

MANAGEMENT OF INSPECTION DATA AT AN AEROSPACE TIER 1 SUPPLIER

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Industry Trends: Product Quality is an Enterprise Concern

Having a grasp on quality allows the organization to produce a predictable product with minimal scrap and rework. High quality relies directly on the manufacture of a product in conformance to design specifications, which is directly linked to product design and engineering, manufacturing engineering, assembly, and test, and customer management. Despite this, many manufacturers continue to treat manufacturing quality apart from their core business processes, making it difficult to achieve real-time visibility into manufacturing costs and product performance actuals. *Manufacturing quality data affects entities across the entire organization, including planning, sourcing, and procurement, product design and engineering, customer management*, and of course the executives who are ultimately held liable when a catastrophic product failure occurs.

AMR Research Alert, October 2005

Case Study: Magellan Aerostructures UK

- Magellan Aerospace Corporation is a leading global supplier of technologically advanced aerospace systems and components.
- Magellan enjoys strong supplier relationships with Original Equipment Manufacturers (OEMs), space, civil, and defense organizations and sells to the global aerospace markets.
- Annual Revenue over the last 5 years has averaged >\$500M

Case Study: Magellan Aerostructures UK

- The Corporation's strategy is to grow by taking advantage of the trend in the major aerospace manufacturing companies to outsource more of the primary component manufacturing process and to consolidate their supplier base.



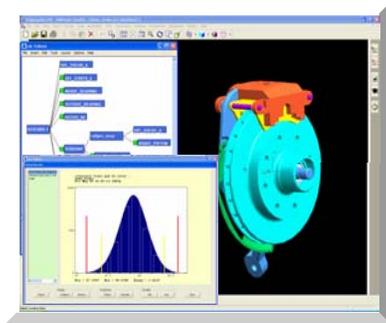
Case Study: Magellan Aerostructures UK



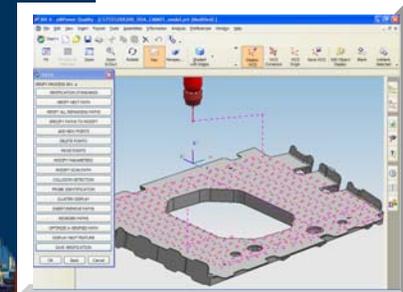
Case Study: Magellan Aerostructures UK

- In 2003-3004 Magellan invested substantially in modern CAD/CAM technologies in order to undertake contracts for the A380 airliner program. One of the components of this investment was the UGS Quality Products
 - eM-ProbeCAD for off-line Programming of CMMs
 - eM-Measure to execute these programs and analyse the results on the shop floor
 - eM-Insight to share the results across the enterprise

The UGS Quality Solution

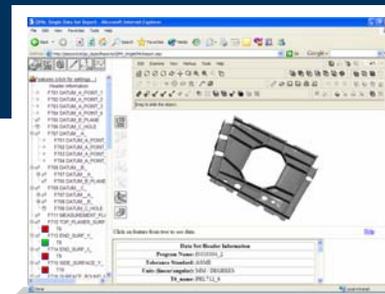


Variation Analysis



CMM Programming

The Quality Products are an integral part of the entire Product Life Cycle



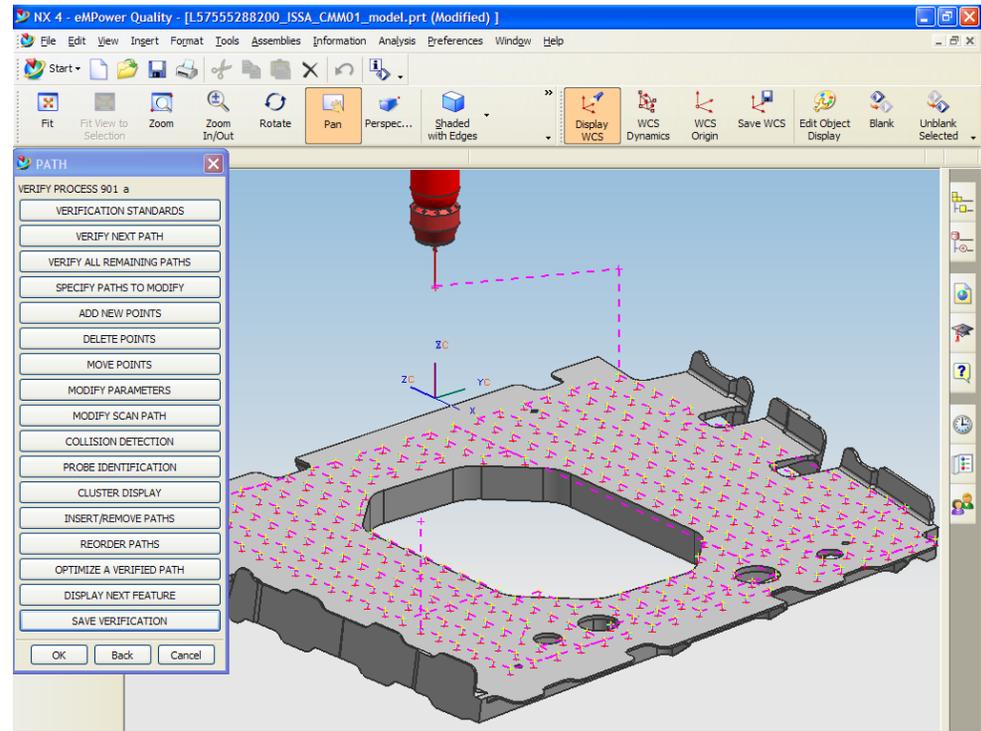
Dimensional Reporting and Analysis



CMM Inspection

CMM Programming

- A CAD embedded CMM off-line programming tool to quickly generate collision free inspection programs that automatically update to design changes



CMM Programming features

- CAD-Embedded with the same user interface of the CAD system
- Data stored associatively in the CAD model
- Automatic reading of native features and tolerances
- Fully supports UG-NX Assemblies & Components (i.e. Master Model concept)
- Automatic feature and path programming update with Geometry changes
- Supports ISO and ASME (1982 & 1994) standards

CMM Inspection

- A web based system for storage, retrieval and execution of job information such as DMIS file, Operator Work Instruction and results.
- It provides a consistent mathematical analysis regardless the measurement device.

The screenshot displays the eM-Measure software interface. The main window shows the TECNOMATIX logo and navigation options. An overlaid window titled 'Analysis Results - Microsoft Internet Explorer' displays a table of inspection results. The table includes columns for Point ID, description, tolerance ranges, and pass/fail status.

Point	Description	Min	Max	Status
F722	bow (3D View) (Mea Pts) (Re-Analyze)			
	DISTB_XAXIS0.006134 0.010000/-0.010000; tol137,F724 bow ref (Re-Analyze) (Display CS) (Display Mea Dev)	0.016847	0.016847	Failed
F725	b le chord (3D View) (Mea Pts) (Re-Analyze)			
	DISTB_XAXIS1.942575 0.005000/-0.005000; tol138,F740 b te chord (Re-Analyze) (Display CS) (Display Mea Dev)	1.938162	1.938162	Pass
F728	e le chord (3D View) (Mea Pts) (Re-Analyze)			
	DISTE_XAXIS2.021947 0.005000/-0.005000; tol141,F743 e te chord (Re-Analyze) (Display CS) (Display Mea Dev)	2.016325	2.016325	Failed
F732	j le chord (3D View) (Mea Pts) (Re-Analyze)			
	DISTB_XAXIS2.118074 0.005000/-0.005000; tol145,F747 j te chord (Re-Analyze) (Display CS) (Display Mea Dev)	2.111318	2.111318	Failed
F733	v le chord (3D View) (Mea Pts) (Re-Analyze)			
	DISTB_XAXIS2.253616 0.005000/-0.005000; tol146,F748 v te chord (Re-Analyze) (Display CS) (Display Mea Dev)	2.242682	2.242682	Failed
F735	x le chord (3D View) (Mea Pts) (Re-Analyze)			
	DISTB_XAXIS2.347135 0.005000/-0.005000; tol148,F750 x te chord (Re-Analyze) (Display CS) (Display Mea Dev)	2.339768	2.339768	Failed

CMM Inspection Features

- Common user interface independent of inspection machine
- Central repository of dimensional quality information
- Easy graphical navigation for inspection job retrieval
- Browser based review of graphical Operator Work Instruction
- Advanced GD&T analysis capabilities fully compliant with ISO, ANSI and ASME standards
- Support of industry standard XML data sharing between applications (DML)
- Out-of-the-box connection to inspection machines
- Customizable HTML, PDF and CSV Reports

Benefits

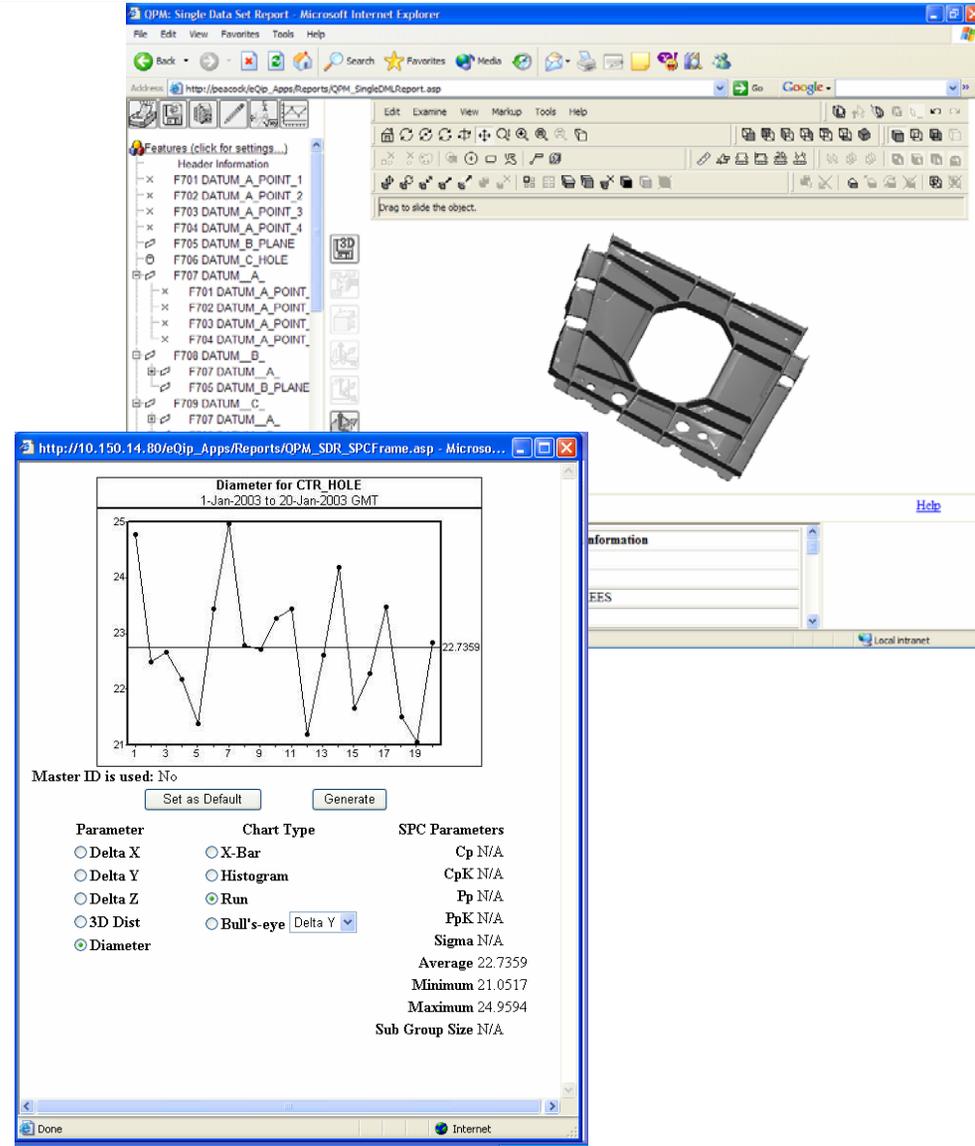
- Reduce cycle time by increasing CMM efficiency thus eliminating bottleneck in the QA area
- Reduce Time-to-Market for New Product Introduction by creating off-line programming while the actual part is still not available and by performing root cause analysis to fix the process
- Improve quality of the process by allowing operators and engineers sharing same information eliminating ambiguous communications.

Some Business results

- Reduces time to generate inspection programs for complex parts up to 70%
- Eliminate investment costs in hard gages by 30 to 50%
- Reduce costs of fixturing by 30% to 50%

Dimensional Reporting & Analysis

- WEB based Measurement Reporting with:
 - Customizable report formats
 - 3D graphics linked to report content
 - Report markup
 - Query for data selection
- SPC Charting

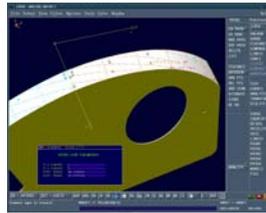


Dimensional Reporting & Analysis Features

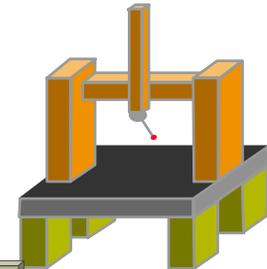
- Common data definition with industry standard XML format (DML - Dimensional Markup Language)
- Central Storage Location on Web Servers
- Integration of data sources with data viewers
- Common Reporting Format that can be customized
- Global Access to Data
- 3D Graphical Display of Measurement Results
- Full GD&T part analysis
- Statistical Process Control Charts

Case Study: Magellan Aerostructures UK

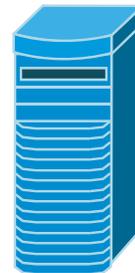
*Offline Programming with
eM-Probe-CAD
Bournemouth Facility*



*Manufacturing and Inspection with
eM-Measure
Wrexham Facility*



*View Inspection Reports, Graphics, SPC
Charts and perform re-work analysis
with eM-Insight
Poole Facility*



*Web Server
-Central Repository
-Stores Job Data
-Stores Results
-Analyze Engine*

*View Inspection Reports
and Graphics with eM-Insight
Chester Assembly Facility*



Case Study: Magellan Aerostructures UK

Results to date

- At the pre-production stage CMMs are used to analyze inspection results and adjust the programming of computer-controlled machine tools. This process requires highly skilled personnel and access to high-level CAD workstations. These resources can be pooled for use across different sites.
- It is now possible to view inspection results locally regardless of where the components were manufactured, so buy-off queries can be resolved quickly and any discrepancies dealt with promptly.
- No other aerostructures supplier in Europe has this flexibility

Case Study: Magellan Aerostructures UK

Results to date

- Winner of “The Manufacturer - IT in Manufacturing” Award for 2005 for the implementation of this system.

Case Study: Magellan Aerostructures UK

“By improving the standard of our internal information, *we can do work that we couldn't tackle before.*

Changing and upgrading the nature of the business has justified the investment in the new tools. Magellan has capitalized on its investment because it has committed to a progressive strategy, based on the need for change.”

David Stewart, Magellan's group quality manager.

Questions?

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Thank You!

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