How Using JMP Helped Save Over 4M€ in Energy Consumption

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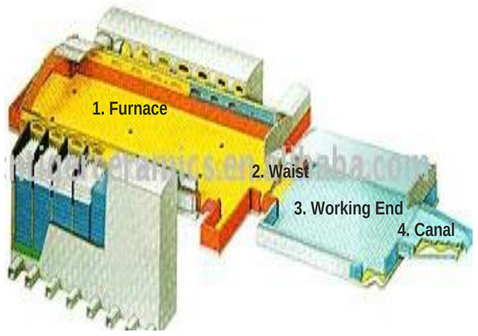
1.Introduction

In 2008 Saint Gobain Glass launched the global project: Reduction of Energy Consumption. This initiative encompassed 30 glass plants globally and had an ambitious target of a 5% reduction in energy use in the furnaces (see picture1). A team was formed and decided to attack the problem on three fronts:

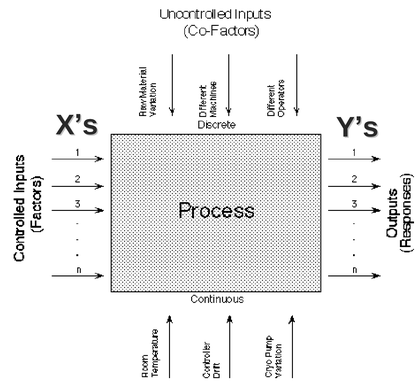
- A review of the measurement system
- Best Practice identification and sharing
- Lean Six Sigma (DMAIC)

From the Lean Six Sigma (DMAIC) front the JMP was used to analyse the data from the plants primarily to help identify the correlations between causes of energy consumption. Pilot tests were performed and models built to help us find the best way to lower energy consumption. The team created a master summary, using JMP (histogram, brushing, partitioning, screening, fit y by x, chart control, capability, etc.) for all the plants.

The JMP software helped improve our awareness of the problems of data collection and how to manage them, to improve our know-how of the furnace process, to avoid losing time when analysing the data, and to explain in a clear way (using JMP's visualisation tools) to our director our progress and reasons for the future course of action.



Picture1. The scope of the Energy Consumption area.



Picture2. General explanation of a process
(also known as the Black Box)

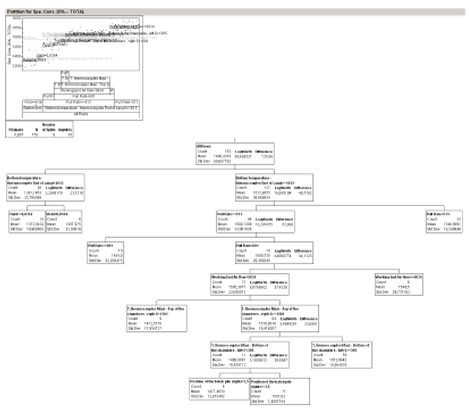
2.Process - Roadmap

The process (see picture 2) itself has more then 90 inputs and three main outputs and all needed to be studied and tested to enable us to isolate the critical one's. To do this we create an internal team of 6 people of which half of them was Lean Six Sigma experts and JMP users. We also required a road map to guide us through the all process and it was divided into:

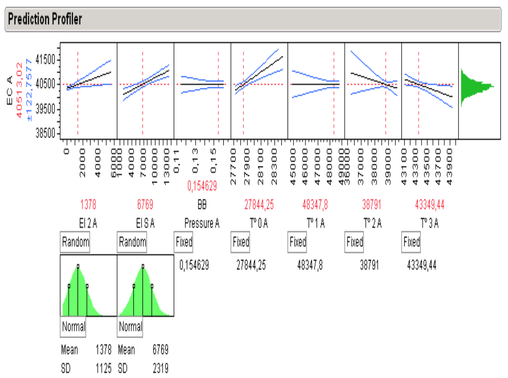
• Methodology: The methodology used was Lean Six Sigma – DMAIC (Define, Measure, Analyze, Improve, Control) for all the projects. JMP was used in all the phases but its importance and the results it generated had more significance after the Analyse phase.

• Data Analysis: Master summary: to reduce from 90 factors to the 4 or 5 critical factors we created the "Master Summary", which is a roadmap based on analysis using JMP. This was done with data from 30 plants around the world and produced very important results. The output helped us for the next stages i.e. doing tests based on the critical factors (DOE's). The "Master Summary" is based on histograms (mean, standard deviation, quartile, etc.), brushing, partitioning, Fit y by x and fit model.

• Perform tests in the plants: After the data analysis (and according to the methodology applied to this project) we needed to assure that our analysis was correct. To do so we needed to perform tests in the plants around the world. The DOE's created in JMP helped us to do this.



Picture3. JMP usage – partitioning
(example from a plant in Asia)



Picture4. JMP usage – prediction profiler
We can see the values from EC changing according to the different values from the critical factors.

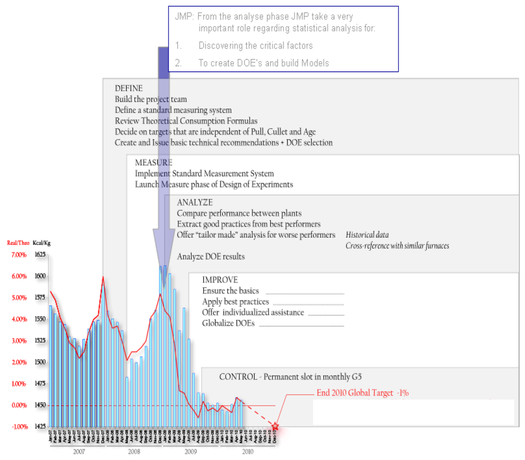
3.Results

In the picture 5 we can see the evolution of this global project with each phase of the methodology applied (Lean Six Sigma – DMAIC). It is also possible to see where JMP is very important in this project since the beginning.

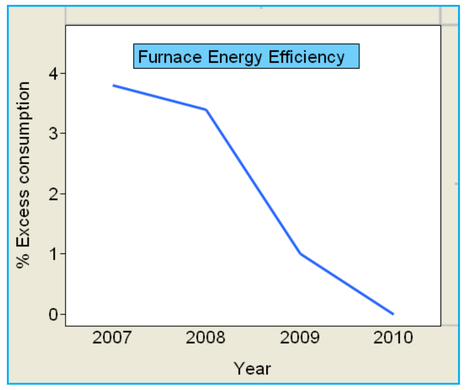
4.Conclusions & additional results

Through using JMP we now have a better understanding of the process and how to manage our furnaces in terms of energy consumption, quality, etc. Here are the main conclusions and additional results:

- Standardization of the control of the parameters that are critical to the furnace has led to a year on year improvement of energy consumption.
- One of the biggest challenges of this project was how to reduce from 90 factors to the 4 or 5 critical ones. To do this we created the "Master Summary", which is a roadmap based on a series of analysis using JMP. This was done for more then 30 plants around the world and produced very important results, helping us for the next stages such as doing tests based on the critical factors (DOE's).
- Today the critical factors are control daily (by IT software) using graphs, control charts, and are analyzed by the line and furnace managers so that the energy consumption, quality, etc., doesn't go out of the limits and to ensure that this output measures achieve the goals define by SGG.
- The furnace managers understand the importance of the data analysis even if they aren't statisticians. The data analysis based on JMP helps them to explain their own judgment and experience to their teams and managers. Today they use graphs, chart controls, histograms, simple correlations to consolidate their work with significant results has you can see from picture 6.
- A result of the standardization and sharing of best practice is that the Furnace managers are able to control the furnace within tighter tolerances and NOT to be afraid of incurring Quality defects which has traditionally been the reason for running furnaces hotter than strictly required.
- Since implementing this project and using JMP to analyze the data there is now an improved discipline regarding the collecting and monitoring of the key performance parameters and the input variables that impact them.
- Since the project entered the "Control" phase the savings in energy consumption in 2009 & 2010 year to date have exceeded 4.3M€.
- This project made us appreciate how JMP can help us to understand, analyze and control our processes and today we use JMP for regular analysis on more then 200 projects around the world.



Picture5. Results achieved linked with different phases in the methodology



Picture6. Graph showing the excess consumption along the years

Picture7. View of inside of a furnace with some quotes about JMP

Acknowledgements

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