DCMA NSEO MANUFACTURING PROCESS REVIEW (MPR) CHECKLIST #08

PAINTING AND SURFACE PREPARATION

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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:**

* Paint coatings are primarily applied for corrosion protection. Failure of the coating will lead to corrosion of the part, assembly, or system. This may affect operational effectiveness and readiness.
* Surfaces must be clean and properly prepared for adequate coating adhesion and coverage. Improper cleaning and surface preparation techniques can result in poorly adherent coatings of inadequate or non-uniform thickness.
* Thick coating passes tend to be less adherent than thinner passes
* The shelf-life of some paint and surface prep products can be limited; the use of out-dated products will likely cause premature failure
* Coating material containers not labeled with expiration dates
* Time of component mixing not recorded to track induction time and pot life
* Viscosity cups not calibrated
* Oven control (Uniformity and System Accuracy Checks) not performed as required
* Thickness testing equipment verification not performed as required
* Processing equipment maintenance inadequate
* Surfaces to be coated are touched with bare hands (oil from the hands will interfere with proper coating)
* Pitting and undesirable marks where rack hooks contact the parts
* Failure to provide uniform coating thickness and/or complete coverage
* Adhesion testing not performed in accordance with specification requirements

***NOTE: The coating manufacturer’s Technical Data Sheets are required to establish proper coating material preparation, application, and storage parameters. These parameters are requirements since they were used in product qualification.***

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

1. Are the personnel performing the preparation, painting, and inspection functions of the appropriate skill/experience level and/or properly trained/certified to produce conforming product? ***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. Is there a system in place for remedial training when errors occur?

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**B. MATERIALS**:

1. Are materials controlled and traceable throughout the process if required?

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1. Are the coating materials that are used listed on the applicable Qualified Products List (QPL), if applicable? Record the specific products used and QPL numbers. (The QPL per specification can be found in the Qualified Products Database (QPD) on the Assist website)

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1. Do the coating materials comply with contract/specification and/or supplier-imposed technical requirements, and are they traceable/identified, if required? ***What were the materials reviewed?***

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

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1. Is the shelf life of painting/coating materials monitored and validated before use? How? (NAV08-10)

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1. Are material certifications reviewedfor chemistry and volatile organic compounds (VOCs), when required? Are paints and other supplies **tested** for VOCs, when required? (NAV08-9/A)

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1. Are parts reviewed for damage, corrosion, sand, dust, grease, etc. prior to painting? (NAV08-4)

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1. Are surfaces of parts, not requiring paint, adequately masked prior to painting? (NAV08-5)

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**C. MACHINERY**:

1. Are exhaust filters relatively clean to allow for positive air flow and overspray removal? Is there a schedule for filter changes, or how is the determination made to change the exhaust filters?

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1. Does equipment, requiring qualification or certification approval, have contractual approval for use?

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1. Identify the thickness measuring equipment available at this facility. Is all thickness testing equipment calibrated and within periodicity?

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1. Are standards, traceable to NIST, available to verify the accuracy of the thickness testing equipment?

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1. Do test specimens, when used; meet the painting specification’s requirements (material, dimensions, etc.) for the tests being performed?

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1. Is there a written procedure for cleaning the spray gun? Is spray equipment clean and well-maintained? Describe the cleaning method.

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1. Is the air supply for the spray gun checked for moisture, oil, and hydrocarbons? How, and how often?

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1. Is the viscosity cup clean, calibrated, and within periodicity?

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1. Are clocks (used for pot life control) and timers (used for viscosity measurements) available in the coating area?

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1. Are wiping and cleaning cloths used for parts checked for grease, oil, etc?

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1. Is there a certified bake oven available? If so, does it meet the following requirements:
   1. Temperature uniformity surveys (TUS) performed quarterly on processing ovens. (frequency may be reduced to twice/year after four consecutive successful surveys)
   2. Accuracy meets required tolerances in temperature ranges used. (*What are the maximum and minimum ranges required for the facility?*)
   3. System accuracy tests (SAT) performed twice/month on temperature control and recording systems (frequency may be reduced to monthly if a preventative maintenance program is in effect)
   4. The oven chart recorder has a maximum resolution of 250F per inch of chart paper and a maximum chart recording increment of 10F.
   5. The chart recorder (circular and strip) speed verified annually, and it is accurate to within +/- 3 minutes per hour

***Note: Ovens must meet the temperature uniformity requirements of AMS 2750D for Furnace Class 5 (± 25⁰F), Instrumentation Type D, unless more stringent requirements are specified.***

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

1. Does the supplier have procedures for cleaning, surface preparation, and painting that meet applicable contract/drawing/specification requirements, are readily available to shop personnel, and cover all applicable processes performed? (NAV08-1/A/B/C)

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1. Do the procedures include and/or reference/meet the requirements of the paint manufacturer’s Technical Data Sheet instructions?

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1. Are the painting procedures/work instructions adequate and address the use of proper equipment, materials, test specimens/coupons when required, the preparation of the base material, pressure and flow settings for abrasive blasting when applicable, and masking methods when applicable?

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1. Are the procedures/work instructions adequate to control the coating material preparation to include proper component mix ratio, sequence of additions, proper mixing technique for the materials used (e.g. power mixer, paddle, shaker, etc.), and coating material viscosity testing after mixing? Do the procedures include material pot life control, when applicable, requiring recording of time mixed, induction time, and coating material disposal or job completion? (NAV08-3)

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1. If applicable, are procedures adequate to control required drying time prior to over-coating and baking temperature and duration?

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1. Are procedures adequate to control the inspection process and include sample size requirements and require inspection records be maintained? Is there a traveler or work process system for recording verifications/inspections performed? (NAV08-2)

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1. Is batch process data documented (paint lot numbers, intermediate Dry Film Thicknesses, bake charts, etc.) and traceable to finished parts? (NAV08-2A)

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1. Is material/product, which has been through the preparation, painting, or inspection process, positively controlled, traceable, and have the inspections/processes performed been documented adequately to provide a positive indication of the status of the material (e.g. individual inspected, operation sign-off, inspection stamped/initialed/signed accepted or rejected)?

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1. Is adequate care and protection taken to prevent damage during transport within the facility?

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1. Are parts adequately protected from contamination during and after processing?

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1. Are adhesion tests performed in accordance with specification requirements and using the proper sample size?

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

1. Is the area where the work is being performed uncluttered, clean, and free from dirt, debris, and airborne particulates?

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1. Is painting performed in an environmentally controlled area when required by specification? Are adequate controls in place for temperature, humidity, and sources of contamination? When humidity and temperature control is required, are the humidity and temperature measurement devices calibrated and within periodicity? (NAV08-6)

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1. Is the coating area enclosed or isolated?

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1. Does the spray booth have adequate exhaust?

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1. Are adequate cleaning facilities available and in use?

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1. Are flammable coating materials stored in flammable safety cabinets *(IAW NFPA Flammable Liquid Storage Code #30 and OSHA standard 1910.106 for class I, II and III liquids)*?

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1. Is the coating material storage area temperature-controlled to preserve material shelf-life?

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1. Is there adequate ventilation in the finishing area?

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1. Are respirators and safety glasses used when spray painting?

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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. If at all possible the QAR should witness performance of the process to verify competency of supplier personnel.***

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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: |  |

1. Are parts visually examined prior to painting for material defects, damage, corrosion, sand, dust, grease, etc.?

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1. Are surfaces of parts not requiring paint adequately masked prior to painting?

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1. Are pieces adequately cleaned and pretreated prior to the painting process? Describe.

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1. Is cleanliness maintained after cleaning and prior to painting? Are parts only handled with lint-free gloved hands?

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1. If applicable, after painting, is the baking temperature held within specification requirements? Does the baking duration meet specified requirements? Is load traceability to the recorder charts maintained?

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1. Are painted surfaces inspected per applicable procedure/specification (e.g. visual inspection for grit, streaks, sags, color verification, thickness, and adhesion)? Does the inspector complete the inspection record properly? (NAV08-7)

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1. Review and record a sample of Dry Film Thickness per the procedure/specification to verify compliance. (NAV08-8)

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1. Was the base material's integrity compromised by processing and/or practices? ***If so, how (e.g. improper cleaning, pretreatment, or baking; improper stripping; etc)?***

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| Additional PE 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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