

Feature: Hydraulics & Pneumatics

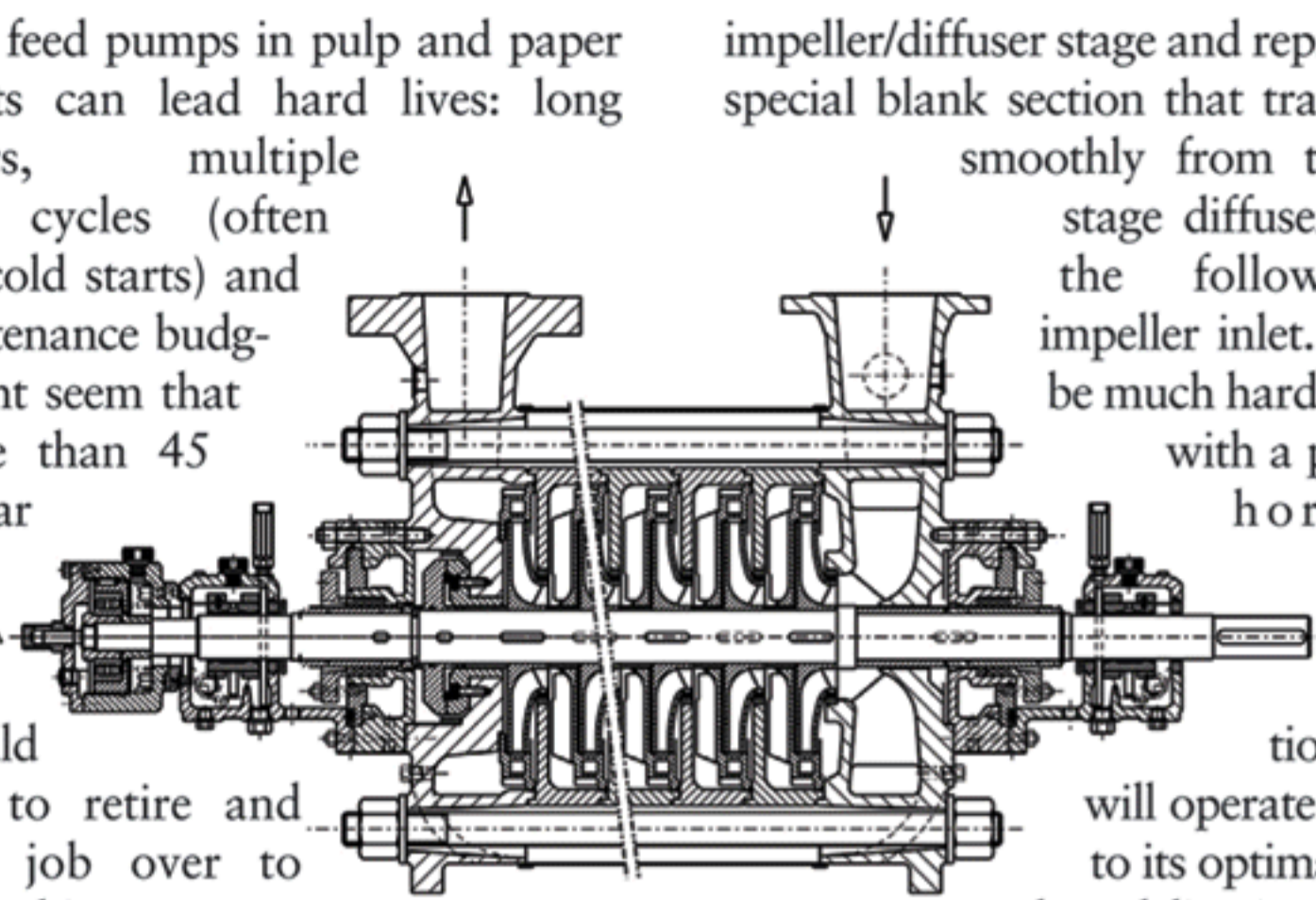
Re-design gives 45-year old pumps a new life

Boiler feed pumps in pulp and paper plants can lead hard lives: long hours, multiple stop/start cycles (often involving cold starts) and tight maintenance budgets. It might seem that after more than 45 years of near continuous service, a pump would be ready to retire and hand the job over to something a bit younger.

But this isn't the case for a HDA-series boiler feed pump from KSB Pumps Inc. installed at the Mercer International's Celgar pulp mill in Castlegar, BC. Three KSB HDA-series boiler feed pumps were originally installed in the Celgar mill in 1960. Since that time, however, the mill has undergone a number of changes and upgrades in order to adapt to changes in market conditions and environmental regulations.

Recent changes to the plant operating setup eliminated the need for two of the pumps and reduced the flow required from the remaining pump from 193 to 102 m³/h, both at a head of 610 m. This reduced output could be achieved by throttling the flow at the boiler control valve, but would mean running the pump at an off-optimal duty point. Operating in this manner would reduce energy efficiency and could also lead

impeller/diffuser stage and replace it with a special blank section that transfers water smoothly from the previous stage diffuser outlet and the following stage impeller inlet. This would be much harder to achieve with a pump with a horizontally split casing. With the reconfiguration, the pump will operate much closer to its optimal duty point when delivering the amount of boiler water required by the plant. By



retaining the old HDA pump casings, it will be possible to retain the old drives, supports and piping systems with minimal changes. Moreover, the surplus HDA pumps are available for use as standbys or as sources for spare parts.

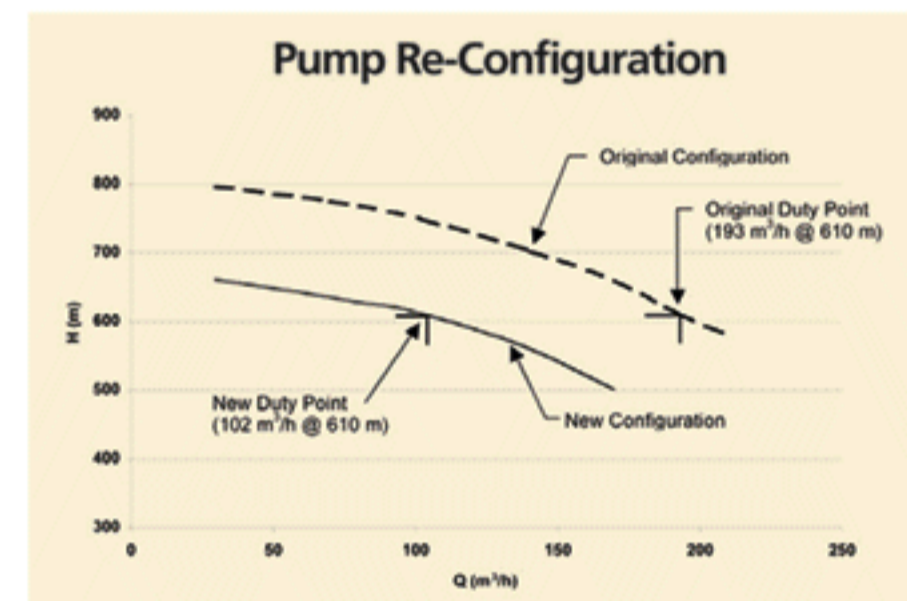
There were several other factors that made it possible to retrofit the old HDA pumps for the new plant setup. First, because of the inherent toughness of the HDA pumps, key components (casing, shaft) were in good condition, even after 45 years of service. And second, even though the HDA pumps are no longer in KSB's current production program, KSB was able to retrieve designs for alternative hydraulic configurations and manufacture parts that would meet the new operating requirements.



Pumps on location in Castlegar, BC. The HDA pump on left has electric motor drive while the one on right is driven by steam turbine. Left: Sectional drawing of the pump type used at Celgar.

KSB Pumps Inc. (ksb.ca), based in Mississauga, ON, is a member of the KSB Group, one of the world's largest manufacturers of pumps, valves and systems. Inproheat Industries Ltd. (inproheat.com) is based in Vancouver.

Circle DPN 321



The solid line represents the pump's new configuration duty point of 102 m³/h @ 610 m while the dotted line represents the original configuration duty point of 193 m³/h @ 610 m. In the pulp and paper mill pump reconfiguration, the new duty point has led to a 23% savings on energy efficiency while preserving much of the plant's surrounding hardware.

to vibrations and noise that would reduce the life span of the pump and nearby valves. Replacement of the old HDA-series pump was also considered, but this would be costly because of need to rebuild or update piping, controls and supports.

So, what to do? Local KSB distributor Inproheat Industries Ltd. was able to suggest a cost-saving alternative. Instead of replacing the old HDA pump, Inproheat and KSB offered to re-configure the pump so that its optimal duty-point would be much closer to the required operating point in the new plant setup. This change is projected to improve energy efficiency savings by approximately 23%.

Re-configuration of the vertically integrated pump involved the removal of one pumping stage and the replacement of the remaining hydraulics (i.e. impellers) with new components matched to the new operating conditions. Thanks to KSB's ring section design for the HDA-series pumps, it was straightforward to remove one

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