

Coles Additive Manufacturing

Quality Management System (QMS)

Quality Policy

Coles Additive Manufacturing is dedicated to providing high-quality additive manufacturing services that consistently meet or exceed customer requirements. We are committed to:

- Delivering precise and reliable 3D printed products on time.
- Maintaining controlled processes, calibrated equipment, and verified materials.
- Monitoring key quality objectives, including print accuracy, on-time delivery, and customer satisfaction.
- Continuously improving our Quality Management System through corrective action, training, and customer feedback.

This policy is communicated, understood, and applied across all operations, and it serves as the foundation for our commitment to continual improvement and customer confidence.

Signed:  (Owner/Manager)
Date: 01/01/2026

Standard Operating Procedures (SOPs)

SOP-01: Order Handling

- Receive customer file/order.
- Review design for printability.
- Confirm material, tolerance, and deadline.
- Log order in Order Tracking Sheet.

SOP-02: Print Preparation

- Verify STL integrity.
- Slice file with approved profile.
- Record slicer settings.
- Save G-code with proper naming convention.

SOP-03: Printing

- Inspect the printer before starting.

- Run test extrusion.
- Monitor the first 3 layers.
- Record start/end time in Print Log.

SOP-04: Post-Processing

- Remove supports carefully.
- Perform finishing as required.
- Clean part before inspection.

SOP-05: Quality Inspection

- Measure key dimensions.
- Check for visual defects.
- Verify against customer specifications.
- Approve or reject and record in QC Log.

SOP-06: Packaging & Shipping

- Protect and wrap parts.
- Include an order sheet and thank you card.
- Ship with tracking.
- Update Order Tracking Sheet.

SOP-07: Non-Conformance & Corrective Action

- Record failed part in log.
- Identify the root cause.
- Reprint if possible.
- Update SOP or slicer profile if needed.

Quality Objectives

- Print failure rate < 2%
- On-time delivery > 95%
- Customer satisfaction > 90%

Coles Additive Manufacturing – Inspection & Quality Control

Purpose

To ensure that all 3D printed products meet defined quality standards, minimizing defects and maintaining customer satisfaction.

Scope

Applies to all 3D printing operations, including prototyping, custom orders, and production runs at MC Handy Tool.

Inspection & Quality Control Process

A. Incoming Material Inspection

- **Filaments & Resins:** Check for proper diameter, color consistency, and any contamination.
- **Storage Conditions:** Ensure materials are stored in a dry, dust-free environment.
- **Documentation:** Record batch number, supplier, and date of receipt.

B. In-Process Inspection

- **Layer Accuracy & Adhesion:** Monitor prints periodically to detect warping, layer shifting, or poor adhesion.
- **Printer Calibration:** Check bed leveling, nozzle condition, and filament feed.
- **Documentation:** Record print temperature, speed, and any deviations from standard settings.

C. Final Product Inspection

- **Dimensional Accuracy:** Measure critical dimensions using calipers or other tools; compare to STL/ model specifications.
- **Visual Inspection:** Check surface finish, color consistency, and absence of defects like stringing or blobs.
- **Functional Testing** (if applicable): Test mechanical or moving parts for proper operation.
- **Documentation:** Record inspection results and identify any non-conformities.

D. Non-Conformance Handling

- **Identify & Isolate:** Separate defective parts immediately.
- **Root Cause Analysis:** Investigate why the defect occurred (material, printer, settings, operator error).
- **Corrective Action:** Adjust process, retrain staff, or repair/replace equipment as needed.

- **Record Keeping:** Maintain a non-conformance log for continual improvement.

E. Continuous Improvement

- **Regular Reviews:** Analyze inspection data weekly/monthly.
- **Trends & KPIs:** Monitor defect rates, on-time delivery, and customer feedback.
- **Process Updates:** Revise procedures and training to reduce defects and improve efficiency.

Coles Additive Manufacturing – Quality Objectives

Document Reference: QMS-MCT-OBJ-001

Revision: 01

Effective Date: 01/012026

Purpose

This document defines the quality objectives of MC Handy Tool, ensuring consistent product quality, customer satisfaction, and continuous improvement in 3D printing operations.

Quality Objectives

Print Accuracy & Consistency

Target: Achieve dimensional accuracy of ± 0.1 mm on 95% of 3D prints within 12 months.

Customer Satisfaction

Target: Maintain a customer satisfaction rating of 95% or higher based on post-order feedback surveys throughout the year.

On-Time Delivery

Target: Deliver 98% of orders within the promised timeframe over the next 12 months

Material Waste Reduction

Target: Reduce filament and material waste by 20% over the next 6 months through optimized print settings and material reuse strategies.

Production Efficiency

Target: Decrease average print setup and post-processing time from 10 minutes to 6 minutes per job within the next 6 months.

Reduction Defect

Target: Reduce the percentage of failed or defective prints to less than 2% of total prints within the next 12 months.

Employee Training & Competence

Target: Ensure 100% of staff complete training on printer operation, troubleshooting, and quality standards within the next 6 months

Monitoring & Review

- Quality objectives will be monitored through production reports, customer feedback, and internal audits.
- Objectives will be reviewed quarterly to ensure they remain relevant and achievable.
- Adjustments will be made as necessary to drive continual improvement.

Coles Additive Manufacturing – Non-Conformance & Corrective Action

Purpose

To establish a structured process for identifying, documenting, and correcting non-conformances in 3D printing operations, ensuring continual improvement and customer satisfaction.

Scope

Applies to all products, processes, and operations at MC Handy Tool, including prototyping, custom orders, and production runs.

1. Non-Conformance Identification

- **Detection Points:** During in-process inspections, final inspections, customer feedback, or internal audits.
- **Types of Non-Conformance:** Defective prints (dimensional inaccuracies, layer adhesion issues, failed prints).
- Material defects (contaminated filament, color inconsistencies).
- Process deviations (incorrect printer settings, operator error).

2. Non-Conformance Documentation

- **Non-Conformance Report (NCR):** Each non-conformance is documented with:
 - Description of the issue
 - Date and time of occurrence
 - Responsible operator or team
 - Reference to affected product/order
- **Record Keeping:** All NCRs are stored for audit and continuous improvement purposes.

3. Containment & Immediate Action

- **Segregation:** Isolate defective items immediately to prevent accidental use.
- **Immediate Correction:** If possible, correct minor defects on the spot.
- **Customer Communication:** Notify customers if non-conformance affects delivered products.

4. Root Cause Analysis

- Investigate the underlying cause of the non-conformance using methods like:
- 5 Whys Analysis
- Fishbone (Ishikawa) Diagram
- Identify whether the cause is material, process, machine, or human error.

5. Corrective Action Implementation

- Develop an action plan to address the root cause.
- Actions may include:
- Process
- Adjustments
- Staff training
- Equipment maintenance or calibration
- Material supplier review
- Assign responsible personnel and a deadline for completion.

6. Verification & Effectiveness

- Verify that the corrective action resolves the non-conformance.
- Monitor for recurrence through inspections and quality metrics.

7. Continuous Improvement

- Analyze NCR trends monthly to identify recurring issues
- Update procedures, training and work instructions to prevent future non-conformance.