



SINT
Technology

Reciprocating compressor diagnostics

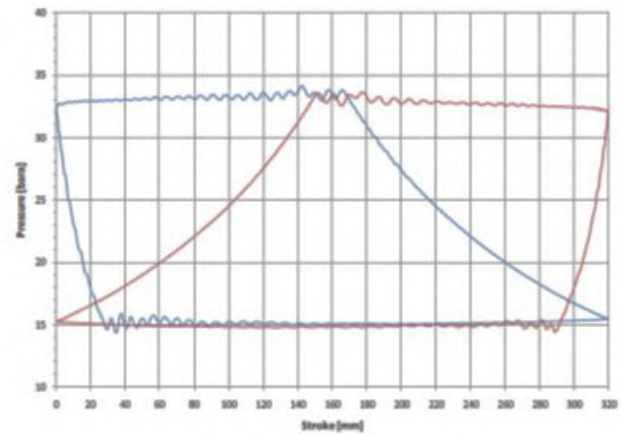
Reciprocating compressor diagnostics

Reciprocating compressor diagnostics makes it possible to monitor the condition of the machine and to detect any malfunctions or changes in behaviour.

Diagnostics can be carried out with both a preventive and an analytical function helping to solve problems.

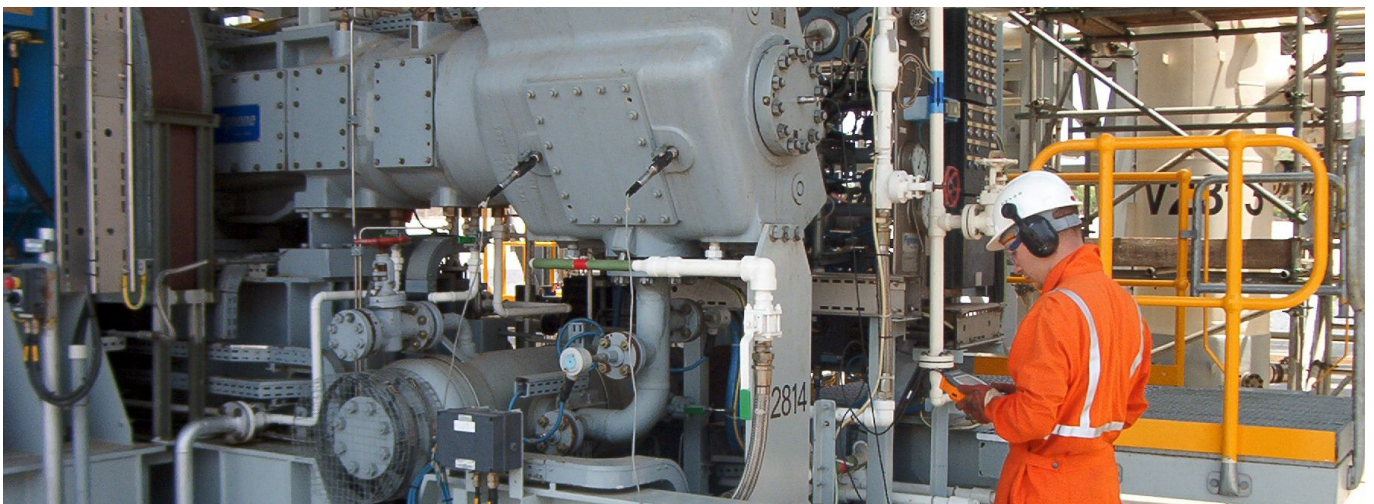
SINT Technology has longstanding expertise in reciprocating compressor diagnostics and is able to provide a wide range of services, including:

- Measurement and analysis of indicated cylinder pressure versus stroke or volume (P-V Cycle)
- Measurement and analysis of vibration
- Measurement and analysis of pressure pulsations
- Troubleshooting
- Predictive monitoring
- Torque and torsional vibration



Our services are characterised by

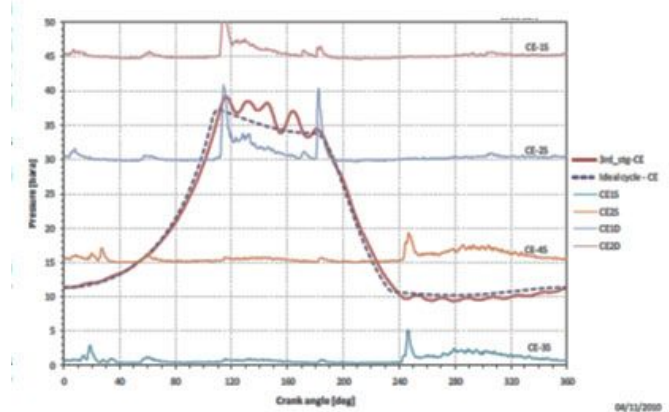
- the professionalism of highly skilled engineering technicians
- dynamism and flexibility
- willingness to perform testing on the customer's plant in all parts of the world
- detailed reporting in accordance with the customer's requirements and the main international technical standards



Measurement and analysis of indicated cycle on reciprocating compressors

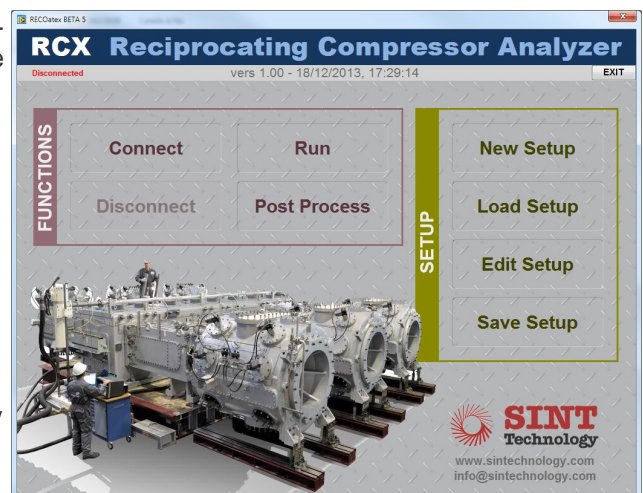
Analysis of cylinder pressure is one of the main ways of checking reciprocating compressor efficiency and of promptly detecting abnormal behaviour, such as:

- excessive valve pressure loss
- leaking packing and piston rings
- gas backflow to the suction and discharge valves
- faulty valve behaviour (fluttering, excessively stiff spring system, etc.)
- suction and discharge pressure pulsations



RCX diagnostic systems is multichannel analyzer for hazardous area, capable of processing a wide range of real-time data:

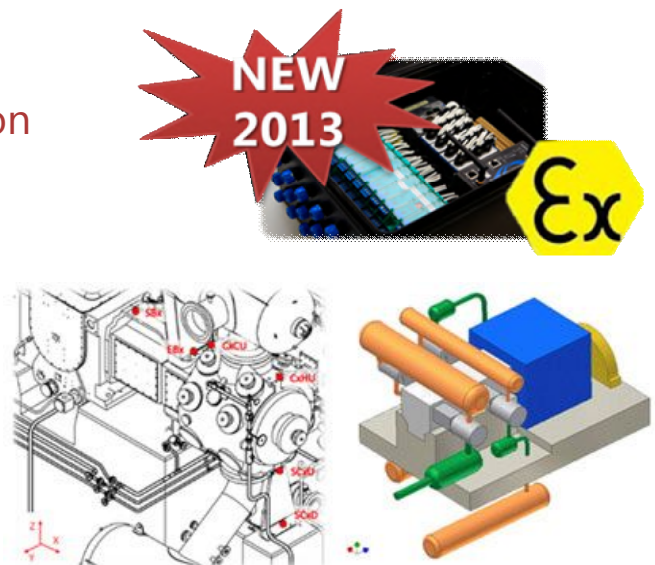
- Pressure versus crank angle and stroke
- (Piston rod vibration) Vibration versus crank angle
- Ultrasounds versus crank angle
- Pressure versus volume (also on a log scale)
- Overlay of plots
- Overlay of theoretical cycles in real time
- Calculation of compressor performance (work, power, valve losses, efficiency, etc.)



Measurement and analysis of vibration

Vibration analysis of a reciprocating compressor and its components is an important instrument for quickly identifying abnormal machine behaviour. It is usually done by comparing measured values with set threshold values and/or with the results of previous measurements.

The points where vibration is measured are the cylinders, valve covers, frame, skid, pulsation dampers, piping and any other component that can provide significant data for the application concerned.

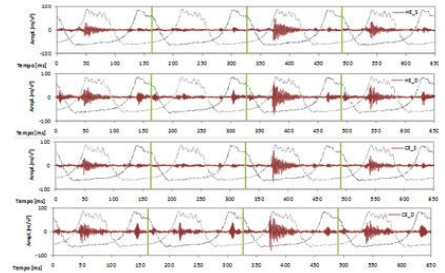


Acoustic emissions and ultrasounds on valves

A very important diagnostic instrument for understanding the condition of valves is high and very high frequency vibration analysis. Acoustic emission sensors (up to 900 kHz) and ultrasound sensors (38-42 kHz) are generally used for this type of analysis.

These analyses provide information such as:

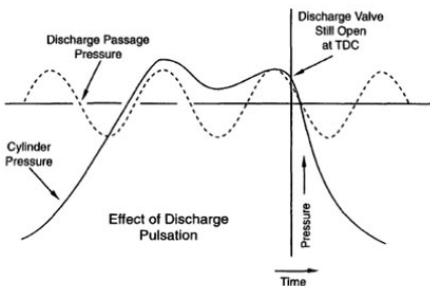
- the instant valves open and close
- the wear condition of hypercompressor valves
- excessive impact of valves on opening and closing



Pressure pulsations

Pressure pulsations are very often the cause of serious problems for reciprocating compressors.

The presence of more or less significant pressure pulsations definitely has an effect on performance of the machine.



It is therefore obvious that measurement and analysis of pressure pulsations is of considerable importance in identifying issues and malfunctions in reciprocating compressors (piping and volume bottle failure, high vibration, etc.).

With its measurement systems and software, SINT Technology is able to compare pressure pulsations with expected values and the values required by reference standards and also to analyse pressure pulsations simultaneously constructing Pressure-Volume curves.

Torsional vibration and torque

Analysis of torsional vibration is an extremely effective diagnostic instrument for identifying abnormal conditions during machine operation which can lead to damage, such as:

- Coupling/drive shaft failure
- Accelerated gear wear and gear tooth failure
- Key deformation
- Slippage of coupling hubs
- Premature wear of electric motor windings
- Irregular output

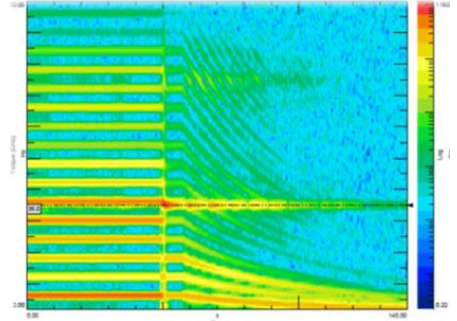


SINT Technology can perform torsional analyses on a wide range of machinery thanks to its advanced measurements systems and processing software.

Measurement of **torque** and shaft speed are required to determine transmitted mechanical power.

When a greater accuracy of measurement is required (for example, in machinery tests and inspections, acceptance tests, etc.), it is necessary to calibrate the instrumented coupling.

SINT Technology can offer a torque meter (instrumented coupling) calibration service with its own calibration facility, which can calibrate couplings for transmission of torques up to 12 kNm.



Advanced experimental modal analysis

Modal analysis is an effective instrument for describing, understanding and modelling the dynamic behaviour of a structure.

It can be carried out both to determine the natural frequencies and mode shapes of a structure and to verify the accuracy and calibrate a finite element model (FEM).

SINT Technology, thanks to your multichannel system and advanced elaboration software, can determine the main modal parameters and detect potentially resonance phenomena:

- Natural frequencies
- Mode shapes
- Damping

An example of the analysis techniques that SINT Technology can use are:

- Impulse excitation (instrumented hammer)
- Controlled excitation (shaker)

Instrumentation

SINT Technology has a wide range of instruments for vibration measurement and analysis. A list follows of the main sensors and instruments at its disposal:

- Dynamic pressure probes for use in **hazardous area (ATEX)**
- Portable multichannel acquisition and analysis system for use in **hazardous area (ATEX)**
- Monoaxial, biaxial and triaxial accelerometers and velocimeters
- Non-contact displacement sensors
- Portable 2-channel analyser for use in **hazardous area (ATEX)**
- Impact hammer with load cell
- Shaker with load cell

Standards

Field of application	Description	Standard Code
Reciprocating machinery	Mechanical vibration - Evaluation of machine vibration by measurements on non-rotating parts - Part 6: Reciprocating machines with power ratings above 100 kW	ISO 10816 : 6
Reciprocating machinery	Reciprocating Compressors for Petroleum, Chemical, and Gas Industry Services	API 618
Modal analysis	Vibration and shock - Experimental determination of mechanical mobility - Part 2: Measurements using single-point translation excitation with an at-	ISO 7626-2
	Vibration and shock - Experimental determination of mechanical mobility - Part 5: Measurements using impact excitation with an exciter which is not	ISO 7626-5



SINT Technology

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Recognitions

SINT Technology's test laboratory is accredited to standard ISO/IEC 17025:2005 by the Italian accreditation body **ACCREDIA** with **certificate no. 0910**



LAB N° 0910

Certification of conformity to the requirements of standard

UNI EN ISO 9001

