

**QUALITY MANUAL**

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**“Committed to Quality and Customer Satisfaction”**

Distribution and Manual Control



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**APPROVALS**

The Quality Assurance Manual for Printed Circuits, Inc. (PCi) is approved as correctly describing the Quality System for achieving the quality objectives of the company.

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## **1.0 Scope**

### **1.1 General**

The Company specializes in flexible and rigid flexible printed wiring boards, serving the high technology areas of the military, commercial avionics, and the medical industry.

Printed Circuits, Inc. has developed and implemented a Quality System to better satisfy its customers and to improve management of the company. The Quality System complies with the International Standard ISO 9001-2008.

The manual is divided into 8 sections corresponding to clauses of the ISO 9001-2008 Standard. The purpose of this manual is to define the authorities and responsibilities of the management staff and to describe Printed Circuits Inc.'s Quality System.

### **1.2 Application**

Printed Circuits, Inc. has determined that the following requirements are not applicable to the operations as this company and are documented as exclusions:

- Clause 7.3 Design and development: There are no design and development activities at the company.
- Clause 7.5.2 Validation of processes for production and service provision: The results of all processes used for product realization can be verified by monitoring and measurement..

## **2.0 Normative Reference**

The following documents were used as reference during the preparation of the company Quality Management System.

- American National Standard ANSI/ISO Q9001-2008, Quality Management System-Requirements
- MIL STD
- MIL-PRF-31032

### **3.0 Terms and Definitions**

HAL-Hot Air Level

SMOBC- Soldermask Over Bare Copper

PIC- Photoimagable Coverlayer

ENIG- Electroless Nickel Immersion Gold

DES- Develop-Etch-Strip

DOE-Design of Experiments

AOI- Automated Optical Inspection

DRC-Design Rule Check

MRB-Material Review Board

TRB-Technical Review Board

MRM- Management Review Meeting

SPC- Statistical Process Control

## **4.0 Quality Management System**

### **4.1 General requirements**

Printed Circuits Inc. has established, documented and implemented a Quality Management System (QMS) in accordance with the requirements of ISO 9001-2008. The system is maintained and continually improved through the use of the quality policy, quality objectives, audit results, analysis of data, corrective and preventive action and management review.

To design and implement the QMS, Printed Circuits, Inc. has:

- Identified the processes needed for the QMS and documented them on the *QMS Process Flow* diagram and *Process Flow Chart* at the end of this section
- Determined the sequence and interaction of these processes and illustrated them on the diagram
- Determined the criteria and methods needed to ensure the effective operation and control of the processes
- Established the systems to monitor, measure and analyze the processes
- Established the methods to achieve planned results and the continual improvement of the processes.
- Ensured the availability of resources and information necessary to achieve the planned results and continual improvement of the processes

Printed Circuits, Inc. does outsource some processes involved in the manufacturing of product. The quality of outsourced processes is insured by quality inspections as called out by the process traveler.

### **4.2 Documentation Requirements**

#### **4.2.1 General**

The QMS documentation includes:

- A documented quality policy and quality objectives
- Quality Manual
- Documented procedures
- Documents identified as needed for the effective planning, operation and control of our processes and
- Quality records

#### **4.2.2 Quality manual**

This Quality Manual has been prepared to describe the Quality Management System for Printed Circuits, Inc. The scope and permissible exclusions of the QMS are described in Section 1 of this manual.

Each section of the manual references documented procedures that relate to the requirements of that section.

The Flow Diagrams at the end of Section 4 provide a description of the interaction between the processes of the QMS.

#### **4.2.3 Control of documents**

All of the QMS documents are controlled according to the Document Control procedure (P-423). This procedure defines the process for:

- Approving documents for adequacy prior to issue
- Reviewing, updating as necessary and re-approving documents
- Ensuring that changes and the current revision status of documents are identified
- Ensuring that applicable documents are available at points of use and that the version of these documents is relevant
- Ensuring that documents remain legible and readily identifiable
- Ensuring that documents of external origin are identified and their distribution controlled
- Preventing the unintended use of obsolete documents and applying suitable identification to them if they are retained for any purpose.

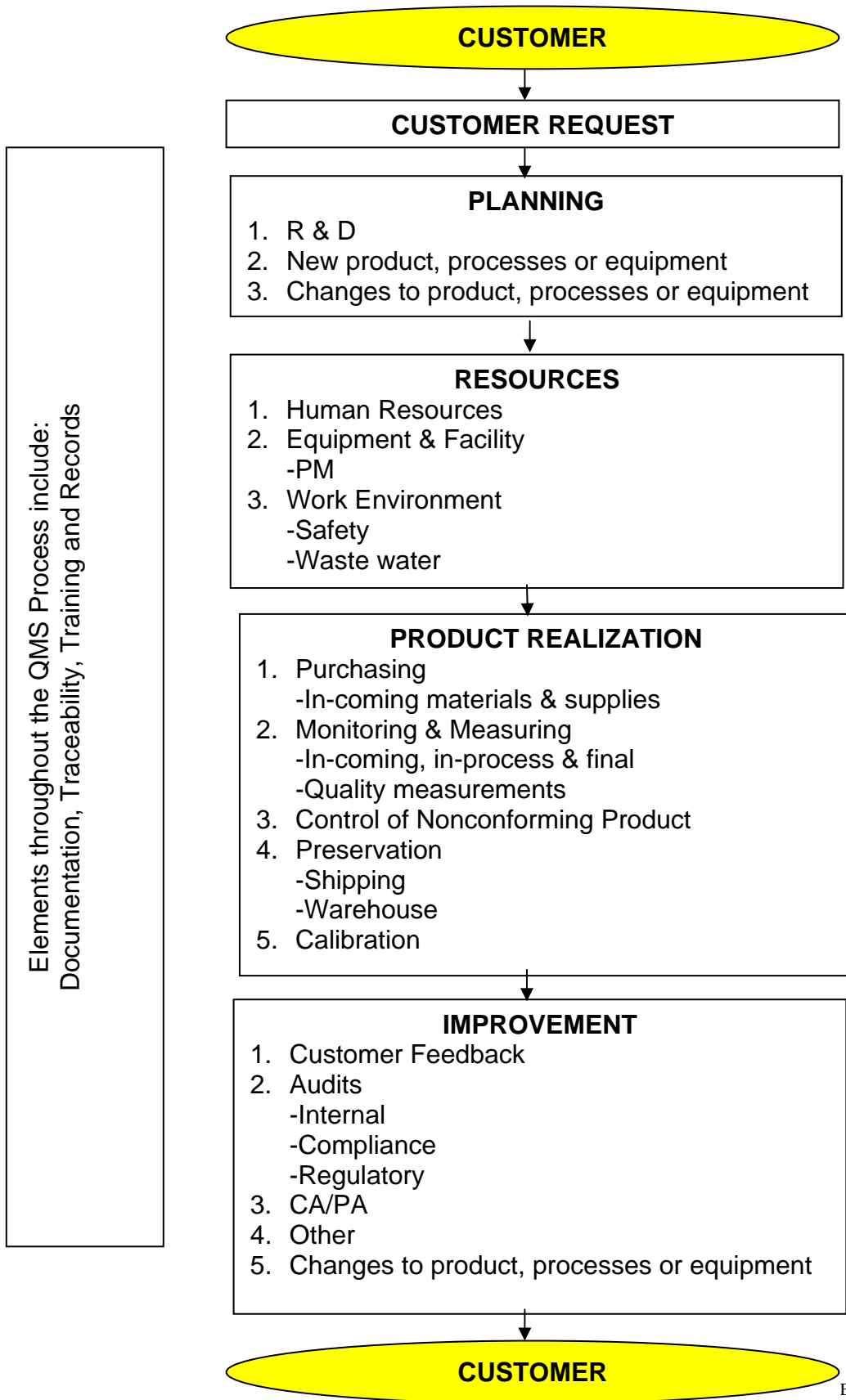
#### **4.2.4 Control of records**

Records are maintained to provide evidence of the effective operation of the QMS and conformity to QMS requirements. The records are maintained according to the Control of Quality Records procedure (P-424). This procedure requires that quality records remain legible, readily identifiable and retrievable. The procedure defines the controls needed for identification, storage, protection, retrieval, retention time and disposition of quality records.

#### **Related Procedures**

Document Control	P-423
Control of Quality Records	P-424

**Quality Management System Process Flow**



## **5.0 Management Responsibility**

### **5.1 Management commitment**

Top management has been actively involved in implementing the Quality Management System (QMS). It has provided the vision and strategic direction of the QMS and established the quality policy and objectives.

To continue to provide leadership and show commitment to the improvement of the QMS, management will do the following.

- Communicate the importance of meeting customer, statutory, and regulatory requirements.
- Establish quality objectives annually
- Establish the quality policy
- Conduct quarterly management reviews
- Ensure the availability of resources

### **5.2 Customer focus**

Printed Circuits, Inc. strives to identify current and future customer needs, to meet customer requirements and to exceed customer expectations.

Top management ensures that customer requirements are understood and met by requiring compliance with documented procedures. Customer requirements are determined, converted into internal requirements, and communicated to the appropriate people within the organization.

### **5.3 Quality policy**

Top management has established the following quality policy:

**“Printed Circuits, Inc. is committed to continuous improvement and customer satisfaction.”**

Top management ensures that the quality policy is communicated to all employees through training, by posting it in prominent places throughout the facility, and by reviewing it during company meetings.

Management reviews the quality policy at each management review meeting to determine the policy’s continuing suitability for our organization.

## **5.4 Planning**

### **5.4.1 Quality objectives**

Objectives are established annually to support Printed Circuits, Inc.'s efforts to achieve its quality policy. Quality objectives are established for each department, are measurable, and reviewed against performance goals at each management review meeting. The company's quality objectives are defined on the Quality Management Table.

### **5.4.2 Quality management system planning**

The quality system has been planned and implemented to meet Printed Circuits, Inc.'s quality objectives and the requirements of 4.1 of the ISO 9001-2008 standard. Planning takes place as changes affecting the quality system are designed and implemented.

## **5.5 Responsibility, authority and communication**

### **5.5.1 Responsibility and authority**

An organizational chart, which is included at the end of this section (5), has been established to show the interrelation of personnel in the organization. Job descriptions define the responsibilities and authorities of each of the positions on the organizational chart. Job descriptions and the organizational chart are reviewed and approved by top management for adequacy. These documents are available throughout the organization to help employees understand responsibilities and authorities.

### **5.5.2 Management representative**

The Quality Control Manager has been appointed as management representative and has the responsibility and authority to:

- Ensure that processes needed for the QMS are established and implemented
- Report to top management on the performance of the QMS and note needed improvements
- Promote awareness of customer requirements throughout the organization

### **5.5.3 Internal communication**

Processes are established for communication within the organization. Methods of communicating the effectiveness of the QMS include department and management meetings, management review, circulation of minutes of management review meetings, Internal Audit Closing meetings, and other routine business communication.

## **5.6 Management review**

### **5.6.1 General**

Top management reviews the QMS quarterly at management review meetings. This review assesses the continuing QMS suitability, adequacy and effectiveness, and identifies opportunities for improvement and needed changes. Records are maintained for each management review meeting.

### **5.6.2 Review input**

Assessment of the QMS is based on a review of information including the following:

- Results of audits
- Customer feedback
- Process performance and product conformity
- Status of preventive and corrective actions
- Follow-up actions from previous management reviews
- Planned changes that could affect the QMS
- Recommendations for improvement

### **5.6.3 Review output**

During the review meetings, management will identify appropriate actions to be taken regarding the following issues:

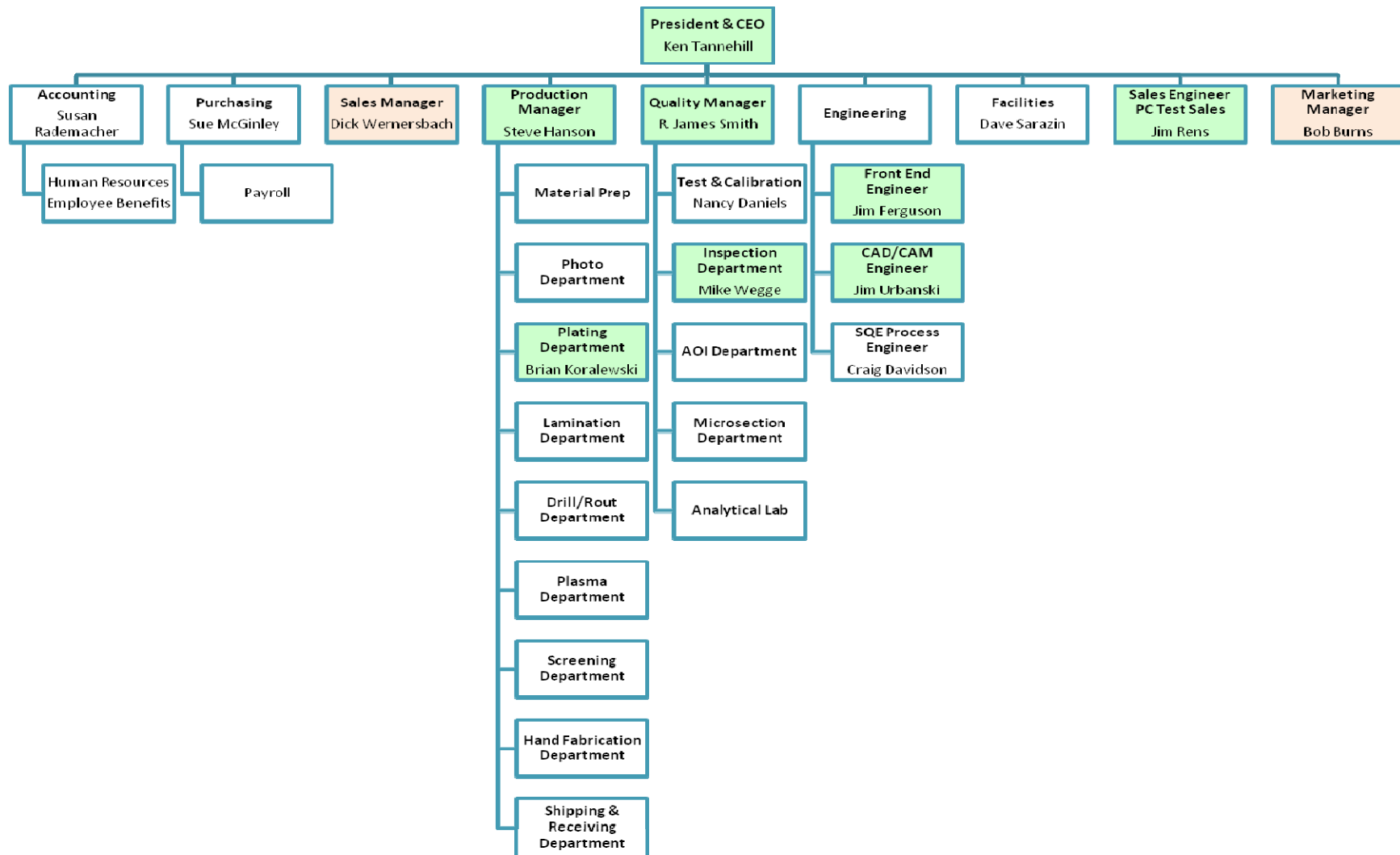
- Improvement of the effectiveness of the QMS and its processes
- Improvement of product related to customer requirements
- Resource needs

Responsibilities for required actions are assigned to members of the management review team. Decisions made during the meeting, and assigned actions and their due dates are recorded in the minutes of management review.

#### **Related Procedures:**

Management Review            P-560

**Printed Circuits, Inc. Organization Chart**



## **6.0 Resource Management**

### **6.1 Provision of resources**

Printed Circuits, Inc. has implemented a Quality Management System that complies with the ISO 9001-2008 standard. This implementation was achieved with management commitment and with sufficient resources for the implementation. Management determines and provides the necessary resources to effectively maintain and continually improve the system and enhance customer satisfaction by meeting customer requirements.

### **6.2 Human resources**

#### **6.2.1 General**

To ensure competence of our personnel, job descriptions have been prepared identifying the qualifications required for each position that affects product quality. Qualifications include requirements for education, skills and experience. Appropriate qualifications, along with required training, provide the competence required for each position.

#### **6.2.2 Competence, awareness and training**

Qualifications are reviewed upon hire, when an employee changes positions and as the requirements for a position change. Human Resources maintain records of employee qualifications. If any differences between the employee's qualifications and the requirements for the job are found, training or other action is taken to provide the employee with the necessary competence for the job. The results are then evaluated to determine if they were effective. Training and evaluation are conducted according to the Competence Awareness and Training procedure.

All employees are trained on the relevance and importance of their activities and how they contribute to the achievement of the quality objectives.

### **6.3 Infrastructure**

To meet quality objectives and product requirements Printed Circuits, Inc. has determined the infrastructure needed. The infrastructure has been provided and includes buildings, workspace, utilities, and processing hardware and software. As new infrastructure requirements arise, they will be documented in quality plans. Existing infrastructure is maintained to ensure product conformity.

## **6.4 Work Environment**

A work environment suitable for achieving product conformance is maintained. Requirements are determined during quality planning and documented in the quality plan. The work environment is managed for continuing suitability. Data from the quality system is evaluated to determine if the work environment is sufficient for achieving product conformance, or if preventive or corrective action related to the work environment is required.

### **Related Documents**

Competence Awareness and Training Procedure      P-622

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## **7.0 Product Realization**

### **7.1 Planning of product realization**

Quality planning is required before new products or processes are implemented. It will take place according to the Planning of Product Realization Processes procedure. During this planning, management or assigned personnel identify:

- The quality objectives and requirements for the product
- Processes, documentation and resources required
- Verification, validation, monitoring, inspection and test requirements
- Criteria for product acceptance

The output of quality planning includes documented quality plans, processes and procedures.

### **7.2 Customer-related processes**

#### **7.2.1 Determination of requirements related to the product**

Printed Circuits, Inc. determines customer requirements before acceptance of an order. Customer requirements include those:

- Requested by the customer
- Required for delivery and post-delivery activities
- Not stated by the customer but necessary for specified use or known and intended use
- Statutory and regulatory requirements related to the product
- Additional requirements determined by Printed Circuits, Inc.

Customer requirements are determined according to the Customer Related Processes procedure.

#### **7.2.2 Review of requirements related to the product**

Printed Circuits, Inc. has a process in place to review requirements related to the product. The review is conducted before the order is accepted. The process ensures that:

- Product requirements are defined
- Contract or order requirements differing from those previously expressed are resolved
- Printed Circuits, Inc. has the ability to meet the defined requirements

- Records are maintained showing the results of the review and any actions arising from the review
- Where a customer does not provide a documented statement of requirement, the customer requirements are confirmed before acceptance
- When product requirements are changed, Printed Circuits, Inc. communicates changes to relevant personnel and amends relevant documents

### **7.2.3 Customer communication**

Printed Circuits, Inc. has implemented an effective process for communicating with customers in relation to:

- Product Information
- Inquiries, contracts and order handling, including amendments
- Customer Feedback, including customer complaints

## **7.3 Design and Development**

Printed Circuits, Inc. does not design any product so design and development will be excluded from the scope of this registration.

## **7.4 Purchasing**

### **7.4.1 Purchasing process**

A documented procedure is followed to ensure that purchased product conforms to the specified purchase requirements. The procedure outlines the extent of control required for suppliers. Suppliers are evaluated and selected based on their ability to supply product in accordance with requirements as outlined in the procedure. Criteria for selection, evaluation and re-evaluation are documented in the procedure. Records of the evaluation and any necessary actions are maintained as quality records.

### **7.4.2 Purchasing information**

Purchasing information describes the product to be purchased, including where appropriate:

- Requirements for approval of product, processes and equipment
- Requirements for qualification of personnel

- Quality Management System requirements

The purchasing documents are reviewed to ensure the adequacy of requirements before orders are placed with the supplier.

## 7.4.3 Verification of purchased product

The Purchasing procedure describes the process used to verify that purchased product meets specified purchase requirements. If Printed Circuits, Inc. or the customer will perform verification at the supplier's premises, the verification arrangements and method of product release are documented in the purchasing information.

## 7.5 Production and Service Provision

### 7.5.1 Control of production and service provision

Printed Circuits, Inc. plans and carries out service provision under controlled conditions. Controlled conditions include, as applicable:

- The availability of information that describes the characteristics of the product
- The availability of work instructions
- The use of suitable equipment
- The availability and use of monitoring and measuring devices
- The implementation of monitoring and measurement
- The implementation of release, delivery and post-delivery activities

### 7.5.2 Validation of processes for production and service provision

Printed Circuits, Inc. does not engage in finished product production i.e. the printed wiring boards are custom fabricated components of electronic assemblies. The results for all component related processes can be verified by monitoring and measurement. Therefore, validation of assembly processes and service provisions will be excluded from the scope of this registration.

### 7.5.3 Identification and traceability

Printed Circuits, Inc. identifies the product throughout product realization according to the Identification and Traceability procedure. Product is identified with respect to monitoring and measurement requirements.

Printed Circuits, Inc. controls and records the unique identification of the product wherever traceability is a specified requirement.

#### **7.5.4 Customer property**

Printed Circuits, Inc. when furnished with customer supplied property, shall segregate and protect this property while it is under the organization's control or until it has been used per the customer's instructions. If any customer property is lost, damaged, or found to be unsuitable for use, it will be reported to the customer and records maintained. Intellectual Property of a customer provided to Printed Circuits, Inc. for fabrication shall be safeguarded from disclosure to third parties, except that subcontractors used for portions of fabrication shall be allowed sufficient data to perform their particular operations. Such subcontractors shall be subject to Non-Disclosure Agreements (NDA's) regarding the customer's Intellectual Property. Intellectual Property shall include blueprints, schematics, electronic data, artwork files, etc. which shall be maintained for 3 years minimum or as specified, after latest usage after which it shall be destroyed, or unless otherwise directed by the customer.

#### **7.5.5 Preservation of product**

Printed Circuits, Inc. preserves the conformity of product during internal processing and delivery to the intended destination. This preservation includes identification, handling, packaging, storage and protection. Preservation also applies to the constituent parts of a product.

### **7.6 Control of monitoring and measuring devices**

Printed Circuits, Inc. has determined what product monitoring and measurement will be undertaken and the devices needed to provide evidence of conformity to stated requirements. A documented procedure outlines the process used to ensure that monitoring and measurement are carried out in a manner that is consistent with the requirements.

Where necessary to ensure valid results, measuring equipment is:

- Calibrated or verified at specified intervals, or prior to use, against measurement standards traceable to international or national measurement standards
- Adjusted or re-adjusted as necessary
- Identified to enable the calibration status to be determined
- Safeguarded from adjustments that would invalidate the measurement result
- Protected from damage and deterioration during handling, maintenance and storage

In addition, Management assesses and records the validity of the previous measuring results when the equipment fails to conform to requirements. The company takes appropriate action on the equipment and any product affected. Records of the results of calibration and verification are maintained.

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When used in the monitoring and measurement of specified requirements, the ability of computer software to satisfy the intended application is confirmed. This shall be undertaken prior to initial use and reconfirmed as necessary.

**Related Documents**

Planning of Product Realization Processes P-710

Customer Related Processes P-720

Purchasing P-740

Control of Production and Service Provision P-751

Identification and Traceability P-753

Preservation of Product P-755

Control of Monitoring and Measuring Devices P-760

Flow chart

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## **8.0 Measurement, Analysis and Improvement**

### **8.1 General**

Printed Circuits, Inc. has planned and implemented the monitoring, measurement, analysis and improvement processes needed to:

- Demonstrate conformity of the product
- Ensure conformity of the Quality Management System
- Continually improve the effectiveness of the QMS.

This process is identified in documented procedures and includes determination of applicable methods, including statistical techniques, and the extent of their use.

### **8.2 Monitoring and Measurement**

#### **8.2.1 Customer Satisfaction**

As one of the measurements of the performance of the quality management system, Printed Circuits, Inc. monitors information relating to customer perception of our service. The method for obtaining and using this information is identified in the customer related processes and the management review procedures.

#### **8.2.2 Internal Audit**

Printed Circuits, Inc. conducts internal audits at planned intervals to determine whether the quality management system:

- Conforms to the planning requirements established in section 7.1, to the requirements of this International Standard, and to the Quality Management System requirements established by the organization
- Is effectively implemented and maintained

An audit program has been designed and implemented. It identifies an audit schedule based on the importance of the areas to be audited, as well as the results of previous audits. The audit criteria, scope, frequency, methods, responsibilities and reporting requirements are defined and documented in the Internal Audit procedure.

The manager responsible for the area being audited is responsible for ensuring that actions are taken without undue delay to eliminate detected nonconformities and their causes. Follow-up activities include the verification of the actions taken and the reporting of verification results.

## 8.2.3 Monitoring and measurement of processes

Printed Circuits, Inc. applies suitable methods for monitoring and, where applicable, measuring the Quality Management System processes. These methods demonstrate the ability of the processes to achieve planned results. When planned results are not achieved, appropriate corrective action is taken to ensure conformity. The requirements for monitoring and measuring are documented in the Management Review procedure and the Monitoring and Measuring and Analysis of QMS Processes procedure.

## 8.2.4 Monitoring and measurement of product

Printed Circuits, Inc. monitors and measures the characteristics of the product to verify that product requirements are fulfilled. This is carried out at the stages of the product realization process identified in the Monitoring and Measuring of Product procedure.

Evidence of conformity with the acceptance criteria is maintained. Records indicate the person authorizing release of product. Product release and service delivery does not proceed until all the planned arrangements have been satisfactorily completed, unless otherwise approved by a relevant authority, and where applicable by the customer.

## 8.3 Control of Nonconforming Product

Printed Circuits, Inc. ensures that product which does not conform to product requirements is identified and controlled to prevent its unintended use or delivery. Nonconforming product will be segregated until dealt with in one or more of the following ways:

- The problem is corrected
- The product is released or used under concession by the appropriate personnel or by the customer
- Action is taken to preclude its original intended use or application

Records of the nonconformities and subsequent actions taken will be maintained.

The controls and related responsibilities and authorities for dealing with nonconforming product are defined in the Control of Nonconforming Product Procedure, P-830.

## 8.4 Analysis of Data

Printed Circuits, Inc. determines, collects and analyses appropriate data to demonstrate the suitability and effectiveness of the Quality Management System and to evaluate where continual improvement can be made. The process for determining, collecting and analyzing this data is defined in the Management Review procedure. Appropriate data includes information generated from monitoring and measuring and from other relevant sources.

The analysis of data provides information relating to:

- Customer satisfaction

- Conformance to product requirements
- Trends and characteristics of processes and products including opportunities for preventive action
- Suppliers

## **8.5 Improvement**

### **8.5.1 Continual improvement**

Printed Circuits, Inc. continually improves the effectiveness of the Quality Management System through the use of the quality policy, quality objectives, audit results, analysis of data, corrective and preventive actions and management review.

### **8.5.2 Corrective action**

Printed Circuits, Inc. takes action to eliminate the cause of nonconformities in order to prevent recurrence. Corrective actions are appropriate to the effects of the nonconformities.

A documented procedure defines requirements for:

- Reviewing nonconformities (including customer complaints)
- Determining the causes of nonconformities
- Evaluating the need for action to ensure that nonconformities do not recur`
- Determining and implementing the necessary action
- Recording the results of action taken
- Reviewing corrective action taken

### **8.5.3 Preventive action**

Printed Circuits, Inc. determines action to eliminate the causes of potential nonconformities in order to prevent their occurrence. Preventive actions are appropriate to the effects of the potential problems.

A documented procedure defines requirements for:

- Determining potential nonconformities and their causes
- Evaluating the need for action to prevent occurrence of nonconformities
- Determining and implementing action needed

- Recording results of action taken
- Reviewing preventive action taken

**Related Documents**

Internal Audits P-822

Monitoring and Measuring of Product P-824

Control of Nonconforming Product P-830

Corrective and Preventive Action P-852