THE JOURNEY FROM TRANSPARENCY TO INTELLIGENCE
Applying Industry 4.0 Principles in SONAE ARAUCO
WHO WE ARE

One of the world’s most relevant players in the wood-based solutions industry
KEY FIGURES

2018

~800 M€
TURNOVER

120 M€
EBITDA

~3000
EMPLOYEES

25
NATIONALITIES

104 M€
INVESTMENTS FOR 2019
EUROPE AND SOUTH AFRICA

4,040,000
m³
PRODUCTION CAPACITY
INTERNATIONAL PRESENCE

9 COUNTRIES
WITH INDUSTRIAL & COMMERCIAL UNITS
Our products are sold in 75 countries
Our factories have high level of automation, working 24/7 with a continuous process.
Roadmap: The journey from Transparency to Intelligence
Roadmap i40: From Transparency to Intelligence

INTELLIGENCE
- Autonomy
- Advance Automation

INTERACTION
- Cooperation
- Collaboration
- Mobility
- Descentralized

TRANSPARENCY
- Data Availability
- Real Time
- Standardized

Source: Fraunhofer Institute

Increase of Complexity

Training and Change Management
Apps developed (Transparency level)
Apps developed in SONAE ARAUCO (Transparency)

Foundations of our Architecture:
- User Experience
- Edge for real time and alarmistics
- Enhanced with Cloud Services
- Digital Plants
- Performance and Security
- IT/OT Governance

Building blocks Vision Industry 4.0 Architecture
Apps developed in SONAE ARAUÇO (Transparency)


- Change weight from 8 to 9 Kg/m²
- Reduce press speed too late!!!
- Starts blisters and press stops
Apps developed (Interaction level)
Apps developed in SONAE ARAUCO (Interaction)

Integration with Lean Manufacturing. KPI’s in real time
Apps developed in SONAE ARAUCO (Interaction)

Alarms and Factory KPIs to smartwatches and smartphones on real time
Apps developed (Intelligence level)
Apps developed in SONAE ARAUCO (Intelligence)

Main Machine Learning Algorithms used

- Neural Networks
- Decision Trees
- Anomaly Detection
Apps developed in SONAE ARAUCO (Intelligence)

Most advanced version of decision trees: XGBoost- eXtreme Gradient Boosting
Apps developed in SONAE ARAUCO (Intelligence)

Building a Machine Learning Model
Apps developed in SONAE ARAUCO (Intelligence)

Real time properties prediction using Machine Learning
Apps developed in SONAE ARAUCO (intelligence)

Based on IIoT (Industrial Internet of the Things) and Edge Computing

Hiperconectivity

Connection to CMMS and ERP with automatic Work Orders

Edge computing
- Vibration
- Elec. Current
- Temperature
- Oil condition

Cloud Platform

Failure detection:
- Step1-Based on Expert Knowledge
- Step2-Based on Advanced Analytics (Machine Learning)

Data collection and alarms

Predictive Maintenance

Vibration
Elec. Current
Temperature
Oil condition
Step 1 - Failure predictions based on vibrations and Expert Knowledge
Apps developed in SONAE ARAUCO (intelligence)

Looseness Alarms: Analysis vibrations bands related to looseness and rpm of the machine

Actions:
- Check the gear box of the unit T631-C
- Check the possible structural looseness in the electric motor T631-C. Tight the bolts between the bedplates and the foot motor
- Check the contact between teeth in the gear box.
- Carry out an oil analysis in the gear box T631-C to detect the possible presence of metallic particles.
- Run the electric motor close to 15 Hz (900 RPM) should be avoided
Apps developed in SONAE ARAUCO (intelligence)

Gearbox failure: Vibrations related to gearbox (upper image) and diagnostic index (lower image)

Typical Frequency spectra of a gear box

Spectra of a gear box with failure
Apps developed in SONAE ARAUCO (Intelligence)

Step 2- Anomaly detection. Example in the refiner
Step 2-ML applied to failure detection: Real vs predicted motor temperature. Motor OK
Early Failure detection

Step 2 - ML applied to failure detection: Real vs predicted motor temperature. Motor failed
Data Analytics Training Programme
Training to leverage our Employees Data Analytics skills
We are sure these apps give Super-Powers to our workers...

...so we encourage you to introduce the Industry 4.0 in your Company.

Taking Wood Further