BUSINESS OPERATING PROCEDURE

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OWNER: MANAGER, SUPPLIER QUALITY

TITLE: MINIMUM QUALITY SYSTEM REQUIREMENTS FOR TOOLING SUPPLIERS

1. Scope

Howmet understands the need to put in place a quality system that provides for a thorough contract review, repeatable processes, and production of products that conform to Howmet requirements. It is Howmet's desire to assist you to implement a basic quality system that will define your systems and establish control of your practices without being burdensome to your company.

In addition to the requirements set out in 700.004.001, Supplier Quality Flowdown Document that is referenced in every Purchase Order, this document describes the minimum quality system requirements tooling suppliers will need to establish, and also provides examples of forms to use to document that the requirements have been met. Your company may use its own forms, as long as they meet the intended requirements of this document.

NOTE: All included forms are examples, however, they contain the minimum requirements for the type of information to be included or obtained.

2. References

2.1	AS 9003	Inspection and Test Quality Systems, Requirements for Aviation, Space, and Defense Organizations
2.2	ISO 9001	Quality Management Systems - Requirements
2.3	ISO/IEC 17025	General Requirements for the Competence of Testing and Calibration Laboratories
2.4	700.004.001	Supplier Quality Flowdown Document
2.5	700.004.003F01	Tooling Minimum Quality System Sample Forms

3. Definitions

3.3	NIST	National Institute of Standards and Technology

4. Quality System Requirements

4.1 Your company must appoint an individual (a Management Representative) who will be responsible for assuring that a quality system is established and maintained.

4.2 The management structure of your company must be shown on an organization chart. The Management Representative must be included in the management structure of the company, and must have signed authorization to stop production without fear of retaliation by management when it is felt that the quality of Howmet product might be compromised.

4.3 Also, the name of the authorized individual who will be responsible for receiving Digital Product Definition (DPD), performing conversions (if required), replications or copies, and maintenance of DPD files, must also be designated on the organization chart referenced in 700.004.003F01, Tooling Minimum Quality System Sample Forms Example 001 - Sample Organization Chart.

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5. Quality System Documents

5.1 Purchase Order Review Form - In order to accurately produce product to meet Howmet requirements, a thorough review of the Purchase Order must be documented to assure that all Purchase Order requirements can be met. Management must review and sign off on these requirements before production begins. There may be other specifications or requirements that have not been flowed down on the Purchase Order. In this case, your organization will need to contact the purchaser named on the Purchase Order, or Howmet Engineering or Quality personnel, and discuss any changes that need to take place to the Purchase Order before production begins. A sample Purchase Order Review Form is attached. It, or a similar document, must be filled out entirely, signed, dated, and kept in the project file referenced in 700.004.003F01, Tooling Minimum Quality System Sample Forms Example 002 - Purchase Order Review Form.

6. Document Control

6.1 All documents referenced in the Purchase Order, for example: engineering letters, technical manuals, etc., must be on file, in acceptable condition, and at the current revision level.

6.2 Management must assure there are current revision levels on documents such as work instructions, specifications, technical manuals, drawings, and engineering letters to assure that only approved, released, and current revisions are available for use. This includes any documents that are in electronic format.

6.3 When product or material requirements are changed, your company must assure all documents concerned with that project are also revised, and all personnel are notified and understand the changes.

6.4 Revision control methods are also applicable to project tooling and inspection equipment or gauging.

6.5 An example of a Controlled Documents Master List is provided with this documentation referenced in 700.004.003F01, Tooling Minimum Quality System Sample Forms Example 003 - Controlled Documents Master List.

7. Obsolete Documents

7.1 All documents that become obsolete must be marked "obsolete," dated when they are taken out of production, and signed by the person removing them. Obsolete documents must be stored or filed so they cannot mistakenly be used for production purposes. (A red file folder in the project file is a good way to separate obsolete documents from production documents.)

7.2 "Reference" or "Uncontrolled" DPD must also be controlled to assure that it is not used for production or inspection of tooling referenced in 700.004.003F01, Tooling Minimum Quality System Sample Forms Example 004 - Project File Checklist.

8. Quality Records

8.1 Records are kept to provide evidence that all requirements have been met. Quality records and data include, but are not limited to, Purchase Order reviews, Purchase Orders to suppliers, material certifications, and inspection results.

8.2 If a document such as a drawing is used in the final inspection of product, and inspection results are recorded on the drawing or other document, it then becomes a quality record and must be controlled.

8.3 Any entry recorded on a controlled document, quality record, or data form must be signed or initialed, and dated, in ink. Any corrections must be made by a single line through the entry, signed or initialed, and dated by the person making the change. "White-Out" or correction fluid is not allowed on ANY quality documentation. All records must be legible, easily identifiable to the project, and retrievable.

9. Digital Product Definition (DPD)

9.1 Digital Product Definition (DPD) refers to any product defined by computer file, Unigraphics, CMM, or other electronic means. This can be transferred by disc, email or electronic file transfer. If any product is designed or built using CAD (Computer Aided Design), CAM (Computer Aided Manufacturing) or CAI (Computer Aided Inspection), then DPD requirements are applicable.

9.2 DPD is no different than a paper copy drawing or specification and must be maintained so it can be properly identified from receipt to final product acceptance. The control of DPD includes any revisions or changes that occur and how those changes are incorporated into the product build.

9.3 Your company must define who has the authority and how the DPD is incorporated into the product build. The DPD system must also identify and provide for any specific training requirements related to all aspects of the use and control of DPD.

9.4 If any DPD is used in measurement and test equipment of tooling and gauging, it must be included in the calibration system (reference Section 11).

9.5 DPD must be correctly documented in the Tooling Build Package (reference Section 10). The DPD identification or file name and revision, if any, must match the Howmet Purchase Order, the tooling build record or project file, and the product itself. The DPD system must provide for verification of all defined characteristics (dimensions, etc.) between the DPD and the final product. If not required by Howmet, this should be documented. If your company writes any software or programming to inspect or test the final product, it will fall under these controls (reference Section 6).

9.6 Your DPD system must include reporting, tracking and resolving of all transmission, hardware, software and data set problems related to the use of DPD.

10. Tooling Design and Development

10.1 When product design or development is required by the Purchase Order, your company must control the planning, design and development of all tools, gauges and fixtures ordered. At the completion of the design and at any other necessary stages of design, reviews will be held with Howmet Engineering. The

final design review must have a written and signed approval by both parties referenced in 700.004.003F01, Tooling Minimum Quality System Sample Forms Example 005 - Final Acceptance Form.

10.2 Any changes to the design of the tooling must be identified in writing, and must be recorded in the tooling package/project file. Any changes must be approved in writing by both parties, before they are incorporated into the tool, gauge or fixture.

11. Supplier Purchase Orders

11.1 When your company purchases items needed to make tooling, gauges, or fixtures for Howmet, the Purchase Orders to your subcontractors/suppliers must clearly define the material or product ordered, including the applicable drawings, specifications, processing requirements, and other relevant information.

11.2 The Purchase Order must also have notes for “right-of-entry." This allows for you, Howmet or any applicable agency to determine and verify the quality of work, records, and material at any place, including the plant of the subcontractor.

11.3 Your company must be sure that if required by the Howmet Purchase Order or engineering letters, etc., any subcontractors are approved by Howmet. This includes any subcontractors used for special processes, such as heat treat or chemical processing. Any product or service ordered must be verified when received either by inspection of the product or a certification.

12. Care of Tooling

12.1 Your company must be able to control and securely store any product or equipment issued to you by Howmet. This might include tools, raw materials, gauges, tools, or fixtures used in the production of tooling. These items must be maintained away from any possible detrimental environmental conditions and be able to be identified as Howmet product. Your company must be able to account for all items supplied referenced in 700.004.003F01, Tooling Minimum Quality System Sample Forms Example 006 - Howmet-Owned Inventory List.

13. Tooling Build Process

13.1 Each tool, gauge, or fixture ordered by Howmet must have a project file that contains all documentation from the time your company receives the Howmet Purchase Order until the final product is received and approved by Howmet. This project file must include: quote, Howmet Purchase Order, Purchase Order Review Form referenced in 700.004.003F01, Tooling Minimum Quality System Sample Forms Example 002 – Purchase Order Review Form, Project File Checklist, design review and approval, rejection notice/rework request (if applicable) and final acceptance and approval. All changes and revisions must be clearly identified and included. Any additional requirement your company has should be included in this job file/record.

13.2 At all times during the manufacture of a tool, gauge or fixture, your company must be able to identify it. There must be traceability to any lot of material used in the manufacture. Any certificates or reports such as heat treat reports, hardness reports or material certifications must be traceable to the Howmet product.

13.3 Your company is responsible for the proper handling, storage, packaging, preservation and delivery, to prevent damage or deterioration of the product.

14. Test and Measurement Activities

14.1 Your company must have in place a system to control, calibrate, and maintain all inspection, measuring and test equipment that has the potential to affect Howmet product quality. These items include testing software, personally-owned equipment, company-owned equipment and any Howmet supplied equipment.

14.2 All calibration must be traceable to a recognized standard such as NIST. If your company performs calibration internally, the master gauges used to perform calibration (i.e., gauge blocks) must be sent out for calibration to an ISO/IEC 17025 accredited laboratory whose Scope of Accreditation shows that they are accredited to perform calibration of your masters.

14.3 All items calibrated must be identified in such a way that indicates the calibration date and due date. If any gauge or equipment is found to be out of tolerance during a normal scheduled calibration, your company must determine if any Howmet product in process, or built and delivered, has been negatively impacted. If so, your company must inform Howmet of the potential for a dimensionally nonconforming tool, fixture or gauge.

14.4 Your company must maintain a list of inspection equipment which shows the calibration due date and location for each piece of equipment referenced in 700.004.003F01, Tooling Minimum Quality System Sample Forms Example 007 - Calibration Log.

15. Nonconforming Material

15.1 Any Howmet potentially nonconforming material found at your company must have a “Nonconforming Product Tag” referenced in 700.004.003F01, Tooling Minimum Quality System Sample Forms Example 008 – Nonconforming Product Tag) attached to it upon identification of the nonconformance. It may be dispositioned as “rework,” “scrap” or “Howmet Review Required”.

15.2 If your company is able to rework any tool, fixture or gauge, it must be re-inspected to all job/project file requirements. After re-inspection it must be reviewed and approved by Howmet.

15.3 Any items determined to be scrap must be separated from production material and clearly marked. Scrap items can be discarded by your company, unless the material to be scrapped was provided by Howmet, in which case it must be returned to Howmet.

16. Corrective Action

16.1 Your company must have a method for implementing corrective action when necessary. The need for corrective action may be an event or issue from within your company or from a subcontractor/supplier, or an event resulting in a request for a corrective action from a customer Howmet.

16.2 When a written corrective action is necessary it must include containment, root cause, corrective action, preventative action, verification and follow-up. If any corrective action impacts any Howmet product,

Howmet must be immediately notified. Notification shall include the concise description of nonconformance, product, tooling identification, delivered quantities, and delivery dates referenced in 700.004.003F01, Tooling Minimum Quality System Sample Forms Example 009 - Corrective Action Request, and 010 - Corrective Action Log).