

Online Condition Monitoring of pumps

Pumps

In almost all areas of industry pumps are essential for conveying liquid and solid materials and for generating specific pressure conditions.

These industry sectors include:

- Chemical and petrochemical industry
- Power generation
- Water supply, waste water management
- Steel production
- Automotive industry
- Mining

Process assurance and availability

High pump availability is essential in many industrial applications. Often the failure of a non-redundant pumping system will bring an entire plant complex to a standstill.

Online Condition Monitoring helps avoid malfunctions, aids in recognizing wear processes and bearing damage early on, and promotes the optimal utilization of component service life.

DMT-Online Condition Monitoring System PlantSafe® can monitor any of a wide variety of pump units and detects unacceptable operating states and spots damage as it develops.

Intermediate coolant pumps in the water circuit of 800 MW brown coal power plant



Centrifugal pump 1P451B
Ruhrpumpen SVN-4X13



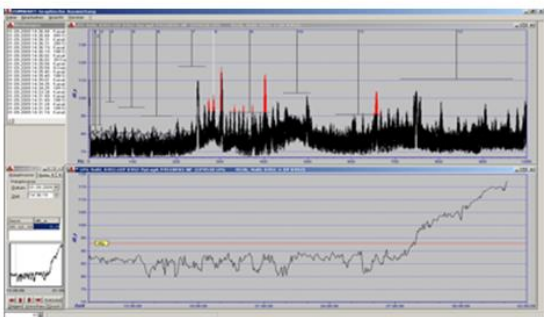
Online Condition Monitoring System

PlantSafe®

In order to ensure early detection of damage to the pump and its components, vibrations are recorded and analysed at defined intervals by the PlantSafe® Online Condition Monitoring System.

PlantSafe® collects structure-borne noise data in real time and processes the signals, averages, defines the parameters and displays information about the current state of wear of the pump and its components. The information is based on the measurement of structure-borne noise, vibrations and shock pulses by means of special sensors and on simultaneous acquisition of operating data in addition.

Structure-borne noise spectra with monitoring thresholds and development of bearing damage.



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Cavitation damage at an axial piston pump



PlantSafe® reports:

- Bearing damage
- Lack of balace
- Toothing damage
- Coupling damage
- Damages at blades
- Impending mixed friction
- Assembly alignment errors
- Impermissible operating states

PlantSafe® helps:

- to recognise wear early
- to reduce unplanned downtime
- to increase availability
- to avoid secondary damage
- to reduce maintenance costs
- to reduce revision times
- to plan maintenance and revisions based on objective data
- to extend revision cycles in combination with other measures

DMT - PlantSafe®

Online Condition Monitoring System PlantSafe®

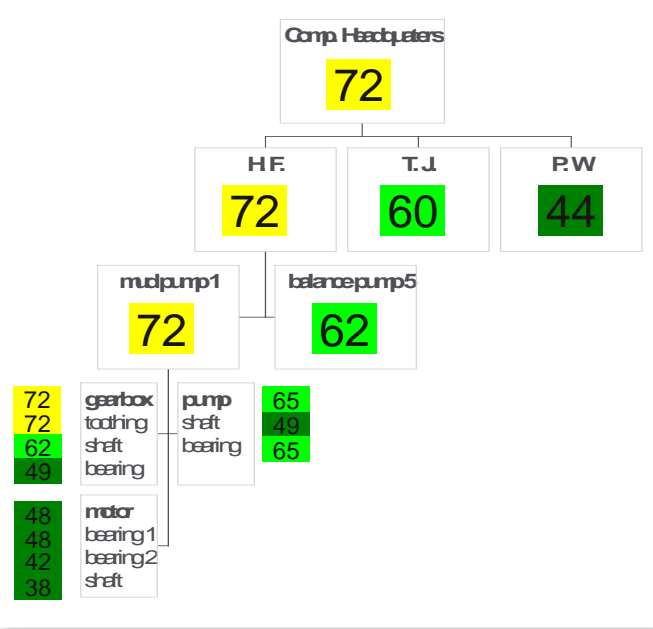
Topbox – Data Acquisition Unit

Topbox is the data acquisition module developed by DMT. The signals from the structure-borne noise sensors are collected in Topbox and processed in the data acquisition unit. An integrated IPC transmits the spectral data, envelopes, FFT's and time signals from the plant to the technical support and also to the plant manager or external service provider (e.g. diagnostician). Autonomous operation of measured data acquisition ensures that no data can be lost in the case of network or telecommunication disruptions. Customisation of the detect unit such as integration in the existing infrastructure and if applicable existing monitoring solutions are possible.

Compact Data Acquisition Unit (DAU)



Structure of the aggregated Condition Monitoring index
Example: deep drilling technology



Monitoring strategy

Characteristic changes in the operating status of the monitored drive train are captured and evaluated by the DMT software. This data can then be used to compile trend analyses and prognoses. Relevant statuses are visualized for the user in form of an easily understood intuitive traffic light logic.

A clarification of the wear occurs by the normalized CMI (Condition Monitoring Index) with a scale value between 10 and 100.

Aggregation

When monitoring a plant with a large number of powerful pumps, a variety of sensors and many monitored parameters, maintaining a clear overview of all the information generated by the system is no longer possible without appropriate support. The control centre concept offers a very clear means of monitoring, as the highest CMI values of all monitored pumps are always reported automatically to the control centre.

Technical Data		
Inputs	Structure-borne noise Operating data	8 channels 8 channels
Sampling rate	Structure-borne noise Operating data	25,6 kHz per channel (5,12 kHz simultaneous) 1,28 kHz per channel (simultaneous)
Resolution	in 20 Hz range in 200 Hz range in 2 kHz range in 10 kHz range	0,0125 Hz 0,125 Hz 1,25 Hz 12,5 Hz
Dynamics	138 dB (24 Bit)	
Signal-to-noise ratio	90 dB	
Analytic process	FFT, envelope of failure, RMS, order analysis (XSafe-software)	
Network based	TCP/IP, Ethernet, WLAN	
Database Connectivities	MySQL, MariaDB	
Data export	CSV	
Memory	2 x 8 GB (SSD, Typ SLC), upgradeable	
Protection class	IP 65	
Operating temperature	-20 ... 60°C	
Supply voltage	100 ... 240 VAC, 50 ... 60 Hz	
Power input	50 W	

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