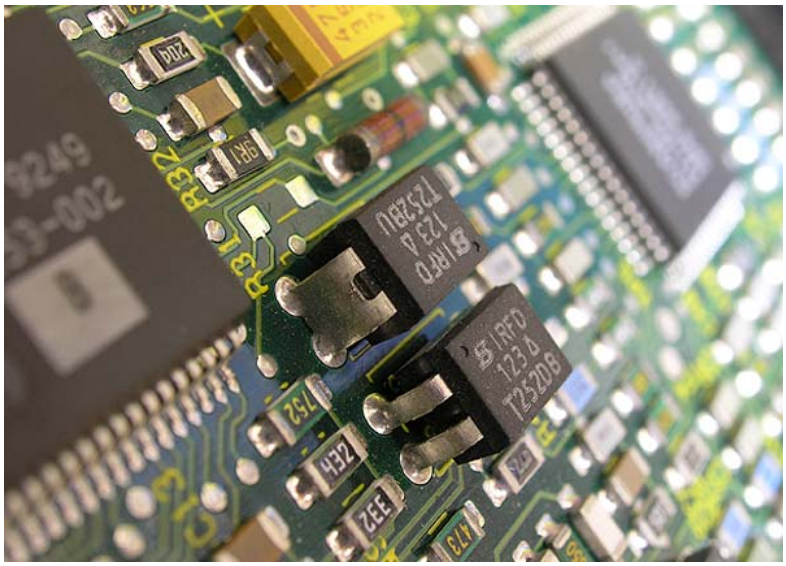
Supplier Quality Manual



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Introduction

Introduction and Welcome to MC Assembly

Originally established in Melbourne, Florida in 1984, MC Assembly now has facilities in Melbourne, Florida; Billerica, Massachusetts, USA and Fresnillo, Zacatecas, Mexico. MCA provides electronic manufacturing services ranging from part procurement through assembly, including In-Circuit Test (ICT), Final Function Test (FT), and box build and system integration. The fully automated manufacturing capabilities offered include both Surface Mount (SMT) and Pin Through-Hole (PTH) technologies with Automated Optical Inspection (AOI) and X-ray Inspection.

MCA's formula for controlled growth and customer service continues to keep focus on consistently striving to delivering on-time, defect-free products that meet customer, statutory and regulatory requirements.

MCA's QMS is registered to International Organization for Standardization's (ISO) ISO 9001:2008, ISO13485:2003, AS9100C and is in compliance with 21CFR Part 820, QSR (FDA), and applicable sections of 14 CFR, Parts 21, 39, & 45 of the Code of Federal Regulations (FAA).

The employees and resources of MCA are dedicated to customer satisfaction through effective Program Management and Process Control.

The company is dedicated to the principle of maintaining the highest levels of quality and integrity in communicating with people inside and outside the business operation.

We invite you to come see our QMS in action. To arrange a visit contact us at:

MC Assembly
425 North Drive
Melbourne, FL 32934
321-427-9216

Quality Policy

M C Assembly will deliver product solutions and services to meet our customers' specifications, on time to schedule, within budget, and in compliance with applicable legal requirements. These activities will be performed with a focus on continuous improvement and maintaining the effectiveness of the Quality Management System.

MC Assembly's Environmental Policy

This Environmental Policy covers all the company's business activities undertaken at its Facilities locations. The company is committed to protecting the environmental from the significant internal and external impacts of its operations and will achieve this by continuous improvement and application of environmental management disciplines and best Practice. The level of satisfaction it achieves amongst all shareholders, suppliers, employees and local communities will measure the company's success.

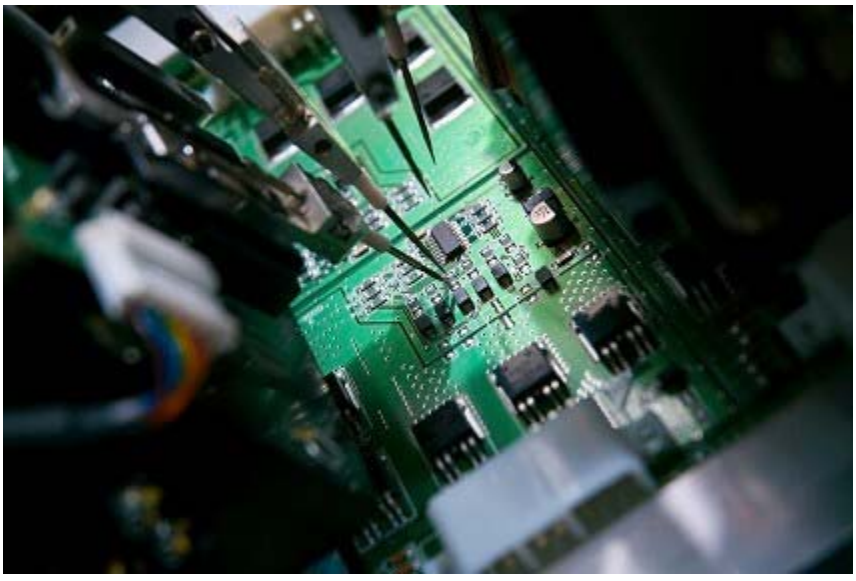
To achieve this result, we:

- Ensuring that product and process design incorporates a full environmental impact assessment
- Minimizing waste and consumption of resources (water fuel and energy)
- Reducing or eliminating the production of discharges and emissions to the environment
- Using environmentally friendly materials and processes consistent with the principle of best practice
- Continuing to meet, and exceed current legislation, regulations
- Monitoring and auditing plant, equipment and process performance to control and improve all activities which may have a significant environmental impact
- Ensuring that all employees are aware of their environmental responsibilities and are fully competent to control the actives for which they are responsible
- Encourage the active participation of employees, suppliers, customers in the achievement of this Environmental Policy
- Employees training and understanding environmental impacts
- To provide a safe and clean work environment to our employees and customers
- To assess the environmental impact of historic, current and likely future operations
- Continue an active Recycling program of all Materials and continue to use Recycling products.

MC Assembly's Occupational Health and Safety Policy

MCA is committed to health and safety practices and work environments that enable our people to work injury and illness free. To achieve this result, we:

- Ensure MCA's operations comply with applicable occupational health and safety regulations and when appropriate implement additional controls to meet company requirements.
- Assure managers and employees are trained and accountable for preventing work related injuries and illnesses.
- Operate an occupational health and safety management system that ensures continuous improvement through risk assessment, risk minimization, and performance reporting.
- Provide wellness programs that contribute to the productivity, health and well-being of employees.
- Inform suppliers, including contractors, of our occupational health and safety expectations and require adoption of sound occupational health and safety management practices.



Conflict Minerals Policy Statement

On August 22, 2012, the Securities and Exchange Commission ("SEC") published the final regulations implementing the conflict minerals reporting obligations of Section 1502 of the Dodd-Frank Wall Street Reform and Consumer Protection Act ("Dodd-Frank Act"). Section 1502 of the Dodd-Frank Act requires, in part, SEC registrants whose products contain metals derived from conflict minerals (generally, tantalum, tin, tungsten, and gold), to report annually to the SEC. This reporting requirement was based upon concerns that the current humanitarian crisis in the Democratic Republic of Congo and surrounding countries has been financed by profits originating from the mining and transport of conflict minerals.

Although, as a private company MC Assembly is not subject to the provisions of the Dodd-Frank Act as written, we support ending the violence in such areas and are committed to the pursuit of responsible procurement practices to support that end.

As an assembler of electronic components (not a manufacturer of components), MC Assembly is contractually bound to procure components only from the Approved Vendor List (AVL) supplied to us by our customers.

MC Assembly supports the efforts of the Electronic Industry Citizenship Coalition (EICC) and Global e-Sustainability Initiative (GeSI) and our customers to address conflict mineral issues. Vendors will be asked to comply with the conflict mineral due diligence practices and policies of MC Assembly and its customers.

In order to assist our customers to comply with the Dodd-Frank Act, MC Assembly is in the process of obtaining, information from approved vendors concerning the origin of the metals that are used in the products made by MC Assembly. Vendors are requested to provide written evidence of due diligence documenting that raw materials used to produce gold, tin, tantalum and tungsten, supplied to or used in the products made by MC Assembly do not originate from mining or smelting operations in the Democratic Republic of Congo and surrounding countries.

Due diligence from each supplier will include, where applicable, requested completion of the EICC-GeSI Conflict Minerals reporting template, available at www.conflictfreesmelter.org.

1. Quality Management System Requirements

1.1 Quality Management System

Each MCA supplier is required to maintain an effective quality management system, preferably one that conforms to ISO 9001 Quality Management System – Requirements. In addition, the supplier must meet all other requirements of this manual. Automotive suppliers must maintain a system certified to ISO 9001, TS16949, or AS9100. Supplier must notify MC Assembly in writing of any changes to the supplier's status after qualification.

1.2 Quality Manual and Procedures

The supplier, as requested, will furnish MCA with a copy of the supplier's Quality Manual and supporting procedures. This includes detailed documents and work instructions specific to production of material for MCA.

1.3 Control of Sub-tier Suppliers

Suppliers are responsible for the quality of materials and components provided by their sub-tier suppliers and sub-contractors. MCA suppliers must impose controls on their sub-tier suppliers that provide quality results and documentation comparable to the controls applied to suppliers by MCA. The extent of the controls may vary, depending on the nature and complexity of the product and processes, but should normally include:

- Evaluation and qualification of sub-tier supplier facilities
- Control to ensure that raw materials used meet MCA's requirements
- Controls to ensure that the sub-tier suppliers of components used are those approved by MCA, where applicable.
- Ensure that sub-tier suppliers have an ESD control program that meets or exceeds the needs of MCA if the parts or materials are ESD sensitive.
- Part qualification, including first article inspection and process capability studies of as applicable.
- Control of drawings/revisions
- Control of nonconforming material
- Corrective action and preventive action programs
- A continuous quality improvement program
- Flow down appropriate quality and customer requirements

Where appropriate, MCA may specify the sub-tier suppliers that may be used, evaluate and qualify the sub-tier supplier's facilities, and assist the supplier in controlling the sub-tier supplier. Typically, this occurs when the sub-tier supplier is an essential component of the supply-chain process. *MCA reserves the prerogative to evaluate the quality system and records of such sub-tier suppliers as necessary. In the event of MCA's involvement, it does not absolve suppliers of the ultimate responsibility for the quality performance of their sub-tier suppliers.*

1.4 MC Assembly Quality Notes

Where appropriate the supplier shall:

Note Code - 1
Retain on file evidence of product conformance, procedures, processes and equipment used. By shipping the product to MCA, the supplier confirms and represents that the product meets all of the applicable MCA, statutory and regulatory and/or supplier design control documents and functional test requirements.

Note Code - 2
Employ personnel that perform work affecting conformity to product requirements shall be competent on the basis of appropriate education, training, skills and experience.

Note Code - 3
Retain the identification and revision status of specifications, drawings, process requirements, inspection/verification instructions and other relevant technical data for the expected life of the device. Changes to supplied documentation are not authorized without prior written consent.

Note Code - 4
Retain requirements for design, test, inspection, verification (including production process verification), use of statistical techniques for product acceptance, and related instructions for acceptance by MC Assembly, and as applicable critical items including key characteristics.

Note Code - 5
Retain test specimens (e.g., production method, number, storage conditions) for design approval, inspection/verification, investigation or auditing as required.

Note Code - 6
Notify MC Assembly; of nonconforming product, obtain MC Assembly's approval for nonconforming product disposition of custom material, notify MC Assembly of changes in product and/or process, changes of suppliers, changes of manufacturing facility locations and where required, obtain MC Assembly's approval and flow down to the supply chain the applicable requirements including customer requirements.

Note Code - 7
Maintain records retention requirements ten years, unless otherwise specified.

Note Code - 8
Permit the right of access by MC Assembly, their customer and regulatory authorities to the applicable areas of all facilities, at any level of the supply chain, involved in the order and to all applicable records.

Note Code – 9
Supplier must provide a date code or lot code information for all receipts.

Note Code – 10
Supplier must provide a signed Certificate of Conformance/Test for all receipts. Signatures may be electronic. For off the shelf components, certificates must have traceability to the manufacture.

For manufactured items, certificates of conformance must be maintained for all items used in the assembly and available upon request. This includes any subassemblies.

Note Code – 11
Any items shipped to MC Assembly with a shelf life must contain at least 75% of the shelf life remaining.

Note Code – 12
All suppliers to MCA shall ensure that persons are aware of:

- their contribution to product or service conformity
- their contribution to product safety
- the importance of ethical behavior

1.5 Reference Documents

- QF7410101 Supplier Tape and Reel
- QF7410106 Supplier BGA Re-Ball
- QF7410107 Supplier Printed Circuit Board Fabrication
- QI74102 Supplier Quality Management
- QF7410202 Supplier Quality Process Assessment Questionnaire
- QP85201 Corrective and Preventative Action Process
- QP71401 Control of Work Transfer
- QP83001 Nonconforming Material Process
- QI74305 Avoidance & Detection of Counterfeit Components

2. Supplier Qualification Process

All suppliers of production materials to MCA must be qualified suppliers. The extent of the qualification process is dependent upon the criticality of product purchased and other factors determined by MCA. The qualification process in its most complete form consists of three parts:

- A questionnaire completed by the supplier.
- A quality management system self-assessment completed by the supplier, using the MCA supplier assessment survey form. This is returned, along with the supplier's quality manual and documentation for review by MCA.
- An on-site assessment by MCA personnel or their authorized agents.

MCA periodically reevaluates suppliers through the use of quality performance data and/or on-site assessments.

2.1 New Supplier Questionnaire

In the early stages of the supplier selection process, potential suppliers are sent a questionnaire. This questionnaire solicits general information about the company such as location(s), size, capabilities, and financial stability as well as detailed questions regarding the Company's quality management system and quality history.

2.2 New Supplier Self-Assessment

When a new supplier is being considered, they are sent a quality management system self-assessment survey form. The supplier completes the self-assessment and returns it along with a copy of their quality manual and supporting documents. MCA will review the quality manual, procedures, and survey to determine if the documented quality system meets MCA's requirements. Printed circuit board suppliers must also complete a copy of IPC-1710 and furnish to MCA.

2.3 On-Site Assessment

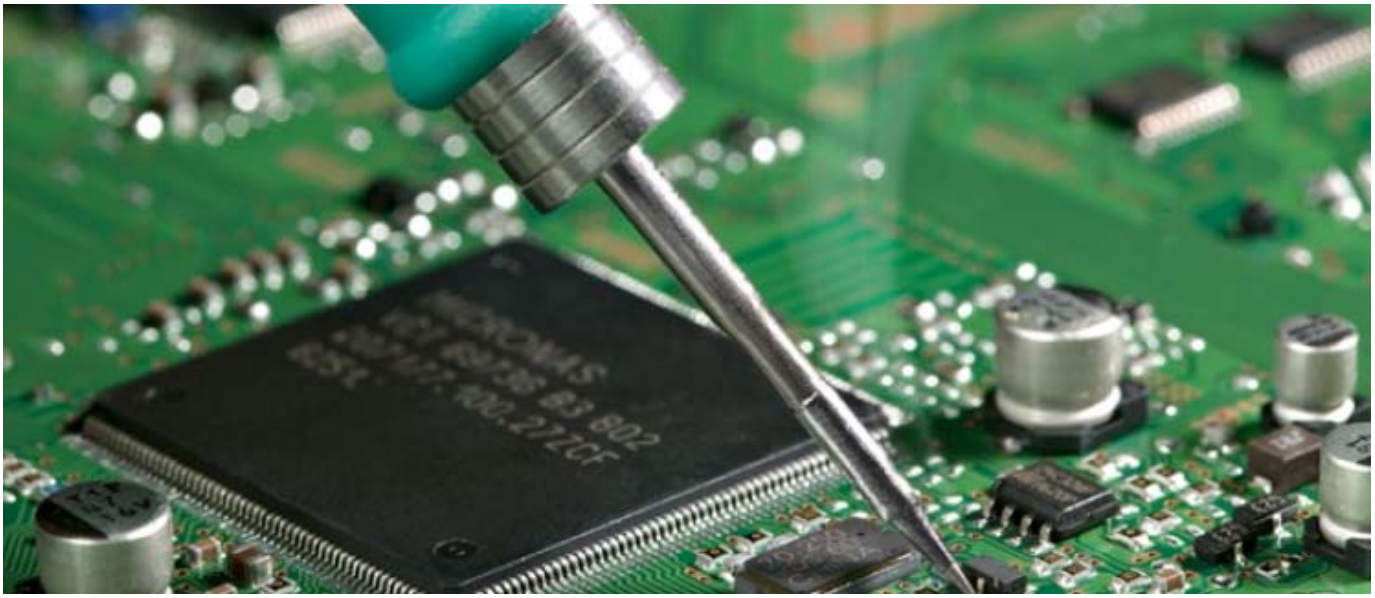
For suppliers of critical components, an on-site assessment of the supplier's facility may be performed. The on-site assessment includes three components:

- A quality assessment to determine whether the supplier's quality management system is in place and functioning effectively.
- A business assessment to determine whether the supplier has financial resources, production capacity, and other business resources needed to fulfill MCA's production needs.
- A technology assessment to determine whether the supplier has the needed technical resources, including production and inspection equipment, facilities, engineering resources, etc.

If the assessment team determines that the supplier meets MCA's requirements, MCA qualifies the supplier to bid on new business and supply production materials.

2.4 Periodic Reevaluation

MCA periodically reevaluates current production suppliers through the use of quality performance data and/or on-site assessments. If requested, the supplier shall make their facility available for on-site process verification by MCA personnel, with reasonable notice.



3. Part Qualification

When specified on purchase order, the supplier is responsible for submitting all First Article data requested by MCA on the first article requirements checklist. MCA and the supplier will agree on the number of the samples to be checked and submitted with the first article data. Where possible, all First Article documents should be submitted to the supplier quality engineer in electronic format (preferably Adobe Acrobat or Microsoft Office).

In some cases MCA personnel may wish to be present during the initial production run. This will allow MCA to validate and verify the process before any product is shipped

3.1 First Article and AS9102 Requirements

For each new or changed part, MCA sends the supplier a First Article Requirements Checklist (when required), listing the steps and information that must be submitted for qualification of the component or assembly for production. The checklist items selected are based on the type of component or assembly to be supplied.

When AS9102's are required, the supplier must submit Forms 1, 2 & 3, along with certificates of conformance for all materials used in the assembly. All subassemblies must be accounted for as well.

3.2 Dimensional Inspection Report

MCA notifies the supplier of the quantity of parts to be inspected, typically five from each tool or cavity. The supplier inspects or tests each sample for all dimensions, drawing notes, and specification requirements listed on the current revision of the MCA drawing and/or specification. The supplier records the results on the First Article Report form or equivalent. The supplier numbers a copy of MCA's drawing and/or specification to correspond with the supplier's results.

The dimensional inspection report must include the specification number, specified requirements, and the inspection/test results. A simple statement that the material meets the requirements is not acceptable. Each report must be traceable to the supplier's material, through lot/heat/coil/batch numbers or equivalent, and must be signed by the organization that performed the testing. For any requirements that the supplier does not have the equipment to inspect or test, the supplier may obtain reports from their sub-supplier or other test agency.

Parts inspected for the dimensional inspection report are randomly selected from a production run of parts. The minimum quantity for the production run is agreed upon between the supplier and MCA. The parts must be produced under volume-production conditions, including material, machines, tooling, processing parameters, cycle times, etc. Any exceptions to the volume-production conditions must be approved in writing by MCA, and included in the data package submitted to MCA.

3.3 Material Certification/Test Report

When requested, the supplier must provide a material certification/test report. This report must include the specification number, specified material and/or physical requirements, and the inspection/test results. A simple statement that the material meets the requirements is not acceptable. Each report must be traceable to the supplier's material, and must be signed by the organization that performed the testing.

3.4 Gage Repeatability & Reproducibility (R&R) Studies

For those characteristics specified by MCA, the supplier must perform gage R&R studies using procedures described in Measurement Systems Analysis published by AIAG. MCA must approve R&R values greater than 10 percent of the tolerance.

Normally for variable gages, three different operators measure ten samples three times each. For attribute gages, the Attribute Gage Study (long method) is required. MCA must approve any alternative methods.

3.5 Gage Correlation Studies

For characteristics specified by MCA, the supplier must perform a gage correlation study. This consists of the supplier identifying, measuring and recording a specified number of production parts. The supplier then sends the parts to MCA for measurement. MCA compares their measurements with the supplier's measurements to determine the correlation between the gages.

3.6 Process Capability Studies

Process Capability (C_{pk}) is a comparison of the inherent variability of a process output to specification limits *under statistically stable conditions*. There are a number of techniques for assessing the capability of processes. MCA suppliers must use methods defined in Statistical Process Control (SPC) published by AIAG for determining process capability and process performance, unless an alternate method is approved in writing by MCA.

A Cpk of at least 1.33 is required for MCA critical dimensions.

When required to submit process capability data to MCA, the supplier must calculate process capability using the following method, unless an alternate method is approved by MCA:

C_p = Process capability ignoring process centering = $\frac{USL - LSL}{6\hat{s}}$

C_{pk} = Process capability including centering = the minimum of either: $\frac{USL - Avg.}{3\hat{s}}$ or $\frac{Avg. - LSL}{3\hat{s}}$

USL = Upper Specification Limit
LSL = Lower Specification Limit
Avg. = Process Average = $\bar{\bar{X}}$

$\hat{s}$ = Estimated Standard Deviation = $\hat{s} = \frac{\overline{R}}{d_2}$

$\overline{R}$ = Average Range

d_2 = Constant from statistical tables

For unilateral tolerances, the same logic is employed, except that only the specified side of the tolerance is used to calculate C_{pk}. When $\overline{X}$ & R charts are used for capability studies, the subgroups must contain pieces taken consecutively from the process and the subgroups must be arranged sequentially in the order they were produced.

3.7 Failure Modes and Effects Analysis (FMEA)

When requested, the supplier must perform a Process Failure Modes and Effects Analysis (PFMEA), and submit it for approval. For parts and assemblies that are designed by the supplier, the supplier should also perform a Design Failure Modes and Effects Analysis. The PFMEA considers all reasonably foreseeable potential failure modes of each process. Based on the potential seriousness and likelihood of the problem, the supplier develops manufacturing controls. The PFMEA should be a living document, and should be updated when process changes occur, or when defective material is produced. PFMEA methods and examples can be found in Potential Failure Mode and Effects Analysis published by AIAG.

3.8 Control Plan

When requested, the supplier must develop a control plan, and submit it for approval. The control plan and is a detailed description of the supplier's proposed processing steps required to produce the part, and the controls that are put into place to control the quality at each step. The control plan must include all in-house processing, external processing, inspection, packaging, and shipping. Suppliers may use their own format. Measuring devices and fixtures designed and built to check MCA parts must be identified with a gage number and drawing, and must be listed on the control plan.

The control plan must include all critical characteristics. Where detailed instructions are required, the supplier details those instructions in a work instruction, or equivalent, which must be listed in the control plan. Inspection methods, sample sizes, and sampling frequencies should be based on the process capabilities, seriousness and likelihood of potential non-conformances, and process stability. Critical characteristics that do not meet MCA's process capability requirements must be inspected 100%, unless MCA approves alternate control methods in writing.

3.9 Electrostatic Discharge (ESD) Susceptibility

When components or assemblies supplied to MCA are susceptible to ESD, the supplier shall establish ESD susceptibility information for them. Procedures, methods, and equipment used for determining the ESD susceptibility shall be provided to MCA. ESD failure modes shall be considered in PFMEAs, and ESD controls shall be included in control plans and packaging. ESD program must be compliant with ANSI S20.20.

3.10 Material Safety Data Sheets (MSDS)

As applicable, Material Safety Data Sheets (MSDS) must be provided during First Article process.

3.11 Agency Approvals and Compatibility Reports

The supplier is responsible to provide the proper agency approval test reports per MCA requirement. Examples are UL, CE, FCC, TUV, etc. The supplier is also responsible for agency test reports from their sub-supplier or other outside test agencies.

The suppler is responsible to submit test results that verify compatibility as required (USB, 1394 etc.). Testing may be done by the supplier or by a test facility certified by the supplier.

3.12 Packaging & Labeling

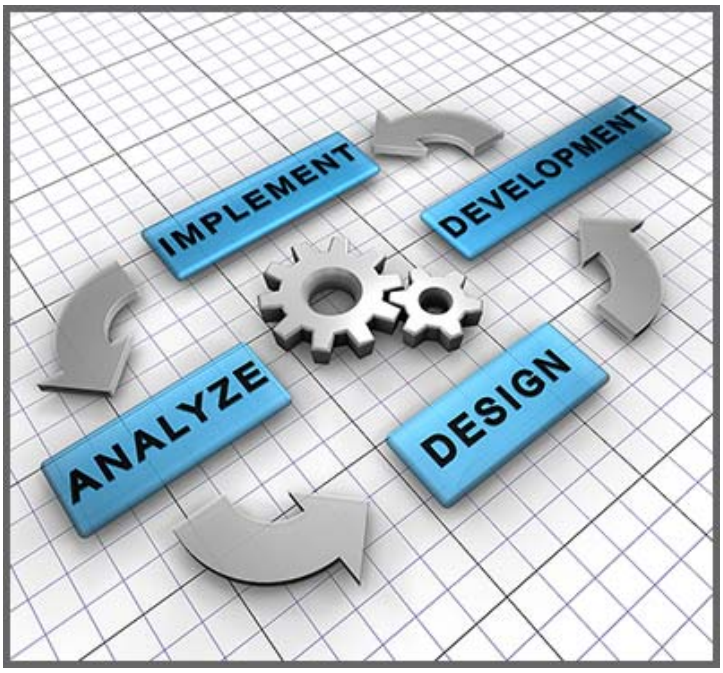
The supplier must adequately plan for packaging of material shipped to MCA. The supplier will provide a documented packaging plan including container size, number of parts per container, packaging configuration, etc. Packaging will be designed to provide protection from any damage that may occur. For static sensitive components, ESD packaging shall be provided. Packaging, labeling, and shipping materials must comply with the requirements of common carriers to secure the least transportation costs. For devices that are moisture sensitive, packaging requirements must be in accordance with J-STD-033.

3.13 Traceability

The supplier must plan for traceability of components. The supplier will provide a written plan specifying how components will be marked with serial or lot numbers and date codes if required, or how containers will be identified with lot numbers or date codes if component marking is not required. The plan will also include sizes of lots or batches. Where possible, batch sizes should be minimized to aid in containment should quality problems be found.

3.14 Counterfeit Parts & Materials Avoidance and Detection

The supplier must have a process in place for avoidance and detection of counterfeit parts and materials. Compliance to SAE AS5553 or ARP6328 is preferred, but other methods that provide significant risk mitigation and avoidance may be acceptable.


IMPLEMENT
DEVELOPMENT
ANALYZE
DESIGN

4. Manufacturing Control

4.1 Process Control (When specified by contract)

MCA suppliers are required to control all manufacturing processes in accordance with the control plan, which is approved during part qualification.

4.2 Statistical Process Control (When specified by contract)

Where specified in the control plan, the supplier is required to apply effective statistical process controls. Effective controls must include:

- The control chart displays control limits that are correctly calculated (specification limits may not be used as control limits).
- The control chart is at the process area, visible to the operator, or persons who are responsible for controlling the process.
- For each out-of-control condition, actions are taken to bring the process back into control. Actions taken to bring the process back into control are recorded.
- Product produced during any out-of-control condition is sorted, scrapped, reworked or dispositioned through the supplier's material review process

4.3 Process Performance Requirements (When specified by contract)

Process Performance (P_{pk}) is the comparison of the actual process variation to the specification limits. When required to submit process performance data to MCA, the supplier must report process performance using the following method:

Critical Characteristics: A P_{pk} at least 1.33 is required. Any critical characteristic failing to meet the minimum requirement requires a containment plan and an improvement plan.

Other Characteristics: A P_{pk} of at least 1.00 is required. The supplier is not required to calculate and report process performance for non-critical characteristics, unless requested by MCA. When specified by MCA, other characteristics failing to meet the minimum requirement also require a containment and improvement plan.

P_{pk} = the minimum of either $\frac{USL - Avg.}{3s}$ or $\frac{Avg. - LSL}{3s}$

USL = Upper Specification Limit
LSL = Lower Specification Limit
Avg. = Process Average = $\bar{\bar{x}}$

s = Estimated Standard Deviation $s = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{\bar{x}})^2}{(n-1)}}$

n = Total number of parts inspected

For unilateral tolerances, the same logic is employed, except that only the side of the tolerance that is specified is used in to calculate P_{pk}.

4.4 Process Improvement (When specified by contract)

Out-of-control or unstable processes (which have assignable causes) and processes that do not meet the minimum C_{pk}/ P_{pk} requirements must be identified and corrected. The Supplier must also improve processes with low yield rates.

4.5 Lot Control

A lot consists of product of one part number and revision that are made at the same time, under the same processing conditions, from the same lot of raw materials. The primary purpose for identifying lots is to determine the scope of actions that must be taken when problems arise during further manufacturing or with customers. Each container of material shipped to MCA must be identified with the Supplier's lot number. Inspection records must be traceable to lot numbers.

The following are typical conditions that result in a change of lot numbers:

Change of part number or revision
Change of part number or revision of components
Interruption of continuous production (typically for more than a few hours)
Repairs or modification to the tooling or equipment
Tooling changes (other than minor adjustment or replacement of consumable tooling)
Change to a different lot of raw materials
Process changes

4.6 Traceability

Traceability ties finished product back to the components used in the product. When traceability is specified, the traceability marking should be effective down to the individual component, i.e., lot code, batch or serial should be identifiable throughout MCA's processes.

4.7 Workmanship

When workmanship standards are not referenced on MCA drawings or specifications, the supplier is expected to follow industry-accepted standards (e.g. ANSI, IPC). When in doubt, consult with MCA for clarification.

4.8 Safety

At no time should any customer, or person at a MCA facility, be exposed to hazardous material or situations that are not inherent in a component's structure. Residues, films, out-gassing products and packaging materials should comply with OSHA (Occupational Safety & Health Association) standards. For items with inherent hazards, safety notices must be clearly observable. As applicable, MSDS sheets must be provided during the First Article process.

4.9 Maintenance

The supplier must maintain all facilities, manufacturing machines, tools, measuring devices, and other equipment in such a manner that the supplier can support MCA's production requirements, and the quality of parts manufactured for MCA is not degraded in any way.

5. Drawings / Changes

5.1 Drawing and Change Control

The supplier must have a documented system for assuring that the latest MCA drawings are in effect at their facility. The supplier's quality management system must contain a documented procedure that describes the method used for the receipt, review, distribution, and implementation of all changes to drawings and specifications. In addition, the procedure must address control of obsolete drawings and specifications. A documented procedure should also detail the method used to contain new or modified parts until approved by the customer.

5.2 Process Changes, Engineering Changes

Suppliers must have systems in place to control changes to drawings, specifications, processes, or produced parts. Systems should be capable of handling changes being requested by the customer, and also changes requested by the supplier.

NOTE: The First Article approval process is directed at a given part number for a specified revision level produced in a specific area of the manufacturer's facility. **Suppliers may not make any changes in their process, location, material, or to the part without written approval from MCA.** The supplier must formally request a process change on all MCA components.

5.3 Supplier Deviation Request

A supplier is never permitted to knowingly ship product that deviates from the print, specification limits, or design intent without written authorization from MCA. If such a condition exists, the supplier may request MCA to allow shipment of the product. This is accomplished by initiating a Deviation Request.

If directed by MCA, the supplier must send samples of non-conforming items to MCA for evaluation. The cost of any testing required to determine the acceptability of the product will be charged to the supplier. MCA will determine the item's acceptability and what corrective actions (if any) are required beyond the deviation. If approved, MCA will send a written deviation approval to the supplier.

The deviation is only intended to be an interim action and **is not** to be construed as an engineering change. The supplier must begin work immediately to correct the condition in question. This must be accomplished within the time frame stated on the deviation. Failure to

comply with the mutually agreed upon closure date for the deviation may result in the supplier's rating being affected.

In all cases, the supplier must fully contain all product suspected of being non-conforming at their facility. In addition, the supplier may be required to sort any suspect product at MCA.

Any parts sent to MCA that have been approved on a Deviation must be clearly identified on the box, container, or other packaging method with the appropriate markings decided jointly by MCA and the supplier.

6. Packing & Labeling

6.1 Packaging

Each supplier must adequately plan for packaging. MCA encourages supplier-initiated packaging improvements. Suppliers will provide packaging that provides protection from any damage that may occur. Packaging, labeling, and shipping materials must comply with the requirements of common carriers, in a manner to secure the lowest transportation costs.

Packaging for ESD sensitive items must meet appropriate ESD packaging requirements. Contamination is a serious concern to MCA. Packaging must protect the components from contamination, including fibers from the packaging materials. For devices that are moisture sensitive, packaging requirements must be in accordance with J-STD-033.

Expendable materials and packaging must be legal and safe for standard "light industry" disposal. The preferred maximum weight of manually handled packs is 40 lbs. The maximum acceptable weight is 45 pounds, unless approved by MCA in writing.

Whenever possible, only one part number and one supplier lot is to be packaged in a shipping container. When more than one part number or lot number is packaged in a shipping container, each part number and/or lot number must be separately packaged (i.e. bags or boxes) inside the container, with each labeled as to the contents.

6.2 Labeling

Each shipping container or inside package must contain the following information:

- MCA part number (if no MCA number exists, supplier part number is used)
- Quantity
- Supplier's Name
- Purchase Order Number
- Lot identification (if required)
- Required ESD Susceptibility Label on packaging for ESD sensitive items, using the Electronic Industries Association Standard EIA-471 symbol or equivalent.

7. Corrective Action System

MCA requires suppliers to utilize a closed-loop corrective action system when problems are encountered in their manufacturing facility, or after nonconforming product has been shipped to MCA.

7.1 Corrective Action Process Approach

The corrective action system utilized should be similar to the process outlined below. The focus should be on identifying the root cause(s) of the problem and taking action to prevent its recurrence.

- Use a team approach
- Describe the problem
- Contain the problem
- Identify and verify root causes(s)
- Use root cause identification tools such as 5-why or Ishikawa
- Implement permanent corrective actions
- Verify corrective action effectiveness
- Close the corrective action

7.2 Supplier Corrective Action

MCA issues a Corrective Action Request (CAR) to a supplier when non-conforming parts are found at incoming inspection, in production, in test, or by a MCA customer. They can also be issued as a result of a supplier audit. The supplier is required to respond by returning the CAR back to MCA with the "Team Response" fields completed. The following provides a brief outline of the CAR procedure that suppliers to MCA should comply with:

- MCA requires that the supplier take immediate containment action upon notification of the nonconformance. The supplier must submit a written response to MCA, reporting the Supplier's initial observation and defining the interim containment plan within 48 hours of notification. The Supplier's Initial Observation is an acknowledgement that the Supplier has been informed of the problem, and has begun to gather information about the problem.
- The containment plan must clearly define the containment actions at the supplier's facility to assure that no nonconforming product is shipped to MCA. If suspect product has already been shipped, the supplier must address all suspect stock in transit and any stock at MCA. The supplier will assist MCA in identifying customer risk by identifying all suspect lot numbers and associated quantities involved.
- Initially, within 2 weeks from the initial notification date, the supplier must submit the corrective action to be taken to prevent recurrence of the problem, and the effectivity date (the date the corrective action will be implemented.). Actions such as "train the operator," "discipline the operator," or "increase inspection," are typically not acceptable corrective actions. Additional time may be granted for response depending on the nature of the investigation.
- The supplier is required to keep MCA informed of progress towards implementing the corrective action. When corrective action implementation is complete, the supplier and MCA verify that the corrective action is effective in preventing the problem's recurrence.

8. Ship-to-Use (STU)

MCA utilizes a Ship-to-Use (STU) (formerly Dock-to-stock (D2S)) policy to reduce the problems associated with receiving nonconforming product from suppliers, while minimizing incoming inspection and speeding up the process of moving product to production.

Suppliers with all parts on STU (D2S) and high ongoing quality performance are Preferred Suppliers. Preferred Suppliers are given first opportunity to quote for new business and are given preference for increased volumes when consolidating suppliers for multiple-source items.

MCA administers the STU program on a part-by-part basis. STU applies to all material and components purchased for use in released product at MCA. It does not include pre-released parts, samples, prototypes, pilot runs, First Articles for new tooling, and other low volume applications. STU material will be moved directly into production, bypassing incoming inspection.

8.1 Ship-to-Use Requirements

Qualifying Dock to Stock Material
Qualification Guidelines:

- The STU selection application scans the Supplier History and MRB tables every two (2) hours. Records less than one (1) year old are selected.
- A part qualifies for dock to stock if the previous receipt has been accepted without error.
- Any single failed receipt generates a DMR with cause code RTV which disqualifies the part for and resets the counter. Once a part has been kicked out of the STU program, three successive shipments with no defects is required to go back onto the STU status.
- For critical parts, the supplier must be qualified through an on-site quality management system assessment. At MCA's discretion, the formal on-site assessment may be waived with a fully completed supplier self-assessment.
- For critical parts, the most recent three lots received must have passed all incoming inspections
- The part must have no outstanding corrective action requests (CPARs or DMRs) for issues affecting form, fit, function, reliability, or customer acceptance.
- The 3-lot requirement may be waived for a critical part if any of the following conditions are met, the provided a mutual agreement is reached between MCA and the supplier:
  - The part was modified from an existing part on STU by a part number or revision change, and the changes did not affect form, fit or function.
  - The part has less than 3 lots received within 6 months.
- For products shipped as complete, sealed, point-of-sale items from the supplier, MCA will determine if that product may be placed as STU immediately. This decision is based on the supplier test and manufacturing process/capability and availability of equipment to do meaningful testing.

If a supplier produces a part in more than one facility, each facility must qualify individually for STU.

Exclusions:
- Printed Circuit Boards (PCBs), mechanical assemblies, program ICs, and cables are excluded.
- Brokers are excluded.

8.2 Ship-to-Use Suspension

The supplier is placed on STU suspension when any of the following conditions occur:
- A lot fails an incoming inspection audit.
- A supplier-caused CPAR or DMR is initiated for an issue affecting form, fit, function, reliability, or customer acceptance.
- The supplier fails a quality management system assessment.
- A control plan audit shows the supplier is not following their approved control plan (if applicable).

If STU is suspended, MCA personnel investigate and determine whether the suspension extends to other part numbers/tools furnished by that supplier, issues a Corrective Action Request (CAR) if a CAR has not already been issued, and works with the supplier to correct the problem.

If a supplier does not implement effective corrective action, or if the supplier is put on suspension repeatedly, MCA determines whether the supplier's STU status should be discontinued. This decision may also include a decision to move the business to an alternate supplier.

9. Supplier Monitoring

MCA continually monitors its suppliers to ensure they continue to meet MCA's requirements, and to ensure that the supplier continues to ship acceptable parts. This may consist of:

- A quality management system surveillance audit at the supplier's facility
- An on-site audit of the supplier's control plan
- A random incoming inspection audit of a batch of product
- Source inspection of product at the supplier's facility
- Nth Article Inspection
- Review of supplier-furnished data packages
- A supplier progress review meeting conducted periodically at the supplier's site or MCA to review supplier performance and progress

9.1 Supplier Audits

Periodically, MCA may audit the supplier's quality management system. The supplier must make their facility available for on-site process verification by MCA personnel at any time, with reasonable notice. This may be a full or abbreviated documentation and on-site audit. The purpose is to evaluate any changes that may have occurred in the supplier's quality management system, and to assess the supplier's continuing commitment to quality improvement.

Periodically, MCA may also audit the supplier's continuing conformance to the control plan approved in the First Article process.

9.2 Inspection Audits

MCA expects its suppliers to furnish material that conforms to all requirements, and that does not need to be inspected when MCA receives it. Material that has not achieved Ship-to-Use status, or that is on STU suspension is inspected on a lot-by-lot basis. MCA uses a C=0 sampling plan (see example in Appendix 1) that rejects the entire lot when a single non-conforming part is found in the sample. At MCA's discretion, in order to meet production requirements, 100% sorting may be done as necessary at the supplier's expense.

MCA may inspect product at the supplier's facility to detect potential problems prior to shipment. MCA may also inspect product at sub-tier suppliers.

9.3 N^{th} Article Inspection

When required, the supplier must perform annual Nth Article inspections of each critical part to verify continuing conformance of the part to the specification. This is also required if an engineering change affecting form, fit, or function occurs. The Nth Article requirement is not applicable to non-critical parts.

For all sub-components, the manufacturing supplier is responsible to ensure that the components that make up each assembly are qualified and monitored through the supplier's own part qualification system.

At the discretion of MCA, Nth Article can be postponed beyond, or required prior to, the annual expiration. Considerations such as component volume, program life cycle and supplier/part performance are used in the decision to pull in or extend the requirement for Nth Article.

9.4 Supplier-Furnished Lot Documentation

MCA may require the supplier to furnish inspection, test, process performance, or other quality data with each shipment to ensure that the product meets MCA's requirements. When data submission is required, the data must accompany each shipment, or be e-mailed or faxed to MCA at the same time the lot is shipped. All documentation must be clearly identified with MCA's part number, and the supplier's lot number.

When specified by MCA, the supplier must submit monthly data packages. Data packages typically consist of copies of control charts and process capability calculations for specified characteristics.

Once the supplier has completed two consecutive quarters of data submissions, the supplier may request elimination of the data submission if records show that the characteristic consistently satisfies MCA's requirements for process stability and process performance, and if the characteristic has caused no problems in MCA's production. MCA will notify the supplier in writing if the data submission may be discontinued.

Appendix A

C = 0 SAMPLING PLAN

	.010	.015	.025	.040	.065	.10	.15	.25	.40	.65	1.0	1.5	2.5	4.0	6.5	10.0
LOT SIZE	**SAMPLE SIZE**															
2 to 8	*	*	*	*	*	*	*	*	*	*	*	*	5	3	2	2
9 to 15	*	*	*	*	*	*	*	*	*	*	13	8	5	3	2	2
16 to 25	*	*	*	*	*	*	*	*	*	20	13	8	5	3	3	2
26 to 50	*	*	*	*	*	*	*	*	32	20	13	8	5	5	5	3
51 to 90	*	*	*	*	*	*	80	50	32	20	13	8	7	6	5	4
91 to 150	*	*	*	*	*	125	80	50	32	20	13	12	11	7	6	5
151 to 280	*	*	*	*	200	125	80	50	32	20	20	19	13	10	7	6
281 to 500	*	*	*	315	200	125	80	50	48	47	29	21	16	11	9	7
501 to 1200	*	800	500	315	200	125	80	75	73	47	34	27	19	15	11	8
1201 to 3200	1250	800	500	315	200	125	120	116	73	53	42	35	23	18	13	9
3201 to 10,000	1250	800	500	315	200	192	189	116	86	68	50	38	29	22	15	9
10,001 to 35,000	1250	800	500	315	300	294	189	135	108	77	60	46	35	29	15	9
35,001 to 150,000	1250	800	500	490	476	294	218	170	123	96	74	56	40	29	15	9
150,001 to 500,000	1250	800	750	715	476	345	270	200	156	119	90	64	40	29	15	9
500,001 and over	1250	1200	1112	715	556	435	303	244	189	143	102	64	40	29	15	9

Sample

*Indicates entire lot must be inspected
NOTE: The Acceptance Number in all cases is ZERO.

Appendix B

ADVANCED PRODUCT QUALITY PLANNING (APQP)

MCA may require a detailed development plan from the supplier, based on the criticality of the part, or performance history, etc. MCA recognizes that communication between the supplier and customer during the APQP process is critical. Therefore, frequent meetings between the supplier and MCA are highly recommended and will be scheduled to review the supplier's APQP progress. The supplier should schedule these meetings through MCA Purchasing. Any issues that affect the program must immediately be brought to the attention of the proper MCA Purchasing Representative.

Advanced quality planning must include a review of all drawings; applicable specifications as well as other MCA supplied documentation. This is to ensure products are designed for manufacturability and assembly at a defect-free level and to ensure that these same products meet quality and reliability requirements. Reference: AIAG Advance Product Quality Planning.

Elements contained in the advance quality planning activities shall include but not be limited to:

- Key product/process characteristics
- FMEA
- Feasibility studies
- Control plans
- Process flow diagrams

- Packaging plans

MCA highly encourages the use of APQP methods and may specify their use as a corrective action requirement. In the event a supplier fails to meet MCA expectations, MCA may require as part of the corrective action the following elements of APQP:

Phase	Task
General	• Quality concept • Quality goals • Determination of the handling of faulty parts, analysis, report • Planning of Quality data reporting (SPC, faulty parts)
Design Definition	• Review of specifications • Design FMEA • Test concept (testing, ability, testing range • Special and Key characteristic identification • Packaging
Qualification of Product Process Definition	• Design Validation • Process FMEA

	• Logistic FMEA • Test Equipment FMEA • Control Plan • Planning of testing concepts (test equipment) • Planning of packaging, shipment, transportation
Qualification of Process	• Product validation • Capability studies (Cpk, Measurement System Analysis) • Release of production of testing equipment
Release Process	• PPAP procedure according to AIAG • Release of the production line (e.g. Run@Rate)

Appendix C

PRE-PRODUCTION APPROVAL PROCESS (PPAP)

1.0 PURPOSE

The purpose of Pre Production Approval Process is to determine if engineering design and specification requirements are properly understood by the supplier and that the supplier process has the potential to produce product consistently meeting these requirements during an actual production run at the quoted production rate.

2.0 APPLICABILITY

PPAP shall apply to suppliers of bulk materials, production materials, or production part unless formally waived by MCA.

2.1 GENERAL

Sample parts for PPAP are required to be numbered and labeled. Each of these individual samples requires a full dimensional layout according to provisions of section 4.1, unless otherwise indicated by MCA Supplier Development representative.

The supplier shall obtain full approval from the supplier product approval activity for:

a) New part or product.
b) Part or product modified by an engineering change.
c) Correction of a discrepancy on a previously submitted part.
d) Requirements of Section 4.1

NOTE: If there is any question concerning the need for production part approval, contact the responsible supplier approval activity.

3.0 PART SUBMISSION STATUS

3.1 Full Approval

The supplier is authorized to ship production quantities of the product subject to releases required by MCA purchase orders.

3.2 Interim Approval

The supplier is authorized to ship limited production quantities of the product subject to releases required by MCA purchase orders. Interim approval will only be granted when the supplier has:

a) An action plan agreed upon by MCA Supplier Development identifying the root cause(s) limiting full approval, specific actions and timing to address corrections. Re-submission to obtain "full approval" is required.

Material covered by an interim approval that fails to meet the agreed-upon action plan either by the expiration date or the shipment of the authorized quantity will be rejected. No additional shipments are authorized unless an extension of the interim approval is granted.

3.3 Rejection

Non fulfillment of the requirements specified in section 3.0. Correction shall be submitted and approved before production quantities may be shipped.

The supplier shall be notified by MCA of the submission disposition. After production approval, suppliers shall assure that future production continues to meet all requirements.

4.0 PRODUCT APPROVAL REQUIREMENTS

4.1 Product or Part Analysis

The supplier shall submit the following as required in a completed package (bound notebook with labeled sections), utilizing this index check sheet as guidance for the package. A PPAP package may be submit utilizing the suppliers internal documents (excluding sections # 1 and # 12), provided the documents are comparable to the ones provided in this index.

#	Requirement	Design Responsible	Design Excluded	Description
1	PPAP Approval Requirements Check Sheet (Form # QMS-F-0672)	Submit	Submit	Signify the availability of requirements with in the package.
2	Design drawings	Submit	Submit	Hard copy product drawings related to submitted product.
3	Design FMEA (Form # QMS-F-0673)	Submit	N/A	Recognition and evaluation of the potential failure of a product design and its effect. Categories include: Item / Function, Hypothetical Failure Mode, Hypothetical Effect(s) of Failure, Severity rating, Hypothetical Cause(s) / Mechanism(s) Failure Occurrence rating, Current Design Controls Detection rating, Recommended Action(s), Responsibility & Target Completion Dates. Design verification must be clearly identified in document.
4	Design verification plan & record (DVP&R) (Form # QMS-F-0674)	Submit	N/A	Functional Characteristics, Functional Requirements, Test type, Testing result, Accept / Reject, Remarks. A copy of specific design and material testing reports shall be made available to WN upon request.
5	Appearance Approval Report (Form #QMS-F-0675)	Submit	Submit	Applies to parts with color, grain, texture or surface appearance requirements.
6	Process Flow Diagrams (Form # QMS-F-0676)	Submit	Submit	A diagram that uses graphic symbols to depict the nature and flow of the steps (Inspections, Operations, Decisions, Inventory), in a process from receipt to ship.
7	Process FMEA (Form # QMS-F-0677)	Submit	Submit	Recognition and evaluation of the potential failure of a process/product and its effect. Categories include: Item / Function, Hypothetical Failure Mode, Hypothetical Effect(s) of Failure, Severity rating, Hypothetical Cause(s) / Mechanism(s) Failure Occurrence rating, Current Design Controls Detection rating, Recommended Action(s), Responsibility & Target Completion Dates.
8	Control Plan (Form # QMS-F-0678)	Submit	Submit	Itemized documented plan for control of the product characteristics and the associated process variables throughout the manufacture process to ensure capability and stability of the product over time.
9	Measurement System Analysis (Form # QMS-F-0679)	Submit	Submit	Verify the acceptability of all gauging used to measure the product during manufacture and all measurement data submitted through PPAP.
10	Master Sample Product, Dimensional, & Material Performance Test Results. (Form # QMS-F-0680)	Submit	Submit	A complete dimensional, functional, and material certificate of analysis supplied for each submitted item. As a minimum, 1 finished sample product from each machine, die, and mold cavity producing the item. Supplier may substitute the use of Eng. Drawing for measuring record.
11	Process Capability & Part Functionality Verification (Form # QMS-F-0681)	Submit	Submit	Minimum of 30 piece capability analysis of production process pieces from each machine, die, and mold cavity producing the item. Capability Hierarchy: Each key characteristic (KPC), identified by design drawings. If no KPC, each specifically tolerance characteristic identified on the design drawing. If no specifically tolerance characteristics, perform a dimensional analysis of length, width, height.

				As a minimum, 30 pieces from the capability analysis samples to be submitted for production verification runs at WNC.
12	Part Submission Warrant (Form # QMS-F-0682)	Submit	Submit	A document by which the supplier of a part gives evidence to the customer that they are able to satisfy the requirements of Delivery Date, Quality, Process Capability and Production Rate.
13	Qualified Laboratory Documents	Submit	Submit	Where external laboratories are used for verification of product, laboratory certifications and traceability to Nationally recognized organizations must be submitted.
14	Checking Aids / Tooling Drawings	Submit	Submit	List of tooling drawings, copy of attribute drawings and/or manufactured variable gages with visual work instructions for use that will be utilized.

Appendix D

Document History

Revision	Description of Change	Approved by	Date
A	Creation of document	Lee Arrowood (Signature on File)	6/1/2017
		Director of Quality	
		Richard Kelly (Signature on File)	6/1/2017
		VP of Supply Chain	
B	Added awareness of ethical behavior and product safety. Revised timeline for SCAR response.	Lee Arrowood (Signature on File)	1/15/2018
		Director of Quality	
		Richard Kelly (Signature on File)	1/15/2018
		VP of Supply Chain	
C	Added additional C of C requirements and AS9102 requirements	Lee Arrowood (Signature on File)	5/18/18
		Director of Quality	
		Richard Kelly (Signature on File)	5/19/18
		VP of Supply Chain	