

**Solon Manufacturing Company  
Quality Assurance Manual  
SMS QA 9001  
September 2007**

**SMS QA 9001 Dated September 2007 supercedes:  
SMS QA 9001 Dated January 30, 2004 supercedes:  
SMS QA 9001 Dated April 1, 2000  
SMQA 1194 revision of,  
SMQA 1191**

SMS 100 Management Responsibility

Rev. 1

9/07

Page 1 of 1

**SOLON MANUFACTURING COMPANY  
STATEMENT AFFIRMING COMMITMENT TO QUALITY**

Solon Manufacturing Company is a small organization owned by the management of the company. Management is closely associated with all phases of the business. Dedication to quality has been of the first importance in the operation of the company since the founding of the company in 1949. Management is responsible for total commitment to quality throughout the organization. Management is responsible for implementing and improving this commitment. All personnel at Solon Manufacturing Company are dedicated to serving the customer through quality in all aspects of the business relationship.

J. Timothy Dunn, President

**SOLON MANUFACTURING STANDARD  
SMS 101  
QUALITY ASSURANCE RESPONSIBILITY**

Quality assurance is organized and authorized by the management of Solon Manufacturing Company. Management consists of the following personnel who are directly responsible for quality.

President and General Manager-----J. Timothy Dunn

Vice President-----George P. Davet  
Mgr. Industrial Controls Division

Vice President-----Perry Blossom  
Mgr. Belleville Springs Division

Chief Engineer-----George P. Davet

Quality Assurance Manager-----Gary L. Ault

The Director of Quality Assurance is the President who has the overall responsibility for the organization and operation of the company. Reporting directly to the President are the Division Managers, the Chief Engineer and the Quality Assurance Manager. See organization charts:

SMS 103S Organization Chart Belleville Spring Division.

SMS 103C Organization Chart Industrial Controls Division.

Management works with the various departments within the company to ensure that quality procedures are implemented, understood, maintained and followed by company personnel. Department Heads have direct access to the President, Division Managers and Chief Engineer on quality matters. All personnel share in the responsibility to manage quality.

The object of this shared responsibility is to:

- Identify and record quality problems.
- Initiate recommendations and provide solutions.
- Implement corrective actions to prevent future occurrences.
- Control the process of manufacturing and delivery during the process of correction until the effectiveness of the corrective actions is verified.

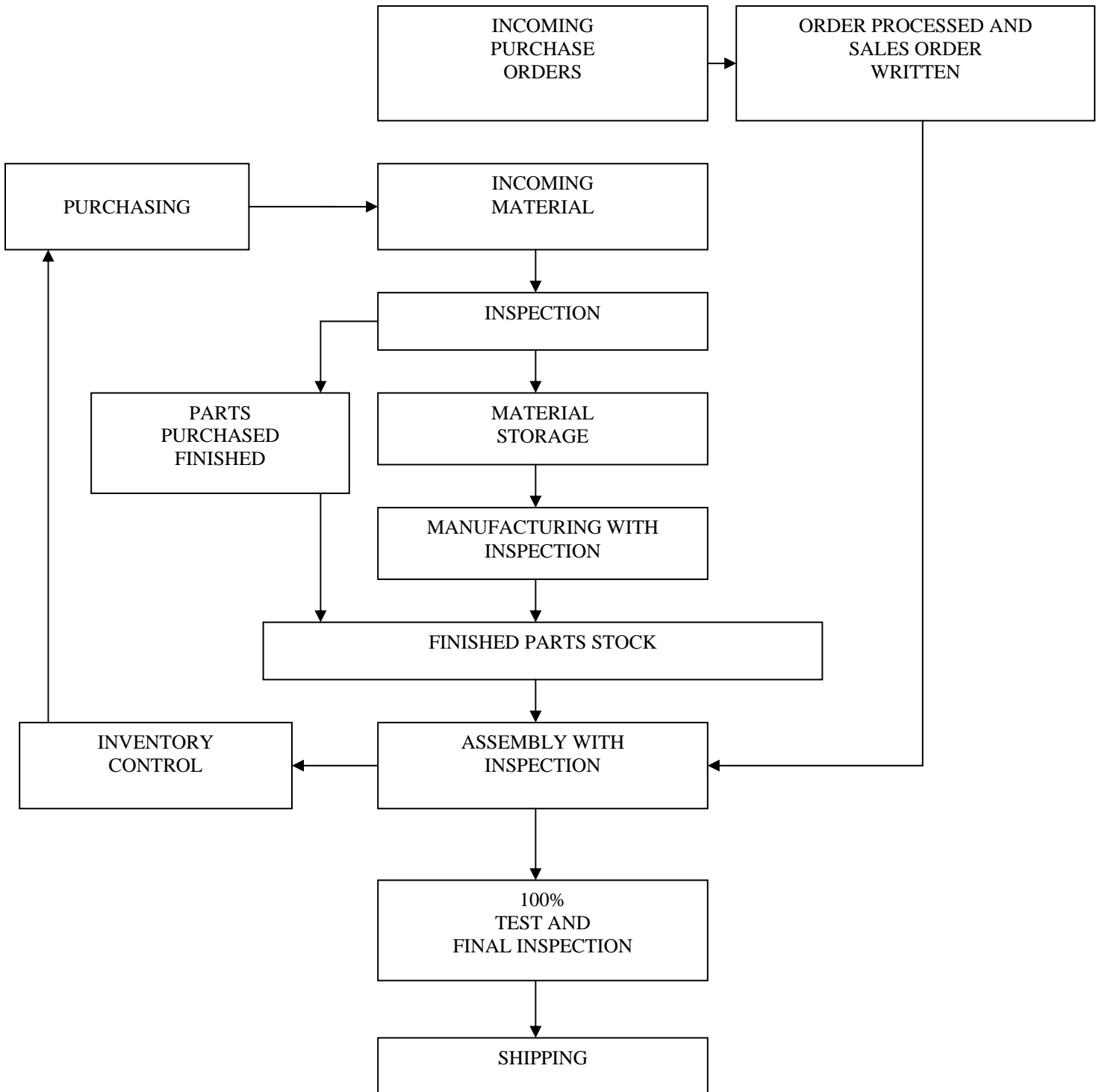
The purpose of the Quality Assurance System is the continuous improvement in our process, products and services.

**SOLON MANUFACTURING STANDARD  
SMS 101  
QUALITY ASSURANCE RESPONSIBILITY**

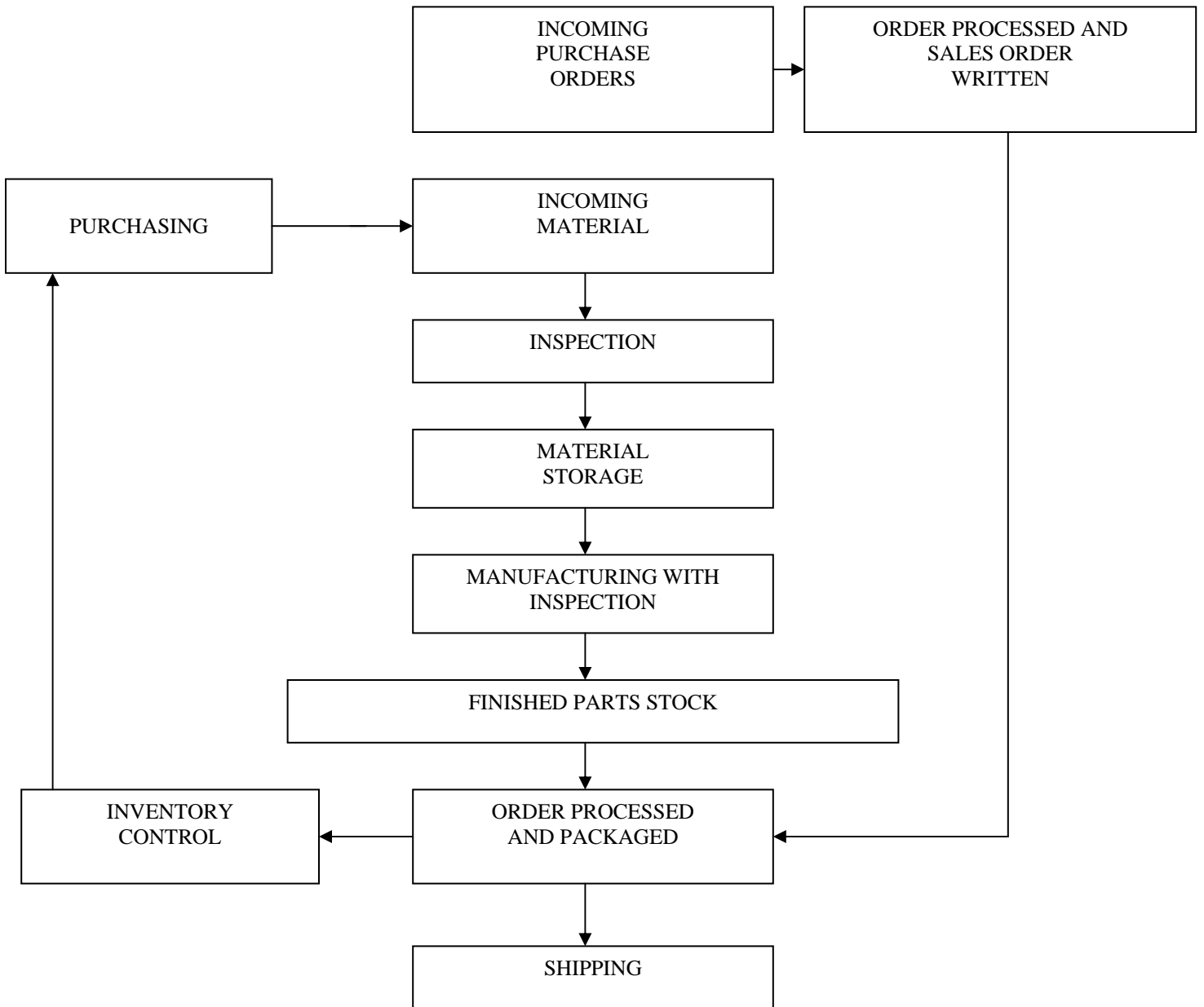
The President, Division Managers, the Chief Engineer and the Quality Assurance Manager form the Quality Assurance Committee. The purpose of the committee is to review the Quality Assurance System annually. This review will take place in the month of January, and will review the prior year. Any changes made to the Quality Assurance System as a result of this review will be done in accordance with SMS 500, Document and Data Control.

Any of the above management personnel can work on individual quality matters. If this work results in changes to the established quality procedures, the changes must be approved by the committee and implemented following SMS 500.

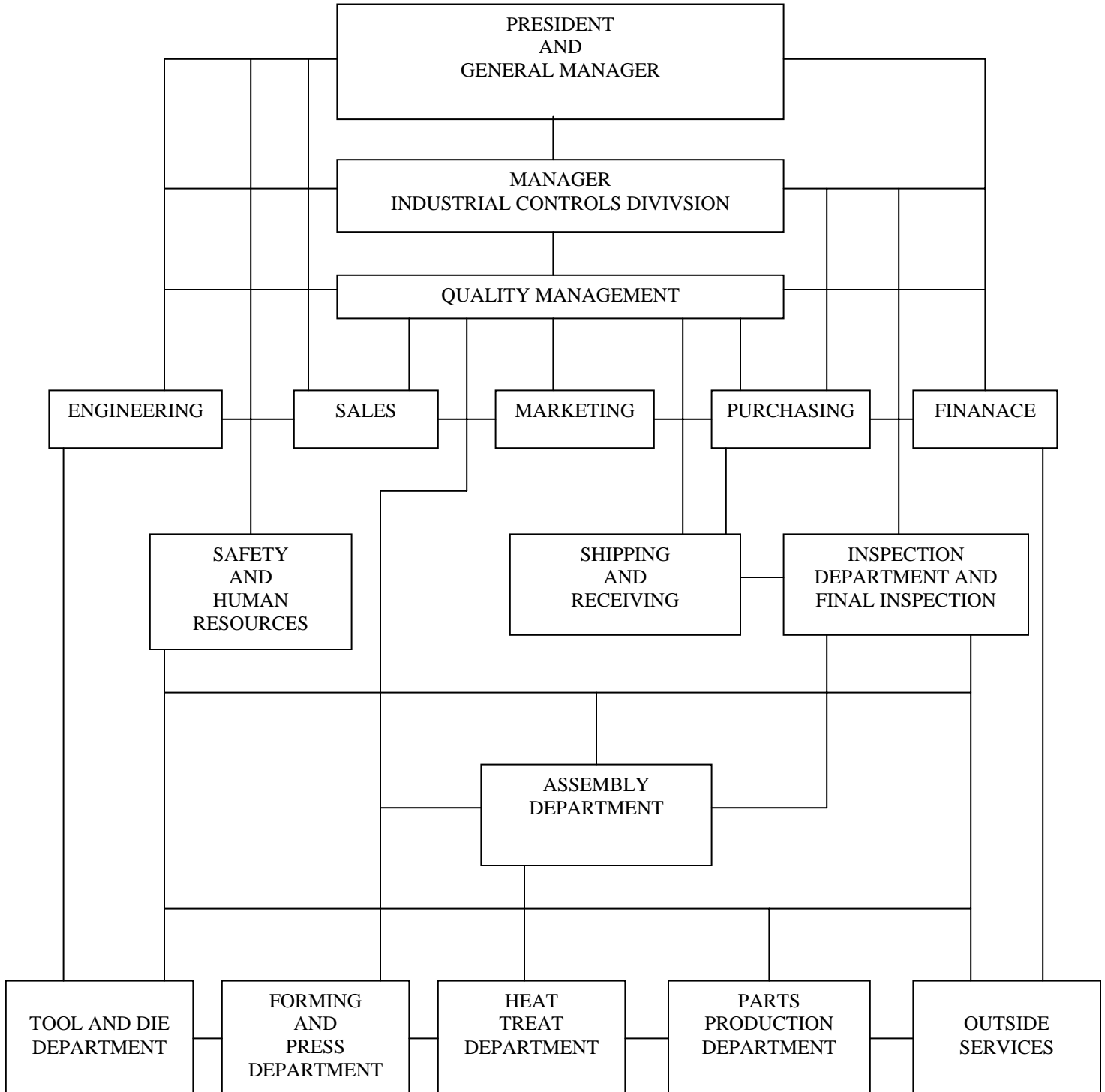
**SMS 102C  
INDUSTRIAL CONTROLS DIVISION  
BASIC FLOW CHART**



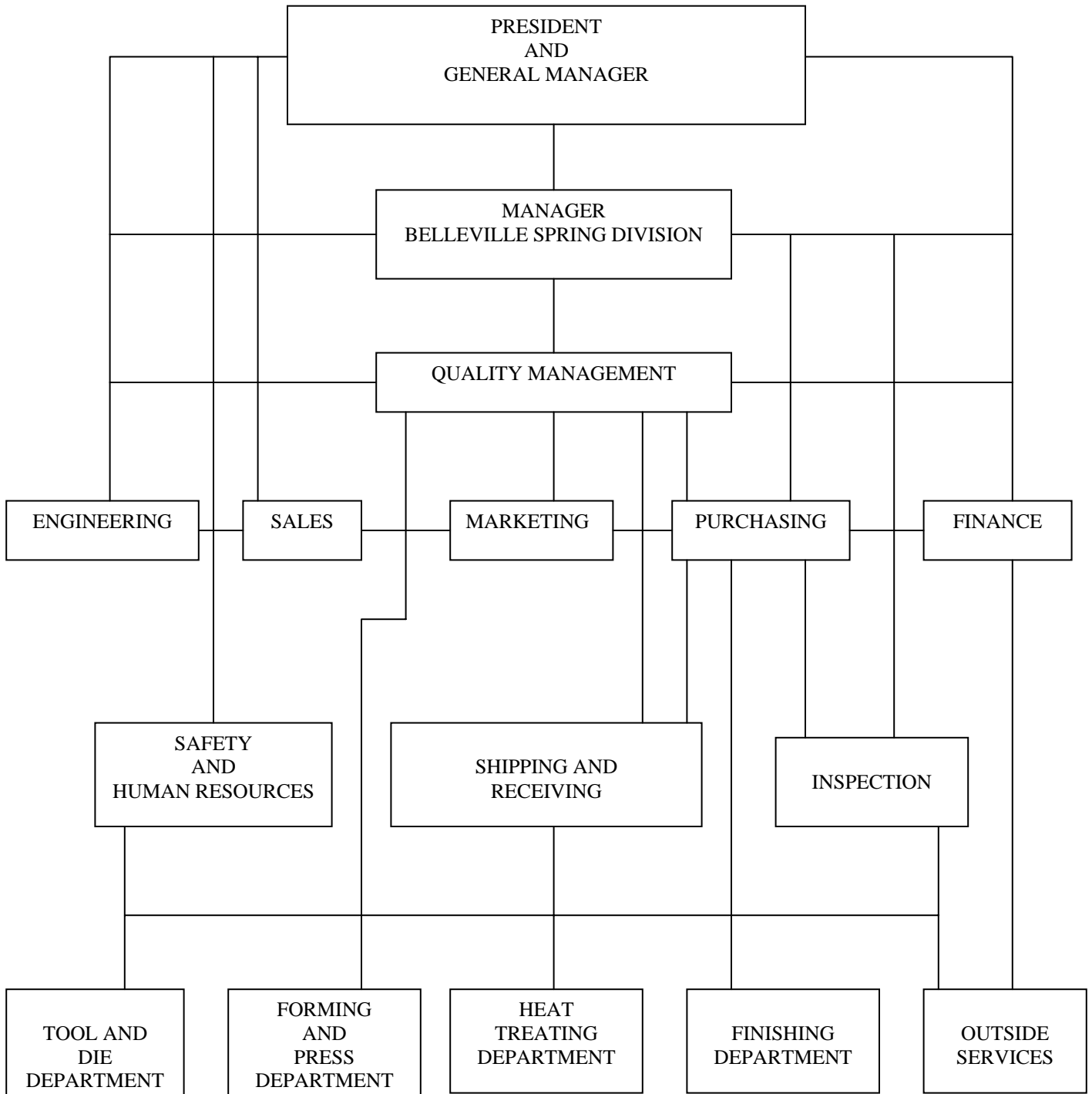
**SMS 102S  
BELLEVILLE SPRING DIVISION  
BASIC FLOW CHART**



**SMS 103C  
INDUSTRIAL CONTROLS DIVISION  
ORGANIZATION CHART**



**SMS 103S  
BELLEVILLE SPRING DIVISION  
ORGANIZATION CHART**



**SOLON MANUFACTURING STANDARD  
SMS 104  
CORPORATE PHILOSOPHY**

To manufacture quality products of great reliability which provide the customer with optimum value.

To serve the customer by providing:

- A. Reliable delivery at a fair price.
- B. A problem solving approach to customer's requests.
- C. A cheerful friendly approach in all dealings with customers.
- D. A can do attitude.

To serve ourselves by:

- A. Always being honest in our relations with our customers, vendors and suppliers.
- B. Always being honest in relations among ourselves.
- C. Working together as a team.
- D. Following the Golden Rule.

Observance of the above will result in:

- A. Customer satisfaction.
- B. Continued Company growth.
- C. Job stability.

**SOLON MANUFACTURING STANDARD  
SMS 200  
QUALITY SYSTEM**

The Quality System is defined by written documents known as Solon Manufacturing Standards. These standards (SMS) are numbered consecutively from 100 to 2000 to incorporate all of the requirements of ISO 9001. The SMS numbering is as follows:

- SMS 100 Management Responsibility.
- SMS 200 Quality System.
- SMS 300 Contract Review.
- SMS 400 Design Control.
- SMS 500 Document and Data Control.
- SMS 600 Purchasing
- SMS 700 Control of Customer Supplied Product.
- SMS 800 Product Identification and Traceability
- SMS 900 Process Control.
- SMS 1000 Inspection and Testing.
- SMS 1100 Control of Inspection, Measuring and Test Equipment.
- SMS 1200 Inspection and Test Status.
- SMS 1300 Control of Nonconforming Product.
- SMS 1400 Corrective and Preventive Action.
- SMS 1500 Receiving, Handling, Storage, Packaging, and Shipment.
- SMS 1600 Control of Quality Records.
- SMS 1700 Internal Quality Audits.
- SMS 1800 Training.
- SMS 1900 Servicing
- SMS 2000 Statistical Techniques.

The Quality Assurance Manual consists of all documents found in SMS 100 series, Management Responsibility, and SMS 200 series, Quality System. SMS 201 is a broad explanation of all of the above requirements.

Specific written procedures, specifications, instructions and policies are given SMS standards numbers in the requirements for which they are intended. These documents govern the Quality System and are located throughout the plant. Implementation and adherence to Solon Manufacturing Standards provide control over all activities affecting quality.

Documents in any series with no suffix after the SMS series number, apply to the company as a whole. Documents that have a suffix "S" after the SMS series number, apply to the Belleville Spring Division. Documents that have a suffix "C" after the SMS series number, apply to the Industrial Controls Division.

**SOLON MANUFACTURING STANDARD**  
**SMS 201**  
**QUALITY SYSTEM DESCRIPTION**

**Quality Manual**

**SMS 100** Management Responsibility: All documents in this series.

**SMS 200** Quality System: All documents in this series.

The following is a broad explanation of the SMS series: SMS 300 through SMS 2000.

**SMS 300 Contract Review:**

For Solon Manufacturing Company a contract is a business arrangement for the supply of goods or services at a fixed price. Customer's purchase orders are contracts for Solon products. Solon's purchase orders are contracts for goods or services supplied to Solon. All contracts are reviewed by management, sales and purchasing personnel to insure that what is specified in the contract is what is delivered to the customer or to Solon. Appropriate records are kept to document these contracts.

**SMS 400 Design Control:**

Solon manufactures products designed by Solon Manufacturing Company for industrial use. The Belleville Spring Division manufactures cataloged springs with published specifications as well as springs for specific applications. The design for these springs uses technology that is over fifty years old and is documented by years of successful manufacturing. The Industrial Controls Division manufactures cataloged pressure controls with published specifications as well as pressure controls for specific applications. The design for these pressure controls is over thirty years old and is documented by years of successful manufacturing. The design of Solon products has been and is under the control of management and the engineering department. The SMS 400 series implements the documents required to: describe design activity and assign responsibilities; record design activity; verify correctness of design; control design change; record tests of product evaluation; and validate the design to ensure the product conforms to user needs and customer requirements.

## **SMS 201 QUALITY SYSTEM DESCRIPTION**

### **SMS 500 Document and Data Control:**

The SMS 500 series documents a system for the creation, publication, distribution, use and revision of all documents and data related to the quality system. Documents are created by management and are reviewed for adequacy prior to issuance.

Current editions of documents are accessible to the personnel who use them.

Superseded documents are removed from the system promptly. Obsolete documents that may be retained for knowledge preservation are archived and identified. A master list of quality documents and data is maintained. The master list contains the SMS number, revision number and date of issuance.

If management changes a document, a review and approval system is used.

### **SMS 600 Purchasing:**

The SMS 600 series documents control the purchasing function. Procedures establish that products purchased from vendors meet specified requirements. A list of qualified vendors is maintained. The performance of vendors is monitored. Purchasing documents contain information which describe the products and services being purchased using drawings, process requirements, inspection procedures or other relevant data. Periodic visits by management to vendors insure that good working relationships are maintained.

### **SMS 700 Control of Customer Supplied Product:**

At present Solon Manufacturing Co. does not use any customer supplied products.

### **SMS 800 Product Identification and Traceability:**

#### **Belleville Spring Division:**

All Belleville Springs, and Flange Washers are assigned part numbers emanating from their design characteristics. The part number identifies the spring with respect to its size, thickness, and material. From the part number using catalog tables or design information, the customer can determine the load at flat and deflection of the spring. During production the part number, work order number, heat number of the material, and dates are used to track the manufacture of the part through production on documents that travel with the part as production proceeds. Finished parts in stock are identified with tags having the part number, work order number, heat number, and weight per part written on the tag.

## **SMS 201 QUALITY SYSTEM DESCRIPTION**

### **SMS 800**

Shipping documents contain the customer's purchase order number, part number, quantity, and ship list number. Packing lists are attached to shipping containers and contain the above information. Traceability of a part is through the part number and purchase order number back to the ship list and production documents to the heat number and material certification.

#### **Industrial Controls Division:**

All Industrial Controls are labeled with name plates that are permanently attached to the control and contain the model number, range of the device, date of manufacture, as well as other information. The model number is derived from nomenclature emanating from the design characteristics of the device. The model number identifies the relative size of the device, the function of the device, and any special features or materials used in the construction of the device. The range of the device is specified separately but may be necessary to completely identify the unit. Work orders for the assembly of a control contain the ship list number, quantity, model number, range of the device, as well as other instructions used in the assembly and test of the unit. All controls are given a functional test and stamped with a mark that identifies the inspector, then the completed work orders are initialed by the inspector before the controls are released to shipping. Shipping documents contain the purchase order number, ship list number, quantity, model number, and range. Packing lists are attached to shipping containers and contain the above information. Cataloged controls are shipped with an instruction and installation sheet that the customer can relate to the model number. Traceability of a control is through the model number, date of manufacture, purchase order number, back to the ship list for the device. The ship list will trace the device to the work order and to the inspection, assembly, and the components used in the construction of the unit.

#### **SMS 900 Manufacturing and Process Control:**

The 900 series documents define the manufacturing procedures and processes that govern the production of Solon products. These documents ensure that quality products are being produced in the following ways:

1. Quality standards and plans are being adhered to throughout the manufacturing process.
2. Products are manufactured and tested using appropriate equipment and tooling.
3. Product characteristics are monitored and controlled at appropriate points in the manufacturing process.

## **SMS 201 QUALITY SYSTEM DESCRIPTION**

### **SMS 900**

4. Documented work instructions specify the required steps in each part of the manufacturing process.
5. Maintenance of manufacturing and testing equipment ensures the production of quality products.
6. Quality records are maintained to document the system.

### **SMS 1000 Inspection and Testing:**

#### **Belleville Spring Division:**

All raw material is inspected for conformance to the purchase order and material certifications required by the purchase order before being entered into the raw material inventory. Inspected raw material is tagged for identification according to documented procedures before being warehoused or released for production. All other material is given receiving inspection for conformance to the purchase order and may be further inspected per documented procedures as noted in the purchasing records.

Inspection reports and certificates of conformance provided by vendors are filed per quality procedures.

Documented data of in-process inspection and testing are recorded on the work order, which travels with the production batch. The Personnel recording the data initial each inspection observation or test. Each Belleville Spring is assigned a part number and has a specific work order that outlines the production procedure and the various inspection and test points where data are recorded. There are both destructive and non-destructive inspections and tests involved in this process. Batches of parts do not progress to the next part of the production cycle until all inspections and tests are completed.

A sample of finished parts is given a final inspection before the parts are released. All inspection and test data must be recorded, reviewed and approved by management before the product specified on the work order can be shipped or placed in finished stock.

The completed work order provides documented evidence that the product has been inspected and tested. Work orders are filed per documented procedures and retained indefinitely.

#### **Industrial Controls Division:**

All material is given receiving inspection for conformance to the purchase order. Material may be further inspected as directed by purchasing records before being released for use as a part for production either finished or semi-finished. Material certifications, certificates of conformance and vendor inspection reports are required for items purchased to Solon Manufacturing specifications. These documents are filed per quality procedures.

## **SMS 201 QUALITY SYSTEM DESCRIPTION**

### **SMS 1000**

Solon Industrial Controls are assembled from parts stored in the finished parts inventory. All finished parts have passed the inspections and tests required of finished parts. The work orders and drawings for the parts specify in-process inspection and testing. Inspection and testing at each stage of the production process must be complete before a part advances in the production cycle. Inspection and test reports document the results that evidence inspection and testing has been done.

Assembled controls represent a functional product built to the requirements specified by the customer's purchase order. Controls receive one hundred percent inspection and test as follows:

1. Inspection for correct nomenclature with respect to labels, markings and related paper work.
2. Functional test for the correct operation of the pressure sensing element, switching mechanism, electrical or valve components. Where specified the control is set and tested to customer specifications with respect to pressure, temperature and operating characteristics.

Final inspection consists of stamping the control with an inspection mark that identifies the inspector, initialing the work order indicating that all inspections and tests are completed and placing with the control the instruction documents. The work order signed by the inspection department authorizes the shipment of the control. The work order document provides evidence that the control was inspected and tested.

Work orders are filed per document procedures and are retained indefinitely.

### **SMS 1100 Control of Inspection, Measuring and Test Equipment:**

Solon Manufacturing's inspection, measuring and test equipment is appropriate in accuracy and precision for the type of products produced. All inspection, measuring and test equipment is identified and inventoried. The frequency of test and calibration of this equipment is documented. The time and method of test and calibration is documented. Primary inspection, measuring and test equipment is tested and calibrated by vendors qualified to test and calibrate such equipment. These vendors use test and calibration equipment with standards traceable to the National Institute of Standards and Technology or an equivalent agency. Secondary inspection, measuring and test equipment, which is tested and calibrated by Solon Manufacturing, uses the primary equipment for test and calibration.

## **SMS 201 QUALITY SYSTEM DESCRIPTION**

### **SMS 1100**

Inspection, measuring and test equipment is identified with serial numbers that are documented. Tags show the calibration status of this equipment. These tags indicate the date of calibration, the date of the next calibration and the personnel doing the calibration. Test and calibration data, that evidence calibration status, are recorded on documents that are filed per document procedures and retained. Tests and calibrations are conducted under suitable conditions, and equipment is stored and preserved to ensure accurate future use. Test and calibration of inspection, measuring and test equipment is limited to inspection and management personnel. Procedures for equipment found out of calibration are documented. Frequent checks on the calibration of equipment ensure the validity of previous inspection and test results.

### **SMS 1200 Inspection and Test Status:**

Solon Manufacturing products are continually identified throughout the production process using markings, labels and tags. In-process inspection and test status is controlled by tags, labels, drawings, reports which reference part numbers, materials, heat numbers, dimensions, weights, tests etc. that relate to the work orders. Finished parts, which have passed all inspections and tests, are stored in containers that are placed in clearly defined locations. These containers are labeled with part numbers and pertinent information for ease of identification. Belleville Springs are shipped from finished parts stock. Industrial Controls are assembled from finished parts stock. The control as an assembled unit is then inspected and tested. The inspected and tested control unit is shipped.

Work orders document the inspection and test status system.

### **SMS 1300 Control of Nonconforming Product:**

Nonconformity's of product are identified by the inspection and test procedures outlined in the receiving, work orders and production procedures. Nonconforming items are marked using tags, labels and reports that prevent the item from continuing in the production process. Where possible the nonconforming items are segregated. Management and purchasing are informed and procedures document the evaluation and disposition of the nonconforming items. Repaired or reworked items are re-inspected and tested per procedures that ensure quality is achieved. Records of nonconformity are filed per documented procedures.

## **SMS 201 QUALITY SYSTEM DESCRIPTION**

### **SMS 1400 Corrective and Preventive Action:**

Corrective and preventive action can be divided into two parts with respect to the action taken when nonconformance problems are reported.

1. Nonconformance of material or parts supplied to Solon by vendors, or nonconformance of parts or product as part of the manufacturing process.
2. Nonconformance of product reported to Solon by customers.

Corrective action as stated in number one is initiated by the inspection and test process. This process alerts management about a nonconformance situation by inspection and test reports. Management analyzes the situation and issues a corrective action report, which is sent to the vendor or to the department within Solon, addressing the nonconformance situation. Management is responsible to ensure that corrective action is implemented and becomes effective. Management is responsible for recording and documenting solutions to nonconformance situations. Management is responsible for preventive action that will eliminate future nonconformance situations by studying the records of quality information and implementing actions that will improve operations and quality. Any changes to the quality system resulting from corrective and preventive action are made in accordance with documented quality procedures.

Management immediately deals with corrective actions resulting from customer reports of nonconformance as stated in two above.

From the customer's information, management applies engineering knowledge to analyze the nonconformance situation. The customer's information and Solon's corrective action are recorded in the RMA file and/or other correspondence that may be required with the customer. Tests may be performed on products returned for evaluation. Test results are made available to the customer and are preserved for reference by Solon. Some products can be rebuilt or reworked to eliminate a nonconformance situation. Management's responsibility is to ensure customer satisfaction by eliminating nonconformance problems. By studying customer-supplied information, management can establish preventive action that will improve manufacturing procedure, product and quality. Any changes made to the quality system or products, resulting from corrective or preventive actions, are made in accordance with documented quality procedures.

## SMS 201 QUALITY SYSTEM DESCRIPTION

### **SMS 1500 Receiving, Handling, Storage, Packaging and Shipment:**

**Receiving-** All materials received at Solon Manufacturing are processed through receiving procedures that require inspection.

These procedures ensure that materials meet the requirements of purchase orders; are identified by marking or tagging; are stored properly or forwarded for further inspection; are properly accounted for in the purchasing system.

**Handling-** Procedures for handling materials, parts and finished products require methods of process and equipment that protect these items from damage or deterioration.

**Storage-** All materials are stored inside under dry and heated conditions. Parts in the manufacturing process are stored and moved in clean containers. Finished parts are stored in clean containers that are properly labeled and placed in designated areas. Belleville Springs and Flange Washers are shipped directly out of finished parts stock. This stock is controlled by procedures relating to inventory and shipping. Controls are assembled from finished parts stock. This stock is controlled by procedures relating to inventory and assembly. Assembled control units that have passed all final inspections are forwarded to the shipping department for packaging. Packaged units are usually shipped the same day. Packaged units that are shipped at a latter date are stored on shelves in the shipping department properly labeled for identification.

**Packaging-** Packaging procedures specify that Solon Manufacturing products are shipped in substantial containers following good commercial practice, which anticipates normal wear and tear on the container, providing adequate product protection during transit and storage at the customer's premise. Packaging procedures consider product size, weight, number of parts or units per container, container size, dunnage, number of containers needed per unit shipment, method of shipment and marking of containers for transit and customer identification.

**Shipping-** Solon Manufacturing products are delivered to customers via the carrier specified on their purchase order.

Shipping procedures ensure that containers are properly labeled and marked, shipping papers properly documented, packing lists or other documents attached to containers and containers placed on the designated carrier. Tracking records are established for each shipment. Shipping records are filed per documented procedures.

## **SMS 201 QUALITY SYSTEM DESCRIPTION**

### **SMS 1600 Control of Quality Records:**

Quality records are under the control of management. Documented procedures determine what constitutes quality documentation. Quality documents are collected, indexed, filed, stored and maintained by these procedures. Quality records documented on the Solon Manufacturing computer system are backed up frequently. The MRP 9000 system now in use allows more quality related data to be recorded and maintained on computer system.

Hard copies of inspection and test reports generated by vendors and Solon are filed and maintained. Procedures specify the quality records and retention times. Quality records are stored in an environment that prevents damage, deterioration or loss. Indexing and location of these records allows for easy retrieval.

### **SMS 1700 Internal Quality Audits:**

Procedures for internal quality audits determine the schedule and areas of company activity to be audited. Personnel who carry out the internal quality audits have no responsibility in the area being audited. Management authorizes these audits and the results of the audits are reported to management. The results of audits are recorded and filed per quality records. Management is responsible for corrective action taken if deficiencies are found during an audit. A follow up audit is made to verify and record the effectiveness any corrective action.

### **SMS 1800 Training:**

Solon Manufacturing believes that quality products result from the efforts of highly motivated personnel who are properly trained. Most training takes the form of on the job experience with supervision emphasizing the quality and safety aspects of the job. Training is provided at all levels of the organization and is a continuing experience. Management's responsibility is that each employee receives the proper training to ensure a continuous improvement process. When the required training is beyond the capability of Solon's management or personnel, outside sources of training are utilized. Job descriptions and employee's training records are documented. These documents are filed per quality procedures.

## **SMS 201 QUALITY SYSTEM DESCRIPTION**

### **SMS 1900 Servicing:**

Customer satisfaction is the goal in defining service relating to Solon's products. Engineering and technical assistance is always available. A problem solving approach to customer's requests is the backbone of Solon's service policy. Reliability of product and delivery of that product is of the first importance in establishing good service.

### **Belleville Spring Division:**

Customers generally understand the use of Belleville Springs and no field service is required. When required by a purchase order, Solon can furnish special markings, inspection and test reports, certificates of conformance and installation guides. Solon's sales and service representatives have the engineering and technical experience to solve customer's problems. These representatives can be scheduled to visit a customer to discuss an application or visit a field installation. In addition to catalog information, either printed or available on the Internet, Solon has published several technical papers dealing with the use of Belleville Springs. These papers are available upon request. Service calls are documented when issues of quality are involved.

### **Industrial Controls Division:**

Controls sold in the general industrial market are shipped with instruction sheets and/or drawings that govern their field installation, and no further service is required. When specified on a purchase order, Solon can furnish special markings, control settings and operating points, certificates of conformance and special installation drawings to aid the customer. Customers that purchase controls with special design characteristics receive special model numbers that identify the specifications for that control. Solon's sales and service representatives have the engineering and technical experience to solve customer's problems. These representatives can be scheduled to visit a customer to discuss an application or visit a field installation. Catalog information, either printed or available on the Internet, is designed to help the customer make the correct choice when specifying a control. Service calls are documented when issues of quality are involved.

## **SMS 201 QUALITY SYSTEM DESCRIPTION**

### **SMS 2000 Statistical Techniques:**

#### **Belleville Spring Division:**

The spring characteristics of Belleville type springs can be predicted by using known material specifications and mathematical formulae. Product testing and years of successful manufacturing have proven the reliability of Solon Belleville Springs. All Belleville Springs have part numbers that identify the specifications of the spring. All specifications are documented such that inspection and test data can be compared to the design criteria. For each batch of a part number in the manufacturing process, samples of the spring are taken at various stages in the manufacturing process. Production procedures determine the sample size and what inspections and tests are performed on the samples. The data collected from these samples plus historical data collected on similar samples are used to monitor acceptance criteria, sampling, process characteristics and lot sizes. With the advent of improved computer and data acquisition systems, Solon will improve the use of statistical techniques.

#### **Industrial Controls Division:**

The parts that are assembled into a particular control are sample inspected and tested during the manufacturing process.

Each part has a part number and documented specifications. The data taken from the inspection and test of these samples are used to monitor sample size and process characteristics.

The design characteristics of a particular control can be predicted using mathematical formulae and documented assembly procedures. Product testing and years of successful manufacturing have proved the reliability of Solon Industrial Controls. All assembled control units receive an operational test as part of their final inspection. Data collected from these tests are used to monitor the assembly and manufacturing process. With the advent of improved computer and data acquisition systems, Solon will improve the use of statistical techniques.