



DEPARTMENT OF THE NAVY

NAVSUP WEAPON SYSTEMS SUPPORT

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MECHANICSBURG PA 17055-0788

Vendor Survey Site Survey First Article Report

23 May 2018

UNION MACHINE COMPANY

6 Federal Way, Groveland, MA. 01834-1564

Cage: (51992) SDVOSB

DUNS Number: 001004332

North American Industry Classification System (NAICS)

332710 / Machine Shops

332721 / Precision Turned Product Manufacturing

336411 / Aircraft manufacturing

336412 / Aircraft Engine and Engine Parts Manufacturing

336413 / Other Aircraft Parts and Auxiliary Equipment Manufacturing.

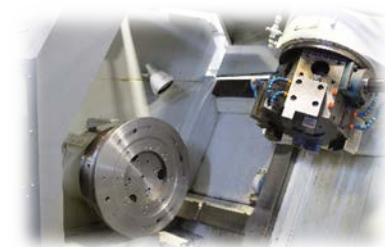
336415 / Guided Missile and Space Vehicle Propulsion Unit and Propulsion Unit Parts Manufacturing.

ATTENDEE'S

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Joel Dahlgren	DCMA Pease	603-373-6095	joel.dahlgren@dcma.mil

BACKGROUND

In a continuing effort to support the Navy and Marine Corps warfighter, NAVSUP WSS performs market research to pursue manufacturers and repair sources, not only supporting competition but to seek out those small businesses with the capabilities to meet the current stringent requirements imposed ensuring a quality part will be delivered to the fleet. Union Machine is an SD veteran-owned business that, as an OEM provider and prime contractor of jet engine and other precision parts, has been an important innovator and contributor to the aerospace business for over 60 years. Union Machine's quality laboratory centers around state-of-the-art computerized coordinate measurement equipment, optical comparators, and helium light band measuring systems supported by a complete complement of standard inspection, measuring, and gauging equipment.



Union Machine has three (3) buildings with a total square footage of: 33,000 feet
 Total employee's: 40
 Quality Management System: ISO 9001:2008 / AS9100C



AREAS OF REVIEW

The DOD Universal Site Survey Checklist was utilized and the following key areas were addressed

Production/Manufacturing Methods and Processes / In-house processes include;

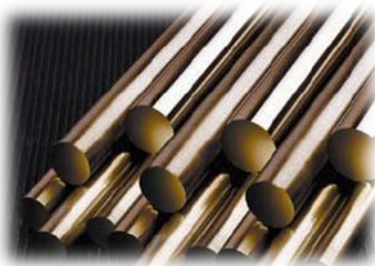
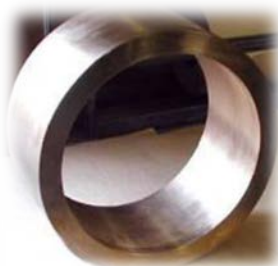
- CNC Lathes
- Contour Machining (4/5 AXIS)
- Conventional Turning
- Conventional Milling – Vertical
- Laser Drilling & Milling; (NADCAP)*
- Cylindrical Grinding
- Surface Grinding - Auto feed
- Blanchard Grinding – Manual
- Honing
- Finishing
- Welding
- Lapping
- Lapping



*NADCAP (National Aerospace and Defense Contractors Accreditation Program)

Materials

- Titanium
- Inconel
- Hastelloy
- Aircraft grade Aluminum
- Rene'
- Stainless Steel
- Carbon Steel
- Beryllium Copper
- Magnesium



- Engine Products produced:**
 - Rings
 - Seals
 - Segments
 - Shrouds
 - Retainers
 - Covers
 - Cases
 - Spacers
- Engineering staffing**
 - 1 In House Engineer
- Facility test equipment and tooling
- Production Manpower and personnel / Total Employees:**
 - 40
- Percentage of production capability:**
 - 80%
 - Scrap rate: 5%
- Automation /Acceptable
- Configuration Management / Reviewed, Acceptable
- Quality Assurance Program Compliance**
 - Quality Management System: ISO 9001:2008 / AS9100C
- Engineering drawings and changes: Stored on a Server and backed up daily/Acceptable
- Risk Management:**
 - Data** – Daily Backup of Operating data kept off-site / Acceptable
 - Strong supply chain depth** – Average 3 qualified suppliers per special process.
 - Disaster recovery** – Working relationships with local machine shops allowing for continuity of operations.
- Document Control: QA Manual Section 5.3**
 - Union Machine Co., Inc., has established and maintains procedures for the control of all documents and data, including copies of controlled documents. These documents are reviewed and approved for adequacy by authorized personnel prior to issue. The documents are made available to operations as required to ensure the proper functioning of the quality system Obsolete documents are properly removed from all locations. Changes and revisions to documents are reviewed and approved by the same functional groups or personnel that performed the original review and approval, unless designated otherwise. The changes are identified on the original document or on appropriate change authorizing approval documents. Documents shall be re-issued after a practical number of changes have been made. Documents and data are maintained both in hard copy form and by means of electronic media. Master data lists are maintained to identify the current revision of documents.
- Control of purchases and Receipt inspection/ Acceptable
- Control of manufacturing, special process and NDT**
 - NADCAP Certified Suppliers
 - NADCAP** (National Aerospace and Defense Contractors Accreditation Program)
 - Plating
 - Welding
 - Heat Treat
 - Non-Conventional Machining
 - Fluorescent Penetrant Inspection
 - Magnetic Particle Inspection
 - X-Ray

Final inspection of completed material / Measuring and test equipment

Brown & Sharpe Global Image 9128 CMM
Brown & Sharpe One Shop Floor CMM
Van Keuran 8" Helium Light Band
Model PC-30 and Model PC-14 J&L Optical Comparator
HD-1D Rockwell Tester

Packing, storage and delivery:

Union Machine utilizes Wetmore Company, Wilmington, MA for their packaging needs.

Non-conforming material and corrective action: QA Manual Section 13.3

Union Machine Co., Inc., has established and maintains procedures to ensure products that do not conform to specified requirements are prevented from inadvertent use or installation. Controls exist that provide for identification, documentation, evaluation, segregation, and when practical, disposition of nonconforming products, and for notification to the appropriate functional groups.

Any nonconforming product is reviewed by personnel with authority for disposition and in accordance with documented procedures. It may be:

- a) Reworked or repaired to meet specified requirements
- b) Accepted with or without repair by concession
- c) Re-graded for alternative applications
- d) Scrapped

Where required by contract, the proposed use or repair of a product which does not conform to specified requirements is reported for concession to the purchaser or the purchaser's representative. The description of any nonconformity that has been accepted, and of any repairs, is recorded to denote the actual condition. Repaired and reworked product is re-inspected in accordance with documented procedures.

Union Machine is using Form 1694 "Request for Variance" for any non-conformance experienced during the manufacture of any item used by the US Government. They do have a secluded area for storage of any non-conforming item awaiting disposition.

The Production and Planning Team from NAVSUP performed a complete review of Union Machines process. Observations and recommendations will be provided in the recommendations and findings section of this report.

Quality Assurance:

- Disposition of Non-Conforming Material Process including Segregation area & process

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- Storage: Acceptable
- Traceability & recall:
 - 10 years for Navy CSI
- Stamp control: Acceptable
- Tool control: Acceptable
- Internal Tag system: Acceptable
- Training requirements: Section 18 QA manual: Acceptable

Training needs, specified and general, shall be identified for each employee by their immediate supervisors and the human resources personnel. Written job descriptions shall be used to assist in determining the scope of training requirements. Employee performance of specific assigned tasks shall be qualified on the basis of appropriate education, training, and/or experience required. Complete records of training and qualification shall be maintained. Union Machine will monitor the effectiveness of training and periodically at Management Reviews and at ISO Steering Committee meetings.

DCMA support: Joel Dahlgren / DCMA Pease / 603-373-6095 / joel.dahlgren@dcma.mil

Areas of interest/review:

- NOTATE SECTION of QA Manual
 - o Retention of records Risk management: Section 23.0
 - o In-house audits: Section 17.0
 - o MRB Review: Section 13.0
 - o Non-conforming material: Section 13.0
 - o Maintenance: Product manager page 39 of QA manual
 - o Back-up procedure: Assistant General manager page 37 of QA manual
 - o Incoming inspection: Section 10.1
 - o Subcontractor surveys: AS9100
 - o Supplier Quality Requirements: AS9100
 - o Tool control: Page 41 QA Manual Material Manager
 - o NDI: Page 43 QA Manual: Also Union Machine utilizes Sub-Vendors (NADCAP) Certified
 - o Shipping requirement Page 38 Quality Manager Duties

The Quality Assurance Team from NAVSUP performed a complete review of Union Machines process. Observations and recommendations will be provided in the recommendations and findings section of this report.

MANUFACTURING TRACEABILITY STUDY

As part of the site survey, the team performs a traceability study of a recent contract for a critical spare that has been completed and delivery made. Union Machine Company (51992) was awarded

contract number: SPE4A7-16-D-0090

NSN: 2840-01-131-0490

Part Number: (99207) 6026T51G02

Nomenclature: Shroud, Fan Vanes-Stage 1

F404 Engine / CAI

The NAVSUP team along with the DCMA performed a complete First Article Inspection of One (1) sample as indicated in the contract:

A dimensional inspection was performed by Dave Harper Quality Assurance Union Machine Company, witnessed by John Zacharkow NAVSUP Mechanical Engineer, and Joel Dahlgren DCMA Pease, New Hampshire.

The Document inspection was performed by Robert Hughes NAVSUP WSS Senior Equipment Specialist and Margie Alloway, Propulsion Equipment Specialist.

The document inspection was on the following:

- Process/Operation Sheets
- Inspection Method Sheets
- Raw material certification
- Special Process certification
- Drawings and revision levels
- Tool custody and calibration
- Packaging
- Marking



The First Article Sample serial number: K6189

Job Number: 202270

Raw material: AMS 4127

Make from: 6026T51P01 / P02 / P03 / P04: Ring Segment

J490P03D: Self Locking Nut: SCD***

MS51992D502: Stud: Purchased item.

MS51997E102P: Ring lock: Purchased item.

Dimensional Inspection performed utilizing Gages, fixtures, CMM and Optical Comparator.

All inspection instruments, fixtures and gages were found to be of current calibration date.

All special processes were performed by outside NADCAP vendor.

Packaging performed by William Wetmore, <https://www.packworld.com/company/wetmore-company-inc>

Results / Recommendations:

DOCUMENT REVIEW:

All documentation was reviewed including but not limited to:

Process/Operation Sheets

Inspection Method Sheets

It was noted that the Critical Characteristic indicated on the GEAE drawing was marked on the IMS sheet

As required. ⊕

Raw material certification

Vendor invoice and delivery certification***

Special Process certification

Drawings and revision levels

All data was found to be in order, easy traceability to DLA contract, all material certifications provided.

*** The Self Locking nut part number J490P03D is a GEAE Source Control Drawing indicating 3 approved vendors to supply this “self-locking nut”. The UMC distributor chose the source located in Taiwan China. A review of FAR 52.225-5 Trade Agreements, a “designated country” under the World Trade Organization Government Trade Agreement, (WTO GPA), Taiwan is an acceptable provider of goods and material. It was recommended that UMC recommend to their distributor to utilize the suppliers in the United States.

All manufacturing, Inspection, Process, Delivery and Packaging documentation was indicated as ACCEPTABLE

DIMENSIONAL INSPECTION:

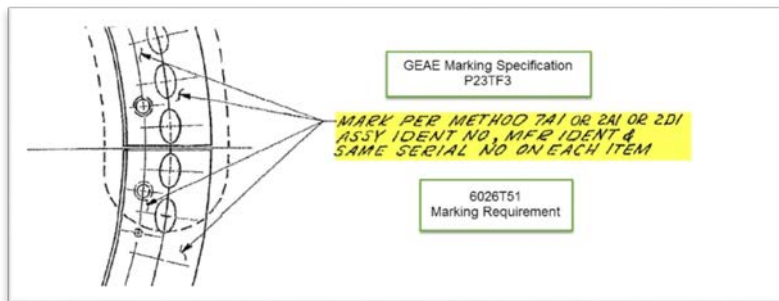
The Dimensional Inspection was performed by David Harper, Union Machine Company and witnessed by John Zacharkow NAVSUP WSS Mechanical Engineer and Joel Dahlgren DCMA Pease AB.

A Ballooned drawing was provided with numbered characteristics listed on a IMS sheet for recording of the findings. A fixture was provided to restrain the sample to ensure accuracy. Dimensions were verified using both manual inspection tooling as well as CMM and Optical Comparator units. All inspection tooling was within calibration dates.



As this item is made in a ring and then cut, some dimensions were taken by UMC on a CMM and recorded prior to the cutting of the ring and prior to the Government inspection team arrival. It was recommended that although UMC did provide a copy of the CMM report, UMC should contact the DCMA for witness of the next CMM inspection of the pre-cut ring during the production cycle. This would be a one-time witness only and not during the entire production run. DCMA would then provide a copy of those findings to NAVSUP WSS.

As part of the inspection process, NAVSUP WSS did inspect the marking IAW GEAE Marking specification P23TF3, Method: 7A1, 2A1, or 2D1.



The inspection team witnessed actual marking of the part and found the part to be within the marking guidelines.

FINDINGS/RECOMMENDATIONS

FIRST ARTICLE RESULTS:

- The Dimensional inspection was found to be acceptable with no out of tolerance conditions indicated. All inspection fixtures and gages were found to be of current calibration dates.
- All paperwork, NDT certifications, material receiving inspection reports, Process Operation sheets and Inspection Method Sheets (IMS) were found to be acceptable

A RECOMMENDATION TO APPROVE THE FIRST ARTICLE WILL BE PROVIDED TO THE CONTRACTING OFFICER AT DLA AVIATION RICHMOND.

PRODUCTION / MANUFACTURING / QUALITY ASSURANCE

FINDINGS

- A review of all areas was performed and Union Machine Company has demonstrated they have the capability to produce critical spares for multiple warfighter platforms.

RECOMMENDATIONS

- Union Machine must ensure they have UID*marking Capabilities as it is now mandated and compliance will be required IAW contract requirements.

* **Unique identification (UID):** A system of establishing globally unique and unambiguous identifiers within the Department of Defense, which serve to distinguish a discrete entity or relationship from other like and unlike entities or relationships. (Ref: **MIL-STD-130N Change 1**)

<https://www.acq.osd.mil/dpap/pdi/uid/index.hTml>

- A recommendation to make the Process/Operation sheets “unique” that being color coded depending on contract i.e. Blue for Air Force, Yellow for Navy, Green for Army, White for commercial, etc. The NAVSUP WSS team has seen this process at other sites and found it very effective for immediate identification of a part on the manufacturing floor.
- The inspection team observed a metal shelf at the entrance to the QA area which had boxes on every shelf marked with part numbers and notes written on the box. Closer review indicated that many of these boxes were awaiting various dispositions either from DLA, FRC or other Government entity. In one case one box contained items awaiting a protest from UM on a PLT determination made by a FRC 12 months earlier. A recommendation was made that detailed paperwork be attached to each box and ensure that a follow-up was made on each item to prevent lost or delinquent deliveries.
- Union Machine Company assigns serial numbers to the many parts that they currently manufacture, however all serial numbers are recorded in a notebook that goes back approx. 15 years. There is no back-up for this system. The team recommended that they look into an automated serial number assignment system and store electronically and off site.
- The Quality and Manufacturing team did a review of the MRB records and QDR records for accuracy and disposition. The following was observed:
 - Union Machine received a QDR in 2013 from FRCE on a Seal and Runner manufactured under a 2011 contract. The QDR was written for non-conformance found during installation on a T64 engine. The item was shipped back to Union Machine and was held for further instructions. The team interrogated the JDRS system and found that this QDR was closed with no further action required. This item remained in the MRB area for 5 years without resolution. In this case the inspection team recommended that the QA department keep records with an automatic reminder of items such as this so these items are not stored without any follow-up. It was recommended that the items returned be marked as “SCRAP”, and disposed of properly.
 - While manufacturing a Turbine case on a 2010 contract, a RFV was generated on 4 serial numbers indicating an “over max” condition on the 4 parts. The RFV was dated November 2011 and was passed to the DCMA for review and forwarding to the buying activity. Upon review of the non-conformance report it was noted in the actions section that the DCMA had sent an email to QA November 2011 indicating that the waiver was rejected and the disposition is “SCRAP”. These four (4) items were found to still be in the MRB room when indeed they should have been marked as scrap and disposed of properly. The proper procedure would have been that the DCMA

address the rejection on the DD1694 and passed to Union Machine instead of sending an email. Union Machine should have better control of the items in the MRB area and perform inventory possibly every month to check the status of the items to ensure the issues are resolved in a timely manner.

PLEASE NOTE THAT THESE ARE JUST OBSERVATIONS WITH RECOMMENDATIONS THAT CAN POSSIBLY IMPROVE UNION MACHINES ABILITY TO CONTINUE TO PROVIDE A QUALITY PRODUCT ON TIME.

The NAVSUP WSS team concludes that Union Machine is a quality shop and has diverse manufacturing capabilities with a solid Quality and Manufacturing background. Union Machine has been found to be acceptable for the manufacture of both Critical Safety Items (CSI) and Critical Application Items (CAI) for the Navy and the Marine Corps.

This document is provided in support of the Source Approval Process which mandates that a Site Survey be performed at least every ten (10) years. It should be included with every Source Approval Request submitted by Union Machine Company to all branches of the service. It in no way has any direct bearing on a company's request for source approval. The source approval process is clearly outlined by each buying command and the company seeking source approval should ensure that they follow the procedures as outlined in the Source Approval Instructions.