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1 PURPOSE

- 1.1 The purpose of this work instruction is to provide Engineers and Designers at MTS Test with guidance on:
- 1.1.1 how to properly determine which parts and assemblies require lifting features
 - 1.1.2 how to use MTS standard hoist ring capacity information
 - 1.1.3 if special lifting apparatus is needed, how to indicate that on the BOM and the assembly drawing
 - 1.1.4 how to properly indicate lifting point labels on BOMs and label locations on assembly drawings
 - 1.1.5 when to initiate a Lift & Move Safety Planning Meeting with Manufacturing Engineering

2 SCOPE – APPLIES TO WHERE & WHEN THE WORK INSTRUCTION IS USED

- 2.1 All equipment designed at MTS Eden Prairie or to MTS specifications for MTS.

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3 DEFINITIONS AND ACRONYMS (IF NEEDED)

- 3.1 BOM – Bill of Material
- 3.2 CG – Center of Gravity
- 3.3 Lift & Move Safety Plan – A plan developed by Manufacturing Engineering in cooperation with the design team to ensure all appropriate considerations are made with regards to safe lifting, moving, and handling. This applies to parts and assemblies at all phases of fabrication, movement, installation, shipment, and use.
- 3.4 lbs – pounds (force)
- 3.5 kg – kilogram (despite being a mass unit, it is commonly understood in reference to weight when used in the United States)

4 GRAPHIC (IF NEEDED)


5 RESPONSIBILITIES

- 5.1 It is the responsibility of the Design Engineer and/or Designer to:
 - 5.1.1 design and document a means to safely lift and move parts and assemblies
 - 5.1.2 indicate proper lift points on piece parts and assemblies
 - 5.1.3 select and indicate proper lifting point labels on the BOM and assembly drawing
 - 5.1.4 design and release special lifting apparatus (if required)
 - 5.1.5 initiate and participate in the Lift & Move Safety Planning Meeting with Manufacturing Engineers during the design phase (as required)
- 5.2 It is the responsibility of the Project Engineer to:
 - 5.2.1 Ensure that a Lift and Move Safety Plan has been developed
 - 5.2.2 (in the case of a “re-release”) ensure that the Manufacturing Engineer has the information necessary to develop a Lift and Move Safety plan
- 5.3 It is the responsibility of the Manufacturing Engineer to:
 - 5.3.1 develop a Lift and Move Safety Plan
 - 5.3.2 ensure that the assemblers have the Lift and Move Safety Plan at the “Toolbox Meeting” before starting assembly
- 5.4 It is the responsibility of the System Engineer to review the documents upon request

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6 INSTRUCTION

- 6.1 These instructions shall apply to all parts or assemblies weighing 30lbs (14.5kg) or more.
- 6.2 Approximate Weight shall be indicated on the drawing: XX lbs (XX.X kg)
- 6.3 Lifting points shall be identified on piece part drawings and assembly drawings
- 6.4 For safe lifting of complicated assemblies with unevenly distributed mass, the weight and Center Of Gravity shall be identified and dimensioned on the drawing
- 6.5 Select the proper thread size to carry the load. This will depend on several factors, including the mass, base material, structure, and the number of lifting points on the part or assembly and their location with respect to the CG. Use [575455-XX](#) to help determine the proper thread size needed.
- 6.6 The proper lift point labels and their locations on the part/assembly shall be called out on the BOM and assembly documentation.
 - 6.6.1 [575806-XX](#), [575807-XX](#), and [575150-XX](#) indicate safe lifting points
 - 6.6.2 [572400-05](#), [572401-05](#), and [572402-05](#) indicate non-lifting point warning
 - 6.6.2.1 These are especially important when individual part lifting points are easily accessible but insufficient for assembly-level lifts because of load carrying capacity or location relative to assembly CG.
 - 6.6.2.2 If possible, it is preferred that piece part lifting holes be sized large enough to lift the assembly.
- 6.7 If special lifting apparatus is needed, it shall be on the BOM and indicated on the assembly drawing. Apparatus must be CE rated if it is to be used at the customer site in a country of the European Union.
- 6.8 All lifting devices/accessories included in a customer project BOM must be CE compliant if shipping to a country of the European Union or required by contract.
- 6.9 Under limited circumstances, equipment designed for “MTS internal use only” can use non-CE lifting hardware as authorized by Manufacturing Engineer (i.e. paint shop hooks).
- 6.10 For new equipment which is similar to existing equipment, the Design Engineer may use sound engineering judgment to determine if the lifting plan for the existing equipment being referenced (all equipment and procedures) are safely applicable to the new design. This should then be properly documented on the Bill of Material and assembly drawing. A new Lift & Move Safety Planning Meeting is not necessary in this scenario unless the Hazard & Risk Analysis of the project mandates it.

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- 6.11 During the design phase, the Design Engineer should initiate a Lift & Move Safety Planning Meeting with Manufacturing Engineering whenever any of the following conditions are met. Consider that a part may not meet the requirements below, but later meet this when incorporated into another assembly. Evaluate at all levels of the design.
- When the Hazard & Risk Analysis mandates it
 - If the CG is above the lifting point and the mass of the part or assembly exceeds 1000 lbs (450 kg)
 - When flipping or tipping is required and the mass of the part or assembly exceeds 500 lbs (225 kg)
 - When special apparatus is required for lifting and moving
 - When there is a customer requirement for a lifting plan (all CE customers)
 - When it may not be clear how the part or assembly might be safely lifted from a drawing alone
 - Where repetitive lifting may be required
 - When the Engineer or Designer determines that Manufacturing Engineering input would be beneficial
- 6.12 Any procedures or documents created to represent safe lifting of the part or assembly should be properly linked. For parts, the procedure should be shown on the part drawing. For assemblies, the procedure can be shown on the assembly drawing or on a separate 700-XXX-XXX document, which must then be attached to the BOM and referenced on the assembly drawing: "See Bill of Material for proper lift instructions."

7 ASSOCIATED QUALITY RECORDS – AS STATED IN THE QUALITY RECORDS LIST

Required Record
Buildable BOM and Final Drawings

8 REFERENCE FORMS / TEMPLATES / DOCUMENTS (IF NEEDED)

Form / Template / Document Title	Location
Lifting and Moving on Manufacture Floor (W.I.)	QMS-Manufacturing
Project Lift & Move Safety Plan SIPOC	QMS-Manufacturing
SolidWorks CAD Best Practices and Standards	QMS-Engineering & Project Quality

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9 CURRENT REVISION'S TRAINING REQUIREMENTS

Training requirements are determined by the document owner.


1. Select Awareness **and/or** Formal training requirements.
2. List (below) the functions or groups that require the training.

Select (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.

Reference Course #: Engineering 012 (per Training Needs Assessments)

Functions/Groups that require training:

- Awareness: List here the function(s) or group(s) that require Awareness training.
- Formal: List here the function(s) or group(s) that require Formal training.
 - Manufacturing Engineers
 - Mechanical Engineers and Designers
 - Electrical Engineers and Designers
 - Project Engineers
 - System Engineers

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10 REVISION HISTORY & APPROVAL

REVISION HISTORY			
Rev	Description of Change	Author	Effective Date
D	Updated all sections with clarifications	Ross Leuer	8/11/14
C	Updated all sections to incorporate inclusion of Lift & Move Safety Planning Meetings.	Jesse Gunderson	3/20/2014
B	Changed 3.2 Updated Section 4 (label drawings) Updated Sections 6.1, 6.4, and 6.5 Added 6.5.1 and 6.6 Added Required Record	Caleb Vainikka	3/22/2012
A	Created	Scott Firman	6/8/2010

APPROVAL OF CURRENT REVISION		
Name / Function	Signature	Date
Dave Winslow Mgr. Manufacturing Engineering		
Marv Westermann Director – Solutions Engineering		
Scott Firman Director – HW Std. Products & Materials		
Vitaliy Pechenuk Director – Systems Engineering		
Tom Kerns Director– Project Engineering		