

**FOR IMMEDIATE PUBLICATION****26 February 2013**

## **The benefits of pump system optimisation**

### **Improved energy efficiency and reliability enhance the bottom line**

For most process industries, rotodynamic pumps represent a key component of their business processes. Too often, however, many facilities will take a “fit and forget” approach to maintenance of these vital pieces of equipment – at least until a critical repair is needed.

There can be severe cost penalties associated with this approach. Some of the most significant include reduced productivity, and higher than necessary energy and maintenance costs. A carefully planned and implemented optimization program can help alleviate these unnecessary costs.

Generally speaking, optimization leads to reductions in energy use, thereby resulting in lower operating costs. And while it is often the anticipated energy cost savings that are used to justify a pump improvement project, the fact is, benefits often extend well beyond energy savings.

For example, shaft misalignment is responsible for up to 50% of all costs related to rotating machinery breakdowns. Accurately aligning shafts can prevent pump breakdowns and reduce unplanned downtime that results in a loss of production.

The point at which the highest proportion of energy from the shaft of a pump is transferred to the fluid being pumped is the Best Efficiency Point (BEP) of that pump. At this point, internal forces in the pump are minimised. As the operating point of a pump moves away from the BEP, this energy transfer efficiency falls and axial and radial forces increase. Although some energy loss is inevitable (for instance, friction at wetted surfaces, at seal faces and within bearings) some of the energy that is not being transferred from the shaft to the fluid is wasted. Of this wasted energy, some is lost by internal recirculation within the pump and some as heat or vibration. These are destructive forces, and so the relationship between reliability and energy efficiency is clear – as more energy is wasted, destructive forces increase in intensity, so reliability is reduced

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### **Case Study: Energy savings with alignment optimization in pumps**

*A customer experienced high vibration levels on 12 pumps, resulting in excessive consumption of both spare parts and energy. An SKF condition monitoring program with SKF Microlog Analyzer showed that the high vibration levels were clearly due to misalignment. Using the SKF TKSA 40 system technicians corrected the misalignment and optimized the electric motor. Measuring energy consumption before and after alignment for the 12 pumps demonstrated an average of 8% energy savings (maximum of 20% in some cases) total kWh/year, along with reduced vibration levels and increased reliability.*

In addition to higher maintenance costs, the costs of unreliability due to forced shut downs can be high. The cost of unplanned shutdowns vary, and in many cases are difficult to quantify. During a one-year survey by a major paper manufacturer at several of its mills, 101 pump reliability incidents were reported, costing a total of \$5 million. Although the value of each of these varied, the average cost per breakdown was almost \$50,000.

The SKF Energy Monitoring Service - Pump Systems is designed to help pump operators track efficiency, as well as actual operating efficiency relative to BEP. Periodic measurements of pressure, flow and power for each pump being tracked provide the data needed for the analysis, which is completed by SKF @ptitude software. This is based on SKF's Operator Driven Reliability concept and provides plant operators with the information they need to establish the optimisation opportunities available within their pump systems. In addition, it can be incorporated into any condition monitoring program. In fact, SKF recommends that condition monitoring programs be adapted to include this data, as condition monitoring alone does not provide all the information needed to assess the health of a pump: energy efficiency is a key component of the information needed.

Pump system optimisation provides real opportunities to improve reliability and to reduce costs. There are many tools and training courses available to help provide the knowledge needed to implement a program to realise these opportunities. Where investment is needed to capture the benefit, the full array of cost savings should be estimated to provide a realistic ROI for that investment.

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Given that energy costs are by far the largest component of the life cycle costs of owning a pump, plant operators owe it to themselves to assure the highest level of pump optimization attainable. By working with the SKF Energy Monitoring Service - Pump Systems to incorporate the right tools and services into their condition monitoring programs, plant operators can go a long way toward maximizing their pump operations.

#### **About SKF**

SKF is a leading global supplier of bearings, seals, mechatronics, lubrication systems, and services which include technical support, maintenance and reliability services, engineering consulting and training. SKF is represented in more than 130 countries and has around 15,000 distributor locations worldwide. Annual sales in 2011 were SEK 66,216 million and the number of employees was 46,039. [www.skf.com](http://www.skf.com)

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