TIMKEN

Supplier Requirements Manual

Timken Corporate Standard 29.1

Revision 14

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Forward / Introduction

Suppliers are responsible for the quality of their products and services.

The goal of The Timken Company's Supplier Requirements Manual is to clearly communicate the conditions for doing business regarding quality with The Timken Company and its global affiliates and to develop systems that drive continuous improvement, prevent defects, reduce variation and waste in the entire supply chain. Information presented in this manual takes precedence, unless officially notified by authorized Timken personnel.

Our suppliers are expected to have zero quality incidents and zero disruptions, provide products with zero defects, and have flawless delivery performance and on time responsiveness to issues.

Type I Materials: are materials that become a part of the products sold by The Timken Company. It also includes services used to produce (in whole or part) product sold by the Timken Company.

Scope of this manual applies to the product quality of all suppliers of Type I production materials, production or service parts, and manufacturers of machinery and related components.

The original of this manual is a controlled document. Copies of the Timken Supplier Requirements Manual distributed to suppliers, printed, or downloaded are considered uncontrolled and will not be automatically updated.

Suppliers to The Timken Company are responsible for obtaining and following this document via The Timken Company supplier website at http://tsn.timken.com. Suppliers are required to check the website periodically for revisions and updates to this document.

Suppliers are responsible for ensuring that products and services they supply conform to the latest revision of this document when shown on purchase orders, supply agreements, or as mailed, electronically transmitted, or viewed online at http://tsn.timken.com/.

Failure to include reference to The Timken Company Supplier Requirement Manual in a request for quote, purchase order or supply agreement does not excuse Suppliers from compliance.

Standard Requirements – Quality

To be a supplier to The Timken Company, all suppliers must meet our requirements for quality. Our standard requirements include:

1. ***Quality Management System:*** Suppliers must have a documented and implemented quality management system and agree to on-site assessments. Suppliers may be required to be registered to ISO 9001:20xx, IATF 16949:20xx or AS 9100D:20xx. As appropriate, ISO 14001:20xx registration/conformance or AS13100 compliance may be required.
2. ***Planning for Quality / Advanced Product Quality Planning (APQP)****:* As requested, the Supplier must have resources available and be capable of participating in Quality Planning / APQP, or industry specific prevention system; including such efforts as Feasibility Reviews, DFMEA'a, PFMEA's, Design Reviews, Prototype Production, Production Part Approval Process, process control plans, and FOD prevention activities.
3. ***Corrective Action****:* In the event of a quality issue related to a supplier's products, the supplier will be required to provide a written corrective action report, filed electronically using the Timken Quality Information System (QIM).
4. ***Hazardous Materials****:* All information related to Hazardous Materials, and the fulfillment of all governmental and safety requirements must be provided by the suppliers. Suppliers will be required to submit Safety Data Sheets (SDS) for all identified items.
5. ***Managing Change:*** Suppliers must agree to notify The Timken Company of any intended process change and obtain Timken's approval prior to implementation. Suppliers must also make this a condition of their own entire supply chain. In some cases, samples and documentation will be required as part of the approval process.
6. ***Material and Process Specifications****:* Suppliers must produce Timken products to the specific material and process specifications. In certain cases, we will require approval of the supplier's sub-suppliers.
7. ***Material Source Approval:*** When Timken specifies material, Timken must approve all material sources. Suppliers may be required to utilize the Material Certification Database (MCD) prior to shipping material to a Timken facility.
8. ***Non-Conforming Product:*** Suppliers must only ship product that meets specification or obtain a written deviation prior to shipment for any non-conforming product. Timken's consent to shipping non-conforming product does not relieve supplier of its responsibilities to Timken.
9. ***Records:*** Suppliers must maintain certain records for defined periods. Timken will define record retention including, as appropriate, disposition of records.
10. ***Shipment and Packaging Requirements:*** Suppliers must comply with Timken's specifications for shipping and packaging. This includes labeling specifications or requirements.
11. ***Supplier Escalation:*** A **s**upplier will be placed on an increased level of activity because of the supplier's continuing failure to perform in the areas of quality, delivery, or costs.
12. ***Supplier Cost Recovery and Chargeback Process***: A formal process where Timken will recover costs associated with a supplier's unacceptable performance.
13. ***Supply Chain Management:*** Suppliers must be willing to identify and manage their own entire supply chain. It is a supplier's responsibility to ensure that its sub-suppliers meet Timken requirements.
14. ***Traceability:*** Product traceability is a requirement. Suppliers must provide unique identification of product batches/lots as required by Timken.
15. ***Verification of Purchased Product:*** Suppliers must allow on-site product verification by Timken, its customer, or the customer's representative.

These Standard Requirements are further detailed on the following pages

1.0 Scope

Welcome to the Timken Company Supplier Requirements Manual for **Type I Suppliers**. Type 1 Suppliers are defined as those that provide products or services that constitute, in part or in whole, the products and services sold by The Timken Company. Requirements described herein apply to all external Type I Suppliers to the bearing and power transmission business unit of The Timken Company. Suppliers of indirect material shall comply with appropriate sections of the Supplier Requirement Manual as defined by purchase order requirements and/or other contractual obligations.

As part of the Timken supplier network, we expect The Timken Company quality reputation and Timken Brand Promise to be reflected in the products we purchase. This manual defines the specific processes and information necessary to fulfill the intent of our Quality Policy.

2.0 Normative References – *No additional requirements, utilize ISO9001/AS9100D where applicable*

3.0 Terms and Definitions

3D Process: A concise three-step problem-solving approach using 3 of the 8 disciplines.

8D Process: An eight-step problem-solving method, especially in the resolution of a nonconforming (discrepant) product, using the Timken Quality Issue Management (QIM).

AECA (Arms Export Control Act): The Arms Export Control Act of 1976 gives the President of the United States the authority to control the import and export of defense articles and defense services

AIAG: Automotive Industry Action Group

AIAG-APQP: Automotive Industry Action Group - Advanced Product Quality Planning, reference manual.

AIAG-PPAP: Automotive Industry Action Group - Production Part Approval Process.

ALW: Aircraft Landing Wheel

APQP: Advanced Product Quality Planning

Control Item Parts: Products with characteristics normally identified on drawings by an inverted delta (∇) preceding the part and/or raw material code number. Control Item parts may affect the safe motor vehicle operation and/or compliance with government regulations.

Controlled Shipping (CS1) - Controlled Shipping is a formal demand by Timken for a supplier to put in place an additional inspection process to sort for nonconforming material, while implementing root-cause analysis and corrective actions.

Controlled Shipping (CSII) - Includes the same processes as Level 1 controlled shipping with an additional inspection process that is completed by a third party.

Counterfeit Parts: Shall mean a part, component, module, or assembly whose origin, material, source of manufacture, performance, or characteristics, are misrepresented. This term includes but is not limited to (A) parts that have been (re)marked to disguise them or falsely represent the identity of the manufacturer, (B) defective parts and/or surplus material scrapped by the original manufacturer, and (C) previously used parts pulled or reclaimed and provided as new. Counterfeit Parts shall be treated as nonconforming material. The seller and its sub-tiers shall comply with the requirements of SAE AS5553 and/or AS6174 current revision as appropriate. The Seller shall ensure that only new and authentic materials are incorporated unless written approval is granted by Timken.

DFARS: Defense Federal Acquisition Regulation Supplement

DFMEA: Design Failure Mode and Effects Analysis

DISCREPANT: Nonconformance from drawing specifications, purchase order specifications, Timken Company Product and Process Specifications and Standards, or Industry Product and Process

Specifications and Standards, including but not limited to the areas of quantity, appearance, material, metallurgy, packaging/handling/shipping, and dimension.

DMR: Discrepant Material Report(s) and is used to notify the subcontractor of discrepancies and/or rejections documented at any Timken Company facility regarding the Type I material received and requests corrective action from the subcontractor.

DVP&R: Design Validation Plan and Report

ECI: Export Controlled Information

FAI: First Article Inspection

FAR: Federal Acquisition Regulation

FMEA: Failure Modes and Effects Analysis

Foreign Object (FO): alien substance or article (e.g., tools, consumables, hardware, product protective devices, personal items, product process debris, operations debris, and environmental debris) that could potentially enter and/or migrate into/on the product or system becoming FOD and potentially cause FOD, if not removed and controlled. (Reference 9146 3.3)

Foreign Object Debris (FOD): any FO that has entered and/or migrated into/on the product or system, and could potentially cause FOD, if not removed and controlled. (Reference SAE AS9146 3.5)

Foreign Object Damage (FOD): Any damage attributed to FOD that can be expressed in physical or economic terms, which could potentially degrade the product or system's required safety and/or performance characteristics. (Reference SAE AS9146 3.4)

GASL: Global Approved Supplier List

IATF (International Automotive Task Force): The International Automotive Task Force is an ad hoc group of automotive manufacturers and related industry associations formed to improve the collective quality control across supply chains in the automotive industry

IMDS: International Material Data System

ISIR: Initial Sample Inspection Report

ITAR (International Traffic in Arms Regulations: International Traffic in Arms Regulations is a United States regulatory regime to restrict and control the export of defense and military related technologies to safeguard U.S. national security and further U.S. foreign policy objectives

MSA: Measurement System Analysis

MSDS: Material Safety Data Sheets

Nonconforming or discrepant product: Product does not meet drawing specifications, purchase order requirements, Timken Company product and process specifications (or standards), and industry product and process specifications and standards. This includes, but does not limit, the areas of quantity, appearance, material, metallurgy, packaging, handling, shipping, delivery, cleanliness, and dimensions.

OTD: On-time delivery

OUO: Official Use Only

PCP: Process Control Plan

PFMEA: Process Failure Mode and Effects Analysis.

PPAP: Production Part Approval Process

Product: is a tangible or intangible output that is the result of a process that does not include activities that are performed at the interface between the supplier (provider) and the customer.

Product Safety: ability of product to perform to its designed or intended purpose without causing unacceptable risk of harm or hazards to persons or damage to property

Purchased Product Submission and Approval Process: Process used to determine if all design and specification requirements of purchased product are properly understood by Timken suppliers and

ensures that the supplier production process is capable of meeting Timken and the Timken customer's technical and quality requirements.

QA: Quality Assurance Representative

QIM: Quality Issue Management

Read Across: Process of reviewing other similar processes, services, or products the corrective action, and controls implemented for a defect, to eliminate the cause of a potential nonconformance in other areas.

'S'- Specifications: The Timken Company designation defining shipping and packaging requirements.

Safe Launch: Additional inspection activities to protect Timken facilities while supplier manufacturing process is maturing to full production volumes.

SPC: Statistical Process Control

SQD: Timken Supplier Quality Development team or their representative.

SQA: Supplier Quality Assurance

Special characteristics: Product or process requirements for which reasonably anticipated variation is likely to affect a fit, function, or the ability to process or build the product.

SR: Status Report

Submission Level: Part approval submission as per **AIAG-PPAP** guidelines.

TSN: Timken Supplier Network

Type I Materials: Materials that become a part of the products sold by The Timken Company. This includes services used to produce (in whole or part) product sold by The Timken Company.

Type I Suppliers: Suppliers that provide products or services that constitute, in part or in whole, the products or services sold by The Timken Company.

4.0 Context of the Organization

4.1 Understanding the organization and its context

a) It is expected that our suppliers will use a continual improvement approach to assist The Timken Company in creating a lean supply chain that minimizes the total cost of ownership for the supplier and The Timken Company through:
   i. Customer focused leadership – Striving to understand and anticipate the needs of The Timken Company, and proactively establishing the infrastructure to meet those needs.
      - This includes innovation, collaboration, speed, inventory management, and cost competitiveness.
   ii. Execution excellence – Flawless delivery performance with zero disruptions and zero quality issues.

4.2 Understanding the needs and expectation of interested parties

a) The Timken Company reserves the right to perform an on-site audit as deemed appropriate to verify conformance of supplier quality management system or to verify effectiveness regarding corrective or preventive actions related to supplier escalation. All such visits will be approved and arranged by The Timken Company.
   i. Type I suppliers must allow Timken's customers, the customer's representatives, government, or regulatory agencies the right to conduct surveillance of the supplier's quality systems at the Supplier's premises. This may include visits extended to sub-contracted suppliers of the supplier.

I. The Timken Company and its customers may review, in the presence of the supplier and on the supplier premises, documentation that contains confidential and proprietary supplier information pertaining to the product manufactured for The Timken Company.
II. Timken and/or its customers may conduct an audit of Supplier's and/or Supplier's sub tier supplier's facility, including without limitation all manufacturing processes and documentation used in the manufacturing of products under the purchase order, to determine compliance with the requirements of the purchase order
III. Where applicable, a quality history for the entire product shall be provided to The Timken Company. The quality history shall contain all verification documents generated during fabrication of the product or service.

b) Suppliers are required to notify, on a timely basis, the appropriate Timken Supplier Quality Development (SQD) associate if an **IATF** registered supplier quality management system is notified of special status conditions (such as new business hold – quality, needs improvement status, Q1 revocation) by any of the IATF or other organizations.
c) Terms in quotations below are as defined in the **AECA** ("AECA" at 22 U.S.C. 2778) and the **ITAR** ("ITAR" at 22 CFR 120-130).
   i. If Supplier is providing to, or on behalf of, Timken, a "defense article" or a "defense service" then the following apply:
      I. Supplier shall be registered with the Directorate of Defense Trade Controls ("DDTC"), U.S. Department of State;
      II. Supplier shall not permit any "Foreign Person" (not a U.S. citizen or permanent resident alien), access to any technical data relating to the defense article or defense service;
      III. Supplier shall not "Export" any "defense article" or "defense service" unless Supplier has first obtained a license from DDTC and provided prior notification to Timken;
      IV. Supplier shall otherwise comply with the ITAR and AECA; and
      V. Supplier shall indemnify and hold Timken harmless from and against any cost or other liabilities arising out of Supplier's failure to perform the above.
d) Pursuant to contract with the U.S. Government and U.S Government contractors, Timken is subject to **Defense Federal Acquisition Regulation Supplement (DFARS)** requirements on the acquisition of articles mentioned below. These requirements are valid when required by Timken's purchase order.
   i. 252.225.7009 - Restriction on Acquisition of Certain Articles Containing Specialty Metals
   ii. 252.225.7016 - Restriction on Acquisition of Ball and Roller Bearings
e) Timken receives rated orders from the U.S. Government and U.S. Government contractors for national defense use. In turn, Timken is required to flow priority ratings to suppliers of items needed to fulfill these rated orders. Likewise, suppliers receiving rated orders from Timken must comply with the requirements of Defense priorities and Allocations System, 15 CFR part 700 and give due priority to rated orders to meet required delivery dates.
f) Timken's Non-Disclosure agreement shall be reviewed and signed by all suppliers having access to material that is considered intellectual property of Timken. Compliance to Timken's Terms and Conditions apply.

4.3 Determining the scope of the quality management system

a) As a minimum, suppliers to the Timken Company are required to conform and may be required to acquire the latest revision of ISO 9001:20xx, AS9100D:20xx, IATF 16949:20xx registration or AS13100 compliance unless otherwise specified or approved by Timken Supplier Quality Development (SQD).

b) If a supplier to Timken does not have adequate resources to develop a Quality Management System according to ISO 9001:20xx, AS9100D:20xx, IATF 16949:20xx registration or AS13100 compliance Timken SQD will conduct audits on site using Supplier Risk Assessment audit or via the desk audit approach to assess gaps, identify risks, and take appropriate actions to protect Timken and customers.
c) Type I suppliers sub-contracting products or services to suppliers are required to provide to sub-tier suppliers the applicable requirements in the purchasing documents, including key characteristics (however named), material or process requirements where required.

4.4 Quality management system and its processes – *No additional requirements, utilize ISO9001/AS9100D where applicable*

5.0 Leadership

5.1 Leadership and commitment – *No additional requirements, utilize ISO9001/AS9100D where applicable*

5.2 Policy – *No additional requirements, utilize ISO9001/AS9100D where applicable*

5.3 Organization roles, responsibilities, and authorities – *No additional requirements, utilize ISO9001/AS9100D where applicable*

6.0 Planning - *No additional requirements, utilize ISO9001/AS9100D where applicable*

7.0 Support

7.1 Resources

a) Suppliers are expected to adhere fully to all applicable governmental laws and regulations to protect the environment and ensure the health, safety, and quality of life within their communities. Suppliers must adhere to laws and regulations that apply to the health and safety of their workers.
b) No abnormal or harmful radioactivity levels shall be permitted in any material. Nor harmful elements or additives shall be permitted that are listed in any EU, ISO or local standards banning such materials at the time of shipment to Timken.
c) Suppliers are encouraged to define, implement, and maintain environmental management systems such as ISO 14001:20xx. Goals of the Supplier environmental management program should be:
    i. Commitment to compliance with all applicable laws, regulations and company policies relating to environmental protection, to prevent pollution at its source by minimizing emissions, effluents, and waste in the design, operation, and maintenance of their facilities.
    ii. Commitment to prevention including source reduction, recovery, reusing and recycling. Where feasible, eliminating negative environmental impacts associated with suppliers' operations and products.
    iii. Commitment to continual improvement to increase the general awareness of environmental requirements among associates, facilitating an understanding of the environmental implications of their day-to-day responsibilities. Developing the capabilities and support mechanism necessary to achieve the Suppliers environmental policy, objectives, and targets.

7.2 Competence – *No additional requirements, utilize ISO9001/AS9100D where applicable*

7.3 Awareness – *No additional requirements, utilize ISO9001/AS9100D where applicable*

7.4 Communication – *No additional requirements, utilize ISO9001/AS9100D where applicable*

7.5 Documented information

a) Suppliers shall maintain appropriate records on file according to requirements of the supplier, The Timken Company, or regulatory bodies *(ISO 9001, AS9100D, AS13100, and IATF 16949 where applicable)*.
b) The supplier shall provide The Timken Company with appropriate documentation during design, manufacturing, inspection, and testing. Documents shall include (where applicable) design records such as:
    i. **Design Failure Mode and Effects Analysis (DFMEA)**
    ii. **Design Validation Plan and Report (DVP&R)**
    iii. Quality Planning / **Advanced Product Quality Planning (APQP)** Status Report
c) Inspection data shall be retained by the supplier and be made available upon request.
d) Where applicable, a quality history for the product shall be provided to The Timken Company. The quality history shall contain all verification documents generated during manufacturing, processing, or fabrication.
e) Control and destruction of documentation applies to manufacturers of product for Timken, service providers for Timken products and laboratories testing Timken product and supporting reports.
f) Quality performance records, including control charts, inspection and test results shall be retained for one calendar year after the year in which they were created.

Section 1: Documented information *(AS9100D & AS13100 Specific)*

a) Suppliers shall have a written procedure that describes controls for ensuring only U.S. persons are permitted access to ECI/OUO information and items. Written procedure must address as minimum the following areas:
    i. Access Control
    ii. Storage
    iii. Transmission
    iv. Destruction

b) **ALW (Aircraft Landing Wheels)** Specific Requirements (*AS9100D 7.5.3.2*)
    i. **ALW** suppliers are required to maintain all records on file for a minimum period of eleven years from date of last delivery. All other aerospace suppliers are required to retain records indefinitely. Prior to the destruction of records, the supplier shall notify Timken in writing for authorization to destroy records. When the decision is communicated to dispose of records, records shall be destroyed in a manner that renders them unusable by suitable means. All other requirements of the modified notes(s) are still applicable. Compliance with documentation required by the drawing or specification is required.

8.0 Operation

8.1 Operational planning and control – *No additional requirements, utilize ISO9001/AS9100D where applicable*

8.2 Requirements for products and services

Section 1: Purchase Order Review

a) It is the supplier's responsibility to perform contract review for each purchase order received from The Timken Company. This shall include the identification of Timken prints, standards, and specifications.
b) This requirement shall be satisfied by one of the following methods:
    i. When the Purchase Order defines the revision of Prints, Standards and Specifications, the supplier shall confirm that they have the same revision of the document noted on the Purchase Order.
    ii. When the Purchase Order does NOT define the revision of Prints, Standards or Specifications, the supplier shall confirm that they have the latest revision of those documents. This requirement shall be satisfied by one of the following:
        I. For Standards and Specifications check **TSN (Timken Supplier Network - https://tsn.timken.com/supplierinfo.asp)** to identify the latest revision.
        II. For suppliers without the ability to retrieve their own Timken prints contact your Timken Purchasing \ Supplier Quality representative to confirm print revision.
        III. For suppliers granted access to retrieve Timken prints by means of **KBE (Knowledge Based Engineering)** and **TADA (Timken All Document Access)**, it is the supplier's responsibility to check for the latest print revision prior to processing.

Section 2: Purchase Order Review *(AS9100D & AS13100 specific)*

a. For aerospace applications and products Timken utilizes transaction codes (T-codes) to specify flow down requirements from our customers. These "T-Codes" will be added to the purchase order and are the responsibility of the supplier to review prior to manufacturing the product. Supplier shall utilize the latest revision of document EGS-P0777 TSN (Timken Supplier Network) to determine the specifics of each "T-Code".

Section 3: Print Review

a) **Control Item** parts are products with characteristics normally identified on drawings by an inverted delta (∇) preceding the part and/or raw material code number. Control Item parts may affect the safe operation and/or compliance with government regulations.
b) **Special Characteristics** are those product or process requirements for which reasonably anticipated variation is likely to affect a fit, function or the ability to process or build the product. Special characteristics will be designated on the Timken print, or specification. 'KPC' or a diamond (◊) placed near the characteristic typically designates special characteristics. Alternate designations may be used. Timken specific characteristics are indicted appropriately being placed near the characteristic.
c) Requirements for Special / Specific Characteristics are:
    i. All Special Characteristics must be made in a process having a special control method(s).
    ii. SPC is the most common and preferred special control method.
    iii. To be considered valid, Cpk values cannot be calculated until there is a stable and capable process.
    iv. Cpk is typically calculated based on data from 20 days of production; minimum is 100 individual sample or data points.
    v. The Cpk value must be noted on control charts.
    vi. Reaction plans to out-of-control signals must be indicated on the chart. Both parts and process must be described.

I. Refer to the **AIAG SPC** manual for out-of-control signals.

vii. On occasion, the Special Characteristic designation will be applied to characteristics, such as raw material, hardness, etc., and therefore, typical SPC cannot be applied. In such cases, you must identify the special controls used for these characteristics in your quality control plan.

8.3 Design and development of products and services

Section 1: APQP

a) When requested, the supplier shall provide The Timken Company with a product quality plan prior to or upon receipt of a purchase agreement.

b) For each stage of product / process design and development, product and process validation and verification, feedback, assessment, and corrective action, the product quality planning process shall include but not be limited to:
   i. Advanced Product Quality Planning
   ii. Special characteristics
   iii. Feasibility reviews
   iv. Product safety
   v. Process Failure Mode and Effects Analysis
   vi. Mistake / error proofing
   vii. Control Plan to cover three distinct phases: Prototype, Pre-launch, and Production

c) Suppliers that are design responsible for Type I material are expected to use the DFMEA approach for robust design integrity. Suppliers that use Timken-generated designs are not responsible for Design FMEA activities but may participate in DFMEA planning activities with Timken.

d) During the Quality planning process, or ongoing execution of existing orders, suppliers shall assure that associates are aware of their contribution to product or service conformity, their contribution to product safety and FOD prevention. Timken requirements and reference to its technical specification shall be included (documented) in the planning of product manufacturing or processes as a component of the quality plan.

e) Suppliers shall plan, and implement and control processes, appropriate to the supplier and product provided, for the prevention of counterfeit or suspect counterfeit part use and the potential inclusion in product or services delivered to Timken.

APQP (AS9100D Requirement)

f) Sampling inspection must be in accordance with the latest revision of ANSI/ASQC Z1.4, “Sampling Procedures and Tables for Inspection by Attributes”.

g) Acceptance criteria shall be defined by the supplier and, where required, approved by Timken. For all data sampling, the acceptance level shall be zero defects C=0.

Section 2: Control Plan

a) All products provided to The Timken Company shall be inspected by the supplier according to an agreed upon control plan. In the absence of a purchasing or a supply agreement, the supplier must develop, implement, and maintain inspection methods necessary to assure the product conforms to the requirements of The Timken Company.

b) The supplier shall conduct in-process and outgoing audit inspections, or tests as defined in the product / process control plan.

c) Suppliers must allow Timken, its customer(s), its customer’s representative(s), government, or regulatory agencies the right to verify at the supplier’s premises that the purchased products conform

to specified requirements. The Supplier shall not use such verification as evidence of effective control of quality.

d) Verification by Timken, its customer(s), or its customer representative(s) shall not absolve the supplier of the responsibility to provide acceptable products, nor shall it preclude subsequent rejection by Timken or its customer(s) subject to final acceptance at its destination.

e) Your control plan will require concurrence from Timken prior to PPAP. This discussion should begin at the initial Quality Planning, APQP or Feasibility meetings. (*IATF 8.2.3.1.1*)

Section 3: Prototype (IATF Requirement)

a) The intent of the prototype activity is to assemble and test product, processes, and assembly systems, and perform conformance/measurement/design validation.

b) Part approval at Prototype (Click here for Procedure) ensures component part problems are identified and corrected to minimize the impact of part variation upon design, evaluation, manufacturing, and assembly.

c) Suppliers of prototype parts are required to have completed, documented and available for review the items listed below:

i. Timken Supplier Warrant of Material for Prototype
ii. Design records.
iii. Inspection results and inspection and/or test devices.
iv. Material certification.
v. Part weight (mass)/Serialization information.

Section 4: PPAP (IATF 8.3.4.4)

d) Purchased Product Submission and Approval Process is implemented to determine if all design and specification requirements of purchased product are properly understood by Timken suppliers and to ensure that the supplier production process is capable of meeting Timken and the Timken customer's technical and quality requirements. The supplier submits documentation, determined during feasibility review with SQD, using Supplier PPAP/ISIR Submission Request Form.

e) The submission requirements will typically include initial sample parts; design review; dimensional layout; performance test results; material certifications; capability studies; process flow diagram; design **FMEA (Failure Modes and Effects Analysis)**; process FMEA, and supplier process control plan.

f) This process follows Timken's customer and The Timken Company internal requirements in accordance with the latest version **AIAG**-**Production Part Approval Process (PPAP**) manual. Notification and submission requirements defined by **AIAG** unless otherwise specified by the customer. Unique customer specific requirements are addressed as defined and required.

g) To fully understand the supplier measurement abilities, as appropriate and defined by the Supplier Quality representative, the supplier shall perform a **measurement system analysis (MSA)** in accordance with the latest version of the ***AIAG Measurement System Analysis manual.***

h) Timken-specific requirements related to the initial sample parts and identification include the following:

i. Samples must be from production tooling operating under production conditions.
ii. Samples are to be uniquely identified, so that measurement correlation may be performed.
iii. Sample quantity may vary according to the nature of the product and the manufacturing process.
iv. Production material and processes.
v. Analysis/Development/Validation Documentation (when requested).
vi. Unless sample quantities are defined in a Timken standard or specification, the following guidelines may be used:

I. A minimum of 5 samples (out of a 300-piece production run) is required from any single part producing tooling.
II. A minimum of 1 sample per cavity is required from multiple part tooling.

i) Suppliers are strongly encouraged to work with their Supplier Quality Development representative or designated plant quality personnel to obtain a full approval on time.
j) Supplier production parts are not to be released for shipment to the Timken user plant until the supplier receives notification from Timken that the PPAP has been approved or interim approved for volume production.
k) When requested by Supplier Quality Development personnel, the supplier shall establish a Safe Launch process, which will serve to validate the Production / **Process Control Plan (PCP)** and ensure that all shipped products meet Timken's expectations.

8.4 Control of externally provided processes, products, and services

a) Suppliers must be willing to identify and manage, as appropriate, their entire supply chain. This includes raw material suppliers or manufacturers and any suppliers of components or processing used for products supplied to The Timken Company.
b) As appropriate, suppliers shall impose all The Timken Company quality requirements on the entire supply chain used to produce the items supplied to The Timken Company.

Section 1: AS13100 Requirement

a) Supplier must have documented defect prevention and process control methods in alignment with SAE AS13100 clauses such as but not limited to SAE AS13004 and SAE AS13006 as applicable.

8.5 Production and service provision

8.5.1 Control of production and service provision

a) **NADCAP Required for Special Processes (see AS9100D 8.5.1.2)**
   i. Special Processes are defined as Heat Treat, Welding, Plating, Passivation, Coatings, Non-Destructive Testing, and Eddy Current. When required, the use of a NADCAP certified supplier must be used when special processes are performed for Timken. Timken must be notified if the vendor loses Nadcap accreditation or if there are findings because of an audit conducted by NADCAP/PRI.

8.5.2 Identification and Traceability

a) As required, suppliers shall be able to demonstrate adequate product traceability. Specific traceability requirements are identified and reviewed at initial feasibility, planning for Quality or APQP meetings. Suppliers to The Timken Company shall establish and maintain documented methods for unique identification of product, batches, or lots, including product marking as necessary for identification or traceability purposes.
b) Lot numbers, as identified on shipping labels, must provide traceability from receipt and during all stages of production by the supplier, including shipment to Timken.
c) The Timken Company reserves the right to perform an on-site audit or request appropriate, timely documentation to verify conformance to traceability requirements.

d) Traceability information must include, and begin with an individual raw material heat number, or equivalent.
e) For aerospace, high-speed rail, and wind energy product a lot or heat treat batch cannot contain more than one material heat number.
f) For other product, a lot or heat treat batch may contain no more than two material heat numbers if the following condition exist.
    i. To maintain maximum lot or heat treat batch size; one lot or heat treat batch may have the end of run of one material heat number and the beginning of another.
g) The lot or heat treat batch with two material heat numbers must be identified as having multiple material heat numbers.

Section 1: Timken Material Certification Database (MCD)

a) The Timken Company has developed a material certification system to improve incoming material control. As required, suppliers of raceway, rolling element, and heat treat retainers (cages) must take the following specific actions before delivering any supplier owned/purchased material to any Timken plant for manufacture of our products. All exceptions must be approved in writing by Timken GMQ or SQD organization.
b) Material Certification Database (MCD) – is utilized to track and verify that all steel supplied to Timken facilities has an approved chemistry. Suppliers are required to populate the material certification database with the appropriate supporting data from each lot of material sold to/received by all Timken facilities worldwide.
    i. All raceway, rolling element, and heat-treated retainers (cages) must be purchased from a Timken approved material source.
    ii. Each supplier must transmit primary melt certificate to Timken at least 48 hours before any shipment will arrive at a Timken plant via either:
        I. E-mail scanned certificates to: ter-mfgtech@timken.com
        II. Fax material certificates to: 001-330-458-6888

Note: Only original heat certificates will be acceptable. Certificates with pencil modifications will be rejected.

    iii. Accompanying each transmission, suppliers must fill out an MCD Submission Form
        I. The MCD Submission Form is available on Timken Supplier Network website found at http://tsn.timken.com
        II. For accurate transcribing of data, please verify that the copy being faxed or emailed is legible.

Note: Our email system accepts only attachments in the form of a .jpg, .tiff, .pdf file types.

    iv. Once the certificate is received, the documents will be evaluated.
        I. If material certification data does not conform to the appropriate specification or is from a Non-Timken Approved melt source, a Quality representative from the receiving plant will be notified that the batch of material submitted is non-conforming and will contact you to hold all products made from this material until further notice. Note: you will not be notified via the MDC system regarding approval status.
        II. The new requirement will not change your delivery schedule unless nonconforming issues are presented.
        III. Do not delay shipment waiting for confirmation. Suppliers will only be notified if there is an issue that requires resolution.

8.5.2 Identification and Traceability (*AS9100D specific)*

a) The seller shall establish and maintain a system for traceability of supplies to their source (including sub tier suppliers) by lot, batch, heat, melt and part. Records of traceability shall be maintained by the supplier as part of this objective evidence of quality control and acceptability, and such records shall be made available to representatives of Timken.

Section 1: Acceptance Authority Media (AAM)

a) Suppliers shall comply with AS9100D requirements regarding the application of Acceptance Authority Media (AAM) requirements. Suppliers shall ensure that within their organization and its supply chain, the use of AAM is clearly defined within the Quality Management System. Suppliers shall maintain compliance to AAM requirements by assessing its process and supply chain as part of its internal audit activities, including but not limited to application errors, untimely use, misrepresentation, and training deficiencies. Additionally, this communication shall reinforce the importance of ethical behavior in their daily activities. The use of AAM must be considered as a personal warranty of compliance and conformity. Suppliers shall, upon Timken request, be able to demonstrate evidence of communication to their employees and their supply chain.

8.5.3 Property Belonging to customer or external providers – *No additional requirements, utilize ISO9001/AS9100D where applicable.*

8.5.4 Preservation

a) Production shipment and packaging requirements discussions should begin during APQP activities or Feasibility review. All requirements shall be finalized prior to first shipment and PPAP submission.
b) All materials used in product manufacture shall satisfy current government and safety constraints on restricted, toxic, and hazardous materials. Suppliers shall not supply chemicals detailed on the Controlled Substances List (Click here for list). Suppliers are required to comply with appropriate restricted or reportable substance notification on PPAP submissions.
c) All materials used in or incorporated into Timken Company products shall satisfy current governmental and safety constraints on restricted, toxic, and hazardous materials; as well as environmental, electrical, and electromagnetic considerations applicable to the country of manufacture and sale. A **Material Safety Data Sheet (MSDS)** must be submitted for all items as defined under applicable regulations. Material Safety Data Sheet(s) must be submitted to the receiving location.
d) A Material Safety Data Sheet(s), with full disclosure, must be submitted to the receiving location for approval as soon as possible following the feasibility meeting and/or receipt of a Purchase Order. At the latest, applicable MSDS sheets must be provided to the using Timken plant prior to first shipment / PPAP submission of any component, raw materials, or product.
e) Approval of each MSDS should be obtained as early as possible in the product launch. The Timken using plant will notify the supplier if the MSDS sheets are not acceptable. If MSDS information is not submitted, or approval is not obtained, the first shipment PPAP submission may not be approved.
f) Suppliers shall use **IMDS (International Material Data System**) as required.
g) In some cases, The Timken Company designates 'S'-Specifications to define shipping and packaging requirements. Requirements in any 'S' specification shall be considered an extension of the purchase order and /or product drawing / agreement.
h) Unless alternate methods have been agreed upon in writing with SQD or the receiving location, all production shipments must include or be preceded by the following:
    a. Material certifications as specified in all applicable material specifications. (*Reference MCD 8.5.2*)

b. Applicable Statistical Process Control (SPC) data (for all print designated special or critical characteristics) unless instructed differently from SQD or the receiving location.
c. Labeling, or bar code labeling, must be in accordance with appropriate **AIAG** guidelines or plant specific requirements.

i) Timken suppliers of packaging equipment may be required to utilize Timken Smartflow to assure packaging aligns with Timken branding and labeling requirements. Contact your Timken representative to determine requirement.

8.5.4 Preservation (*AS9100D specific)*

a) Supplier must have a program in place to protect product from damage during production and handling from foreign debris. Supplier associates should be trained, qualified and competent regarding prevention, detection, and removal of FOD. Supplier FOD prevention program should meet the requirements of 9146

Section 1: Government Property

a) In furtherance of the performance of a purchase order, Timken may deliver Government Property to Supplier. "Government Property" is property owned by or leased to the U.S. Government or acquired by the U.S. Government and placed in the possession of a supplier.
b) Supplier shall comply with the requirements of FAR 52.245-1 with respect to any Government Property delivered to Supplier in connection with a Timken purchase order. Without limiting the foregoing, Supplier shall not remove, rework, repair, or scrap Government Property without the prior written approval of the Timken Contract Administrator.

8.5.5 Post-delivery activities (*AS9100D specific)*

a) The seller shall maintain on file and submit upon request a report for the delivered end items or assemblies with the following information included as a minimum: part number, revision letter, part name, purchase order number, lot number, lot quantity, inspection sample size, characteristics/ parameters inspected and/or tested, inspection test data, quantity passed/rejected by characteristic, date of inspection/test, and signature/stamp of seller's inspection / test representative.

8.5.6 Control of Changes

a) After product approval, suppliers shall not make any type of change without prior written notification and approval from The Timken Company. Suppliers must also make this a condition of their own entire supply chain.
b) Changes are defined as alteration in the product design; product specification; purchased parts; material, service supplier or provider; manufacturing location; method of manufacturing; processing; testing; storage; packaging; preservation or delivery.
c) Changes shall be communicated through Timken's **Quality Issue Management (QIM)**. These include changes to part design, material, sub-tier supplier, manufacturing location or process. When in doubt, suppliers are encouraged to contact their respective Corporate SQD or sourcing representative. Submit the request to The Timken Company for approval to proceed with a defined validation plan. This plan may include or require new **Production Part Approval Process (PPAP)** submission or **FAI (First Article Inspection).**

d) The supplier shall notify The Timken Company in advance and obtain approval for all design or process changes affecting the product manufactured, processed, or serviced for The Timken Company.
e) Changes are classified based upon impact or the most adverse effect, either in the subsequent processing of a part, in its handling, or in its intended or foreseeable application.
f) The supplier change can be initiated by:
    i. Timken Engineering department
    ii. Customer-initiated change communicated to the Timken Supplier Quality Development department by the customer's engineers or marketing department
    iii. Timken's Purchasing and Supplier Quality Development departments
    iv. Quality Advancement department
    v. Timken's manufacturing plant/user
    vi. Supplier
g) For permanent changes, the Timken Supplier Quality Development representative determines if a new Production Part Approval Process is required and advises the supplier accordingly.
h) Following validation and/or Production Part Approval Process (PPAP) approval, the Supplier Product/Process Change Request is granted or denied, and the supplier is advised accordingly.
i) At this stage, the timing to phase in the approved change is established and communicated to the supplier and all interested parties.

Section 1: Change Approval

a) Upon approval by Timken as a qualified source, through first article or first lot acceptance, the seller shall not make any changes in design, materials or processes which may affect the acceptability (dimensional, visually, functionally, durability, etc.) of the items to be delivered to Timken without prior notification and approval of Timken. For the purpose of this clause, a process is defined as any procedure, system or practice used during the manufacture or production of a deliverable item (i.e. machining, de-burring, heat treating, soldering, cleaning, finishing, etc.). Examples of process changes that require customer notification and approval are as follows:
    i. Change in inspection and/or testing methods.
    ii. Changes in product or processing of components used in the manufacture of the end item including components manufactured by the seller or a sub-tier supplier.
    iii. Change of sub-tier suppliers.
    iv. Production from new or modified tools, dies, molds including replacements (excluding perishable tools).
    v. A change in manufacturing location.
    vi. A special process changes.

Section 2: First Article Inspection

a) On the first initial production and the first article produced, after design change incorporation, the seller shall perform and document a comprehensive inspection and test of that article to assure articles' conformance with all drawing and specification requirements. When multi-cavity molds/dies are used, First Article Inspection is required for each cavity.
b) A new First Article Inspection shall be required if:
    i. A significant design or process change has been made that affects the original First Article and is applicable only to those characteristics affected by the change
    ii. The item has not been produced for a period of one year
    iii. A change in manufacturing location.
c) The seller's report shall provide, as a minimum: purchase order number, part number, revision level, part name, seller's name, drawing requirements (including tolerances), method used to obtain results

and actual results of each measurement. Part(s) used for the inspection shall be identified when shipped to Timken as "First Article Inspection Sample". First Article data, regardless of format, shall accompany the first shipment to be delivered.

8.6 Release of products and services (*AS9100D specific)*

Section 1: Certificate of Conformance (C of C)

a) Seller shall prepare and submit a certification of conformance to Timken for each shipment made under a Purchase Order (or each designated item if specific items are designated in the body of the Purchase Order.) The certification shall be signed by the Seller's Responsible Quality Representative as evidence that the deliverable product conforms to stated requirements: i.e., Material Certifications, Process Requirements, Supplier Qualification Status, Hardware Qualification, etc.
b) The sub-tier specifications used and certified for each operation must be the current revision as defined by Timken standard EGS-D0005 and listed in EGS-D0005-A.
c) Completion of the Certificate shall not modify or limit any representations, warranties or commitments made or in any way affect the obligation of seller to perform strictly in accordance with the provisions of the Purchase Order.
d) The following information shall be provided as a minimum: seller's name, quantity of shipment, lot numbers/date codes/serial numbers if applicable, Timken part number and drawing revision, country in which the part was manufactured, Timken purchase order number and revision, and a statement that all other applicable requirements as called out by the purchase order, drawings or specifications have been met.

8.7 Control of nonconforming product

a) **Non-conforming or discrepant product** is defined as: deviation from drawing specifications, purchase order requirements, Timken Company product and process specifications or standards and industry product and process specifications and standards, including but not limited to the areas of quantity, appearance, material, metallurgy, packaging, handling, shipping, delivery, cleanliness and dimensions. Counterfeit Parts shall be treated as nonconforming material.
b) When non-conforming product is detected by the supplier after product has shipped, is in transit or delivered to Timken, supplier shall take appropriate action to mitigate the effect including formal, detailed notification to The Timken Company.
c) Notification shall include a clear description of the non-conformity, which includes as required: parts affected, part numbers, quantities and dates delivered or in-transit. If required by Timken, supplier shall provide traceability information for lots or batches of material or product.
d) **Discrepant Material Report (DMR)** (Click here for Procedure) is used to notify the supplier of non-conformance, discrepancy and/or rejection. The DMR is sent via e-mail directly to the Supplier contact using Timken's **Quality Issue Management (QIM)** and can be initiated from any Timken Company facility receiving Type I material. A DMR may be initiated upon detection of non-conforming product. Requests for corrective action may be required from the supplier.
e) The supplier is responsible to respond directly to the Supplier Complaint within the requested timeframe using QIM. Unless otherwise noted in the Supplier Complaint, the initial response is expected within 30 days.
f) If a supplier's product is determined to be defective in material and/or workmanship, as defined by the design requirements, product(s) will be immediately contained. The Timken Company and the supplier

shall determine if the product can be inspected to remove defects from the "lot" that has been contained.

g) The supplier shall provide detailed inspection instructions to The Timken Company on request to support DMR investigations.
h) The Timken Company reserves the right to approve all inspection methods.
i) If it is determined that inspection alone cannot detect the defect, the product(s) will be returned to the supplier or scrapped as agreed upon by the supplier and Timken. The Timken Company will identify any costs incurred from these defective parts and will initiate the Supplier Cost Recovery Chargeback procedure with the supplier.
j) If the purchased product is needed for urgent production at a Timken facility, the supplier shall provide a rapid inspection team to Timken's production facility for inspection or agree (by providing purchase order to the third party) to the use of a third-party inspection service with the cost of service being assumed by the supplier. In most cases, as appropriate, the supplier shall be given the option regarding sorting methodologies by the effected Timken facility. The use of a third-party to sort defective product does not relieve the supplier of their responsibility for the quality or delivery of product.
k) The Timken Company shall have the right to perform any, and all, necessary safe, destructive, and non-destructive tests to evaluate fully the performance of the supplier's product or services.
l) The Timken Company shall have the right to utilize the service of an independent 17025:20XX accredited testing laboratory. The supplier shall reimburse The Timken Company for the expense of said tests only if testing confirms the product or service is defective. The Timken Company must provide proper accounting of hours for inspection to the supplier.
m) If the purchased product is determined to be defective or non-conforming for reasons other than those defined on the design prints, the two parties will discuss and determine if containment action is required.
n) If containment action is required, inspection criteria will be established. If containment action is not required, the supplier's product will be approved for use in production with a proper record of using the deviation process.

Section 1: Supplier Responsiveness

a) The Timken Company will monitor speed, timeliness, and effectiveness of corrective or preventive actions using QIM and may use the supplier's response as input for awarding future business and monitoring performance. (*See 9.1*)

Section 2: Supplier Controlled Shipping (CSI/CSII)

a) The intent of Controlled Shipping is to implement a rigorous process that protects Timken from the receipt of nonconforming parts and/or material.
    i. **Level One Controlled Shipping (CSI)** - Controlled Shipping is a formal demand by Timken for a supplier to put in place an additional inspection process to sort for nonconforming material, while implementing root-cause analysis and corrective actions. The Controlled Shipping process is in addition to normal controls. The data obtained from the Controlled Shipping inspection process is critical as both a measure of the effectiveness of the containment process and the corrective actions taken to eliminate the initial nonconformance.
    ii. **Level Two Controlled Shipping (CSII)** - Includes the same processes as Level I Controlled Shipping with an additional inspection process that is completed by a third party. Timken and the supplier will mutually agree upon the third-party company and location. The third-party company must be minimum certified to ISO 9001:20xx.
b) Based on the severity of issue, Timken determines whether Level I or Level II would be appropriate.

Section 3: MRB Authority (*AS9100D specific)*

a) Unless otherwise specified in the purchase order, the seller and/or any of their sub-tier suppliers do not have authority to process “USE-AS-IS”, “REPAIR”, “STANDARD REPAIR PROCEDURES (SRPS)” or “NON-SRPS” via their internal material review board (MRB). These dispositions, as well as deviations and request for waivers, requiring MRB disposition shall be submitted to Timken for approval (this does not include rework or scrap). The seller shall contact Timken purchasing to obtain a waiver form.

9.0 Performance Evaluation

9.1 Monitoring, measurement, analysis, and evaluation

a) The Timken Company’s supplier evaluation process is designed to measure supplier performance over time. The evaluation is completed on a periodic basis by a cross-functional team, which typically consists of The Timken Company user plant, purchasing, order fulfillment and Supplier Quality Development personnel. Specific supplier or supplier locations may be evaluated using only delivery and quality performance as determined by the Timken Company. The evaluation typically focuses on five performance areas:
   i. ***Quality*** - Product quality demands stringent adherence to purchase, transportation, engineering, and packaging specifications – including cleanliness, and consistent, reliable service to assure customer satisfaction. Examples of measures:
      I. Number of DMRs
      II. P.P.M. (Parts Per Million)
      III. Number of external complaints
      IV. Overall Cost of Quality
      V. Warranty claims and field returns
   ii. ***Delivery*** - On-time delivery (OTD) is having the correct material in the right quantity at the right place and at mutually agreed upon delivery time and date. The delivery date is the acknowledged or re-promised date. Examples of measures:
      I. OTD rate
      II. Deviation of gross total receipts from total due / average percent deviation
      III. Expedited shipments
      IV. Average percent deviation
   iii. ***Cost*** – Examples of measures:
      I. Level of prices
      II. Contractual agreement
      III. Delivery cost
      IV. Payment terms
   iv. ***Customer Service:***
      I. Invoicing problems
      II. Supplier’s ability to respond to requests
      III. Supplier’s ability to provide correct line and releases, quantities received
   v. ***Continuous Improvement / Lean:***
      I. Continual Improvement activities
      II. Cost reduction ideas
      III. New product development
      IV. Supplier lean work with the plants, purchasing, and SQD to drive problem solving and cost reduction initiative(s).

b) Timken has recognized that certain processes and operations in our supply base required to make our product have levels of risk that must be managed appropriately. Timken has processes to evaluate levels of risk with our supply base. If during business, we determine a process or operation to have an unacceptable level of risk, we will contact supplier directly with specific measures that will need to be implemented to bring the level of risk to a manageable level.
c) The supplier escalation process is an increased level of activity with a supplier resulting from the supplier's continuing failure to perform in the areas of quality, delivery, or cost. Escalation may also be initiated when there are noticeable trends that indicate that quality systems may be stressed or deteriorating at a supplier. Supplier Quality Escalation is the methodology used by Timken SQD personnel to define actions, resolve, and improve overall supplier performance. Supplier escalation definition, consequence, and entrance criteria, refer to below link: Supplier Escalation Process.
    i. Escalation stages vary up to and include notification to the supplier's registrar of ongoing systemic quality issues or recognition that it may be in the best interests of The Timken Company and supplier to discontinue doing business.
d) Suppliers shall monitor process performance using the appropriate statistical techniques in accordance with the latest revision of **AIAG Statistical Process Control** manual. The determination of need is based on the ability to control and verify the process capability and product characteristics. The use of quality planning tools such as **Design Failure Mode and Effects Analysis (DFMEA)** and/or **Process Failure Mode and Effects Analysis (PFMEA)** is essential. The supplier shall submit capability data for key characteristics when requested by Timken personnel. The supplier is encouraged to use statistical techniques including:
    i. Gage R&R study
    ii. Predictive maintenance
    iii. Defect analysis
    iv. Sampling and (C=0)
    v. Process analysis and control charting methods
    vi. Regression analysis - analysis of variance
    vii. Other graphical methods

9.2 Internal audit

a) Suppliers shall incorporate lessons learned from previous experiences, process knowledge or other sources into quality planning documentation.
b) Lesson learned are to be identified as such throughout the entire quality planning documentation process and available to Timken personnel upon request.
c) **Safe Launch Plan (SLP)** is implemented to verify product & process stability in an organized manner. SLP is intended to be a learning period. Collected data will be monitored, analyzed, and product & process adjustments should be made when necessary and should take place when new production is starting.
    i. Safe Launch is to be used as appropriate for all pre-production and production requirements that require the **Production Part Approval Process (PPAP)** and whenever requested by a Timken Plant or Timken Customer on any parts that present significant risk. Safe Launch should not be used for discrepant material received at the customer's plant.
    ii. SLP is recommended as appropriate in the following situations.
        I. Process - new, changed, moved, or re-sourced processes.
        II. Product - new, transferred, or changed product.

III. Suppliers - new suppliers or existing suppliers on modified or new product.
IV. Correlation Activities - correlation of testing, inspection, or gage equipment.

9.3 Management review – *No additional requirements, utilize ISO9001/AS9100D where applicable*

10.0 Improvement

10.1 General

a) Timken and its suppliers strive to achieve excellence in manufacturing and may review certain Timken units and other companies for examples of best practices. Best practices are business principles, often identified through benchmarking, that produce better results. Suppliers are strongly encouraged to become familiar with these concepts and become effective practitioners of continual improvement.
b) Suppliers shall be able to determine areas that need correction and improvement:
    i. Quality results
        I. Supplier quality performance indicators - e.g., ppm (parts per million defects), number of Discrepant Material Reports, etc.
    ii. Delivery
        I. On time delivery, deviations in deliveries, etc.
    iii. Cost
        I. Price reduction, cost of quality, etc.
    iv. Service and innovation
        I. Continual improvement initiative, capacity planning, invoicing problems, responsiveness to change notices, etc.
c) The supplier should be able to relate all goals to Timken requirements and priorities. It is very important to determine the scope of the issues or processes to be studied. The supplier should identify any gaps between current processes and the requirements, determine severity of the gaps, and prioritize its efforts to minimize and eliminate gaps, using a structured, and improvement methodology.
d) Cost reduction is an integral element of the Timken strategy affecting Timken's Suppliers. To achieve and improve their competitive position in the market, Timken and suppliers must implement focused, systematic methods and tools to reduce the costs of products sold.
    i. Cost reduction goals can be achieved in the following ways:
        I. Cost reductions by Timken through the promotion of long-term agreements with suppliers and market analysis benchmarking.
        II. Implementation, after Timken approval, by suppliers of internal quality improvement programs, value engineering and value analysis methodology.
        III. Development of Timken supplier joint cost reductions based on a review of both supplier and customer prices, delivery means and business performance measures.
    ii. Recommended techniques by Timken that could be used to achieve cost reduction:
        I. 8D problem solving
        II. Kaizen philosophy
        III. Value Analysis/Value Engineering
        IV. 5-S Principles
        V. 5-Why Analysis
        VI. Seven Tools of Quality

VII. Brainstorming
VIII. Benchmarking
IX. Cross-functional Teams Gap Analysis
X. Mistake – Proofing
XI. VA/NVA value add/nonvalue add (lean)

10.2 Nonconformity and corrective action

a) The Timken Company's expectation is zero defects.
b) Achieving this level of quality requires capable processes combined with statistical process control techniques and the utilization of mistake-proofing methodology.
c) When potential causes of non-conformance are determined, the supplier shall employ solutions in the process to prevent or detect these non-conformances. These solutions shall be independent of operator's actions.
d) Solutions should be designed and installed integral to the process to prevent or detect a wrong setting of an element (e.g., the proper position or inverted), defects in the element, machine, or standard, thereby making further use impossible.

Section 1: 8D Process

a) The Timken Company recognizes the 8D Process for problem solving. Especially in the resolution of a nonconforming (discrepant) product using the Timken **Quality Issue Management (QIM)** system.
b) It is a disciplined eight-step problem-solving process and report format. This technique is applicable also to continual improvement initiatives.

1. Use the team approach *(Used in 3D Process)*

Establish a key group of people with the process/product knowledge, allocate time, authority, and skill in the required technical disciplines to solve the problem and implement corrective actions. The group must have a designated champion.

2. Describe the problem

Specify the internal/external customer problem by identifying in quantifiable terms the who, what, when, where, why, how, how many (5W, 2H) for the problem.

3. Implement and verify interim (containment) actions *(Used in 3D Process)*

Define and implement containment actions to isolate the effect of the problem from any internal / external customer until corrective action is implemented. Verify the effectiveness of the containment action.

4. Define and verify root causes *(Used in 3D Process)*

Identify all potential causes, which could explain why the problem occurred. Isolate and verify the root cause by testing each potential cause against the problem description and test data. Identify alternative corrective actions to eliminate root cause.

5. Verify corrective actions *(Used in 3D Process)*

Quantitatively confirm that the selected corrective actions will resolve the problem for the customer and will not cause undesirable side effects. Define contingency actions, if necessary, based on risk assessment.

6. Implement permanent corrective actions

Define and implement the best permanent corrective actions. Choose on-going controls to ensure the root cause is eliminated. Monitor the long-term effects and implement contingency actions if necessary.

7. Prevent recurrence

Modify the management systems, operating systems, practices, and procedures to prevent recurrence of this and all similar problems.

8. Congratulate team / Read Across

Recognize the collective efforts of the team.

Cost Recovery Process

The Timken Company, when appropriate, can recover costs associated with a supplier not meeting defined expectations. The issuance of an 8D DMR in the Quality Issue Management (QIM) can initiate the recovery process. The Timken Company may recover additional costs using the Timken Supplier Chargeback process or by direct negotiations with the supplier.

c) The supplier shall apply (Read Across) to similar processes, services, or products the corrective action, and controls implemented, to eliminate the cause of a potential nonconformance in other areas.

10.3 Continual improvement

a) The supplier should promote and implement a continual improvement philosophy that provides a sustained approach to achieving competitively superior performance in those areas critical to business success by rigorously applying proven methodology and processes. Timken recognizes that the **Timken Quality Management System (TQMS)** provides elements that provide a foundation for continual improvement. TQMS Supplier Fundamentals provides a systematic approach that helps suppliers achieve flawless launches, zero defects and a higher level of customer satisfaction, enabling continual process improvement. TQMS Supplier Fundamentals complements the supplier quality management system by applying tools to reduce errors, improve productivity and ensure closed-loop feedback.
    i. Supplier TQMS elements include:
        I. Quality System Certification
        II. RPN Reduction Methodology
        III. Standard Work
        IV. Standard Training
        V. Layered Process Audits
        VI. Control of Non-conforming Material
        VII. Error Proofing Verification
        VIII. Fast Response
    ii. These methods and processes shall be used throughout the Supplier organization to continually improve the quality, delivery, service, and cost of Supplier products to the benefit of its customers and associates.
    iii. The Supplier should perform the functions of leading importance to continual improvement by means of:
        I. Continual improvement of own actions and distribution of resources.
        II. Advising the employees of objectives and tasks
        III. Providing an environment which encourages open communication.
        IV. Supporting every employee and any process improvement efforts covering all employees with a training system.
    iv. Additional recommended tools that assist in the implementation of the continual improvement process are:
        I. Benchmarking
        II. Brainstorming
        III. Pareto Analysis

IV. 5-Why Analysis
V. Affinity Diagram
VI. Involvement Worksheet
VII. Cost Benefit Analysis
VIII. Cause and Effect Diagrams
IX. Process Capability/Performance
X. Process Mapping

Revision Number:	Date Revised:	Revised By:	Revision Detail
14.0	2/16/2023	Ean Dickerhoof	• Restructured Manual • Remove complete text for DFARS • Added requirements for AS13100 • Added Smartflow references • Removed Duplicate sections
13.0	6/8/2022	John Krug	• Phrasing in Standard Requirements section (p.2 clause 1 & 8) • Add verbiage of flow down of relevant SAE AS13100 AESQ Quality requirements to Timken SRM (p.17 3.0 & 3.1)
12.0	10/1/2021	John Krug	• Added Section 1.3 – Timken Prints, Standards, and Specifications • Added references to QIM in sec 1.5 • Added heat treat traceability under section 1.14
11.0	04/1/2021	John Krug	• Added Supplier requirements under section 3.7 Documentation Control / Retention • Add Foreign Object Damage (FOD), Foreign Object Debris (FOd), and Foreign Object (FO) into manual