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cmc electronics

QUALITY MANUAL

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1 INTRODUCTION

1.1 Company Primary Activities and History

In 1895, Guglielmo Marconi was one of the first to devise a means of transmitting electrical impulses over short distances without wire, i.e., wireless. In December 1901, the first transoceanic wireless telegraphy signals were transmitted from southwest England and received in St. John's, Newfoundland. The Marconi Wireless Telegraph Company of Canada was formed in August 1903. In 1925, the name was changed to Canadian Marconi Company. On February 7, 2000, the name was changed to BAE SYSTEMS CANADA INC., and was again changed to CMC Electronics Inc. (hereinafter also referred to as CMC, or "the Company") on April 10, 2001 subsequent to the purchase of the company by ONCAP L.P.

CMC Electronics Inc. is a world leader in the design, manufacture, sales and support of high-technology electronic products, which include avionics, communications, specialized electronic components and subcontracting of electronics assemblies. CMC Electronics has been designing and building communication and electronic systems since 1903. CMC also operates a calibration and repair facility for test and measuring equipment as well as mechanical and mass metrology, traceable to the National Research Council of Canada Standard.

CMC's corporate headquarters and principal engineering/manufacturing plant is located in Montreal, Quebec. The Company's facilities include a plant in Ottawa, Ontario, as well as sales and service offices across Canada. A network of sales and service agents and representatives complement its support activities worldwide.

CMC's philosophy is to pursue niche markets in which products of the utmost quality, highest reliability and most innovative functions are required. The Company is a major supplier to aerospace, airlines, military and government customers around the world.

1.2 Quality Manual: Scope and Exclusions

CMC Electronics Inc. developed and implemented a Quality Management System to demonstrate that it is continuously maintained for effectiveness and process improvements in accordance with the requirements of ISO 9001:2000, AS9100 and specifically for the calibration laboratory, ISO17025.

This Manual is the top-level document of the CMC Electronics Inc. Quality Management System. The Manual is divided into four sections modeled on the sectional organization of the ISO 9001:2000. The purpose of this manual is to define and describe the quality system, to define authorities and responsibilities of the management personnel involved in the operation of the system, and provide general procedures for all activities comprising the quality system. Another purpose of this manual is to present the quality system to our customers and other interested parties, and to inform them of what specific controls are implemented at CMC Electronics Inc. to assure quality.

No exclusions were taken because all requirements of ISO 9001:2000 Section 7, and AS9100 apply.

This Quality Manual applies to the activities of CMC Electronics in the following two locations:

600 Dr. Frederik-Philips Blvd.
Ville Saint-Laurent, Québec, Canada
H4M 2S9

415 Legget Drive,
Ottawa, Ontario, Canada
K2K 2B2

2 RELATED DOCUMENTS

- ISO 9001:2000 Quality Management System Requirements
- ISO 9000:2000 Quality Management Systems-Fundamentals and Vocabulary
- ISO 9004:2000 Quality Management Systems-Guidelines for Performance Improvements
- SAE AS9100 Aerospace Standard
- ISO 17025 Calibration & Testing Program Management
- S.E.I Capability Maturity Model v1.1
- All Procedures and other procedures referenced within the pages of this document
- All Work Instructions that directly or indirectly have impact on product or process.
- All Forms used in conjunction with the procedures and work instructions described
- Appendix A provides an index of the applicable Quality System procedures.

3 ACRONYMS

ATP	Acceptance Test Procedure
CAR	Corrective Action Request
CMC	CMC Electronics Inc.
CMM	Capability Maturity Model
ECO	Engineering Change Order
EDOV	Electronic Distribution and On-line Viewing
EHS	Environment, Health and Safety
ESD	Electrostatic Discharge
ISO	International Standard Organization
NCR	Nonconformance Report
OBS	Operations Breakdown Structure
QA	Quality Assurance
WHMIS	Workplace Hazardous Material Information System
WI	Work Instruction

4 QUALITY MANAGEMENT SYSTEM

4.1 General Requirements

The Quality Management System has been developed in accordance with ISO 9000:2000, AS9100 and the Capability Maturity Model. It supports the philosophy of continuous improvement and our Quality Policy. The Quality System Procedures detail the quality requirements that must be satisfied in order that high quality products and services are provided to customers and that contract requirements are fully met. Figure 1 describes the Quality Management System and Figure 2 the main processes and their interaction.

The calibration laboratory has developed specific processes and documented work instructions to meet the requirements of ISO 17025.

The effectiveness of the Quality Management System is monitored against objectives established by the management using Balanced Scorecard, Business Reviews and Internal Audits.

The results of these measurements are presented at the Management Reviews, where, if necessary, corrective actions or continuous improvement activities are assigned to ensure that the planned results are obtained and that the processes are continuously improving. Corrective actions and improvement activities are monitored in the subsequent Management Review meetings.

Quality Management System

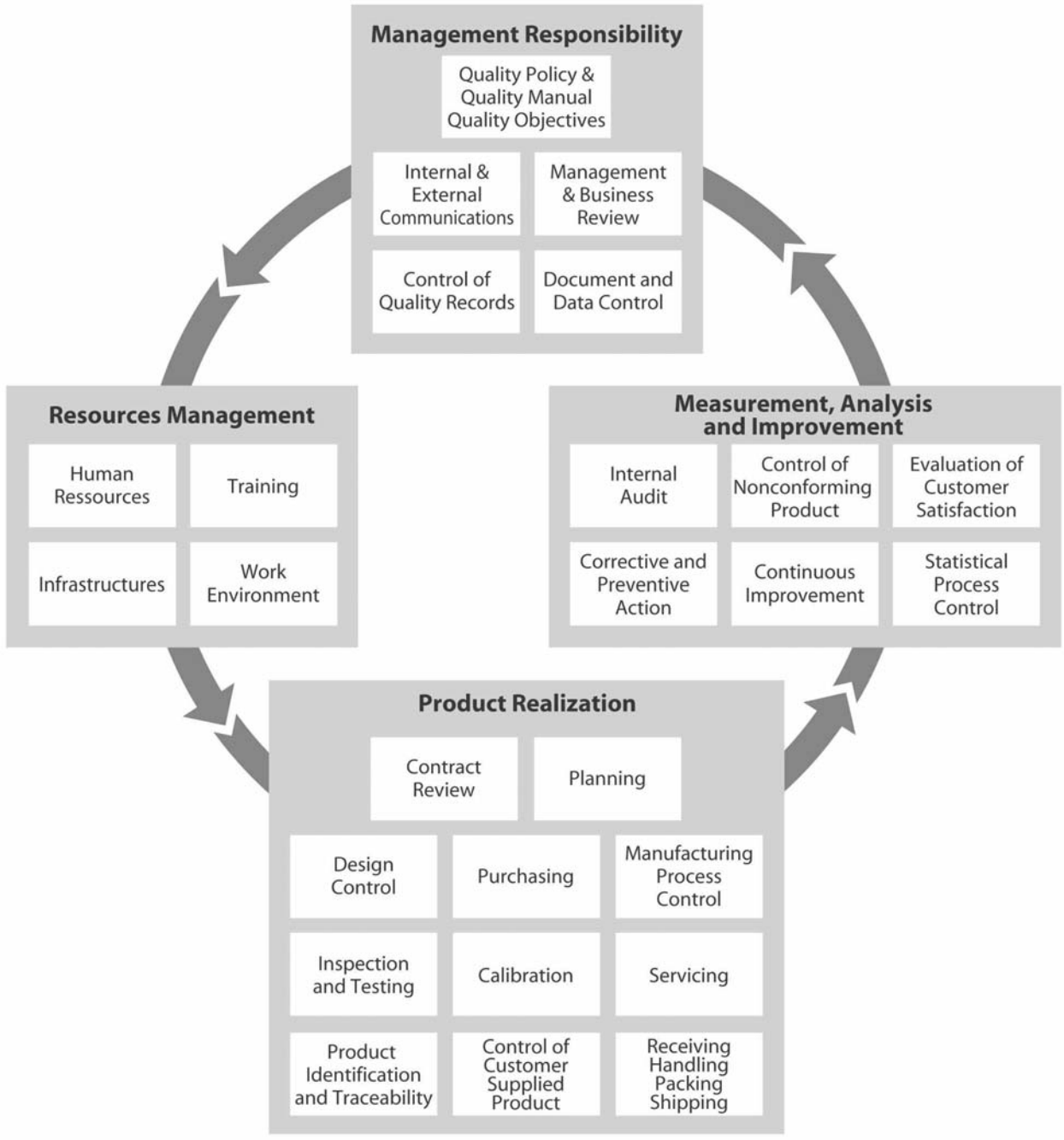

Figure 1

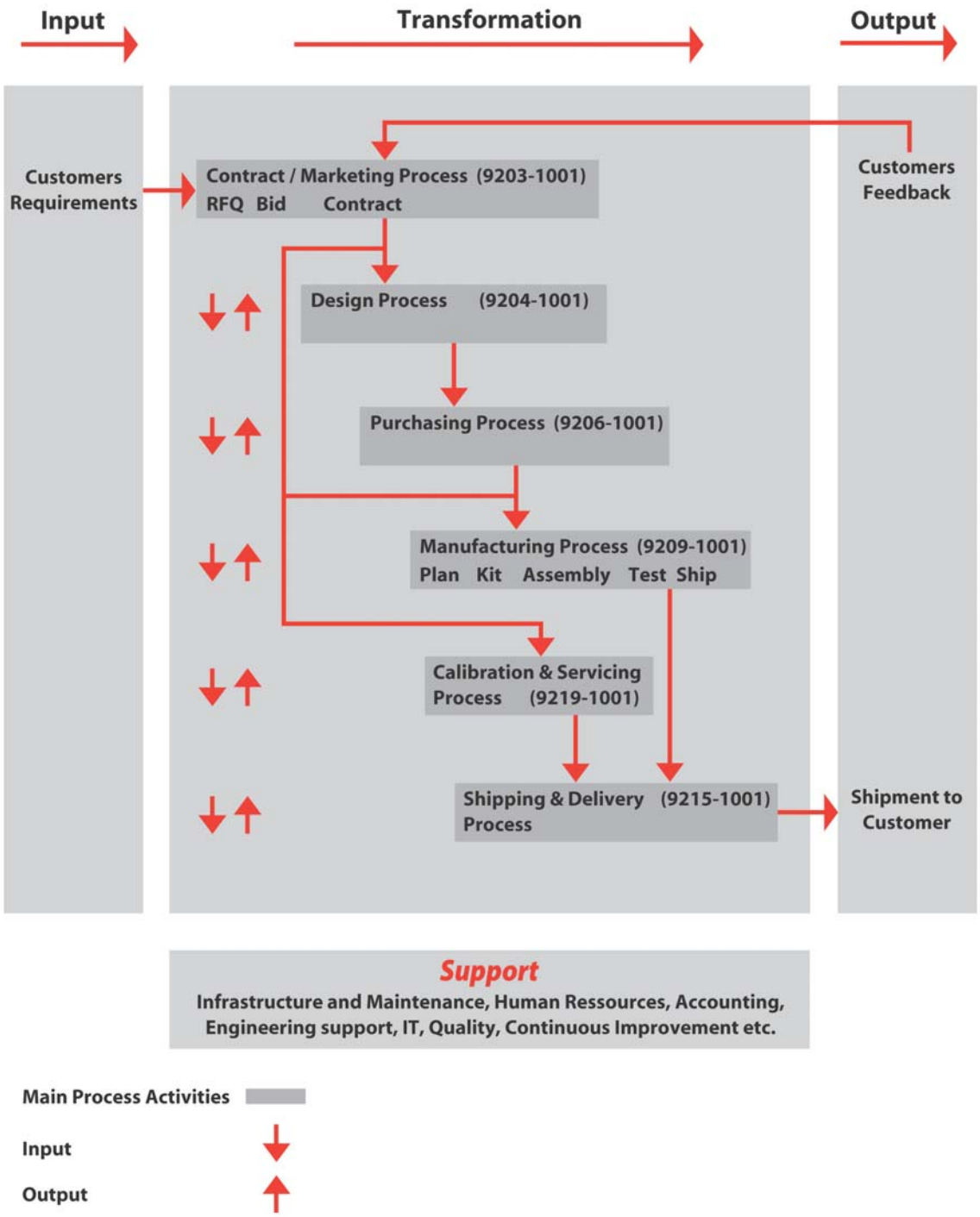
Input
Transformation
Output
Customers Requirements
Contract / Marketing Process (9203-1001)
RFQ Bid Contract
Design Process (9204-1001)
Purchasing Process (9206-1001)
Manufacturing Process (9209-1001)
Plan Kit Assembly Test Ship
Calibration & Servicing Process (9219-1001)
Shipping & Delivery Process (9215-1001)
Customers Feedback
Shipment to Customer
Support
Infrastructure and Maintenance, Human Ressources, Accounting, Engineering support, IT, Quality, Continuous Improvement etc.
Main Process Activities
Input
Output

Figure 2

4.2 Documentation

4.2.1 General

The Quality System is documented and structured in the following three levels of documentation:

Level 1: Quality Manual (9100-1001)

This document defines the quality policy and the Company structure and methods for maintaining the Quality Management System.

Level 2: Quality System Procedures (92xx Series)

These documents describe the functional responsibilities, the procedures to be used and the methods of control for each of the four sections of ISO 9001:2000 and AS9100. The Quality System Procedures also reference, if applicable and when practical, departmental work instructions.

Level 3: Work Instructions (93xx Series)

When required, work instructions (WI) are developed to define details as to how specific tasks must be performed.

For the manufacturing area, work instructions are developed and maintained as appropriate to supplement engineering drawings and specifications and to document various manufacturing processes. There are two types of work instructions:

a) Process work instructions are generic in nature and are used on a number of products. Those are called Generic WIs.

b) Product work instructions are associated with a particular product or part. Those can be Operation Breakdown Sheets (OBS), Visual Aids or Acceptance Test Procedures (ATPs) etc. Those are called Part Number Specific WIs.

Appendix A lists the actual procedures and shows the relation between the procedures, the quality manual and the ISO 9001 standard.

4.2.2 Quality Manual

This manual was written to meet the requirements of ISO 9001:2000, AS9100 and ISO 17025.

4.2.3 Control of Documents

Documents and data essential to the accomplishment of the work are generated, approved, distributed and revised in accordance with documented procedures. The same level of control is applied to those documents, standards and specifications of external origin, which are considered essential to the work. Changes to document are coordinate with customer and/or regulatory authorities when required by contract or regulatory requirements,

Instructions applicable to the control of documents and data have been developed by each functional group. The documents and data are generated by qualified personnel and are reviewed for adequacy and submitted for approval by authorized personnel prior to issue.

The generation, review and approval of changes to controlled documents or data are subject to the same level of control as for the original documents. Changes to this Quality Manual are reviewed by Senior Management and approved by the President.

4.2.4 Control of Records

Quality records are maintained to demonstrate conformance to specified requirements and to provide objective evidence of the Quality System effectiveness. The quality records are also used to analyze trends in quality performance and the need for preventive action.

Department managers are responsible for identifying the pertinent quality records in their areas, and for documenting the procedures for collecting, analyzing, indexing and the filing of quality records. Those records also include pertinent supplier documentation.

The retention period and disposal instructions for quality records are established depending on the type and importance of data, or as specified by contract or regulatory requirements. The procedure also covers the method for controlling records created by and/or retained by suppliers

The quality records are available for review by the customer or regulatory authority as specified in the contract and /or regulatory requirements.

4.3 Configuration Management

A configuration management process appropriate to the type of products manufactured by CMC has been established and is maintained.

5 MANAGEMENT RESPONSIBILITY

5.1 Management Commitment

Senior management is actively involved in maintaining the Quality Management System. It provides the vision and strategic direction for growth of the Quality Management System, and establishes quality objectives and the quality policy.

To continue to provide leadership and show commitment to the improvement of the Quality Management System, senior management communicates the importance of fulfilling customer, legal and regulatory requirements through the periodic communication meetings as well as by conducting management reviews to ensure the availability of resources.

5.2 Customer Focus

CMC Electronics strives to identify current and future customer needs, to meet customer requirements and exceed customer expectations.

Senior management ensures that customer requirements are transformed into clear requirements through the processes described in the section 7.2, and that these requirements are met. The customer satisfaction measurement is described in section 8.2.1 “monitoring and measurements customer satisfaction”.

5.3 Quality Policy

At CMC Electronics we are committed to understanding the needs and expectations of our customers and providing them through strategic objectives and continuous improvement of our processes, products and services that meet or exceed all of their requirements.

CMC Electronics Inc. is a world leader in the design, manufacture, sales and support of high-technology electronic products. This Quality Policy is established by senior management to provide the framework to develop and improve the quality management system, planned and executed in conjunction with other management functions, such that quality awareness is an integral part of the business strategy.

The quality policy is provided and explained to every employee, such that it is implemented and maintained at all levels of the organization. It is included in new employee training on the quality management system. It is posted in prominent places throughout the facility to maintain high standards within our organization.

Management reviews the quality policy at management review meeting to determine the policy's continuing suitability for our organization (see section 5.6 Management Review)

5.4 Planning

5.4.1 Quality Objectives

Senior management ensures that the quality objectives are flowed down through the organization and that the results against these objectives are measured. The Balanced Score Cards are used to monitor and analyze the performance against these goals and the results are reviewed at the Management Reviews (see section 5.6 Management Review). These objectives may be broken down into sub-objectives and communicated to the appropriate level of the organization.

5.4.2 Quality Management System Planning

CMC's Quality Management System is documented and designed in order to guarantee that all products and processes meet all the requirements of our customers.

Satisfaction of specified requirements is achieved through the effective implementation of all processes and related Quality System Procedures and work instructions in day-to-day activities. The Quality System documentation is designed to achieve quality in the definition of the needs of the customer, in the planning and design of product realization, in the conformance to the product design and in the support throughout the product life cycle.

Quality Management System reviewing or planning is performed prior to the addition of significant changes that have an impact on the organization's quality management system in order to minimize the risk of negative effects.

5.5 Responsibility, Authority and communication

5.5.1 Responsibility and Authority

The President is responsible for the management of CMC Electronics, for the issue and follow-up, in collaboration with the QA Director, of the implementation of the Quality Policy and objectives. He also provides the resources necessary to facilitate the development and the implementation of the Quality System. He is chairman of the management reviews and has the authority to ensure the effective implementation of the Quality System.

The Vice-Presidents are responsible for all activities within their respective sector. They are responsible for supporting the quality policy by providing adequate resources necessary to achieve the organization's objectives and to ensure customer satisfaction.

Product/Program Managers have overall responsibilities for all activities related to contracts and projects. They ensure that customers' requirements are known and understood at all times by everyone involved.

Marketing responsibilities includes the preparation and presentation of pursuit plans, proposals and bid approval documents.

CMC Electronics uses files with job description and organization charts to identify responsibilities and authorities within the organization. Responsibilities are also identified in each procedure and work instruction.

The corporate organization of CMC Electronics is shown in Figure 3 below.

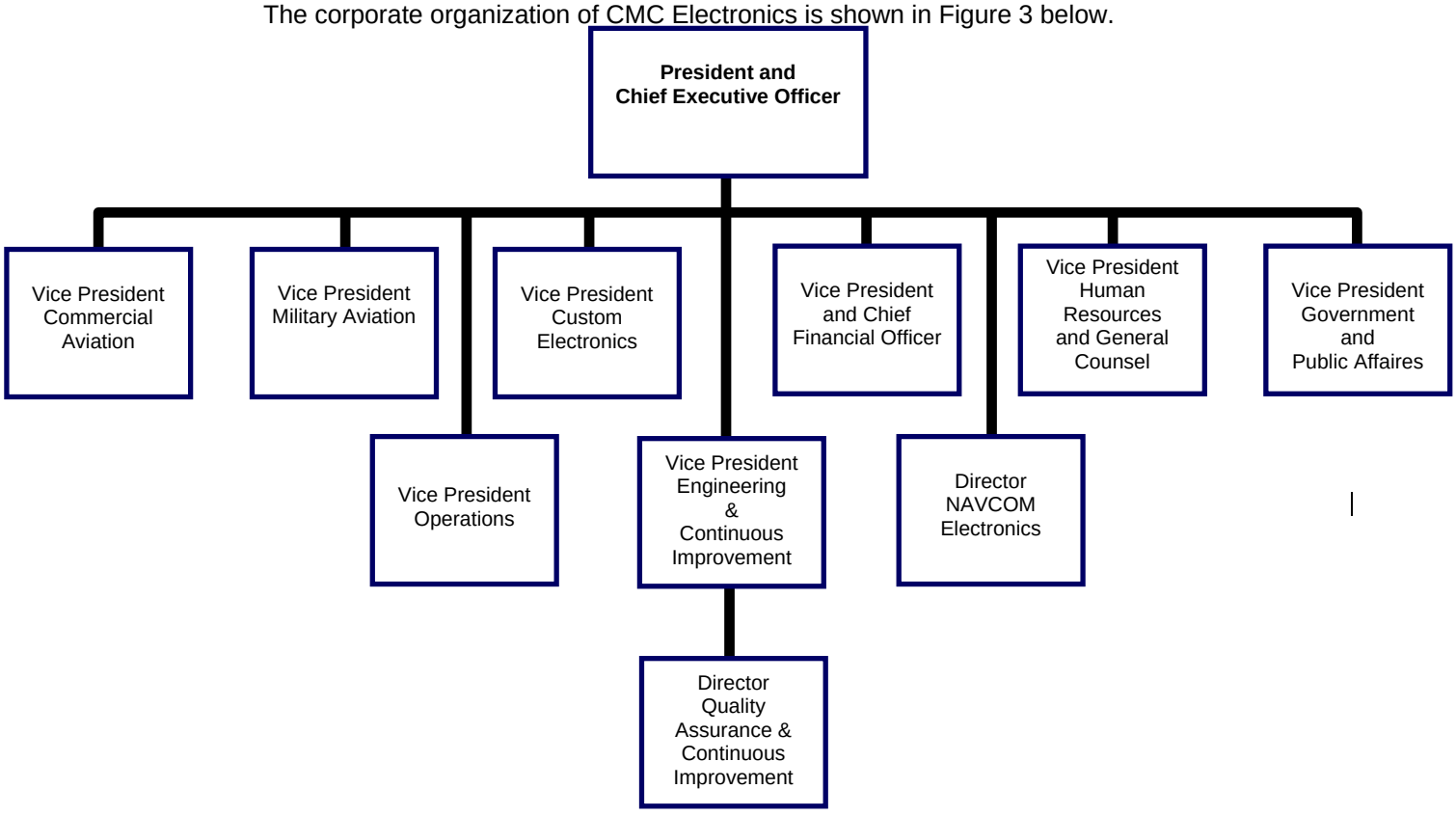

Figure 3: Corporate Organization

5.5.2 Management Representative

Senior management has appointed the Quality Director with the authority and organizational freedom to:

- Ensure that the requirements of the ISO 9001:2000 Quality Management System Standard, AS9100 Aerospace Standard and ISO 17025 General Requirements for the Competence of Testing and Calibration Laboratories, are established, implemented and maintained;
- Resolve matters pertaining to quality.
- Report on the performance of the Quality management System to senior management and any need for improvement and maintain records of those reviews; and
- Interface with customers, Government and regulatory agencies on matters relating to the Quality Management System.

The Quality Director has the above mandate for CMC's Montreal and Ottawa locations.

The appointed Quality Director mailing address is:

Olivier de Brouwer,
Director, Quality Assurance & Continuous Improvement
CMC Electronics Inc.
600 Dr. Frederik Philips Blvd.
Saint-Laurent, Quebec
H4M 2S9
Telephone: 514-748-3000 Ext. 4127
Fax: 514-748-3177
E Mail olivier.debrouwer@cmcelectronics.ca

5.5.3 Internal Communication

Data regarding the performance and effectiveness of the quality management system is shared throughout CMC Electronics in the following ways:

- Intranet communication
- Results of balanced scorecards
- Meetings with employees
- Scoop monthly newsletter
- Performance data posted on the bulletin boards.
- EDOV
- Accessibility of corrective and preventive action status on the computer to all concerned.

5.6 Management Review

5.6.1 General

Senior management reviews the Quality System at least on a quarterly basis in order to ensure its continuing suitability, adequacy and effectiveness. An expected outcome of that review is the determination of the need for any changes to the Quality Management System, including changes to the quality policy and quality objectives. Records of the management reviews are filed and maintained in accordance with Quality Records Procedure 9216-1001.

5.6.2 Review Input/Output

The Management Review input includes:

- Result of internal and external audits
- Customer feedback
- Processes performance and product conformity (Balanced Scorecards)
- Status of preventive and corrective actions (CAR aging)
- Follow-up actions from previous Management Review
- Strategic or operational changes that could affect the Quality Management System
- Improvement recommendations

The Management Review Output comprises the minutes of the meeting and the resulting action items regarding:

- Improvement of the effectiveness of the Quality Management System
- Improvement of the product related to customer requirements
- Resources needed

6 RESOURCE MANAGEMENT

6.1 Provision of Resources

Management ensures that adequate staff, equipment and materials are available in order to:

- Implement, maintain and improve the Quality Management System processes.
- Ensure customer satisfaction.
- Meet the quality objectives.

6.2 Human Resources

6.2.1 General

Anyone in CMC Electronics having an assignment associated with any of the processes of the Quality Management System is competent through education, skill, training and experience as necessary. Requirements for education, skills, training and experience are found in the job descriptions maintained by the Human Resources department.

6.2.2 Competence, Awareness and Training

The needs for training of personnel are identified, and documented procedures for providing that training are established and maintained. Appropriate training is provided to all levels of personnel within CMC performing activities affecting quality. All employees are aware of the importance of their activities and how they contribute to achieving quality objectives. The qualifications of personnel performing specialized operations, processes, tests or inspections are evaluated and documented.

Training needs are summarized in the Global Training Plan. This plan is updated at least once a year. The employee's performance review is also used to identify specific individual training as well as evaluate effectiveness of actions taken to satisfy competency needs.

Formal training records are maintained by the Organizational Development and Training section of the Human Resources Department, including proof of certification for special processes, as applicable. Additional documented education and experience records are maintained in the employee personnel files.

It is the responsibility of the relevant management to ensure that their employees are aware of the quality objectives and of the importance of their activities in achieving these objectives.

6.3 Infrastructure

The organization determines the needs for each new project or significant change to an existing project. Consideration is given to the following:

- Workspace
- Facilities associate with the workspace
- Equipment – hardware, software and back-up
- Services for support

The Infrastructure is determined and maintained to achieve conformity to product requirements.

6.4 Work Environment

CMC Electronics considers and addresses many different aspects of the work environment. The most significant ones are listed below:

- Facilities;
- Health and safety;
- Environmental Laws and Regulations;
- Housekeeping and cleanliness;
- Work ethics;
- Special working environment such as ESD, air-conditioning, lighting, temperature and humidity control.

CMC Electronics has established an Environmental, Health and Safety Program. The EHS Coordinator maintains the policies and procedures that support this program.

7 PRODUCT REALIZATION

7.1 Planning of Product Realization

Quality Planning, which is performed at the earliest phase of the contract, new product or project, addresses the following topics:

- Specific measurable quality objectives for contract, project and product are determined;
- The compatibility of the design, manufacturing process, installation and servicing, by the application of concurrent engineering practices and Design For Six Sigma (DFSS) processes;
- The timely identification of product characteristics and manufacturing processes and the acquisition of inspection and test equipment, fixtures, tooling and skills that may be needed to ensure product quality;
- The identification of resources to support operation and maintenance of the product.
- The development of OBS, visual aids, ATPs, and the identification of suitable verification (process control, inspection and test) at appropriate stages of manufacturing;
- The clarification of customer's requirements and standards to be used for the acceptability of the product; and
- The identification and preparation of quality records.

7.2 Customer-Related Processes

7.2.1 Determination of Requirements Related to the Product

Prior to submission of a tender, or acceptance of a contract, the customer's requirements are defined and communicated to the functions responsible or affected (i.e.: Program Management, Engineering, Operations, Supply Management, Quality Assurance, Customer Support etc.) in order to ensure that all the requirements are properly documented, and can be met, before submitting a tender or accepting a contract.

7.2.2 Review of Requirements Related to the Product

The scope of the work and all customer requirements and associated risks are fully understood and if necessary, clarified with the customer as part of the tender submission process. Any discrepancies between the contract and the related tender are completely resolved before acceptance of a contract.

Amendments to contracts are reviewed in the same manner as the original contract with all affected and concerned parties.

Evidence of tender and contract reviews and associated documents, correspondence and forms are maintained and controlled in accordance with section 4.2.4.

7.2.3 Customer Communication

Formal communication channels are established and maintained between the Company and the customer to ensure that customer requirements are properly addressed.

Internal communication channels are established and maintained between the Program Manager and all of the program team members to ensure that the customer requirements are known and understood at all times, and that cost, schedule, technical performance and quality objectives are being achieved.

The Contract Review and Servicing procedures are addressing :

- Communications with the Customer;
- Customer Complaints;
- Customer Survey.

7.3 Design and Development

7.3.1 Design and Development Planning

All the tasks required by the project are identified and assigned to the appropriate functional unit in the Work Authorization. Product/Program Management coordinates the development of project plans with the functional units. These plans may include an Engineering Development Plan, Configuration Management Plan, Software Development Plan and/or Quality Assurance Plan depending on the size and scope of the specific project. These plans define the organization and responsibility, the resources, the task sequences and all the mandatory steps required by the project. Project plans are reviewed and updated as required during the design and development process. Updates or changes to these plans may require customer approval when defined by the contract.

Periodic project design reviews as defined in the project plans and project phase reviews as mandated by the Phase Review Process are conducted by the responsible Product/Program Manager to evaluate the progress of the project.

To meet airworthiness requirements, CMC support software development as per DO-178B.

7.3.2 Design and Development Inputs

The design input requirements are defined either by the customer's Statement of Work, the customer's product specification, military and other governing specifications, and internal product specifications in the case of development projects, and/or the contract. The documents identify characteristics such as function, performance, reliability, physical constraints, spare capacity and safety. Requirements are defined so that their achievement can be verified to ensure customer satisfaction. The design input is reviewed for adequacy. Any conflicting, incomplete, or ambiguous requirements are escalated to the Product/Program Manager for resolution and, where necessary, discussed with the customer.

7.3.3 Design and Development Outputs

The design output is a product definition package that meets the design input requirements and satisfies the acceptance criteria. This definition is contained in design specifications, drawings, parts lists and test procedures, which are all reviewed before release. As appropriate, the product definition data package specifies the characteristics that are

essential to the safe and proper functioning of the product and identify key characteristics, when applicable, in accordance with the design or contract requirements.

All pertinent data required to allow the product to be identified, manufactured, inspected, used and maintained are defined:

- Drawings, part lists, specifications;
- A list of those drawings, part lists and specifications necessary to define the configuration and the design feature of the product;
- Information on material, processes, type of manufacturing and assembly of the product necessary to ensure conformity of the product.

7.3.4 Design and Development Review

Project team meetings, peer reviews, and formal design reviews are conducted as defined in the Project Management Plan throughout the design, development, and qualification phases of product development in order to control, coordinate, and track the project status.

Product/Program Management ensures that formal hardware and/or software design reviews are conducted for each program. Reviews are supported by independent design review expertise as required to ensure adequacy of the design to satisfy the contractual, quality and productivity requirements of the end product. The design reviews identify problems and proposed necessary actions, and authorize progression to the next stage. Records of design reviews are maintained as quality records in accordance with section 4.2.4.

7.3.5 Design and Development Verification

Designs are verified to meet product/program (input) requirements through the design output documents preparation and approval process. The approval and release of the documents is the record that the design meets the requirements of the specification. As an integral part of design verification, designs are verified through analysis, alternative calculations, test, demonstration, and design similarity analysis. Records of the results of the verification are reviewed before being released and are maintained as quality records in accordance with section 4.2.4.

7.3.6 Design and Development Validation

Product function and performance are validated in accordance with the customer or internal SOW or product specification. These activities typically include standard and environmental condition tests, reliability and maintainability demonstrations, formal qualification testing and acceptance testing. Records of the results of validation are maintained as quality records in accordance with section 4.2.4.

Note:

- Design and/or development validation follows successful design and/or verification.
- Validation is normally performed under defined operating conditions.
- Validation is normally performed on the final product, but may be necessary in earlier stages prior to product completion.
- Multiple validations may be performed if there are different intended uses.

7.3.6.1 Documentation of Design and Development Verification and Validation

At the completion of design and/or development, the organization ensures that reports, calculations, test results, etc., demonstrate that the product definition meets the specification requirements for all identified operational conditions.

7.3.6.2 Design and/or Development Verification and Validation Testing

Where tests are necessary for verification and validation, these tests are planned, controlled, reviewed, and documented to ensure and prove the following:

a) Test plans or specifications identify the product being tested and the resources being used, defined test objectives and conditions, parameters to be recorded, and relevant acceptance criteria;
b) Test procedures describe the method of operation, the performance of the test, and the recording of the results;
c) The correct configuration standard of the product is submitted for the test;
d) The requirement of the test plan and the test procedures are observed;
e) The acceptance criteria are met.

7.3.7 Control of Design and Development Changes

Design changes can result in a change to existing documentation or the generation of new documentation. Design change documentation is reviewed, approved, controlled, recorded and issued in accordance with established configuration management procedures by the same functions involved in the original issue. Controlled documents, which include drawings, test procedures, engineering change orders (ECOs), etc., are reviewed and approved prior to their initial release or revision.

Changes to controlled documents are approved by the same authorized functions/organizations that reviewed and approved the original document, unless specifically authorized otherwise by those functions/organizations.

The change control process provides for customer and/or regulatory authority approval of changes, when required by contract or regulatory requirement.

7.4 Purchasing

7.4.1 Purchasing Process

The selection of sources and the type and extent of control exercised, are dependent upon the type of materiel and services, the supplier's demonstrated ability to meet CMC's quality and purchase order requirements, and the customer requirements.

CMC is responsible for the quality of all products purchased from suppliers, including customer-designated sources.

The supplier's quality and delivery performance are reviewed at intervals consistent with the nature of the product and the supplier's demonstrated performance. Results of supplier performance are documented and maintained in accordance with section 4.2.4. Results shall include the Incoming Inspection results, supplier surveys, evaluation of samples, first article inspections and source inspections. The Supply Management Group shall maintain a supplier rating system covering all pertinent aspects of supplier performance.

An approved supplier list including the scope of the approval is maintained by Supply Management Quality Assurance, based on the supplier's performance as recorded in the supplier rating system.

Where required, both CMC and all suppliers shall use customer-approved special process sources.

Authority for inclusion and removal from the approved supplier's list rests uniquely with Supply Management Quality Assurance.

7.4.2 Purchasing Information

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

a) Requirements for approval of product, procedures, process and equipment;

b) Requirement for qualification of personnel;

c) Quality management system requirements;

d) The name or other positive identification, and applicable issues of specifications, drawings, process requirements, inspection instructions and other relevant technical data;

e) Requirements for design, test, examination, inspection and related instructions for acceptance by CMC;

f) Requirement for test specimens (e.g., production method, number, storage conditions), for design approval, inspection, investigation and auditing;

g) Requirements relative to supplier notification to CMC of nonconforming product and arrangements for CMC approval of supplier nonconforming material;

h) Requirements for the supplier to notify the CMC of changes in product and/or process definition and, where required, obtain CMC approval;

i) Right of access by CMC, their customer, and regulatory authorities to all facilities involved in the order and to all applicable records, and;

j) Requirements for the supplier to flow-down to sub-tier suppliers the applicable requirements in the purchasing documents, including key characteristics where required.

Materials are planned to meet requirements. The plan is calculated based on materials required, materials on hand, materials on order, attrition and spares, parts substitutions, manufacturing cycles and throughput, manufacturing yields and batch sizing.

The purchase order or release document shall contain a complete and clear description of the products and services ordered, including the applicable quality clauses to meet the specified requirements.

The purchasing documents are reviewed and approved for adequacy of the specified requirements prior to their communication to the supplier.

7.4.3 Verification of Purchased Product

CMC has established and implemented the inspection or other activities necessary for ensuring that the purchased product meets the specified purchase requirements.

Verification activities may include

a) Obtaining objective evidence of the quality of the product from the suppliers (e.g., accompanying documentation, certificate of conformity, test reports, statistical records, process control);

b) Inspection and audit at supplier's premises;

c) Review of required documentation;

d) Inspection of products upon receipt in accordance with section 8.2.4 and;

e) Delegation of verification to the supplier, or supplier certification.

Purchased product shall not be used or processed until it has been verified as conforming to specified requirements unless it is released under positive recall procedure

Where CMC utilizes test reports to verify purchased product, the data in those reports shall be acceptable per applicable specifications. CMC periodically validate test reports for raw material.

Where CMC delegates verification activities to the supplier, the requirements for verification shall be defined and a register of delegation maintained.

Verification at Supplier's Premises

When it is established that verification of the purchased product should be conducted at the supplier's facility, the purchasing document shall specify the conditions under which the release of the product will be made.

Customer Verification of Subcontracted Product

When specified in the contract, customers or representatives are afforded the right to verify at the supplier or at CMC's incoming inspection department, that the purchased products conform to specified requirements. Such verification by the customers performed at source or at CMC's incoming inspection department does not preclude subsequent rejection or absolve CMC Electronics of its responsibility to provide conforming product.

7.5 Production and Service Provision

7.5.1 Control of Production and Service Provision

Processes for the manufacturing, inspection, test, installation and servicing of products are identified, planned and carried out under controlled conditions, in order to ensure the quality of those products and services.

Documented procedures defining those processes are provided by means of drawings, specifications, workmanship standards and work instructions. Workmanship, including accept and reject criteria, is specified in written standards or by means of representative samples.

Planned inspections and tests are performed at specific points during the manufacturing cycle.

Work Instructions are used to ensure that inspection and test personnel accurately evaluate the products and processes to be carried out at the various stages of manufacturing as outlined in section 8.2.4.

Manufacturing travelers are used as evidences that all manufacturing and inspection operations have been completed as planned, or otherwise documented and authorized.

Where key characteristics have been identified, appropriated process control is planed to ensure that all necessary tools are available to perform the controls.

The manufacturing, inspection, test, installation and servicing of the products are performed in a suitable working environment, with the use of suitable production, installation and servicing equipment. The precision of the equipment selected is consistent with the process capability. A schedule for preventive maintenance is maintained to provide evidence of the maintenance performed on the equipment.

Controlled conditions also include as applicable:

- The implementation of release, delivery and post-delivery activities,
- Accountability for all product during manufacturing (e.g., parts quantities, split orders, nonconforming product);
- Provision for the prevention, detection, and removal of foreign objects;
- Monitoring and control of utilities and supplies such as water, compressed air, electricity and chemical products to the extend they affect product quality, and;

The requirements for the control of processes are as prescribed in contracts and as defined in the applicable manufacturing, inspection and test work instructions.

7.5.1.1 Production Documentation

Production operations are carried out using approved data. This data contains as necessary:
- Drawing, parts list, traveler, process key cards, work instructions, test specifications, etc.
- A list of tools, ATE, and associated software with the applicable revision, etc.

7.5.1.2 Control of Production Process Changes

Production process changes are documented and approved by the industrial engineer, and when applicable by the regulatory authority or the customer.
Results of these changes are assessed to confirm that the desired effect has been achieved without adverse effect to product quality.

7.5.1.3 Control of Production Equipment

Production equipment, tools and programs are validated prior to use. Validation prior to use includes verification of the first article produced to the design data/specification.

Production equipment, tools and programs are maintained and inspected periodically according to documented procedures.

Storage requirements, including preservation/condition checks, are be establish for production equipment or tooling in storage.

7.5.1.4 Control of Work Transferred, on a Temporary Basis, Outside the CMC's Facilities

CMC does not normally transfer work outside the company, however if need be, it will be done under controlled conditions and CMC will define the process to control and validate the quality of work.

7.5.1.5 Control of Service Operation

The service process provides for:
- A method of collecting and analyzing in-service data;
- Action to be taken where problems are identified after delivery, including investigation, reporting activities, and actions on service information consistent with contractual and/or regulatory requirements;
- The control and updating of technical documentation;
- The approval, control, and use of repair schemes and;
- The controls required for off-site work.

7.5.2 Validation of Processes for Production and Service Provision

Special processes such as high reliability soldering are validated and approved before being performed. Qualified operators carry out these processes. Records of qualified personnel, processes and equipment are maintained.

The significant operations and parameters of special processes are controlled using appropriate process specifications.

7.5.3 Identification and Traceability

CMC Electronics uses configuration management as a means by which identification and traceability are maintained.

Identification

CMC maintains the identification of the configuration of the product in order to identify any differences between the actual configuration and the agreed configuration.

The identification of inspection and test status of products is maintained throughout receiving, production, installation and servicing to ensure that only products having passed the required inspections and tests are released, used or installed.

The inspection and status of the product is identified using suitable means in order to clearly distinguish between conforming and nonconforming products.

The indication of inspection and test status is traceable to the authorized individuals responsible for the verification of the product.

Traceability

The methods of product identification and serialization are established during the design stage, or as specified in the contract or regulatory requirements. Every assembly, sub-assembly and component is identified by a unique part number, which are maintained during all stages of production, delivery and installation.

Traceability is maintained by the use of serial and/or line numbers, batch number or date codes, in order to establish the configuration status of the delivered product, and the source of the material used to build the product.

Appropriate records are retained in accordance with section 4.2.4 in order to document the traceability of the delivered products. Modifications to the product subsequent to the original delivery are documented when incorporated by CMC Electronics and the configuration records are updated accordingly.

7.5.4 Customer Property

Procedures are established for the control, storage, maintenance and accounting of Customer/Government furnished materials, tooling and equipment, including data used for design, production and/or inspection provided to the Company for the performance of work under a specific contract or contracts. The procedures are submitted to the Customer or Government as applicable.

Customer/Government furnished property is inspected upon receipt to determine suitability, and completeness of applicable documentation. Customer/Government furnished property not meeting the requirements is segregated and the Customer notified of this condition.

Verification by CMC Electronics does not, however, absolve the customer of the responsibility to provide an acceptable product.

Customer/Government furnished property used for incorporation in the Company's products is stored and handled in accordance with existing procedures applicable to CMC's purchased materials. The material is examined at normal inspection points and if damage has occurred after receipt, or if the material is lost, or otherwise unsuitable for use, this condition is handled as nonconforming material, and the customer is notified. Records of this notification are retained in accordance with Section 4.2.4.

7.5.5 Preservation of Product

CMC 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 apples to the constituent parts of a product.

Preservation of product includes, where applicable in accordance with product specifications and/or applicable regulations, provisions for:

a) Cleaning;

b) Prevention, detection and removal of foreign objects;

c) Special handling for sensitive products;

d) Marking and labeling including safety warnings;

e) Shelf life and stock rotation;

f) Special handling for hazardous materials.

CMC ensures that documents required by the contract/order to accompany the product are present at delivery and are protected against loss and deterioration.

Products, including incoming materials, materials in process, and finished goods (deliverable/returned), are handled in a manner that prevents abuse, misuse, damage or deterioration. This includes protection from Electrostatic Discharge (ESD) and physical damage, and exercising safety precautions in labeling hazardous materials in accordance with the WHMIS regulations. The condition of material and products in storage is assessed at specified intervals.

Secure storage facilities or stock rooms are provided as necessary for storage of material and products pending use or shipment, to prevent damage or deterioration. Those areas are limited to authorized personnel only. An ESD control program is established for storing of ESD sensitive material.

Hazardous material is stored in accordance with its specific handling requirement in accordance with WHMIS regulations. Shelf life expiration dates are recorded and monitored.

Where applicable, special preservation methods are used to protect material during storage.

Packaging methods are documented to ensure the protection of the product for delivery and transportation. These documents shall include specified packing, preservation and marking (including materials used) in accordance with contractual requirements.

Delivery methods and carriers are selected to ensure damage free shipments and on-time delivery per contract specifications.

7.6 Control of Monitoring and Measuring Devices

A system is maintained to ensure that inspection, measuring and test equipment and test software that can affect product quality are adequate to demonstrate conformance of product to specified requirements.

Engineering test procedures and inspection work instructions identify the appropriate inspection, measuring and test equipment to be used to be consistent with the required measurement accuracy and the type of measurement to be made.

The calibration system defines the extent and frequency of calibration to ensure that all inspection, measuring and test equipment, and measurement standards used have the necessary controls and accuracy to perform the required measurements.

Equipment requiring calibration is identified and tracked through periodic recall and calibrated using documented procedures against certified equipment having a known valid relationship

to National or International Standards. Safeguards are used to prevent adjustments and modifications that would invalidate the calibration settings.

Equipment is utilized in environmental conditions suitable for the calibration, inspections, measurements and tests being carried out and in a manner consistent with required measurement capability. Handling, transporting and storing of measuring equipment is done in a manner so as to prevent abuse, misuse, damage or change in dimensional or functional characteristics.

The records of calibration contains as a minimum, a description of the equipment and a unique identification number, date on which each calibration was performed, calibration interval, results obtained and action taken when results are unsatisfactory. These records are made available to the customer's representative for review upon request. They are maintained in accordance with section 4.2.4.

8 MEASUREMENT, ANALYSIS AND IMPROVEMENT

8.1 General

CMC Electronics' product quality plans are used for planning and defining the necessary monitoring and measurement techniques, including statistical techniques (reference sections 7.1, quality plan, statistical techniques and determining process capability). Implementation occurs according to the defined plans, the resulting data is analyzed and improvements are pursued (reference section 8.4 and 8.5)

8.2 Monitoring and Measurement

8.2.1 Customer Satisfaction

The success in meeting customer's requirements and in achieving a high level of customer satisfaction with the Company's products and services is evaluated on a regular basis. This is done using warranty analysis, in-service performance monitoring, customer complaint analysis, annual customer satisfaction surveys, and other appropriate means.

An efficient method of handling customer inquiries is established to provide a rapid response to CMC's customers who have an urgent need for assistance or a complaint, which would adversely affect customer satisfaction.

The customer satisfaction results are summarized for discussion at management reviews.

8.2.2 Internal Audit

Internal Quality System audits are conducted to ensure that CMC's quality system comply with specified requirements and is implemented effectively. The internal audit assess compliance with processes and related procedures, approach and deployment, identify any non-conformances, opportunities for improvements, and initiate preventive and corrective action where required. The internal audit process is reviewed as required to ensure that it is effective and that all contractual and regulatory requirements are met.

The internal audits are conducted according to an established schedule. An audit plan is maintained to ensure that all aspects of the Quality System are properly addressed. The

frequency and scope of the audits take into consideration the significance of the process and results of previous audits.

The auditors are selected to ensure objectivity and impartiality of the audit process. This is achieved by selecting a team of auditors from cross-functional departments who have received the appropriate training in the auditing process.

The audit is conducted according to a documented procedure and to ensure that timely corrective actions are implemented to correct any deficiencies found. The results of the audits are recorded and submitted to the personnel having responsibility in the area audited. The audit is complete when the implementation and effectiveness of corrective actions has been verified and recorded. Audit results become part of the quality records in accordance with section 4.2.4

The results of the internal quality audits are summarized for discussion at management reviews.

The tools and techniques used are detailed in the Internal Audit procedure.

The acceptability of the selected tools is measured against the effectiveness of the internal audit process and overall organization performance.

The internal audit also meets the contract and/or regulatory requirements.

8.2.3 Monitoring and Measurement of Processes

The processes are monitored in order to ensure their continuing ability to achieve the planned results.

If the planned results are not achieved, correction and corrective action are taken to ensure the product conformity.

In the event of process nonconformity, appropriate actions are taken to correct the nonconforming process and evaluate weather the process nonconformity has resulted in product nonconformity. If product nonconformity has resulted these product are identified and controlled in accordance with section 8.3.

CMC's establishes the monitoring and measurement process to be applied to the realization processes necessary to achieve customer requirements such as Internal Quality Audit (see section 8.2.2) Statistical Techniques (see section 8.4).

8.2.4 Monitoring and Measurement of Product

The extent and sequence of the required inspection and test are specified in documented procedures, work instructions and manufacturing planning documents in order to demonstrate that the specified requirements are met. The amount and nature of inspection and test are based on the importance of the product characteristic, the process control exercised and the specified requirements.

When key characteristics have been identified, they shall be monitored and controlled.

Sampling inspection may be used in accordance with our Statistical techniques procedure 9220-1001. When required by contract this plan shall be submitted to the customer for approval.

Incoming Inspection and Testing

Purchased material designated for ultimate use in deliverable products shall not be used or processed until it has been inspected or otherwise found to conform to specified requirements. The amount and nature of inspection performed are based either on contractual requirements, past experience with the product, the controls exercised at source and objective evidence of conformance provided by the supplier.

Incoming material is withheld pending completion of required inspection or receipt of objective evidence of conformance from the supplier. Non-conforming material is handled in accordance with section 8.3. When released under positive recall, it is recorded on an NCR.

In-process Inspection and Testing

Product conformance to specified requirements is verified at appropriate stages of manufacturing by conducting inspection and test of selected characteristics as defined in applicable work instructions. Products are withheld from further processing until there is objective evidence that the required inspection and test have been performed. The in-process inspection and test may be reduced or eliminated with the implementation of proven statistical process control techniques, in accordance with section 8.4 of this manual. Non-conformances during in-process inspection and test are handled in accordance with section 8.3.

Final Inspection and Testing

Final inspection and testing are performed on every deliverable product to demonstrate compliance with contractual requirements and to ensure the delivery of high-quality products. The final inspection shall also provide evidence that all inspections and tests that were required during previous stages of manufacturing were in fact performed and documented as meeting the specified requirements. Nonconforming products are handled in accordance with section 8.3.

The shipments are also verified to ensure that they include a release note duly approved by an authorized individual. The release note shall consist of a Certificate of Conformance or the applicable release form required by the customer or regulatory agency. The release of shipments on behalf of the customer shall be in conformance with applicable agreements.

8.2.4.1 Inspection Documentation

The inspection Documentation is documented as per 9210-1001

8.2.4.2 First Article Inspection

The First article Inspection is performed in accordance with 9310-1025

8.3 Control of Nonconforming Product

Provisions are made for the identification and control of all nonconforming products and material including nonconforming product return from a customer, in order to prevent the inadvertent use or shipment of nonconforming products and the unnecessary costs associated with the processing of nonconforming products.

Control of Nonconforming Product procedure, document 9213-1001 defines the responsibilities, authorities and methods used for the identification, segregation, review and disposition of nonconforming products, as well as the implementation of corrective action in order to prevent recurrence of the nonconformance.

Records, clearly identifying the product, the nature and extent of nonconformance, the approved disposition and corrective action taken are maintained and form part of the quality records in accordance with section 4.2.4.

Defect, malfunction or failure of an aeronautical product affecting the safety of civil aviation systems manufactured/serviced by CMC Electronics under Transport Canada approval No. 3-73 are handled as per W.I. 9310-1053.

In addition to any contract or regulatory authority reporting requirements, CMC Electronics will report nonconforming product that may affect the reliability or safety in a timely manner. The notification includes as necessary parts affected, customer and/or CMC part numbers, quantity, and date(s) delivered.

Note: Parties requiring notification of nonconforming product may include suppliers, internal organizations, customers, distributors, and regulatory authorities.

8.4 Analysis of Data

CMC Electronics' quality management system data is recorded as indicated in the section 4.2.4 and analyzed to determine the suitability, effectiveness and opportunities for improvement of the quality management system. The data analysis objectives for CMC Electronics are:

- To assess customer satisfaction levels or to reveal customer dissatisfaction
- To determine success rates in fulfilling customer requirements
- To gather Knowledge on trends associated with product and processes
- To maintain awareness of the performance of suppliers.

The need for implementing statistical techniques is defined either at the contract review stage (when it is a contractual requirement), or at the design and manufacturing planning stage when key product/process characteristics are established. These techniques include: flow diagrams; process capability studies; design of experiments; Pareto analysis; control charts; cause and effect analysis; and histograms depending on the type of data (attribute or variable).

8.5 Improvement

8.5.1 Continuous Improvement

CMC Electronics Inc. is committed to continuous improvement. At CMC Electronics continuous improvement is:

- A part of the quality policy
- Reflected in the quality objective
- A part of the actions taken upon audit results
- Driven by opportunities surfacing from data analysis
- A result of corrective action when the action taken corrects a new problem

- Always a result of preventive action
- A required output from management review

CMC Electronics uses mainly the Six Sigma methodology for continuous improvements. The Six Sigma projects are carried out under the direction of a full-time Master Black Belt who deploys trained resources to solve process or product problems.

8.5.2 Corrective/ Preventive Action

A corrective and preventive action system is established for the recording and analysis of all quality related problems to identify trends and determine the causes of non-conformances. This system is also used for the tracking of the corrective and preventive actions in order to measure their effectiveness.

The need for corrective action may originate from internal or customer Quality System audits, rejection reports during manufacturing or incoming inspection, return of products for repair, customer complaints and management reviews.

Procedure 9214-1001 defines the responsibilities and implementation of the corrective and preventive action system. It includes the flow down of the corrective action requirement to a supplier, when it is determined that the supplier is responsible for the root cause and the specific actions where timely and/or effective corrective action are not achieved.

Corrective Action

The needs for corrective action are documented on a Corrective Action Request (CAR) and submitted to the process owner or the supplier, for the identification of the root cause and to initiate appropriate corrective action. The CARs are entered in a central database for tracking and follow-up. The originator ensures that the corrective action is implemented in a timely manner and is effective before closing the CAR. Corrective action requests that are delinquent are discussed at the management reviews.

CARs are part of the quality records in accordance with section 4.2.4.

Preventive Action

Non-conformances are analyzed to determine the preventive actions needed to avoid their occurrence. The analysis may include the review of the dispositions taken on nonconforming products, observations during internal and customer audits, trends in rejection reports and product returns, and customer complaints.

All opportunities for improvement identified during internal audits are documented as a CAR.

The depth of the analysis is related to the criticality of the nonconformance, the impact on performance, reliability, customer satisfaction, safety and the risk involved. Relevant information on preventive actions taken is submitted for management review.

APPENDIX A

ISO 9001:2000 Quality System Documentation Numbering System and References

Subject/Title	ISO 9001:2000 Reference	Quality Manual 9100-1001	Procedures (QSP)	Work Instructions
Quality Management System	4	4		
General Requirements	4.1	4.1		
Documentation requirements	4.2	4.2		
General	4.2.1	4.2.1		
Quality Manual	4.2.2	4.2.2		
Control of Documents	4.2.3	4.2.3	9205-1001	9305-1XXX
Control of Records	4.2.4	4.2.4	9216-1001	9316-1XXX
Configuration Management	4.3			9304-1040
Management Responsibility	5	5		
Management Commitment	5.1	5.1		
Customer Focus	5.2	5.2	9203-1001	9303-1XXX
Quality Policy	5.3	5.3		
Planning	5.4	5.4		
Quality Objectives	5.4.1	5.4.1		
Quality Management System Planning	5.4.2	5.4.2		
Responsibility, Authority, and Communication	5.5	5.5		
Responsibility and Authority	5.5.1	5.5.1		
Management Representative	5.5.2	5.5.2		
Internal communication	5.5.3	5.5.3		
Management Review	5.6	5.6		
General	5.6.1	5.6.1		
Review Input / Output	5.6.2, 5.6.3	5.6.2		
Resources Management	6	6		
Provision of Resources	6.1	6.1		
Human Resources	6.2	6.2		
General	6.2.1	6.2.1		
Competence, Awareness, and Training	6.2.2	6.2.2	9218-1001	9318-1XXX
Infrastructure	6.3	6.3	9209-1001	9309-1XXX
Work Environment	6.4	6.4	9209-1001	9309-1XXX
Product Realization	7	7		
Planning of Product Realization	7.1	7.1		
Customer Related Processes	7.2.	7.2.	9203-1001	9303-1XXX
Determination of Requirements Related to the Product	7.2.1	7.2.1	9203-1001	9303-1XXX
Review of Requirements Related to the Product	7.2.2	7.2.2	9203-1001	9303-1XXX
Customer Communication	7.2.3	7.2.3		
Design and Development	7.3	7.3		
Design and Development Planning	7.3.1	7.3.1	9204-1001	9304-1XXX
Design and Development Inputs	7.3.2	7.3.2	9204-1001	9304-1XXX
Design and Development Output	7.3.3	7.3.3	9204-1001	9304-1XXX
Design and Development Review	7.3.4	7.3.4	9204-1001	9304-1XXX
Design and Development Verification	7.3.5	7.3.5	9204-1001	9304-1XXX
Design Validation	7.3.6	7.3.6	9204-1001	9304-1XXX
Design Changes	7.3.7	7.3.7	9204-1001	9304-1XXX
Purchasing	7.4	7.4		
Purchasing process	7.4.1	7.4.1	9206-1001	9306-1XXX

Subject/Title	ISO 9001:2000 Reference	Quality Manual 9100-1001	Procedures (QSP)	Work Instructions
Purchasing information	7.4.2	7.4.2	9206-1001	9306-1XXX
Verification of purchased product	7.4.3	7.4.3	9206-1001	9306-1XXX
Production and Service Provision	7.5	7.5		
Control Process	7.5.1	7.5.1	9209-1001	9309-1XXX
Servicing	7.5.2	7.5.2	9219-1001	9319-1XXX
Identification and Traceability	7.5.3	7.5.3	9208-1001 9212-1001	9308-1XXX 9312-1XXX
Customer Property	7.5.4	7.5.4		
Preservation of Product	7.5.5	7.5.5	9215-1001	9315-1XXX
Control of Monitoring and Measuring Devices	7.6	7.6	9211-1001	9311-1XXX
Measurement, Analysis, and Improvement	8	8		
General	8.1	8.1		
Monitoring and Measurement	8.2	8.2		
Customer Satisfaction	8.2.1	8.2.1		
Internal Audit	8.2.2	8.2.2	9217-1001	9317-1XXX
Monitoring and Measurement of Processes	8.2.3	8.2.3		
Monitoring and Measurement of Product	8.2.4	8.2.4	9210-1001	9310-1XXX
Control of Nonconforming Product	8.3	8.3	9213-1001	9313-1XXX
Analysis of Data	8.4	8.4	9220-1001	9320-1XXX
Improvement	8.5	8.5		
Continual Improvement	8.5.1	8.5.1		
Corrective and Preventive Action	8.5.2, 8.5.3	8.5.2	9214-1001	9314-1XXX

(-1XXX is for English language documents and -2XXX is for French language documents).

Note: Since the ISO 17025 standard is only applicable to the Calibration Laboratory; most elements of that standard are covered with 9211-1001, the 9311-XXXX work instruction series, the PSL-XXX and ESL-XXX calibration instruction.