Supplier Quality Manual

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1. Bracalente Quality Policy

Bracalente strives to work with our employees and our suppliers in an environment of continuous improvement to provide our customers with an optimized total cost solution for machined parts and assemblies. This total cost solution leverages Bracalente's domestic and global capabilities, including global inventory systems, to provide cost effective, quality parts, delivered on time.

2. Purpose

This manual describes the fundamental elements comprising the Bracalente Supplier Quality Management System. It was developed to effectively communicate the expected interaction between the Bracalente Manufacturing Group and our suppliers.

3. Scope

This manual applies to all suppliers that provide production material or who provide outsourced processes to Bracalente.

4. Expectations

The expectation is that when our suppliers accept a purchase order they will work in good faith to comply with the requirements of the purchase order along with the requirements as set forth in this manual.

5. Supplier Qualification Requirements

Supplier qualification ensures that the supplier has the basic elements in place to:

1. Strategically manage the business
2. Produce parts with consistent quality
3. Deliver parts consistently on time
4. Become more efficient over time (therefore reducing cost over time)

Bracalente considers a culture of strategic management in combination with an AS9100 or ISO 9001 quality system and a Lean Production system to be the ideal combination for its suppliers. Suppliers who are currently certified to AS9100 or ISO 9001 will be considered as meeting the qualification requirements. Suppliers who are not certified to AS9100 or ISO 9001 will be assessed via the Bracalente Supplier Quality Survey. This assessment may take place as a self-assessment or through an on-site audit.

6. Production Part (or Special Process) Approval Process (PPAP) Requirements

The disciplined use of the production (or process) approval process ensures the complete development of an effective manufacturing system for a part. Specifically that the:

- Supplier has the required information to consistently produce quality parts
- Part/process learning happens before the start of production
- Process is stable and is capable
- Material handling, packaging, and labeling requirements are fully in place and understood.

6.1 Part Approval Check Sheet/Purchase Order Required Items

The Part Approval Check Sheet, as applicable, can be issued with the initial purchase order to communicate all part qualification requirements relevant to a specific part or part family.
The initial part submittal must be accompanied by all elements identified on the Part Approval Check Sheet or as listed requirements on the purchase order. Questions from the supplier for any element should be discussed with BMG Sourcing and/or Quality.

6.2 Sample Parts

As applicable, the supplier must:

- Provide sample/First Article parts as specified on the purchase order. Sample parts must come from the production tooling and/or processes unless otherwise approved in writing. Where multiple production molds, cavities, dies, machines, tanks, etc., are utilized, samples are required from each.
- Complete the dimensional analysis and performance test reports as required, and provide it with the sample parts (Initial Sample Inspection Report, ISIR)
- All results must be traceable to the specific samples from which obtained.
- Dimensional results may be reported on BMG Operational Method Sheets in lieu of an ISIR form.
- BMG may verify sample results by doing a First Article/ISIR at BMG on the sample parts prior to releasing the supplier for production.

6.3 Material Test Results

Material Certifications must be supplied with the shipment if the material was not supplied by BMG. If required, a qualified, independent lab must supply certified material test results.

6.4 Key Characteristics (KCs)

A key characteristic is any feature of a material, process, or part whose variation within or outside the specified requirement has a significant influence on product fit, form, function or other expected deliverable. KCs will be identified by BMG.

6.5 Process Studies

For all key characteristics, an acceptable level of process capability or performance must be determined prior to production. Initial process studies, often referred to as short-term or preliminary studies, refer to assessments of the manufacturing process based on data collected over a short period of time, usually less than 30 days or from one operating run. The collection of this data should consider the type of process and production level. Data should be analyzed with control charts. Based on the capability study analysis and method for sampling, a minimum value of 1.33 Cpk is required. If acceptable process capability/performance cannot be obtained a Corrective Action Plan and a revised Control Plan must be developed by the supplier and approved by BMG. Acceptable interim controls require 100% inspection or other means agreed to. Such controls must remain in place until capability can be demonstrated.

Long-term process capability studies consist of data collected over a longer period of time or multiple production runs. The studies reflect all possible types of normal variation found in the manufacturing process, such as material, method, personnel, fixtures, equipment, tool wear, and environment. The period of time should be long enough to include all expected sources of variation. Process capability is defined when the control charts for this interval show the process to be in statistical control. Based on customer requirements, BMG may require long term process capability data to be gathered and reported on.

6.6 Gage Repeatability and Reproducibility (Gage R&R)

Gage repeatability and reproducibility analyses measure the total repeatability and reproducibility of a gage system as a percentage of the total specification.
As applicable, Gage Repeatability and Reproducibility analyses should be completed for all variable gages that are used to monitor key product or process characteristics. 20% Gage R&R is the maximum limit that is allowed.

6.7 Process Flow Diagram

The process flow diagram is a schematic representation of the current or proposed process flow. The supplier shall have a process flow diagram that clearly describes the production process steps and sequence beginning at material receipt through packaging and shipping. Where process steps include operations performed by outside sources, these steps need to be identified within the diagram.

6.8 Process Failure Mode and Effects Analysis (PFMEA)

The Process Failure Mode and Effects Analysis (PFMEA) is a preventive analytical technique to methodically study the cause and effects of potential failures in a process. The process is examined for all the ways in which a failure can occur. For each potential failure, an assessment is made of its effect on the system and its seriousness, and a review is made of the action being taken (or planned) to minimize the probability of failure or to minimize the effects of the failure.

The PFMEA is a living document and shall be revised as changes are made to the product or process.

6.9 Control Plan

The Control Plan is a detailed, process step-by- process step listing by which the part is to be manufactured, inspected, and tested. The control plan outlines the process monitoring and control methods that will be used to control characteristics.

6.10 Material Handling, Packaging, Labeling, Shipping

As part of the production approval process, material handling during production processing and during shipping must be analyzed and defined. Part protection which effectively manages metal-to-metal contact and rust, is to be developed. Containers that effectively deliver the parts to the customer's "point-of-use" need to be defined. When specified, BMG formatted labeling which employs bar coding is to be used. When required, material handling, packaging, labeling and shipping requirements will be forwarded with the purchase order.

7. Repeating Order Requirements

For specific orders ongoing quality requirements can exist such as:

- submittal of sample parts with a dimensional analysis
- submittal of material certifications
- submittal of special process certifications (i.e., heat treat, plating)

These ongoing Quality requirements will be communicated through the purchase order.

8. Change Management

The culture of continuous improvement drives changes to the design of parts and processes. The supplier is expected to have effective systems in place to manage part or process changes. The current purchase order and any documents supplied with the purchase order will completely define the part requirements. Any changes to the part requirements will be communicated through an updated purchase order and the supplier may have the opportunity to communicate the impact of any change.

To manage part design changes the supplier is expected to check that:

- the part requirements listed on the current purchase order match the part requirements used to develop existing processes
- the revision level of any documents supplied with the current purchase order match the revision level of the documents used to develop the existing processes.

Any process changes at the supplier (for example, when parts are going to be processed on a different machine group) must be communicated to BMG and an updated PPAP may be required

to be submitted. In these cases the supplier should contact BMG to coordinate the management of the process change.

9. Management of non-conforming product

Suppliers do not have Material Review Board (MRB) authority and all non-conformances must be communicated to BMG. No Rework or Repair is allowed unless authorized by BMG. BMG uses the 8D Process to contain the issue, analyze and drive corrective action/improvements to the supplier's process. Initial responses to the 8D are expected in 4 weeks with a validation of the actions taken due with the receipt of the next order. In cases where the response will take longer the supplier should contact BMG to discuss. In cases where there is an ongoing, chronic quality issue, BMG will request that the supplier submit a final inspection report with each order submitted, which will include a dimensional analysis, using a C=0 inspection plan at a AQL level of 1.0. Upon resolution of the issue and demonstration that the process is again capable this requirement will be dropped.

In critical cases BMG reserves the right to send quality personnel to the supplier to participate in the final inspection and to participate in the process improvement activities.

10. Supplier Performance Management

The Bracalente Business System is based on the principle of continuous improvement. As such Bracalente strives to work with our employees and our suppliers in an environment of continuous improvement to provide our customers with an optimized total cost solution for machined parts and assemblies. BMG will look for opportunities to work "in an extended team framework" with our supplier's to establish strategic capabilities valued by our joint customers. Therefore BMG seeks suppliers who also value working in an extended team framework.

11. Records Retention

The supplier shall contact Bracalente to determine the records retention policy for the parts being processed. Unless otherwise specified, retain records for a minimum of 10 years.

12. Right of Entry

The supplier shall grant access as needed to the business for the purpose of audits or inspections. These visits might include FAA personnel or End Use Customers in addition to Bracalente staff. The time of the visit will be agreed upon by all parties.

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