

Air Force Materiel Command

ASIP PANEL SESSION

USAF NDI Reliability Improvements

Session Chair

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U.S. AIR FORCE

Integrity - Service - Excellence



Panel Members

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Inspection Reliability



POD

Probability of Detection

- Measures ability of the inspection system to detect cracks
- Assumes inspection is accomplished
- Function of:
 - Instrumentation & probe
 - Calibration
 - T.O. procedures
 - Structural location
 - Etc.

POI

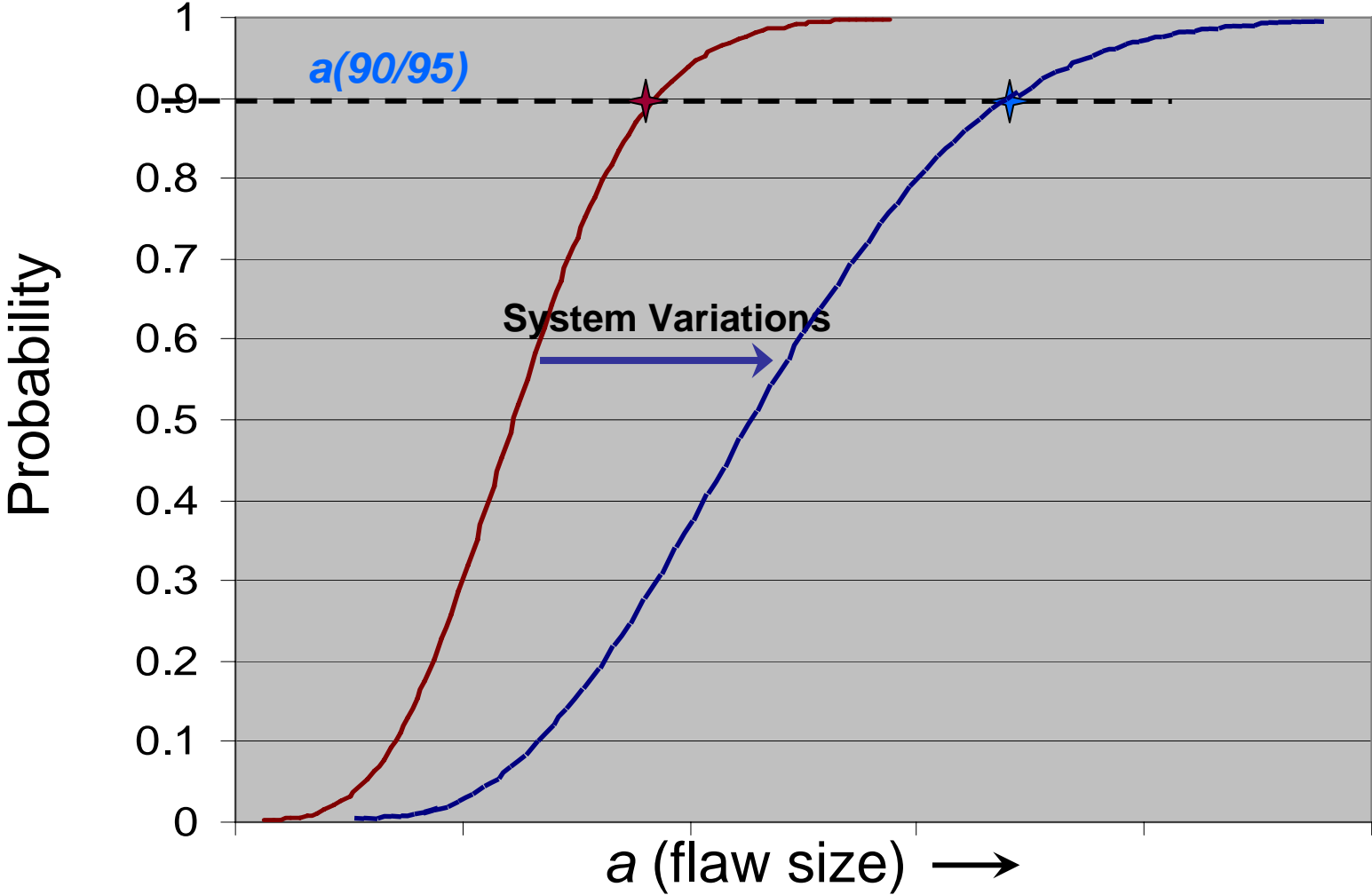
Probability of Inspection

- Measures probability inspection is accomplished per validated process/procedures
- Associated with choices or decisions (discrete events) that influence the inspection process
- Examples:
 - Large vs. small area inspections
 - Inspector fatigue influences
 - Correct inspection locations
 - Surface prep
 - Record keeping

Capability is a function of POD and POI



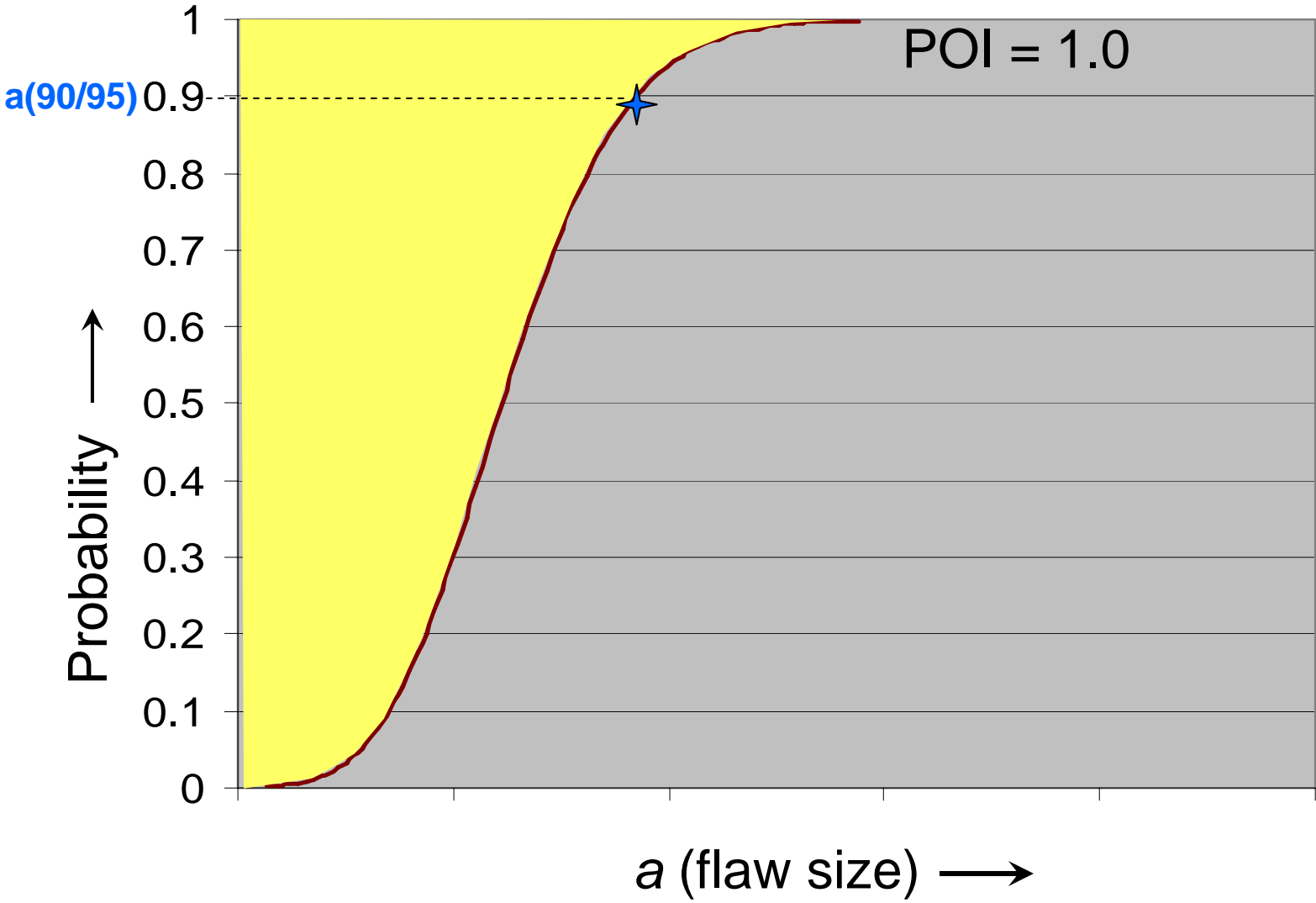
$POD = a(90/95) = Capability$



Measure of System Performance

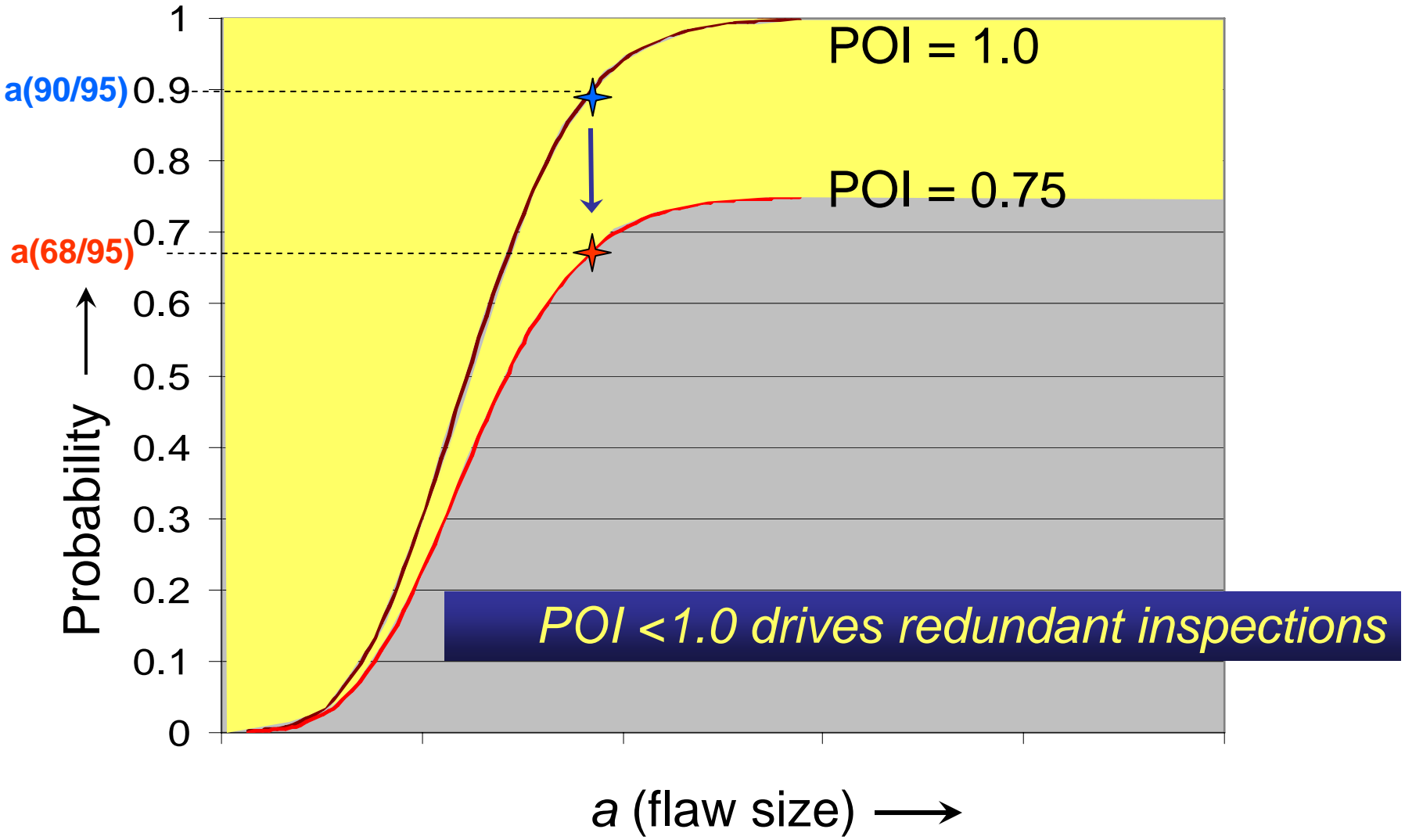


$$a(NDI) = a(90/95) \times POI = \text{Reliability}$$





$$a(NDI) = a(90/95) \times POI = \text{Reliability}$$





AFMC NDI Summit Outcomes

Addressing POD and POI



- Enforce policy and establish guidance
 - **Baseline safety-of-flight (S-o-F) structure NDI requirement**..... In Progress
 - **Establish NDI capability baseline & best practices**..... In Progress
 - Conduct NDI Benchmarking..... In Progress
 - Implement improved NDI analyses for decision making
 - Create NDI guidance to complement MIL-STD-1530C
- Establish effective organization
 - Improve NDI organizational structure In Progress
 - Conduct NDI systems analysis..... In Progress
 - Respond to recommendations from AFIA Eagle Look Study
- Train and educate stakeholders
 - Enhance awareness among program & Mx personnel In Progress
 - Conduct ALC NDI proficiency testing
- Ensure required inspection capability exists
 - Review and update NDI tech data & data systems..... In Progress
 - Ensure availability of required equipment



Questions to Address



- Can we continue to rely on inspections to maintain safety-of-flight structures where cracking exists?
- What is being done, near term, to improve reliability?
- How do we improve POI and reduce human factors variance?
- How can we do a better job estimating inspection capability?
- How do we motivate our inspection force to achieve excellence.

IDENTIFY and IMPLEMENT SOLUTIONS



Moving in the Right Direction



Baselining Eddy Current Standard Practices

TO-33B-1-2



Problem:

Significant variability exists in eddy current inspection procedures across USAF resulting in inconsistent capability from system-to-system.

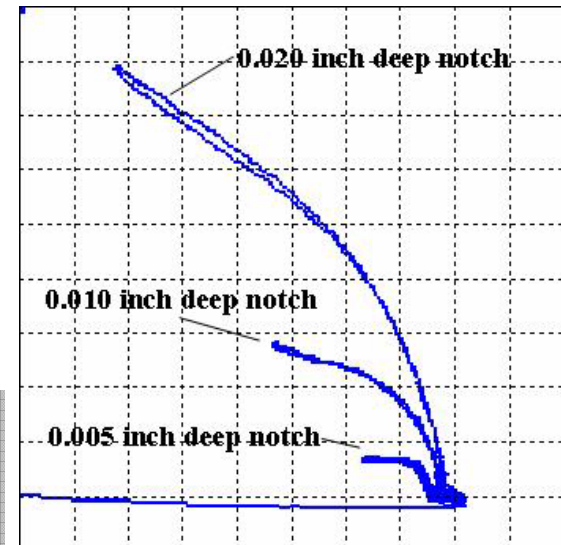
Approach:

- Published standardized eddy current inspection procedures (set-up and calibration) USAF wide (TO-33B-1-2).
- Baselining inspection capability for standard practices at the ALC's

Impact

- Establishes standard practice throughout USAF
- Reduces cost and time for tech data updates
- Establishes common procedures to develop baseline POD assumptions

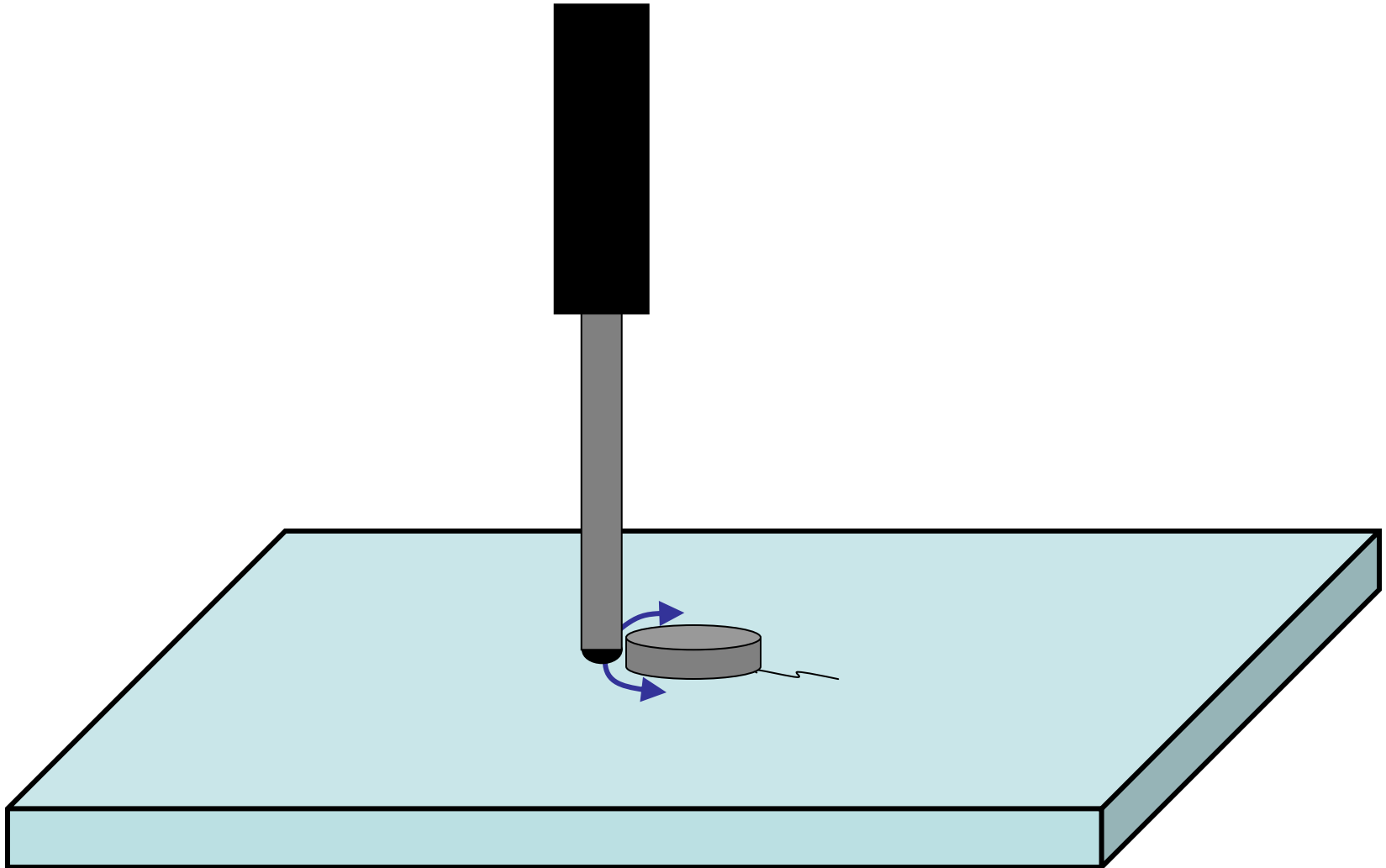
***Establishing a Capability
Baseline***





Reducing Inspection Variability

Example: EC Inspection Around Fasteners





Reducing Inspection Variability

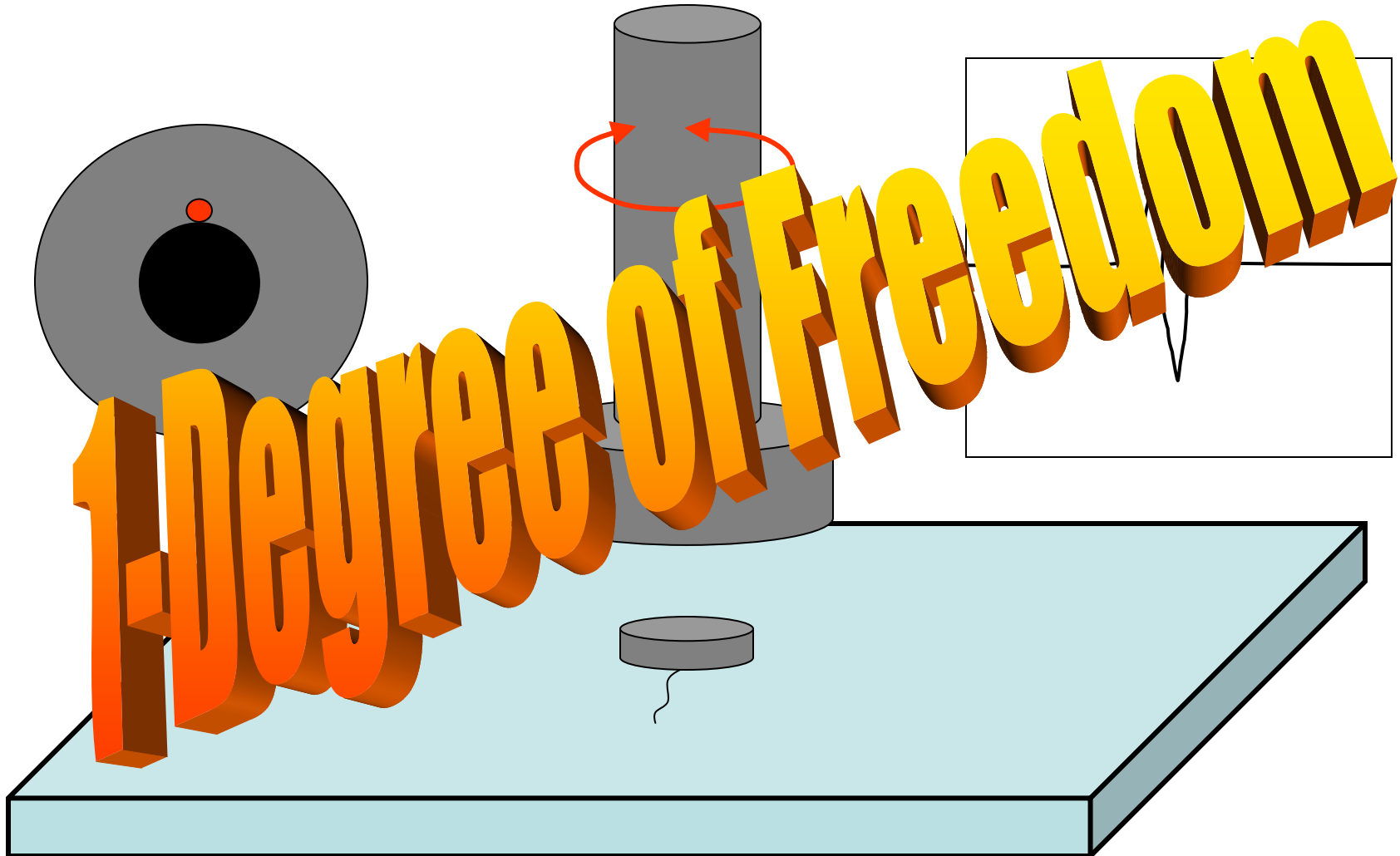
Example: EC Inspection Around Fasteners





Reducing Inspection Variability

Example: EC Inspection Around Fasteners





Improving Eddy Current Probe Designs *A Transformation*



Extended field
compliant surface
probes



Conformal/compliant
Radius Coils



Reduced Variability + Improved Coverage
= Improved POD and POI