Aluminerie Alouette implements *STATISTICA* Data Miner and MSPC

Started in 1992, Aluminerie Alouette is an independently operated company producing primary aluminum. With its 1000 employees and an annual production capacity of over 600,000 tons, it is the largest employer in Sept-Îles, Canada and the leading aluminum smelter in the Americas. The Sept-Îles smelter is a worldwide benchmark for energy consumption efficiency, and uses state-of-the-art technology. It exceeds government environmental standards.

Background

Aluminerie Alouette has been using *STATISTICA* Enterprise for several years to efficiently monitor numerous key performance indicators and control the production process. To stay among the worldwide leaders, it is necessary to continuously improve the different production processes for each area of the smelter by increasing our level of comprehension. In fact, several hundreds of inputs can potentially have a significant impact on the aluminum manufacturing output. Some of these inputs can be controlled (dosage of the additives, energy management, etc.) while other inputs can't be controlled (outside temperature, raw material composition, etc.). To better understand the influence of these inputs, Aluminerie Alouette has augmented *STATISTICA Enterprise* with *STATISTICA* Data Miner and MSPC software for multivariate analyses.

Requirements

These StatSoft modules were expected to address a dual requirement:

1. Identify the inputs with a significant influence on the process key performance indicators.
2. Develop a multivariate model to monitor additional key performance indicators.

Since the implementation of these modules, several analyses have been conducted which validate that *STATISTICA* Data Miner and MSPC meet Aluminerie Alouette's needs.
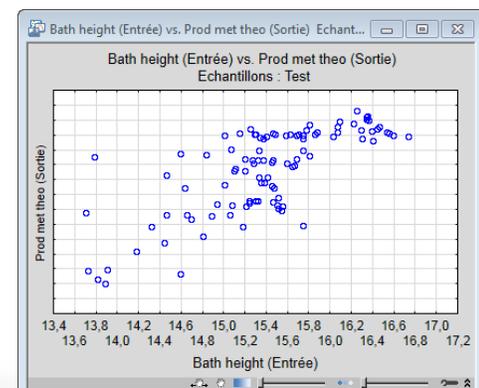
Output

Predictor analysis

As written in Dion and al.'s article, published in « Journal of light metals – TMS 2013 », the use of *STATISTICA* Data Miner has proven to be successful at Aluminerie Alouette. Indeed, it is very easy to identify, by decreasing importance, the parameters that significantly impact the various aspects of the process. However, the level of expertise of the user is a key factor for each of the analyses. It is necessary to understand the inputs to choose the appropriate variables, but also the output data to draw appropriate conclusions.

	Meilleurs prédicteurs de la var. dépendante continue : CE%	
	valeur de F	Niveau p
TSI	116,4028	0,000000
IMM	97,7797	0,000000
MBLC	80,5014	0,000000
NDALF3	71,9809	0,000000
MBLAJOU	71,4922	0,000000
RKM	47,6949	0,000000
RS	45,0740	0,000000
HM	44,7261	0,000000
Phosphore	43,8691	0,000000
POTAGE	43,1216	0,000000
RRM	40,5790	0,000000
PPL	35,4416	0,000000
QUINT	29,4959	0,000000
Vanadium	28,9396	0,000000
CAF2	25,6542	0,000000

Models development

In order to reach the optimal aluminum production, it is important to first understand which inputs have the highest influence. Thanks to automated neural networks in *STATISTICA*, it was possible to implement a model that represents different operating scenarios, based on historical data. This model allows adjusting the relevant inputs, without altering the quality of the operations. Also, with the models that have been developed, it is possible to make predictions on the production in the medium term, taking into account future and planned events. Finally, the model allows for the "what if" exploration of operation outputs when the input parameters diverge from their respective target area.

Conclusion

The implementation of *STATISTICA* Data Miner and MSPC initiated a new approach at Aluminerie Alouette to identify the source of problems related to the production process. In fact, these software solutions allow for a better understanding of the interaction between the different inputs. Also, the deployment of the models allows exploring different scenarios by extrapolating outside the domain currently being used. To conclude, the combination of training on the solutions offered by StatSoft, and a good understanding of the domain being analyzed are crucial to get significant and interesting results.

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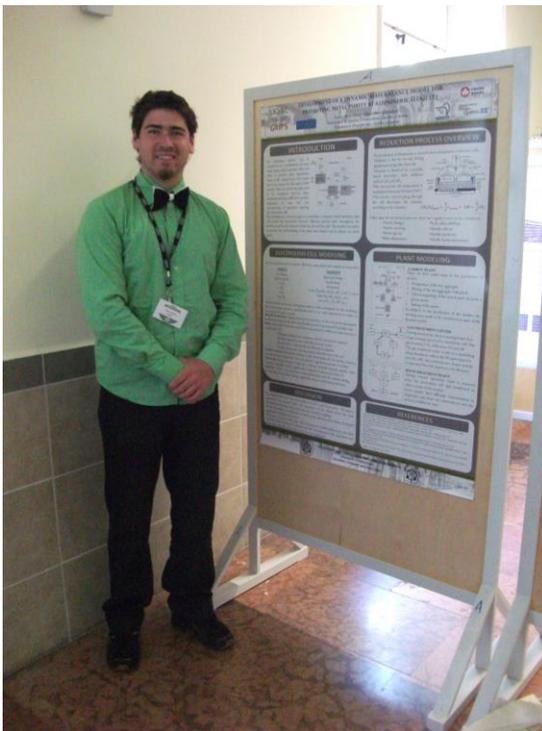
About Lukas DION

Lukas DION received a baccalaureate in aluminum engineering from UQAC (Quebec University) and is working on a master's-level project to develop a dynamic mass balance simulation for aluminum smelters. During his courses, M. DION has published articles related to the analysis and the mathematical modeling of complex primary aluminum manufacturing processes. As part of his academic cursus, he joined the R&D department at ALUMINERIE ALOUETTE in 2007, to analyze the various factors influencing the process efficiency in the cell rooms.

During his time at ALUMINERIE ALOUETTE, M. DION helped achieve better performance indices in the plant, while reducing the environmental impact (with the help of six sigma software and methodology).

He explains how StatSoft software solutions helped him with his research.

About *STATISTICA* and StatSoft

StatSoft, a global leader in enterprise-wide statistical data analysis tools for product quality control and improvement, was founded in 1984 and is now one of the world's largest providers of analytics software, with 30 offices around the globe and more than one million users of its *STATISTICA* software.

StatSoft's solutions enjoy an extremely high level of user satisfaction across industries, as demonstrated in the unprecedented record of top ratings in practically all published reviews and large, independent surveys of analytics users worldwide. With its comprehensive suite of STATISTICA solutions for a wide variety of industries, StatSoft is a trusted partner of the world's largest organizations and businesses (including most of the Fortune 500 companies), providing mission-critical applications that help them increase productivity, control risk, reduce waste, streamline operations, achieve regulatory compliance, and protect the environment while "Making the World More Productive".

For more information about StatSoft and the *STATISTICA* suite, please contact:

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