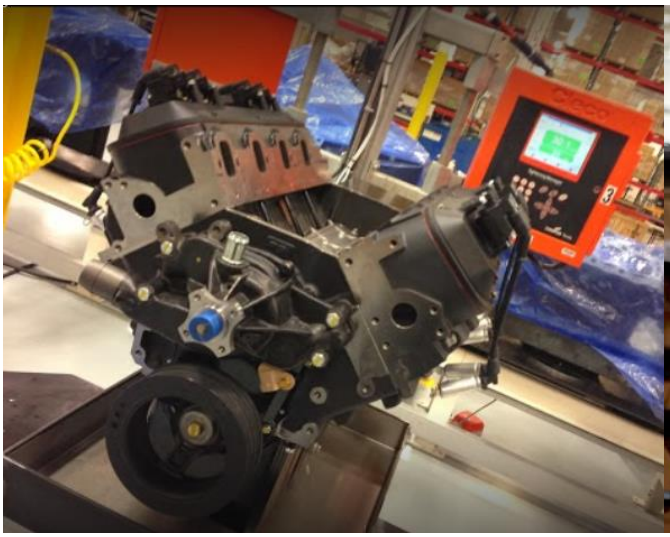
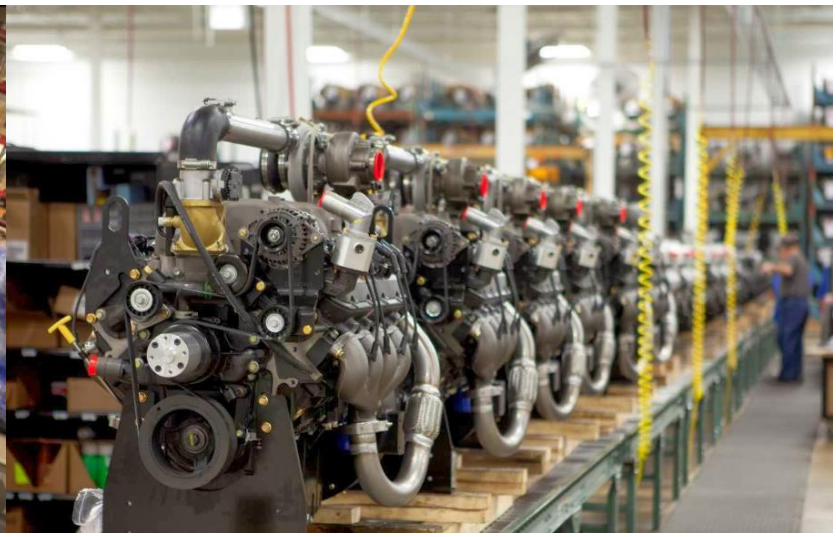
Quality Manual

August 2021

Revision 5





Power Solutions International, Inc.

201 Mittel Drive
Wood Dale, Illinois 60191
(630) 350-9400

https://www.psiengines.com

Revision History

Date	Revision	Description of Change	Changed by	Approved by
3/2/2017	1	Original Release to ISO 9001:2015	David Lasiurus	Chris Colwell
9/22/2017	2	Re-defined the Scope	John St. John	Chris Colwell
10/22/2019	3	Revised the manual to be Process based and not ISO Element based. Complete rewrite.	Sterling Foster	Terry Jarrell
10/4/2020	4	Updated the QMS Processes in the Process Map Diagrams and in the verbiage. Added the following QMS Processes – Warranty, PMO, Maintenance, and Human Resources / Safety.	Sterling Foster	Terry Jarrell
8/30/21	5	Changed Customer Service Engineering to Customer Support Engineering. Combined PMO and Product Engineering Processes into Product Engineering. Eliminated Operations processes at Bldg. 1465.	Sterling Foster	Terry Jarrell

Authorization

This Quality Manual is published to document and communicate the quality policies of **Power Solutions International, Inc.** It provides policy direction for the development of procedures and work instructions for activities and operations affecting quality. It is the intent of this manual to ensure that systems are defined and documented, records maintained, and evidence of product and process conformance are recorded.

This document is controlled and maintained by the Quality Assurance Organization, with direct content responsibility assigned to the Management Staff. It is reviewed periodically and updated as necessary to reflect the current quality plan.

PSI's Quality Management System is established in accordance with ISO 9001:2015.

This manual has been authorized by:

Terry Jarrell, Vice President of Quality

Date

SECTION 1 – TABLE OF CONTENTS

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SECTION 2 - SCOPE

2.1 QUALITY MANAGEMENT SYSTEM SCOPE

This Quality Manual describes the Quality Management System (QMS) at Power Solutions International, Inc. (PSI). This manual defines requirements, assigns responsibilities, and provides guidance for its implementation. PSI is a world leader in cleantech engines and is focused on value-added solutions.

PSI is responsible for the design, engineering, manufacturing, emissions certification, and assembly of diesel, gasoline, and alternatively fueled engines. PSI products are powering the future in the industrial, energy, and transportation markets.

The Quality Management System (QMS) has been developed in complete alignment with both the ISO 9001:2015 Standard and the Plan-Do-Check-Act model of Continuous Improvement. The QMS is the component of the overall business strategy that is focused on implementing the Quality Policy and achieving Key Business Metrics to ensure customers are satisfied with PSI's products and services.

2.2 PERMISSIBLE EXCLUSIONS

Power Solutions International, Inc. does not exclude any sections nor any clauses of the ISO 9001:2015 Standard from the implemented Quality Management System. The fully implemented QMS is separated into four (4) physical locations with QMS processes at each location as shown in Section 4.3 of this manual.

Corporate Headquarters	Remote Location
Power Solutions International, Inc. **201 Mittel Drive** **Wood Dale, IL 60191 USA** Main: (630) 350-9400; Fax: (630) 350-9900 The application design, manufacture, and assembly of engines for the industrial, transportation and power generation markets.	**Power Solutions International, Inc.** **101 Mittel Drive** **Wood Dale, IL 60191 USA** Phone: (630) 350-9400 The offsite location performs the following primary functions: Manufacturing and Assembly.
Remote Location	**Remote Location**
Power Solutions International, Inc. **1465 Hamilton Parkway** **Itasca, IL 60143 USA** Phone: (630) 350-9400 The offsite location performs the following primary functions: Sales and Engineering Support.	**Power Solutions International, Inc.** **6450 Muirfield Drive** **Hanover Park, IL 60133 USA** Phone: (630) 350-9400 The offsite location performs the following primary functions: Warranty Services.

SECTION 3 – POWER SOLUTIONS INTERNATIONAL, INC.

3.1 OUR COMPANY and OUR PRODUCTS

Power Solutions International designs, manufactures, markets, and sells advanced, emission-certified engines and power systems to customers in the energy, industrial and transportation markets.

PSI's comprehensive engine portfolio includes displacements ranging from .97 liter to 65 liters, which are enabled by advanced controls to run on a wide variety of fuels including natural gas, propane, gasoline, diesel, and biofuels.

3.2 OUR GOALS

- **PUT THE CUSTOMER FIRST**
  We want to be the best supplier of Power Solutions by meeting customer's requirements the first time, every time, performing and truly providing a partnership.
- **DEVELOP AND REWARD OUR PEOPLE**
  We will promote and reward entrepreneurship and encourage our people to fully develop their professional and personal skills.
- **INNOVATE**
  We want to achieve a competitive edge by encouraging innovation in the design and delivery of our products and service.
- **GROWTH**
  We want to be the industry leader, sustain growth, and develop our companies' profit opportunities, while consistently working to develop our company's financial strength.

3.3 OUR CORE VALUES

- **TRUST**
  We trust and respect each other.
- **OPENNESS**
  We listen to each other, are open to new ideas, and are not afraid to make mistakes.
- **TEAMWORK**
  We all work for one to succeed.
- **OUR GOLDEN RULE**
  If we do not take care of our customer…. Somebody else will.

3.4 OUR MISSION

SECTION 4 – MANAGEMENT, HUMAN RESOURCES AND SAFETY

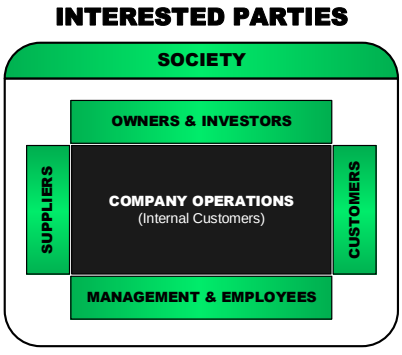
4.1 CONTEXT OF THE ORGANIZATION

The Quality Management System (QMS) is governed by the Management Process which provides the leadership, resources, performance evaluation, and other support necessary for the Company's operations. The Senior Leadership Team oversees the Management Process with regular Operations, Sales, and Quality reviews of Key Performance Metrics and goals. The performance of Senior Level KPIs are reviewed with the CEO to ensure alignment with the strategic direction of the organization.

Internal and external issues that are relevant to the strategic direction of the organization are reviewed and discussed on a regular basis at the Senior Leadership Review Meetings. Performance Metrics and organizational priorities are reviewed and adjusted in accordance with the changing nature of the business climate, customer expectations, and regulatory requirements. Market conditions are evaluated, including the effects of global climate changes, oil price trends and fluctuations, and the impact of global diseases and pandemics. As required, new initiatives and changes in resource and capital allocations are made in response to business needs.

4.2 INTERESTED PARTIES

As a first step to ensuring stakeholder satisfaction, PSI has determined the essential needs and the expectations of interested parties relevant to our business operations. The management of performance, and progress towards achieving stakeholder satisfaction, is ensured via monitoring of these stakeholder needs.



As required, the re-evaluation of resources or implementation of Action Plans are used to ensure interested parties are satisfied with results.

4.3 PSI QMS PROCESSES

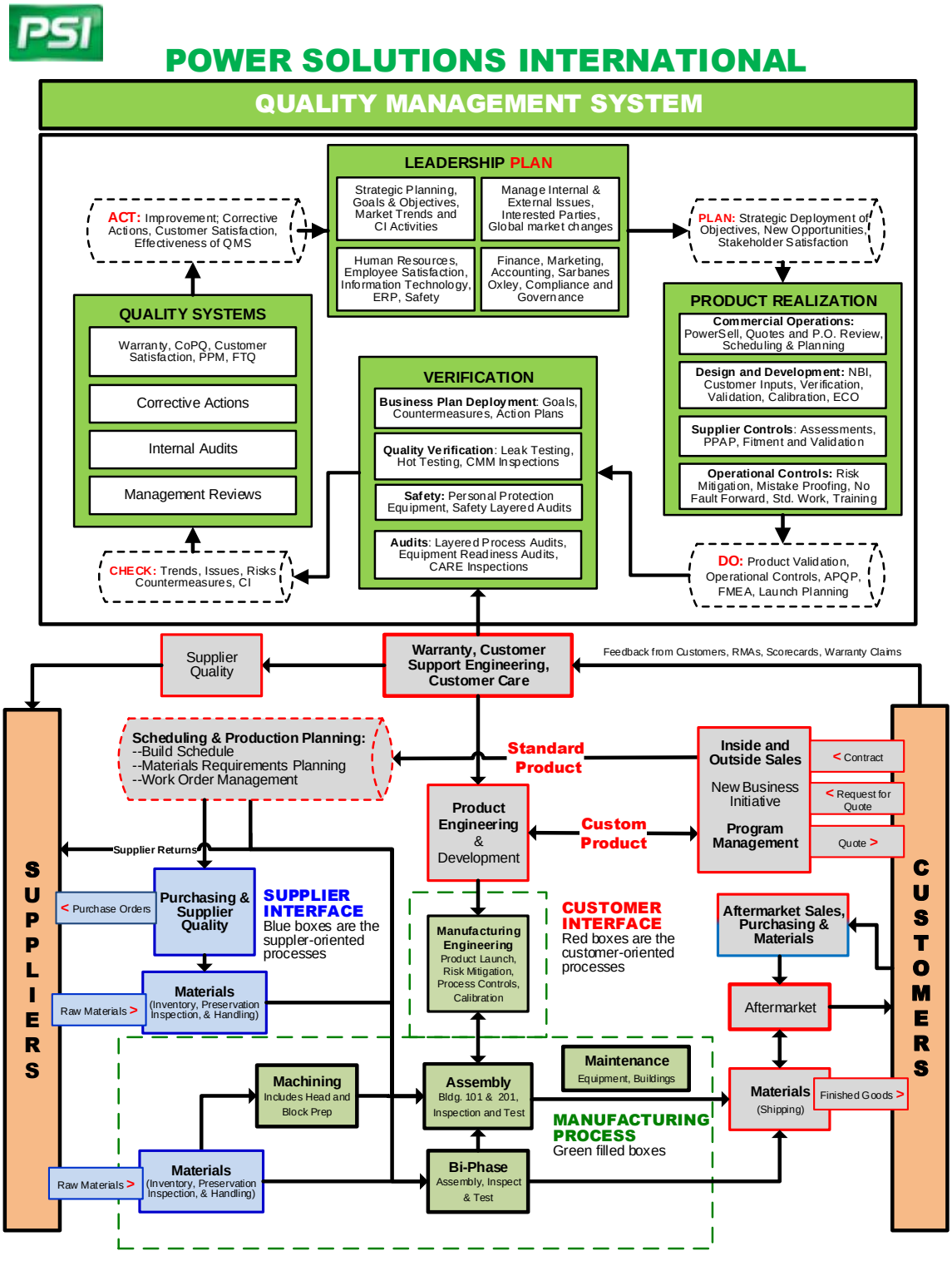
The Quality Management System at PSI is broken into fifteen (15) distinct process, each of which is monitored for performance effectiveness. These processes are located at four different PSI facilities, as shown below.

	ISO 9001 QMS Processes		Bldg 101	Bldg 201	Bldg 1465	Hanover Park
1	**Management and Leadership**	MG		XX		
2	**Inside Sales and Customer Service**	IS			XX	
3	**Purchasing**	PUR	XX			
4	**Machining Operations**	MA	XX			
5	**Assembly Operations**	AS	XX	XX		
6	**Bi-phase Operations**	BP	XX			
7	**Quality Systems**	QA	XX			
8	**Materials (Incl. S/R)**	MT	XX	XX		
9	**Scheduling and Planning**	SP		XX		
10	**Product Engineering**	PE			XX	
11	**Manufacturing Engineering**	ME	XX	XX		
12	**Human Resources and Safety**	HRS		XX		
13	**Maintenance**	MTN	XX	XX		
14	**Customer Support Engineering**	CSE			XX	
15	**Warranty**	WT				XX

	Process is NOT Located at Identified Facility
XX	Process is Located at Identified Facility

The sequence and interaction of the QMS processes is displayed on the next page. New engine designs, verification and validation testing, in-house emissions certification, and participating in production launch are the strength of PSI's Design Group. Speed, flexibility, and customer focus are the keys to an effective Operations strategy. Established world class suppliers in low-cost global markets help PSI to be the Market Leader in pricing.

4.4 SEQUENCE AND INTERACTION DIAGRAM OF PSI QMS



4.5 PSI QUALITY MANAGEMENT SYSTEM PROCESSES

PSI has established and continually improves its QMS, including the processes needed and their interactions, in accordance with the requirements of this International Standard.
PSI has determined the requirements of these processes and their application throughout the company, including:

- The inputs required and the outputs expected from these processes,
- The sequence and interaction of these processes,
- The criteria and methods (including monitoring, measurements, related performance indicators) needed to ensure the effective operation and control of these processes,
- The resources needed for these processes to ensure their effectiveness,
- The responsibilities and authorities assigned for these processes,
- The risks and opportunities as determined in accordance with the requirements of this International Standard,
- Changes needed to ensure that these processes achieve their intended results,
- Improvements required of the processes and the quality management system.

4.6 LEADERSHIP AND MANAGEMENT COMMITMENT

The Senior Leadership Team takes accountability for:

- Ensuring the effectiveness Quality Management System,
- Ensuring the Quality Policy and Quality Objectives are established and aligned with PSI's strategic direction,
- Promoting the use of the process approach and risk-based thinking,
- Providing support and resources necessary for the QMS,
- Communicating the importance of conforming to customer, and regulatory requirements,
- Initiating actions to ensure quality objectives are achieved,
- Promoting Continuous Improvement,
- Supporting managers in leading people to contribute to the effective operation of the QMS.

4.7 CUSTOMER FOCUS

PSI's Top Management is committed to ensuring that statutory and regulatory requirements applicable to its products and processes are determined, understood, and consistently met. Significant product and process risks are determined and addressed. Strategic risks and opportunities are discussed at monthly Leadership Meetings with the aim of achieving strategic objectives and enhancing customer satisfaction.

4.8 MANAGEMENT REPRESENTATIVE

The Chief Executive Officer of Power Solutions International has assigned the responsibilities of Management Representative to the Vice President of Quality. The Management Representative will not be assigned other responsibilities that would create a conflict of interest with these duties.

4.9 QUALITY POLICY

Power Solutions International, Inc.

Quality Policy

Our commitment is to provide high quality, value-added power solutions for diesel, gas and alternative fuel engines and engine parts to industrial, construction, on-highway and agricultural markets. Our goal is advanced through this policy by:

- **Applying systems of processes and procedures that capture our collective knowledge and experience.**
- **Accepting change as the key to our survival and continued growth.**
- **Ensuring that all employees understand their responsibility for quality through individual goals and competencies.**

We will learn from our customers, experiences, and environment to further enhance our processes and procedures, resulting in greater knowledge and continual improvement.

4.10 PROMOTING A SAFE WORK ENVIRONMENT

Providing a safe working environment and employee safety are strategic priorities at PSI. The following practices are in place at all PSI locations:

- Safety dedicated staff members employ best practices and provide training for PSI employees. Safety KPIs and metrics are established and monitored.
- COVID 19 screenings are performed for employees upon entering the facilities. Contact tracing is performed, when required.
- Equipment preventive maintenance policies and practices ensures that the Operations equipment are maintained in safe working conditions.
- Safety policies and procedures guide daily operations and PPE requirements.
- Workplace Organization audits and 5S audit programs are effective.
- Safety Layered Audits are performed at all facilities. Countermeasures and corrective actions are implemented.

4.11 QUALITY POLICY AND QUALITY OBJECTIVES

Power Solutions International's commitment to quality is defined and documented in the Quality Policy and Quality Objectives. The Quality Policy is communicated to all employees at the various levels of the organization. Management demonstrates its commitment to quality by performing the following actions:

- Ensuring that employees understand and implement Power Solutions International Quality Policy and established procedures.
- Ensuring that employees strive to improve quality and delivery performance to meet established goals and KPI objectives.
- Communicating to the organization the importance of meeting customer, as well as statutory and regulatory requirements.
- Evaluating performance against established KPI Objectives at Senior Leadership Meetings and taking corrective actions when goals are not achieved.
- Driving continuous improvement at the Floor Operations level via Operations KPI Metrics meetings and Management Gemba Walks.
- Monitoring the resources required to support the operations and customer requirements and ensuring the availability of these resources.

PSI's quality objectives and goals are defined, documented, and communicated throughout the organization. Key Performance Indicators (KPI's) are posted throughout the facility and actual performance is monitored and communicated for continuous improvement.

4.12 QMS PLANNING

Management ensures that the planning of the QMS is carried out to meet the requirements of our stakeholders and the identified interested parties. Changes to our products, processes, and systems are conducted in a controlled manner so that the integrity of the outcome meets with the planned objectives. Risk analysis and planning are performed for product and process changes, when appropriate.

4.13 PROVISION OF HUMAN RESOURCES

Management provides the appropriate resources necessary to implement and maintain the Quality Management System and continually improve its effectiveness to enhance customer satisfaction.

The review of human resources is performed by the Human Resources Department, working closely with the Senior Leadership Team. The Management Review process, Senior Leadership meetings, and Human Resources Staffing Requirements Planning are tools that are used to evaluate the employee human resource requirements on an on-going basis.

4.14 PROVISION OF CAPITAL RESOURCES

Management determines and provides the infrastructure hardware and work environment needed to achieve conformity to product requirements, including:

- Building, workspaces, and associated utilities,
- Process equipment, including hardware and software,
- Transportation resources,
- Computers and communication technologies.

The determination and provision of infrastructure hardware and work environment are accomplished via the Product Development process, Capital Expenditure Planning, and the Management Review process. The infrastructure equipment, production machinery, and hardware are maintained via the use of PSI's Maintenance process and 5S initiatives.

4.15 RISK MITIGATION ACTIVITIES

In planning for PSI's quality management system, consideration is given to the needs and expectations of Stakeholders and interested parties. Potential internal and external issues are identified and managed to assure the strategic direction of the company is maintained.

Risks and opportunities are evaluated and discussed at Senior Leadership meetings. With the quickly changing landscape of the power generation demand market, firsthand market knowledge and quick decisions by Senior Leaders allows PSI to respond quickly. Speed, flexibility, cost, and quality are essential to maintaining a market leadership position.

External risks and opportunities are technically evaluated by our subject matter experts, including changes in regulatory compliance law, changing sales market dynamics, impact analysis of international affairs, and oil and gas market changes. At the Senior Leadership staff meetings, these items are discussed. The actions taken to address these risks and opportunities are proportionate to the potential impact on the strategic goals and potential business opportunities.

Product and Manufacturing Engineers provide risk mitigation assurance related to new products and process changes. Risk analysis for new products and design changes can include: Design Verification and Validation, Simulation studies, Dynamometer Testing, Emissions Testing performed internally, Design and Process FMEA, and On-Road Testing.

Product introductions and production release includes Pilot builds, Production Trial Runs, and the development of on-line Standardized Work Documentation for the Operations personnel. Extensive training of Assembly operators and machinists is performed. Supplier partnering and development are key to minimizing supply chain interruptions.

4.16 ORGANIZATIONAL KNOWLEDGE

PSI determines and acquires the technical and organizational knowledge for the operation of its equipment, machinery, and QMS processes on an on-boing basis. When addressing the changing needs and trends due to new technologies, PSI relies upon external subject matter experts to transfer the information to our employees. Additional knowledge is gained from academia, conferences, and knowledge gathered from customers and other external providers.

4.17 TRAINING

PSI employees are evaluated for competence on an annual basis. PSI determines the necessary competence for employees based on education, training, skills, and experience requirements. PSI has a process for identifying training needs, employing Training Matrices, Employee Development Plans and using the Performance Evaluation process. When training needs are identified, training, or other knowledge transfer activities, are performed to ensure employees are adequately trained. The effectiveness of these training activities is evaluated. Records of training are maintained.

PSI ensures that employees are aware of the relevance and importance of their activities and how they contribute to the achievement of quality objectives. This is accomplished in the following ways:

- Department meetings where the achievement of KPI metrics are discussed,
- All Hands meetings to discuss the organizational performance,
- Newsletter and Company Intranet,
- KPI Metrics posted on Bulletin Boards and Cubes.

4.18 CUSTOMER SATISFACTION

Power Solutions International monitors customer satisfaction utilizing data from customer returns, complaints, delivery performance feedback, and Customer Scorecard Performance Reports. The Customer Support Engineering Team and Customer CARE Team communicates Customer Satisfaction information to the organization. Customer Satisfaction is a required input into the Management Review process.

Customer Satisfaction is an important business metric. As required, correction and corrective actions are taken as a result of the Customer Scorecard Performance reviews and Customer Satisfaction Survey results.

4.19 MONITORING OF PROCESSES

PSI has planned and implemented the monitoring, measurement, testing and auditing processes necessary to evaluate and improve product conformity, to ensure conformity to operational procedures, and to continually improve the effectiveness of the Quality Management System.

Management collects and analyzes internal nonconformance data to identify opportunities for improvement. This includes data generated by Operations personnel, inspection personnel, test data, and process audit findings. Operations driven Continuous Improvement Teams implement countermeasures and corrective actions, as required.

External data analysis includes customer feedback, product returns, supplier performance, customer satisfaction, and complaint information. External and internal data analysis is provided to the Senior Leadership Team to evaluate potential risks and opportunities. Resources are directed and priorities are aligned by the Leadership Team to mitigate potential risks and to capitalize on opportunities. Actions are taken to maintain the strategic objectives. Planning activities are reviewed to monitor progress.

Management monitors the Quality Management System processes by evaluating Internal and Third-Party Audit results. Feedback from customer visits and audits are also used to for input for Continuous Improvement.

4.20 MANAGEMENT REVIEW

The PSI Quality Management System is reviewed during the Bi-annual Management Review process to determine its suitability, adequacy, and effectiveness. This cross-functional meeting is utilized to communicate corporate strategy and evaluate performance to established goals. The records of the Management Review process are maintained.

4.20.1 Review input

The Management Review Meeting includes an evaluation of current performance and opportunities for improvement. The Management Review input includes:

- Review of Action Items from previous Management Review Meetings,
- Changes to internal and external issues relevant to the QMS,
- Trends in Customer satisfaction and feedback from interested parties,
- Trends monitoring and measurement results,
- KPI Performance to goals and objectives and product conformance,
- Customer Complaints and Corrective Actions,
- Internal and Third-Party Audit results,
- Supplier Performance,
- Resource requirements,
- Effectiveness of actions taken to address risks and opportunities,
- Opportunities for Improvement.

4.20.2 Review output

At a minimum, outputs from Management Review meetings include actions required for improvement of the QMS and its processes, including the following:

- Any changes to the Overall Quality Management System
- Opportunities for improvement
- Resources needs
- Overall effectiveness of the Quality Management System.

The evaluation of the performance of the Quality Management System is the primary goal and output from the Management Review process.

SECTION 5 – INSIDE SALES AND CUSTOMER SERVICE PROCESS

5.1 CUSTOMER FOCUS

Customer focus is inherent in each business process at PSI. Processes such as, Engineering, Sales Management, Customer Support Engineering, Warranty and Customer CARE demonstrate commitment to customer satisfaction. The Senior Leadership Team provides steadfast guidance and focus on customer requirements.

5.2 REVIEW OF CUSTOMER REQUIREMENTS

The Outside Sales Team interacts with the customer and captures the customer's requirements in the New Business Initiative process. The customer's product requirements are identified, including application specific requirements, statutory and regulatory requirements, and performance specifications. The Engineering Team works closely with Outside Sales, and directly with the customers, in developing new customer specifications. Quotations are provided timely. Application Engineering assistance is provided, as required.

Product requirements specified by the customer are determined, including requirements for delivery and post-delivery activities. Requirements not stated by the customer but necessary for specified or intended use are determined. Regulatory requirements are determined. Any other additional requirements determined by the organization are also documented. The Quotation is provided to the customer.

Purchase orders are received via email, customer portals, or direct mail. The Inside Sales and Scheduling/Planning Teams work closely together to ensure that customer order and delivery requirements can be achieved. Established Lead times are maintained through close supplier partnerships, efficient machining and assembly operations, and focus on customer delivery and quality requirements. Sales Orders are entered into EPICOR and order acknowledgements are provided to customers.

5.3 CHANGE ORDER REQUIREMENTS

Purchase order requirements differing from those previously expressed are resolved to ensure that PSI can meet the customer requirements. Where product requirements are changed, relevant documents are amended, and relevant personnel are made aware of changed requirements. Records of these reviews and actions arising from the review are maintained.

5.4 OUTSIDE SALES

The Outside Sales and Engineering Teams work closely with customers and other Interested Parties. Strategic information pertaining to customer application needs, changing engine designs, market fluctuations are communicated to the Senior Leadership Team. The communications pertaining to the engine demand and market conditions allows PSI to make strategic decisions that are favorable to Interested Parties and stakeholders.

SECTION 6 – SCHEDULING AND PLANNING PROCESS

6.1 PLANNING PRODUCTION TO MEET DEMAND

Sales orders are reviewed by the Scheduling and Planning Team, when required, to ensure that adequate inventory quantities will be in stock to meet the customer's expected delivery needs. The Planning Department performs material review analysis for long-term planning of inventory requirements once the Purchase Order has been received. When required, material shortages are identified far in advance of production needs. Purchasing communicates these requirements to our supplier partners.

6.2 PRODUCTION SCHEDULING

Production Jobs are scheduled to meet customer demand needs. MRP planning is performed in the EPICOR Inventory Management System to schedule the delivery of internally produced and externally supplied products and/or services. Being vertically integrated, the scheduling of customer demand requires the balancing and planning of kitting, machining and assembly operations, and monitoring supply chain delivery expectations.

Production schedules are reviewed in Operations Planning Meetings to ensure the communications are robust and required personnel are informed. Demand requirements are evaluated to ensure delivery expectations are satisfied.

SECTION 7 – PURCHASING AND SUPPLIER CONTROL

7.1 VERIFICATION OF PURCHASED PRODUCTS

PSI ensures that purchased products and services that impact the quality of our products conform to specified requirements. We accomplish this objective by identifying the product and quality requirements on the Engineering drawing. Following the AIAG Production Part Approval Process (PPAP) guidelines, PSI works closely with our suppliers to ensure that they provide PPAP documentation with their initial shipment.

The Supplier Approval Process for PSI often starts with a Supplier QMS Self-Assessment Survey. Once the Survey is received and evaluated by PSI, the supplier may receive a PO for the initial shipment of parts. Based on the criticality of parts, the PPAP is requested of the supplier. Supplier PPAPs are evaluated by dedicated Supplier Quality personnel. Upon approval of the PPAP document, and dependent upon the final PPAP assessment, the supplier may be approved for future orders.

Re-verification of suppliers may come in the form of new PPAP requirements, the supplier could be audited, or in some cases the re-verification can be approved based upon supplier performance. The Supplier Quality Department is responsible for supplier approvals, PPAP, and providing feedback on supplier performance.

7.2 CONTROL OF EXTERNAL PROVIDERS

Purchased products that arrive to PSI may be evaluated or sent directly to stock, based on the supplied part classification. Inspection is used to identify effectivity dates of corrective actions or to protect customers from suspect nonconformance conditions. PSI places the responsibility on the supplier to assure good quality. Verification activities are not a standard operating condition. When supplier nonconformances arise, parts are flagged for inspection and supplier corrective actions are requested. Non-fulfilment of purchasing requirements are addressed with the supplier proportionate to the risk associated with the purchased product.

Outsource operations are controlled in the same manner as other external suppliers to Power Solutions International. PPAPs are requested of outsourced operations, based on the risk of the operation to the product. When outsourced operations are identified as nonconforming to the Purchase Order requirements, correction and corrective actions are taken. Suppliers are notified. Parts are quarantined. The nonconforming products system is employed to make disposition decisions in a timely manner and to work with the supplier for improvement.

7.3 RISK MANAGEMENT

The quality of externally supplied products is closely monitored, and the suppliers are provided feedback of their performance. Supplier Quality Engineers work closely with suppliers, developing partnerships by extensive supplier development activities. The PSI Production Part Approval Processes (PPAP) follows the established Automotive Industry Action Group (AIAG) guidelines and PPAP performance is used to guide supplier decisions.

Extensive inspection capabilities are possible through the employment of Zeiss CMM Inspection equipment. Mitutoyo CMM Inspection is also utilized. Extensive investment in inspection equipment includes a new surface finish profilometer and improved Engine Hot Testing capability in Operations.

7.4 PURCHASING INFORMATION

Purchasing documents fully describe the product to be purchased. As appropriate, this may include any of the following, as appropriate:

- Product specifications,
- Engineering drawing requirements, Drawing numbers and revision,
- Statutory and regulatory requirements,
- Verification and validation activities to be performed by PSI or the customer,
- Requirements for the qualification of personnel, processes, or equipment
- Quality Management System requirements.

The adequacy of the requirements contained in the purchasing documents is verified prior to the placement of an order.

SECTION 8 – PRODUCT ENGINEERING AND PROGRAM MANAGEMENT

8.1 PROGRAM MANAGEMENT AND PRODUCT DEVELOPMENT PLANNING

Product design is performed by the Engineering Department. Working closely with the Program Management Office, each design team leader establishes a plan that includes:

- Identification of functional, design, and/or customer requirements, including regulatory testing and emissions requirements.
- The expected nature, duration, and complexity of the development project.
- Pre-determined reviews of development activities and PMO/Leadership reviews.
- Identification of required verification and validation activities.
- Responsibilities and authorities for design and development.
- Internal and external resource needs.
- Anticipated customer involvement in the development process.
- Documented information needed to demonstrate that development requirements have been satisfied.

Development teams are used in the design and development process. The persons responsible for the design and development phase, and the interfaces between the different groups are identified to ensure effective communication and clear assignment of responsibility.
Planning output is updated as the design and development progresses.

Gate reviews are established at predetermined stages in the product development cycle to provide adequate communications to Engineering Managers and PSI Leadership Team.

8.2 DESIGN AND DEVELOPMENT INPUTS

Design and development input requirements include:

- Functional and performance requirements, as derived from customer input.
- Useful information or experience from previous similar development efforts.
- Regulatory requirements.
- Standards or codes of practice that PSI is committed.
- Other necessary requirements

Records are maintained of the functional design input requirements.

8.3 DESIGN AND DEVELOPMENT OUTPUTS

Product Engineering assures that product design output will:

- Comply with the customer, regulatory and functional input requirements.
- Include information needed for purchasing, production and service.
- Includes or reference acceptance criteria.
- Indicate design characteristics critical to the safe and proper operation of the product.
- Be approved before issuance.

Records of design and development outputs are maintained.

8.4 DESIGN AND DEVELOPMENT CONTROLS

Engineering Design Reviews are performed during the product design and development cycle. The reviews are intended to assure that requirements are being fulfilled. When they are not, those involved in the review must propose a remedy for each identified problem. All functions concerned with the stage being reviewed are represented at the review. Design or development review results are recorded, including problems that are identified and the actions taken to address them.

8.5 DESIGN AND DEVELOPMENT VERIFICATION

Verification is performed in accordance with planned arrangements to ensure that design outputs meet design and development input requirements. Records of the results of verification and any necessary actions are maintained.

8.6 DESIGN AND DEVELOPMENT VALIDATION

Product resulting from design and/or development efforts is validated to assure that it performs to expectations or that it is suitable for application. Design Validation is often performed in collaboration with the customer. Records of the results of validation and any necessary actions are maintained, as appropriate.

8.7 CONTROL OF DESIGN AND DEVELOPMENT CHANGES

- Design and development changes are identified, and the records are maintained.
- Design and development changes are reviewed, verified and/or validated, as appropriate, prior to implementation.
- The review of design and development changes includes the evaluation of the effect of the changes on constituent parts of the product to ensure conformance to customer requirements.
- Records of the results of the review and any necessary actions are maintained.

8.8 CONTROL OF ENGINEERING DRAWINGS AND ENGINEERING SPECIFICATIONS

- Engineering drawings and specifications are stored in the Engineering SolidWorks Vault. The electronic repository of Engineering intellectual property is tightly controlled with limited Vault access. Rights are regularly reviewed to ensure the protection of PSI intellectual property.
- Engineering drawings and other published engineering specifications are reviewed and approved prior to issuance and use. Drawings include review and approval initials to indicate the persons performing the review.
- Customer input requirements and product development plans, verification evidence, validation trials, etc. are maintained by the Project Engineer leading the Design Team. Control of such documentation is limited to the Engineering Team.

8.9 CUSTOMER PROPERTY

Customer property arrives to PSI's Engineering Group in the form of Validation Samples, On-road Testing Vehicles, and customer provided test samples. This product used in Product Development trials, testing, or performance evaluations. Fit, form, function samples are also received for verification.

PSI Engineering is responsible for the verification of customer property upon receipt. In cases where the customer property does not meet the intended criteria or expectation, Engineering notifies the customer. If property is lost or damaged, the customer is notified.

SECTION 9 – MATERIALS – SHIPPING, RECEIVING, AND WAREHOUSING

9.1 RECEIVING

- Raw materials, components, assemblies, and finished goods that are received to Power Solutions International are verified and counted prior to moving the parts into stock.

- The verification consists of comparing the Part Number and description on the Purchase Order against the Packing List information and the label physically attached to the material.

- The quantity of material received is verified. The information on the Purchase Order is compared to the Packing List and the product label.

- In cases of Shipping Damage, Quality Control is notified. Photographs of the damage are made. A freight claim is filed, and the supplier is notified by the SQE, as appropriate.

- In cases where the Part Number, Part Description, or Quantity on the Purchase Order are different from the material identification (label or Packing List), the Receiving person immediately notifies the Materials Team Leader or Group Lead. The Epicor Purchase Order information in the computer system is reviewed to verify any changes that may have been made. The shipment is refused if the issue cannot be effectively resolved.

- After the product is verified, the Receiving person signs the paperwork for the delivery and physically moves the product into stock.

- The paperwork is signed and dated and delivered to the Incoming Receiver for entering the Receipt into Epicor.

- The Material Receipt is entered by following the instructions outlined in the Receiving Work Instructions.

9.2 CUSTOMER PROPERTY

- Customer-owned packaging, dunnage and carriers can be used to ship and receive engines and/or components to customers.

- Upon receipt of the carriers, they are reviewed for damage and condition to ensure they can be used for the return shipment.

- When damage is noted, the customer is notified by Inside Sales. Customers maintain inventories of carriers that are on-site at any given time.

9.3 MATERIAL HANDLING AND PRESERVATION

- Proper handling of all parts and raw materials is performed.
  - Specific handling requirements for operations will be defined in the appropriate work instructions, where applicable.
  - Customer-mandated handling requirements will be defined on the order documentation.
  - Labeling of special handling requirements (such as hazard warnings) will be utilized, as required.
  - Purchased components and assemblies are stored in a manner that prevents nonconformance.
  - PSI utilizes stock rooms, storage areas, shelving, and other means to segregate and store materials.
  - Parts are stacked to prevent damage. If required, material is used to separate fragile parts to prevent damage.
  - Best industry practices are used by PSI when crating, wrapping, or supporting engines for shipment to customers.
  - Raw materials, parts, assemblies, and finished parts are protected from damage or contamination during transit using the following methods:
    - Engines and components are securely strapped, bagged, fastened, and fixed in location to prevent damage during shipment.
    - Incoming parts are retained in their original containers for as long as possible to prevent rust and corrosion.
    - Parts susceptible to vibration and shock damage are packed with foam, pads or other special packaging.
    - Any parts that could be knocked or blown from carts, trucks or dollies are covered, tied, or banded.
    - All parts and materials are protected from weather conditions that could adversely affect them. This includes use of rust preventive coating or special containers to prevent corrosion or rust.

Environmentally sensitive materials are protected using the following special procedures:

- Materials are stored in original containers or, if removed for inspection, are appropriately resealed.
- Stock areas are checked to ensure compliance with any written procedures for environmentally sensitive materials.

9.4 PRODUCT IDENTIFICATION AND TRACEABILITY

Raw materials, components, assemblies, and finished goods within Power Solutions International's inventory control are clearly identified at all stages of production, inventory storage, and shipping.

Materials at all stages of production, Work-In-Process (WIP), incoming engines and finished goods inventory are clearly identified. This is accomplished using one of the following methods: Product Identification Tags and labels are created for incoming parts. Job Placards, Manila Tags, location signage (overhead, floor, bin) are used for parts in WIP. Nonconforming material tags are used to identify nonconforming parts.

Product Identification Tags are attached to the parts, or the part number being physically scribed into the part is also used for product identification.

When traceability is a requirement, Serial Numbers are recorded by Shipping into EPICOR and can be traced back to the Job. The Job Number is used for traceability.

9.5 MATERIAL RELEASE

A listing of items to ship for that day is provided to the Shipping Department daily. The Ship List is used to identify the engines and MasterTrak components that are required to ship on specific dates. When items on the Ship List are not located in Shipping, Sales personnel are notified.

Material release can proceed for engines which are identified with an OK to Ship tag attached to the engine. In cases where engines in Shipping do not have the OK to Ship Tag, the engine does not ship until the issue is resolved. Quality is notified of such occasions.

9.6 SHIPPING

Packing Lists are created in EPICOR for the items to be shipped. Serial numbers are entered into EPICOR to provide traceability to the Job Number.

Aftermarket engines and components are shipped from the Bldg. 201 location. Packing Lists and Shipping paperwork are generated in the same fashion as Bldg. 201 goods.

Due to the weight of the engines, Carriers must be booked to transport many shipments to the customer's location. Shipping personnel schedule the trucking pickups for the products to be shipped. Customs paperwork (International Orders) and Bill of Ladings are created in the EPICOR system. Once the items have been placed onto a truck, a photograph of the condition at Shipment is taken and saved. Photos of the sealed truck are also saved when possible.

SECTION 10 – OPERATIONS (ASSEMBLY, MACHINING, BI-PHASE, MAINTENANCE)

10.1 PROCESS CONTROL - MACHINING

Power Solutions International utilizes precision CNC machinery with experienced programmers and machinists in a precision manufacturing environment. Each machine is dedicated to specific products, which allows for greater consistency with minimal quality risks and changeovers.

World-class Coordinated Measuring Machines (CMMs) are staffed by Quality professionals who can detect tool wear and SPC Control Limits boundary breaks. Statistical Process Control is employed to minimize nonconformances to specification. When a nonconforming condition does occur, the nonconforming product control protocols are enacted. Suspect nonconforming parts are contained from reaching the Assembly areas.

10.2 PROCESS CONTROL – ASSEMBLY OPERATIONS

Programmable torque power tools are used in the Assembly Operations to control the critical features of the engine assembly process. The torque control systems provide repeatability, traceability, and an error proofing capability. Torque values are captured, and they are traceable to specific engine serial numbers.

Assembly line operations are essential to achieve minimal set-up requirements and efficient production lead times. Lean tools are employed to manage the low-volume, high-complexity mix model manufacturing operation. Quality is key. Experienced and trained operators are aided with the use of Standardized Work documentation at each workstation. Operator accountability is heightened with computerized traceability of the Operator to the Serial Number and Build Date.

Standardized Work documentation are displayed on computer monitors with detailed step-by-step Operator guidelines and takt time for the work to be performed.

10.3 PROCESS CONTROL – BI-PHASE OPERATIONS

The assembly steps for Bi-Phase Fuel Injector Assemblies are controlled with precision assembly equipment. On-line Assembly Work Instructions are employed by Operators maintained by Manufacturing Engineering.

Pressure, leak testing, flow rates are measured during the assembly operations to ensure the highest quality reaches the customer.

A semi-clean room environment is used to enforce cleanliness standards and to ensure Workplace Organization is maintained.

10.4 PROCESS CONTROL – ALL AREAS

Employees are trained to perform their operations and inspections properly. Additional production controls include the use and implementation of the following:

a) Information: Information used to control each operation and describe the characteristics of the product are included in the On-line Standardized Work Instructions, Job Element Sheets (JES) and Standard Operations Sheets (SOS). The JES instructions identify the steps to be performed and the results to be achieved. Standardized Work JES instructions and MAIs are used throughout machining, assembly, and Bi-Phase Operations.

Product Quality Standards (PQS) are displayed in assembly and manufacturing areas. Product Quality Standards are used to heighten quality awareness and to display specific quality characteristics and features.

b) Measuring and monitoring devices: Measuring and monitoring gauges and torque equipment are determined, purchased, and issued during Production Launch planning preparations. New Product Introduction and Production Trial Runs are used to create customer PPAP samples, when required. These trial builds on actual production equipment are used to verify the effectiveness of the monitoring and measuring devices to control quality.

Manufacturing Engineering, working closely with Operations and Product Engineering, identifies the quality control points, gauges, torque monitoring equipment and other inspection requirements. Calibration traceability of the torque equipment is maintained in the Calibration Database. Calibration records are also maintained for gauges, hand tools, and other inspection/test equipment.

c) Maintenance: Process and manufacturing equipment, and infrastructure hardware are maintained in suitable working conditions in accordance with Maintenance schedules. Infrastructure equipment, transportation equipment, and plant maintenance is outsourced to third-party contractors. Operator Daily Maintenance responsibilities are identified, where appropriate.

d) Inspection activities: Inspection and assembly requirements are identified in the Standardized Work Instructions for each workstation. Engine testing, as required, is performed at dedicated stations. Operator Inspections are performed, and records maintained. When internally generated nonconformances are identified, countermeasures are taken by the responsible parties. These countermeasures are tracked until completion.

e) Training and Competence: Job Instruction Training (JIT) is performed by Senior Operators or Team Leaders and records are maintained. Training Matrices are used to identify training that has been performed and training needs. Personnel are not assigned tasks for which they are not trained.

f) Mistake Proofing and No-Fault Forward Assembly: Programmable DC Tools are being used that employ pre-set specification limits to stop the sequence of operations when torque drivers are used outside the pre-set boundary limits. Scanning of the Job Numbers and assembly component serial numbers is performed to provide traceability to supplier lots and purchase orders.

g) Release, delivery, and post-delivery processes: Release of product is dependent on compliance with all specifications and satisfaction of requirements. Hot Tested Tags are employed to visually display when units have passed Functional Hot Testing. OK to Ship Tags are used to denote when a unit has passed all testing and can be moved to Shipping.

10.5 PRODUCT IDENTIFICATION AND TRACEABILITY

Component parts, assemblies, and finished goods at all stages of production are clearly identified. This is accomplished using one of the following methods: Product Identification Tags and inventory labels are created for incoming parts. Job Placards, Manila Tags, location signage (overhead, floor, bin) are used for parts in WIP. Nonconforming material tags are used to identify nonconforming parts.

10.6 OPERATIONS INSPECTIONS AND PRODUCT RELEASE

Inspections are performed as specified in the Work Instructions. These Work Instruction also indicate the criteria to be used and the expected results. There are End-of-Line Quality Inspections performed by Operations Team Leaders and Team Members.

Engines are 100% functionally tested prior to shipping to the customers, when required. This functional test ensures that the engine is assembled correctly and eliminates failures.

10.7 CONTROL OF NONCONFORMNG PRODUCT

Nonconforming products can be identified at any stage of the operations. Nonconforming materials found during operations are identified and segregated to prevent the inadvertent use or shipment to the customer. While nonconforming product is typically found during an inspection or test, it can be discovered at any time, by any person in the organization.

- When nonconforming material is discovered, the Team Member or Team Leader will review the problem to confirm the nonconformity. If the nonconformity is confirmed, the product will be identified clearly to distinguish it from acceptable product, or product awaiting inspection.

- Nonconforming parts are segregated from good parts to ensure the nonconforming parts are not inadvertently used in the final product.
- Nonconforming parts are taken to the MRB area. The MRB Team reviews the MRB Tag to ensure adequate information pertaining to the nature of the nonconformance is recorded. The MRB Team will review the nature of the nonconformance and determine the Final Disposition of the nonconforming parts at MRB Meetings.

- **Building 101 Machining Operations**
  - In Bldg. 101, when nonconforming material is discovered in CMM Lab, the CMM Inspector will place a Yellow Sticker (for 80% of Spec.) or red sticker (for Spec Breaks) onto the attached Work-In-Process Tag (QAP8.5.2-08). The Team Leader and/or Group Leader will be informed about the issue.
  - The Machining Group Leader and/or Process Engineering performs a Root Cause investigation on the machining process for Out-of-tolerance conditions. As required, the Machining Group Leader will quarantine the Work-In-Process and finished goods.
  - Nonconformance Tags are used to identify single parts or one pallet of the same part number. One tag must be used for each skid or pallet load of parts. Parts identified as scrap in the Machining Area are individually tagged.
  - The CMM Inspection Daily Exception Reporting (DOER) is communicated to the Operations staff and Engineering personnel for evaluation. The CMM Inspection Report summarizes the Control Limit breaks and Specification breaks for each day and captures the corrective actions taken for correction. SPC charts are maintained for critical and special features.

10.8 EMPLOYEE TRAINING

- The competence, skill level, and job-related knowledge of each employee are evaluated on an annual basis. The purpose of the annual assessment is to provide feedback to the employee on their performance, to evaluate the impact of training, and to identify future training requirements.
- Training Matrices, also known to PSI employees as Flexibility Charts, are used to document and demonstrate the completion of training and the specific employee job knowledge. Flexibility Charts display areas where training has been completed and identifies the training needs of the employees.
- Flexibility Charts are Department or Line specific. Team Leaders and Group Leaders can track cross-training initiatives and use the Flexibility Chart to schedule employees for specific Workstations or tasks.
- Employees are trained in advance for the work they are requested to perform.

10.9 PRESERVATION OF PRODUCT

- Proper handling of all parts and raw materials is performed. Specific handling requirements for operations will be defined in the appropriate work instructions, where applicable.
- Labeling of special handling requirements (such as hazard warnings) will be utilized, as required.
- PSI utilizes stock rooms, storage areas, shelving, and other means to segregate and store materials. Access to stockrooms is limited to authorized personnel, with this authorization recorded in the employee's training file.
- Parts are stacked to prevent damage. If required, material is used to separate fragile parts to prevent damage.
- Environmentally sensitive materials are protected using the following special procedures:
    - Materials are stored in original containers or, if removed for inspection, are appropriately resealed.
    - Stock areas are checked to ensure compliance with any written procedures for environmentally sensitive materials.
    - Internal Audits are performed to identify date or temperature sensitive materials that are at risk when being used.

10.10 STANDARDARDIZED WORK DOCUMENTATION and RISK MITIGATION

- Standardized Work Instructions (JES and SOS) are initially created during the Production Launch Planning phase of the product lifecycle. Manufacturing Engineering defines the sequence of operations, identifies fixtures and tooling, purchases gauges and torque equipment, and identifies necessary equipment or processes from similar designs. Lessons learned from Warranty claims, customer complaints, or internal nonconformance issues are taken into consideration as well.
- Risk planning and mitigation activities are undertaken. As the Standardized Work Instructions are created, the Control Plan is created, when required. Process Failure Mode and Effects Analysis are also performed during this product lifecycle phase, when required.
- Standardized Work Documentation is displayed at Assembly Stations or Machining Cells. The ability to amend or revise the Work Instructions is controlled and prevented. Server locations are secure to select personnel with rights to upload the documentation.
- After the revised document is re-submitted for approval, the appropriate Manufacturing or Industrial Engineer reviews the changed document for approval. The Revision History and document approvers are captured in the Standard Work Document Control System.

10.11 PERFORMANCE METRICS AND COMMUNICATIONS

Internal communications are provided throughout the facility regarding the effectiveness of the Quality Management System. The methods of communication include the following:

- Daily Production Meetings and Operations Cube Meetings,
- Level 2 Action Center Meetings,
- Countermeasures and Customer Complaint Team Meetings,
- Material Review Board (MRB) Meetings,
- Senior Leadership Operations Review Meetings,
- PSI Newsletter and Intranet,
- Management Review Meetings.

SECTION 11 – CUSTOMER CARE – WARRANTY, FIELD SERVICE, AND CUSTOMER SUPPORT ENGINEERING

11.1 WARRANTY AND SERVICE

The Warranty and Service Group provides technical support, field service, and handling of customer issues and complaints for PSI's Distribution customers. Reliability and supplier failure analysis and root cause testing are also performed by employees of the Warranty and Service Group. The Customer Support Engineering Teams provides support for the OEM Customers.

RMAs are issued via the Mize Warranty Software System. The tracking of customer returns includes product risk assessments of products in the field with similar designs. Product Quality Bulletins are used for customer notification.

Customer technical training is offered, as well as product support and field service. Technical product literature is created for customer use.

11.2 CUSTOMER COMPLAINTS

Customer Support Engineering serves as the primary Customer touch point for customer complaints, product returns, and product issues for our OEM customers. Trained application engineers respond to customer issues ranging from telephone assistance for troubleshooting or installation issues, including field service assistance. Corrective actions are processed in our CRM computer system CRM Maximizer.

11.3 POST DELIVERY ACTIVITIES

PSI ensures all regulatory requirements, customer concerns, warranty, and contractual post-delivery requirements associated with its products and services are met. Resolving customer satisfaction issues is top priority of PSI. This is achieved by the following:

- Customer relations and high priority responses to customer issues,
- Trained product specialist with technical and hands on experience,
- Dedicated customer support professionals that manage accounts,
- Detailed knowledge of engine performance, mechanics, and assembly drawings,
- Ability to requisition and provide parts directly from stock to resolve customer issues and maintain customer engines in top working condition.

SECTION 12 – MANUFACTURING ENGINEERING PROCESS

12.1 PRODUCTION LAUNCH PLANNING

Manufacturing Engineering performs activities to reduce the technical risk and improve quality. These risk mitigation activities are performed during Launch Planning, New Product Introduction trials, and during Production Trial Runs.

These Risk Mitigation activities include the following (as required):

- Creation of Process Flow Diagrams, PFMEA Analysis, and Control Plans,
- Creating Bill of Materials, Routings, and Manufacturing Assembly Instructions,
- Creating Standardized Work Documentation (Job Element Sheets, Standard Operations Sheets, Product Quality Standards, and Key Point Visuals),
- Identifying and purchasing fixtures and tooling,
- Purchase and calibration of gauges and torque fastening equipment,
- Review benchmarks from similar designs.
- Incorporating lessons learned from Warranty claims, customer complaints, or internal nonconformance.

Risk planning and mitigation activities are undertaken. As the Manufacturing Assembly Instructions are created, the overarching Control Plan is constructed, and documented when requested. Process Failure Mode and Effects Analysis are also performed during the product lifecycle phase, when required.

Completed Manufacturing Assembly Instructions are uploaded to the MAI On-Line System which allow the MAIs to be displayed on computer monitors at the Assembly Stations or Machining Cells when required. The ability to amend or revise the MAIs is controlled and prevented. Server locations are secure to select personnel with rights to upload MAI documentation.

12.2 STANDARDIZED WORK DOCUMENTATION (WORK INSTRUCTIONS)

Manufacturing Engineering creates and maintains the MAIs and Standardized Work documentation. Industrial Engineers and Core Team Leaders are tasked with revising and updating changes to the MAIs.

To revise the MAIs and Standardized Work documentation, the Industrial and Manufacturing Engineers download controlled copies of the documentation for editing. Core Team Leaders, Operations personnel and Quality are consulted during the documentation revision process. The revised documents are approved with Revision History and the persons responsible for making the changes identified. The person responsible for approving the document changes are also captured in the Standard Work Document Control process.

12.3 PROCESS CHANGES

PSI reviews and controls changes made to production processes, to the extent necessary, to ensure continuing conformity with requirements. Risk mitigation actions are performed prior to the implementation of process changes. Documented information describing the results of the review of changes, the person(s) authorizing the change, and any necessary actions arising from the review is maintained.

Process changes are evaluated for risks and managed using the PSI Process Change Request process. Customers are notified in advance, when required.

Changes are verified and validated before being implementation to ensure the desired effect has been achieved without adversely affecting product conformity to requirements. Risk assessments (e.g., FMEA) and Control Plans are updated for the planned changes.

Changes, including those made at suppliers, require a production trial run for verification of changes to validate the impact of any changes on the manufacturing process.

12.4 CALIBRATION

Gauges and torque assembly tools are recalled and calibrated per the Calibration Procedure. It is the responsibility of the Manufacturing Engineering Department to maintain a calibration database to aid in the identification of all the measuring devices and verification of calibration status. A Calibration Database is used monitor the calibration schedule for all Inspection, Measuring, and torque equipment.

The Manufacturing Engineering Managers are responsible for ensuring that gauges are calibrated and ready to use. Prior to providing gauges to the Operations, the Manufacturing Engineering Managers, or Calibration Technician must verify the gauge's operation and function and enter the calibration information into the Calibration Database. Calibrated gauges are identified with the gauge or tool number.

Calibration stickers identify the month calibration is due. Calibration is to be performed prior to the end of the month that is indicated on the Calibration sticker.

Inspection, Measurement and Torque equipment that is calibrated by the Manufacturing Engineering Department are stored and handled in such a way as to preserve its accuracy and fitness for use. Operator training and internal audit activities shall emphasize the importance of handling and use of inspection equipment on the production floor.

12.5 VALIDATION OF SPECIAL PROCESSES

Engines are functionally tested and programmed to a specific set of engine parameters. Hot Testing starts the engines and evaluates ignition timing, fuel and air pressure leak testing and multiple other engine functioning parameters. The engine control module interface provides data in a user-friendly output format. Engine calibration is verified for the proper product specifications. On-Highway engines are 100% Tested. This test data is data-logged with the engine Serial Number and Job Number.

Cold Test stands have sensors, gauges and transducers that are calibrated and maintained via the calibration process.

SECTION 13 – QUALITY SYSTEMS PROCESS

13.1 Quality Management System Processes

The Quality Management System at PSI is broken into fifteen (15) distinct process, each of which is monitored for performance effectiveness. These processes are located at four different PSI facilities, as shown is Section 4.3 of this Quality Manual. Power Solutions International, Inc. does not exclude any sections nor any clauses of the ISO 9001:2015 Standard from the implemented Quality Management System.

The 2021 changes to the PSI QMS include the following:

- The Customer Service Engineering Department was renamed Customer Support Engineering Department, with greater focus on post-delivery activities. Product Launch activities were moved to Manufacturing Engineering.
- The Program Management Office was absorbed into Product Engineering. While still in existence, Program Management is considered part of the Engineering process.
- The production operations processes being performed at the 1465 Hamilton Parkway, Itasca Illinois (Assembly, Materials, Manufacturing Engineering, and Quality Control) are no longer included in the ISO 9001 scope of registration. The PSI consolidation of operations has relocated Engine Assembly of Heavy Duty 22L back-up power generation engines into the 201 Mittel facility. Therefore, the 1465 QMS Processes were removed from ISO 9001 QMS scope of registration. Sales and Engineering continue to operate from the 1465 Hamilton Pkwy location.
- The Quality Control responsibilities were absorbed into Manufacturing Operations and Manufacturing Engineering. The Quality Assurance Process was renamed Quality Systems.

12.6 CUSTOMER FOCUS

The Quality Management System has been designed to ensure that focus is maintained on ensuring that customer requirements are determined and are met. Risk planning requires design verification analysis, validation testing, and fitness for use trials. Quality planning involves Design, Application Engineering and Manufacturing Engineering. Production Trial Runs are used to make final adjustments to the on-line Standardized Work documentation.

KPIs goals are established for different levels and departments of the organization. When goals are not achieved, correction and corrective actions are taken. Layered Audits and Internal Audits are performed to assess compliance to the established processes. Verification Audits are performed on process equipment. Performance reports, customer scorecards, audit findings, risks and opportunities are provided to the Senior Leadership Team. The Senior Leadership Team provides guidance and strategic direction. The Management Review process is used to evaluate the effectiveness of the Quality Management System and to provide additional resources or identify required actions, as necessary.

12.7 RECORD RETENTION

Power Solutions International maintains records that are needed to provide evidence of conformity to requirements and the effective operation of the quality management system.

The Quality Records Retention Policy includes:

- The retention time (including archive requirements, as necessary) for each record that is to be retained.
- The personnel or department responsible for the retention and storage of the records.
- The method of disposal once the retention period has expired.

Managers, Supervisors, and Group Leaders in their respective departments are responsible for ensuring quality records and inspection records are legible and maintained to adequately demonstrate the effectiveness of the Quality Management System. Completed forms are stored and maintained in such a manner as to be readily retrievable, and secure from damage, deterioration, or loss.

Quality records in any storage status are:

- Adequately identified to permit reasonable retrieval, as required.
- Stored in a location sufficiently large to accommodate all records.
- Provided adequate security to prevent unauthorized access.
- Protected to prevent environmental deterioration or mishandling during retention.

12.8 INTERNAL AUDITING

Power Solutions International performs Internal Audits at planned intervals to determine whether the Quality Management System:

- Conforms to PSI QMS documentation, conforms to the requirements of the ISO 9001:2015 Standard, and conforms to applicable statutory requirements,
- Is effectively implemented and maintained.

PSI has documented Internal Auditing procedures to ensure:

- The responsibilities for planning and conducting audits are defined,
- Recording and reporting of audit results is conducted in a timely manner,
- Audits are planned to take into consideration the status and importance of the processes and area to be audited, as well as the results of previous audits,
- The audit criteria, scope, interval, and methods are defined and recorded,
- The selection of auditors and conduct of audits ensures objectivity and impartiality,
- Auditors do not audit their own work.

Records of the results of Internal Audit are maintained. The management responsible for the areas being audited are informed of the necessary corrections. Corrective actions are taken without delay. Follow-up audit activities include the verification of the actions taken and the reporting of the verification results.

12.9 DOCUMENTATION REQUIREMENTS

The PSI Quality Management System documentation includes this Quality Manual, Quality Policy, Quality Objectives, Procedures, Work Instructions, Quality Alerts, Product Quality Standards, Gage Charts, and forms required to assure the effective planning, operation, and control of the manufacturing processes.

Documents employed in the Quality Management System are controlled. QMS Documents meet the following requirements:

a) Approved prior to issue.

b) Reviewed for adequacy, updated as necessary, and re-approved.

c) Identified with the current revision status.

d) Available at points of use.

e) Legible, readily identifiable, and retrievable.

f) Prevented from unintended use if the document is obsolete.

g) Suitably identified if the obsolete document is retained for any purpose.

QMS Documents are maintained electronically in a centralized server location. Access to controlled documents is limited and rights protected. The computerized servers are backed up with off-site storage to prevent loss of QMS documentation. External documentation is controlled via the use of a Master List and limited centralized server access.

Engineering drawings and specifications are stored in the Engineering SolidWorks Vault. The electronic repository of Engineering intellectual property is tightly controlled with limited Vault access. Rights are regularly reviewed to ensure the protection of PSI intellectual property.

Engineering drawings and other published engineering specifications are reviewed and approved prior to issuance and use. Drawings have review and approval initials to indicate the persons performing the review.

12.10 MEASUREMENT, ANALYSIS, AND IMPROVEMENT

Management collects and analyzes appropriate data to determine the suitability and effectiveness of the QMS and to identify opportunities for continual improvement. This includes data generated by:

- Monitoring and measuring activities,
- Customer feedback,
- The results of planning, projects, and changes to the QMS,
- The results of risk mitigation activities,
- Supplier performance evaluation results,
- Corrective & preventive action system data,
- Internal and third-party audit process results.
- Internal and external quality performance

Data is analyzed to provide information on the suitability of the QMS. When the results indicate improvement is required, corrections and corrective actions are implemented.

Power Solutions International monitors and measures the characteristics of the product to ensure that product requirements are met. This verification of product quality is performed at various stages of the product realization process in accordance with the planned arrangements. Records are maintained to provide evidence of conformity with the acceptance criteria. These records also indicate the persons authorizing the release of product.

Product is not released from the production area until all required inspections and tests have been verified to meet specifications and the appropriate documents are completed. Engines that pass testing and Final Inspection are identified when an *OK to Ship* Tag and the parts are released for delivery to the customer.

12.11 POST DELIVERY ACTIVITIES

The Warranty and Service Group provides technical support, field service, and handling of customer issues and complaints for PSI's Distribution customers. Customer Support Engineering serves as the primary Customer touch point for customer complaints, product returns, and product issues for our OEM customers. Analysis of all customer issues is summarized by the Quality Department. The Corrective Action process is also facilitated by the Quality Department.

12.12 CONTINUAL IMPROVEMENT

The Quality Systems Team ensures that improvement activities are taken to address the following objectives:

- Continual improvement of the effectiveness of the Quality Management System via the Management Review process,
- Improvements to the quality of the products and services offered to our customers with robust metrics reporting and communications,
- Needs and expectations of Interested Parties are satisfied,
- Prevention of undesirable outcomes, risks, and unfavorable effects.

12.13 CORRECTIVE ACTIONS

Documented procedures have been established and implemented to review the nonconformances (including Customer Complaints), to determine the root cause, evaluate the need for action to ensure nonconformance does not recur, determine and implement actions needed, and review the effectiveness of the action taken.

Changes are made to the process controls, control plans, inspection verification requirements, MAIs, or error-proofing, as appropriate. Re-training is a component of the implemented corrective action. Permanent changes to Quality Management System are made, when required.

Corrective actions are reviewed at Management Review Meetings. Corrective actions are appropriate to the effects of the nonconformances encountered.

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