are within the allowable operating range.

### The scope of the hydraulic re-design included:

Outlet width was reduced from 1-9/16" to 1-1/4" on 1st stage impeller: **20% reduction**

Outlet width was reduced from 1-7/16" to 1-1/8" on 2nd stage impeller: **22% reduction**

Thrust balancing was changed to match new stage pressures

Throat area was reduced on both stages by ~30% using welded volute inserts

Volute passages were centered with as-machined geometry for improved hydraulic balancing

## SOLUTION & OUTCOME

Based on customer supplied site data, it was discovered that two of the three pumps were operating in series at 310 m<sup>3</sup>/h. The first pump was operating at 297m differential head and 3172 RPM, and the second pump was operating at 274m differential head and 3043 RPM.

Two additional RPM curves were added to match the site VFD readings and are shown in the figure below. The efficiency was within +2% of initial calculations. The sales curve would

indicate the head at 3172 RPM and 310 m<sup>3</sup>/h is 295.5 M (actual head 0.5% high). The sales curve would indicate the head at 3043 RPM and 310 m<sup>3</sup>/h is 269 M (actual head 1.8% high).

Westpower customized three pumps based on the client's requirements and this project was delivered on time and on budget. As a result of Westpower's successful hydraulic engineering re-design, the pumps are currently operating at their optimal design conditions.

