DCMA NSEO MANUFACTURING PROCESS REVIEW (MPR) CHECKLIST #30

BALANCING OF PROPELLERS

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| **SUPPLIER & CAGE:**  |  |
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| **LOCATION:** |  |
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**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:**  |  |
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| **Date(s) of Review:** |  |
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**Process Concerns and Guidance:**

* The contractor does not have an effective system in place to ensure proper calibration of balancing equipment.
* Procedures defining the proper use of the balance equipment
* Contractor personnel do not follow proper techniques to detect, locate and measure unbalance of marine propellers.
* Government source inspection shall in no way replace contractor inspection or otherwise relieve the contractor of their responsibility to furnish acceptable products.
* Contractors recall system does not adequately control the calibration of balance equipment.
* Test results and accompanying documentation is incorrect, incomplete or missing.
* Operations not performed in the proper or specified sequence
* Improper handling equipment can damage machined surfaces
* Operations not being performed from the latest or specified drawing revision or work instructions

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

1. Have personnel performing Balance inspection been qualified on the basis of appropriate education, skill/experience level and/or have they been properly trained/certified to perform balance inspection as required?  ***What are the requirements?***

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1. Are training records available (review sample), current, properly documented and are they accurate and complete with proper personnel certifications?

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1. Record all processing operations observed (include type and specification, where applicable) and the corresponding operators’ names. What type of training/certification is required? Is anyone’s certification expired and are they still working in the process?

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1. Verify QA/QC proficiency in balance inspection/test performance. Record names and tests or measurements witnessed, and equipment used.

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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?

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**B. MATERIALS**:

1. Are items that require balance inspection properly identified/marked, when required by specifications, after proper values have been obtained?

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

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1. Was the material's integrity compromised by further processes and/or practices?

***If so, how?***

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**C. MACHINERY**:

1. Is the Balancing inspection and test equipment used by personnel adequate to examine supplies in compliance with contractual specifications and drawing(s)? Is this equipment a part of the manufacturer’s calibration program? ***What items of equipment were sampled and were they within the calibration/check cycle?***

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1. Are calibrated tools used in the inspection and test process current, adequate and traceable to certifications*?*

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1. Is **manufacturing equipment** (tooling, fixtures, jigs, etc.) 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. 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**:

1. Are work instructions, test procedures, travelers, etc. available to the personnel performing the tasks with clear acceptance criteria, and are they following these documents?

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1. Are balance inspection and testing methodologies current and adequate to produce supplies conforming to contract requirements?

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1. Are balance work instructions, testing and inspection and testing procedures, travelers, etc. being used current, adequate, clear, concise and up to date (latest revision) to allow only contractually conforming supplies to be delivered to the Government? ***What documents (identifying number & rev) were reviewed?***

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1. Does the supplier’s procedures, work instructions or travelers state inspection frequencies, inspection methods and accept/reject criteria and is it clearly documented and understood by personnel?

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1. Has the propeller been examined for defects in materials and workmanship?

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1. Are the balance results documented satisfactorily and traceable to the actual propeller? Are records in ink utilizing "line thru", initial and date procedures? Are balance records retained as required by specifications or procurement documents?

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1. Is material/product, which has been through the balance process, been positively controlled, traceable and identified to indicate its inspection status (e.g. individual operation sign-off/inspection stamping/accepted or rejected?

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1. Is the product adequately identified with the proper documentation or certifications to provide clear inspection and test status throughout the products’ processing?

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1. Particular attention needs to be placed on the following important balance set-up, inspection and test parameters. **Check and Verify**:
	1. Correct balance tolerance (**UT**) obtained from drawing?

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* 1. Balance machine table is level and **TIR** is minimized?

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* 1. Propeller is shimmed to a tight fit on the balance ring?

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* 1. Forward and aft **TIR** is within tolerance (**UT/73W**)?

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* 1. Unbalance tolerance correctly calculated (**0.75(UT)**)?

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* 1. Measured angle of unbalance for run #1 recorded as **Y1**?

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* 1. Measured unbalance from run #1 recorded as **U1**

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* 1. Propeller rotated **180°**?

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* 1. Measured angle of unbalance for run #2 recorded as **Y2**

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* 1. Measured unbalance from run #2 recorded as **U2**

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* 1. Sensitivity weight calculated as **0.1(UT)/r** and recorded as **S**?

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* 1. Sensitivity weight angle of unbalance recorded as **ɵ**?

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* 1. Sensitivity inspection (**Y2 - ɵ**) within tolerance (**20°**)?

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* 1. Sensitivity expected unbalance calculated (**U2 + 0.1(UT)**) and recorded as **E**?

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* 1. Difference between expected sensitivity unbalance and actual unbalance (**E – S**) within tolerance (**0.05(UT)**)?

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1. Is there supplier data available for analysis that can substantiate the effectiveness of the balance inspection and testing process? ***If so, what data was reviewed, and what does it indicate?***

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1. Is adequate care and protection taken to prevent damage during manufacturing, inspection and testing, and transport of shafts within the facility?

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

1. Is the balance process conducted under controlled environmental conditions 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. Is the area where the balancing is being performed organized with the proper tools, gauges or other necessary equipment and is it uncluttered, clean and free from dirt and debris?

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1. Has sufficient work area been allocated to the balance process being performed?

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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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