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1 Purpose

- 1.1 This procedure provides guidance to Manufacturing so that production is consistently carried out under controlled conditions and instruction is delivered in a clear practical manner.


2 Scope

- 2.1 This procedure applies to all Manufacturing production processes listed in the QMS Manufacturing System – Production Phase
- Machining
 - Paint
 - Transducers
 - Calibration and Metrology
 - ServoElectric Loadframes
 - Actuators
 - Pumps/Electromechanical Products
 - ServoHydraulic Loadframes
 - System Assembly
 - Checkout
 - Custom Electrical

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3 Definitions and Acronyms

- 3.1 Production Order:
 - 3.1.1 A production order contains the information required for producing product and has the following elements: Which materials are used and when they are used; Which operations and suboperations are performed at which work centers; The dates these operations are carried out; Which materials and activities must be procured externally for the order; The receivers to which the actual costs can be settled
- 3.2 Production Route
 - 3.2.1 An SAP generated document (electronic or paper) that describes the work centers where an operation will be performed, the steps required to perform the operation, and the sequence in which these steps are to be completed. A route may also include additional comments that are specific to the method of manufacture
- 3.3 Shop Paper (Job Packet)
 - 3.3.1 A packet of information that contains a copy of the route, Bill of Materials, Part Prints and other related information. Components routed to specific NC work centers will also have an electronic version of programs available for manufacturing. There may also be other information such as tool lists, set up sheets etc.
- 3.4 Work instruction
 - 3.4.1 Controlled instructions that describe and direct how we manufacture in a clear practical manner. Acceptable instructions may be comprised of more than one type of format and may be located in more than one controlled location.
- 3.5 Test Design and Development controlled items
 - 3.5.1 Models, drawings, bills of materials (BOMs), calibration plans, checkout plans and other controlled engineering documentation as-required for purchasing and production activities.
- 3.6 Time
 - 3.6.1 Any references to time in routes without tolerances are to be taken as minimums. The accuracy of a commercially available clock is satisfactory for non-toleranced times. “Overnight” is to be translated as from the end of one shift to the start of the same shift the next day.

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- 3.7 Supplier or Vendor
 - 3.7.1 A qualified source external of MTS that is contracted to perform one or more of the operations required to manufacture a part.
- 3.8 POND = Projects on Demand
 - 3.8.1 An MTS electronic data base for Custom and ETO sales orders (customer projects) in which key information is stored.
- 3.9 C/O Plan = Checkout Plan
 - 3.9.1 Instructions provided by Project Management for general-level functional Checkout of a customer project.
- 3.10 ITAR = International Traffic in Arms Regulations
 - 3.10.1 All controlled documentation and material (ITAR) is protected from the view of unauthorized personnel.

4 Graphic

Not required.


5 Responsibilities

- 5.1 Manufacturing Staff
 - 5.1.1 EXCEPTION: Metrology Technicians are to follow QMS 200
 - 5.1.2 Performs all manufacturing tasks using current production and engineering processes including workmanship standards.
 - 5.1.3 Materials are to be handled appropriately to prevent damage during production.
 - 5.1.4 ESD sensitive devices are to be protected using methods described in the ESD Control Procedure.
 - 5.1.5 Reports errors found on manufacturing processes and engineering documents using non-conforming product process.
 - 5.1.6 Assures that tools requiring calibration are calibrated and identified accordingly.
 - 5.1.7 Completes quality records and stores the completed records in the designated location per quality records list for the area.
 - 5.1.8 Assures that shelf life material used (such as Loctite) has not surpassed its shelf life date by reviewing the expiration date marked on the material prior to

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use. Disposes expired shelf life material in the appropriate manner.

- 5.1.9 Assures that related tools/equipment utilized in completing a job function are used and maintained appropriately.
- 5.2 Numerical Control Programmer
 - 5.2.1 Creates NC programs for the automated machines with names according complying with the naming convention specified in the Default Work Center Work Instructions.
- 5.3 Manufacturing Engineer
 - 5.3.1 Creates and maintains the production processes (work instructions, procedures, routes, fixturing, equipment, tools, and workmanship standards) in their area of responsibility.
 - 5.3.2 Approves changes to production processes as required and verifies that those changes are effective. Maintains a record of all changes and verifications.
 - 5.3.3 Oversees the routes created by the area Planner or others who may route standard and repetitive assemblies.
 - 5.3.4 Assists the manufacturing supervisor/manager with the implementation of processes.
 - 5.3.5 Reviews Quality Notifications and takes action(s) when necessary
 - 5.3.6 Makes improvements to processes as needed to support overall objectives.
- 5.4 Manufacturing Planner
 - 5.4.1 Manages production scheduling aspect of Production, including planning, releasing, and rescheduling of production orders
- 5.5 Manufacturing Production Technician
 - 5.5.1 EXCEPTION: This area only applies to Actuators and System Assembly
 - 5.5.2 Conducts rapid, objective assessment and correction of manufacturing stoppages as needed. Provide first line support to drive resolution of production issues through close collaboration with other functional groups (Manufacturing Engineering, Engineering, Procurement, etc).
- 5.6 Production Team Lead
 - 5.6.1 EXCEPTION: This applies to all areas but Paint, ServoElectric Loadframes, and ServoHydraulic Loadframes
 - 5.6.2 Order administration

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5.6.2.1 Processes production order SAP transactions as required

5.6.2.2 Job packet release & distribution to assure timely execution.

5.6.3 Coordinates production resources to facilitate work flow.

5.7 Area Lead

5.7.1 EXCEPTION: This applies to all areas but Machining, Transducers, Calibration and Metrology, Actuators, Pumps/Electromechanical Products, System Assembly, Checkout, Custom Electrical

5.7.2 Manages release of orders to production as capacity allows

5.7.3 Provides troubleshooting assistance when necessary

5.7.4 Addresses non-conformance events as they occur

5.8 Operations Supervisor

5.8.1 EXCEPTION: Metrology Operations Supervisor is to follow QMS 200

5.8.2 Plans and supervises execution of daily activities in assigned area(s).

5.8.3 Develops and implements local and shorter-term solutions supporting departmental, divisional and corporate policies and decisions.

5.8.4 Assures that Manufacturing staff have the proper skills sets required by the process, are trained and have access to the applicable QMS documents

5.9 Operations Manager

5.9.1 Direct and coordinate the operation of a designated group or groups to provide efficient, cost effective and timely provision of high quality goods and/or services.

5.9.2 Assures the product of service of the assigned area meets all applicable quality requirements (i.e. engineering, project specific, product and industry standards).

6 Procedure


6.1 General Requirements

6.1.1 Production orders are controlled by the MTS SAP MRP system.


6.1.2 Production order scheduling is managed by a Production Planner.

6.1.3 Material is kept organized and identified during production, handling, storage and shipping.

6.1.4 Material will be handled appropriately to prevent damage during production, handling, storage and shipping.

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- 6.1.5 In-process inspection and/or testing will be performed when adequate verification of conformance cannot be performed at a later stage of realization (such as Special Process requirements, risk to cost and schedule requirements).
- 6.1.6 As production is performed, all operations as listed on the routing are done in sequence and confirmed in SAP.
- 6.1.7 Changes to production orders will be handled per section 6.5 of this document.
- 6.1.8 In the event of unplanned work, a production rework order or a Work Request is generated. The rework is scheduled and prioritized by the area planner.
- 6.2 Production Planning
 - 6.2.1 Per QMS-Materials Management: Plan-Production
- 6.3 Creating and Maintaining Routes Prior to Production and Post-Production
 - 6.3.1 Per Production Route Create/Maintain procedure located at QMS-Manufacturing: Routing and Costing
- 6.4 Production Documentation (Creating and Maintaining Production Order Documentation)
 - 6.4.1 Production Documentation is composed of schedule items, engineering items and manufacturing items utilizing SAP MRP.
 - 6.4.1.1 Schedule items are composed of dates and build quantities
 - 6.4.1.1.1 Per QMS-Materials Management: Plan-Production
 - 6.4.1.2 Engineering items may be composed of prints, BOMs and solid models.
 - 6.4.1.2.1 Per QMS-Engineering and Project Quality: Engineering Records Control
 - 6.4.1.3 Manufacturing items are composed of work instructions, routes, equipment, fixtures, jigs, and tooling.

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6.4.1.3.1 Work instructions may be located in QMS Manufacturing process locations, in the job packet, SAP route text, and in POND.

6.4.1.3.2 QMS Manufacturing process locations (all areas)

6.4.1.3.3 Job packet (all areas)

6.4.1.3.4 SAP route text (all areas)

6.4.1.3.5 POND (System Checkout)

6.4.1.3.6 Routes, equipment, fixtures, jigs, and tooling per QMS-Manufacturing Phase: OPERATIONAL READINESS

6.5 Control of Production Process Changes

6.5.1 Applies to All Areas

6.5.2 Reporting Non-Conformities for Manufacturing, Engineering, Supplier, and Date Related Items

6.5.3 Per Nonconformity Process Work Instructions -- Nonconformity QN Type Q1 or Q3 Entry Screen located at QMS-Quality: Nonconforming Product

6.5.3.1 Production item changes follow all four steps of non-conforming product process. SAP Quality Notification is the record providing evidence of the four steps.

6.5.3.1.1 Manufacturing staff identifies items needing review for change

6.5.3.1.2 Manufacturing engineers review and, if changes are approved, initials and dates the items, as well as provides any necessary direction. Additional open production orders are reviewed and updated as well.

6.5.3.1.3 Manufacturing engineers revise master documentation

6.5.3.1.4 Engineering item changes use QMS-Manufacturing Phase: Production Submitting As-Built Engineering Changes from MTS Manufacturing (W.I.)

6.5.3.2 QMS-Materials Management: Plan-Production


6.6 Control of Production Equipment, Tools and Numerical Control Machine Programs

6.6.1 QMS-Manufacturing: Manufacturing Engineering

6.6.2 QMS-Manufacturing: Operations Capital


6.6.3 Numerical Control Machine Programs

6.6.3.1 QMS-Manufacturing: Machining, Work Instructions - Default

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Work Center Work Instructions

- 6.7 Control of Work Transferred, on a Temporary Basis, Outside the Organization's Facilities
 - 6.7.1 Per SAP route operation to outside suppliers (external services), refer to Production Route Create/Maintain procedure located at QMS-Manufacturing: Routing and Costing
- 6.8 Validation of Processes for Production
 - 6.8.1 Refer to Special Processes procedure located at QMS-Manufacturing: Special Processes
 - 6.8.2 Machining
 - 6.8.2.1 Nylon
 - 6.8.2.2 Weld
 - 6.8.3 Paint
 - 6.8.3.1 Paint
 - 6.8.4 Transducer Manufacturing
 - 6.8.4.1 Bond
 - 6.8.4.2 Solder
 - 6.8.4.3 Heat Treat
 - 6.8.4.4 Anodize
 - 6.8.5 Extensometer Machine Shop
 - 6.8.5.1 Heat Treat
 - 6.8.5.2 Plate (external supplier only)
 - 6.8.6 System Assembly
 - 6.8.6.1 Bond
 - 6.8.7 Checkout
 - 6.8.7.1 Solder
 - 6.8.8 Standard/Custom Electronics
 - 6.8.8.1 Solder
- 6.9 Identification and Traceability
 - 6.9.1 Traceability - QMS-Manufacturing Phase: Production, SERIALIZATION

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PLAN - By Manufacturing Area

- 6.10 Customer Property including Government Furnished Property
 - 6.10.1 Customer Property - QMS-Engineering and Project Quality Home Page, Control of Customer Furnished Property
 - 6.10.2 Government Furnished Property - QMS-Quality: Control of Government Furnished Property
- 6.11 Preservation of Product
 - 6.11.1 Workmanship Standards Library - QMS-Quality: General Cleaning and Packaging
 - 6.11.2 QMS-Materials Management: Logistics
 - 6.11.3 ESD Control Procedure - QMS-Manufacturing Phase: Production
- 6.12 Training
 - 6.12.1 QMS-Human Resources: Training
 - 6.12.2 QMS-Quality Phase: Training Needs Assessment

7 Associated Quality Records – as stated in the Quality Records List

Required Record
N/A


8 Reference Forms / Templates / Documents

Form / Template / Document Title	Location
Documentation of Production Control procedure	QMS Manufacturing
Workmanship Standards that relate to MTS-Test are located in the Quality QMS	QMS Quality – Workmanship Standards
Master Data – Production Routes procedure	QMS Manufacturing

9 Current Revision's Training Requirements

Training requirements are determined by the document owner – either awareness or formal.

Select One (mark X)	Training Type	Training Definition
	Awareness	Awareness training is conducted by communication,

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		which is sent/delivered by the approver/author/owner of the document to the affected employees/groups.
X	Formal	Formal training requires the approver/author/owner to collect/store evidence that the affected employees/groups were trained.

9.1 Formal Training: Per Learning Management System course MFG124_OLT, Documentation of Production Control

9.1.1 Assignment of training is defined within the Training Needs Assessment for course MFG124_OLT.

10 Revision History & Approval

REVISION HISTORY			
Rev	Description of Change	Author	Effective Date
A	Unified eleven production QMS documents into one. Ref. CA 3077	J. Pawlicki / M. Thomas	10/2/2015

APPROVAL OF CURRENT REVISION		
Name / Function	Signature	Date
Tom Paal / Business Unit Manager	<Approval on file>	
Dave Winslow / Business Unit Manager	<Approval on file>	
Linda Fechter / Production Inventory and Control Manager	<Approval on file>	