

TAS Online

(Pty.) Ltd.

Pump Monitoring & Consultancy

P.O. BOX 411203
CRAIGHALL
2024
SOUTH AFRICA

TEL +27 11 325 0681
FAX +27 11 325 0488

2007/035840-07

sales@tasonline.co.za

http://www.tasonline.co.za

TAS PUMPMONITOR Product Profile

TAS PumpMonitor gives over-stretched engineers in busy industrial settings the technical and financial data required to take action to cut excessive energy consumption in their pumping systems, thereby improving business profitability.

Besides pricing electricity wastage, TAS PumpMonitor data – fed from pump to desktop in real time via the internet – also identifies equipment failure before it manifests. This facilitates relevant, timeous maintenance, and saves wasted man hours and costly lost production.

The industry proven technology has been developed by South Africa-based Technical Applications Software (TAS) and is operating in numerous challenging settings around the world.

For nearly 20 years, TAS has been producing innovative software to help end users choose and manage pump systems efficiently. In 2001 TAS Online was formed to fully exploit web-based TAS PumpMonitor technology, and take it to a global market.

The case for pump monitoring

Electricity tariffs around the world are rising fast and threaten the profits and competitive edge of energy intensive businesses¹. Besides escalating prices, generating capacity and environmental concerns are driving legislation designed to force industry to reduce current and projected energy use².

Exacerbating the situation, the global shortage of qualified engineers means there are fewer people around to implement essential energy reducing measures.

Pumps in industry

Pump systems are at the heart of production – without them industry would stop.

- Pumps are the largest single user of electricity in industrial and commercial applications, consuming at least 1,100 TWh world-wide³.
- Pump systems consume approximately 15% of electricity generated world-wide⁴.
- Pumps frequently operate at poor efficiency levels – anywhere between 15% and 40% inefficiency.
- Pump systems are victims of their own robustness. As long as they deliver the correct amount of product (flow), pumps are deemed to be 'OK', regardless of operational efficiency.
- Electricity wasted in the pumping process is often hidden or viewed as inevitable and unavoidable.
- The U.S. Hydraulic Institute estimates that the average pump application could improve efficiency by 20%⁵.
- The British Pump Manufacturers Association says current energy use could be improved by 40% if overall systems improvements are carried out.
- According to progressive Lifecycle Cost models, electricity use during the lifetime of a pump accounts for up to 90% of the ownership cost. Capital expenditure accounts for around 5% and maintenance between 5 and 25%, depending on the pumped product's abrasiveness (Fig.1).

¹ <http://www.eiug.org.uk/press/pr10.htm>

² Veness, J., Pump Energy Reduction – A Systems Approach (<http://www.pro-vensolutions.co.uk/uploads/links/Pump%20Energy%20Reduction%20-%20A%20Systems%20Approach.pdf>)

³ World Pumps, July 2008 'Changing the Habits of a Lifetime'

⁴ www.pro-vensolutions.co.uk

⁵ U.S Hydraulic Institute figures (http://www.pumps.org/content_detail.aspx?id=2244)

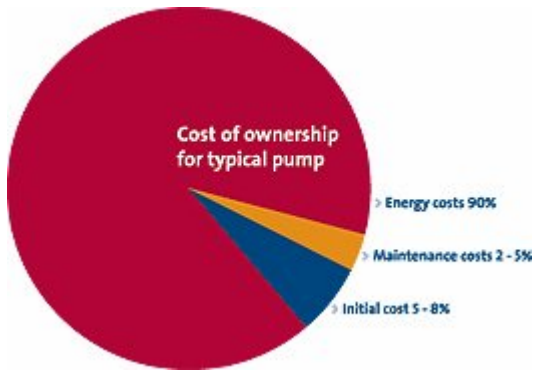


Fig. 1: Typical Lifecycle model for an industrial pump (Source: www.bpma.org.uk)

Pumps are vital, but neglected. Over-stretched engineers' lack of day-to-day visibility into unit operation means pump analysis is shelved until they fail or inhibit production. The price of this neglect is:

- Excessive and continuous energy waste
- More frequent and unexpected production downtime
- Increased maintenance
- Wasted skilled resources

Why Monitor?

Energy savings increase profitability. Energy waste in pumping systems is not inevitable and is highly avoidable. Saving electricity and reducing maintenance in energy intensive pumping systems greatly improves overall profitability.

However, the only way to uncover the source of inefficiency and provide engineers with the platform to eliminate the problems is regular and consistent performance monitoring.

Pumps: the pump curve and monitoring options

Regardless of manufacturer, no two pump models are the same. Each model operates within a very confined envelope of best efficiency – graphically displayed by the Pump Performance Curve (Fig 2). This unique graph describes the relationship between head, flow, power and efficiency over the pump's capacity range, and remains an accurate measure of the pump's characteristics throughout its operational life.

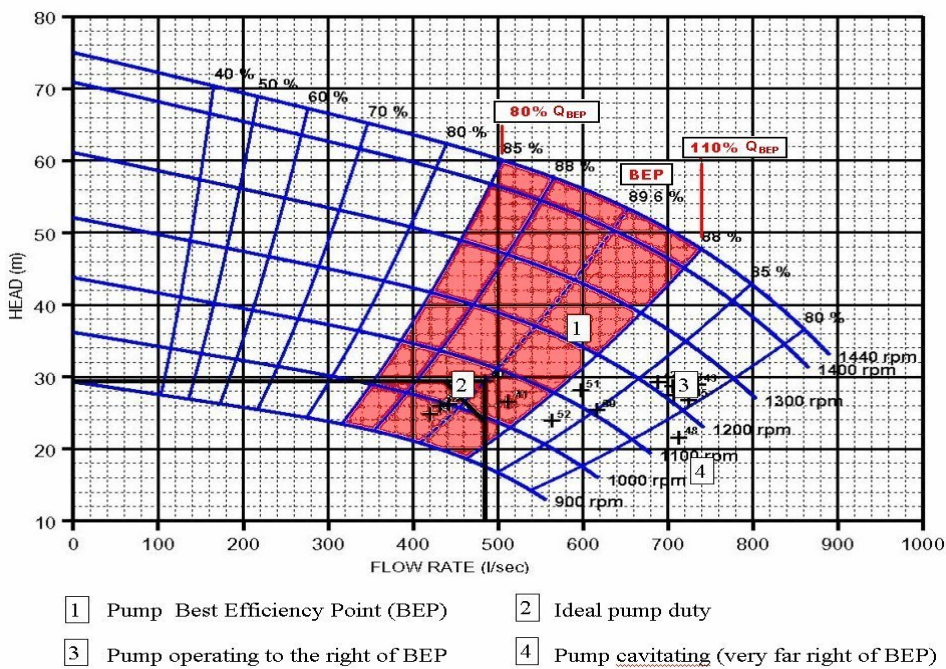


Fig. 2: Typical Pump Performance Curve

On either side of the Best Efficiency Zone lie performance inhibitors such as increased energy consumption, reduced component life, product re-circulation, etc (Fig. 3).

The reasons why a pump may operate outside the efficiency sweet-spot include:

- Incorrect assumptions and application of erroneous safety factors during the design stage
- Inappropriate application (wrong pump for the job)
- Unresolved component wear and tear
- Changes to systems requirements (increased/decreased flow)
- Quick fix solutions (bypassing flow or throttling the discharge line)

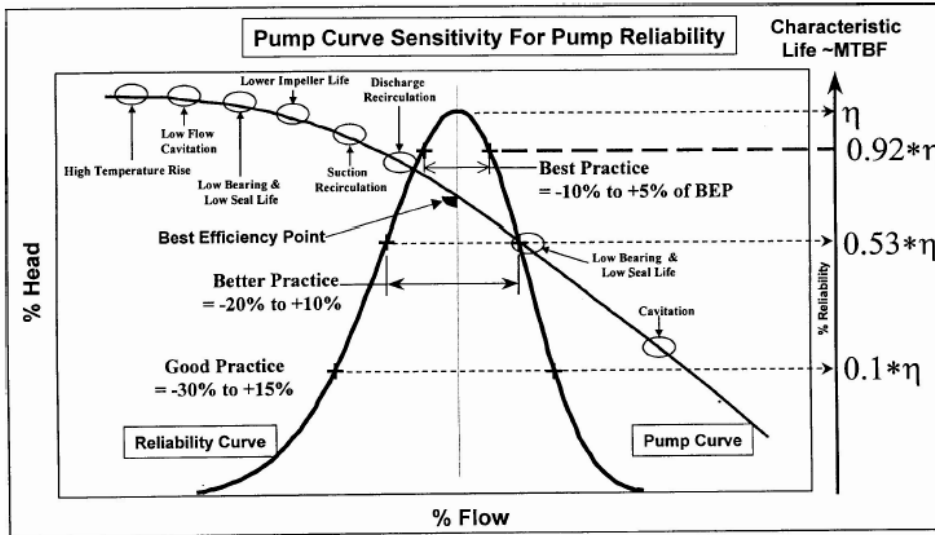


Fig. 3: Consequences of operating pumps outside of best efficiency envelope (Source: www.pro-vensolutions.co.uk)

TAS PumpMonitor – monitoring beyond human capability

Pump monitoring is the solution to energy inefficiency and unnecessary servicing, but testing manually or relying on condition monitoring is flawed. Drawbacks include:

- Manual monitoring only gives a snapshot into the status of continuously operating units; this could give a misleading picture of long-term performance.
- On-site pump instrumentation is frequently inaccurate or absent
- The process ties up scarce skilled man power in time and travel.
- By the time condition monitoring highlights a problem, some form of pump destruction is already underway and the engineer’s response becomes reactionary.

TAS PumpMonitor is the only pre-emptive, cost-effective system enabling engineers and operators to accurately assess pump performance from their office or control room.

- Automated, continuous evaluation provides a level of visibility into pump performance that is humanly unattainable.
- TAS PumpMonitor resolves all the drawbacks of manual and condition monitoring.
- TAS PumpMonitor also produces a wide range of regular (e.g. monthly) reports of pump performance – e.g. electricity wastage over a given period, average cost per unit pumped, wear trends, etc.

TAS PumpMonitor information flow

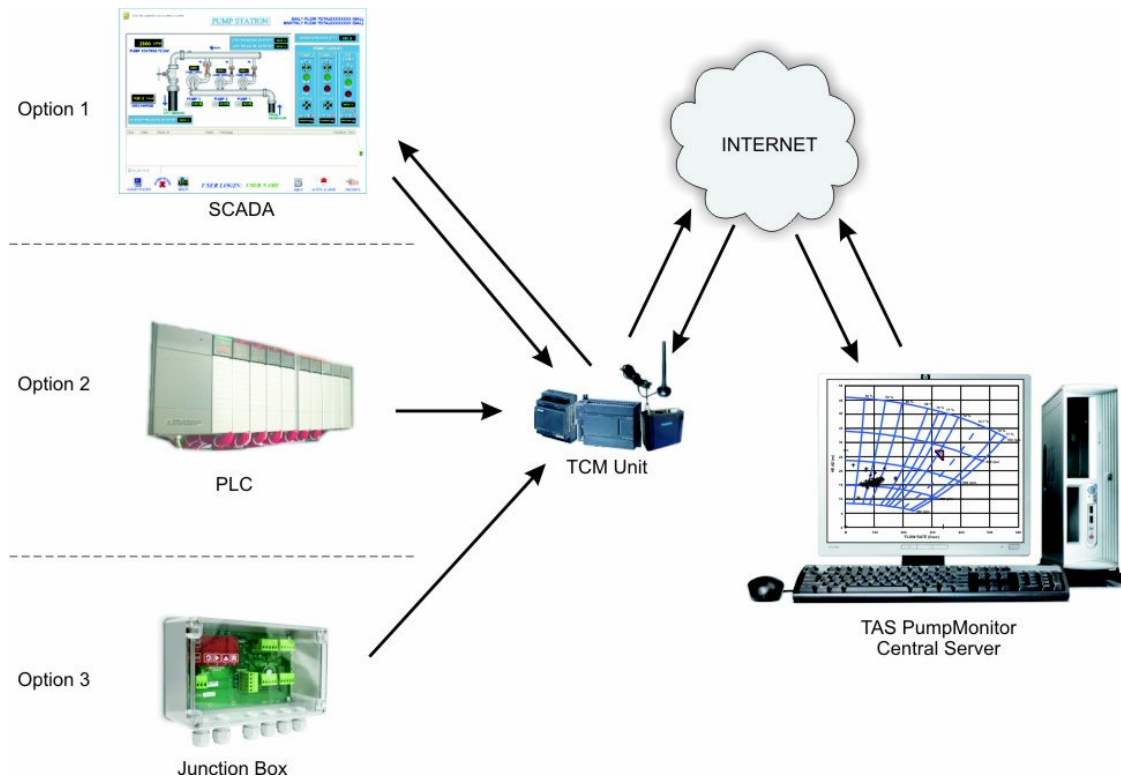


Fig. 4: Typical installation options for configuring TCM on site

TAS PumpMonitor works by continuously comparing current performance against the optimum duty defined by the Pump Performance Curve. The requisite data is gathered from standard pump instrumentation including suction and discharge pressure transducers, power meters and flow meters.

- Data from instrumentation is collected automatically at pre-set intervals (from one minute to an hour) by the TAS Communication Module (TCM). The TCM is a robust, cost effective Programmable Logic Controller (PLC) based solution developed by TAS Online.
- On clear water pumps without a flow meter, the TCM calculates flow-rate in real-time and writes the parameter back to the SCADA for immediate access by the operator.
- The TCM also automatically calculates values like pump efficiency, cost per unit pumped, kW.hrs/ML, performance variations, instrumentation failure, etc. This data is transmitted to the SCADA immediately to help pre-empt unit and component failure.
- Simultaneously, raw data is transmitted from the TCM to the TAS PumpMonitor Central Server in Johannesburg via GPRS at pre-set intervals.
- TAS PumpMonitor software processes the information and generates a series of reports like unit electricity consumption, level of component wear, etc. Reports are sent directly to the pump-user's desktop.
- Besides processing data, new settings and pump coefficients can be transmitted back to the communications module in order to maintain the accuracy of TCM calculations as pump wear sets in, for example.

Collected data can be analysed in numerous ways to help identify the most effective performance enhancing corrective action. For example, TAS PumpMonitor can subject potential remedial actions (e.g. installing a variable speed drive) to a cost/benefit analysis before practical action is undertaken.

Quick Payback

Payback periods on TAS PumpMonitor are extremely short – frequently within a year and, on average, between one and two years. This is because TAS PumpMonitor findings uncover many problems that can be resolved with low cost action.

Typical remedial low-cost actions that TAS PumpMonitor data could facilitate include:

- Reschedule more efficient pumps to run during peak tariff periods
- Remove redundant units in parallel and series structures
- Change motor speed or trim the impeller
- Replace low cost components e.g. by-pass flow assemblies
- Reshuffle pumps to ensure unit matches application
- Adapt pipeline characteristics
- Wherever possible, do not run pumps with excessive friction losses

Savings with TAS PumpMonitor

TAS PumpMonitor classifies inefficiencies where savings can be made into three loss types – Wear, Duty and Volumetric. This separation helps users identify the optimal corrective action, which, when implemented, results in savings throughout the pump’s lifecycle.

TAS PumpMonitor loss category	Problem	Possible corrective action
Wear	Performance reduction	Overhaul pump Replace impeller Apply pump coatings
Duty	Wrong pump for the job	Install appropriate pump Trim impeller Change pump speed
	Pump operates out of efficiency sweet-spot	Install variable speed drive Overhaul system (pipes, valves, etc)
Volumetric	Excessive bypass flow	Replace components
	Over-throttled pump	Replace bypass/throttling valves with VSD

Fig. 5: Summarised problem/solution matrix

Reduced energy consumption

Lifetime electricity consumption accounts for up to 90% of the costs associated with pump ownership, and much is wasted – turned into heat, vibration and noise. As such, this is where TAS PumpMonitor can help engineers realise the greatest financial savings. The magnitude of savings – and therefore improved profitability – depends on numerous factors, for example:

- Product being pumped
- Pump utilisation
- Condition of pump
- The pump’s role as an integral part of a larger energy consuming system

To date, TAS PumpMonitor applications have helped reduced operational pump electricity costs by an average of 10% in the short term. Long term savings are still being established but should be in the region of 15-30%.

Reduced maintenance costs

Pumps operating close to best efficiency fail less often. TAS PumpMonitor findings may increase short term costs in order to finance immediate improvements. However, in the medium to long term, these initial outlays will be recouped through reduced, properly scheduled and therefore more effective maintenance.

Improved process safety and profitability

When production is halted, profits are lost. Because pumps are integral to many processes, poorly managed units are not only prone to their own failure; they increase pressure on the entire plant. Besides reduced production, an unstable plant also presents a safety risk.

- A pumping unit operating within its Best Efficiency Zone and fitted with TAS PumpMonitor reduces energy wastage and alleviates mechanical stress throughout the wider production process
- A stable process increases plant safety, and would probably lead to efficiency improvements throughout the entire system.

Reduced man hours and skills requirement

TAS PumpMonitor collects, processes and analyses data at a rate and accuracy level beyond human capability. Once the TCM is installed, site visits are drastically reduced and maintenance becomes proactive, not reactive. This frees skilled man power to focus their attention elsewhere.

- TAS PumpMonitor helps technicians operate units close to best efficiency, reducing man hours spent on avoidable maintenance
- Multiple pumps situated anywhere in the world can be monitored at a central resource by a single technician
- TAS PumpMonitor data can be understood with minimal training
- Detailed summary reports can be accessed via the TAS PumpMonitor website
- The TAS Online pump consultancy team assists with data analysis and advice on corrective action.

Reduced capital costs

TAS PumpMonitor data provides an accurate projection of pump requirements in future build programmes.

- Extra capacity frequently built into pumping applications to compensate for unit failure can be reduced. TAS PumpMonitor helps lower the risk factor by warning of impending pump failure
- TAS PumpMonitor identifies redundant units in existing operations; such pumps could be moved elsewhere.

Improved company policies relating to pumping systems

With growing pressure on companies to reduce energy consumption both for financial and environmental reasons, TAS PumpMonitor is a useful and accessible reporting tool that quantifies the effectiveness of corrective action taken to streamline the energy intensive process.

- TAS PumpMonitor provides a clear baseline of performance before and after corrective action is undertaken
- It helps create a business case for further energy efficiency implementation
- It facilitates development and maintenance of Group-wide Best Practices
- It allows meaningful comparisons between operating sections
- It allows meaningful comparisons between different operating techniques, suppliers, pump models, and components; data improves purchasing and design decisions for a given operational environment
- It provides independent data to resolve disputes with pump OEMs

Conclusion

- TAS PumpMonitor is the only cost-effective remote monitoring system giving engineers and operators complete visibility into pump operation delivered to their desktop.
- TAS PumpMonitor eliminates energy waste from the electricity intensive pumping process, thereby improving business profitability.
- It offers unrivalled levels of accurate data and allows engineers to model the impact of corrective measures before taking practical action.
- TAS PumpMonitor identifies the signs of imminent failure long before traditional condition monitoring techniques, thereby allowing engineers to act before problems threaten production.
- TAS PumpMonitor frees up scarce skilled manpower to concentrate on other tasks vital for maintaining and improving the production process.

For more information in North America Applications:

Contact Us



<http://synergysalesassociates.com/pumpmonitor.aspx>

Outside Sales: Bryan Wadsworth

Cell Phone # 1-815-790-4494

E-Mail: wb9mcw@gmail.com

Inside Sales: Paul Pieper

Phone: 815-790-4203

2nd #: 815-759-5174

Fax: 815-331-0235

PO Box 202
Ringwood, IL. 60072