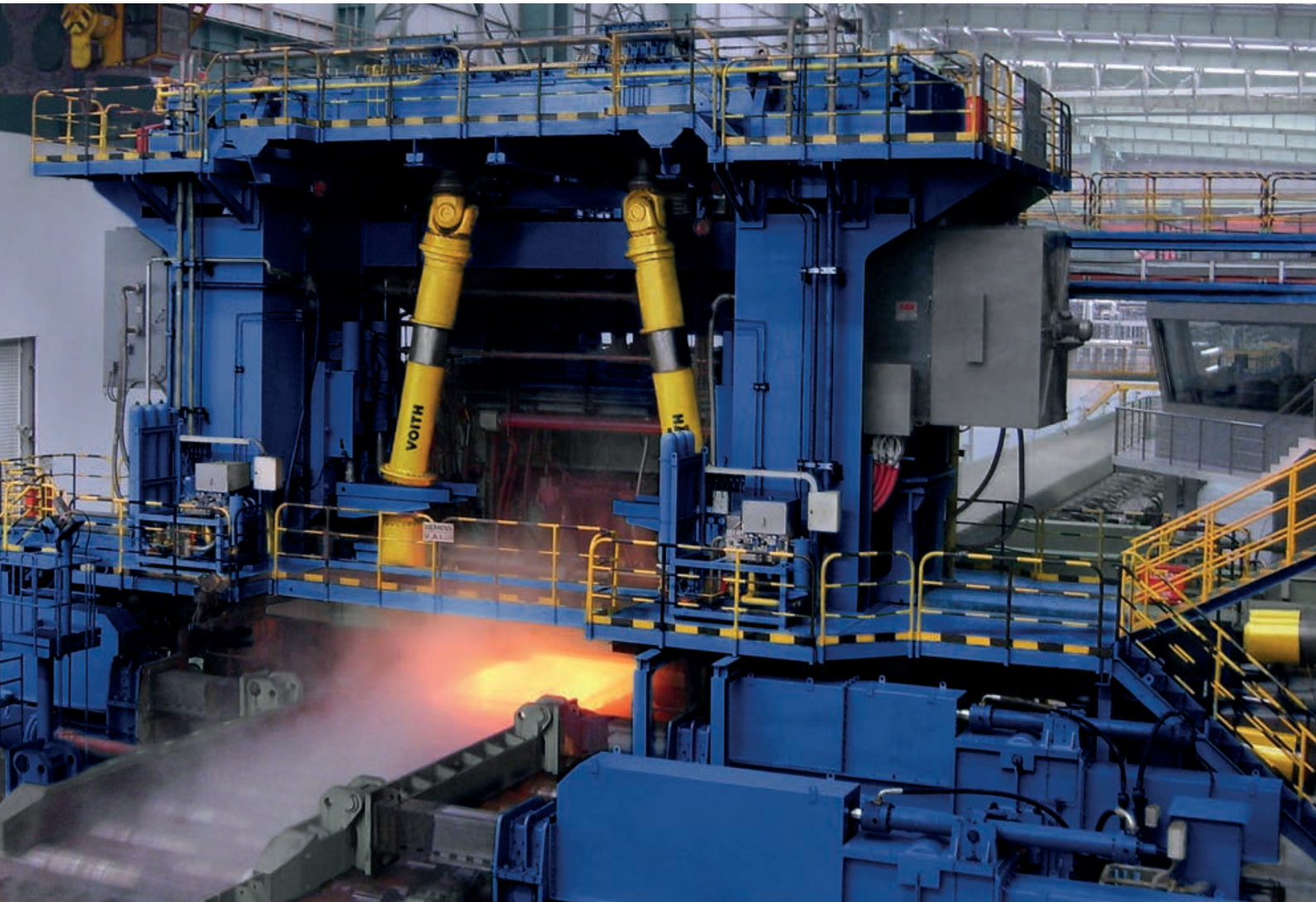


**High quality. Torque monitoring  
for every industry**  
**OnCare.Health ACIDA**





# Reliability is imperative

Rolling mills, wind turbines, paper machines, compressors, excavators – nearly all industrial and transportation equipment have one thing in common: they all have drives which power processes, move masses or convert energy. Machine drives only function properly when rotating at the correct speed and with the correct torque. The driven machines only meet their optimum design output specifications, if plant design, process control and maintenance harmonize reliably.

OnCare.Health ACIDA offers a full line of field services, engineering solutions and custom-designed monitoring equipment. Our portfolio is applicable not only with stand-alone machines, but also for complete plants with complex processes. We focus on condition-based maintenance, machine reliability and process efficiency. OnCare.Health ACIDA is strongly committed to research and

development to guarantee state-of-the-art monitoring and diagnostic technology for plant operators, maintenance departments as well as equipment suppliers.

**Solutions**

- Diagnostic services for condition-based maintenance, field measurements and trouble-shooting

- Machine monitoring systems for the online surveillance of machines subject to wear and fatigue
- Process monitoring for continued quality control and know-how based improvements in efficiency
- Sensors for torque, vibrations and other physical parameters with a special focus on telemetry solutions for rotating components

# Solutions for productivity, quality and maintenance

- Rolling mills
- Wind turbines
- Paper machines
- Roller presses
- Power plants
- Coal pulverizers
- Hauling machines
- Excavators
- Crushers
- Test benches
- Feeding pumps
- Compressors
- Centrifuges
- Hydraulic pumps
- Mixers
- Chemical reactors
- Cruise ships and trawlers
- Trains

- 1 Monitoring of train drive units
- 2 Vibration and Torque Monitoring Solutions for Paper Machines
- 3 Vibration Diagnostics for Compressor Drives
- 4 Drive Train Monitors for the Oil and Gas Industry





# OnCare.Health ACIDA

**Services, products, consultancy and software solutions in the field of maintenance, diagnostics and machine monitoring offer our customer a complete overview of their production assets' condition, helping optimize production time and minimize maintenance.**

The OnCare.Health ACIDA product line consists of custom-designed systems for nearly all industrial monitoring applications. OnCare.Health ACIDA is used for the continuous, multi-channel monitoring of sensor signals, process data and machine parameters in real-time at high sampling rates. Scalability of the system configuration and the implemented data management are two major strengths of this product line. The diagnostic algorithms are most versatile and

include for example vibration monitoring in the time and frequency domain, fatigue and residual life-time analysis. The Report-Generator module minimizes the requirement for diagnostic expertise and thus allows the operators to concentrate on their core business: productivity, quality and maintenance.

All OnCare.Health ACIDA systems use standard industrial PC-hardware, MS Windows operating systems and a rela-

tional database for data management. The signal digitization and the upstream conditioning such as anti-aliasing filters, envelope analysis or galvanic isolation are selected individually for each application. OnCare.Health ACIDA systems are thus suitable for stand-alone machine units and for mobile data acquisition tasks as well as for the holistic monitoring of whole production plants.

### Plant and process monitoring

Paper machines, rolling mills, cement plants or power plants are capital-intensive production facilities with a high cost concentration in production processes. This implies that improvements in maintenance and process control result in significant financial gains. Following our lifecycle philosophy, OnCare.Health ACIDA not only covers the condition diagnosis of components subjected to wear and fatigue. Our optimization of machine reliability also includes the production processes. Just as in medicine a conventional diagnosis only registers the damage, which has already occurred and offers solutions to remedy the illness.

The OnCare.Health ACIDA plant and process monitoring solutions take the whole picture into account. The solutions are engineered to detect every conceivable pre-indicator of incipient machine damage. The cross-correlation between machine condition, force and torque loads and process performance is the key to pro-active measures for long-term plant successful operation. To further illustrate our methodology, referring again to our medical analogy, when we implement an OnCare.Health ACIDA solution: We believe an organism should not be stressed to the point where therapeutic or even radical measures become mandatory. Rather a stable process should be accompanied by suitable monitoring allowing for sustained effective operation.

### Vibration diagnostics

Vibration diagnostics are the state-of-the-art technology for detecting poor

machine condition such as roller bearing defects, gear box tooth meshing, unbalance, misalignment, structural resonances or sub-synchronous excitation. The best technical solution is to implement permanently installed online systems, which enable continuous collection and trending – a prerequisite to detect changes in machine condition. Machine vibrations are usually captured through structure-borne sound using accelerometers and analogue signal conditioning, especially the envelope analysis. In addition to the vibrations, secondary signals such as the rotational speed, motor current, torque load or bearing forces are used to improve the diagnostic results.

The MORC module “is designed for online and offline vibration diagnosis. This features static or speed related frequency tracking. Besides chronological trending, also offered is the unique feature of trending the vibration amplitudes versus the secondary input signals. This is a powerful tool for vibration-based root-cause analyses through cross-correlation.

### Fatigue and residual life-time monitoring

True to our life-cycle philosophy, we offer residual life-time monitoring of fatigue affected mechanical components. Machine parts with design restrictions or stochastic overload events may be stressed beyond fatigue limits. The monitoring of fatigue defects solely through vibration analysis or visual inspections is often insufficient. The defect detection is too late for initiating corrective measures, or the risk of a disaster break-down is too high.

The OnCare.Health ACIDA fatigue monitoring is based on counting the measured load cycles. The residual life-time is obtained through comparison with the design and material parameters for the fatigue-affected components. Moreover, an inadequate progression of the residual life-time curve allows application of corrective measures to the process control in order to keep fatigue within the design parameters.

### Measuring instrument

OnCare.Health ACIDA solutions are provided for test bench applications as well as for mobile measuring equipment. The flexibility of the signal input, i.e. the number of channels, the signal conditioning, the sample rates or the resolution of digitization enable a virtually unlimited variety of system designs for the most challenging applications.

### Flight recorder

Continuous and complex industrial processes or mobile equipment often require an online signal-based documentation of the operation at high sampling rates. The OnCare.Health ACIDA system offers archiving and transient recording features far beyond the relatively slow parameter logging of programmable controllers. All plant and process data as well as additional sensor signals are recorded in a ring buffer designed for permanent operation. Moreover characteristic values of all information are stored in a relational database, thus allowing trending as well as event browsing.

## Hardware

### OnCare.Health ACIDA Server

The OnCare.Health ACIDA server is the high-end monitoring system ideally designed for stationary industrial application with continuous operation. The OnCare.Health ACIDA server is based on 19" rack industrial PC hardware of the latest generation. The MS Windows operating system provides enhanced network ability and communication options. The server solution is delivered turn-key in a free-standing 19" industrial enclosure. The included EventVIEWER basic module offers online and offline visualization in the time and frequency domain. The SQL database offers unique features for long-term trending and extensive data mining capability. Optional modules extend the diagnostic functions as required. Data acquisition can be implemented within the server or via OnCare.Health ACIDA clients. This allows for a flexible monitoring network with a virtually unlimited number of distributed signal input points.

### OnCare.Health ACIDA Client

OnCare.Health ACIDA clients extend the performance of a server either by adding signal input channels or com-

puting power to support the required monitoring performance. OnCare.Health ACIDA clients are based on 19" rack industrial PC-Hardware and use the MS Windows XP Professional operating system.

### OnCare.Health ACIDA Box

An OnCare.Health ACIDA box is the perfect solution for lean stand-alone applications such as the vibration monitoring of a gear box unit. The number of channels, typically 8, 16 or 32, is only limited by the available computing power. The hardware platform is an industrial standard compact box-PC equipped with mobile processors running MS Windows XP Professional. The OnCare.Health ACIDA box is delivered in a wall-mountable compact enclosure which includes the power supply, signal conditioning and analogue to digital conversion. The visualization relies on networking, either via available PC or a Notebook connected on site. Email is used for alerts and reporting.

### OnCare.Health ACIDA Mobile

The performance of the mobile OnCare.Health ACIDA version is comparable to the OnCare.Health ACIDA box with the added features of portabil-

ity and integrated visualization. The system is contained in a robust aluminum hand carrying case that complies with the IATA standard. The PC hardware is a standard laptop connected via USB 2.0 cable to the integrated data acquisition unit.

### Signal conditioning

Options are: galvanic isolation, anti-aliasing filters, low, band and high-pass filters or envelope analysis, pulse counting, IEPE sensor supply (i.e. accelerometers, strain gauge, thermocouple or PT100 input modules).

### Analog to digital conversion

Options are: 16, 32, 64, 128 scalable input channels, differential or single-ended signal input, 12, 16 or 24 bit resolution, up to 1.25 MHz sampling rates.

### Hardware options

Streamer backup, RAID hard disk array(s), redundant or uninterruptible power supply (UPS), preferred PC suppliers, box-PC without fan, moisture and impact resistant laptop, size, material (stainless) and color of the enclosures, cable types.

## Software

### EventVIEWER BASIC

is included in each OnCare.Health ACIDA package and features measuring device and digital scope features, as well as the on- and offline visualization in the time and frequency domain.

### Module LC – Load Collectives

Level-Cross-Counting (LCC), Level-Persistence-Counting (LPC), Hysteresis-Counting-Method (HCM-rainflow) for the on- and offline classification, summation and residual life-time analysis.

### Module CHALG – Channel Algorithms

Algebraic channel calculation, orbit diagrams, Campbell analysis, peak search, gradient search, peak hold.

### Software options

### MORC – Monitoring of Rotating Components

Online or offline monitoring of static or dynamic frequency bands. The outputs are trend curves for kinematic frequencies, resonances, harmonics or sub-synchronous frequencies. Trends can be plotted chronologically or versus another recorded parameter such as the load. The parameter trending is a unique feature and enables cross-

correlation and vibration excitation root cause analysis.

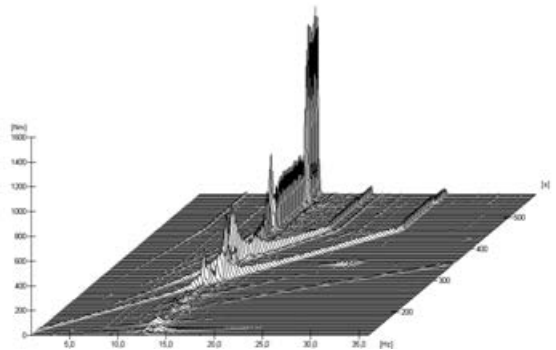
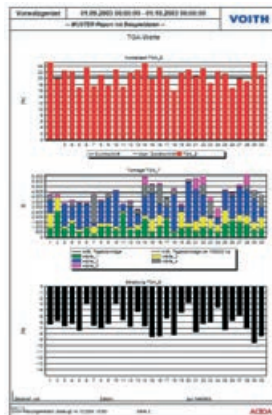
The custom-designed report Generator modules perform routine diagnosis and reporting automatically.

The OnCare.Health ACIDA end-user benefits from a significant increase in efficiency and time savings. The Telegram-Server networks OnCare.Health ACIDA to the end-users process mainframe, thus enabling the database to archive all records with reference to process data for extensive process-related data mining features. The database option upgrades the standard 2 GB limited database to a full-size MS SQL Server database.

### Compact O.M.M. box for standalone or networked applications



### Examples of a report generator output and a frequency analysis



# OnSens.Torque

One of OnCare.Health ACIDA's unique strengths is the supply of non-standard monitoring solutions. Such applications often require sensor and instrumentation products that are not available on the market. A variety of sensor solutions required to solve these challenges has emerged from our research and development effort. In most cases our sensor and instrumentation portfolio is custom-designed.





OnSens.Torque sensors are designed for permanent industrial use with heavy duty drives with high to extremely high torque loads. OnSens.Torque sensors are mounted on existing shafts, thus no modifications to drive trains are necessary.

OnSens.Torque sensors are based on strain gauge technology to measure the torque proportional to the torsion of a shaft. The use of a telemetric system guarantees a contact-free operation.

Sensor design, sealing system and application technology are selected individually according to the requirements of each application. OnSens.Torque excels in providing this sensor technology for large to very large drive shafts and for the harshest operating conditions, for example rolling mills, vessel propeller shafts, roller presses or hauling engines in the mining industry. The sensor application is carried out by the OnSens.Torque experts at the manufacturer's workshop or on site.

- 1 Torque measuring at large drive shafts
- 2 Torque measuring at vessel propellers
- 3 Torque measuring in paper machines





Our Service –  
Part of Your  
Business.

# Services

**Our goal is to ensure that your operation runs according to your expectations – reliably, efficiently and profitably.**

The diagnostic services of it enable condition-based maintenance of machines, the most effective of all maintenance strategies. For example, our health-check service for turbo machinery can be embedded into the maintenance schedule of our customers. The diagnostic know-how of our specialists ensures that defects are detected at an early

stage and corrective maintenance measures can be taken before a catastrophic failure or consequential damage occurs. Operational measurements and troubleshooting – especially for large scale machines and plants. Our strengths are machine diagnostics and process analysis using online multi-channel data acquisition at high sample rates for

extended measuring campaigns. We analyze torque, force, vibrations, temperatures and structural stress and are prepared for adverse conditions – on-shore and offshore.

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# We are prepared for adverse conditions – onshore and offshore.

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## Health checks

For turbo machinery and hydrodynamic drives.

- vibration measurement and analysis of complete drive train during operation
- condition diagnosis of hydrodynamic package
- visual inspection of mechanical components and instrumentation

## Vibration diagnostics

For early-stage defect prediction and corrective measures.

- condition monitoring of roller bearings and gear box diagnostics
- resonance analysis
- modal analysis
- bedplate and foundation assessment
- in place multi-plane balancing
- laser and optical geometric alignment

## Torque and torsion measurements

- non-contact torque measurements at rotating equipment, especially suitable for heavy-duty drive shafts
- measurement of the angle of twist in highly flexible couplings
- telemetry solutions for rotating equipment signal transmission
- pirate loading, i.e. bending moment or axial forces, measured at rotating equipment

## Structural analysis

- strain gauging to measure all types of mechanical parameters, such as stress, pressure, force or torque
- Deformation analysis of roll housings, bedplates, superstructures and framework
- fatigue and residual lifetime assessment

## Engineering

- finite-element-model analysis (FEM)
- torsional simulation
- multi-body simulation

## Remote Service

For machinery equipped with online monitoring systems.

- remote access diagnostics
- online system maintenance
- routine reporting services

## Process solutions

- rolling mill process optimization
- assessment of process – machine interaction
- data collection during commissioning of new components or process upgrades

Voith Group  
St. Poeltener Str. 43  
89522 Heidenheim, Germany

Contact:  
Phone +49 241 997392-0  
[acida@voith.com](mailto:acida@voith.com)  
[www.voith.com](http://www.voith.com)



**VOITH**

Inspiring Technology  
for Generations