Part Marking Master’s Perspective

[Machine Readable Identification (MRI) With Automated Data Capture]

-SMART Implementation-
Journey to Optimization

Facilitated By:
NDIA Industry Leadership Advisory Group (ILAG)
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Part Marking Master’s Input

Honeywell – Torrance (Kelvin DeWinter)
Honeywell – Toronto (Dan Cosman)
Pratt & Whitney - Connecticut (Andy Jay)
Progeny Systems – Connecticut (Ron Lounsbury)
Rolls Royce – UK (Nat Russhard)

Leading The Way To MRI With Automated Data Capture!
Why MRI With Automated Data Capture?
-Success Stories-

- 100% Reduction – Quality Errors
- 100% Reduction - Quality Escapes
- 100% Reduction - Quality Notifications
- 90% Reduction – Labor (cycle time)
- 50% Reduction – Product Development Span Time
Master’s Perspective – SMART Implementation

✓ **Simple Rules**
✓ **Manage Implementation**
✓ **Advanced Planning**
✓ **Reduce Costs**
✓ **Transform!**
Master’s Perspective – SMART Implementation

✓ Simple Rules
SIMPLE RULES!

- LEAD transformation to MRI with automated data capture
- Identify “your pain” and quantify what transformation will mean to the organization in terms of internal and external benefits
  - Cost, schedule, standardization, confidence and quality improvements, compliancy
- Align transformation journey to customer(s) needs
  - IUID Compliance and Customer timelines used as a trigger (engagement) opportunity
- Estimate the cost of transformation
  - Infrastructure costs for Optimization vs. IUID compliancy
- Obtain and maintain High-level support
  - Commitment to transformation journey, resources and funding
  - Flow-down commitment and expectations to organization and suppliers
SIMPLE RULES!

✓ Begin transformation journey with pilots
   ✦ Small “bounded” pilots – 1 Product
   ✦ Fully test MRI and automated data capture procedures
   ✦ Fix root problems prior to next roll-out activity
   ✦ Notify and engage suppliers during planning stage
     • To begin to transform their processes in order to provide MRI product and data elements as required

✓ Remain informed
   ✦ Work with technology providers
   ✦ Engage in industry and government working groups
   ✦ Modify transformation journey as technology evolves and as common standards and policy requirements are more universally adopted & applied
Master’s Perspective – SMART Implementation

✓ Simple Rules
✓ Manage Implementation
MANAGE IMPLEMENTATION!

✓ Manage implementation like a “Program”
   Set measurable objectives and goals
   Form a diverse team – organization, customers, suppliers
   Plan, estimate, schedule, execute, mitigate
   Monitor performance and improvement metrics

✓ Formulate strategy and timelines based on
   Compliance
   Internal and external “Pain” (process improvements)
   Evolutionary approach
    • Pilots
    • Trigger events to reduce cost impacts
    • Supplier input
   Full optimization and institutionalization
MANAGE IMPLEMENTATION!

- Engage a diverse implementation team
  - Contracting, procurement/supplier management, engineering, operations, information systems, sustainment organizations
  - Major Customers, DCMA, suppliers, sub-tiers
- Standardize and disseminate plan elements and expectations
  - Global policy regarding transformation (5-10 year plan)
  - Communication and training plans
  - Performance metrics
  - Harmonize configuration mgmt requirements with marking and data requirements
- Manage supplier flow-down and costs
- Build energy and excitement regarding transformation
  - Engage
  - Communicate, communicate, communicate!
Master’s Perspective – SMART Implementation

✓ **Simple Rules**
✓ **Manage Implementation**
✓ **Advanced Planning**
ADVANCED PLANNING!

✓ Agree to MRI products/items listing
✓ Identify current state and capabilities
  ✧ How items are marked…with what data elements (uses)
  ✧ Technology utilized and types of equipment
  ✧ Location of product/item “touch points”
  ✧ Location of product/item “data capture touch points”
  ✧ Information Systems potentially affected
    • Data elements, uses and current integration
  ✧ WAWF and IUID Registry integration (process flows)
  ✧ Supporting documentation
✓ Agree to data elements listing (integrated with use cases)
  ✧ Internal value
  ✧ Customer requirements
  ✧ External value
ADVANCED PLANNING!

✓ Develop MRI with automated data capture future state processes and implementation activities
  ✷ Standard procedures and work instructions for implementation
    • Accessible (electronic)
  ✷ Common marking processes
    • Create marking requirements to integrate with current marking capabilities and change engineering specification upfront
    • Based on latest MIL-STD 130
    • Harmonize DoD and commercial requirements for single marking system
  ✷ Common data elements and information system data flow processes
    • Eliminate non-value added “data capture touch points”
      – Future state includes only value added “data capture points”
    • Define information system integration
      – What systems need to be modified
      – Automated downloads of data
ADVANCED PLANNING!

- Notify and engage suppliers to begin to transform their processes in order to provide MRI product and data elements as required
  - Disseminate an expectation notice to suppliers
  - Train and assist suppliers in their journey

- Develop supportive and continuing processes
  - Monitoring performance and metrics
  - Training
Master’s Perspective – SMART Implementation

✓ Simple Rules
✓ Manage Implementation
✓ Advanced Planning
✓ Reduce Costs
REDUCE COSTS!

✓ Drive automated reading of marks and data transfer to eliminate manual key stroking, manual quality errors and processing time throughout the entire lifecycle!

✓ Minimize legacy system changes...utilization suggestions
  ✦ Keyboard wedge technology to feed legacy and new systems
  ✦ Automate pull of import text files into legacy and new systems
  ✦ Distribute numerical control system to store saved marking system instructions (patterns)

✓ Standardize marking formats
  ✦ Suppliers benefit as well
REduce Costs!

✓ Devise formal, documented training programs
  ✷ Team members, marking and verification equipment operators, data capture operators, suppliers
  ✷ Be creative….accomplish training via internet web meetings

✓ Provide continuing support to suppliers
  ✷ Standardize information to suppliers
  ✷ Brainstorm with suppliers how to
    • Reduce equipment and marking transformation costs
    • Eliminate errors prior to the “first mark”
      – Offer to review sample marks prior to production and/or require FAIR - First Article inspection Reports
Master’s Perspective – SMART Implementation

✓ Simple Rules
✓ Manage Implementation
✓ Advanced Planning
✓ Reduce Costs
✓ Transform!
TRANSFORM!
Benefits of MRI and Automated Data Capture

- Significantly reduces risk of quality failure associated with identification escapes
- Eliminates legibility issues
- An enabler to a paperless system
- Improves speed and accuracy of data transfer
- No data transcript errors
- Internationally recognized
- Has the ABILITY to..........
  - Improve parts traceability
  - Reduce internal processing procedures
  - Capture accurate ‘As Built’ data
  - Check ‘Should Build’ data
  - Reduce Replenishment costs
  - Generate electronic log books

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An MRI Journey - Sample

**The Need for Improvement**

Cost to MAKE an error

Cost to FIX an error

**Direct Part Marking - Data Collection**

Scanning a Fan Blade

Scanning a Blade Set

View of the Codes through the Scanner

**Process Capability**

1 Chart of Scan Time Taken to Scan Complete Trent 500 Fan Blade Set

Total Time to Scan Full Set (min)

**Before**

Provided Courtesy of Rolls Royce Engines: Nat Russhard Oct 2005

**After**
Technical Information
-Lessons Learned-
Technical Information

- Eliminate UII construction errors which could cause costly labor hours to fix and schedule delays
  - Don't encode the UII data element string without a format code
  - Don't 'hard code' RS, GS, EOT
    - Must use their ASCII character representation in the syntax
  - Use the message header, group separators, record separator, and end of transmission in the syntax per ISO 15434
  - Don't use the same enterprise identifier more than once in the message string
  - Use the appropriate data qualifier when encoding a concatenated UII or a DoD recognized IUID equivalent
  - Don't mix the use of Data Identifiers, Application Identifiers or Text Element Identifiers in the message

- Finding a UII construction or syntax error AFTER marking the part is too late!

Technical Information

The DoD UID Construct is an accepted equivalent to the ATA Construct.

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Technical Information

**Verification** – Evaluation of the marking quality of the 2D Data Matrix symbol for:

- Marking quality and part payment acceptance
- Marking process setup and control
- Prediction of marking durability
- Standards are still evolving
- Sampling plan
  - Defined by internal Mfg process procedures for the verifier
  - 5% of markings checked but could be larger based on batch size

**Validation** – 2D Data Matrix symbol has the appropriate syntax and semantics according to the last version of MIL-STD-130

- Syntax shall comply with ISO 15434 → Unprintable ASCII characters complicate that
- Semantics for AIs or DIs shall comply with ISO 15418
- Semantics for TEIs shall comply with ATA Common Support Data Dictionary (CSDD)
IN SUMMARY...

✓ Simple Rules
✓ Manage Implementation
✓ Advanced Planning
✓ Reduce Costs
✓ Transform!

and...continue to share Lessons Learned!