



U.S. Army Research, Development and Engineering Command



**Measurement System Evaluation (MSE) and
Process Capability Control and Improvement (PCCI)
Feedback Analysis and Path Forward**

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Why the New MSE Clause?



- **Previous AIE Clause Deployment:**

- **Variability:**

- Three overlapping clauses used.
- Outdated Data Item Descriptions (DIDs).
- Multiple requirements spread over various specifications, for both commercial and DoD.

- **Waste:**

- Lack of requirements in one place leads to waste. Labor and energy needed to connect the dots.
- Affects first pass yield of submissions.
- Can lead to Government and contractor miscommunication.

- **Current MSE Vision:**

- The MSE clause, along with its corresponding CDRL, DID, and comprehensive review guide consolidates all AIE requirements into a single location.
- Reduced difficulty with identifying any and all AIE/AAIE requirements in specifications, contracts, drawings, etc...
- Clause is longer, but clearer.
- Very few “new” requirements.
- Clause requirements may appear to be “new” due to lack of previous requirement consolidation.



Review
Guides
Here!!

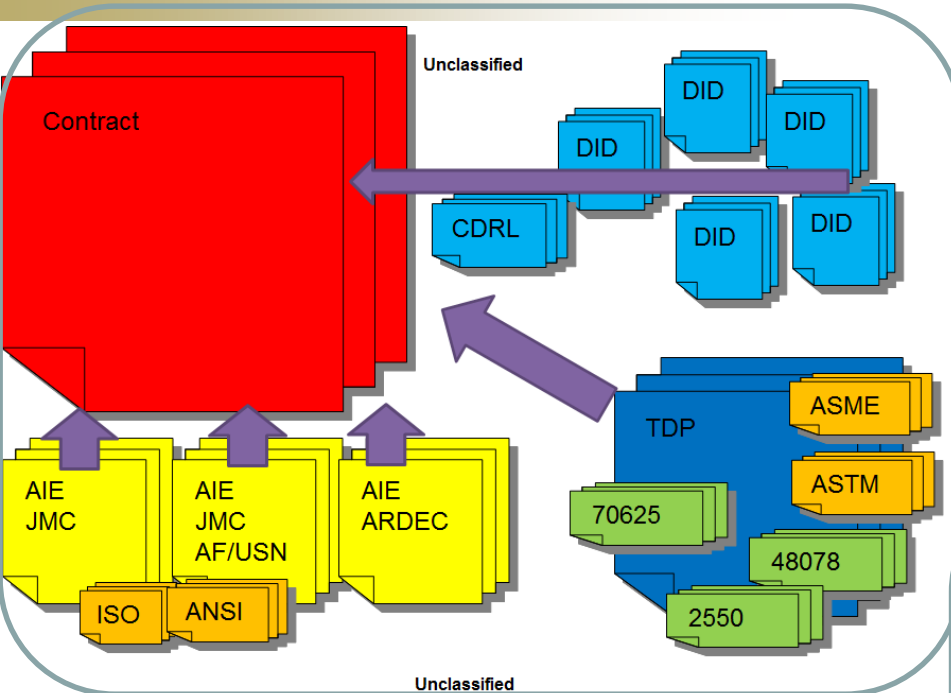
<http://www.ardec.army.mil/organizations/QESA/>

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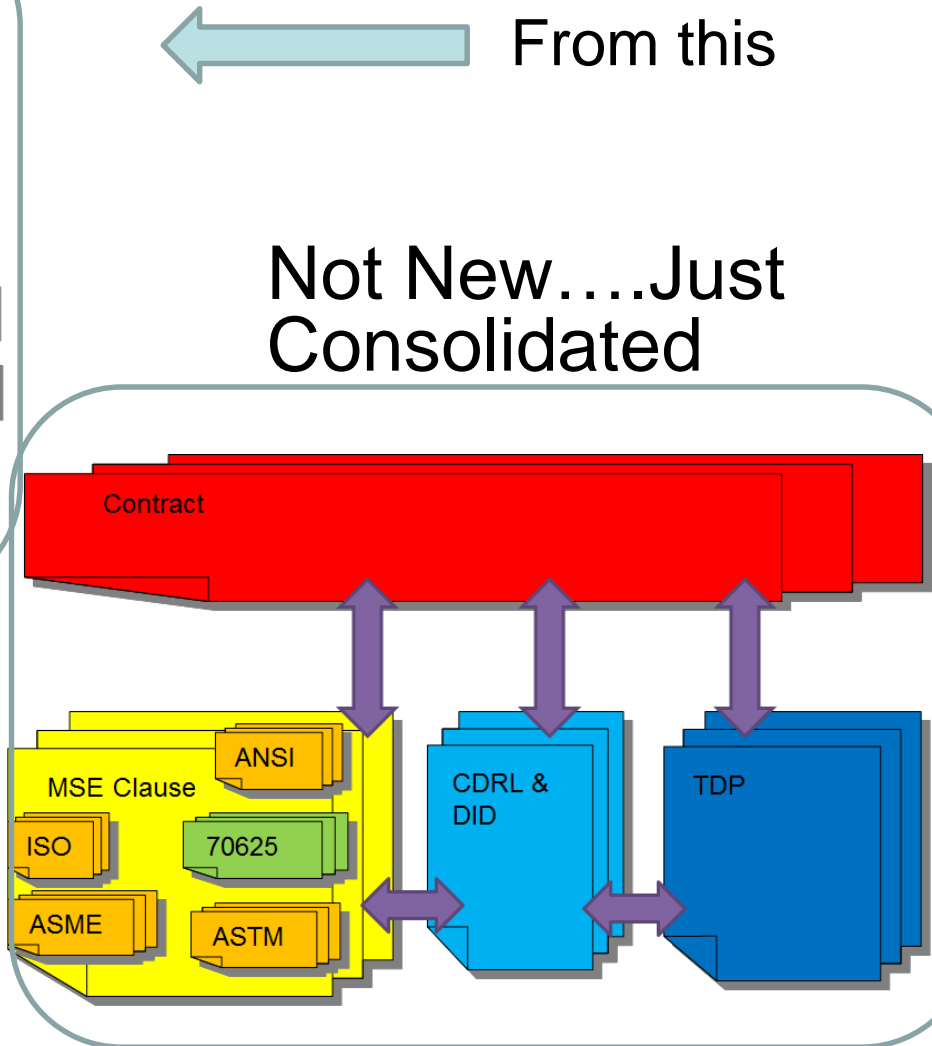
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Old vs. New MSE Process



To this



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Industry Feedback Themes with Government Response:

- Requirement flow down to sub-contractors?
 - Whoever is performing acceptance inspections, prime contractor or subcontractor, AIE is required on applicable characteristics.
- How Will USG tailor the Clause?
 - Clause will be tailored to program needs, risk areas, history, or Warfighter urgency
 - USG will identify any Measurement Systems Analysis (MSA), if any, that is required
 - USG will identify any additional requirements. If none are identified, none are required.
 - USG will identify reliability and confidence level for AAIE prove out.
 - USG will specify submission requirements for minor characteristics.
 - USG will identify GFM/ Navy Special Interface Gages (NSIG)
- Any Commercial exceptions?
 - No. Ensuring proper commercial equipment is selected with proper documentation is required, but due to the availability of documentation, should not be a difficult task.
- How to treat Legacy AIE?
 - Legacy AIE or legacy products are not exempt from MSE clause requirements. Previously approved AIE can be submitted to the USG for rollover consideration.

- Visual Standards?
 - The USG maintains that visual standard submission is required to ensure a shared and complete understanding of accept/reject criteria.
- NDT Certification Requirements?
 - Yes, operators are required to maintain proper level of training and certification.
- Submittal Review Time?
 - The government will do all that is necessary to ensure timeframes specified within the contract are adhered to. However it has proven difficult to provide a thorough initial review of an AIE package that is immature requiring multiple iterations of submittal.
- Government Right to Revoke?
 - USG has always had this right. However, if contractor meets contractual acceptance criteria requirements, risk of rejection is minimal.
- Is a Normal Production Environment demonstration of Robust AIE?
 - Not quite. Contractor should maintain awareness of how environmental considerations affect AIE. USG may require additional information to ensure that AIE is robust to environmental stimuli.
 - Example: Can a precision scale operate in close proximity to heavy machinery without vibration dampening or in a lab without humidity control?

Why the new PCCI clause?



- Improvement to the Statistical Process Control (SPC) Clause
- Provides for alternate acceptance for difficult-to-inspect characteristics.
- Focus on controlling the most important characteristics know as Characteristics for Process Control (CFPCs)
 - Quality, like everything, is a resource. If the resources necessary to implement the clause outweigh the benefit derived, PCCI might not be appropriate
 - Manage the process, not the measurement
- Compliments both ISO 9001 and MIL-STD-1916
 - The Government seeks to buy conforming product produced with capable processes
 - LAT sampling is merely detection. Emphasis of PCCI is on prevention.
 - “Sampling inspection by itself is an inefficient industrial practice for demonstrating conformance to the requirements of a contract and its technical data package”

Clause took 4 years to develop through the Single Manager for Conventional Ammunition (SMCA) with extensive collaboration from all services and industry partners.

- PCCI vs. SPC?
 - SPC is only one of many methods for process control; the PCCI clause allows for use of any suitable/appropriate method(s) for the process in question.
 - The PCCI clause can help better lower the Non-Conforming Material rate in support of the Critical Characteristics Clause (CCC).
- How does this tie into existing quality systems?
 - The clause is designed to be complimentary. If a contractor's QMS includes PCCI elements, minimal effort should be required to demonstrate compliance.
- When will this clause be implemented?
 - On New contracts to be awarded, or with a contract Mod for current contracts.
- What are the Characteristics For Process Control (CFPCs)?
 - CFPCs are features within a product, subassembly, part and process whose variation from nominal (i.e., target value) significantly impacts safety, performance in terms of customer's requirements, or final cost of a product. Special controls should be applied where the cost of variation justifies the cost of control.
 - Depending on the clause option selected by the USG to best meet its acquisition needs, the CFPCs are generated either by the government, contractor, or joint. If the USG identifies the CFPCs, the list will likely be found in paragraph (g). *(Standardization of exact CFPC location within the contract is not yet finalized)*
 - The clause requirements only apply to CFPCs and NOT ALL TDP REQUIREMENTS.
 - If a CFPC resides at a supplier, the associated requirements should be flowed down.

- Can the USG withhold acceptance of good product based on poor process control?
 - The USG will NOT withhold product acceptance simply because a process is observed to be out of control. The USG can potentially withhold acceptance based on noncompliance with the contractor generated Process Control Plan (PCP).
 - Again while the intent of this clause is to move towards process capability based acceptance, this clause is NOT written to reject product based solely on Cpk values.
- PCCI vs MIL-STD-1916?
 - The PCCI clause is designed to be integrated with MIL-STD-1916.
 - If a contractor is following MIL-STD-1916 provisions for prevention and process control, the task for translating and documenting what is already being done to meet PCCI requirements should not be a difficult task.
 - The Process Control Plan (PCP) forms the basis for the alternative method of acceptance option permitted within MIL-STD-1916.

- Common Theme: Extensive resources will be needed for Process Capability Studies, Process Failure Modes and Effects Analysis, Effectiveness calculations, corrective action reporting, MSE/MSA Studies, flow Charts, etc...
 - Only required for CFPCs. Therefore resources are appropriately placed on those items identified that will benefit most from process control.
- “To realize a benefit of the cost implementing PCCI, data must be reviewed at frequent intervals during each lot.”
 - Agreed; part of the intent of this clause is to ensure that the Contractors are continuously monitoring their processes throughout production, not after the entire lot has been built.
- How are product costs handled when the USG selects the CFPCs?
 - If the USG identifies the CFPC's that must be controlled, than the contractor will need to evaluate all processes that impact the CFPC's and price their bids accordingly.

Next Steps



- Continue to train DoD and industrial base workforce to ensure consistency and uniformity in clause tailoring and deployment.
 - USG Organizational Champions identified
 - MSE: (ARDEC) Jennifer Aviles jennifer.p.aviles.civ@mail.mil
 - PCCI:
 - (ARDEC) Shin Chung shin.k.chung.civ@mail.mil
 - (JMC) Corey Hotle Corey.hotle.civ@mail.mil
 - In process of revamping training to include and clarify industry concerns
 - Reinforce guidance at pre-award / post-award
- Incorporate lessons learned to ensure successful deployment of future clauses or future clause revisions.
- Nurture USG partnership with ammunition producers to ensure mutually beneficial successes.



Questions??



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- MSA: capable Stable repeatable reproducible
linearity bias
- AAIE Proveout: Accuracy Repeatability reliability
failsafe