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Procedure Owner(s) – list functions: **Manufacturing Engineering**		Revision's Training Requirements – select one (per section #9): **Awareness _ Formal** X	

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1   Purpose

1.1   The purpose of this document is to define the process to create and maintain production routes in SAP

2   Scope

2.1   New or existing materials requiring value add process requirements
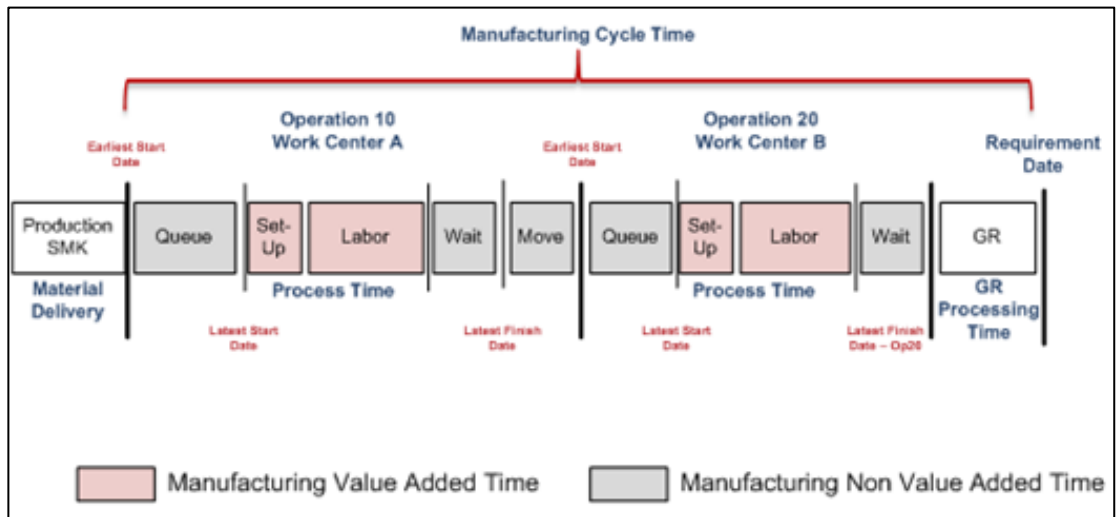
3   Definitions and Acronyms

3.1   Production Route

3.1.1   Defines where the work is to be completed including settings for operation, duration, and location

3.2   SDS

3.2.1   A document that communicates the hazards and precautions required in regards to a particular material

3.3   PPE

3.3.1   Personal Protection Equipment (i.e. safety glasses, gloves, etc.)

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3.4   CTQ

    3.4.1   Critical to Quality

3.5   Wait Time

    3.5.1   Adds additional time to operation finish date to adjust the cycle time

    3.5.2   Adjusts the cycle time between the start and finish date of the same operation

    3.5.3   Typical units are hours or days

    3.5.4   Ignores factory calendar when scheduling operation dates

3.6   Queue Time

    3.6.1   Adds additional time to operation start date to adjust the cycle time

    3.6.2   Adjusts the cycle time between the finish date of an operation and the start date of the next operation

    3.6.3   Typical units are hours or days

    3.6.4   Schedules based on the factory calendar

4   Graphic

4.1   Manufacturing Cycle Time (Reference **Section 3.5** and **3.6**)

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5 Responsibilities

5.1 Manufacturing Engineer

5.1.1 Creates routes and maintains the fields with the appropriate data

5.1.2 Reviews safety and environmental considerations in regards to materials and processes

5.2 Manufacturing Staff

5.2.1 Refers to the route included in the Production Order paperwork

5.2.2 Notifies support staff of any discrepancies and requests change

5.3 Production Planner

5.3.1 Loads capacity requirements against the routes for the schedule

5.4 Operations Manager

5.4.1 Maintains appropriate staff capacity and competency to achieve route requirements

6 Procedure

6.1 Routing Factors

6.1.1 Safety & Environment

6.1.1.1 SDS, PPE

6.1.1.2 Dimensions, weight, pressure, noise, etc.

6.1.1.3 Lift and Move Plans

6.1.2 Scope of Work

6.1.2.1 What are the tasks required

6.1.2.2 What area will be doing the work

6.1.2.3 What sort of volume is expected

6.1.2.3.1 **Note:** This may affect the level of detail put into the route, the elements contained within, or whether or not it is put into a particular type of route or not

6.1.3 Skill Sets and Qualifications

6.1.3.1 Any special skills required (i.e. soldering, welding, etc.)

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6.1.3.2 Any certifications required (i.e. TUV, ISO, UL, etc.)

6.1.4 Tooling, Fixture, Test, and Measurement Considerations

6.1.4.1 Work-holding requirements

6.1.4.2 What are the tool and fixture requirements in order to build the product

6.1.4.3 What tests are required to verify conformance to Engineering specifications

6.1.5 Facilities Requirements

6.1.5.1 Material Handling (i.e. cranes, hoists, etc.)

6.1.5.2 Power, water, air, ventilation, etc. (i.e. Pit access)

6.1.6 Special Processes

6.1.6.1 Paint, Welding, Nylon, Heat Treat, Bonding, Soldering, Plating, Anodizing

6.1.6.2 Refer to Special Processes QMS Document

6.1.7 Master Data, BOM Structure, Drawings, and CTQ

6.1.7.1 Review documents for alignment with Manufacturing processes and procedures

6.1.7.2 Code master data to align with Manufacturing processes and procedures

6.1.7.3 Verify make/buy settings to ensure proper alignment with product requirements and manufacturing capabilities

6.2 Route Creation & Maintenance

6.2.1 To create a route with only internal operations, refer to the following document:

6.2.1.1 **Note:** When defining the interoperation times, it is highly recommended that Queue Time be used as opposed to Wait Time. Queue Time adjusts the start date of the operation whereas Wait Time adjusts the finish date but ignores the factory calendar which is not ideal.

6.2.1.2 Production Route Create – 100283

6.2.2 To create a route with outside services (external operations), refer to the following document:

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6.2.2.1 **Note:** When defining the interoperation times, it is highly recommended that Queue Time be used as opposed to Wait Time. Queue Time adjusts the start date of the operation whereas Wait Time adjusts the finish date but ignores the factory calendar which is not ideal.

6.2.2.2 Outside Service Example: Plating

6.2.2.3 **Note:** If the need is present to deviate from an established External Supplier, contact Purchasing

6.2.2.4 [Create Production Route with External Services – 100682](#)

6.2.2.5 [Purchasing Info Record - Create - 100616](#)

6.2.3 To change or view a route, refer to the following document:

6.2.3.1 **Note:** If standard text keys are used, the short text information can be overwritten if necessary

6.2.3.2 [Production Route Change/Display – 100429](#)

6.2.4 To assign components to a route in order to schedule them in a manner where they are delivered at the operation where they are needed, refer to the following document:

6.2.4.1 **Note:** This helps with scheduling parts to arrive when needed as opposed to at the start of the order

6.2.4.2 **Note:** This is beneficial for long cycle time assemblies

6.2.4.3 [Assign Components to Specific Operation - 101698](#)

6.2.5 To update the scheduling aspect of the material based on the route information, refer to the following document:

6.2.5.1 [Work Scheduling for Material Master Update – 101154](#)

6.2.6 To create a route with a parallel sequence, refer to the following document:

6.2.6.1 **Note:** This is beneficial to use when different operations within a route can be processed at the same time or out of order

6.2.6.2 **Note:** This is beneficial to use when multiple departments are performing work on the same route at the same time

6.2.6.3 [Parallel Sequence Instructions](#)

6.2.7 To add on to a group route, refer to the following document:

6.2.7.1 **Note:** This is to be used when multiple material numbers require the same route information (i.e. hours, queue, work centers, etc.)

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6.2.7.2 **Note:** This can be used to speed up the routing process when the same change applies to many materials

6.2.7.3 **Note:** This can be used for grouping products within a family together

6.2.7.4 Instructions for adding to a Production Group Route

6.3 Monitoring and Measurement

6.3.1 To track changes made to a route, refer to the following document:

6.3.1.1 Instructions for Determining Route Change History

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

Required Record
Master Route

8   Reference Forms / Templates / Documents

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

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, 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.

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9.1 Formal Training: Per Learning Management System course MFG125_OLT, Master Data – Production Routes

9.1.1 Assignment of training is defined within the Training Needs Assessment for course MFG125_OLT

10 Revision History & Approval

REVISION HISTORY			
Rev	**Description of Change**	**Author**	**Effective Date**
D	Major revision. Updated/added information in Section 5 and 6. Changed Title of document and linked to LMS system.	JMP, RK, MT	10/2/2015
C	Added co-owner, modified scope section	MT	3/13/2014
B	Added material assignment to operation	MT	3/6/2013
A	Initial Release	MT	9/21/2012

APPROVAL OF CURRENT REVISION		
Name / Function	**Signature**	**Date**
Dave Winslow / Business Unit Manager	<Approval on file>	
Tom Paal / Business Unit Manager	<Approval on file>	