



# Beyond Machine Protection Condition Monitoring Makes a Difference

Optimal performance, uptime and reliability of your machines

Early fault detection and improved maintenance planning

Flexibility and scalability for many types of applications



Integration  
of ANY  
machine protection  
system



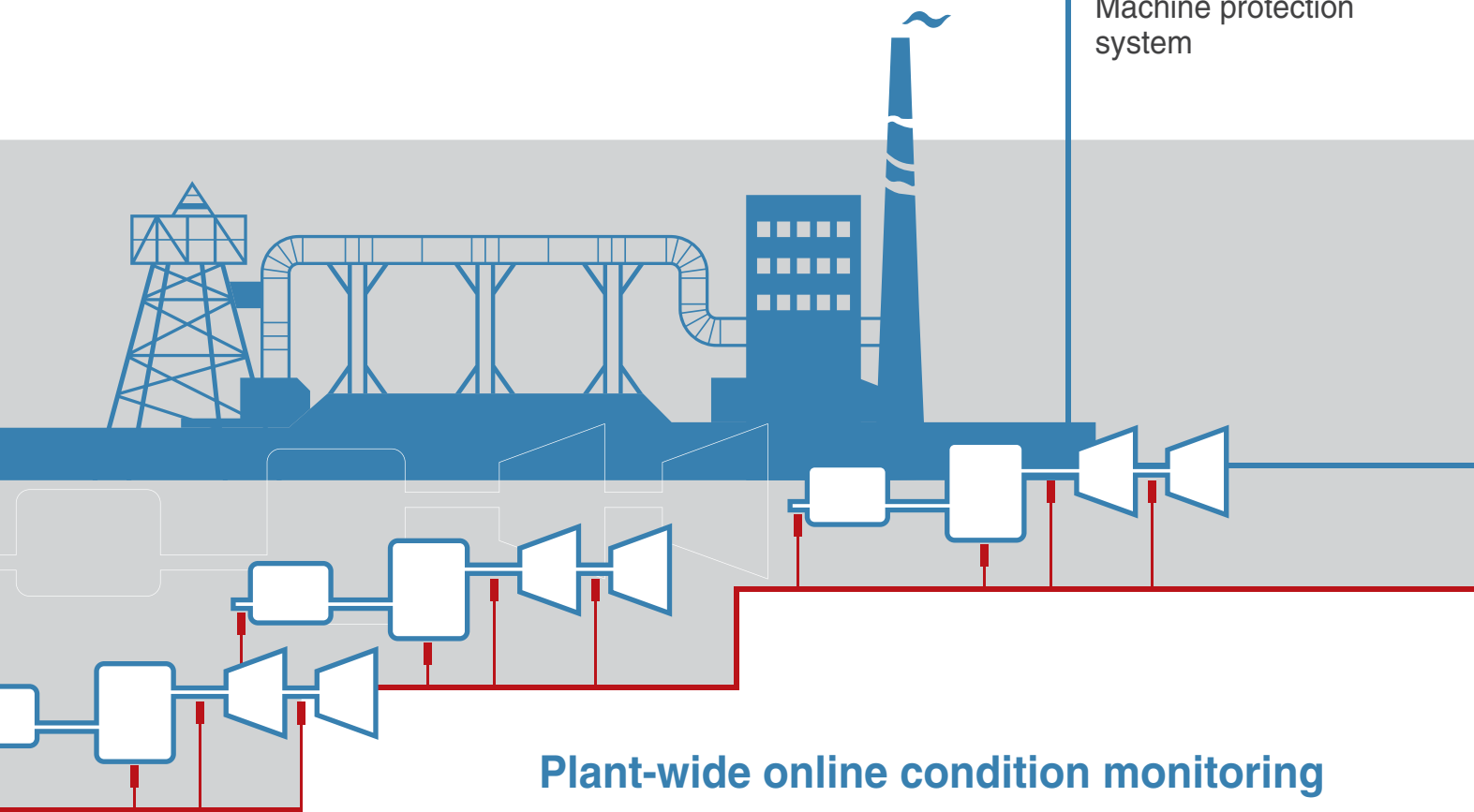


## Is machine protection enough?

Your machines are protected but there is no protection against losses in uptime or productivity during a shutdown. Is there any way to prevent a shutdown in the first place? Is there a way to get an overview on the health of the machines without jeopardizing the protective function? The answer is yes! Your under-utilized protection system investment can actually help you to better manage your valuable assets ... by simply adding Brüel & Kjær Vibro condition monitoring capability to it!



DCS  
Machine protection  
system



## Plant-wide online condition monitoring

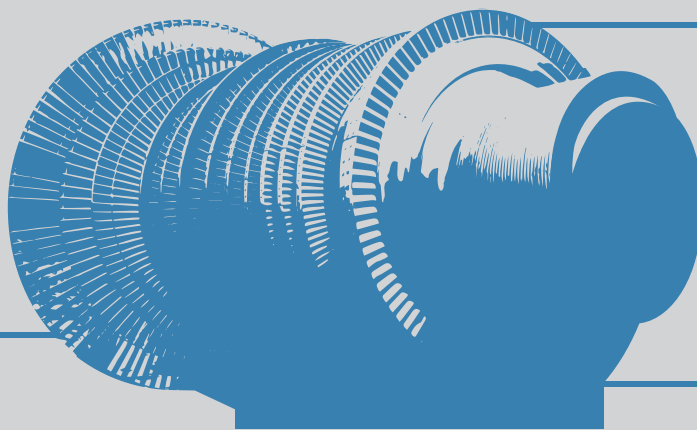
not only improves machine uptime, productivity, efficiency and reliability, but it also reduces life cycle costs!

With little investment from your side, you can extend your machine protection system to include powerful plant-wide condition monitoring capability. Our monitoring solutions can work on any protection system and be easily extended over a period of time to meet changing customer requirements, such as including performance monitoring and advanced diagnostic and analysis capability. This not only multiplies your ability to more effectively manage your machine assets, but it will also improve the overall plant profitability in your competitive market.

# Brüel & Kjær Vibro's condition monitoring and diagnostic solutions fit your plant requirements and experience

All our monitoring products and services are designed to fulfil plant and user requirements based on criticality of machines, machine maintenance history, remoteness, client experience, networking, required lead-time, interconnection with existing systems and budget. These monitoring solutions are of course backed by our renowned services through a world-wide network of sales offices and agents.

No matter which system is selected, the goal is the same: To maximise lead-time to maintenance with early fault detection, thus giving reliable, accurate actionable information for service. The end result is maximized production, improved machine efficiency, reduced downtime and maintenance costs that together deliver increased plant reliability and availability.



Brüel & Kjær Vibro  
**VIBROCONTROL 6000®**  
machine protection system

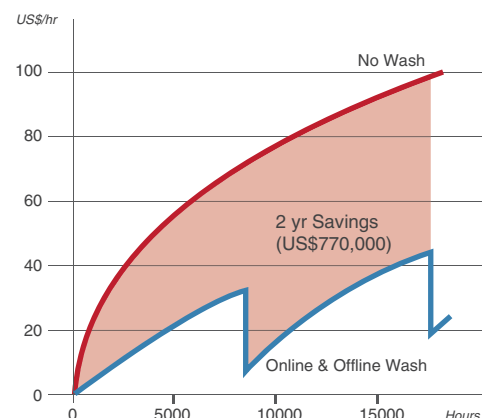
Other machine protection system  
(or directly from sensors)

## Compass 6000™ for plant-wide monitoring

All the critical and balance-of-plant machines in your plant can be monitored by **Compass 6000™**, including those that are remotely networked. With one common user interface, this comprehensive system provides an at-a-glance overview on the health assessment of hundreds of machines as well as delivering powerful diagnostic capability for reliably planning maintenance ahead of time and performing root cause analysis. It is completely scalable, and can be used by operators with all types of experience. The system grows as the customer requirements grow.

**Compass 6000™** can use the Brüel & Kjær Vibro **VIBROCONTROL 6000®** data acquisition and conditioning unit for data input without requiring any additional hardware or wiring or it can be connected to any existing protection system using the new Brüel & Kjær Vibro **VI-6080** vibration interface. For machines without a protection system, it is possible to directly connect sensors to the **Compass 6000™** system using the **VI-6080** interface.

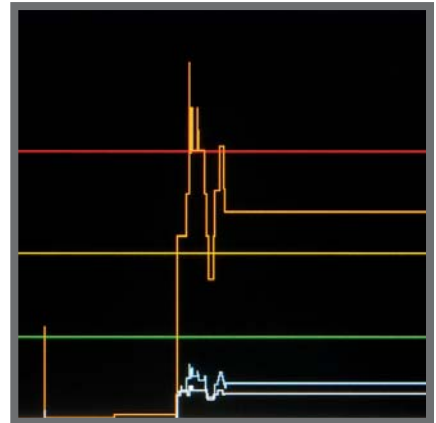
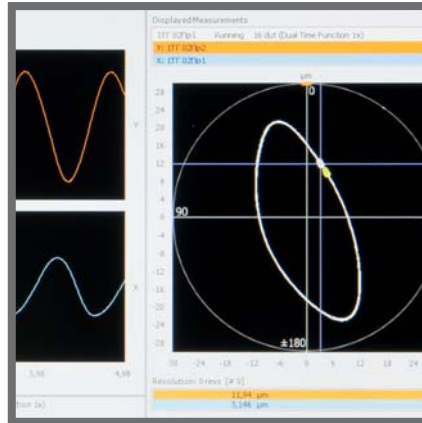
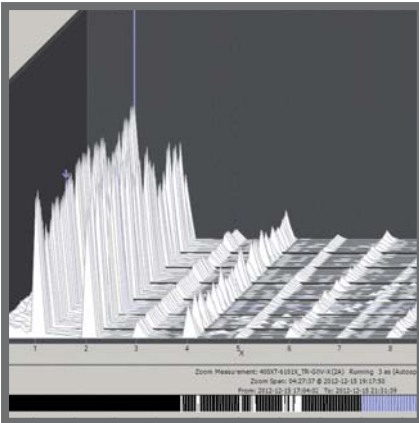
Extra fuel required per hour operation for 30MW gas turbine



*Continuous base load, natural gas US\$ 4 MMBTU*

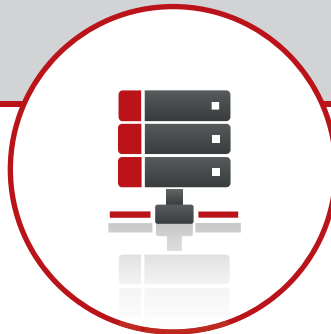
*In addition to savings gained by increasing time between major overhauls of a gas turbine, there is also a significant efficiency gain by performance monitoring.*

Example of **Compass 6000™** powerful plotting functionality. Left to right: Waterfall spectrum plot, orbit plot, multi-trend plot



## Compass 6000™ database and server for trending and analysis

Brüel & Kjær Vibro  
Vibration  
Interface VI-6080



## Other Brüel & Kjær Vibro condition monitoring solutions

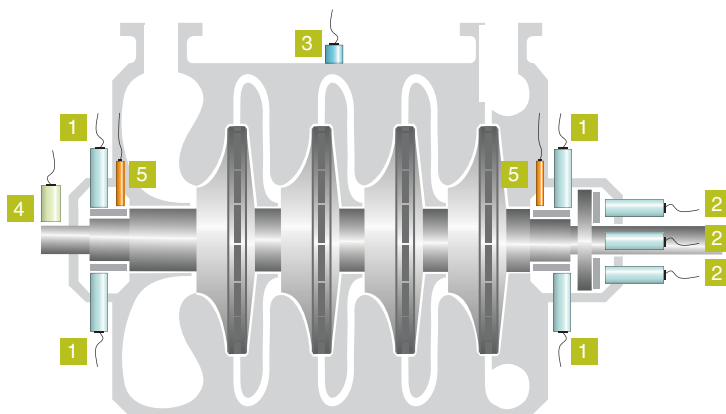
We offer one or more products and services that can precisely fit your condition monitoring requirements.

The 16-channel online **VDAU-6000** (Vibration Data Acquisition Unit) field monitor provides an early fault detection condition monitoring strategy using smart descriptors (scalar measurements) for one or more specific machines. **VDAU-6000** runs on Monitoring Workstation monitoring software as does **Compass 6000™**, but it can also run on **VibroSuite**, which provides powerful post-processing analysis functionality using time signals.

We also offer compact field monitors such as the **VIBROCONTROL 6000® Compact monitor** and **VIBROCONTROL 1500** for basic online condition monitoring capability. Our powerful **VIBROPORT 80** and **VIBROTEST 80** portable handhelds and accompanying monitoring software offer unique analysis, balancing and data collection capability. These instruments plus **Compass 6000™** all share the same common goal: Delivering reduced life cycle costs for your machines, critical or balance-of-plant.

# Brüel & Kjær Vibro delivers a condition monitoring strategy for many types of machines and industries

It does not matter if you are monitoring a compressor, turbine, motor, fan or pump, Brüel & Kjær Vibro, the leading independent supplier of uptime related solutions for over 60 years, provides a condition monitoring strategy that precisely fits your specific machine.



## Vibration and Process Measurements

- 1 Relative vibration / radial
- 2 Axial displacement
- 3 Case vibration
- 4 Tacho (rpm and phase reference)
- 5 Bearing temperature

*An example of a vibration monitoring strategy for a centrifugal compressor, which can be easily combined with process parameters (measured and imported) and performance monitoring.*

## Steady state

- Bandpass
- FFT
- Vector (1x, 2x, nx)
- CPB
- Orbit

## Transient monitoring

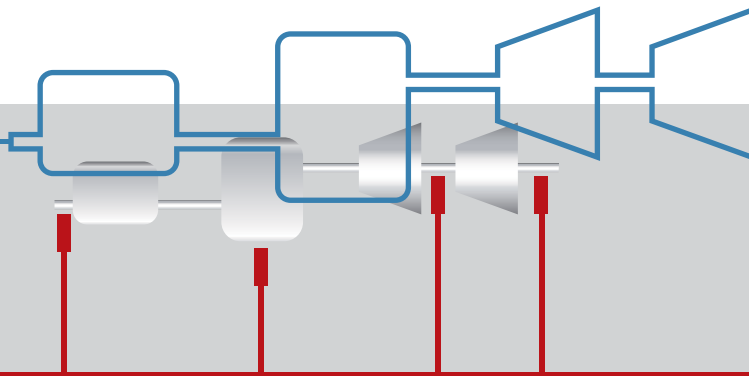
- (delta rpm based)
- Bandpass
  - Vectors
  - Bode
  - Waterfall spectra (rpm and time based)
  - Shaft centerline
  - Delta amplitude based

## Diagnostic

- Trending
- FFT
- Vector (1x, 2x, nx)
- CPB
- Orbit



**Brüel & Kjær Vibro**



**If you are ready to add condition monitoring capability to your machines to increase productivity and reduce operation and maintenance costs, contact your local sales representative now for more information on how to get started or look us up at [www.bkvibro.com](http://www.bkvibro.com).**

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