

Jindal: Plastic film process optimization via Advanced Analytics

Savings
> 56 000 €
PER YEAR

Benefits



Reduction of extruder heat consumption: 50 000 €/year savings

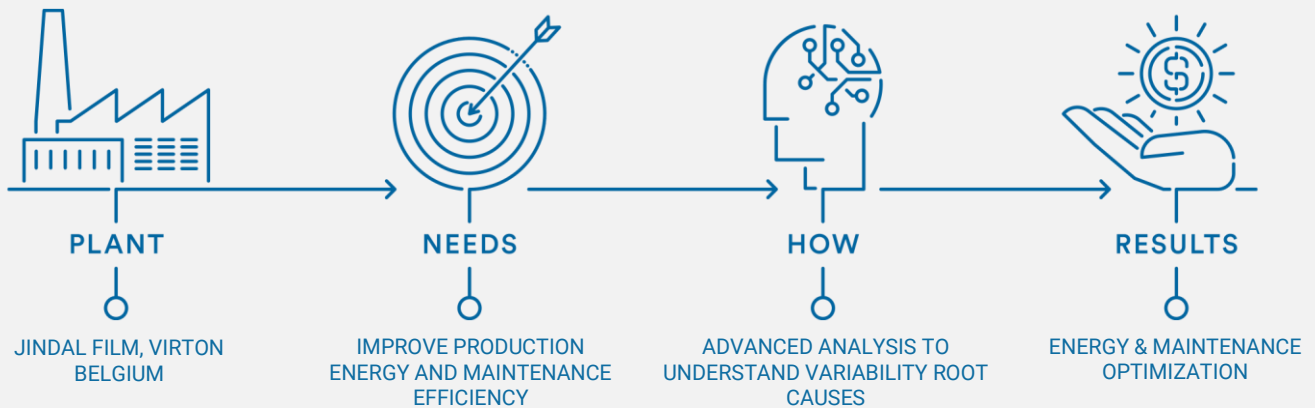
Gas consumption analysis: 6 000 €/year savings

Reduction of specific electrical consumption

Reduction of compressed air consumption

From annual preventive maintenance to 3-yearly preventive maintenance

Reduction of equipment losses



Context

Jindal Films Europe Virton produces and markets bi-stretch multilayer films, mainly from polypropylene plastic resin, for food packaging and labeling.

Through a separate coating process, films can be coated with a water-based varnish which provides specific properties to the products (sealability, printability, gloss, protection to water vapor, aromas, slippage). Ventilation and temperature of the large buildings hosting the production lines and storage are important for the staff well-being and product quality. Also, production units require significant amounts of natural gas and electricity to operate.

JINDAL'S CHALLENGES:

- ◆ Automate the plant
- ◆ Measure all its processes as exhaustively as possible (production energy consumption, utilities, quality reports, etc.)
- ◆ Familiarize employees with new technologies so they can perfectly manage future optimization projects
- ◆ Proceed to an advanced data analysis to understand what causes the variability in the production/energy consumption and reduce it
- ◆ Optimization
- ◆ Continuous improvement

Challenge 1

Automate the plant

Aware of technological development and competitiveness on the market, Jindal took a lead in 2015 and decided to carry out an IT audit with Pepite in order to **automate and measure its production processes and associated energy utilities**. Jindal understood that “we only control what we can measure”. From this idea, Jindal knew it was key to base its medium and long-term decisions on facts and not on intuitions in order to gain a competitive advantage.

→ Pepite made an initial Digital Data Diagnostic. This first step is useful to understand the company’s IT status and to determine if additional hardware or software should still be installed. In fact, different equipments (computer networks, new automated systems, measuring instruments, etc.) and various software solutions had previously been installed allowing the generation, acquisition and long-term backup of process data on site. Pepite’s software, DATAmaestro was then chosen to harness this newly available data.

Challenge 2

Measure production

Too often, manufacturing companies do not even know the amount of inputs consumed for an amount of output produced. Having the data, it is easier for the operators, engineers and managers to **keep track of real-time production** and build weekly and monthly reports – this statement was true for Jindal in terms of monitoring energy consumption. In fact, each of Jindal’s production lines had an individual historian that captured manufacturing process parameters but there was no energy data storage system (utilities, ventilation and temperature control processes) or real-time energy performance monitoring.

→ *DATAmaestro Collectors* were installed, making it possible to collect data from different sources (process parameters, energy meters (gas, electric, calorimeter), water meters, refrigeration units, cooling, air compressors, temperatures and speed of fresh air impulse into buildings) and store them in a centralized data historian. *DATAmaestro Lake* fueled by real-time data, was then able to feed Advanced Analytics projects (in *DATAmaestro Analytics*) as well as real-time Dashboards (designed via *DATAmaestro Dashboards*). These analytics projects and Dashboards were customized with the Jindal team.

Challenge 3

Familiarize staff with new technologies

Having a good vision on its production, Jindal then wished to solve certain issues on the process lines. Advanced Analytics was able, based on historical data, to create predictive models and identify optimal operation modes to resolve these issues.

→ To help with change management, Pepite ran brainstorming sessions and involved Jindal staff in the optimization projects. Thanks to training courses on DATAmaestro and the Advanced Analytics methodology, the staff became aware of the changes to come, understood them and applied them, creating long-lasting process improvements.

Challenge 4

Proceed to an advanced data analysis

Once the staff was engaged in the project, Jindal had the following **goals** to achieve:

1. Optimizing energy consumption

- ◆ Reduction of extruder heat consumption by improved temperature regulation: by smoothing the successive heating and cooling zones and by optimizing the temperature set points, Jindal was able to save more than 50 000 € / year recurring.
- ◆ The gas consumption analysis of building 214 showed that it was more the adjacent premises (storage, maintenance workshop) that consumed heat, and not the production hall as Jindal thought. They reduced the T° setpoints on weekends and during periods of inactivity and reset the clock of the automat which manages the building's heating. This resulted in recurring energy savings of 6 000 €/year.
- ◆ Reduction of specific electrical consumption (kWh / kg produced): New line speed guidelines have been applied for certain films, following the identification of fixed and variable factors influencing the specific consumption on line 206.
- ◆ Reduction of compressed air consumption: The analysis of air compressors (total air flow sent into the network) allowed Jindal to make the link with process equipment operations (start of lines, opening of smoke outlets, etc.) and helped faster identification of losses (leaks).

2. Optimize maintenance actions

- ◆ Jindal went from annual preventive maintenance to 3-yearly preventive maintenance. Thanks to DATAmaestro, the hours and speeds of building fresh-air fans were analyzed. From this analysis, Jindal realized that the operation was much lower than they imagined. They were therefore able to reduce maintenance occurrences.
- ◆ Thanks to electrical power analysis on line 206 it was possible to identify the operating conditions which maximize the power factor ($\cos \varphi$) and preserve the electrical condenser and electrical components life by reducing losses and preventive maintenance actions.

Challenge 5

Optimization

By implementing these optimization projects, Jindal has managed to improve its processes and the tools in place allowing for even greater optimization.

- ◆ Improved timing for changing the filters on the air impulse groups: Monitoring the current intensity of the fresh air impulse groups in the orientation buildings has enabled the air filters to be changed on a performance basis rather than a fixed frequency basis. When the impulse group motor intensity - and therefore the fresh air flow - drops below a threshold this signals that the filters should be changed.
- ◆ By continuously monitoring the smoke density in the production hall, Jindal has also been able to optimize the fresh air booster fan speed and to maintain a more constant room temperature.

Challenge 6

Continuous improvement loop

Jindal Films Europe Virton is today an exemplary site in terms of Industry 4.0. Thanks to Advanced Analytics, they were able to:

- ◆ Easily detect the parameters that most influence an issue
- ◆ Understanding the root causes of the issue
- ◆ Build optimization models (using Machine Learning techniques)
- ◆ Feed these models with real-time process data in order to warn operators via dashboards in the event of a drift and to correct certain production parameters if necessary.

Pepite's step-by-step approach proves quick and concrete results. Since 2015, PEPITe and Jindal continue to work in close collaboration.