



*SUPPLIER*

*QUALITY*

*MANUAL*

TABLE OF CONTENTS

	<u>PAGE NUMBER</u>
<i>FORWARD</i>	3
<i>KEYSTONE OVERVIEW</i>	4
<i>SUPPLIER QUALITY EXPECTATIONS</i>	5
<i>SUPPLIER ASSESSMENT</i>	6
<i>SOURCING PROCESS</i>	7
<i>CONTROL PLANS, PFMEA, GAGE R&amp;R'S</i>	8
<i>ISIR/PPAP</i>	9
<i>CHECKING FIXTURES, GAGES, TEST EQUIPMENT</i>	11
<i>NON-CONFORMING MATERIAL AND CORRECTIVE ACTION</i>	12
<i>PACKAGING AND TRACEABILITY</i>	14
<i>SUPPLIER SPECIFIC REQUIREMENTS</i>	15
<i>QUALITY CONTACTS</i>	16
<i>SUPPLIER DEVELOPMENT</i>	17

***FORWARD***

The information contained in this Supplier Quality Manual is for the supplier's reference to conduct business with Keystone Powdered Metal Company. The Supplier Quality Manual will help a supplier understand the way business and quality matters should be handled. The Supplier Quality Manual should not be copied or distributed without the expressed written consent of Keystone® Powdered Metal Company.

---

---

## **Keystone Powdered Metal Overview**

Keystone Powdered Metal Company (KPMC) is a leader in the Powdered Metal Industry with three manufacturing locations in the eastern United States. They include *St. Marys, PA, Cherryville, NC, and Lewis Run, PA*. KPMC employs over 400 people in the three sites, with most of the employees located in the St. Marys facility.

The St. Marys facility holds most of the engineering, sales, and quality organizations along with substantial research facilities. Its manufacturing capabilities include Powder Blending, Molding, Sintering, Sizing, Hot Forming, and a wide variety of Secondary Processing.

The Cherryville facility is a manufacturer for medium to smaller P/M parts, mostly bearings and smaller structural assemblies.

The Lewis Run facility is the newest of the KPMC locations. Opened in April of 1997, its function is to provide KPMC with expanded capacity in the production of low cost larger parts.

KPMC customers include most major automobile manufacturers and their suppliers, lawn and garden equipment manufacturers, and a variety of miscellaneous manufacturers. Some of its products include: Gears, Sprockets, Cam Lobes, and Bearings.

KPMC's Quality Policy is to "be a leading producer of powdered metal components. With a workforce committed to Continual Improvement, all expectations of our customers, external and internal, will be met or exceeded. We will consistently provide defect-free products and services on-time and at competitive prices."

KPMC maintains an open communication policy for all suppliers. KPMC feels that its suppliers are the life blood of its existence, and that supplier problems can and do occur. Suppliers should identify any problem that will affect quality or delivery as soon as it arises.

## **Supplier Quality Expectations**

KPMC's goal is to be compliant to a current release of TS-16949 technical specification. This aligns our quality system to the format, which the big three automakers have prescribed. KPMC requires that all of its suppliers, at a minimum, be working toward TS16949 certification. As a first step, suppliers should be compliant to a current release of ISO-9001 technical specifications

We expect our suppliers to follow our lead in consistently providing defect-free products and services, on time and at competitive prices. Suppliers should be continually improving all process and services subcontracted or supplied to KPMC, in an effort to support KPMC's quality policy.

Part or Material Requirements:

The supplier must be involved in and be able to produce the following items (upon request):

1. The supplier must monitor quality performance on an on-going basis and have an acceptable plan to improve quality.
2. The supplier must follow requirements of and participate in the AIAG advanced quality planning process on all new parts or materials, including the team feasibility review, when required.
3. The supplier must have all performance and material testing performed by a lab approved by an appropriate accrediting body (A2LA, Standards Council of Canada, ISO-9001, ISO/IEC 17025) when required.
4. The supplier must have an early production containment or pre-launch quality control plan for a minimum of 1200 pieces or a designated quantity/duration specified by KPMC when required. These are additional controls at startup and acceleration, which assures all potential failure modes have been addressed. An additional label and management signoff is mandatory.
5. The supplier must perform/participate in a run-at-rate process for all new parts/materials and major changes as required by KPMC or its customers.
6. The supplier must give the proper notification of all hazardous materials associated with any product or material supplied to KPMC.

## **Supplier Assessment**

Approval is necessary in order to receive any business from KPMC as a key vendor. This will require the following steps:

1. The Supplier must provide a copy of their ISO or TS Certification Certificates or receive a waiver by KPMC Management.
2. A survey may be sent to the supplier to be filled out and sent back to KPMC Quality Engineering. This survey will ask certain questions about your business and quality systems, and require the supplier to send a copy of the supplier's quality manual.
3. If required, the supplier will receive an audit notice. This notice will be sent to the supplier one to two months in advance, along with the scope of the audit.
4. If required, representatives from KPMC's Quality Engineering, Purchasing, and/or Engineering functions will complete the audit at the supplier's facility.
5. All audit information will be given to the supplier within a week after an audit, and if feasible, at the closing meeting.
6. If non-conformances are found during the audit, the supplier is required to submit a plan for countermeasures and completion dates. This plan is to be submitted within 30 days of receipt of request for countermeasures.
7. The vendor must complete all counter measures identified.

KPMC reserves the right to audit any supplier at any given interval. Audits will cover any element of the ISO-9001:2008 requirement deemed necessary by KPMC management. Audits will be performed according to KPMC's Supplier Quality Assurance Assessment. Registration to a recognized quality standard does not exempt a supplier from a customer conducted assessment, either business or quality related.

## **Sourcing Process**

KPMC's Product Engineers and/or Business Analyst determine if a subcontracted services or external supplied material is needed for the possible manufacturing of any new or old part or process. A Request for Quote (RFQ) is then sent to potential vendors. The Business Analyst and/or Product Engineer in consultation with the Purchasing Director choose the vendors who will receive the RFQ. . Priority is given to existing key vendors. The quote should be returned to Purchasing.

The Keystone Key Vendors list is a list of companies that supply goods/services that fall into one or more of the following categories: raw material (ultimately sent to customer), contact tooling, subcontractors, and gaging. An audit at the supplier's facility may be necessary to become an approved key vendor. It is also necessary to fulfill any corrective action request from these audits. Depending on severity, some corrective actions require a follow-up audit for approval. An audit and successful corrective action does not guarantee that a supplier will receive any business from KPMC.

Responding to a RFQ:

1. The bidder is required to respond to the RFQ by the requested date. Preference will be given to on time responses.
2. The bidder should quote exactly what is specified, including all quality requirements, specifications, and/or print dimensions. All *Exceptions* must be very clearly defined in writing.
3. The bidder is encouraged to review and comply with all information in the Quote package. Exceptions after the award of business will not be tolerated by KPMC.
4. The bidder is entitled to know the status of a bid. KPMC purchasing will be able to discuss with the bidder if they did or did not get the award. Any additional information will be given at the discretion of the KPMC Purchasing Department.
5. If the bidder decides to decline a quote, they should clearly state in writing 'NO QUOTE',.
6. If the bidder has an alternate proposal to KPMC's request, clearly state in writing 'ALTERNATE PROPOSAL'.

## **Control Plans, PFMEA, Gage R&R's**

The following is a list of specific requirements that all supplier could be asked to provide: Control Plans, Process Failure Mode and Effects Analysis, Gage R&R.

1. Control Plans are a systematic way of inspecting product through the production process. Key characteristics to the supplier's process are inspected at specified intervals. The goal is to produce a 100% defect free product. A control plan lists the stages of manufacturing and the different inspections that will occur at each station. Each inspection requires a gaging method, frequency of inspections, and a reaction plan. Additional information can be added to the control plan such as Statistical Process Control. For more information on Control Plans refer to AIAG Advanced Product Quality Planning and Control Plan-APQP or contact any KPMC Quality Engineer.
2. On some occasions, suppliers will be required to join in on the preparation of a Process Failure Mode and Effects Analysis (PFMEA). A PFMEA evaluates most possible failures of that process, and evaluates the failure based on the severity of the failure, the possible occurrences of the failure, and the inspection system's capability of detecting the failure. For more information on PFMEA refer to AIAG Potential Failure Mode and Effects Analysis- FMEA or contact KPMC Engineering.
3. The purpose of the Gage Repeatability and Reproducibility (R&R) is to identify the amount of measurement error associated with a particular gage - producing a quantitative confidence level which can be evaluated. This R&R value obtained should be the basis for decision on whether the gage should be replaced repaired, operators trained, or no action taken. There are many methods for performing an R&R study and also many ways of evaluating the results. The method of preference for KPMC is the Average and Range Method with Percent of Tolerance Analysis. KPMC requires the gage to be less than 10% error capable. If the gage error is between 10% and 30%, contact KPMC Quality Engineering for evaluation. Over 30% error is not permissible. Refer to AIAG Measurement System Analysis- MSA for further discussion on R&R and other measurement techniques.

## ISIR/PPAP

For every new part or service that a supplier submits to KPMC, an Initial Sample Inspection Report (ISIR) must accompany the sample. An ISIR is a confirmation of new parts and/or materials produced on mass production tooling. The parts and/or materials are to meet KPMC drawings and specifications. The ISIR can encompass the following:

1. First piece layout - 100% of all applicable specifications measured and reported of a specified number of pieces. Specifications to be identified on the KPMC drawing.
2. Material Certification - Materials are tested (whether internally at the supplier's location or at an independent A2LA laboratory) against the KPMC specification.
3. Capability Studies - Measurement of one specification for a minimum of 125 parts or tests (unless otherwise specified). All measurement to be recorded and submitted. Capability indices Pp and Ppk to be calculated along with the standard deviation and the mean of the measurements. Ppk must be  $\geq 1.67$ .

Production Part Approval Process (PPAP) is similar to an ISIR, but more extensive. PPAP is a 14 element submission that collects all of the necessary documentation. It requires a substantial amount of planning time and coordination. Unlike an ISIR, the PPAP has many living documents.

The default submission level for all PPAP's is level 3. A process change will mean updates to all applicable files. A KPMC representative will contact your company if PPAP is required. For more information on PPAP refer to AIAG Production Part Approval Process- PPAP.

The 14 elements normally submitted in the PPAP package are as follows:

1. The Warrant - The warrant includes background information such as; the part number, document revision level, supplier information, reason for submission, submission level, submission results, and supplier signature (the signature should be of someone at the engineering or management level). A completed Warrant is always included in PPAP package.
2. The Appearance Approval Report – This is a measurement of colors, textures, and appearance on parts or materials. In most cases, this will not be required in a PPAP package submitted to KPMC.
3. Sample Product - The sample purchase order should show the number of samples required for each PPAP order. We suggest that the suppliers keep a sample of the order for themselves, for further review at a later date.
4. Design Records - Any tooling print associated with the production of a new product or service. KPMC does not require you submit this with the PPAP package, but does require it to be available upon request. These prints are only items that are part/service specific.
5. Change Documents - Any change that the supplier has initiated, and has received written approval for. All documents of this type must be included in the PPAP package.
6. Dimensional Results - A minimum of 3 pieces must be laid out on the print with numeric identifiers for each applicable dimension. The results should be listed on a separate document by numeric identifier. All applicable notes should also be included. Results and marked up print must be included in PPAP package.
7. Checking Aids - Fixtures, models, templates, mylars, etc., specific to the part being submitted, used in inspecting or testing will be retained by the supplier and available for KPMC review.
8. Test Results - Are the material tests with the required chemical composition, and any physical requirements deemed necessary by KPMC Engineering. An A2LA accredited laboratory should

---

perform all tests, if they are unable to be completed at the supplier's facility. Any requirement of this type must be included in the PPAP package.

9. Process Flow Diagrams - A mapping of the process from start (usually raw material) to finish (completed part or material). Each process step, including inspection must be mapped. This requirement is always included in a PPAP package.
10. Process FMEA - If a FMEA is required, it must be submitted in the PPAP package.
11. Control Plan - Control plans are always required in PPAP package.
12. Process Capability Studies - See item ISIR #3 above. Mandatory in PPAP package. Ppk must be  $\geq 1.67$ .
13. Measurement System Studies – These are usually submitted in the form of Gage R&R's (sometimes linearity and stability). Reference item #3. Gage R&R's are to be completed on all critical characteristics that require capability studies. Gage R&R's are always required in a PPAP package.
14. Design Engineering Approval - Engineering approval, when required, on the customer's part drawing or specification. Must be submitted with the PPAP package.

Once a supplier has received ISIR/PPAP approval, no changes in raw material supply, manufacturing location, or manufacturing methods can be made without KPMC approval.

## **Checking Fixtures, Gages, Test Equipment**

KPMC requires suppliers to have sufficient measurement capability to inspect subcontracted/supplied products and services. KPMC requires that these gages be in good working order and that they are calibrated to a national or international standard (minimum yearly). We also require that the Gage Repeatability and Reproducibility be under 10% error (See Gage R&R in the AIAG MSA Documentation/ Tests Section). All gages for Geometric Dimensioning and Tolerancing should be designed per ASME Y14.5M-2009 unless otherwise notified by Keystone Engineering. Operators must be properly trained and documentation of their skill level must be available to KPMC upon request. Checking fixtures, gages, and test equipment shall not be changed without the written approval by KPMC Quality Engineering.

On occasion, gages will be sent to suppliers for use in inspection. These gages are the property of KPMC and under the control of KPMC's Gaging Department. Specific instructions will be sent with each gage. If any questions or problems arise in the use or function of any received gage, feel free to contact KPMC's Gage Department Supervisor. Supplier is responsible for any damage to gages in their possession. Any damage by the misuse or improper packaging of any gage will result in the supplier's reimbursement for the gage. Gages are to be returned in working condition and clean. Calibration in most cases will be done at KPMC in St. Marys, PA. If the supplier is responsible for calibration, specific instructions will be given to the supplier to accurately calibrate the gage.

## **Non-Conforming Material and Corrective Action**

In the event that defective parts/materials are shipped to KPMC, a KPMC representative will contact you.

Corrective Action is to happen immediately with the following countermeasures:

- 1 The supplier should take immediate actions for containment of parts or raw material at the supplier's facility. All suspect product must be segregated from other production. An immediate sort of the material (if possible) should occur. The supplier must inform KPMC if any suspect parts are potentially in-transit to KPMC.
- 2 KPMC Quality Engineering may require certified shipments until permanent corrective actions have been implemented.
- 3 The supplier is required to assist in sorting inventory at KPMC when requested by KPMC Purchasing. If KPMC is required to rework/sort any non-conforming parts or product at KPMC or KPMC's customer, KPMC may charge the supplier for this rework/ sort activity.
- 4 If any part is found to be non-conforming, the supplier is responsible for repairing or replacing the part. Rework of such part may be required at KPMC or at the supplier's facility. Before any rework is instituted, KPMC Quality Engineering or Engineering must approve the rework and marking methods.
- 5 Corrective Actions Reporting:
  - 5.1 The form used for reporting is optional. An 8-D corrective action form is included in this manual as a guideline for response. Another example of report format is 7-D Analysis.
  - 5.2 Regardless of the report format, the response to the failure must include the following:
    - Part Number, Part Name, KPMC Material Number, Supplier Name.
    - Initial Actions taken at the supplier's facility, including sort results, rework results, and certification mark used for certified shipments, sorting/rework completion date (as applicable).
    - Supplier's investigation details, including a confirmation of the defect mode and of the detection of the defect before corrective actions have taken place, along with any other steps taken to investigate the problem.
    - Root Cause(s) for the defect and for the non-detection.
    - Corrective Actions for the root cause and for the non-detection including implementation date for each corrective action.
    - Standardization of process documentation, indicating documentation affected and implementation date; if no standardization, explain reason(s).
    - Review of similar parts or processes that may be affected by implementation date(s) for corrective actions or reasons no corrective action(s) are needed.
  - 5.3 The supplier's Quality Assurance Manager must approve the response. The supplier may decide any other appropriate signatures.
  - 5.4 The response should be sent to KPMC Quality Engineering by the Due Date, whether or not the permanent corrective actions have been determined.

- 
- 
- 5.4.1 If the response is not a final response (lacking permanent corrective actions), the supplier should indicate it is an initial response. It is not necessary for an initial response to include section 5.2 above.
  - 5.4.2 Temporary corrective actions must be reported, along with a scheduled date for permanent corrective actions to be reported.
  - 5.4.3 The supplier should follow up with KPMC Quality Engineering and report permanent corrective actions as scheduled.

**NOTE: IF THE SUPPLIER FINDS DEFECTIVE PART(S) AT THEIR FACILITY, KPMC QUALITY ENGINEERING MUST BE INFORMED OF THE POTENTIAL FOR THIS PROBLEM TO SPILL TO KPMC.**

**Packaging and Traceability**

Packaging

Packaging must be sufficient to guarantee safe arrival to KPMC. Packaging should also be kept to minimal size necessary to guarantee safe arrival to KPMC. .

Each label must provide the following information:

- KPMC Part Number, or Material Number
- Purchase Order Number
- Vendor Traceability Number (ex: lot or order number)
- Quantity Shipped (lbs, # of parts)
- Date Shipped
- If the product is a sample, clearly mark 'SAMPLE' on the package

Traceability

- The supplier must have a system that ensures documentation retention for a specified amount of time. This time is usually 3 years and in some cases is for the life of the part/material used plus 1 year.
- The supplier must ensure that documented systems are in place at all sub-suppliers to control traceability of all critical components to raw materials and date of manufacturer.

## Supplier Specific Requirements

### Raw Material Suppliers

#### Oils and Chemical Suppliers

KPMC requires oil suppliers supply a Certificate of Analysis with each shipment.

#### Powders Suppliers

Chemical analysis of each lot shipped to KPMC is required, and certification against the KPMC specification is required with the shipment (or faxed to the appropriate KPMC representative).

#### Tooling and Equipment Suppliers

Dimensional analysis similar to First Article Layout (in ISIR section) on all dimensions. Stability studies of the gaging system could be required. KPMC Engineering will prescribe all necessary checks of capacity and quality for each new machine purchased.

#### Subcontracted Services

100% Inspection -- SPC requirements such as p, u, np, c charting could be required. Also capability studies and analysis could be required. Inspection equipment per Check Fixtures, Gages, and Test Equipment.

Machining -- ISIR/PPAP (PPAP when required-ISIR at a minimum). Quality system to conform to ISO-9001:2008.

Finishing (Mechanical, Coatings) -- ISIR/PPAP (PPAP when required-ISIR at a minimum). Quality system to conform to ISO-9001:2008. Self assessment to CQI-11 or CQI-12 could be required.

Laboratory -- A2LA or ISO/IEC 17025 certification will be the preference for KPMC. If lab work cannot be completed by a certified lab, additional labs may be used.

## Quality Contacts

The following is a list of contacts for the different KPMC facilities:

Outsource Coordinator Location: St. Marys	P (814) 781-4409 F (814) 781-4278
Purchasing Agent Location: St. Marys	P (814) 781-4229 F (814) 781-4563
Gage Department Supervisor Location: St. Marys	P (814) 781-4487 F (814) 781-4563
Corporate Director of Quality Location: St. Marys	P (814) 781-4247 F (814) 781-4564
Product Engineering Manager Location: St. Marys	P (814) 781-4203 F (814) 781-7648
2nd Shift Contact-St. Marys	P (814) 781-1591
3rd Shift Contact-St. Marys	P (814) 781-1591
Quality Manager Location: Cherryville	P (704) 435-4036 F (704) 435-8132
Quality Manager Location: Lewis Run	P (814) 368-5320 F (814) 368-5729

**Supplier Development**

It is our duty to assist our suppliers in their pursuit for registration. We are willing to aid in any possible way to help our suppliers to become certified to ISO-9001:2008. This could include help with formulating the documentation, training on the individual requirements of the standard, and independent auditing of your Quality System. We feel this will help in developing a partnership and open a line of communication between our companies.

---