Closing The Loop Of The Digital Thread

Joe Pritchett
F-35 is Re-Inventing Aerospace Programs

This Program is Different.....

...VERY Different

Different in Everything We Do

- International Partnering
- Prime Contractor & Partners
- Multi-Service Platform
- Manufacturing Concept
- Commonality Across Versions
- Industrial Participation
- Communication
- Best Value Replaces Offset
Environment – Radically Different
Production Requirements

- Standard Work for every task
- Snap Together vs. Hand Crafted
- Moving line in Final Assembly
- Predictable Supply Chain
- Predictable Detail Part Dimensional Control
- Product Designs Must Be Tolerant of Manufacturing Process Variations
- Supplied Parts Must Meet Assembly Requirements
- Processes Must Be Capable and Stable
Global Standardization Challenge

Design
- Standardize Tolerances
- Standardize Datum Schemes
- Standardize KC Definition
- Standardize Inspection Plans

Supplier
- Communication
- Standardize Inspections
- Performance Assessment

Quality
- Standard Reporting & Metrics
- Standardize Supplier Feedback
- Influence Design & Source Selection
Challenge – Parts Must Meet Assembly Requirements

• Dimensional Integrity

• Many of the disruptions in the Assembly process are a direct result of part feature not meeting dimensional requirements.

• A complex part can have thousands of dimensional requirements, but how do you communicate what is important at Assembly?
Step 1 – Define and Understand Process Performance

Enterprise Process Capability Database

- Selected the AIMS suite developed by Boeing & Metronor
- Provides the ability group by Part Family, Part Number, Part Feature, Process, Program, and Supplier
- Reporting function provides basic management information type reports
- Reports are accessed via the Web

Collaboration — One Set of Shared Information
Step 2 – Standardize the Measurement Process

Measurement Plan

- Define a measurement approach to ensure that a part is measured the same way no matter where it is built.
- Focus attention on Key Characteristics and assembly integration.
- Require actual measurement result data to be sent in ahead of the part.
- This allows us to efficiently populate a Process Capability Database.
- Improves communication between design & build.
Step 3 – Manage the Process to Improve

- Manage the processes proactively “Information Rich not Data Rich”
- The Supply chain is a process; not just a subcontract management task
- Inspection/verification must be managed like any other process

Stable and Predictable Supply Chain
Key Characteristics Data Usage

- Updates Machining Design Standard
- Trade study support for reducing designed in shim gap
- A-1 troubleshooting/problem resolution
- Reconciling Loss Function estimates with actual performance
- Getting initial insight to Supply Chain capabilities
- Data is available to support Corrective & Preventative action tasks for both Suppliers and Internally

More than simply a data collection exercise
### Detail Part Process Capability Metrics - KC’s

**Supplier:** All  
**Process:** Multi-Axis Machining  
**Product Family:** Detail Parts  
**Material:** Aluminium/Ti  
**Date:** March 2005

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**Corrective / Preventive Action**

- Get Process Control Documents in place to identify process improvements  
- Program to Nominal

*Supplier: All  
Process: Multi-Axis Machining  
Product Family: Detail Parts  
Material: Aluminium/Ti  
Date: March 2005*
KC Feature A - Profile Tolerance of 0.016

Supplier Comparison

The **Green** line are Specification limits

Who do You want to support Your Moving Assembly Line?
Questions