



opus
automazione

Turbomachinery services

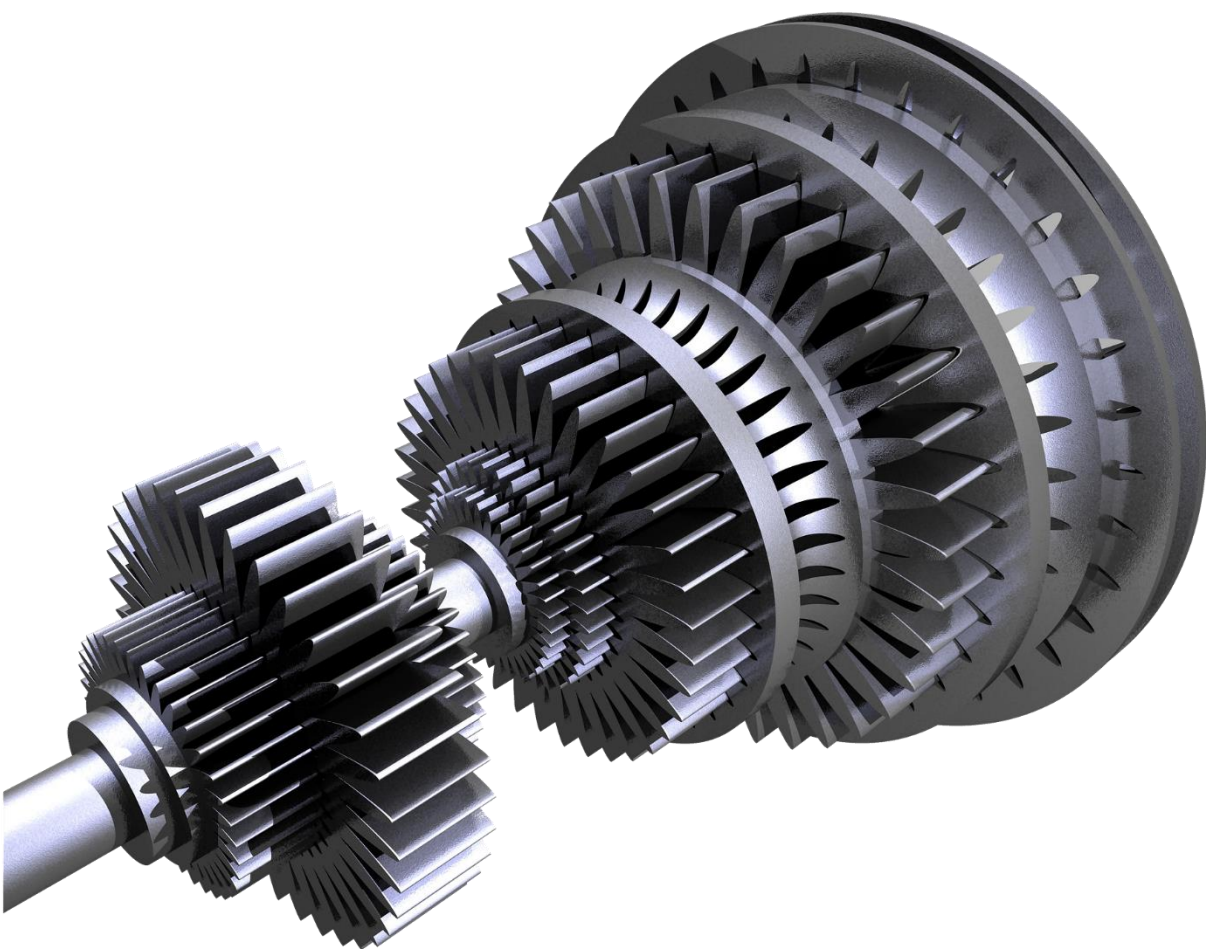
TOGETHER
WE BUILD
THE FUTURE

SISTEMI DI
GESTIONE CERTIFICATI

CQY
CERTIQUALITY

UNI EN ISO 9001:2015
UNI EN ISO 14001:2015
UNI ISO 45001:2018

Diagnostic services on rotating machines



opus automazione provides diagnostic services on rotating machines as follows:

- Gas and steam turbine
- Centrifugal compressors
- Pumps / Fans / Blowers
- Electric motors
- Gear Boxes
- Auxiliary systems

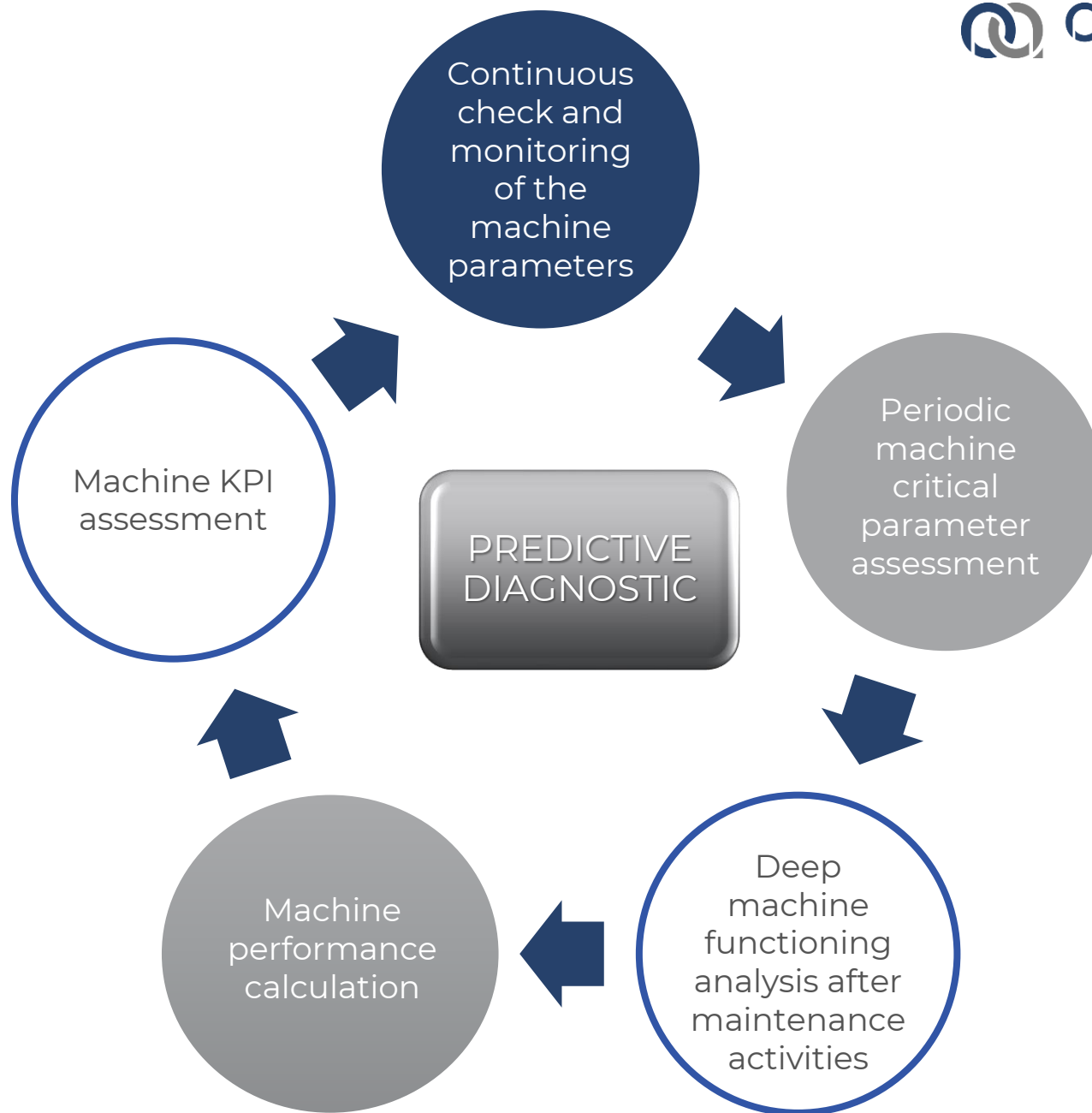
Main experience has been carried out on the turbo-compressor and turbo-generator plants (simple or combined cycle), on-shore and off-shore in the Oil&Gas sector.

This diagnostic activities have been extended to other industrial fields as paper industry, plastic packaging production plants and the chemical industry.

Predictive Diagnostic

opus automazione implements PREDICTIVE DIAGNOSTIC systems (condition monitoring) depending on machine/plant type and critical aspects. The final scope is to:

1. Minimize machine/plant shut-down and enhance process machine/plant reliability
2. Achieve a correct overview of the machine/plant status, relevant performance and KPI
3. Improve scheduled maintenance activities by decreasing the relevant costs
4. Improve warehouse supplying management



Performance Test and Vibration Analysis

PERFORMANCE TEST

Performance tests on rotating machines and auxiliary systems. Data processing by additional equipment and dedicated systems

Assessment or definition of compressor anti-surge control curve

Flow rate, pressure and temperature measurement for diagnostic and troubleshooting

Exhaust gas emission test

VIBRATION ANALYSIS

Acquisition and analysis of vibration signals by dedicated portable systems, linked to machine probes or to additional probes, such as no-contact probes, velocity, accelerometers

Trim balance

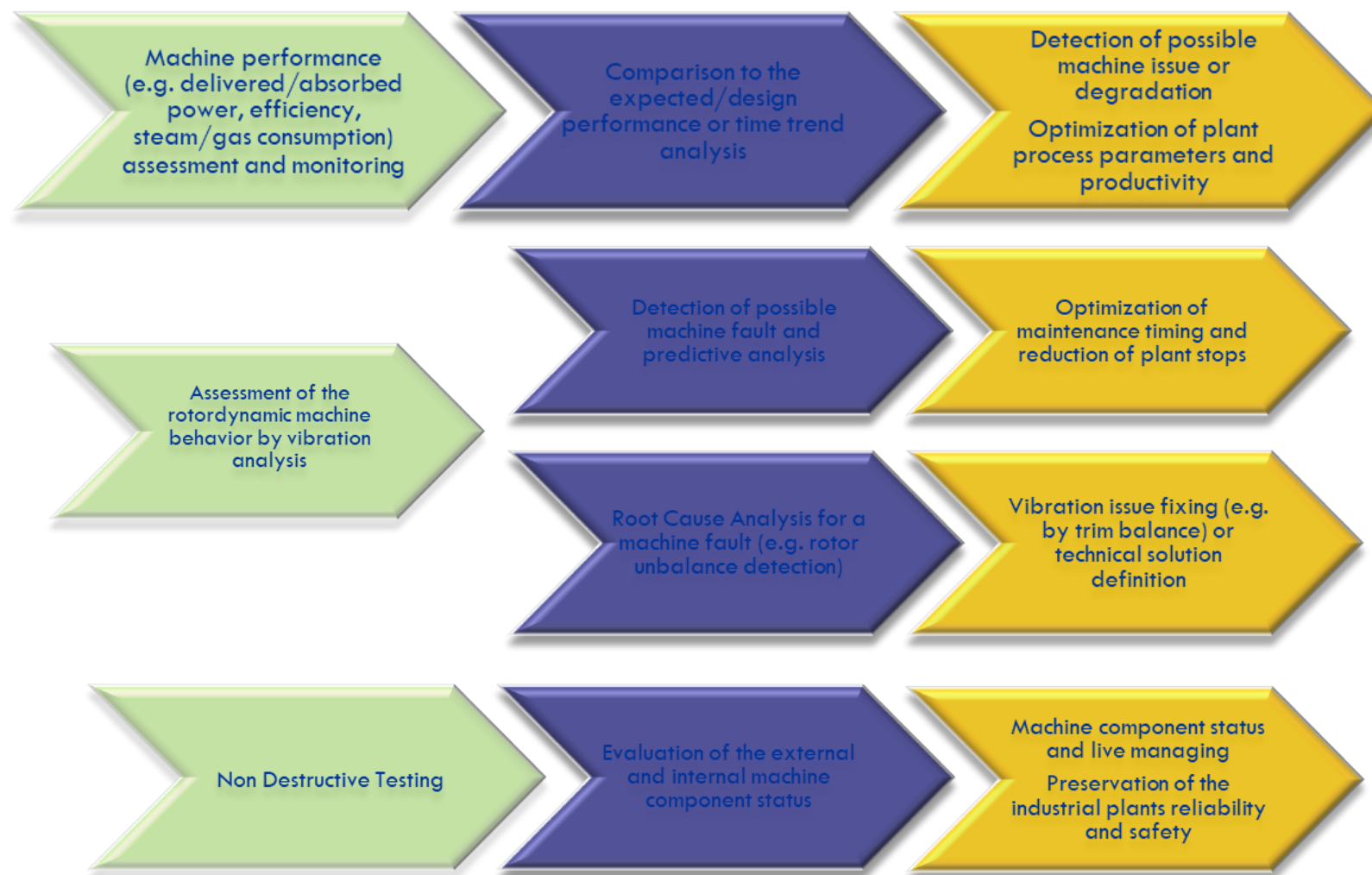
Diagnostic and troubleshooting

NON DESTRUCTIVE TEST

- Direct and Indirect Visual Testing
- Penetrant Testing
- Magnetic Testing
- Eddy Current Testing
- Ultrasonic Testing
- Hardness Testing

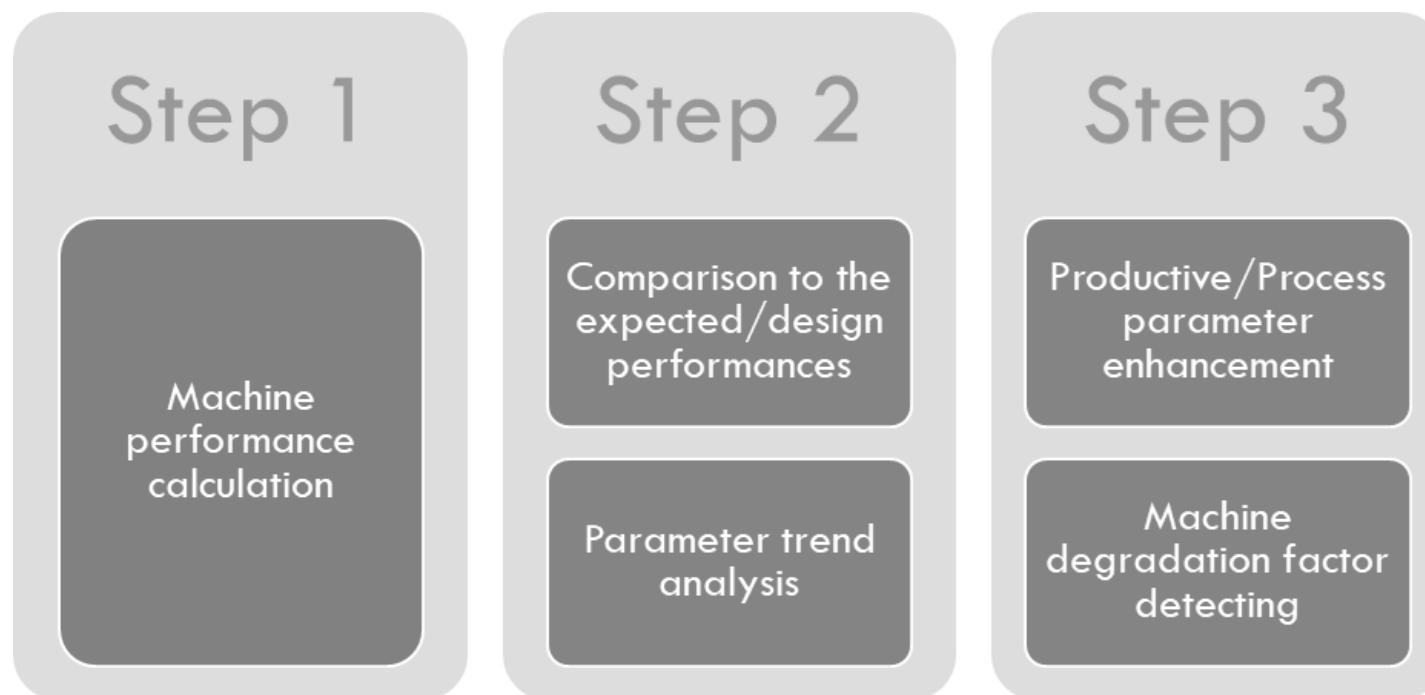
Customer Benefits:

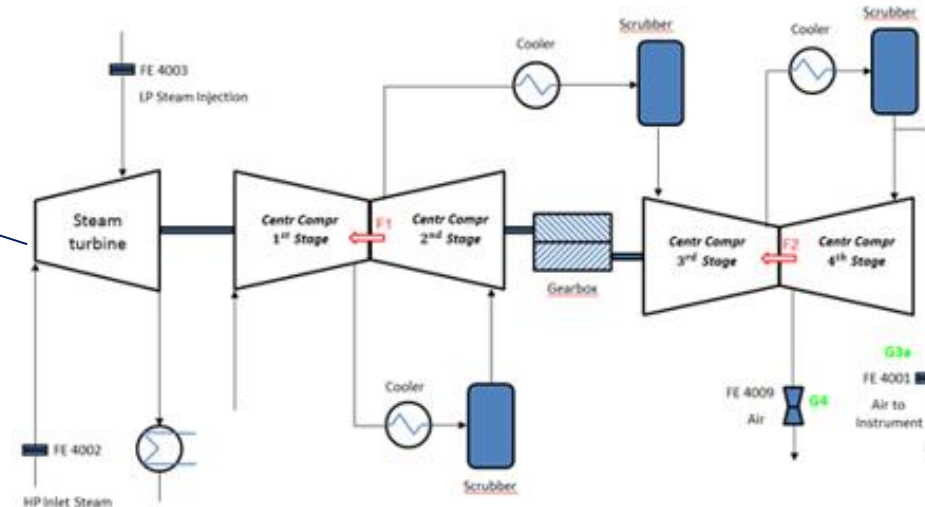
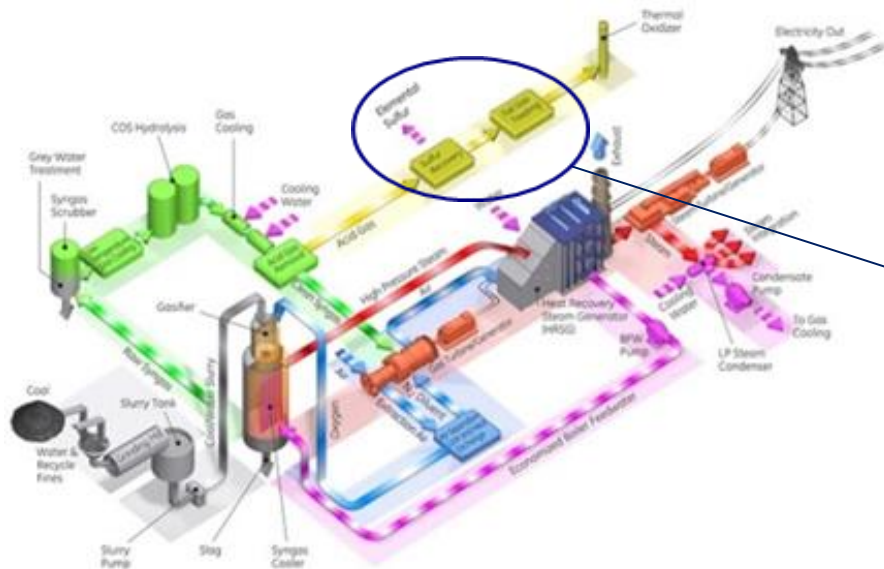
Cost Reduction And Production Increasing



Performance Test

opus automazione carries out plant performance evaluations by means of DCS readings (e.g. pressures and temperatures) or by using high precision additional instrumentation wired to a digital data logger, in order to guarantee more accurate results.





opus automazione carries out plant performance test on rotating machinery following the main international standards:

For Gas Turbine Test:

- ASME PTC 22 – 2014
- ISO 2314 – 2009

For Steam Turbines Test:

- ASME PTC 6 – 2014

For Centrifugal Compressors Test:

- ASME PTC 10 – 1997
- ISO 5389 - 2005

Flow measurement is crucial during these activities, for this reason and to achieve the most accurate results, the following international standards are applied when the steam and/or gas flows are measured by orifice, Venturi and nozzle:

ISO 5167 - 2020

ASME PTC 19.5 - 2013

The following parameters, in different operating conditions (e.g. ISO for gas turbine), can be evaluated for rotating machinery:

GAS TURBINES

- Delivery shaft power
- Heat rate / Efficiency
- Fuel gas consumption

STEAM TURBINES

- Delivery shaft power
- Efficiency
- Steam consumption

CENTRIFUGAL COMPRESSORS

- Absorbed shaft power
- Head and efficiency
- Surge limit line
- Mapping (assessment of the operating range)

These outcomes can be used to verify guaranteed contractual conditions defined between Customer and Supplier, carry out a machine fingerprint to evaluate possible improvements or new plant configuration, evaluate the general performances or machine degradation



RELEVANT TECHNICAL DOCUMENTS:

Site test procedure
Site test report
Data post-processing
report
Plant performances
calculation
Evaluation of
measurements
uncertainty

Vibration Analysis

opus automazione executes Vibration Analysis on rotating machinery.

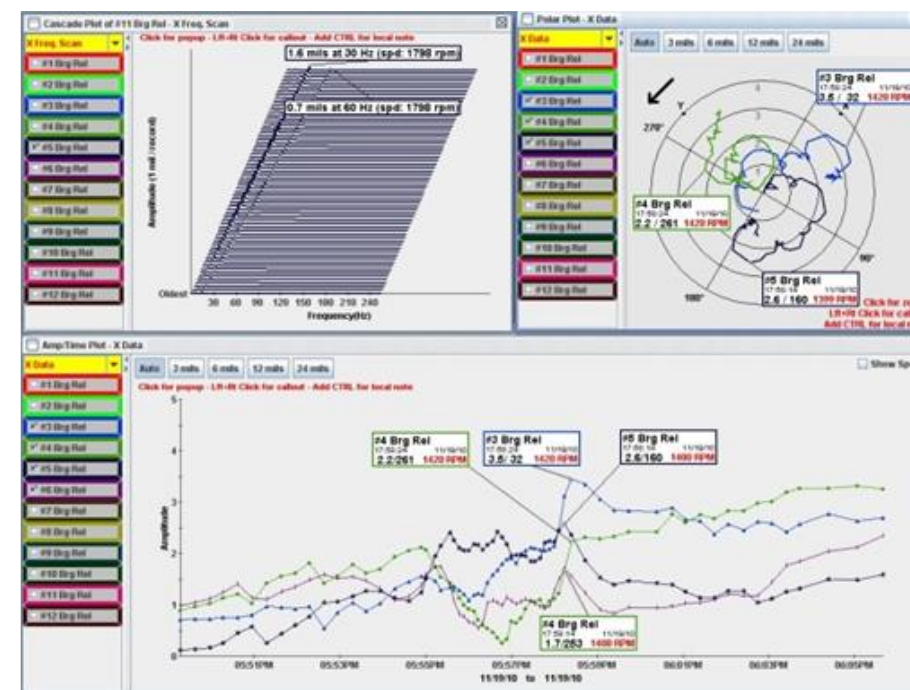
We are able to determine and monitor the health of machinery and the early prediction of potential problems of equipment. Through a vibration data analysis the following issues can be identified on rotating machinery:

- Rotor Unbalance
- Misalignment
- Resonance
- Mechanical Looseness
- Bearings problem
- Rotor Rub
- Oil Whirl/Whip
- Tooth malfunction/broken

In case of unbalance problems, our Team is trained to correct the unbalance through a single or multi-plane balancing on site.

RELEVANT TECHNICAL DOCUMENTS:

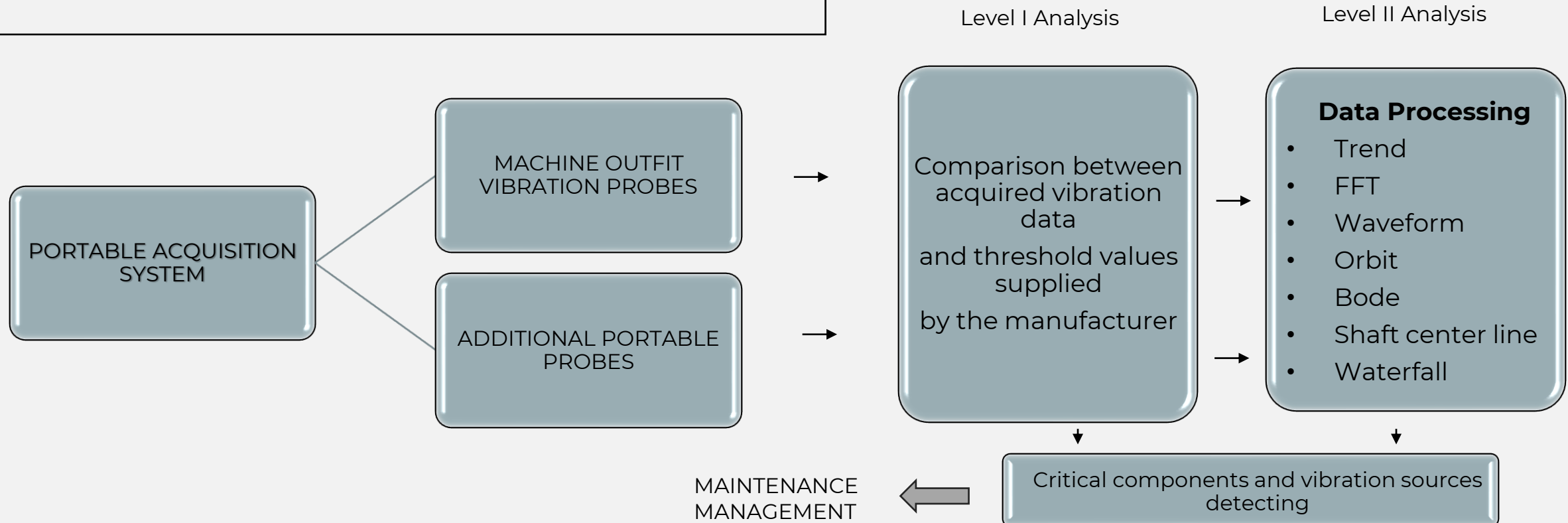
- Site test procedure
- Site test report
- Data post-processing report



Vibration Analysis

Vibration analysis carried out by means of portable analyzer can be considered as part of the highest control levels of the predictive maintenance, these checks can be performed as follows:

- Periodically
- After maintenance activities, repairs and overhaul

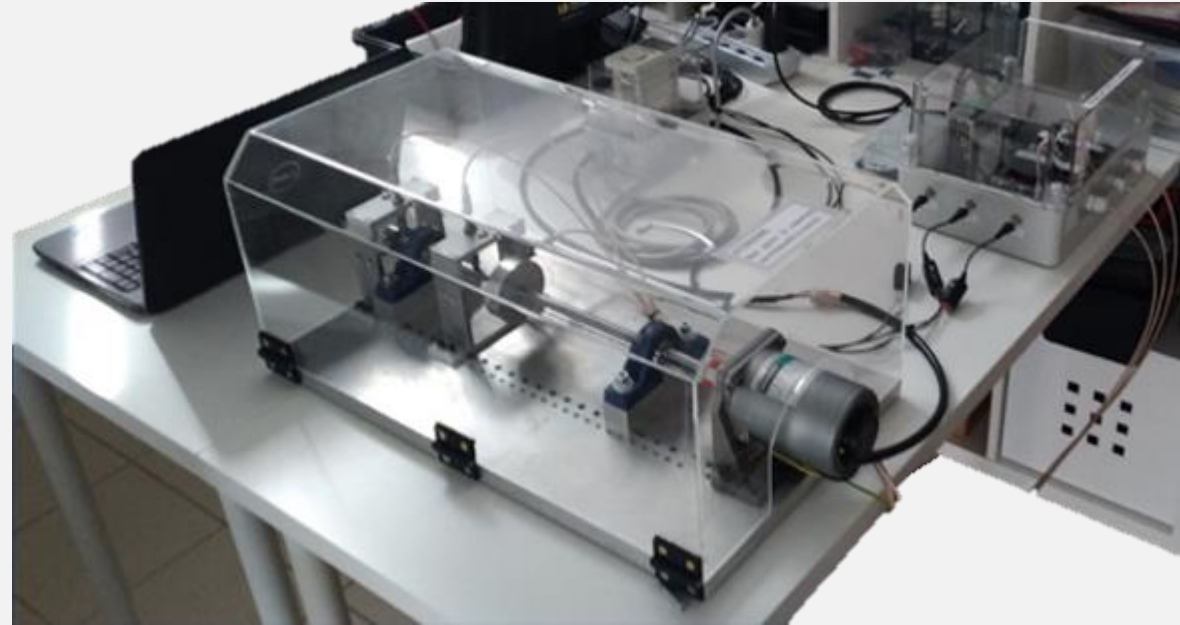


Vibration Test Instrument

Vibration data acquisition can be carried out acquiring machine vibration probe signals through plant vibration panel or by using the following additional instrumentation:

- No contact Probes
- Seismic Probes
- Accelerometers

Our Team is trained to use the following Bently Nevada data acquisition systems (ADRE 408 and System One) and National Instruments (cDaq e cRio).



OPUS ROTORKIT FOR ROTORDYNAMIC TESTS

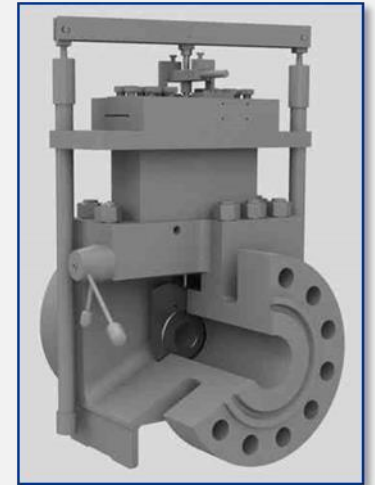
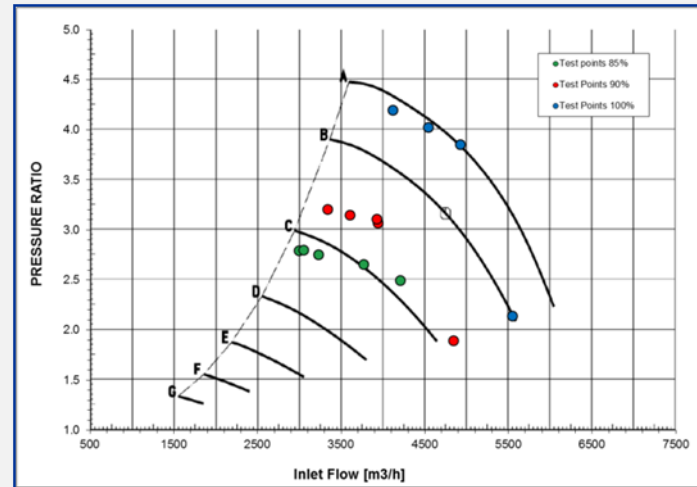
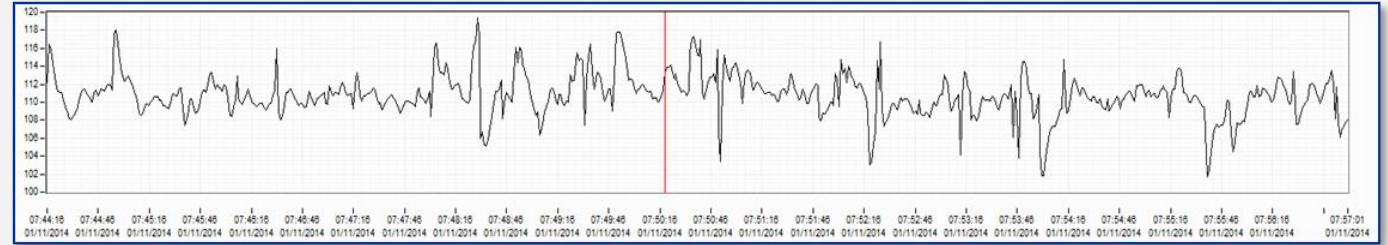


CASE 1

Compressor Surge Issue

After centrifugal compressor control system replacement (2014) Customer claimed surge phenomena (operating instability) before the expected surge line (verified in 2011), dangerous condition for the machine safety. During Troubleshooting activities the compressor operating point showed an anomalous behavior related to the measured flow.

A flowmeter inspection by boroscope was suggested to verify its interior condition and an internal sealing damaged was found. The problem was solved installing the pressure transmitter in a different position.

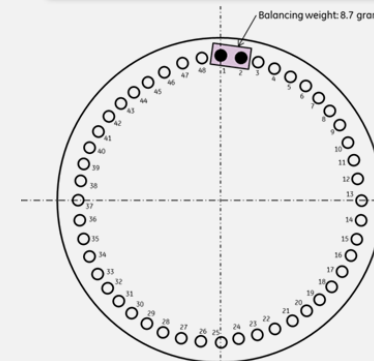
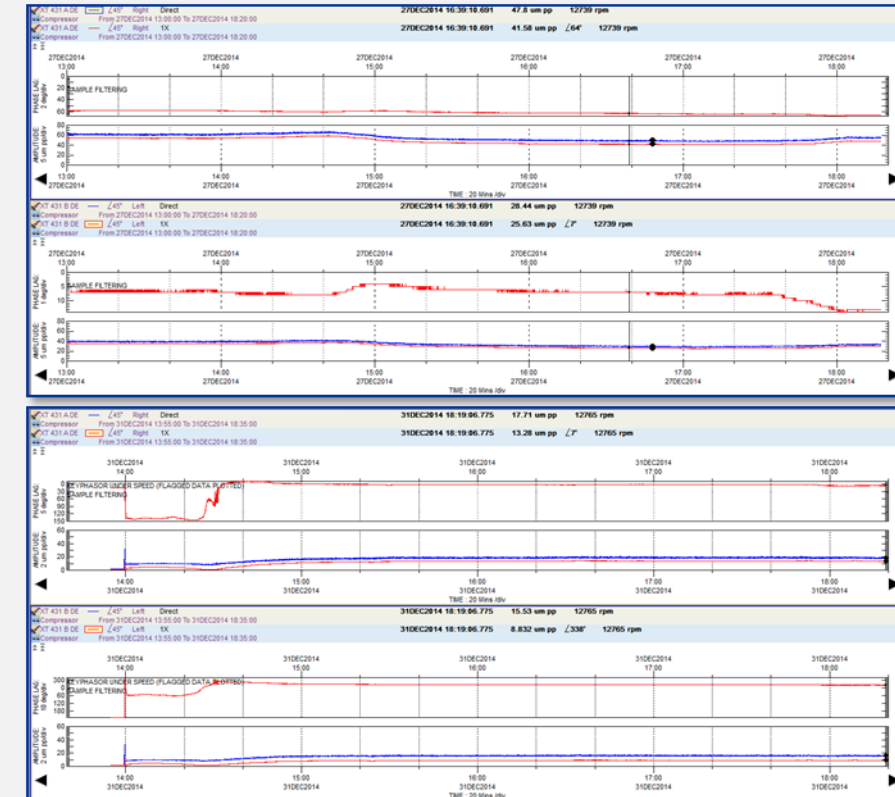


CASE 2

Vibration Troubleshooting

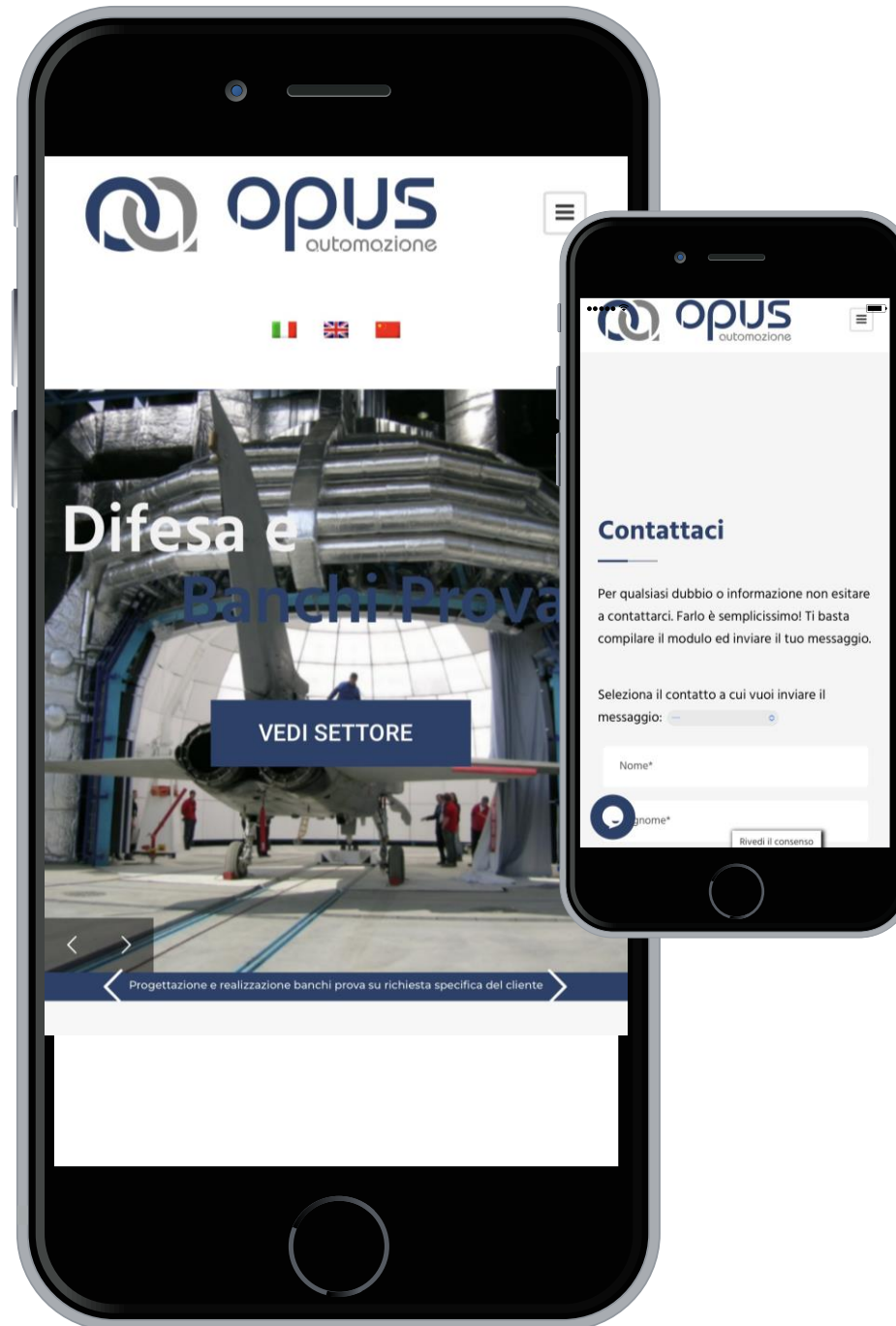
A vibration troubleshooting activity was performed on a Centrifugal Compressor due to a high level of vibration (63 μm) during normal operating conditions. The vibration analysis carried out on site led to detect an unbalance source on the centrifugal compressor, and a single plan trim balance was performed.

An additional mass of 8.7 gr was installed on coupling flange. By means of this weight correction, the vibration levels decreases from 63 to 17 μm .



Vibration trend before and after trim balance

Contacts



*Write to us or call us for
any information!*



info@opus-automazione.it



+39 0566 58619