



Hawthorn
AERO



**SQM-001 HAWTHORN AERO
SUPPLIER QUALITY MANUAL
Miamisburg, Ohio 45342**

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Introduction

Hawthorn Aero recognizes the very important role our Suppliers have in the value we offer our customers. As an extension of our own operations, we rely on our Suppliers to provide material, products, and services which meet all of the requirements of Hawthorn Aero contracts, applicable specifications, and the quality management requirements outlined herein.

The purpose of this manual is to inform Hawthorn Aero Suppliers of the core expectations we have regarding the Suppliers' quality management systems, design requirements, and manufacturing process controls required for the purpose of doing business with Hawthorn Aero. This manual describes what Hawthorn Aero expects its Suppliers to do to ensure that all Hawthorn Aero requirements and expectations are met.

Supplier Code of Conduct

Suppliers shall ensure operations are being performed in a manner that is appropriate, as it applies to their ethical, legal, environmental, and social responsibilities. Below is a listing of the basic requirements:

- Compliance with Local Laws and Regulations
Suppliers must adhere to the laws and regulations in the locality in which they reside. This includes all local, state, and federal laws/regulations in the country of origin.
- Compliance with Environmental, Health, and Safety Laws
The Supplier must maintain and operate its manufacturing/production facilities and processes in accordance with local, state, and federal laws/regulations in the country of origin. At no time shall any Hawthorn Aero person be exposed to hazardous materials or unsafe conditions as a result of Supplier shipments to a Hawthorn Aero location, or while visiting a Supplier's location. For items with inherent hazards, safety notices must be clearly visible. As applicable, documented safety handling and protection information must be provided.
- Product Safety
In all instances where a product is manufactured to a new design, for a new system, or for a new application, it is important that Supplier and Hawthorn Aero allocate responsibility for assuring that all performance, endurance, maintenance, safety and warning requirements are met. It is preferred that this allocation of responsibility be in writing. The supplier shall have a process in place to make their employees aware to their contribution to product safety and their contribution to product or service conformity.
- Non-Discrimination
Suppliers shall not discriminate against race, color, sex, religion, age, physical disability, political affiliation, or other defining characteristics as

prohibited by local, state, and federal laws/regulations in the country of origin.

- Labor
 - *Child Labor* – Suppliers shall employ workers of minimum legal age in accordance with local, state, and federal laws/regulations in the country of origin. Child labor laws must be followed.
 - *Forced/Indentured Labor* – Suppliers shall not practice the use of forced or indentured labor.
 - *Work Hours/Days* – Suppliers shall not exceed the daily and weekly working hours as permitted by local, state, and federal laws/regulations in the country of origin.
 - *Wages and Benefits* – Suppliers shall compensate workers in accordance with local, state, and federal laws/regulations in the country of origin. This includes minimum legal wage, overtime wages, and benefits (required by law).
- Ethics

Evidence of corruption, bribes, improper advantage, or any other form of illegal practice by the Supplier or associated operations will terminate all relations with Hawthorn Aero. Suppliers will conduct their business in an ethical manner. Supplier shall ensure their employees are aware of the importance of ethical behavior.
- Code of Conduct and Policy Enforcement

This policy applies to Suppliers and their sub-tier sources. It is the responsibility of the Supplier to verify and monitor compliance of this code at their operations and sub-tier source operations.
- Confidentiality

The Supplier shall ensure the confidentiality of Hawthorn Aero-contracted products and projects under development, and related product information, as well as intellectual property shared as a result of the working relationship.

Supplier Quality Requirements

Suppliers shall maintain a Quality Management System (QMS) suitable to the products and services provided to Hawthorn Aero, which is certified by an accredited third-party certification body to the latest version of one or more of the following, as applicable:

- *ISO 9001 - Quality Management System Requirements*
- *AS/EN/JISQ9100 - Quality Management System Requirements (Aerospace)*

In the absence of third-party certification, depending on the product, its application, value, and criticality, the Hawthorn Aero Quality representative may authorize the acceptance of other evidence of compliance. This may include

second-party (Hawthorn Aero) audit or first-party (self) assessment to the applicable criteria above, or to a set of alternative basic quality requirements (Leadership, Planning, Support, Operation, Evaluation and Improvement).

Calibration Suppliers - shall establish and maintain a measurement management system that is in compliance with either:

- *ANSI/NCSL Z540.1 - Calibration Laboratories and Measuring & Test Equipment Requirements, or*
- *ISO/IEC 17025 – General requirements for the competence of testing and calibration laboratories*

Quality Manual

Upon request, the Supplier shall furnish Hawthorn Aero with a copy of the Supplier's Quality Management System Manual, which is to be current and approved by the Supplier's management, including or making reference to related documents. The quality management system documentation shall include Supplier's statements of a quality policy and quality objectives. Top management shall define quality objectives and measurements which should address customer expectations and be achievable within a defined period of time. The Supplier shall promptly notify the Hawthorn Aero Quality Representative of any substantive changes to the Supplier's quality management system or personnel.

Counterfeit Parts

The supplier shall plan, implement, and control processes, appropriate to the organization and the product for the prevention of counterfeit or suspect counterfeit parts. Counterfeit part prevention should involve training personnel in the awareness and prevention of counterfeit parts.

For Hawthorn Aero, supplier shall have policy or procedure to cover and apply requirements, practices and methods to mitigate risk of receiving and installing counterfeit electronic parts (reference SAE AS-5553 - Counterfeit Electronic Parts; Avoidance, Detection, Mitigation and Disposition). To prevent the inadvertent use of counterfeit parts and materials all fasteners and/or electrical, electronic and electro-mechanical parts delivered and/or used in the manufacture of deliverable products shall be from the Original Component Manufacturer (OCM)/ Original Equipment Manufacturer (OEM) or their franchised dealer or an authorized distributor chain. Parts shall not be used or reclaimed and misrepresented as new. Parts shall not be acquired from independent distributors or brokers unless specifically authorized in writing by the buyer. The supplier shall flow down this requirement to sub-tier suppliers.

Foreign Object Damage (FOD)

The supplier shall establish, document and maintain a program to control and eliminate Foreign Object Damage (FOD) and/or contamination during the supplier's manufacturing, assembly, test and inspection, and packaging/shipping (e.g. use of FOD causing materials like Styrofoam packing beads) operations. When applicable, the supplier's FOD control program shall include controls to preclude FOD or contamination at the supplier's sub-tier sources. AS9146 shall be used as a guide to establish and implement the supplier's FOD program. The supplier's FOD program is subject to on-site review and approval by Hawthorn Aero.

Supplier Required to Provide

- Access to the suppliers OASIS Tier 2 data (e.g., information and results of audits, assessments, nonconformance's, corrective action, scoring, and suspensions) upon request, unless justification can be provided (e.g., competition, confidentiality, conflict of interest).
- Immediate notification in the event certification has been lost.
- Notification of significant changes within the supplier's organization (e.g., changes related to address, ownership, key management, number of employees, scope of operations).

Communication

Communications from the Supplier should go directly to the Hawthorn Aero Project Engineer serving as the POC (Point of Contact) for the purchase order. Any correspondence that occurs between the supplier and the other Hawthorn Aero personnel (design engineer, buyer, salesman, etc.) or Hawthorn Aero customer should be copied to the Project Engineer.

Supplier Approval Process

Hawthorn Aero requires all Suppliers to be approved prior to the issuance of contracts or purchase orders. All Suppliers must be approved by Hawthorn Aero, regardless of approvals by customers or other entities.

Supplier Assessment

The Supplier Approval Process may include the following:

- Supplier Initial Assessment
Hawthorn Aero may request the Supplier to provide a copy of its quality management system certificate and/or complete a self-assessment of its business and quality management system and capabilities (i.e., quality, delivery, technology, cost, and continual improvement objectives).
- Documentation Audit
In those cases where a Supplier's quality management system has not

been certified by an accredited certification body, Hawthorn Aero may request a copy of the Supplier's Quality Manual and supporting procedures (and perhaps internal audit reports) to determine if the Supplier's quality management system meets Hawthorn Aero requirements.

- On-Site Assessment

Generally, when a Supplier is certified to a related standard by an accredited certification body, Hawthorn Aero will not conduct an on-site assessment of the Supplier's quality management system against the same criteria. However, Hawthorn Aero and/or its customers, due to product/process complexity or criticality, may elect to conduct on-site assessments of a Supplier's product or process capabilities. As a result, findings may be issued. These assessments could include:

- Product or Process Capability – to determine the Supplier's ability to meet Hawthorn Aero' requirements for complex and/or critical products/processes.
- Quality Management System (QMS) – if necessary, as a result of (or in conjunction with) product or process capability assessments, to determine whether the Supplier's quality management system meets one or more of the applicable standards, and is functioning effectively.
- Business and Manufacturing Operations – to determine whether the Supplier has the financial resources, production capacity, and other business resources needed to fulfill Hawthorn Aero volume production needs and continuity of supply.
- Continual Improvement Initiative – to determine if the Supplier's culture, methods and skills are present to actively pursue continual improvement.
- Technology Assessment - to determine whether the Supplier has the needed technical resources, including production and inspection equipment, facilities, engineering resources, Hawthorn Aero-specified computer-aided design language/format, electronic commerce capability, etc.
- Sub-Tiers' Supplier Control – to evaluate the effectiveness of the Suppliers sub-tier management processes and ensure that products or services procured from sub-tier sources and delivered to Hawthorn Aero conform to all applicable Hawthorn Aero requirements.

Site assessments may occur at any time per Hawthorn Aero discretion.

General Requirements

Compliance to Contractual or Purchase Order Requirements

Upon accepting a Hawthorn Aero contract and/or purchase order, the Supplier is responsible for compliance to all contract (e.g., engineering drawing, specification, purchase order) requirements. All documents, drawings and specifications, regardless of origin, are applicable to the Supplier when specified in the contract or documents referenced in the contract, and are required to be used at all levels of the supply chain. Unless otherwise specified in the contract, the document revision in effect on the date of issue of the contract applies to the contract. Neither audit, surveillance, inspection or tests made by Hawthorn Aero, representatives of Hawthorn Aero or its customer(s), at Supplier's facilities, at any sub-tier facilities, or upon receipt at Hawthorn Aero, relieves the Supplier of the responsibility to furnish acceptable products or services that conform to all contract requirements; nor does it preclude subsequent rejection by Hawthorn Aero or its customers.

Hawthorn Aero Designated Sources

Where specified by contract, the Supplier shall purchase products, materials or services from Hawthorn Aero designated sources. However, the Supplier is responsible to ensure that items procured from such sources meet all applicable technical and quality requirements.

Control of Sub-Tier Suppliers

The Supplier, as the recipient of the contract, is responsible for meeting all requirements, including work performed by the Supplier's sub-tier Suppliers (also known as Sub-Suppliers or subcontract Suppliers). When the Supplier uses sub-tier sources to perform work on products and/or services scheduled for delivery to Hawthorn Aero, the Supplier shall include (flow-down) on contracts, to its sub-tier sources, all of the applicable technical and quality requirements contained in the Hawthorn Aero contract, including quality system requirements, regulatory requirements, the use of Hawthorn Aero designated sources, and the requirement to document and control key characteristics' and/or key processes, and to furnish certifications and test reports as required. Hawthorn Aero and its customers reserve the right-of-entry to sub-tier facilities, subject to proprietary considerations.

Risk Management

All suppliers are expected to have identified all internal and external interested parties along with any significant risks that may impact the supplier's ability to meet the expectations of the interested parties (see ISO 9001:2015)

For Hawthorn Aero, the Supplier shall establish a risk management program to effectively assess those elements from all aspects of the business that

could affect the quality of the products and/or services scheduled for delivery to Hawthorn Aero. A copy of the Supplier's risk management program shall be furnished to the Hawthorn Aero Quality Representative upon request.

Control and release of Hawthorn Aero Furnished Documents

Documents furnished by Hawthorn Aero to the Supplier are furnished solely for the purpose of doing business with Hawthorn Aero. Proprietary documents may be furnished to the Supplier in hard copy, electronic or other media. The Supplier is responsible for controlling and maintaining such documents to preclude improper use, loss, damage, alteration and/or deterioration. Unless authorized by the Hawthorn Aero Buyer in writing, the Supplier may not transmit or furnish any Hawthorn Aero furnished documents, or copies of such documents, to anyone outside the Supplier's business organization except to a sub-tier source used by the Supplier for performance of work on the Hawthorn Aero contract. The Supplier shall flow down this requirement to all sub-tier sources, when such sources will be in receipt of Hawthorn Aero proprietary documents during performance of work for the Supplier.

Business Continuity

The Supplier should have a business continuity plan which would allow for the safeguarding, storage and recovery of engineering drawings, electronic media, and production tooling in the event of damage or loss. This plan should also contain contingency plans to satisfy Hawthorn Aero requirements in the event of significant utility interruptions, labor shortages, equipment failure and field returns.

Right of Access

Hawthorn Aero, their customers, and regulatory authorities retain the right of access to all supplier facilities involved in the aerospace order and to all applicable records. The right of access is for all levels of the supply chain.

Facility Changes

During performance on the Contract, the Supplier shall give Hawthorn Aero written notice prior to:

- relocating any production, inspection or processing facilities;
- transferring work between different facilities
- initiating any changes in the source of major components procured by the Supplier and designated for use in or for installation on products scheduled for delivery to Hawthorn Aero
- making any other changes which may affect product quality, reliability or integrity.

Such changes are subject to approval/disapproval by Hawthorn Aero prior to shipment of affected products. A change in ownership or a change in the individual designated as the management representative with respect to the Suppliers Quality/Inspection System shall be construed as a facility change and requires the Supplier to notify Hawthorn Aero within 30 days.

For Hawthorn Aero suppliers, Supplier shall establish an internal procedure for formal notification to Hawthorn Aero that includes; risk assessment/mitigation, transfer plan, demonstration of capacity and demonstrate the existence of buffer stock to mitigate risks to on-time delivery and quality.

Unauthorized Product Repairs & Salvage

The Supplier may not perform any repairs such as welding, brazing, soldering, plugging, peening, bushing, or, use of paints, adhesives or plating, or use any standard or other repair practice or method, on products damaged or found to be discrepant during fabrication or processing, or, on defects in castings or forgings, unless such repairs are specifically permitted by the applicable drawing or specification, or are specifically authorized by Hawthorn Aero in writing for each occurrence. Unless specifically authorized by Hawthorn Aero, this prohibition also applies to reworking products by removing plating (stripping) and re-plating. In those cases, where Hawthorn Aero authorized product repair, salvage or stripping has been accomplished, the Supplier shall include on the packing list/shipper or on a separate attached document a list of the products that have been subjected to such Hawthorn Aero approved repair, salvage or stripping, the method(s) used for the salvage or repair, and the nonconformance document number authorizing the salvage or repair.

Training

The Supplier shall prepare documented work instructions, for all employees having responsibilities for the operation of processes that impact product quality. These instructions shall be maintained current and accessible for use at the work station. A curriculum of training requirements will be defined for every operator. Appropriate training is required in order for employees to demonstrate competency prior to working and potentially impacting quality. Training records must be maintained as well as updated on a regular basis for all operators.

Unauthorized Product Changes or Substitutions

The Supplier may not make any changes or substitutions to any products or services required by the Contract and/or Purchase Order, drawing, specification, standard, or other applicable document without prior written authorization by Hawthorn Aero. Authorization may be contingent on Hawthorn Aero conducting an on-site review of the proposed product or service changes at the Supplier's facilities, or the facilities of the Supplier's sub-tier sources.

Altering Data on Documents

The use of any method that causes the original data on documents to be obliterated and unreadable (i.e. the use of correction fluids, correction tape, write-over, or other methods) to correct, modify or otherwise alter the data and/or entries on any certifications, test reports or other documents required by the Contract and/or Purchase Order, is strictly prohibited. Corrections may be made on inspection reports such as 1st Article Inspection Reports (FAIR), providing it is clearly obvious that a correction was made and it is signed (initialed) or stamped by an authorized individual. Upon receipt at Hawthorn Aero, products or services represented by documents that show evidence that they have been corrected or altered in an unauthorized manner are subject to return to the Supplier at Supplier's expense.

Contract Changes & Their Effectivity

Hawthorn Aero Initiated Changes

The Supplier shall incorporate, at the specified and agreed upon effectivity points, all changes initiated by Hawthorn Aero and communicated to the Supplier through a formal Contract change and/or amendment. Such changes may be in the form of revised drawings, specifications, tests, inspection or fabrication methods, etc., and may apply to products as well as to the Supplier's management and administrative systems.

Engineering design changes initiated by Smart Tooling will be submitted via a revised build print. The Supplier is to acknowledge receipt of the revised prints and inform Hawthorn Aero of any cost/schedule impact within three business days. A cost change will be added as a separate line item on the existing purchase order if approved by Hawthorn Aero.

The Supplier's business management system shall include appropriate controls and records, including controls at the Supplier's sub-tier sources, which provide objective evidence that changes were incorporated as required by the Contract. Objective evidence may be in the form of date, lot, serial number, revision letter, or other positive identification. Such records are subject to on-site verification by Hawthorn Aero at the Supplier's facilities or the facilities of the Supplier's sub-tier sources. Hawthorn Aero shall have the right to make changes in Purchase Orders relating to testing, design specification, quantity, quality, packing, shipping destination, and delivery schedule.

Supplier Initiated Changes

The Supplier may not make any changes in product design, drawings, performance specifications, materials or processes that will result in a Class I

change (defined as changes that affect Fit, Form, Function, Reliability, Maintainability, or Safety) without specific approval by Hawthorn Aero in writing prior to making such changes in products or data. When applicable, the Supplier shall flow-down this requirement to the Supplier's sub-tier sources. The Supplier may make changes on products under Supplier's proprietary engineering design control that result in a Class II change (any change other than Class I as defined above). The Supplier shall furnish a copy of the Class II change to Hawthorn Aero prior to the initial delivery of the (changed) products; so that Hawthorn Aero can verify that the change does not violate the above requirements. The Supplier shall notify Hawthorn Aero within 48 hours of any increases or decreases in costs caused by such changes and shall suggest an equitable adjustment in prices or other pertinent terms for Hawthorn Aero. In consideration, Hawthorn Aero, shall have the right to cancel this order, without penalty, if not filled in accordance with the terms hereof.

Product Qualification

This section defines the generic requirements for production part qualification and approval. The purpose is to determine if all Hawthorn Aero design and specification requirements are properly understood by the Supplier and that the manufacturing processes have the capability to consistently meet these requirements. In all instances where a product is manufactured to a new design, for a new system, or for a new application, it is important that Supplier and Hawthorn Aero allocate responsibility for assuring that all performance, endurance, maintenance, safety and warning requirements are met. It is preferred that this allocation of responsibility be in writing.

The supplier should be able to present objective evidence of their manufacturing capability on similar processes or products, to demonstrate technical competency, when a new process is being used in the production of product for Hawthorn Aero. Objective evidence can include capability data, FPY, quality issues with other customers, and any existing supplier quality metrics.

Hawthorn Aero suppliers that produce Aerospace products may require an FAI on a pre-determined basis. All submissions for FAI report are required to be followed according the AS9102 Standard requirements. If the supplier is using sub tier sources the supplier is required to flow this requirements down to their sub tier sources and provide all needed requirements per AS9102, as requested by Hawthorn Aero.

The supplier shall provide evidence that the following verifications required by the design record have been completed and that the results indicate compliance with specified requirements:

- Dimensional Results – for each unique manufacturing process, a record of actual results of all characteristics
- Material and Performance Test Results – for all parts and product materials with chemical, physical, metallurgical, and functional performance requirements.
- Records of Compliance – copies of records showing compliance to all applicable Hawthorn Aero specific requirements

Certificates of Conformance (COC)

A signed COC by the Suppliers head of quality or company officer (or their authorized delegate) attesting that all products and/or services delivered are in compliance with all contract requirements shall be furnished with each shipment to Hawthorn Aero when requested. All COC's must be in the English language and shall include:

- Supplier Name
- Part Number
- Drawing/specification revision (when applicable)
- Hawthorn Aero PO number
- Line /release number (when applicable)
- Quantity delivered
- Packing list /shipper number (when applicable)
- Signature and/or stamp of Quality Inspector

Statistical Process Control

Where specified in the Control Plan, the Supplier is required to apply effective statistical process controls. Suppliers should consult the Statistical Process Control (SPC) manual published by AIAG for guidance, methods, examples, and related reference information.

The Supplier is responsible for 100% verified quality for all items delivered to Hawthorn Aero. For Hawthorn Aero, when the Supplier elects to use statistical methods for the acceptance of products or processes, such methods shall be in compliance with the requirements established by SAE ARP9013, 9013/1, 9013/2, 9013/3 and 9013/4 as applicable, except that in all cases the sample sizes shall be AQL 4.0 or higher (i.e., AQL 1.0, .65, etc.) and the criteria for lot acceptance as zero (i.e., C=0). A copy of Suppliers statistical process control plan shall be furnished to Hawthorn Aero upon request.

Process Control

Control of Monitoring and Measuring Devices

The Supplier shall determine the monitoring and measurement to be undertaken and the monitoring and measuring devices needed to provide evidence of conformity of product to determined requirements. As a minimum, where

necessary to ensure valid results, measuring equipment shall:

- Be calibrated or verified at specified intervals, or prior to use, against measurement standards traceable to international or national measurement standards; where no such standards exist, the basis used for calibration or verification shall be recorded; and
- Be identified to enable the calibration status to be determined.

For Hawthorn Aero, unless otherwise specified by contract, the Supplier shall establish procedures to control Measuring and Test Equipment (M&TE) that are in compliance with the requirements of ANSI/NCSL Z540-3 or ISO/IEC 17025.

Special Characteristics

The Supplier shall demonstrate conformity to those special characteristics designated by Hawthorn Aero through means of documentation and appropriate control methods. In addition to any special characteristics identified by Hawthorn Aero, the Supplier shall also review, identify, document, and control other product and process characteristics that are key to achieving quality. Supplier may need to provide test specimens for design approval, inspection/verification, investigation, or auditing upon request.

Preventive Maintenance

The Supplier should identify key process equipment and provide resources for machine/equipment maintenance activities and develop an effective planned total preventive maintenance system.

Traceability

Suppliers shall establish a lot traceability system that tracks components throughout the value stream, from raw material through shipment to Hawthorn Aero. This includes all process steps including inspection and test procedures, rework and sub-tier supplier operations.

Where a 'shelf life' restriction applies, suppliers shall ensure that materials are tracked and controlled to prevent expired materials from being used in production.

Shelf-Life Control

Materials - With each delivery of materials or products that have a limited or specified shelf life, the Supplier shall furnish data that shows (a) the cure or manufacture date, (b) expiration date or shelf life, (c) lot or batch number, and when applicable any special handling or storage requirements. Unless otherwise specified by contract, for all shelf life limited materials or products delivered to Hawthorn Aero, the remaining shelf life shall be a minimum of 75% of the total shelf life for the material.

SDS (Safety Data Sheets)

All raw materials, including chemicals, delivered to Hawthorn Aero receiving facility must be accompanied by an SDS. Suppliers shall ensure SDS's are provided to the quality department on the initial shipment and with any subsequent revisions. The supplier will ensure that all products supplied by Hawthorn Aero, or from Hawthorn Aero customers, will be managed in accordance with a documented procedure which ensures that the product is verified, stored, and protected. This will include receipt and verification records, product inventory records and procedures for rejecting non-conforming material.

Change Control

The Supplier is responsible for controlling changes and notifying the Hawthorn Aero Process Engineer of all changes to the approved part design, manufacturing process, or site.

Change Control Process

The Supplier shall have a process to ensure that relevant versions of applicable documents furnished by Hawthorn Aero (as well as those specified of external origin) are available at points of use.

The Supplier is responsible for the timely review, distribution and implementation of all Hawthorn Aero engineering standards/specifications and changes in accordance with the schedule required by Hawthorn Aero. Timely review should be as soon as possible, and shall not exceed two working weeks. The Supplier shall maintain a record of the date on which each change is implemented in production. Implementation shall include updated documents.

Supplier Change Requests

Suppliers shall not make changes to their processes, location, facilities, equipment, material, product design (or any change which may affect product design or function) without written approval from the Hawthorn Aero Process Engineer for:

- Correction of a discrepancy on a previously submitted part;
- Product modified by an engineering change to design records, specifications, or materials; or
- Any planned changes by the Supplier to the design, process, or manufacturing location, such as:
 - Use of other material than was used in previously approved part or product
 - Production from new, additional, replacement or modified tools, dies, molds, patterns, etc.

- Production following upgrade or rearrangement of existing tooling or equipment
- Production from tooling and equipment transferred to a different plant site or from an additional plant
- Change of sub-tier Supplier for parts, nonequivalent materials, or services (e.g. heat treating, plating, etc.)
- Product produced after tooling has been inactive for production for 12 months or more
- Change to test/inspection method – new technique (no effect on acceptance criteria)
- For bulk materials: new source of raw material from new or existing Supplier, or change in product appearance attributes, etc.
- Use of any non-conventional manufacturing methods such as electro-discharge machining (EDM), electro-chemical machining (ECM), laser or abrasive water jet metal cutting, flame spray coatings, etc.

Before submitting to Hawthorn Aero a request for a permanent change to a Supplier-controlled design, the Supplier shall review the FMEA and Control Plan, as applicable, to ensure that all process-related issues have been addressed and resolved. Hawthorn Aero may require the Supplier to submit an updated FMEA and Control Plan prior to approval of such permanent changes. Hawthorn Aero may also require other portions, or all, of the related qualification process to be repeated. In some cases, Hawthorn Aero may elect to review Supplier proposed permanent changes at the Supplier's facility.

Control of Nonconforming Materials

For nonconforming products supplied to Hawthorn Aero, including those that reach a Hawthorn Aero customer, the Supplier must cover all costs to correct the nonconformance including; assessment costs, administrative costs to process the nonconformance, and any rework or repair costs incurred by Hawthorn Aero as a direct result from receiving nonconforming hardware from the supplier.

Machining errors that will result in nonconformance are to be discussed with the Smart Tooling POC to identify acceptable rework. If the proposed method of rework is found to jeopardize the quality of the tooling, Smart Tooling reserves the right to reject the tooling and require the Supplier to remachine a replacement.

Supplier Request for Nonconformance Deviation

A Supplier shall not knowingly ship product that deviates from the drawing, specification limits, or design intent without prior written authorization from the Hawthorn Aero Buyer. If such a condition exists, the Supplier may petition the

Hawthorn Aero Project Engineer, in writing, to allow shipment of the product under a written nonconformance deviation.

Packaging, Labeling, Delivery and Record Retention

Packaging

The Supplier must adequately plan for packaging designed to prevent product contamination, deterioration or loss and to eliminate shipping damage. Suppliers should provide expendable packaging or returnable containers, where appropriate, that provide for sufficient density and protection from any likely damage that may occur. Expendable materials and packaging must meet local and national standards for safe disposal and/or recycling.

Labeling

Labeling requirements may vary. Hawthorn Aero will provide the Supplier with necessary specifications.

Delivery

The Supplier should systematically inform Hawthorn Aero of any delay on delivering product and provide a new dispatch date. The Supplier is responsible for additional transport costs due to delays.

Record Retention

Unless otherwise specified by Hawthorn Aero on the Purchase Order the Supplier shall retain quality records for minimum time period of 10 years. Upon request, the Supplier shall be capable of retrieving and delivering required records to Hawthorn Aero within a forty-eight hour time period from the point of request. Prior to discarding, transferring to another organization, or destruction of such records, the Supplier shall notify Hawthorn Aero in writing and give Hawthorn Aero the opportunity to gain possession of these records. These requirements are also applicable to records generated by Supplier's sub-tier sources.

Continual Improvement

Suppliers should define a process for continual improvement, (examples: lean and six sigma) Recommend ISO 9004, including Annex B. A copy of the Supplier's continual improvement program shall be furnished to Hawthorn Aero upon request.

Corrective Action Report

Hawthorn Aero may issue a request for a Corrective Action Report (CAR) to the Supplier when nonconforming material, components, or assemblies are found. When documenting the root cause, the Supplier shall include the underlying reasons:

- why the specific nonconforming condition or incident occurred,
- why it was not detected by the Suppliers quality controls, and
- why the related process, from a systemic viewpoint, allowed the nonconformance (and potentially others like it) to occur.

Statements from the Supplier indicating that the corrective action is to alert or retrain the operator, and/or increase inspection, alone, are NOT acceptable corrective actions. These kinds of actions would be considered insufficient and not address the real underlying root cause(s) of why the Supplier's policy, instructions, process, procedure, and/or system allowed the problem to develop and occur and not be detected by quality controls.

Purchased Product Verification

Hawthorn Aero expects to receive products from Suppliers with zero defects allowing products to move directly from dock to stock, or to the point of use, without incurring additional costs associated with receiving inspection. Hawthorn Aero may charge Suppliers for costs to inspect, sort, evaluate, and/or return products that do not meet requirements. Hawthorn Aero's respective divisions will administer their Purchased Product Verification program on the basis of individual part numbers, product families, or overall Supplier performance. Purchased Product Verification may include Supplier Self Verification; Source Inspection at the supplier's premises or inspection upon receipt of product at Hawthorn Aero.

Source Inspection

Supplier's products or services may be subject to source inspection by representatives of Hawthorn Aero or applicable government or regulatory agencies. Source inspection requirement will be included on the contract and may apply to any and all operations performed by the Supplier or the Supplier's sub-tier sources, including prior to delivery of products to Hawthorn Aero. The Supplier shall provide the necessary access, equipment and resources required to effectively accomplish the source inspection.

Source Inspection when imposed, requires purchased product verification by a Hawthorn Aero Quality Representative at the Supplier's facility prior to delivery to Hawthorn Aero. The Hawthorn Aero Quality Representative may be a Hawthorn Aero employee or a Hawthorn Aero authorized third party inspection contractor.

The Supplier shall notify Hawthorn Aero, or the Hawthorn Aero approved inspection contractor, at least forty-eight (48) hours in advance of the time the products will be ready for final inspection. Upon request, the Supplier shall make available to the Hawthorn Aero Quality Representative any measuring and test equipment, facilities, records and personnel to facilitate the source inspection.

Supplier Performance

Hawthorn Aero monitors the performance of suppliers on an annual basis to determine if the suppliers are to remain approved or if they are unapproved. Suppliers are measured on Quality and Delivery.

Quality

Hawthorn Aero suppliers to maintain less than a 1% return rate with the exception of tooling and mold vendors. Tooling and mold suppliers must maintain less than a 5% return rate. If the supplier trends undesirable, Smart Tooling and Hawthorn Quality Department may request a Corrective Action to resolve the issue.

Delivery

Hawthorn Aero requires suppliers to maintain an on time delivery of greater than 95%. If the supplier trends undesirable, Smart Tooling and Hawthorn Quality Department may request a Corrective Action to resolve the issue.

Tooling and Mold Vendors

Schedule

The Supplier will provide a tooling plan upon acceptance of the purchase order that will identify milestone completion dates for each tool set. Milestones to include are as follows:

- Billet procurement
- Rough machine
- Welding (if applicable)
- Final machine
- Benching
- Inspection
- Shipment

An update to the schedule will be provided to the Hawthorn Aero POC weekly. Delivery dates should be reported as soon as they are known, independent of the weekly update.

Signed copy of PO acceptance requested within seven calendar days. Rejected purchase orders require written response from the vendor within seven calendar days, including reasoning for rejection. Failure to respond within seven calendar days will result in default acceptance of order.

Tool Design Approval

A signed and released copy of the build-to prints, along with a 3D Catia and .stp model, will be provided with the purchase order for every new order. Work may begin on receipt of all above data.

In the event that a staggered release is desired, Hawthorn Aero will provide incremental approval for billet procurement, rough machining only, etc. in the form of email to the Supplier POC. In this case, **ONLY** the portion of work released shall be progressed upon.

Tools should never be built to drawings used for quoting purposes received prior to the purchase order.

Tool Identification

All tooling is to be stamped with the corresponding part number, as specified on the build prints. Location and font size will be dictated by annotations on the prints. If stamping is requested on Hawthorn Aero nameplates, Hawthorn Aero will provide nameplates.

Additional stampings, such as weight or “1 of 2” markings, may also be included on the build prints.

Hardware

The Supplier is responsible for all hardware associated with the tooling/fixtures. A comprehensive list of hardware is included on each build print. Hardware listed as “Supplied by Hawthorn Aero” is not the responsibility of the Supplier.

Paint and Coatings

All steel tooling/fixtures is to be painted with high-temperature (400°F +) paint. Specific instructions are provided on the build prints.

Invar and composite tooling may or may not require paint. Check build prints to confirm.

Aluminum tooling should not be painted.

Powder coating may be requested on some fixtures. This will be noted on the build prints.

Metrology

Computer-aided, three-dimensional measuring equipment must be used to verify all delivered tooling. Touch probes or non-contact laser scanners are both acceptable, assuming a sufficient number of points are taken to fully inspect the tool. At a minimum, any surface called out as a datum in the 3D model and/or 2D prints must be measured. Data must be made available in a CATIA-compatible format upon request.

In addition, all o-ring grooves must be inspected using go/no-go pin gauges to verify accuracy.

| Nom. Diameter (in) | Groove Bottom | | Groove Top | |
|--------------------|------------------------|---------------------------|------------------------|---------------------------|
| | Go Pin Gauge Dia. (in) | No-Go Pin Gauge Dia. (in) | Go Pin Gauge Dia. (in) | No-Go Pin Gauge Dia. (in) |
| 1/16th | 0.0785 | 0.0895 | 0.085 | 0.101 |
| 3/32nd | 0.114 | 0.126 | 0.125 | 0.141 |
| 1/8th | 0.158 | 0.170 | 0.174 | 0.192 |
| 3/16th | 0.233 | 0.245 | 0.256 | 0.275 |
| 1/4th | 0.303 | 0.315 | 0.334 | 0.355 |

Special Certificate of Conformance Requirements for Tooling and Mold Suppliers

A certificate of conformance (COC) will be provided with every new tool and fixture. A copy will be provided to Hawthorn Aero' POC before shipment via email or in person if a source inspection is to be performed.

The COC must contain the requirements listed on page 14 and the following when applicable:

- Metrology data, including inspector name and method used
- Vacuum leak rates on required welds
- Photograph of tooling, assembled (showing proper fit) and unassembled (showing tooling surface)
- Stress relief histogram of machined parts
- Certified test report on raw materials

Exceptions to the COC requirement may be granted for tooling designated as "infusion stands", "containment sleeves", or "miscellaneous". Exceptions will be granted through written correspondence only.

Special Shipping Instructions for Tooling

Tooling shall be contained in a protective, wooden crate that completely encloses the tooling. Care shall be taken to insure parts to do rub or hit each other during shipping. Blocks are to be installed around the tooling to keep them from sliding.

Damage to tooling resulting from inadequate packaging will be the sole responsibility of the Supplier to correct.

Supplier shall include a pack slip with every shipment that will include:

- Supplier's name
- Smart Tooling's PO and line item #
- Quantity shipped
- COC #

Incentives and Penalties for Tooling Vendors

Schedule is of critical importance to Hawthorn Aero and its customers. It is a major factor in determining top tier suppliers from lower tier suppliers.

Hawthorn Aero will pay a 1% bonus per week per PO line item delivered ahead of schedule, up to 3%. The bonus is calculated when a fully-functional tool set, free of errors/defects, arrives on Hawthorn Aero' dock. If the purchase order contains multiple tool sets with different delivery dates, bonuses will only be paid if the earliest delivery dates are met. For example, if Tool #1 is due two weeks before Tool #2, no bonus will be paid on Tool #2 for early delivery until Tool #1 is delivered on schedule.

Conversely, Hawthorn Aero will impose a 1% penalty per week per PO line item delivered behind schedule. Any delays associated with incorrect machining found during tool inspection (either on-site or at Hawthorn Aero' facility) will be included in the penalty calculation. After three weeks of failure to deliver a fully-functional tool set, Hawthorn Aero reserves the right to completely cancel a PO with no expense to Hawthorn Aero, or to ship the tooling to another vendor to finish with all expenses covered by the first machinist.

Bonuses and penalties are calculated by week and are not pro-rated by the day.