CNC Vendor Quality Control Steps

Purpose: To define the minimum quality control requirements and procedures to be followed by CNC machining vendors prior to shipping parts to our offices, ensuring strict compliance with engineering specifications and zero-defect deliveries.

Review Requirements → **Verify Material & Setup** → **Run FAI** → **Perform In-Process Checks** → **Final Approval** → **Package & Ship**

1. Scope

This document applies to all external vendors, contractors, and suppliers providing computer numerical control (CNC) machining services. The procedures outlined herein cover the entire manufacturing lifecycle, from initial drawing review to final packaging and shipment to our offices.

2. Vendor Responsibilities

Vendors are fully responsible for the quality of the parts they produce. This includes maintaining properly calibrated measurement equipment, training personnel, strictly adhering to supplied engineering drawings, and reporting any discrepancies or required deviations prior to continuing manufacturing processes.

Vendors are also expected to follow PBI Quality Control Steps of Excellence, review all applicable quality items with Engineering before shipping, and obtain final shipping approval when required.

3. Pre-Production Process Steps

Before initiating full-scale manufacturing, vendors must complete the following preparation and verification steps:

1. **Drawing Review:** Thoroughly examine all engineering prints, CAD models, and accompanying specifications to ensure clear understanding of tolerances, material requirements, and finishes.
2. **Material Verification:** Confirm that the raw material matches the specified grade, temper, and dimensions. Procure necessary material certifications.
3. **Machine Setup Verification:** Ensure the CNC machinery is properly calibrated and that fixtures are securely and accurately mounted.
4. **Tool Condition Checks:** Inspect all cutting tools for wear or damage prior to use to prevent out-of-tolerance features and poor surface finishes.

4. In-Process Inspection

Quality checks must be conducted continuously throughout the machining process to prevent systemic errors.

- **First Article Inspection (FAI):** The first part off the machine must undergo a comprehensive 100% dimensional inspection against the engineering drawing. Production must halt until the FAI is approved.
- **In-Process Dimensional Inspection:** Regularly sample parts during the production run using calibrated metrology equipment (e.g., calipers, micrometers, CMM) to verify critical dimensions remain within tolerance.
- **Surface Finish Checks:** Compare machined surfaces against required roughness specifications (e.g., Ra values) using surface profilometers or standard comparative gauges.

5. Final Inspection and Pre-Shipment

Once machining is complete, the following steps ensure parts are ready for delivery:

- **Deburring and Cleanliness:** Remove all sharp edges, burrs, and machining debris. Parts must be thoroughly cleaned of coolant, oils, and chips.
- **Labeling:** Clearly label the parts or part containers with the correct part number, revision level, and purchase order number.
- **Final Release Approval:** Conduct a final dimensional and visual inspection on a statistically significant sample (or 100% for critical components) to authorize the batch for shipment. Where specified, complete all required quality process steps and obtain final shipping approval before release.

Final Shipping Approval

For orders requiring final release review, vendors must not ship parts without explicit authorization. Vendors must copy **William** on the final shipment approval communication after confirming all PBI QA/QC procedure standards and engineering reviews have been successfully completed.

6. Packaging and Shipping Requirements

To prevent damage during transit to our offices, vendors must adhere to strict packaging guidelines:

1. Apply rust inhibitors to susceptible metals prior to packaging.
2. Pack parts individually or in controlled quantities as specified by the order requirements (for example, 20 pieces per pack when directed) to prevent dings, contamination, and retained shavings during transit.
3. Use adequate packaging protection, such as bubble wrap, foam inserts, individual part netting, and when required oil-free anti-rust film wrapping, to prevent parts from contacting one another and to preserve part cleanliness.
4. Securely box and seal the components, ensuring the exterior of the package clearly displays the destination address and packing slip.

7. Handling of Nonconforming Parts & Corrective Actions

If any parts are found to be out of tolerance or defective at any stage, they must be immediately segregated and clearly marked as nonconforming. Vendors must not ship nonconforming parts to our offices without prior written authorization or a formalized deviation approval.

Following any first article inspection (FAI) failure or other quality escape, the vendor must submit a documented corrective action plan describing root cause, containment, corrective measures, verification steps, and timing for implementation. Corrective actions may include, when applicable, ultrasonic deep-hole cleaning, improved debris removal, and oil-free anti-rust film wrapping to support zero-defect deliveries.

Documentation Required Before Shipping

The following documentation must be prepared, reviewed, and included with every shipment delivered to our offices:

- Detailed Packing Slip referencing the Purchase Order.
- Raw Material Test Reports/Certificates.
- Completed First Article Inspection (FAI) report (if requested).
- Final Dimensional Inspection Report.
- QC reports applicable to the order requirements.
- **Clear pictures** of the completed parts, packaging method, and shipment contents before shipping.
- Certificate of Conformance (CoC) signed by the vendor's quality representative.

8. Vendor Sign-off Checklist

Please complete, sign, and include this checklist with your shipping documentation.

Status	Quality Control Item
☐	Drawing and specification review completed
☐	Material verified and certificates obtained
☐	First Article Inspection (FAI) passed
☐	In-process dimensional and surface finish checks completed
☐	Parts deburred, cleaned, and visually inspected
☐	Nonconforming parts segregated & corrective actions approved (if applicable)
☐	Parts properly protected and packaged for transit (individual packing / netting applied)
☐	QC reports and pre-shipment pictures prepared and reviewed
☐	All required documentation included with shipment
☐	Final shipping approval obtained (William CC'd on communication)

Vendor QA Signature: _____ **Date:** _____