Production Part Approval Process (PPAP)

Manual

Manitowoc Foodservice

2227 Welbilt Boulevard

New Port Richey, FL 34655

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1.0 Introduction

Manitowoc Foodservice Quality Management has implemented a modified version of the Production Part Approval Process (PPAP) and has prepared this manual for new and existing suppliers. PPAP is used to approve new or revised parts or parts resulting from new or significantly revised production processing methods.

Manitowoc PPAP Forms Kit

This manual must be used in conjunction with the Manitowoc PPAP Forms Kit which contains forms and instructions for the PPAP process.

Supplier's Responsibility

It is the suppliers' responsibility to:

- ✓ Ship only parts that meet Manitowoc's specification requirements and the supplier's design and process records.
- ✓ Notify Manitowoc of any changes to part(s) or process(es).

2.0 Production Part Approval Process (PPAP)

2.1 Purpose

The purpose of the Production Part Approval Process (PPAP) is:

- ✓ To provide the evidence that all Manitowoc engineering design drawings and specifications are properly understood and fulfilled by the manufacturing organization.
- ✓ To demonstrate that supplier established manufacturing processes has the potential to produce product that consistently meets all requirements during an actual production run at the supplier's production rate.

2.2 When is PPAP Submission Required?

Note: After a submitted PPAP is approved, any changes to the process and part/component must be requested in writing.

In general a PPAP is required anytime a ***new part or a change to an existing part* or process is being planned.** Manitowoc sites will determine when and if a PPAP submission is required. As a supplier you should have a comprehensive quality system that develops all of the requirements of a PPAP submission regardless of whether you have been asked to deliver a submission. In the event a PPAP submission is not requested Manitowoc quality reserves the right to request any of these documents at any time during the life of the product. In addition to a site, Manitowoc Corporate Quality reserves the right to request a PPAP submission for a variety of reasons including the following.

New parts, process or suppliers:

1. New part or product
2. New supplier
3. New process or technology

Changes to existing product:

1. Change to material or component
2. New additional or modified tools
3. Upgrade or re-arrangement of existing tools
4. Tooling production or equipment transferred to a different site
5. Change of supplier or non-equivalent materials/services
6. Product when tooling has been inactive for 12 months
7. Product or process changes on the components of the product
8. Change in test or inspection method
9. Bulk material: New source of raw material
10. Change in product appearance attributes
11. Change in production process or method
12. Change of sub-supplier or material source

2.3 Supplier Change Request (SCR) Instructions

Whenever there is a plan to change a part, process, or tooling, Manitowoc approval is required ***prior to initiating any activity***. The SCR is used for initiating all supplier changes and must be approved by Manitowoc Sourcing and Quality. Failure to have an approved SCR may affect customer quality and therefore future business opportunities.

The SCR is only for changes that are permanent in nature.

Specification Deviation:
Any temporary change to a print requirement from a supplier must be done using the Specification Deviation Form.

Changes that require notification are outlined in Sect 2.2: Changes to existing product.

2.4 Elements of a PPAP Submission

One or more of the following elements may be required as part of your formal submission depending upon your assigned submission level:

1. Part Submission Warrant (PSW)
2. Design Records & Bubbled part print(s).
3. Approved Engineering Change Documentation
4. Design FMEA
5. Process Flow Diagrams
6. Process FMEA
7. Control Plan
8. Measurement System Analysis Studies
9. Dimensional Results
10. Material, Performance Test Results
11. Initial Process Study (Cpk) Capability Studies or Ppk for existing lot
12. Appearance Approval Report
13. Sample Product Parts
14. Manitowoc Specific Requirements:
    a) Tooling Information Form
    b) Packaging Form
    c) Specification Deviation Form
    d) Supplier Change Request
    e) Supplier PPAP Checklist

2.5 Submission Levels

The level to be submitted is determined by the Manitowoc site, and unless otherwise noted, always defaults to Level 3 which is a full PPAP submission. There are three submission levels listed below, and each is typically applied to the specific areas listed.

Level 1 – Part Submission Warrant only (Applied to non-functional parts and raw bulk material)
Level 2 - Part Submission Warrant with product samples and limiting supporting data. (Applied to catalog or contract manufactured functional product or product with critical material and/or dimensions)
Level 3 - Part Submission Warrant with product samples and complete supporting data. (Applied to critically designed components)

Definition of Levels:

Level 3:

CRITICALLY DESIGNED FUNCTIONAL COMPONENT

Components that are critical to the performance and reliability of the equipment that heat, cool, safety, move or control. Component selection requires heavy supplier involvement to fit the component specifically to the application. e.g. controller, compressor, motor, actuator, complicated fabricated assemblies, oven cavities, fryer pots, griddle assemblies, etc.

Level 2:

CATALOG OR CONTRACT MANUFACTURED FUNCTIONAL COMPONENT

Functional components that are critical to the performance of the equipment but can be selected from standard offerings based on spec requirements or designed by Engineering for contract manufacturing. Application suitability is validated and confirmed by MFS (e.g. fabrications, special processes (anodizing), refrigeration std. controller, castings, machined parts)

NON-FUNCTIONAL PART WITH CRITICAL MATERIAL/DIMENSION SPECS

Non-functioning parts that may or may not be manufactured to our specific requirements but the material used and the dimensional tolerances are critical to the design and manufacturability of our equipment. e.g. labels, hardware, aesthetics, sheet steel, insulation, adhesives, Loctite, specific packaging design (pallet, carton), more complicated fabrications with multiple bends or simple subassemblies.

Level 1:

INDIRECT TYPE ITEMS/PARTS/SERVICES WITH NON-CRITICAL SPECS

Items that are necessary but specs and tolerances are not critical to production or the performance of the equipment; indirect services. e.g. packaging, industrial gases, maintenance and repair operations (MRO), simple fabricated components.

2.6 Supplier PPAP Checklist (see PPAP Forms Kit)

Manitowoc requires the use of the PPAP checklist for referencing and organizing the PPAP submission. Here are the required elements for each LEVEL option 1 through 3.

Element Order	PPAP Requirements Important: Submit your documents in this order.	Level 1	Level 2	Level 3	Required Documents
1	Part Submission Warrant (PSW)	S	S	S	Manitowoc PSW Required
2	Design Records & Bubbled Drawing(s)		S	S	Manitowoc Site Parts Print
3	Approved Engineering Change Documentation		AR	S	Various engineering documentation; e.g. AR = required for contract manufactured par
4	Design FMEA			AR	AR = Supplier Format if Supplier is the Design & Development organization.
5	Process Flow Diagrams			S	Any standard flowchart format.
6	Process FMEA		AR	S	Manitowoc PFMEA Format; e.g. AR = required for contract manufactured part
7	Control Plan		AR	S	Must be Manitowoc supplied format; test plans can be supplier format. E.g. AR = required for contract manufactured part
8	Measurement System Analysis Studies		AR	S	Statistical package format for gage R&R. E.g. AR = required for contract manufactured part
9	Dimensional Results		AR	S	Must be on Manitowoc Dimensional report format; e.g. AR = required for contract manufactured part
10	Material Performance Test Results, Reliability, or Test Performance		AR	S	Industry Standard reports or test result formats designated by Manitowoc.
11	Initial Process Study (Cpk) *Capability Studies or (Ppk)*		AR	S	Process Capability or Process Performance Study using a statistical package; e.g. AR = required for contract manufactured part
12	Appearance Approval Report	AR	AR	AR	Supplier form with accompanying material documents if needed; e.g. AR = where appearance is important
13	Sample Product Parts		S	S	Parts tagged in accordance with Manitowoc PPAP reference manual
14	Manitowoc Specific Requirements				
a	Tooling Information Form			S	Manitowoc Form
b	Packaging Form		AR	S	Manitowoc Form
c	Specification Deviation Form		IA	IA	Manitowoc Form
d	Supplier Change Request		IA	IA	Manitowoc Form
e	Supplier PPAP Checklist		S	S	Manitowoc (this current) Form

Required for PPAP submission S Not required

Documents on a case by case basis are marked AR for "As Requested" AR IF Applicable IA

2.7 Electronic Submission/Submission Method

Manitowoc requires that all PPAPs be submitted electronically to your supplier quality representative, Supply Chain Category Manager and Value Stream Purchasing coordinator prior to the agreed due date.

2.8 Submission Status

The review and approval process will be managed by each Manitowoc site and identified with one of the following submission rankings:

Approved: The submission is acceptable to the guidelines of any and all criteria set forth by the Manitowoc site managing the submission.

Rejected: The submission is not acceptable and needs to be resubmitted for approval. (Note: Submissions with the wrong revision level or part number will be rejected.)

Interim: An interim approval can occur through an agreement with quality management. The product must be deemed "acceptable with deviation" by the Manitowoc site, and the interim *may only be issued for 90 days. The submission must have an approved Specification Deviation that clearly identifies the corrective action plan to achieve full approval within the 90 day period. The Specification Deviation is in the Manitowoc PPAP Forms kit.*

Note: The supplier will be notified by email of the status including any reasons for "Rejected" or "Interim" approval.

Suppliers must not ship parts without proper "Approval" and any parts manufactured without proper "Approval" are the responsibility of the supplier.

2.9 Ongoing Requirements

Manitowoc reserves the right to request any information you have provided in any data or documented in any element of approval, at any time including after the approval has been granted. Manitowoc reserves the right to require recertification at any time.

2.10 Critical to Quality (CTQ) Characteristics

> A critical PART requirement specified on a controlled document (typically an engineering drawing, specification or performance requirements)

> A critical PROCESS requirement identified by Customer or Supplier.

> Directly represents the safety, regulatory, or primary functional performance requirements by the end customer.

> Requires verification of part conformance during first production.

> Requires documented evidence of process control to maintain part conformance through the life of the product

Manitowoc's expectation is that you will address all CTQs in the control plan and ensure that you have a robust process for consistently achieving all CTQ requirements as they are defined in the Manitowoc part print. For the process, a visual instruction or appropriate methodology for control will be used. Notification to Manitowoc is required.

CTQ are mandatory for Element 11 the "initial process study." Manitowoc requires capability studies for all CTQs and any process related characteristics that either the supplier or Manitowoc identifies as critical.

All submissions must be received prior to the PPAP due date. The review and approval process will be managed by each Manitowoc division.

3.0 INSTRUCTIONS FOR COMPLETING A PPAP SUBMISSION

Note: Refer to the Manitowoc PPAP Forms Kit

Element 1: Part Submission Warrant (PSW)

The Part Submission Warrant (PSW) documents the submission and the approval or rejection of purchased parts prior to production. The PSW must be submitted as part of the PPAP at every submission level.

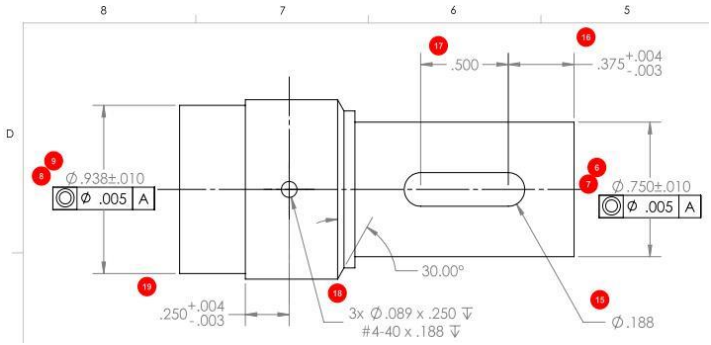
Any fields that do not apply to your submission should be filled in with "N/A" (Not Applicable).

Element 2: Design Records and Ballooned Drawings

Design records and ballooned drawings document the part print and provide any additional engineering records for reference.

A ballooned drawing shows the parts or assemblies in a part print with numbered "balloons" that point to individual dimensions and requirements of the part. The numbers on the ballooned drawing correlate with the numbers found on the Dimensional Data Sheet in the PPAP forms kit. A ballooned drawing must be submitted as part of PPAP for every submission level when there are dimensional results.

Sample Balloon Drawing



Element 3: Approved Engineering Change Documentation)

This section is used to cover anything that is not addressed in a part print such as emails and Supplier Change Requests.

1. Manitowoc ECNs must be approved prior to use.
2. Print change submissions must have current prints.
3. All supplier initiated changes must have a copy Manitowoc approved Supplier Change Request (SCR) form in the forms kit.
4. Emails can only clarify requirements not define them.
5. Emails cannot re-define a requirement in lieu of a print change.

Element 4: Design Failure Mode and Effects Analysis (DFMEA)

The DFMEA shows evidence that potential failure modes and their associated risks have been addressed in order to eliminate or minimize their effects on the design or through product design changes and improvements. DFMEA is only required when the part is designed by the supplier and must address all (CTQs) and any potential voice of the customer inputs identified in the Manitowoc Project Scope. Manitowoc has included a template in the forms kit.

The date on the DFMEA should show release prior to print release. Severity, Occurrence and Detection ratings are used when performing FMEA activities.

Any potential failure mode not mitigated in the DFMEA should be included in the PFMEA also included on the PPAP worksheet. Any potential failure mode with a severity ranking of 9 or 10 must be addressed with a corrective action plan. Furthermore, potential failure items in the top 25 percent high RPN ranking must have corrective action items addressing the potential failure mode.

Element 5: Process Flow Diagrams

The Process Flow Diagram documents and clarifies all the steps required in the manufacturing of a part. The Primary process steps must match both the Control plan and the PFMEA. Process flows must include the entire manufacturing process (receiving through shipping) including offline activities (such as measurement inspection, handling, flow of nonconforming material, and rework parts.

Element 6: Process Failure Mode and Effects Analysis (PFMEA)

The PFMEA is used to show evidence that potential failure modes and risks have been assessed in the manufacturing processes. There is a template in the Forms Kit.

A PFMEA should be performed for every part piece of equipment or process involved in manufacturing. PFMEA is a cross-functional activity that is performed internally, updated routinely and reviewed periodically.

Manitowoc requires that any severity ranking of 9 or 10 be addressed with a corrective action plan. Furthermore, potential failure items in the top 25 percent of the high RPN ranking items must have actions carried over and addressed in the control plan. All critical failure modes must be addressed.

Element 7: Control Plan

A Control Plan defines the operations processes, materials, equipment, methodologies, and CTQs (as determined by Manitowoc and suppliers) for controlling variations in key product or process characteristics integral to the manufacturing process. Its purpose is to communicate the supplier's decisions during the entire manufacturing process from materials purchase through final shipping. Specifically, the control plan should address the following:

- Methods of production
- Identification of CTQ characteristics and controls
- Secondary or outsourced operations
- Materials and their physical and chemical characteristics
- Types of process equipment at each operation
- Types of test equipment used to measure each characteristic
- Specifications sampling strategy, control and reaction methods used
- Periodic product verification

All processes must have a control plan that defines all methods used for process control and complies with the customer-specified requirements. The control plan must clearly state each step in the process; the specification & all Critical to Quality (CTQs) must be addressed for product and process. There is a template in the Forms Kit.

Element 8: Measurement System Analysis (MSA)

MSA helps to understand the measurement process and determines if the process will deliver product that meets the design records, which includes:

- Analysis of statistical properties for the measurement tools
- Identification of environmental factors that influence the measurement tools
- Verification of ongoing statistical properties (gage repeatability & reproducibility (GR&R), gage calibration, and gage maintenance)

Manitowoc requires an analysis of the capability of all measurement tools identified in the Control Plan (in process and offline gages). GR&R must be submitted for devices measuring data on CTQs and for each measurement device on all Level 2 and 3 submissions. The Manitowoc requirement for Suppliers is a GR&R of 10% or less.

Important: Gages with a GR&R of 10 - 30% error need an improvement action plan.

Element 9: Dimensional Results

Document dimensional results in the "Dimensional Data Sheet" provided in the PPAP Tool Kit. The measurements should correlate to the balloon drawing.

These results show conformance to the Manitowoc part print. Non-dimensional requirements (Element 10) should be addressed in the Material and Performance section of the PPAP submission. Manitowoc requires a full dimensional layout of the part on all PPAP submissions for level 2 and 3 for all drawings related to the part.

The parts used for dimensional data must be randomly sampled from a run at production rate. The dimensional report must address All dimensions, Applicable notes with variable dimensions, and Dimensions contained on reference prints.

The Method of Measurement must be documented for every CTQ characteristic. The following conditions will result in a requirement being unacceptable:

1. Any specification that is non-conforming
2. Any specification with excessive range and/or variation
3. Any specification that is too close to the tolerance limit(s).

Any of these conditions will require corrective action to be addressed and identified on the Dimensional Data Sheet. The proposed corrective action must address the cause and what will be done in response. PPAP will NOT be approved before the corrective action is implemented.

Element 10: Material, Performance, and Reliability Test Results

Material should be confirmed and acceptable performance demonstrated. If there is a performance requirement make sure the results of the testing are acceptable, from a credible source and performed to the specification, these should be reviewed and agreed with MTWFS engineering prior. Together with the Dimensional Data Sheet this section of the submission should address a complete review of all product specifications and/or part print requirements.

Material Test Results should be provided in a format that allows for clear interpretation and be from an accredited lab to a known standard. It is your responsibility as a supplier to Manitowoc to confirm the composition of your material for both the PPAP submission and ongoing conformance.

Manitowoc engineering or quality will communicate specific material performance, reliability, and/or testing performance requirements in part print. It is the responsibility of the supplier to confirm the data and format for this requirement with their Manitowoc Quality or Supplier Quality representative.

Element 11: Initial Process Study (Cpk, Ppk)

The purpose of initial process studies (Cpk, Ppk) is to determine if the production process manufacture product to the requirements. Initial process studies (capability) are mandatory for all CTQs. There are two primary indexes used in determining process capability.

Cpk Process Capability and Ppk Process Performance

- ✓ Cpk: Measures the process compared to the control limits (On-going)
- ✓ Ppk: Measures the process compared to the CTQ characteristics (Specific Batch)

Note: There is additional information in the PPAP forms kit.

Element 12: Appearance Approval Report

This requirement should always be in reference to a specific specification such as color, texture, contrast or paint. Given the nature of the foodservice equipment business a variety of stainless steel is utilized. Discoloration can be an important element in this business.

Element 13: Sample Parts

The actual sample parts should be delivered with or before the submission. Contact your Supplier Quality representative or Quality Manager at the site you are delivering parts to for clarification on who should receive the sample parts. The default quantity for all submissions is 3 parts unless requested otherwise. Sample parts must reflect the print revision the submission data and be sampled from an actual production run.

Instructions for Sample Parts Identification.

A minimum of 3 samples should be included with the PPAP submission. Contact your Quality Manager or Supplier Quality Representative to determine the proper department(s) to which to address the parts. Each sample part MUST be properly tagged and identified as a PPAP sample part with information listed below. The box that ships the parts should also be clearly labeled as containing *Unapproved PPAP Sample Parts* in order to avoid being misplaced or inadvertently mixed with approved production parts.

Your sample parts must contain the following information listed below at a minimum or could possibly be rejected back for re-submission:

1. Identifying the part as a PPAP Sample Part
2. Date of Manufacture
3. Manitowoc Part Number
4. Revision Level
5. Supplier Name
6. Name of Product
7. Product Serial and Batch Number (Required if applicable)
8. Approval markings (CE, UL, etc.) where applicable

Element 14 Manitowoc Specific Requirements

Purpose: To address Manitowoc specific requirements during PPAP submission.

- ✓ Tooling Information Form
- ✓ Packaging Form
- ✓ Specification Deviation Form
- ✓ Supplier Change Request
- ✓ Supplier PPAP Checklist

Manitowoc reserves the right to request any of these at the time of PPAP submission or to request updates to these documents anytime during the life of the part.

The forms and instructions in this section are included in the PPAP Forms kit.

Tooling Form

Purpose: Identifies all Manitowoc owned tools at the time of production start-up.

This requirement is mandatory for all Manitowoc owned tools and must be completed by the supplier prior to PPAP approval.

Packaging Form

Purpose: Approve the packaging method and material for supplied product to ensure protection during transportation and introduction to the assembly line.

Specification Deviation Form

Purpose: Documents variations in products or process from the initial specification and the actions of the supplier regarding those variations. There are three instances in which a Specification Deviation Form can be submitted:

1. Existing Production Deviation: When a temporary deviation to a print or process (less 60 days) is requested from Manitowoc. Approval must be received before the supplier can proceed.
2. PPAP Submission: When requirements are viewed as not attainable or require a print change in order to approve the submission. Notify Manitowoc immediately upon discovery.
3. Request Print Changes: When seeking a change to a part specification for manufacturing issues or variances.

Supplier Change Request (SCR) Instructions

Purpose: Documents a planned **permanent change** that affects the part or the process. Approval is required from Manitowoc ***prior to initiating any activity***. Failure to have an approved SCR may affect customer quality and therefore future business opportunities.

Manitowoc relies on the supplier to notify us in good faith of any planned change such as changing the manufacturing process or upgrade of tooling used to manufacture the part(s) supplied.

Supplier Checklist

Purpose: The checklist is used for referencing and organizing a PPAP submission. The checklist identifies the required elements for each LEVEL option 1 through 3.

4.0 Approval

This document requires the approval of:

- Process Owner
- Corporate Quality Director

Revision History:

RELEASE AND REVISION HISTORY		
Date	**Originator**	**Description**
03/04/16	Tom Wooderson	Initial Release
10/27/16	John Jackson	Minor updates to support the Supplier Quality Manual
12/03/16	John Jackson	Major revision for simplification

Approved: *(signature on file)*

Process Owner (John Jackson)

Approved: *(signature on file)*

Corporate Quality Director, designee (John Jackson)