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ASI DataMyte
Total Quality Solutions

Case Study: Consumer Products Manufacturer Tackles SPC for Multi-Cavity Injection Molding

Multi-position analysis is an effective tool for all manufacturers who have to analyze data from processes that contain two inherently different sources of variation. Examples include processes that utilize multiple filling heads, web coating, multi-cavity injection molding, batch manufacturing or a series of lines that all manufacture the same product.

The Challenge

A global consumer products company manufactures multiple personal hygiene products utilizing injection molding throughout its manufacturing process. The intensity of monitoring data for high speed multi-cavity injection molding operations poses a major data collection challenge. The task becomes even more challenging because the company has set dual monitoring goals: being able to monitor the injection molding process as a whole while also being able to perform analysis on specific cavities. For example, it is important not only to know that Cavity_1 is behaving within expected parameters yesterday, today and tomorrow; it is also important to know the same for Cavity_2, Cavity_3 and so on up to Cavity_n. Further, it is absolutely imperative for the next user of the process output to be confident that the products from the entire set of cavities be similar enough so that they constitute a homogeneous lot for the user's needs.

The Quantum Software Solution

The solution this Fortune 500 manufacturer adopted was the deployment of ASI DataMyte Quantum software with multi-position tracking capability. This solution offers the production personnel clear, concise data entry screens and intuitive graphics from which real time action can be taken. Electronically-interfaced handheld gages and vision measurement systems are used to obtain the data.

Standard Solution Deployed Worldwide

The Quantum solution also addresses data analysis needs of the organization. The ability to adopt a standardized system provides for a common information exchange between staff in production facilities around the world.

Isolate the Process Streams for Analysis and Corrective Action, plus Combine the Data for Total Lot Analysis

Samples are randomly pulled and the data is recorded by cavity and characteristic. The operator is alerted to changes in the process through simple color coding of the data matrix cells, even prior to reviewing the control charts.

Each process stream can be tracked as an individual entity using all the tools available in Quantum – control charts, histograms, capability charts, box & whisker charts, plus many more – and the data can be combined to view the overall process variation and to quickly and easily identify process streams that vary significantly from the overall average.

By allowing the separation of the process streams, the user can identify the outliers, corrective action can be taken, and the overall process will be improved, resulting in lower costs and higher quality.

Charts automatically update as data is being collected, and data can be further focused using filters to ensure that specific actionable information is being reviewed. The operator can view charts for specific cavities with the click of the mouse.

CELL	Pc #	OD	ID	Vial Thickness	Length	Crown Height	Stem Height
UCL:		5.000	5.000	0.750	11.000	3.500	2.800
UCL:		5.375	4.875	0.688	10.750	3.375	2.725
Nominal:		5.000	4.500	0.500	10.000	3.000	2.500
LCL:		4.625	4.125	0.313	9.250	2.625	2.275
LCL:		4.500	4.000	0.250	9.000	2.500	2.200
1		5.000	4.800	0.688	11.000	3.000	2.500
2		5.200	4.800	0.688	10.000	3.100	2.560
3		4.900	4.900	0.687	10.100	3.200	2.950
X-bar:		5.033	4.767	0.698	10.370	3.100	2.530
R:		0.300	0.300	0.002	1.070	0.200	0.060
Max:		5.200	4.900	0.688	11.010	3.200	2.560
Min:		4.800	4.600	0.687	10.000	3.000	2.500
2	1	5.010	4.500	0.500	10.000	3.100	2.380
2	2	4.990	4.700	0.480	9.950	2.800	2.770
2	3	4.990	4.500	0.490	10.050	3.000	2.600
X-bar:		4.997	4.567	0.490	10.000	2.967	2.623
R:		0.020	0.200	0.020	0.100	0.300	0.270
Max:		5.010	4.700	0.500	10.050	3.100	2.770
Min:		4.980	4.500	0.480	9.950	2.800	2.500
3	1	5.030	4.500	0.685	10.000	2.900	2.500
2		5.040	4.520	0.600	10.250	3.000	2.590
3		5.300	4.480	0.650	9.750	3.100	2.550
X-bar:		5.123	4.500	0.645	10.000	3.000	2.547
R:		0.270	0.040	0.085	0.500	0.200	0.090
Max:		5.300	4.520	0.685	10.250	3.100	2.590
Min:		5.030	4.480	0.600	9.750	2.900	2.500
4	1						

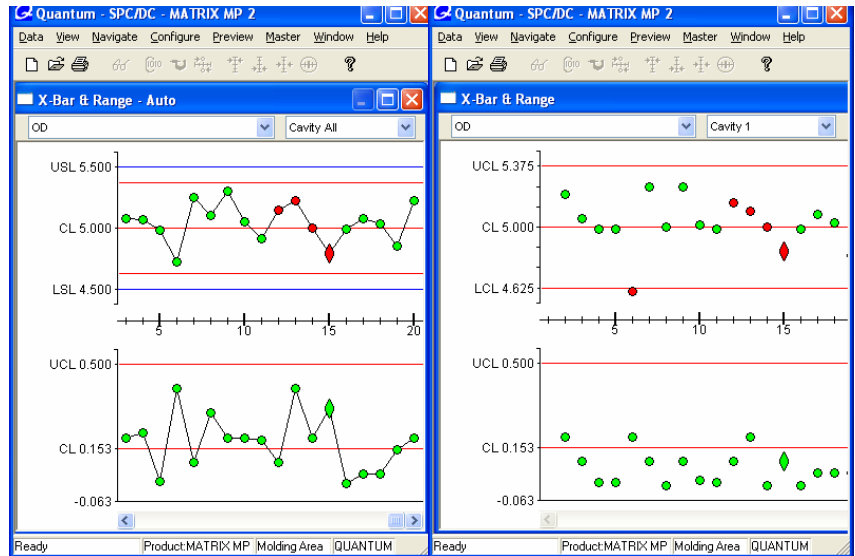
Color-coded matrix cells alert operators to changes.

Automatic Data Acquisition From Multiple Electronic Sources

Operators input data using both electronic handheld gages and vision measurement systems. The operator presses a button or footswitch to submit data to the Quantum system from handheld gages. The vision system sends the data automatically to Quantum once the measurements are completed.

Designed by Industry Experts

Additional tools have been provided to the plant floor data collection station to make the data entry process virtually foolproof. Unlike other applications that advertise a multi-stream process capability, ASI DataMyte consulted with the leading industry experts in this field to determine the feature set that would maximize user acceptance while providing the necessary analytical tools for the engineers and managers to make decisions. The application allows the non-used, or non-sampled, process streams to have data entry blocked so data cannot be entered incorrectly, which can render analysis useless – or worse, misleading.



Left, control chart of all cavities; right, control chart for a single cavity.

To increase acceptance, which can often be the difference between success and failure, the Quantum system allows users to customize the interface by applying familiar terminology: cavity, filler, line, position or whatever terms are common in their facility.

Data Access for Support Staff

Quantum's analytical tools are designed to give your engineers the ability to drill down through multiple levels of the process to find and eliminate the root causes of variation. Some of the tools available are:

- Capability
- Box and Whiskers
- Cause Pareto
- Control Charts
- Histograms
- Multiple Data Reports
- Custom User-Defined Reports

The Data Analysis and Reporting package also offers these additional features:

- Custom data filters and custom report templates that can be easily created, edited and reused
- Reports and charts that are HTML-compliant and can be easily posted to intranet and extranet sites
- Data can be easily passed to other analysis software tools with a simple copy/paste or export
- An event viewer that posts real time events for staff to review, acknowledge and take action.

Benefits

Today's rising material and energy costs and increasing global competition have increased the value of information that's clear, concise and available in real time. Quantum software has provided the means of efficiently turning data into actionable information. Today this consumer products manufacturer continues to expand their global deployment of the Quantum system.

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