

Process Approach to Determining Quality Inspection Deployment Product Overview

May 7, 2015

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Process Approach to Determining Quality Inspection Deployment

Product Overview

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May 7, 2015

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Agenda

- Motivation and Team Charter
- Product Overview
- Examples
- Topic Details
- Topic Follow-on Recommendations
- Team Membership and Recognition



Motivation for Topic

- DOD issued 55 years ago MIL-Q-9858A and MIL-I-45208A
 - *Emphasis on complete and frequent visual inspection*
- Technology has improved since then
 - *Process controls*
 - *Product quality*
 - *Inspection capabilities*
- Inspection change versus risk guidance is lacking

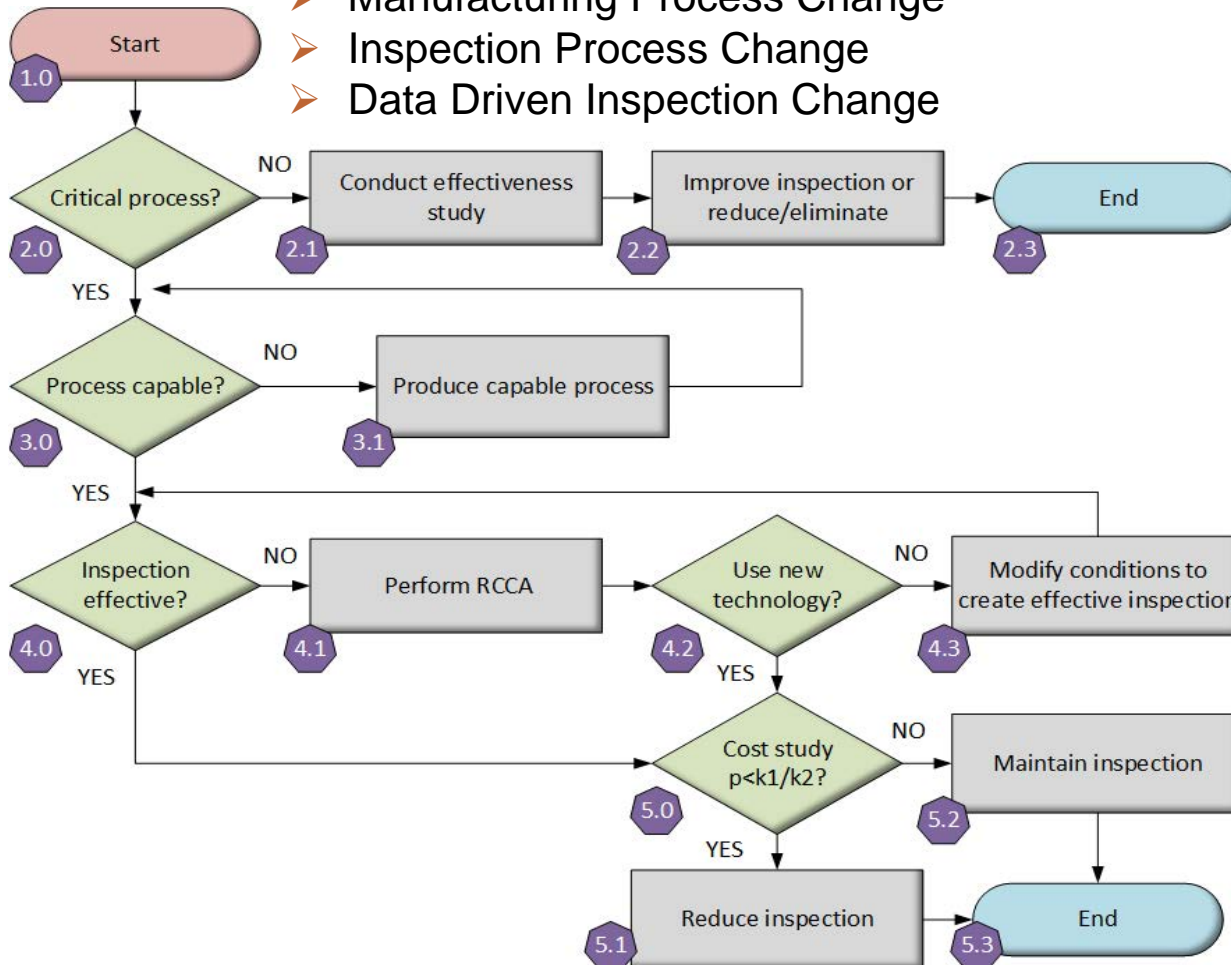
Team Charter

- Develop a tool for determining if a change in inspection approach is warranted
 - *Review industry data and feedback from DCMA to identify candidate processes*
 - *Identify best practices for optimal quality inspection planning and deployment*
 - *Evaluate candidate processes using new tool*



Decision Tree

- Manufacturing Process Change
- Inspection Process Change
- Data Driven Inspection Change



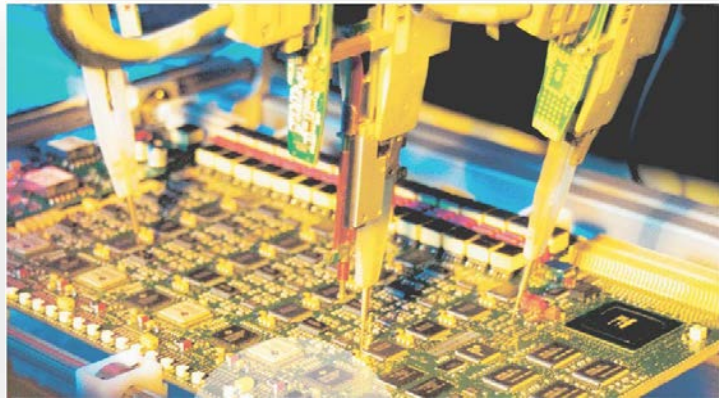
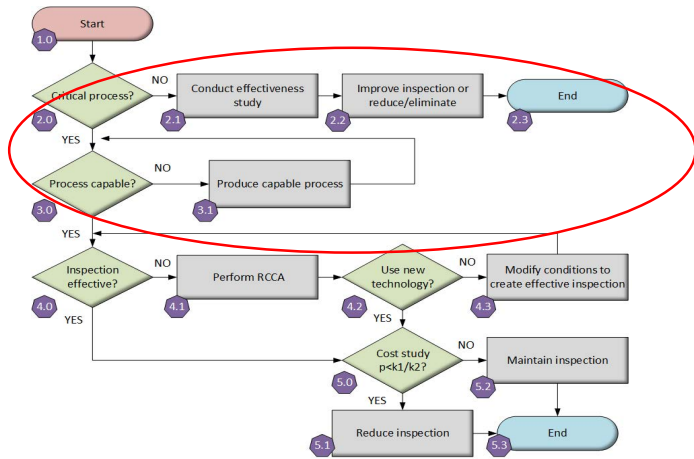
Example

ICT via Flying Probe

- Shift inspection of PWB from manual inspection to flying head automated probe
 - *False errors manual inspection reduced*
 - *Time study of the same board shows significant time reduction*
 - *Output of machine lists part non-conformities*
 - *Manual Inspection covers 10-20% of parts not covered by the machine*



In-Circuit Test via Flying Head Probe Analyses Performed



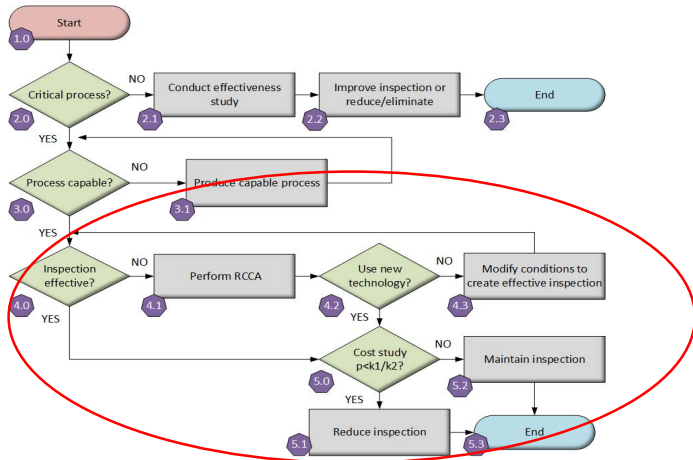
Critical Process

- Reviewed historical inspection process output
- Reviewed customer requirements
- Identified potential tool suppliers
- Performed risk analysis against existing processes
- Study of cost vs. CAPEX vs. inspection performance completed

Process Capability

- Reviewed supplier tool sets
- Performed bench test using EDU boards
- Verified results against existing inspection method
- Identified process accuracy and repeatability issues
- Compared results to risk and cost analyses

In-Circuit Test via Flying Head Probe Analyses Performed

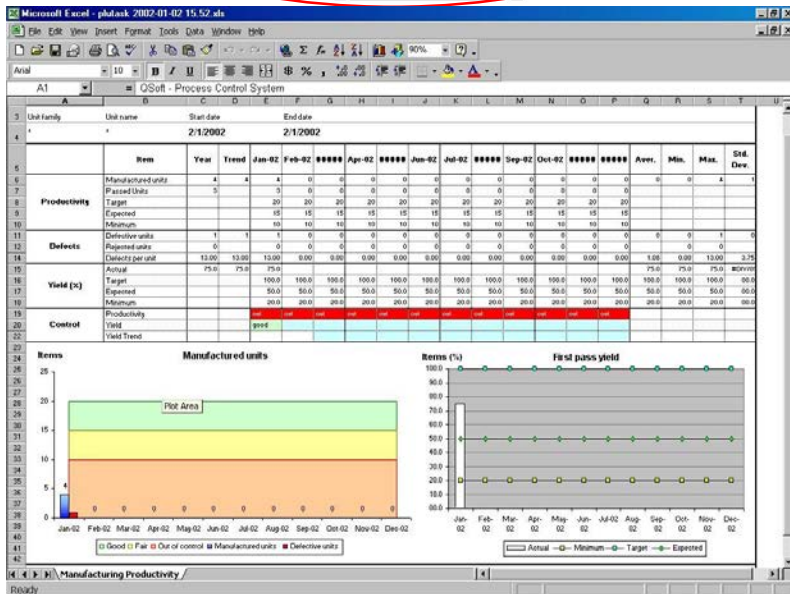


Effective Inspection

- Test board coverage and issues reviewed
- Identified requirements against typical part usage
- Identified part types and applications where ICT not able to capture all issues

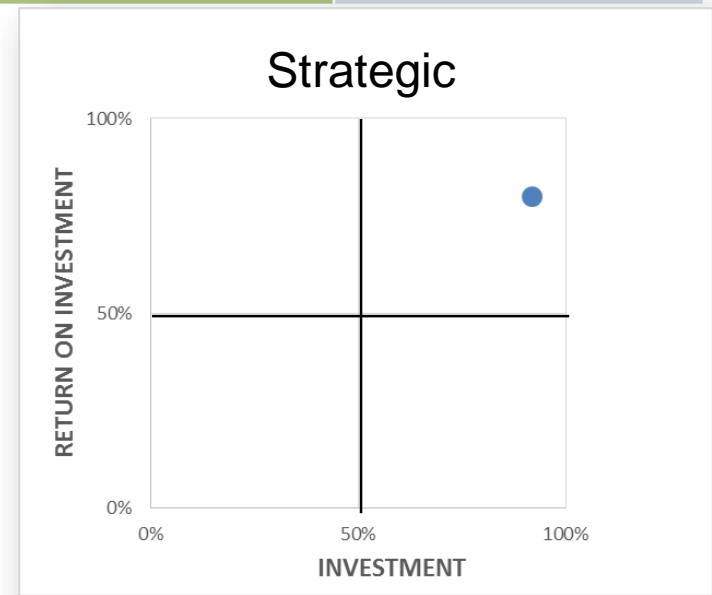
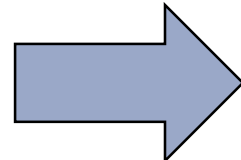
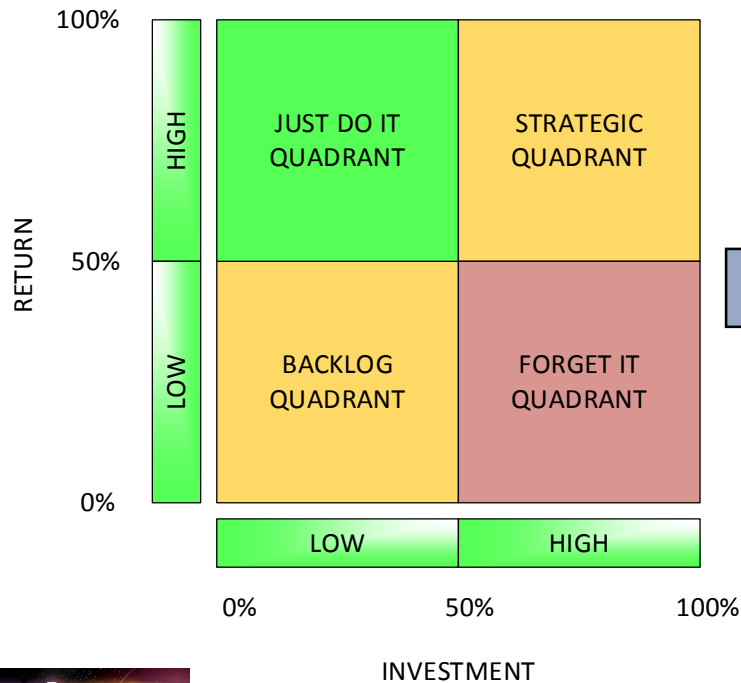
ROI

- Performed study for purchasing unit vs. outsourcing
- Identified multiple suppliers and reviewed capabilities against requirements



Analysis Results into Tool

Analysis Category	Entries in tool	Manufacturing Process Change	Inspection Process Change	Data Driven Insp. Change
Manufacturing	Lines 1-5	40%	22%	22%
Inspection	Lines 6-8	30%	45%	38%
Cost and Customer	Lines 9-10	30%	33%	40%



Tool Design

<u>Analyses</u>	<u>Justification</u>	<u>Weight</u>	<u>Return</u>	<u>Investment</u>
<ol style="list-style-type: none"> 1. Do the results of a PFMEA show potential for improved quality? 2. Is the process qualified and capable? 3. Does the first article indicate less inspection is required? 4. Does the current process have a low level of nonconformities? 5. Does the proposed process output rate affect inspection capabilities? 6. Was a gage R&R performed with personnel performing the inspection function? 7. Will the improved inspector process increase the ability to find nonconformities? 8. Will the process change reduce inspector escapes? 9. Has a cost analysis been performed ($p < k1/k2$, see Appendix B)? 10. Will the customer allow the change? <p><u>Fixed by Tool</u></p>		<ul style="list-style-type: none"> • Manufacturing Process Change • Inspection Process Change • Management or Customer Input <p><u>User Modifiable</u></p>	<ol style="list-style-type: none"> 1. Does not justify removal of inspection process 2. Additional data required before decision can be made 3. Data Justifies capabilities study for process modification 4. Justifies modification of inspection process 5. Justifies removal of inspection process <p><u>User Modifiable</u></p>	<ol style="list-style-type: none"> 1. Low Effort (Easy or completed, limited personnel, <3 months) 2. Between Low and Medium 3. Medium Effort (Hurdles, somewhat difficult, >6 months) 4. Between Medium and High 5. High Effort (Complex, lots of people, >1 yr) <p><u>User Modifiable</u></p>
<u>Weighted results</u>				

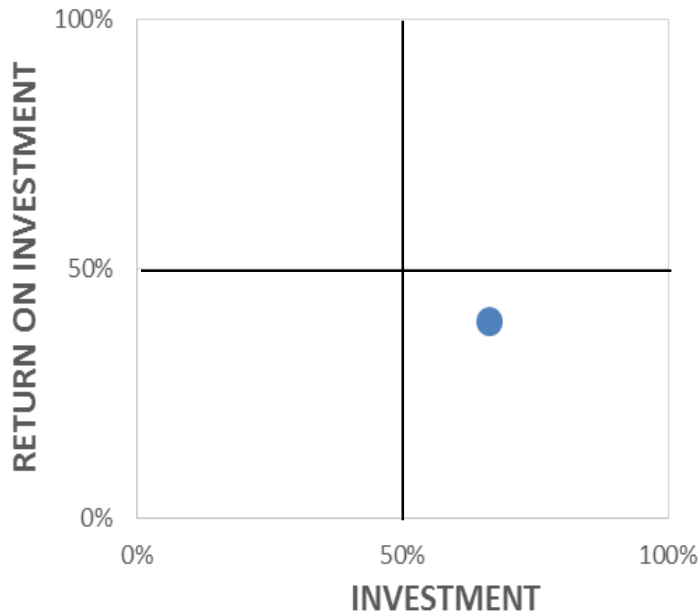


Additional Examples in Product

Torque Witness by Inspection Personnel

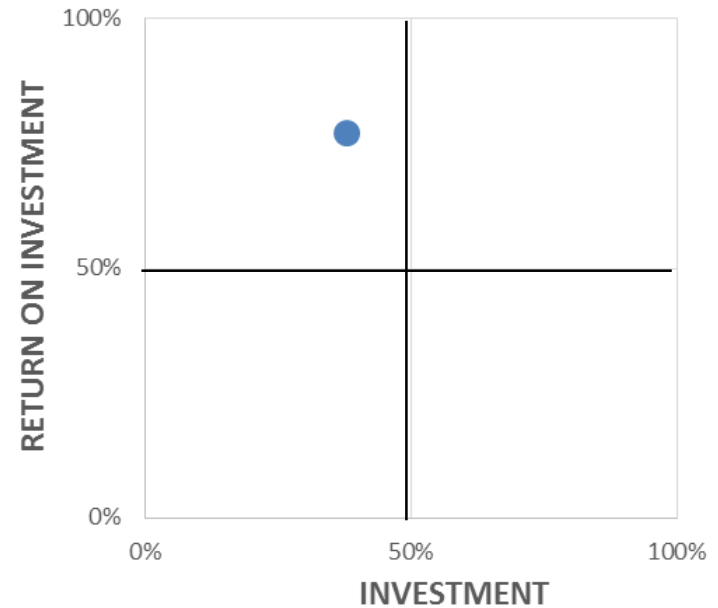
Test to flight (class 2) electrical mates

Forget It



Evaluating whether or not to eliminate Inspection witness of "Torque" operations

Just Do It

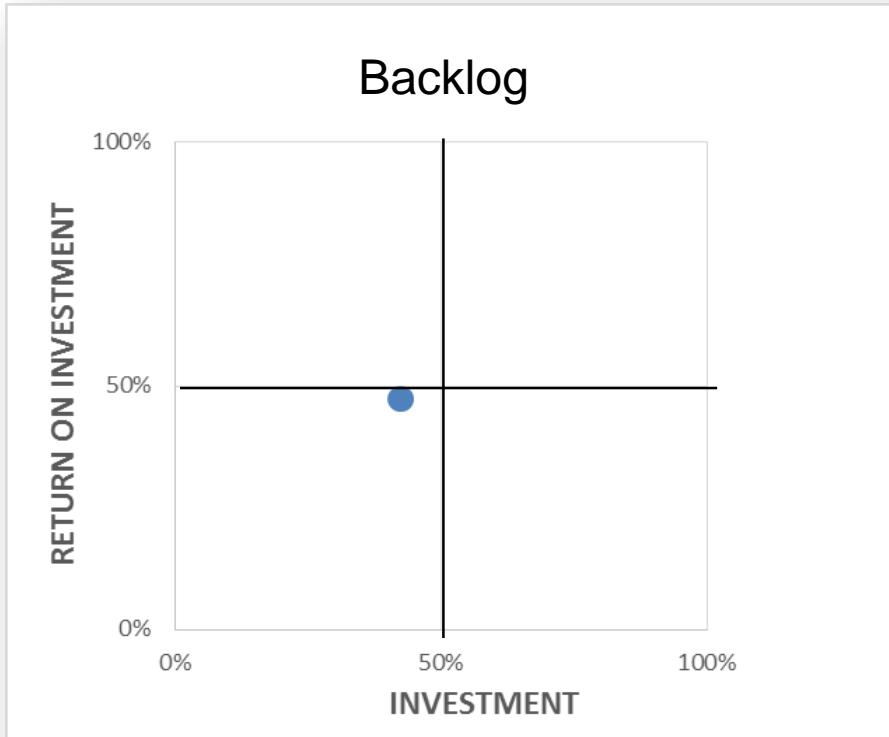


Elimination of a secondary inspection (by QA) for test to flight connector mates

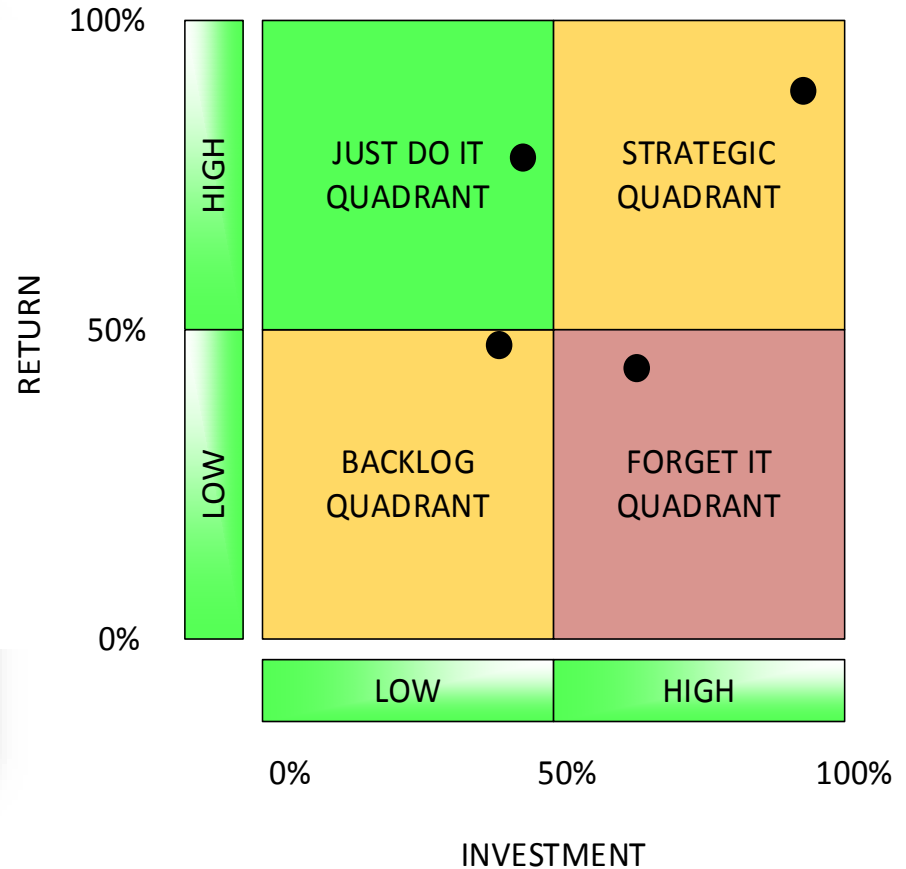


Additional Examples in Product

Receiving Inspection of subcontracted products (QSI-1002)



Examples of Each Potential Outcome



Evaluating reduction in duplicative inspection efforts upon receipt for items that are Final Source Inspected



Target Audience and Intended Product Use

- Target Audience
 - *Quality organizations looking for efficiencies*
 - *Manufacturing organizations pursuing new technology*
 - *Stakeholders seeking ways to reduce non-value added costs*
- How Used
 - *Best applied early in change evaluation decision*
 - *Useful when many trades are possible*
 - Provides best indication of tradeoffs resulting from a proposed process change



Quality Deployment Team Membership

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