



Pump Users  
International Forum 2008

# Technical Paper

## Maintenance and safety operations

### Session 4-4

## Retrofit – Improving Pump Performance and Efficiency

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## Summary

The performance, efficiency and eco-friendliness of pumps can be considerably improved by retrofitting which can lead to substantial power savings and thus to a reduction of CO<sub>2</sub> emissions.

Up-rating of process machinery may be carried out at several levels - ranging from small increases in capacity and improved reliability to major upgrades of complete systems. An important goal is the increase of the efficiency of the pumps. This has not only a significant economical effect but also improves the ecological impact. If less power is needed to drive the pump, emissions of CO<sub>2</sub> into the atmosphere are reduced. The most flexible type for retrofitting is the barrel casing pump which allows the cartridge to be exchanged for a cartridge with an upgraded design. However, impressive up-rate results can also be achieved for axially split multi-stage pumps. The reasons for an up-rate vary from the modernization of old or obsolete equipment to changes in operating requirements and under-performing equipment. The retrofit should also enhance the eco-efficiency of the pump. The objective of all upgrades is to maintain the existing boundary parameters and utilize a maximum number of the original parts, ultimately to ensure considerable, consequential savings in time and cost. Therefore, in many cases, significant benefits from the process are possible with little or no influence on the original footprint area, drive system, utility supplies, skid/site interfaces, and control instrumentation.

We also seek to improve the mechanical characteristics of the pump such as vibration levels, thrust loading, operating temperatures, etc. These can be determined, along with the new hydraulic performance, during factory tests using a test barrel and associated equipment. The upgraded cartridges can be tested to industry standard codes and specifications for new equipment.

Once the need to up-rate existing equipment has been established, a feasibility study is performed to establish the scope of the up-rate in order to meet both the expectations of the end-user and the requirements of the system. From this study, a simple cost-benefit analysis can be carried out which typically demonstrates significant savings. Typical examples of payback periods for multi-stage pumps are 20 to 60 days for a high flow unit, one to two years for increasing the pump efficiency and two to three years for increasing the Mean Time Between Repairs (MTBR).