

Data Driven Innovation for Manufacturers

Q&A with ProSensus



Ahead of the **American Manufacturing Summit 2019**, Generis Group spoke with ProSensus to discuss data driven innovation and how leveraging technology can give manufacturers a competitive edge in an ever-changing landscape. In this eBook, we discuss how manufacturers can achieve their big data objectives with multivariate analysis, how they can leverage their data to accelerate their product development efforts, and how they can achieve quality control with machine vision.

How can manufacturers achieve their big data objectives and optimize plant performance with multivariate analysis?

“Big Data” is the new manufacturing buzzword.

Companies across various industries are working hard to collect more data across their production lines. But what are companies *doing* with this data? At the **American Biomanufacturing Summit 2018**, an executive told **ProSensus**: "My data doubles every 15 months but my knowledge does not."

ProSensus uses multivariate analysis (MVA) to integrate the “Big Data” initiatives into actual process insights that are otherwise left uncovered.

A key aspect of multivariate analysis is the ability to combine data from various sources such as raw material information, laboratory data, and process data from a variety of process steps to product quality. By creating a multivariate model that encompasses multiple sources of variation, manufacturers can gain real insights from their historical data to improve quality, increase yield and reduce costs.

The technical principle behind MVA is that variation in most datasets is driven by only a small set of independent factors. Therefore, the purpose of MVA is to reduce the number of variables recorded in a dataset to a small number of independent factors that are capable of explaining the variance in the data and that can later be manipulated for process optimization.

"If you can't model a process, you don't understand it. If you don't understand it, you can't optimize it."

- AspenTech Founder

How can companies leverage their data to accelerate their product development efforts?

Manufacturers are continually looking to innovate and produce better or new products, at lower cost, and often with fewer or alternative raw materials. This must all be achieved while still adhering to existing manufacturing constraints. One of the main strengths of MVA is the ability to combine data from different sources and frequencies into a global multi-block model that represents any process from start to end.

ProSensus' approach to rapid product development utilizes existing experimental data, multivariate modeling, and constrained optimization to help you reach your desired product faster. Our innovative methodology allows manufacturers to simultaneously optimize the selection of raw materials, recipe formulations, and manufacturing conditions to reach targeted product properties. Manufacturing companies that use multivariate analysis get ahead of the competition by arriving at product development targets faster using ProSensus' proven approach:

- 1 Set up and maintain useful databases**
- 2 Design future experiments**
- 3 Model optimization for product development**
- 4 Build latent variable models**
- 5 Provide custom software solutions**

How can data enable decision making?

In our analytics projects on historical manufacturing data, we can identify specific process unit(s)/raw material(s) that are most correlated with the final product quality. The results of the MVA point the decision makers to the key process units that require improvement, which may have otherwise been challenging and time-consuming to determine using traditional univariate analysis. The comprehensive analytics allow our clients to efficiently make informed decisions about necessary or desirable process improvements.

In our rapid product development (RPD) projects, data is actually our compass. The insights we get from analyzing historical experiments guide us to where to go next rather than wasting resources on physical experiments. Analyzing the experimental data through the ProSensus' RPD framework always gets companies to their desired "new" product faster.

How can manufacturers achieve quality control with machine vision?

Machine vision is an extremely valuable in-line quality control tool with untapped potential for manufacturers. Advanced vision systems enable manufacturers to quantify quality in order to not only inspect their products, but also optimize their manufacturing processes to avoid making off-spec products. ProSensus' machine vision technology integrates the appropriate camera technology (color, thermal, 3D, hyperspectral) to detect the quality attributes of interest (color defects, temperature distribution, hot/cold spots, shape, etc.) and output these results for product rejection, process troubleshooting, optimization and control.

ProSensus offers complete customization of turnkey machine vision solutions including: camera selection, control panels, enclosures, operator display screens, algorithm development, customized software, and documentation that allows manufacturers to:

- ✓ Achieve 100% inspection that is much more effective than manual inspection
- ✓ Automate rejection and log defect rates
- ✓ Gain new process insights to optimize processes and off-spec production

ProSensus offers feasibility studies to quickly quantify the benefits of a machine vision solution with minimal investment. Using portable equipment, the trials can either be held at the manufacturers site or at our lab.

What are the minimum data requirements to start a project with ProSensus?

ProSensus works closely with process experts to align the objectives of the projects with the available data. Different objectives require different types of data:

Troubleshooting analysis

- Dataset contains examples of good and bad operation
- Then model can explore what variables correlate with the change

Process condition monitoring

- Dataset contains only examples of good plant operation
- Therefore model easily detects anything different from this

Models for control

- Dataset must capture cause-and-effect
- Plant tests in key manipulated variables are often necessary

Robust soft sensors

- Dataset contains examples under all expected conditions
- Ensures reliable predictions under different conditions

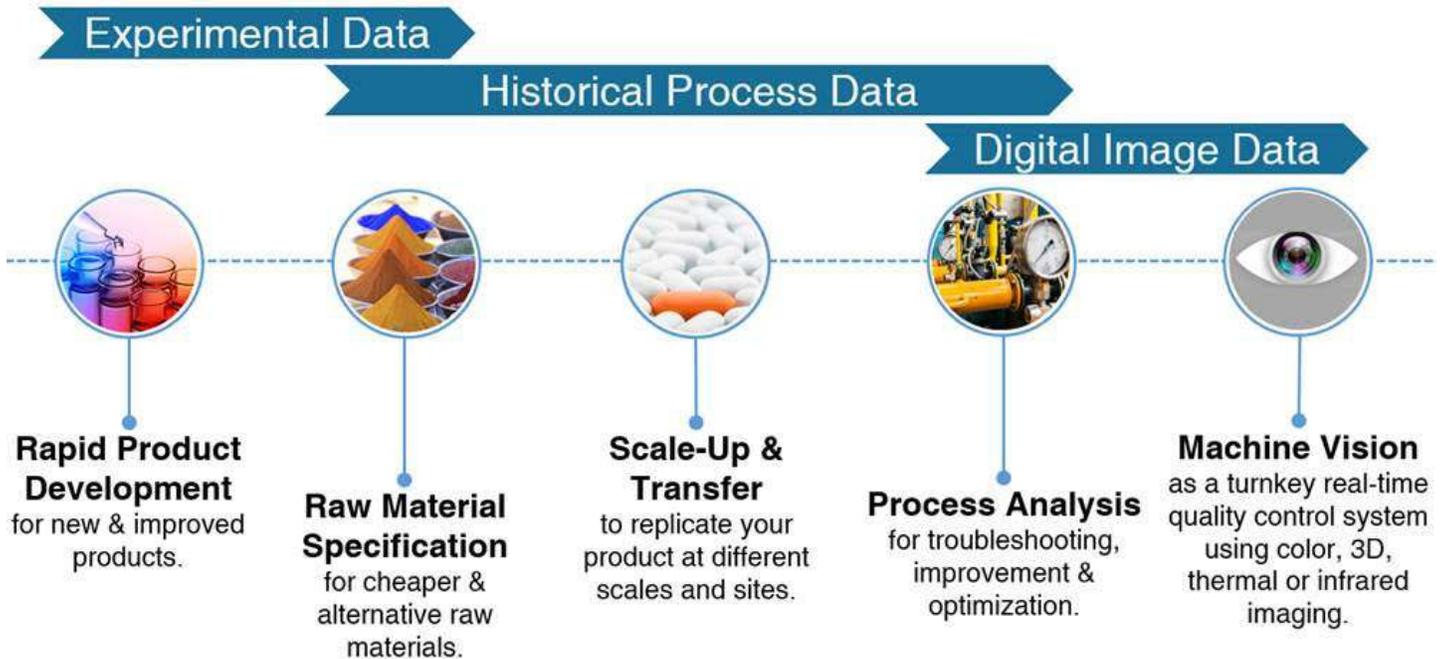
Why do manufacturers choose to work with ProSensus?

Many Fortune 500 companies across a variety of industries (such as ExxonMobil, Dow Chemical, PepsiCo, Mondelez, Synthos, and Johnson & Johnson) have chosen to work with ProSensus based on our MVA expertise and our diverse experience.

Our engineers work closely with our clients to make the best use of product and statistical knowledge. We don't offer a "black box" solution that just works. Rather, we build a robust model that enables the subject matter experts to better understand the sources of variations in their process and potential degrees of freedom that can improve it. Our non-biased view of the client's data is often a key advantage in unlocking new insights.

ProSensus

data driven innovation



Since 2004, ProSensus has been providing multivariate analysis consulting, software and education to clients across the globe.

We help pharma, biologics, food, chemicals, mining, and energy clients develop products faster, improve product quality and get valuable insights from data they are already collecting. We do this by modeling complex data sets in a way that's easy to visualize and interpret, deploying these models online for state-of-the-art process monitoring and control, and using models and advanced optimization techniques to formulate new products and optimize processes.

To find out more, visit: <http://www.prosensus.ca/>