

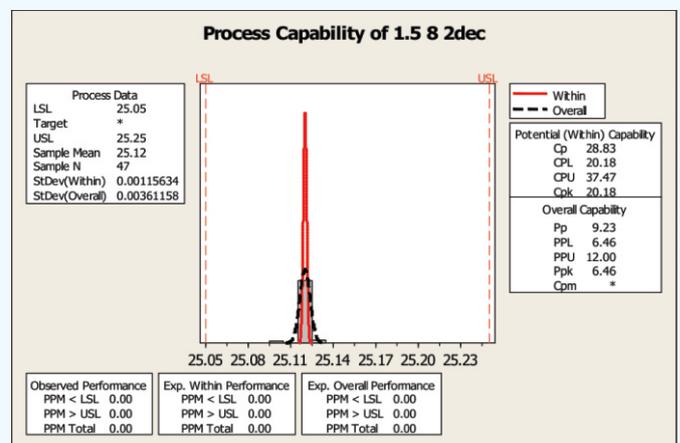
Better monitoring and control using Statistical Techniques

It became apparent that existing controls defined by a customer were failing due to the complex interaction of mating parts. Customers often specify critical areas by way of dimensions and W&S Plastics continually monitor these dimensions using Statistical Process Control, SPC. Using this system we can maintain product quality throughout the entire process.

The parts in question satisfied the customer's specification dimensionally, however the additional functional testing that we perform highlighted that the product failed to meet the design requirements. We explored several options and settled on designing a proprietary system for monitoring and control.

Following is an overview of the system and details of the successful implementation.

The initial step was to gather data across multiple batches of multiple production runs to ensure the data is statistically significant. Statistical checks for normality and exceptions are performed. This ensures the process is capable. Note that we are looking across multiple dimensions. Data is extensively analysed within minitab.



A correlation analysis is performed which analyses all the dimensions to determining if there is a close correlation between them. This allows us to tune the monitoring to just one or two dimensions which correspond to movement of other critical dimensions.

The following shows a typical analysis.

Correlation Analysis

Factors:

1. Correlation among inspection and significant dimensions
2. Nominal Values and tolerances
3. Process Means and Standard Deviations
4. Other factors from existing knowledge

1. Correlation

a. Correlation among dimensions

	D9	D17	D25	D26	D27
D9					
D17	Medium				
D25	Strong	Medium			
D26	Strong	Medium	Strong		
D27	Weak	Weak	Medium	Weak	

b. Response to process variations (unlisted dimensions are ignored due to their relatively weak response)

Response	D9	D17
D9	Strong	
D17	Weak	Medium
D25	Strong	
D26	Medium	Medium
D27	Strong	Strong

2 & 3. Nominal values & Current process performance

Dimension	Nominal	U.y	L.T	Cav. 2		Cav. 3	
				X.Bar	S.D	X.Bar	S.D
D9	23.68	0.07	0.07	23.7	0.007	23.68	0.006
D17	25.4	0.1	0.1	25.41	0.008	25.37	0.006
D25	25.2	0.05	0.05	25.21	0.009	25.22	0.008
D26	25.09	0.05	0.05	25.09	0.006	25.09	0.007
D27	8.94	0.15	0.05	8.942	0.008	8.992	0.009

4. Other Factors
N/A.

5. Verdict

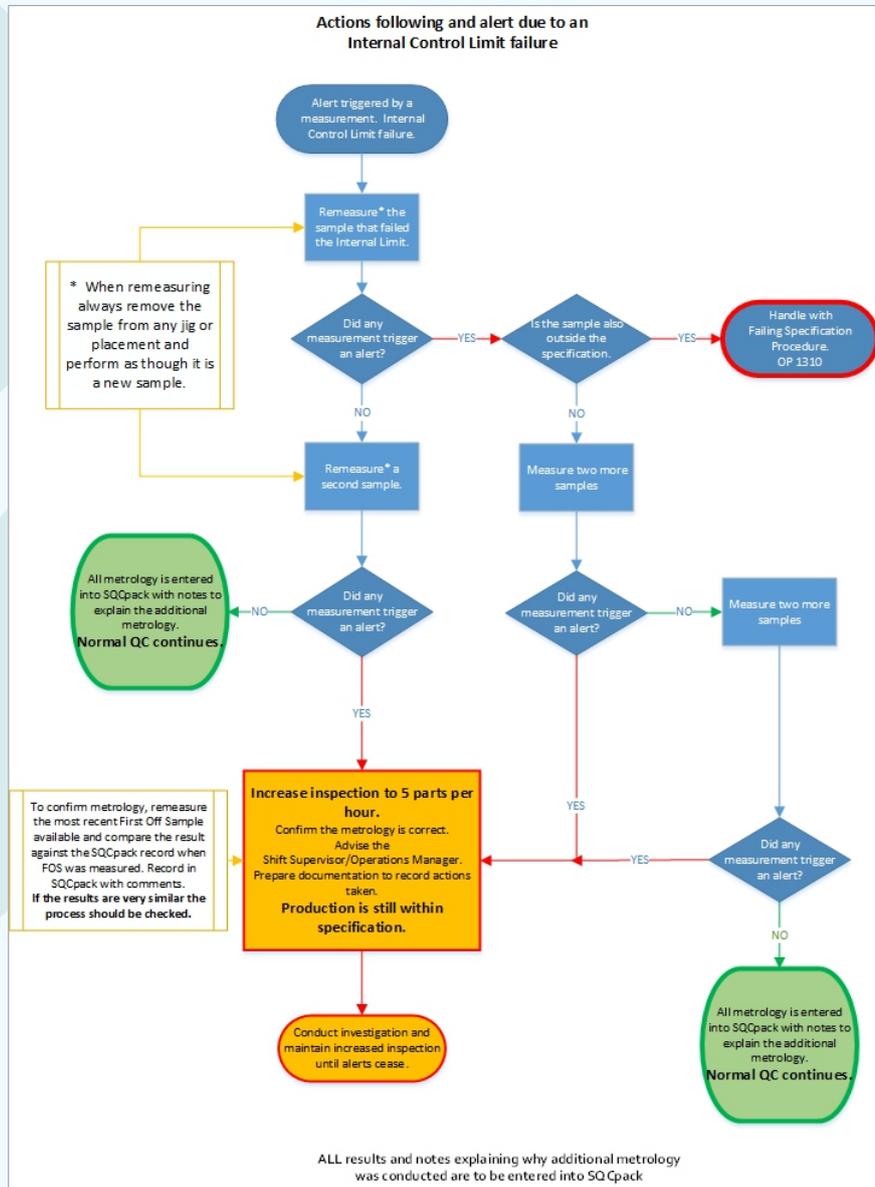
Dimension 25 is the most sensitive and therefore the most appropriate to monitor.

For the next step we have developed a proprietary algorithm that is used to calculate the new monitoring limits.

This calculator relies on a number inputs including the historical data on the monitored dimension and DPM (defects per million)

Whilst developing the system it became apparent that monitoring is only one side of the solution. How to respond to a measurement that triggers one of these new limits is equally as important.

In consultation with all stakeholders a flowchart was developed to clearly define and communicate what actions are taken at every step of the process ensuring a robust system of actions and controls.



If you would like more information about how we apply advanced statistical techniques to ensure product quality, please call:-

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W&S Plastics

W&S Plastics is a leading global manufacturer of plastic injection molded products, specializing in components and sub-assemblies for the medical device industry. Located in Sydney Australia, and Kulai Malaysia, W&S Plastics has supplied critical components to world leading device manufacturers for more than 35 years.

Our ISO accredited Quality Management System includes verification and validation elements such as DFMEA, PFMEA and PCP enabling us to consistently deliver superior quality. W&S Plastics utilizes the latest European injection moulding machines with advanced robotic production cells that deliver reliable and consistent injection molded components.

At W&S Plastics we pride ourselves on customer focus. We tailor our systems and procedures to ensure that the quality of our products and services exceed your expectations. Seamless management of complex supply chains enable us to meet your critical milestones.

A strong passion for reliable precision tooling has driven strategic alliances with several manufacturers of tooling throughout Australia and Asia. Our multi-cultural and multi-lingual Product Implementation team ensures that we leverage the best that Asia has to offer.

With unmatched experience providing high-performance injection molded products, W&S Plastics is committed to ensuring the highest quality products and service. Our best-in-class products will help you realize significant cost-of-ownership efficiencies and rapid response to market. Our Johor, Malaysia plant began production in October 2016 with the best European equipment available at the time.

The Engel moulding machines that we utilise connect through e-factory, Engel's production manufacturing and execution system, to our network making all scheduling and production data, SQC and process parameters available in real time to the people that need it.

W&S Plastics is dedicated and focussed to delivering your business the best possible solution in its field.

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