DCMA NSEO MANUFACTURING PROCESS REVIEW (MPR) CHECKLIST #01

**METALLURGICAL/CHEMICAL LABORATORY TESTING**

**Including Alloy Identity and Destructive Testing Mechanical Metallography**

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| **SUPPLIER & CAGE:** |  |
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| **LOCATION:** |  |
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| **PROCESS REVIEWED:** |  |

**Program Type:**

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|  | Level I/SUSBAFE (LI/SS) |  | Navy Propulsion Program (NPP) |  | Deep Submergence Systems/Scope of Certification Program (DSS-SOC) |
|  | Nuclear Plant Material (NPM) |  | Naval Nuclear Propulsion Program (NNPP) |  | Aircraft Launch & Recovery Equipment (ALRE) |
|  | Fly By Wire Ships Control Systems (FBWSCS) |  | Ships Critical Safety Items (SCSIs) |  | Other: |

**Contractual Requirement(s) for this Process:**

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**Supplier Procedure Number(s), Title(s) & Revision Level(s)/Date(s):**

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| **Process Reviewed By:** |  |
|  |  |
| **Date(s) of Review:** |  |
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**Process Concerns and Guidance:**

* Determination of appropriate test methodology/criteria
* Samples taken in the wrong orientation or from the wrong location may not properly reveal the characteristic being examined, potentially allowing for acceptance of deficient material.
* Careful and proper sample preparation, particularly when destructively evaluating defects is necessary to assure the sample and defects are evaluated properly.
* Improper testing of material could result in inaccurate material certifications.
* A test specimen was taken from the wrong orientation and location resulting in a specimen which did not have the worst case grain growth properties.
* The wrong method for determining Yield Strength was used. Contractor used the Upper Yield Point vs. the 2% offset method that was called out by specification, providing a false and higher indication of the actual Yield Strength.
* The wrong class of extensometer was being used which affected the accuracy of the stress-strain diagram and the resulting calculated yield strength of the material.
* An incorrect orientation of a fastener tension test wedge (angle) resulted in the acceptance of product when the product represented by the Test Specimen should have been rejected.
* An improperly machined test specimen diameter resulted in an invalid test and indeterminate product quality on delivered product.
* Chemical, mechanical (tensile), and hardness testing has been performed on an insufficient number of test specimens.
* Chemical analysis must be taken at the appropriate production point – ladle vs. heat vs. product analysis – and by the correct analysis method (e.g. quantitative analysis).

**Additional Oversight Checklists**

* Addendums to this MPR checklist are available to use for a more in-depth process review. If used, the completed Addendum(s) are to be uploaded to the SAP Database in PDREP with the base checklist.

* + 01 MPR-MPS - Addendum 1 – Chemical Analysis
  + 01 MPR-MPS - Addendum 2 – Tension Testing
  + 01 MPR-MPS - Addendum 3 – Charpy V-Notch
  + 01 MPR-MPS - Addendum 4 – Drop Weight Testing

**A**. **MANPOWER:**

1. Are the personnel involved with the metallurgical and chemical laboratory testing of the appropriate skill/experience level and/or properly trained/certified to correctly perform testing and meet requirements? ***What are the requirements?***

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1. Record all operations observed (include type and specification, where applicable) and the corresponding operators’ names. Are any personnel certifications expired and are they still working in the process?

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1. Are training records available (review sample), and are they accurate and complete?

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1. Are the credentials of the training/certification official in accordance with specification requirements? ***What are the requirements?***

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1. Is there a system in place for remedial training when errors occur? Is the system documented, and are there records of remedial training available, if applicable?

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**B. MATERIALS**:

1. Review a sample of completely machined test specimens to specification (e.g. ASTM A-370 for ferrous material). Record number of samples reviewed, type, and if they meet the applicable specification. (NAV01-B5)

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1. Does the material(s) used in producing the item(s) comply with contract/specification and/or supplier-imposed technical requirements? Is the product adequately identified on travelers/routers to provide clear material traceability throughout processing? ***What were the materials reviewed?***

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1. Are samples prepared utilizing the proper procedure? Are test samples of the proper size orientation and temperature? (NAV01-A13)

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1. Are materials/test specimens identified/traceable back to applicable heat and/or lot? (NAV01-A13)

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1. Was the material's integrity compromised by further process and/or practices? ***If so, how?***

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1. Are there controls to ensure conforming material is consistently used in the process? Describe.

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1. Is all non-conforming material segregated, controlled, traceable, and do procedures exist for disposition of the non-conforming material?

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**C. MACHINERY**:

1. Is **manufacturing equipment** (tooling, fixtures, jigs, and measuring/test equipment) adequate to produce/assess conforming supplies in compliance with contractual specifications and drawing(s)? *What Items were sampled and were they part of the supplier’s calibration program and within the calibration/check cycle?*

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1. Is **inspection and testing equipment** of the required adequacy, accuracy and precision (type & condition) to assure supplies produced comply with specifications and drawings? *What Items were sampled and were they part of the supplier’s calibration program and within the calibration/check cycle?* (NAV01-A11/B10)

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1. Does equipment (to include fixtures, jigs, and software [ATE]), requiring qualification or certification approval, have contractual approval for use? *For software, was the correct software in use?* ***What program(s) and revision level(s)/date(s) was in use?***

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1. Is Government owned equipment adequately protected/maintained in accordance with a documented process?

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**D**. **METHODS**:

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| 1. Identify all testing performed at the facility being reviewed, which processes were witnessed, and which were verified through Objective Quality Evidence (OQE). (NAV01-A1A/B) | **Testing performed at facility** | **Witnessed** | **Verified through OQE** |
| **Chemical:** |  |  |  |
| **Tensile:** |  |  |  |
| **Charpy V Notch:** |  |  |  |
| **Dynamic Tear:** |  |  |  |
| **Weldability:** |  |  |  |
| **Wedge:** |  |  |  |
| **Bend:** |  |  |  |
| **Hardness:** |  |  |  |
| **Alloy ID:** |  |  |  |
| **Other: (Specify)** |  |  |  |

1. Do the supplier's procedures contain requirements for the method and location of obtaining test specimens and identifying the specific number of test specimens required for each type of test? Do these requirements meet applicable material specifications? (NAV01-A2/3A/B)

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1. Review the method for identifying test specimens to heat, melt, and lot, as applicable, and the system for maintaining this identity through the laboratory process, including any machining of the specimen. Is the system adequate for maintaining test specimen identification and traceability? (NAV01-A4A/B)

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1. Are all applicable work instructions, test procedures, travelers, etc. adequate, clear, of the proper revision, readily available, and in use by personnel? ***What instructions (identifying number) were reviewed?*** (NAV01-B8)

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1. Are the tests performed to specific written procedures? ***List procedures reviewed*** (NAV01-A7)

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1. Do the procedures meet contract/applicable requirements, and do they contain specific parameters and correct accept/reject criteria? (NAV01-A/9)

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1. What kind of over-checks does the supplier use to assure tests are being carried out correctly?

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1. Are adequate numbers of checks made on each part to determine alloy identity?

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1. Review the supplier's policy for retests as a result of test failure and ensure that it meets applicable specification requirements. Explain if unsatisfactory. (NAV01-A6)

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1. Are changes to methods (instructions) controlled and translated adequately and timely to affected personnel?

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1. Is there supplier data available for analysis that can substantiate the effectiveness of this process? If so, what does the data indicate about the process?

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1. If applicable, has the supplier performed audits and qualified all sub-contractors for metallurgical and chemical testing including destructive testing and mechanical metallography?

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1. Review a sample of test reports to ensure that data recorded satisfies applicable specification requirements. Document the reports that were reviewed. (NAV01-B14)

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**E.** **ENVIRONMENT**:

1. Is the process conducted under controlled environmental conditions (clean room, humidity/temperature, etc.) as required by contractual and/or supplier-imposed technical requirements? ***What are the environmental conditions and are they monitored (charts, gages, etc., within calibration)?***

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1. Does the supplier observe ESD practices, if applicable?

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1. Is safety equipment available and in use, if needed? ***What are the safety requirements for this process?***

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1. If applicable (charpy and dynamic tear), is the test specimen at the correct temperature at the time of the test? (NAV01-A12)

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**F. PRODUCT EXAMINATION:**

***The QAR must perform a product examination in order to verify the output of the process being reviewed and document the results below.***

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| Date(s) Conducted: |  |
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| Product Examination Performed By: |  |
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| Contract Number(s): |  |
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| Part Number(s)/Serial number(s): |  |
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| Part Nomenclature(s): |  |
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| Supplier Personnel Contacted and Titles: |  |
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| Drawing Number & Revision: |  |
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| Lot Size and Sample Size: |  |

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| Characteristics Examined: | # Observations |
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1. Identify the inspection methods (W, I, T, V) used to verify conformance with procedures and standards:

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| **W** |  |  | **I** |  |  | **T** |  |  | **V** |  |

**PE Comments/Concerns**

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| **Overall MPR Results:** | **SATISFACTORY** |  | **UNSATISFACTORY** |  |

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| **Corrective Action Generated?** | **No** |  |  | **Yes** |  |  | **CAR#** |  |

FOLLOW-UP ACTION REQUIRED?

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**SUMMARY/NOTES/COMMENTS/CONCERNS**:

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