

Acquire

Analyze

Act



## Turning pump data into dollars

Do you know which actions will optimize your pump installations and reduce operation and maintenance costs? You will if you acquire the right data in the field and evaluate it with Sulzer's BLUE BOX™. The BLUE BOX software can analyze data from any pump or pipeline equipment – not only Sulzer-made pumps. BLUE BOX combines the available data with Sulzer's pump expertise and presents valuable insights, so pipeline operators can target their actions to optimize the performance of their pumps and pipelines.



[Click here to see a video about BLUE BOX.](#)

These days, everyone is talking about digitalization, big data, predictive analytics, digital twins, Internet of Things (IoT) and industry 4.0. The main idea behind these buzzwords is to optimize industrial workflows, performance and efficiency using digital data and to invent new business models. Digital solutions can even help industrial pumping and pipeline operations reach their sustainability goals by streamlining processes and, thus, saving energy and money.

## BLUE BOX in action at Phillips 66

Sulzer has delivered a BLUE BOX solution that has been tailored to the requirements of Phillips 66, a leading US-based energy manufacturer and logistics company. Amongst other things, they operate two pipelines with 40 performance-critical pumps, which are a mixture of Sulzer and third-party manufacturers. BLUE BOX continuously monitors every pump. The management of Phillips 66 is committed to reducing the costs of energy and maintenance as well as improving pump availability. For pipeline operators, case studies reveal the potential for an annual cost reduction in the millions of dollars. BLUE BOX aims to reduce energy bills by 5% each year and to cut the costs associated with unplanned outages by 20%.

The whole BLUE BOX package has been implemented through close cooperation between Sulzer's experts and IT specialists at Phillips 66 to ensure seamless integration with the existing infrastructure. The dashboard reports allow operators to see all BLUE BOX information at a glance. All reports were configured to suit the individual needs of the Phillips 66's key stake holders.

Sulzer's BLUE BOX is a software tool that captures essential process data. This data is used to improve performance, increase reliability and optimize system settings. The output of BLUE BOX supports managers in interpreting data quickly and making fast, fact-based decisions.

### Accelerate performance on the digital highway

Pipeline installations can spread across continents, and the pumps are not always easy to reach, which complicates the data collection. To optimize the reliability, efficiency and performance of pumping equipment, operators must know the actual, real-time values.

The first move towards digitalization is to acquire data (Fig. 1). To gather data for BLUE BOX, there are several approaches:

- Instrumentation of the pump itself (integrated data collection)
- Installed supervisory control and data acquisition systems (SCADA)
- Data use from a data storage system (e.g. process historian for pipelines)

It is important to judge the overall efficiency of installations, and Sulzer's engineers have emphasized the use of data from all possible sources. BLUE BOX is able to import all data — regardless whether it is from a Sulzer pump or a pump from another manufacturer.

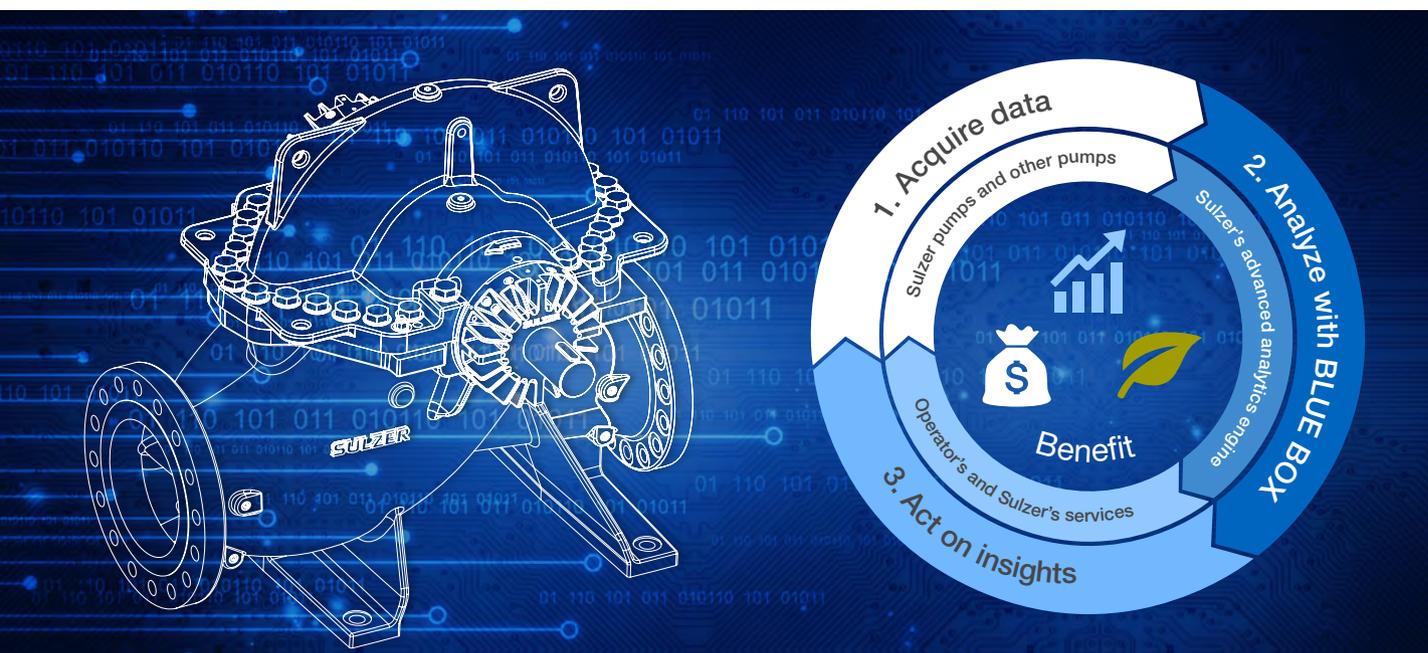


Fig. 1 The three main steps on the digital highway.

“ The Sulzer team designed BLUE BOX to be implemented with a minimal footprint on a customer's site and to collect data from their existing data collection systems. This allows customers to gain insights into the behavior of both Sulzer and third-party pumps. We support pump experts with BLUE BOX and make it easy for them to use the analyzed data. It enables them to act proactively instead of reacting to problems, thus gaining speed and efficiency. Just don't expect a real box. BLUE BOX is a software tool.

**Matthew Anderson**, Data Analytics and Smart Technologies Manager, Winterthur, Switzerland

The second stage is to analyze and understand all data. There is no substitute for the years of expertise that real-life pump operators and OEMs have. BLUE BOX integrates the collective experience that Sulzer has accumulated throughout its rich history. Thanks to its automatic data collection and digital processing abilities, BLUE BOX has a broader information base. This ability is what makes BLUE BOX the digital advisor for the pump experts and allows them to see all data at a glance.

As a third stage — to take full advantage of BLUE BOX — customers have to act and optimize the pumps in real life. They might need to check the hardware, perform maintenance, improve settings, refurbish a piece of equipment, or request a personal consultation from a Sulzer service engineer.

### Benefits of digitalization

Imagine the wisdom of all Sulzer pump experts — gained over decades — collected and transformed into numerous software algorithms. This artificial intelligence combined with the expertise of customers and operational data makes BLUE BOX such a powerful toolbox. That is why Sulzer calls it an advanced analytics engine: because it automates the analysis, giving fact-based insight into the pumps' behavior.

With comprehensive reports, BLUE BOX enhances the interpretation of the vast amounts of gathered data for the operators. The reports highlight the critical points and enable the pump experts to focus on the pumps needing the most attention and allow them to plan their maintenance activities accordingly.

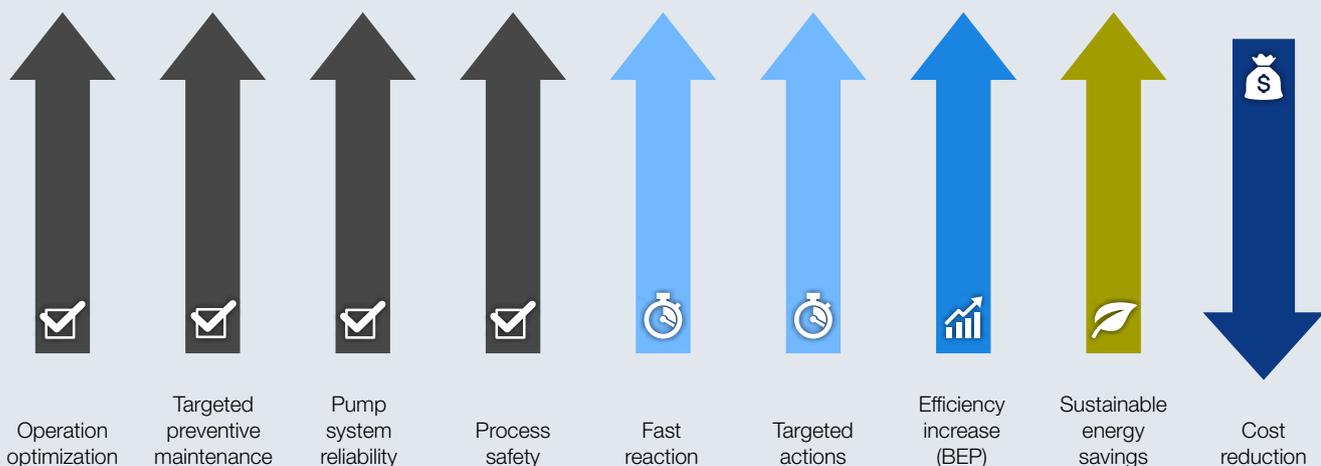


Fig. 2 Advantages of using the BLUE BOX advanced analytics engine.

The information is tailored to the needs of key personnel. From senior management to maintenance supervisors to maintenance crews and operators, everyone receives customized, comprehensive information and reports. Targeted and predictive maintenance increases the reliability of the whole pump system and the pipeline. Of vital importance is the process safety gained through this preventive maintenance. Continuous surveillance of the installation by BLUE BOX quickly indicates where the operator needs to intervene and perform the exact, expedient actions to boost performance. In some cases, the throughput rate must be adapted to allow the pump to operate at the best-efficiency point (BEP). Another action could be to use a different impeller optimized explicitly for the pump throughput rate.

### Digitalization is paying off

Over 90% of the operational cost over the lifetime of the whole pump is energy consumption. The use of BLUE BOX increases efficiency, which in turn reduces energy consumption and leads to significant cost savings (Fig. 2). Operators can run their installation more sustainably and help to reduce the energy consumption in our world thanks to big data and advanced analysis.

### Visualization gives a clear picture

Executive management teams are responsible for looking at the bigger picture, ensuring that the business continues to operate with a profit by making carefully considered asset investments. It is essential for them to have accurate performance and efficiency data to allow them to identify those assets that will benefit most from additional funding.

It is often said that “a picture is worth a thousand words.” That is why the visualization of the entire pumping system is so important (Fig. 3). It highlights underperforming assets at a glance and can be the key to investing in upgrades or new equipment. Data on reliability, performance and efficiency illuminates the condition of assets in the field. Big data allows customers to determine key performance indicators (KPIs) for their installation or individual pumps. BLUE BOX makes it visible to customers if they consistently operate within the target KPIs.

BLUE BOX analyzes raw data from pumping assets in near real time. It generates informative visualizations for all those involved — be it for the management or for maintenance personnel. The information on each screen can be tailored to the needs of each user group.

The general overview focuses on the performance of the complete installation. Total throughput, energy consumption and potential savings can all be seen at a glance. Graphical representations of reliability, efficiency and throughput provide excellent visibility, highlighting exceptions helps to address the right issues (Fig. 4).



Fig. 3 Visualization of the pipeline productivity for the entire system.



Fig. 4 Analysis of optimization potential per pump and entire pipeline.

## Secure data transfer for the industry

A new software system like BLUE BOX, which is going to read existing data, needs to be flexible enough to integrate with a range of data acquisition systems. In contrast to previous decades, not only mechanical and pump operation knowledge is required. IT knowledge is of relevance as well, and the customer's IT department has to be involved in setting up data interfaces, data management and the network infrastructure. Data security is of the highest importance in the industry and plays an important role for all parties. It was an essential part of the software development at Sulzer to be able to guarantee no data loss or unauthorized access to the data.

## Comparison of values

The storage of historical pump data is required for some pipeline operations and supports long-term analysis. With the BLUE BOX software implemented, operators can compare values from years ago with current data and use these values for fact-driven decisions.

## Range of data used

In the field, each pump asset and pipeline installation provides data for pressure, flow, density, viscosity and power consumption. They also provide information for the maintenance department including vibration and asset temperature readings.

A car driver can quite often identify from a change in the sound of the engine that a car repair is needed. Pump experts also know that they have to listen to a pump to find out more about its status. A higher vibration level of a pump can indicate increased wear and tear, cavitation or bearing problems, for example. That is why the vibration data are important and fed into BLUE BOX for analysis. The experience of the Sulzer experts instilled within the program is used to determine the critical vibration level for the specific type of pump. If the vibration is over the threshold limit, BLUE BOX highlights this to allow the operators to investigate the root cause and avoid costly catastrophic failures (Fig. 5).



Fig. 5 Correlation of pump data with warning at vibration threshold.

## Data transfer in detail

Data is extracted directly from a variety of sources such as SCADA, programmable logic controllers (PLCs), process historians, databases and instrumentation. At this point and as required, Sulzer offers the installation of an industrial-grade computer, known as an edge device, equipped with firewalls that provide a secure one-way connection (secure data storage and transfer system) to Sulzer's data lake. Customer data is transferred to Sulzer's data lake using a secure file transfer protocol (SFTP).

The data is processed using proven algorithms and analyzed against known performance curves and displayed in a custom interface that offers the operator the greatest benefit. This cloud-based solution has a minimal impact on the customer's IT environment and is designed to be easily scalable to suit a wide range of operations.

### Discovering the benefits

Whatever the scale of a pumping installation, BLUE BOX has been designed to deliver optimized pump solutions. By using Sulzer's centuries of expertise in pump design, manufacturing and maintenance to create the algorithms in the advanced analytics software, it is possible to make the best use of existing data.



Dr. Marc Heggemann,  
Winterthur, Switzerland

BLUE BOX consists of a flexible and structured data analytics system that delivers a range of clear visualizations. A graphic is easier to understand than hundreds of numbers. That is why visualizations are so powerful. The pump or pipeline performance is shown as a near-real-time picture. The software quickly identifies under-performing assets and highlights it for the operators. Their quick action minimizes downtime, improving overall performance and process safety. Saving energy is an important additional benefit of the performance improvement and leads to cost savings. Reducing energy consumption in the industry while making customers more competitive is one of our most significant aims at Sulzer. With BLUE BOX, Sulzer is using big data to boost sustainability.