DCMA NSEO MANUFACTURING PROCESS SURVEILLANCE (MPS) CHECKLIST #24

PLATING

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| **SUPPLIER & CAGE:** |  |
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| **LOCATION:** |  |
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| **Program Type:**   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | 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:**   |  | | --- | |  |   **Supplier Procedure Number(s), Title(s) & Revision Level(s)/Date(s):**   |  | | --- | |  |  |  |  |  | | --- | --- | --- | | Surveillance Performed By: |  | | |  |  | | | Date(s) of Surveillance: |  | | | Contract Number(s): | |  | |  | |  | | Part Number(s)/Serial number(s)/NSN: | |  | |  | |  | | Part Nomenclature(s): | |  | |  | |  | | Supplier Personnel Contacted and Titles: | |  | |  | |  | | Drawing Number & Revision: | |  | | | | |  |  |  |

**Process Concerns and Guidance:**

* Inadequate stress relief baking of hardened steel prior to plating can result in base material cracking during the plating process.
* Improper plating techniques can result in plating that does not adhere properly to the base metal or could cause hydrogen embrittlement of the base metal. This could lead to premature catastrophic failure of the part, which can potentially result in complete functional and/or structural failure of the component in which the part is installed.
* Improper or inadequate hydrogen embrittlement relief baking of hardened steel after plating can result in base material cracking.
* Baking some tool steels above 275F may reduce their hardness.
* Failure to maintain plating baths within established parameters will yield deposits with inconsistent properties that may not meet the finish requirements verified during periodic process control testing.
* Entrapment of some plating solutions in part seams can lead to base material attack and premature failure of the part.
* Inadequate corrosion protection can be caused by incomplete plating coverage and/or variation in plating quality and thickness.
* Process Control testing not being performed as required
* Lot Testing (especially for passivation and phosphating) not being performed as required
* Solution Control of processing baths inadequate
* Oven Control (Uniformity and Probe Checks) not performed as required
* Thickness testing equipment verification not performed as required
* Processing equipment maintenance inadequate
* Test failure, replacement testing and retesting not adequately defined and controlled (Process Control & Lot Testing)
* Platers have failed to provide uniform plating thickness and/or complete coverage.
* Non-adherent (peeling or flaking) plating
* Pitting and undesirable marks where rack hooks contact the parts
* Poorly controlled stripping resulting in significant base material attack
* Inadequate stripping and re-plating over old plating

**Additional Oversight Checklists**

* Addendums to this MPS checklist are available to use for a more in-depth process review. If used, the completed Addendum(s) are to be uploaded to the Surveillance Plan in PDREP.

* + 24 MPR-MPS - Addendum 1 – Black Oxide on Steel – MIL-DTL-13924D – Class1
  + 24 MPR-MPS – Addendum 2 – Black Oxide on Stainless – MIL-DTL-13924D-Class4
  + 24 MPR-MPS – Addendum 3 – Chromium Plating – MIL-DTL-23422F
  + 24 MPR-MPS – Addendum 4 – Salt Spray Testing – ASTM B117-09
  + 24 MPR-MPS – Addendum 5 – Ovens, Stress, and Hydrogen Embrittlement Relief – AMS 2750D
  + 24 MPR-MPS – Addendum 6 Teflon Coating – MIL-P-24074B – Type II
  + 24 MPR-MPS – Addendum 7 Zinc Phosphate – MIL-DTL-16232G – Type Z – Class 3 (Zinc Phosphate, No Oil)

**QARs should use the “BASIS OF DETERMINATION” column to document the objective quality evidence and/or clarify the rationale used to support their decision. (e.g. direct observation, documents verified etc.)**

S = Satisfactory U = Unsatisfactory

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| **SURVEILLANCE QUESTIONS** | **S** | **U** | **BASIS OF DETERMINATION** |
| 1. Are the personnel performing the plating and inspection functions of the appropriate skill/experience level and/or properly trained/certified to produce conforming product? ***What are the requirements?*** |  |  |  |
| 1. If the Plating Facility is a sub-contractor, has the Supplier flowed down all of the necessary information for the plater to perform in accordance with contractual requirements? |  |  |  |
| 1. Does the supplier have procedures for plating that meet applicable contract/drawing/specification requirements, are readily available to shop personnel, and cover all applicable processes performed? Has the procedure been approved by the customer if required? |  |  |  |
| 1. Is inspection and testing equipment of the required adequacy, accuracy, precision, and range 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?* |  |  |  |
| 1. Is each processing bath on an established analysis and maintenance schedule? (s*ome specifications have set minimum analysis frequency requirements)* |  |  |  |
| 1. Is there an analysis record, completed by an individual qualified per specification requirements, for each processing bath with established control parameters for each bath constituent? |  |  |  |
| 1. Do records show that the baths are maintained within all parameters at the established analysis frequencies and that processing is ceased when any chemical constituent is not within established parameters? Is analysis performed, with documented results, after any chemical addition or maintenance procedure performed to a processing bath? |  |  |  |
| 1. Is material/product, which has been through the plating 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 and maintained to confirm the inspection process was performed (e.g. individual inspected, operation sign-off, inspection stamped/initialed/signed accepted or rejected)? |  |  |  |
| 1. Do test specimens meet the plating specification requirements for number, size, configuration, material, etc., and are they positively identified during all stages of processing and testing until disposed of (tags, bags, etc.)? |  |  |  |
| 1. Is there an established schedule of periodic plating deposit testing for each plating bath that meets specification requirements? |  |  |  |
| 1. Are processing baths, which are operated at non-ambient temperatures, verified to be at the proper temperature prior to use? |  |  |  |
| 1. Is the plating current and voltage controlled? Is batch process data documented (i.e., tank number, temperature, voltages, etc.) and traceable to finished parts? |  |  |  |
| 1. Are parts protected from contamination and damage during and after the plating process? |  |  |  |
| 1. Are parts visually examined prior to plating for material defects, dimensions (critical surfaces), heat treat condition, dissimilar metals, presence of residual stresses, etc.? |  |  |  |
| 1. Are all lot tests required by the plating specification being performed? |  |  |  |
| 1. Is post plating baking or stress relieving required, performed, and documented properly? |  |  |  |
| 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.** |  |  |  |
| 1. Review **periodic process control testing** (visual, adhesion tests, hardness, thickness, corrosion resistance, etc.) documentation and verify that all process control tests are being performed at the frequencies required by the plating specification and records exist for each test. List number of documents reviewed, required tests and the frequency of performance, noting if each test performed meets the requirements. |  |  |  |
| 1. Is there a procedure in place for customer notification in the event of a process control testing failure which includes identification of all affected hardware shipped to the customer, isolation of all affected product, investigation of failure cause and implementation of corrective action? |  |  |  |
| 1. Do inspection records clearly identify the results of the inspections and tests performed and include traceability back to the procedure, lot/heat numbers, instruments used, personnel who performed each inspection, and the finished product inspected? Are these records completed properly, and are they adequate to meet procedural requirements? Are they maintained to confirm that all required inspection processes were performed? |  |  |  |
| Other observations: |  |  |  |
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| **Overall MPS 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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