> Diagnosis by electrical current analysis

> Your requirements?

- Monitoring couplings and cardan shafts
- Detecting electromagnetic faults
- Manufacturing problem
- Speed control fault
- Machine not accessible

> The solutions

- Analysis of the motor current
- Monitoring the modulation rates
- Detecting torque fluctuations
- Seeking the origin of the fault
- Remote current analysis





> Detection of electromagnetic faults

- Cracked rotor bars
- Eccentric gap
- Stator fault
- Failure of the thyristors
- Motors and generators

> Diagnosis of mechanical faults

- Set of keys
- Set of couplings
- Wear and tear of cardan shafts
- Trimmings
- Meshing faults

> Torsion modes

- Torsional resonance
- Identifying natural torsional frequencies
- Non-intrusive measurement

> Control loop

- Instability, pumping
- Coupling with a mechanical defect
- Impact on the quality of the product

> Torque fluctuations and torsion vibrations

- Image of the operation of reciprocating machines
- Irregularity of combustion engines
- Image of pressure fluctuations on hydraulic turbines

DYNAE

> Vibratory analysis
> Electrical analysis
> Infrared thermography
> Instrumentation and sensors
> Software
> Training

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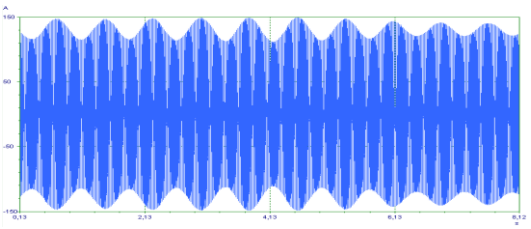
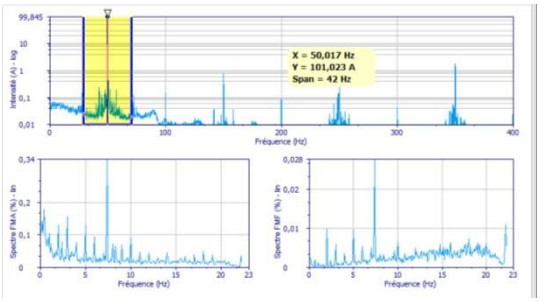
> Subject and applications

Analysing the supply currents of driving engines is complementary to the vibratory analysis, in particular for all the phenomena involving instantaneous torque or rotation speed fluctuations.
There can be four different kinds :
- Electromagnetic faults on the engines or alternators: broken bars, eccentric gap, thyristor faults
- Mechanical faults on the shaft line: set of keys, cardan shaft fault, set of couplings, pinion offset, faceting of rolling mill rollers or paper machine, torsional resonance
- Torque fluctuations inherent in the process: irregularity of a combustion engine, hydraulic pulsation of a pump or a turbine
- Control loop : pumping, instability





> Principle and interest of the technique

Torque fluctuations result in a modulation of the amplitude and the frequency of the current intensity. The size of these modulations can be quantified by indicators which can be easily interpreted: rate of modulation, variation in the electrical intensity or power consumed or generated.
Determining the modulation frequencies and the shape of the modulation signal make it possible to located the origin of the fault. This analysis can be usefully completed by an analysis of the signal delivered by an angular rate sensor or by a torque-meter.

> Implementation

The signal is measured using an ammeter clamp, or on the terminals of a current transformer connected to a CTMO®.
The signals are then processed using our dedicated software Dynalim® in order to extract the amplitude and frequency modulation functions associated with the fundamental component of the supply current. The spectral and temporal analysis of the modulation functions, calculating the associated modulation rates, as well as determining the rates of harmonic distortions are systematically carried out.
After comparison with the facility's kinematic frequencies, a diagnosis relating to the nature and seriousness of the faults inducing instantaneous torque or rotation speed fluctuations is carried out.

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