

PROGNOST[®]-NT

Machine protection and diagnostics
for predictive maintenance



Compressors for a Lifetime





Confidence.

PROGNOST Systems provides the highest level of confidence. Our system is proven reliable and supports many global players in the refining, gas, and petrochemical industry for more than 30 years. Our team of experts is available 24/7 to provide consultations and system support.

PROGNOST®-NT overview

Total machine protection and analysis
Detect component failures at the earliest possible stage and limit the consequence of serious failures to protect personnel, environment, and assets.



PROGNOST®-SILver is a signal acquisition system designed for SIL 3 machine protection of all rotating equipment

Protection is based on vibration and other critical parameters such as dynamic rod/shaft position and dynamic pressure.

Signal plausibility checks help prevent false alarms and warnings

Specialized signal processing avoids false warnings caused by broken wires, loose sensors, and other electrical failures.

Automatic 10-minute ring buffer for detailed root cause analyses (RCA)

Continuously recorded uncompressed signal data of all connected sensors (hardwired and DCS connected) are available for detailed root cause analyses. This ring buffer is automatically saved in case of an alarm, at every start/stop, or can be user initiated.

Early failure detection

PROGNOST®-NT automatically recognizes changing machine operating conditions and adjusts the monitoring thresholds to avoid false warnings caused by variables such as changing pressure, speed, and vibration during different phases of production.

Reliable and useful piston rod position

Conventional monitoring methods use piston rod position measurements for wear monitoring purposes only. PROGNOST®-NT uses the dynamic piston rod position for a more reliable rider ring wear calculation and to monitor the mechanical condition of the piston rod, piston and crosshead connections.

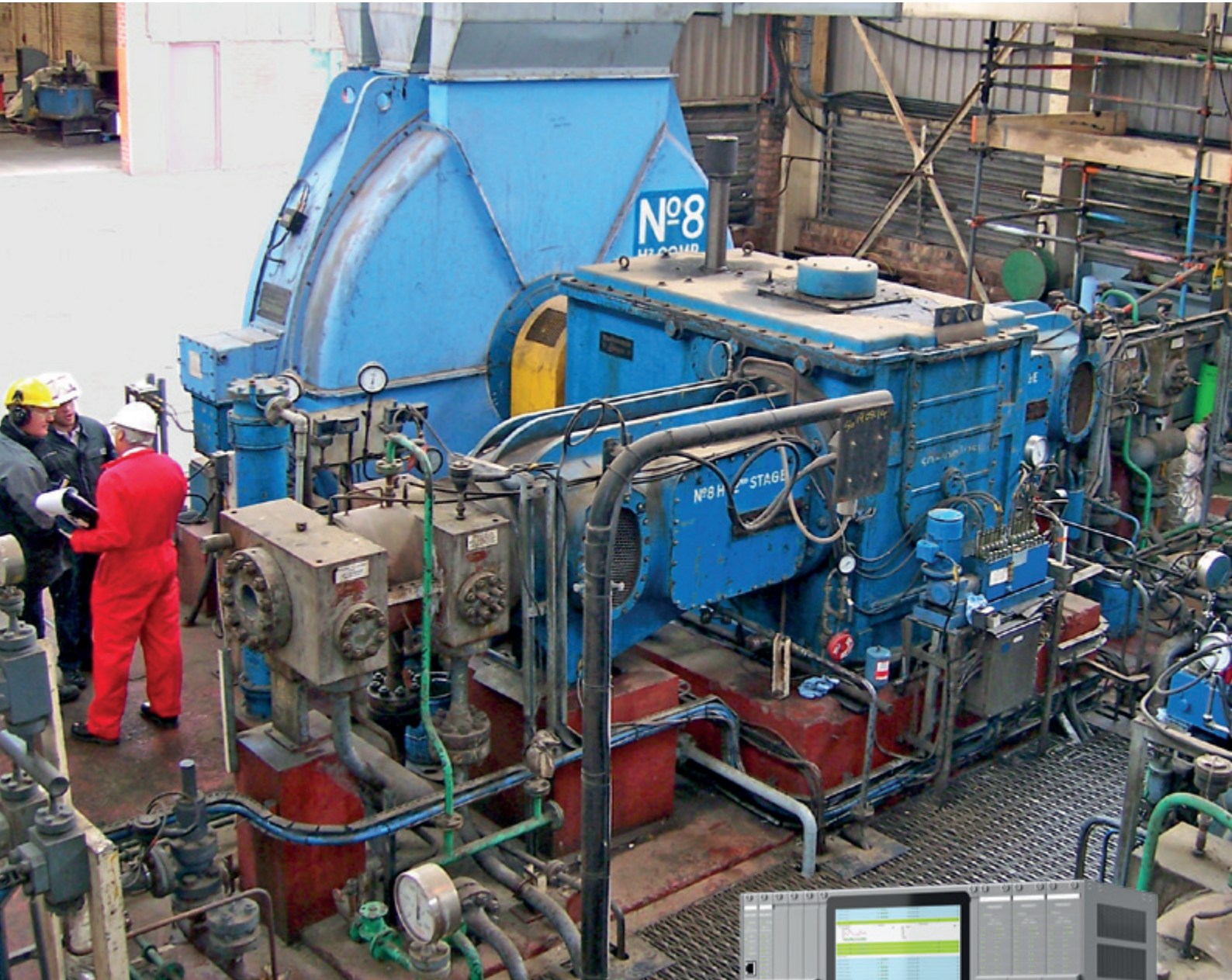
Automated p-V diagram analyses

PROGNOST®-NT processes the online p-V diagram with dedicated analyses to optimize machinery performance and to detect leaks, such as suction/discharge valves, packing, or piston rings. Further, the system calculates dynamic piston rod loads to provide an early warning of overload.

Pattern recognition with fully integrated diagnostic database

Each PROGNOST®-NT system automatically generates and saves new damage patterns when component failures occur. All major failures are analyzed and integrated as failure patterns into the default systems' diagnostic database, along with more than 150 patterns derived from millions of operating hours.

Designed for all your monitoring tasks



PROGNOST®-SILver
SIL 3 machine protection system

- Accurate, intelligent, and powerful machinery analyses and protection based on 30 years of experience
- Proven reliable with installations worldwide on all types of critical rotating equipment
- Global customer support and sales network
- 24/7 customer support capability
- Made in Germany

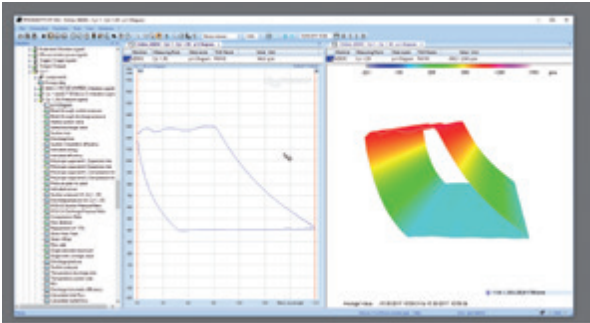


PROGNOST®-NT system in cabinet

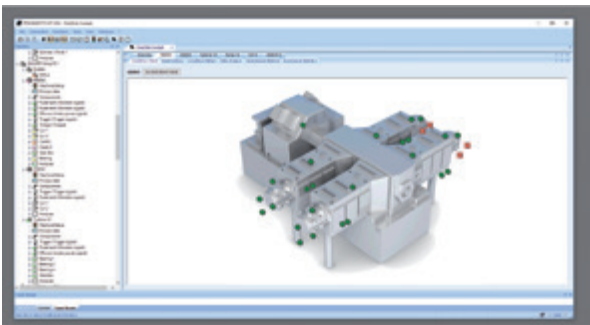
- Online condition monitoring
- SIL 3 machine protection
- Automated diagnostics
- Failure pattern database for clear text messages
- Ring buffer

Reciprocating equipment

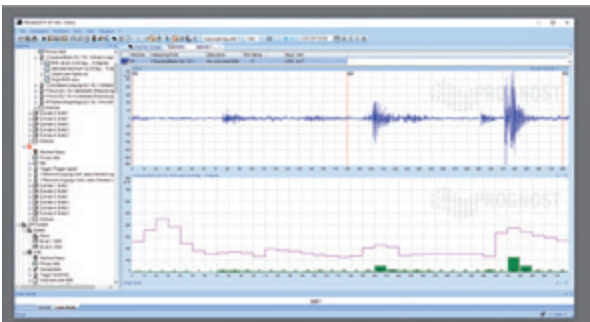
275 analyses and views



Machine tree, p-V diagram, and p-V diagram trend



Machine status with sensor and alarm status



Crosshead vibration threshold setting per segment

PROGNOST®-NT VISU



- Machine
 - Process data
 - Components
 - Trigger (speed)
 - Fundament velocity
 - RMS 36 segments
 - Absolute peak 36 segments
 - Single RMS
 - Amplitude spectrum - 180°
 - Turn frequency
 - 0 - 200 Hz
 - 1 - 10 kHz
 - FFT peak
 - FFT peak position
 - Turn frequency
 - Non harmonic band RMS
 - Non harmonic band peak
 - 1. Integration
 - RMS
 - Peak-to-peak
 - Amplitude spectrum
 - Cylinder 1
 - Components
 - Process data
 - Crosshead slide 1
 - Absolute peak 36 segments
 - RMS 36 segments
 - Crest factor 36 segments
 - Amplitude spectrum
 - 1,0 x Turn frequency
 - Amplitude
 - RMS
 - 200 10- kHz
 - FFT peak
 - FFT peak position
 - Vibration
 - Single RMS
 - RMS 36 segments
 - Absolute maximum 36 segments
 - Piston rod position
 - Average 36 segments
 - Rider ring wear
 - Rider ring wear projection
 - Peak-to-peak
 - Peak-to-peak 8 segments
 - Single position
 - Cylinder 1 head end pressure curve
 - p-V diagram
 - Break through suc/dis pressure
 - Inertia valves
 - Losses
 - Volumetric efficiency
 - Indicated energy and efficiency
 - Polytropic exponents
 - DCS/CA pressure ratios
 - Indicated power
 - Piston rod load
 - Compression ratio
 - Flow balance

Centrifugal equipment

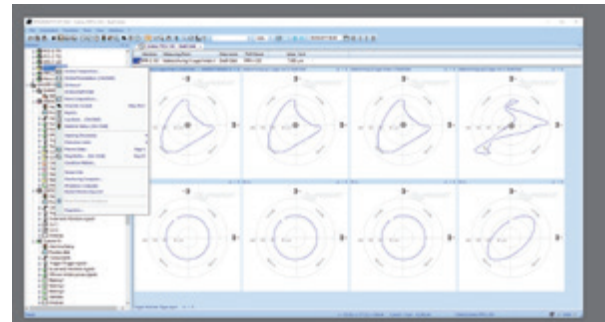
188 analyses and views

PROGNOST®-NT VISU

File Connection Functions Tools View Windows ?

Machine

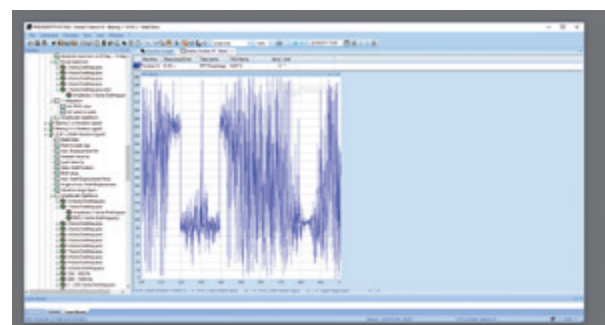
- Process data
- Components
- Trigger (rotation speed)
- Fundament velocity
 - RMS 36 segments
 - Absolute peak 36 segments
 - Single RMS
 - Amplitude spectrum - 180°
 - Turn frequency
 - 0 - 200 Hz
 - 1 - 10 kHz
 - FFT peak
 - FFT peak position
 - Turn frequency
 - Non harmonic band RMS
 - Non harmonic band peak
- 1. Integration
 - RMS
 - Peak-to-peak
 - Single absolute maximum
- Drive power
 - Peak-to-peak
 - Single RMS
 - Single arith. average
- Bearing 1
 - Components
 - Process data
 - Shaft vibration bearing 1
 - Shaft orbit
 - Peak-to-peak
 - Maximum displacement Sm
 - Greatest value So
 - Least value Su
 - Static shaft position
 - RMS
 - Maximum shaft displacement Smax
 - Angle of max. shaft displacement
 - Vibration range Sppm
 - Amplitude spectrum
 - Orbit center displacement
 - Orbit displacement angle
 - Bearing 1 vertical vibration
 - Single absolute maximum
 - Single RMS
 - Amplitude spectrum
 - 1 - 10 x turn frequency
 - 0 - 200 Hz
 - 1 kHz - 10 kHz
 - FFT peak
 - FFT peak position
 - Power spectrum
 - 1, integration
 - Amplitude spectrum
 - 0,5 - 10 x turn frequency
- Bearing 1 axial vibration
 - Single absolute maximum
 - Single RMS
 - Amplitude spectrum



Online shaft orbit

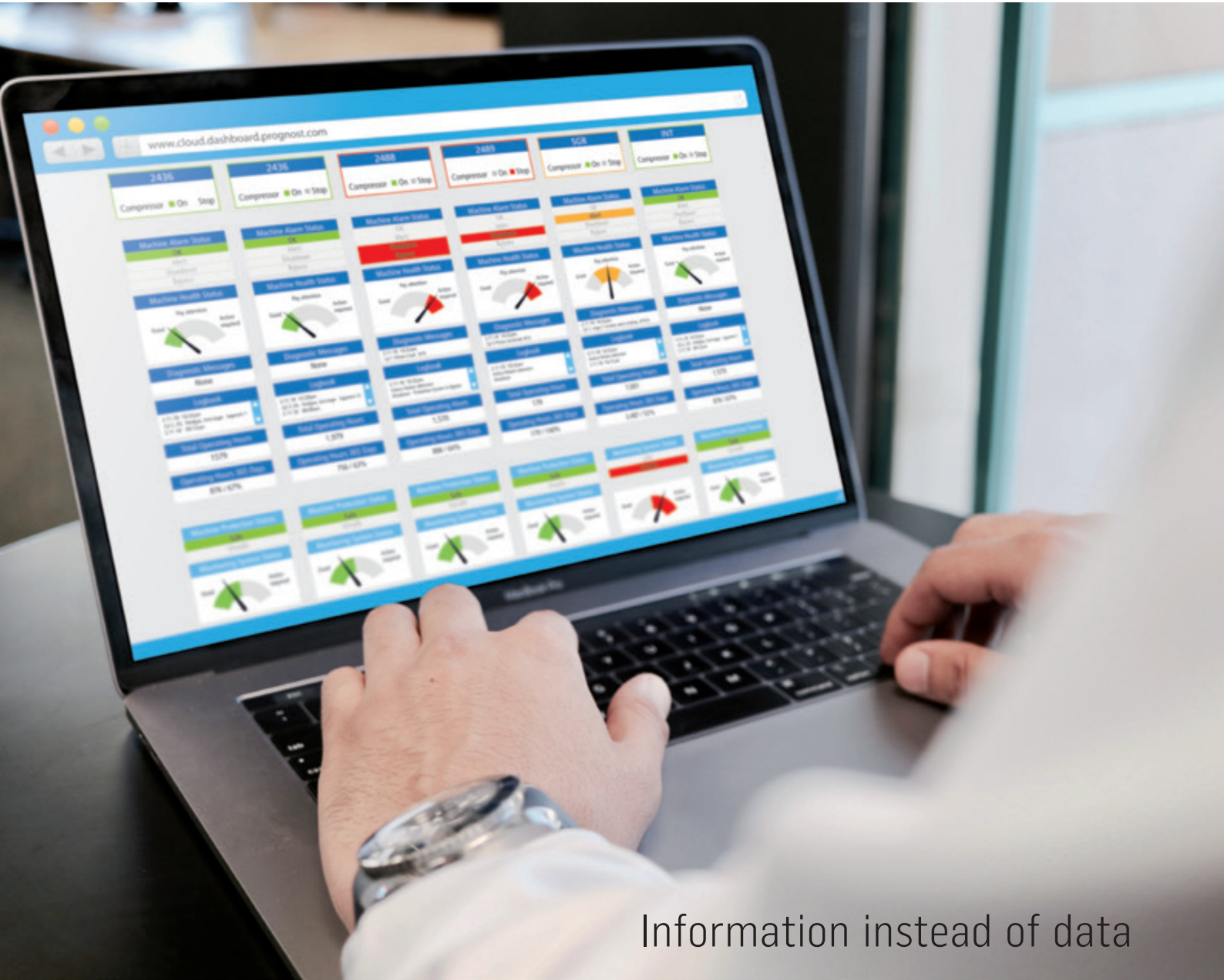


Filtering of shaft orbit

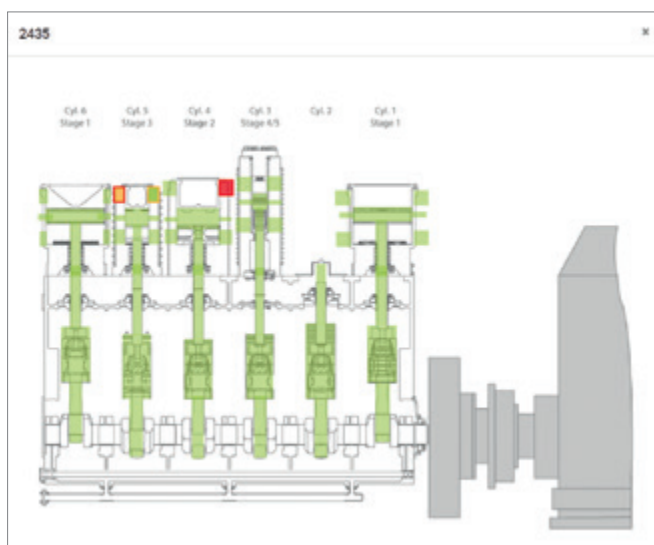


FFT phasing of orbit

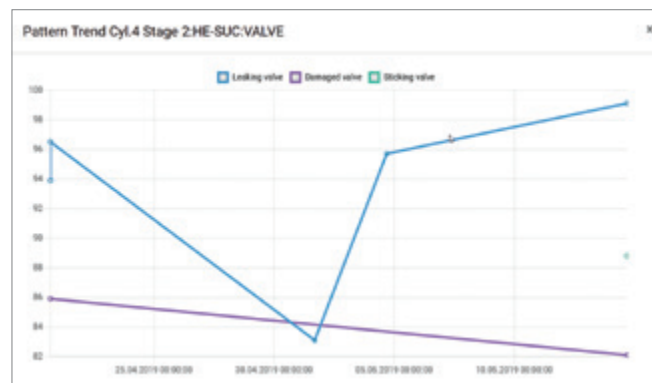
PROGNOST® Cloud Dashboard



Information instead of data



Machine status showing affected components via color code (active failure patterns)



Pattern trend of all related damage patterns

Diagnostic Messages	
14.05.2019 9:53 am	Damage class: Sleeve Bearing, Correlation: 100%
13.05.2019 3:34 pm	Damage class: Sleeve Bearing, Correlation: 91%
13.05.2019 3:32 pm	Damage class: Sleeve Bearing, Correlation: 82%

Diagnostic messages history for the machine

Logbook	
14.05.2019 11:57 am	Alert - Protection limits violated in the following segment(s) 30
14.05.2019 11:56 am	Alert for Protection limit segment canceled
14.05.2019 11:54 am	Alert - Protection limits violated in the following segment(s) 29

Logbook with alarms, limit violations etc.

Machine Reports	
PROGNOST_semi-annual_report_2019-1_H2435-Rev.2.pdf	
PROGNOST_semi-annual_report_2018-2_H2435-Rev.1.pdf	
PROGNOST_semi-annual_report_2018-1_H2435-Rev.2.pdf	

Library to store all health reports and other machine relevant documents

Let our experience help you!

The PROGNOST® Cloud Dashboard delivers the knowledge of more than 30 years experience in machine monitoring to you.

Benefit from our in-house vibration analyst expertise and the in-depth machinery comprehension demonstrated by our PROGNOST®-NT systems performing hundreds of analyses in realtime.

All this knowledge has been used to create the PROGNOST® Cloud Dashboard. Informative, customizable, worldwide and easy to use.

Modular software for varying degrees of protection and analysis needs



Protection analyses

Visualizes and saves online and trend data to provide all information required for precise root cause analyses.

Early failure detection

Detects developing damage at an early stage while accounting for changing operating conditions to avoid false alarms.

Wear monitoring

Provides wear trend plots for critical components, such as rider rings or packings.

Performance optimization

Evaluates the efficiency of a compressor and its sealing elements with automated p-V diagram analyses.

Lubrication monitoring

Monitors the flow rate of every individual lubrication point by trend analysis.

Process data analyses

Incorporates both inputs and outputs between the PRONGOST®-NT System and the DCS connection in order to have a comprehensive overview of all machinery values which can be trended over time.

Component tracking

A tool for planning and tracking maintenance activities along with real-time component lifetime information.



Data recording for root cause analyses



Signal analyses after emergency shutdown

While critical machines usually demand a full condition monitoring system, such as PROGNOST®-NT, less critical machines in many cases only call for a machine protection system.

But what happens after the protection device initiated a shutdown?

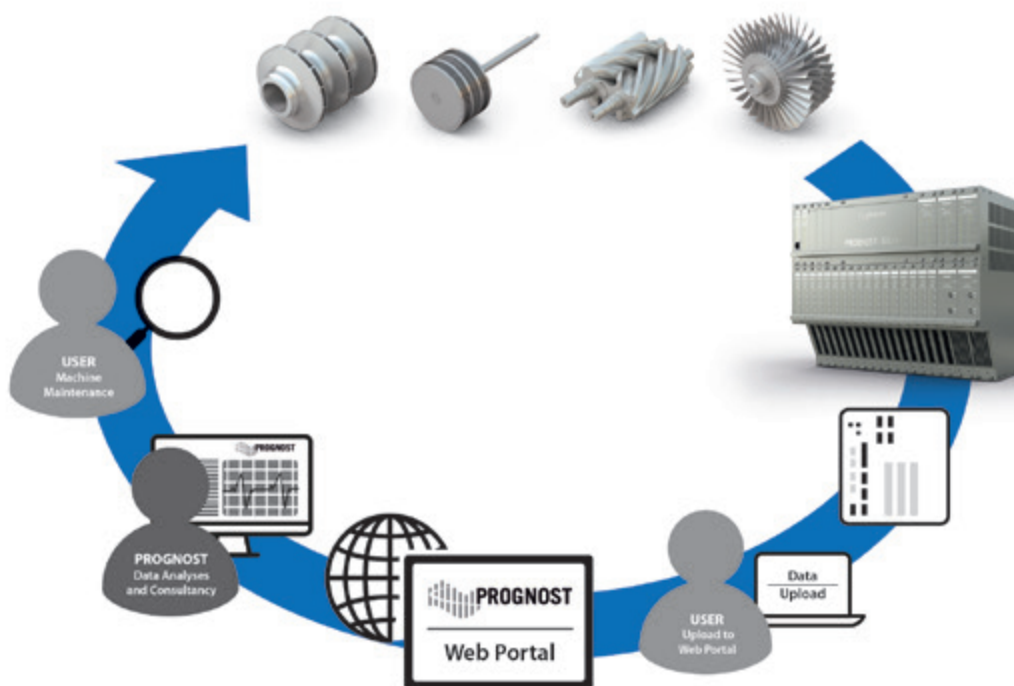
How can you determine the root cause of the problem?

Users of PROGNOST®-SILver get the answers from diagnostic specialists. Support is available on demand in case of an emergency shutdown or any other operation-critical

situation. This unique service requires an optionally available recording function. After retrieving data from the affected machine, the PROGNOST customer support team will communicate initial findings and, if requested, follow with a written report including detailed conclusions.

This meaningful failure analysis is based on:

- Ring buffer with transient recordings of all online signals before and during the shutdown
- Trends of the monitored parameters, and
- A protocol with all status information such as alarms per machine, per sensor, and per PROGNOST®-SILver card



Development and production of the worlds' best online monitoring systems for predictive maintenance

PROGNOST Systems offers intelligent monitoring systems for rotating equipment, especially for reciprocating compressors and gearboxes, of extruder trains. Our solutions include automated machinery diagnostics, SIL-certified machine protection and performance monitoring. Especially developed solutions for predictive maintenance of reciprocating and centrifugal machinery detect impending failures very early and assign the affected components. Operation-critical damages are avoided and maintenance measures can be performed efficiently.

Our customers are excited about the possibilities to diagnose failures at their machinery and to get a user-friendly tool at the same time which enables them to move from preventive to predictive maintenance procedures. The PROGNOST customer support is sharing its 30 years experience as a email or phone 10/5 to 24/7 service. Our global sales and services network in 40 countries provides timely responses to any question and requirement – in your timezone and your local language.

WE PERSONALLY SUPPORT ALL PROGNOST® USERS FOR REACHING THEIR ULTIMATE GOAL:
RELIABLE PROTECTION AND MONITORING OF ROTATING EQUIPMENT



Your PROGNOST Systems Team

Imprint

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