ASTRIIS

Towards zero failure

gipsa-lab

IRIT Institut de Recherche en Informatique de Toulouse

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AStrion Automated Spectral analysis

Tenerrdis Auvergne-Rhône-Alpes

Linksium technology transfer & startup building Grenoble Alpes


Vice-President Technical
Vice-President Technology
President
Vice-President Sales
Paul Roy
Ensimag
C # .NET
2 nd startup created
Nadine Martin
Engineer Electronic
Physics PhD TS
Signal analysis expert
Nicolas Saubin
3
Master in Management
IAE
4th startup created
Pascal Gain
Ecole Centrale Lille
Marketing, Sales,
Communications

Predictive maintenance of Rotative Machine

Rotative machines are important to day-to-day industrial productivity

Common causes of failure are well-known but not easy to foresee

Predictive tools and Root cause failure analysis can help prevent failure

01

SITUATION

Lack of expertise and time consuming analyses

System-dependent solution and associated cost reducing ROI

Irrelevant alarms reduce confidence

02

CHALLENGES

Easy access to advance condition monitoring combining smart signal processing and IA algorithms

AStrion detects more defects, earlier than other technologies, and with fewer "false positives"

03

AStrion SOLUTION

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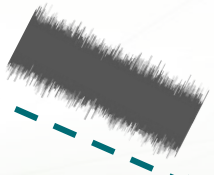
General principle of AStrion

From any
Rotating system



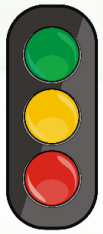
Raw data
from any type of sensor

AStrion
Cloud-based

All Automatic
Nothing to set

List of alarm per sensor

VIB6_GeneratorBack	112 signals	4 warnings	3 alarms
VIB1_MAIN_BEARING	771 signals	1 warnings	0 alarms
VIB5_GENERATOR_FRONT	198 signals	5 warnings	5 alarms
VIB4_PARALLEL_GEAR_1	210 signals	9 warnings	7 alarms



Fault detection
Fault localization
Severity tracking

Detailed continuous monitoring reports

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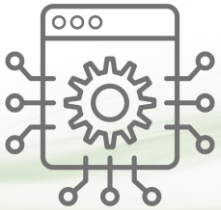
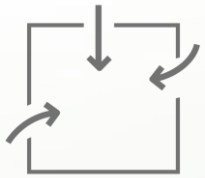
Implementation: Simple and fast journey

Provide a description of your system including a rotative machinery

Selection of most suitable sensor(s) position(s)



Interface with your systems (Signals transmitted via the existing LAN through existing industrial protocols)



Transmission secured with privatized cloud for AStrion operation

Commission and benefit from a fully automated Operation

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Automated and innovative fault identification

AUTOMATED EXPERT INTELLIGENCE

on each data

1 - Data validation And pre-treatment

2 – Expert level spectral analysis

1 component = 1 set of relevant indicators

3 - Harmonic detection

4 – Monitoring of indicators

ARTIFICIAL INTELLIGENCE

Every new data

5- Identification of alarms without historical data

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The innovations brought by AStrion

1 AStrion-D

Validation Datas

non- stationarity index calculation : a hypothesis test by frequency

Automatic angular resampling : compensation for small residual variations

Automatic selection of valid data

2 AStrion-I

Extraction of indicators for each signal

Thin band analysis: **high resolution, multi-method**

Innovative methodology for calculating attributes of frequency peaks

100% spectral band analyzed

3 AStrion-H

Grouping of harmonic families

Each family of harmonics **characterizes a component** and therefore its **state**

Calculation of modulation sidebands: **characterizes a defect**

Calculations of specific indicators

4 AStrion -T

Monitoring of health indicators by family

Monitoring of indicators in a **time-frequency plan** : generation of trends

Trend variations are characteristic of **the physics of the component** and therefore of its state of health

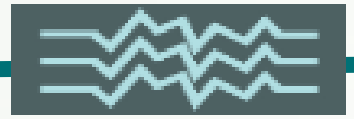
5 AStrion -S

Raising of alarms

drift analysis : **incremental algorithm, space dimensionality regulated by indicators**

Automatic identification faulty components

Characterization of the **severity level**



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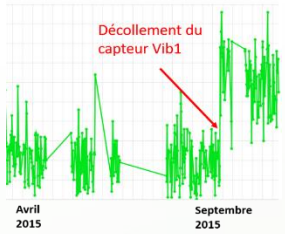
Keys to AStrion operation

Reliability

resolution

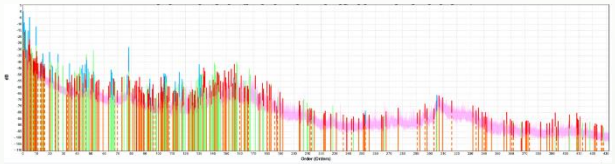
Detection

Classification



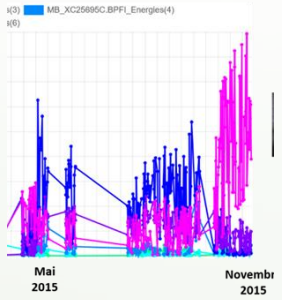
Non-stationarity measures

Extraction of non - stationarity of the signal



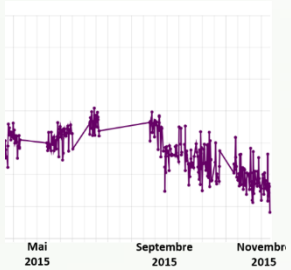
Analyzes carried out on 100% of the frequency band (Thousands of frequencies)

Focus on very fine frequency bands



Evolution followed by harmonic

Evolution followed by the Fundamental frequency



All alarms are characterized and categorized automatically by an artificial intelligence module

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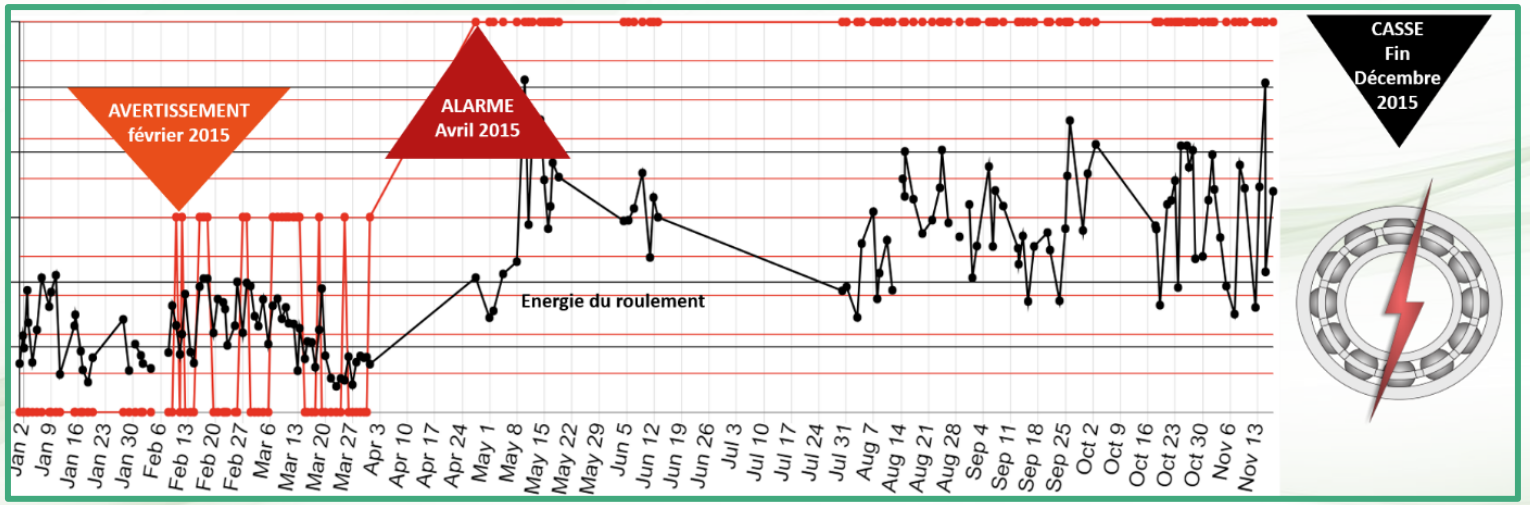
Use case: detection of the fault of a wind turbine bearing with 6 months of anticipation

European research project KAStrion
2012 - 2014

The 2 wind turbines are monitored and the analysis results are published. Sensors and software surveillance remain in place afterwards



30 December 2015
Main bearing breakage WT8

At VALEMO's request, we post-analyzed the data for the year 2015 after the fact

Arfons Wind Farm, FRANCE
11 wind turbine, 2MW each
2 instrumented: WT6 and WT8

VALEMO
exploitation & maintenance EnR

ALERT February 2015	ALARM April 2015	DEFAUT 30th December 2015
LOCALIZATION MB_XC25695C.BPFI Inner ring main bearing	INCREASE in the degree of severity	Broken main bearing

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Why choose Astrion?

Historical data not required, first results obtained in minutes

The result of 30 years of research in 2 world-renowned laboratories

Ergonomic and very easy to use user interface

Leverage for more than 10 years on many use cases in several different industries

False alarms are automatically detected

In-depth automatic analysis from our signal processing expertise

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References – 10 years of industrial experience

Monitoring based on time-frequency tracking of estimated harmonic series and modulation sidebands

CMMNO14
International conference on Condition Monitoring of Machinery in Non-Stationary Operations

Wind turbine CM – August 2015

Wind Turbine Control and Monitoring

SUstainable PREdictive Maintenance for manufacturing Equipment

European Commission | CORDIS EU research results

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EDF

DTG
L'UNITÉ DE MESURE ET D'EXPERTISE

VALEMO
exploitation & maintenance EnR

NTN®

SNR®

bluetwin

TotalEnergies
OneTech R&D Wind Program

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Wrap up

Team

4 experienced and complementary managing partners

Technology

A technology with a strong competitive advantage and validated by manufacturers

Market

Dynamic and growing market

Commercial

First contract signed at the end of 2022 (France + Japan)

7 POC projects being deployed

gipsa-lab

Technology resulting from **30** years of laboratory research

2022

Year of creation of ASTRIIS

€6m

Targeted turnover in 2027

LABELISED DEEP TECH

La FRENCH TECH bpifrance

Labeled in 2022

€1 million

R&D budget from 2023 to 2025

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