

Supplier Advanced Quality Practices

SR-002

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Manager Supply Chain Quality**

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REVISION RECORD

The latest issue of this manual may be confirmed by viewing the **“Suppliers”** web site (address shown on the cover).

Revision	Date	Revision	Date	Revision	Date
Rev NC	11 Nov 2011				
Rev A	13 Mar 2012				

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Description of Changes

Revision	Date	Area Changed	Reason for Change
NC	11 Nov 2011	NA	Original Issue
A	13 Mar 2012	Para 4.0, 4.1 & 4.2	Removed Flow down Document

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Attachment 1 Primus International Auburn Division: Supplier AQP Assessment Checklist

Introduction

Recognizing that variability of supplied products and services has a direct affect on our internal processes, Primus International – Auburn Division views the implementation of Advanced Quality Practices (AQP), including variability reduction and process control, as standard practice in our requirements with, and development of, our supplier base.

The goal is to develop a supplier base that is capable and reliable in providing Primus International – Auburn Division with “Best Value” products and services. The focus is on defect prevention rather than defect detection. In order for this to be successful, this must include the flow down of AQP requirements to Primus International – Auburn Division suppliers.

Primus International – Auburn Division also believes that the supplier base benefits from the implementation of Advanced Quality Practices by improving customer satisfaction, reducing scrap, rework and inspection costs through reduced inspection and/or sampling. Reduction and/or elimination of some inspection requirements are a reasonable goal when key characteristics and inspection requirements are aligned.

It is through teamwork and cooperation that Primus International – Auburn Division can remain competitive in a changing market where customers are demanding higher quality at a lower cost.

Primus International – Auburn Division has developed an assessment checklist used to assess the supplier to the requirements of this document (see attachment 2).

The results of these assessments will also be used as criteria for consideration in other Primus International – Auburn Division rating systems and programs (i.e. Primus International – Auburn Division Delegated Acceptance Program, etc...). Supplier support of the requirements set forth in this document will have bearing on source selection for long term purchasing agreements.

Typically, the assessment expectations are commensurate with the size of the supplier, complexity of the products produced, key characteristics identified, and the supplier’s strategic relationship to Primus International – Auburn Division.

A Primus International – Auburn Division Supplier AQP Assessment Checklist and Assessment Scoring Instructions for the Supplier AQP Assessment Matrix are included with this document and define the specific system elements necessary to satisfy the requirements specified herein.

1.0 Policy

1.1 The contents of this document specify the Advanced Quality Practices requirements for suppliers of products and/or services to Primus International – Auburn Division.

1.1.1 The requirements of this document apply when imposed on the purchase order, subcontract or inter-divisional work order.

1.1.2 The requirements of this document shall be in addition to all other purchase order requirements.

1.1.3 Approval of a supplier's Advanced Quality Practices does not relieve the supplier of complying with the basic quality system requirements as specified in the Primus International – Auburn Division Supplier Quality Assurance Requirement (SQR).

1.1.4 Primus International – Auburn Division reserves the right to modify, amend, or revise the requirements set forth, as required.

1.2 Supplier shall implement the Advanced Quality Practices as defined within this document when the PO contract specifies that any of the following conditions apply:

1.2.1 When a Primus International – Auburn Division key characteristic is identified and contractually flowed to the supplier.

1.2.2 When a Primus International – Auburn Division customer has identified key characteristics on drawings or specifications which is usually identified by a Flag note Key, or KC

1.3 Supplier is required to achieve and maintain a minimum Cpk value of 1.33 for Primus International – Auburn Division identified key characteristics unless otherwise specified by the contract.

2.0 Supplier Advanced Quality Practices Assessments

2.1 Assessments (initial and recurring) using the Primus International – Auburn Division Supplier AQP Assessment Checklist will be used as the measure of compliance and approval to the requirements of this document. The scoring by level is summarized on the Assessment Scoring Summary Sheet. The supplier will be advised of the results and corrective action will be requested as required. The Supplier Quality Manager reserved the right to waive the Supplier Advanced Quality Practices assessments at any time.

2.2 The purpose of the assessment is to gage the implementation of AQP and key characteristics support capabilities. The assessment will be used primarily to gage a supplier's capability to manage KC requirements (prior to contractual flow down) from Primus International – Auburn Division, and is intended to be a reasonable and responsible flow down of AQP and KC management requirements.

2.3 The Primus International – Auburn Division Supplier AQP Assessment Checklist combines the requirements of this document into nine categories. The categories are further divided into two levels, "Level 1" and "Level 2".

2.3.1 Level 2 requirements are expected of all Primus International – Auburn Division suppliers. In addition to level 1 requirement, this level adds the elements necessary to sustain the management of key characteristics and provide the structure for continuous improvement.

2.4 Suppliers are encouraged to perform on-going self assessments in order to assure continuous compliance with Primus International – Auburn Division AQP requirements.

3.0 Supplier Key Characteristic Flow Down via Purchase Order

3.1 In support of the flow down of key characteristics to our suppliers, will be call out by each character for that Part Number on the Purchase Order. The and associated documents clearly define Primus International – Auburn Division expectations and requirements for consistency in measurement location and measurement methods at the supplier. Additionally, this allows Primus International – Auburn Division to rate supplier capabilities in support of Primus International – Auburn Division supplier assessment criteria.

3.2 Typically, the Purchase Order will contain the following information:

- KC feature dimensions
- Drawing and sheet and location of KC

4.0 Supplier Reporting Requirements (Data Reporting Requirements)

4.1 The supplier is required to report their AQP and key characteristics implementation status when a Primus International – Auburn Division key characteristic has been flowed down. When the cpk value is less than 1.33, the supplier must report on a quarterly basis by the 15th of each preceding month (e.g. 1st Qtr 2012, data must be submitted before Apr 15, 2012) and must have at least 30 data points. The Supplier must report the following by the 15th of each month and email Control Charts for each Key Characteristic.

P/N	KC #	cpk value	Key Characteristic in Control	Improvements
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4.2 The supplier may be required to provide copies of additional data not identified in the PO at the request of Primus International – Auburn Division or its customers. Primus International – Auburn Division will coordinate the requirements with the supplier, and when practical, shall request data at the supplier’s convenience.

5.0 Supplier Advanced Quality Practices Requirements

The following paragraphs correspond to the elements in the Supplier AQP Assessment Checklist and provide a detailed explanation of the requirements

5.1 Management Commitment :

5.1.1 Suppliers are required to have a published AQP procedure signed by senior management

5.1.2 Suppliers are responsible for establishing an AQP/SPC coordinator/focal point. Responsible person shall have a background and or training in AQP methods including SPC. The responsibility for AQP/SPC coordinator/focal point shall be clearly designated within the supplier’s organization and the departmental functional relationships described. Ultimately, the manufacturing department shall own the AQP implementation and be responsible for the status

of SPC applications/projects.

5.1.3 Suppliers shall establish and maintain an implementation plan that supports the incorporation of the Primus International – Auburn Division requirements.

5.1.4 Suppliers shall support the established AQP policy and implementation plan through a cross functional AQP Management Team. Ongoing meetings should be established to monitor progress towards goals and objectives of AQP implementation plan. AQP shall be implemented into top level company strategies and link manufacturing goals to AQP performance.

5.2 Procedures and Documentation

5.2.1 All key characteristics must be documented on a control plan. The control plan shall contain all necessary, pertinent information to control key characteristics. Such information must include, but not limited to:

- a. Description of the Key Characteristic
- b. Engineering Specification
- c. Manufacturing sequence where measured
- d. Control Chart Type
- e. Sampling Size and Frequency
- f. Process Capability value when assessed
- g. Gauging method and capability
- h. Process parameters and settings

5.2.2 A process flow diagram that describes the manufacturing process should be developed for each process that has a key characteristic and include relevant operations such as machining, assembly, inspection, SPC data collection, transportation, etc... Important process parameters such as temperatures, machine feeds and speeds, should also be noted on the process flow and provide easy access to valuable information for common understanding.

5.2.3 The supplier should have either a process or procedures which define their Advanced Quality Practices. Adequate procedures are required to support the following elements:

- a. Training
- b. Implementation Strategy
- c. Roles and Responsibilities
- d. Continuous improvement policy and approach
- e. Key Characteristic selection criteria
- f. Control Plans
- g. Record Retention
- h. Control Chart selection
- i. Cause and Corrective Action plans for Special causes of variation
- j. Process regarding out-of-control conditions and KC data analysis
- k. KC Flow – internal and external
- l. Gage variation guidelines

5.2.4 Supplier KC Documentation: All Key Characteristics (Customer and Primus International defined) shall be documented on process flow diagrams or equivalent, control plans, and Manufacturing Documentation (traveler, shop order, planning, etc..)

5.3 Training

5.3.1 Personnel involved in control charting identified KCs are trained in SPC techniques or OJT SPC training is provided. Appropriate personnel include, but not limited to, operators, inspectors, supervisors, and support personnel.

5.3.2 The must have a training program that at a minimum, addresses each of the AQP requirements as defined within this document. The supplier must maintain a training schedule that includes objective evidence of attendance.

5.3.3 Advanced Statistical Techniques: Education in advanced statistical techniques is available to appropriate personnel.

5.4 Key Characteristics: Defined as product features or process parameters whose variation has the greatest impact on the fit, form, function, performance, or service life of the finished part from the perspective of the customer. They are used to help decide where to apply variability reduction activities considering most cost effective use of resources. Key Characteristics include those defined by our customer and those identified internally by Primus International – Auburn Division via the Supplier Key Characteristic Flow-Down Document (SKCFD). Suppliers are encouraged to identify process Key Characteristics for controlling product variability whenever possible.

5.4.1 The requirement to measure key characteristics must be noted in the manufacturing plan or shop traveler and be traceable to the control plan, engineering drawings, and or Supplier Key Characteristic via Purchase Order. Key characteristics should be measured at the earliest possible point in the manufacturing process.

5.4.2 Internal and External KC Flow-down: Customers and internally identified KCs must be flowed down internally and externally. The supplier must be contractually flow down key characteristics to sub-tiers when any of the following conditions exist:

- a. The key Characteristics feature is produced by a sub-tier.
- b. The ability to control a KC is dependent upon relevant processes and their associated parameters at a sub-tier.

5.4.3 Suppliers shall utilize cross-functional teams to establish internal key characteristics through a structured approach. Teams should use standard AQP tools and consider KC selection criteria.

5.5 Improvement Tools

5.5.1 Process owner teams must exist to improve processes and products. Teams shall utilize Advanced Quality Practices tools and techniques to study and improve key processes and products.

5.5.2 The supplier must control key process parameters and setting which could affect the process stability. Such controls may include operator instructions, “mistake-proof tooling, in-process audits, machine speeds, cutter life expectancy, etc... Applicable process parameters and their setting must be documented on the supplier’s manufacturing plan.

5.5.2.1 The supplier shall use the information in the Supplier Key Characteristic Flow-down Document for planning and implementing their own key characteristics.

5.5.3 Gage variation studies (Gage R&R , gage capability) must be conducted when investigating common cause variation or as otherwise required. Gage variation should be less than 30% to have an effective measurement system.

5.6 Control Charting

5.6.1 Control Charts shall be maintained in a real time mode by the process owner. Charts shall be available for audit at specified workstations at the time of production run. These charts must also be available for periodic review when requested by the buyer or Supply Chain Quality Manager periodic Supplier performance review meetings.

5.6.2 Special Cause variation must be noted on control charts and investigated.

5.6.3 The supplier shall utilize control charts that are best suited for the manufacturing and non-manufacturing process that produces the key characteristic feature. Proper chart selection will depend on such factors as quantity of part numbers, volume of work, quantity of dimensions, similarity of engineering tolerances, similarity of standard deviations and number of work stations. Variable control charts must be used when possible. When help is needed, suppliers are encouraged to contact Primus International – Auburn Division Supply Chain Quality Manager for assistance.

5.7 Key Characteristic Data Analysis

Processes that produce key Characteristic must be in statistical control. A minimum of 20 points that represent the full output of the production processes are required before control limits can be established. A key characteristic will be considered in statistical control if the plotted points do not fall outside the control limits.

5.7.1 When a key characteristic is not in control, special causes of variation must be investigated and eliminated, procedure. Special causes are indicated by points which fall outside the control limits. Actions to correct special causes must be documented. This can range from annotating fixes or adjustments directly on the control chart, to the use of more elaborate systems. If the reason for a special cause cannot be assigned, then other sources of variation must be investigated. These may include, but not limited to, gage variation, accuracy

of the data reporting, proper control charts selection, etc... Process tampering or over-adjustment is not permitted. Tampering is the term used to describe making adjustments or changes without taking into account the natural variability of the process. Tampering makes it difficult, if not impossible, to understand the natural variability, identify special causes and maintain control of the processes. Once a special cause of variation has been identified and corrected, it must be removed from the control limits calculations. Any points removed from calculation do not contribute to the minimum of 25 points.

5.7.2 Process capability must be maintained for all Key Characteristics. A process must be in statistical control before capability can be assessed. Capability must be reassessed when process changes have been made. All processes which produce customer identified and or Primus International – Auburn Division (SKCFD) key characteristic must be capable to the requirements identified on the contract. The process capability index (Cpk), will be used for this purpose. The formula for determining the Cpk Value is as follows:

$$\text{Cpk} = \text{Smaller of : } \frac{\text{USL} - \text{Mean}}{3 \text{ standard deviations}} \quad \text{or} \quad \frac{\text{Mean} - \text{LSL}}{3 \text{ standard deviations}}$$

Capability results shall be assessed by the supplier for improvement

5.8 Process Improvement

5.8.1 Control Charts and or their associated Cpk's are monitored for improvement and are regulatory reported to internal and external customers. When a supplier cannot demonstrate that the process which produces a Key Characteristic is capable, common cause variation must be identified and reduced. Common cause variation may be attributed to gage capability, process parameters and their settings, or initial process selection. The identification and reduction of common causes at times may be difficult and may require analysis using statistically Design of Experiments (DOE). Before investigating common cause variation, a supplier must conduct a Gage capability study (Gage R&R) as noted in paragraph 5.5. Gauging capability shall be expressed as a percent of the engineering tolerance consumed by variation in gauging method.

5.8.2 The supplier shall maintain a permanent record of information and "lesson learned" from application of AQP to Key Characteristics. This information shall be reviewed for planning and establishing controlled processes for subsequent key characteristics. Information contained in the process knowledge database should include:

- a. Part numbers affected
- b. Key and non-key characteristics studied
- c. Machinery and or equipment used and their capabilities
- d. Results of gage variation studies
- e. Process description: flow charts, operator instructions, reference to specifications and standards
- f. Process Capability information or Process parameters and settings

5.9 AQP Flow Down

5.9.1 Flow down Procedure: The suppliers Advanced Quality Practices must have provision for the flow down of key Characteristics. The system for flow down of key characteristics shall be included in the Advanced Quality practice processes and be applicable to all customer and Primus International – Auburn Division (SKCFD) identified key characteristics. AQP assistance shall be provided to sub-tiers when appropriate.

5.9.2 The supplier must levy the requirements of this document on the sub-tiers who have key characteristics flowed down as a result identified by Primus International – Auburn Division (SKCFD) or its customers.

5.9.3 An assessment of sub-tiers advanced quality practices must be accomplished by the supplier. Documentation of assessment matrixes surveys or audits must be maintained and is subject to review by Primus International – Auburn Division or its customers.