




# PC ANN ARBOR MANAGEMENT SYSTEMS


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R9	6-21-2019	David Schiller	Renovation of original quality manual to reflect new layout and simplified quality process. This document obsoletes MP-5000, 6000, 7000, 8000, and replaces the original QMS Map.

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# Leadership Commitment

## 1. Introduction

Kaiser Optical Systems, Inc. (Kaiser) was established in 1979 and is today a subsidiary of Endress + Hauser, Inc. Kaiser's offices and manufacturing facilities are located in Ann Arbor, Michigan USA. Principal products include sensors and instrumentation, display systems, and advanced holographic components for spectroscopy, communications, astronomy, and ultra-fast sciences. Kaiser is a world leader in applied holographic technology for industrial, scientific and defense applications. Its customers for products and services are based throughout the world.

### 1.1 Purpose

This Quality Manual describes the overall requirements and activities that must be performed when providing products, solutions, and services our customers in both regulated and non-regulated industries. Kaisers Quality Manual provides the framework by which they will meet or exceed those requirements as specified by ISO-9001 and other Standards/Directives such as ISO-80079 governing the manufacture of equipment to be used in explosive atmospheres.

## 2. Policy

Kaiser is committed to providing our customers with quality products and services that represent the best value. To achieve this goal, we have developed and maintain an ISO-9001 based Quality Management System (QMS) that includes processes, process controls, and measurable quality objectives and targets. Furthermore, we strive to maintain and improve a cooperative work environment that is conducive to meeting customer requirements, enhancing customer satisfaction, and continually improving the effectiveness of our QMS. Quality, continual improvement, and customer satisfaction are the personal responsibility of each of our employees.

### 2.1 Applicability

All sections of the ISO-9001 and ISO-14001 regulations apply in executing the Scope of the Ann Arbor business.

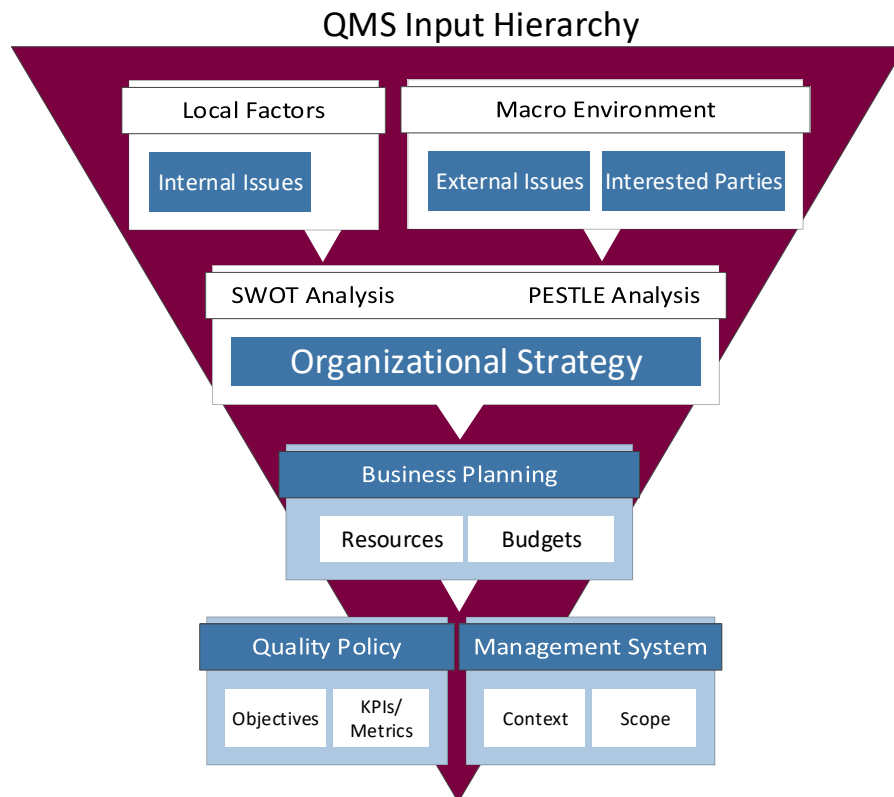
This document is considered a public document and can be made available to those stakeholders that request access to it. This document refers to several supporting documents that are considered "internal" to the business. These documents are not available for public consumption.

This document is a business level document and refers to many facets of the organization. Only those sections of this manual that address QMS clauses or Environmental Health and Safety Management System (EHSMS) clauses respectively are 3<sup>rd</sup> party auditable.

## 2.2 Context of the Organization

The senior management of Kaiser determines the external and internal issues that are relevant to the purpose and strategic direction of the company including interested parties that are relevant to the QMS and their statutory and regulatory requirements. This context and inputs are monitored and any modifications in response to changes in the interested parties or their requirements are planned as part of the Management Review (SP-5600) (See Figure 1). The main context of Kaisers business operations is to provide the following:

- A source of revenue for the local business and any parent corporation associated with the business.
- Provide a quality, value-adding product to our customers.
- Provide a stable income and benefits for the company's employees and their families.
- Provide a growing revenue stream for the local community that is maintained in a socially responsible manner.



*Figure 1: Context of the Organization*

### 3. Scope

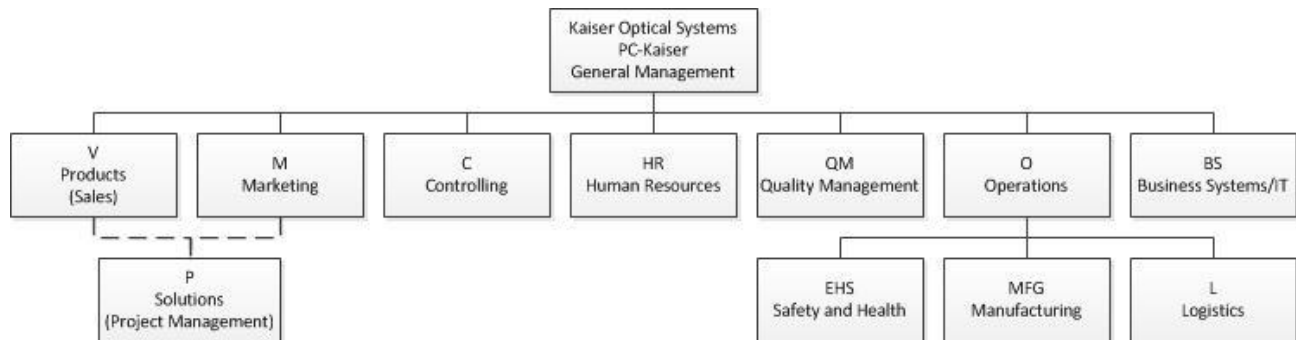
Based on the analysis of the issues and requirements identified within the context of the business and the needs and expectations of the relevant interested parties; Kaiser has established the scope of their quality management system to implement the objectives and the policies that are relevant to the context, products and any interested parties.

This document describes Kaisers quality management system, delineates authorities, inter-relationships and responsibilities of process owners and personnel that operate within the system. Although its recognize that ISO 9001 does not require a quality manual, Kaiser has decided to produce and update a quality manual, as employees, customers, suppliers, and other stakeholders perceive it will add value to its operations.

Kaiser has established and applies this quality management system for the Manufacture of Raman Spectrographic Instruments including Software; Specialty Holographic Assemblies, Elements and Components.

### 4. Organization Description & Responsibility

The Managing Director along with the Quality Manager for Endress+Hauser Kaiser are responsible for the implementation of the quality program. The Engineering, Manufacturing, Service Manager, Sales, Marketing and Project Managers are responsible for the observance of this plan within their departments as Process Owners. Refer to F-5510-01 (Organizational Chart) for the specific breakdown of each department and assigned tasks. Figure 2 represents a general organizational structure for Kaiser.



*Figure 2: General Organizational Structure*

## 4.1 Leadership and commitment

Kaiser leadership is responsible for implementing the QMS, which includes the development and deployment of the quality policy, the quality objectives, and product/project-specific plans that are customer focused.

Top management provides the leadership and governance to all activities related to the lifecycle processes including defining the strategic direction, responsibility, authority, and communication to assure the safe and effective performance.

Kaiser's governance structure provides necessary support for creating and establishing appropriate processes that are important for maintaining and achieving our quality objectives and policies.

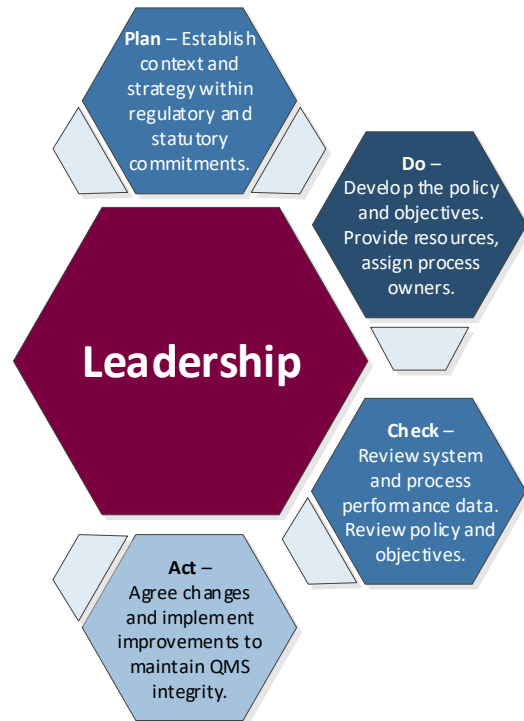
In addition, governance activities include systematic verification of the effectiveness of our QMS/EHSMS by undertaking internal audits and analyzing performance data.

Regular management reviews ensure that our QMS is adequate and effective, and that any necessary adjustments are made as a result.

Top management is committed to implementing and developing the quality management system and this commitment is defined by our corporate policies and objectives. Kaiser ensures that our policies are understood, implemented and maintained throughout all levels of the Organization through printed distribution of our policy statements and through periodic management review of the policy statements, and corporate level improvement objectives. Kaiser communicates our mission, vision, strategy, policies and processes to all employees to:

- Create and sustain shared values of fairness and ethical behavior;
- Establish a culture of trust and integrity;
- Encourage commitment to quality;
- Provide people with the required resources, training and authority to act with accountability;
- Inspire, encourage and recognize people's contributions.

In addition, our policies, objectives and targets are communicated and deployed throughout the business via individual performance objectives which are established and discussed during employee performance reviews.



## 4.2 Relevant Interested Parties and Customer Focus

Kaiser maintains a customer centric vision to its operations (see Figure 3). Kaiser recognize that they have a unique set of interested parties whose needs and expectations change and develop over time, and furthermore; that only a limited set of their respective needs and expectations are applicable to its operations or to its quality management system. To ensure that their products and processes continue to meet all relevant requirements, they identify and assess the potential impact of any relevant needs and expectations that may be elicited from the interested parties. Such needs and expectations broadly include those shown in the table below.



*Figure 3: Kaiser Customer Philosophy*

Interested Parties	Needs and Expectations
<b>Customers</b>	Price, reliability & value
<b>Owners/shareholders</b>	Profitability & growth
<b>Employees</b>	Shared values & Security
<b>Suppliers</b>	Beneficial relationships
<b>Regulatory &amp; Statutory</b>	Compliance & reporting

Where appropriate, to ensure that processes are aligned to deliver the requirements of the interested parties; Kaiser converts relevant needs and expectations into requirements which become inputs to the QMS and to product/service designs. Refer to SP-5600 (Management Review) for a more detailed look at the relationship between Kaiser and their interested parties.

Kaiser welcomes the opportunity to meet and/or communicate with customer representatives. Frequently these meetings and/or communications involve the review of its performance as a supplier. The Sales and Marketing department is the primary representative during these interactions. They will request participation from other functions, such as Engineering, as appropriate. Additionally, the opportunity to host customer representatives at its facility frequently results in a better mutual understanding of customer requirements and supplier capabilities.

## 4.3 Objectives and Planning

The purpose of objectives is to address customer satisfaction, meet product and process requirements, address significant environmental impacts, and provide direction for continual improvement. Measurable objectives are established as part of business planning and documented as appropriate. Quality and Environmental objectives are further defined, reviewed, and updated by the senior management during Management Reviews (SP-5600).

When setting objectives and targets, Kaiser ensures that they are consistent with the needs and expectations of their interested parties, as defined in Section 4.2, and to their corporate policies. In addition, technological options, financial, operational and business requirements are considered.

To address Environmental Impacts of the business, the business has been broken down into several main Aspects. These Aspects, sometimes known as functions of the business, are evaluated for their



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impact on the environment or potential for impact on the environment. These Aspects are evaluation against the Probability that they will occur; and the severity of impact should they happen. Certain Aspects are considered significant due to their current impact or potential for impact. Kaiser management determines whether action will be taken to address those significant aspects and adds those actions to the business objectives.

To determine whether, or not, our objectives and targets are being met, they are measured and reported as a set of key performance indicators (KPIs). This allows progress to be monitored as metrics are gathered and data is analyzed. KPIs and objectives for Kaiser include the following aspects;

1. Turnover and profitability;
2. Sales targets & production efficiency targets;
3. Reject and rework & cost of quality targets;
4. Staffing breakdown.

Based on the set of quality policies and in connection with the application of ISO 9001 quality management principles, Kaiser sets quality objectives that are specified in the scorecard. All employees are responsible for fulfillment of the quality policies and subsequent objectives. Managers of all departments are obliged to develop general objectives into objectives applicable to their departments and employees.

Objective	Target	Measure
Quality Objective <b>Implement ISO 9001:2015</b>	Achieve certification by Q3 20XX	ISO 9001 certificate
Business Objective <b>Implement employee survey</b>	Employees surveyed by Q1 20XX	TNS Survey scores in various areas of review.
Environmental Objective <b>Reduce pollutant concentration</b>	Concentration Level less than XXXX	Units / Volume

Sample Objectives matrix

#### 4.4 Addressing Risks & Opportunities

The overall aim of risk and opportunity management within Kaiser is to ensure that organizational capabilities and resources are employed in an efficient and effective manner to take advantage of opportunities and to mitigate risks.

Top management is responsible for incorporating risk-based thinking in to our organization's culture. This includes the establishment of risk management policies and targets to ensure effective implementation of risk and opportunity management principles and activities by:

- Providing adequate resources to carry out risk and opportunity management activities;

- Assigning responsibilities and authorities for risk and opportunity management activities;
- Reviewing information and results from audits and risk and opportunity management activities.

The scope of Kaiser's risk and opportunity management process includes the assessment of the internal and external issues identified in Section 2.2, and the assessment of the needs and expectations of any interested parties identified in Section 4.2. Risk and opportunity management is undertaken as part of Kaiser's day-to-day operations and is captured at the following hierarchy:

- Strategic level;
- Program level;
- Department level;
- Process level.

Establishing such a hierarchy for capturing risk and opportunity ensures that each is managed at the most appropriate level within the organization. Typically, the following categories are assigned to each level in the hierarchy as shown in the table below.

<b>Business Hierarchy</b>	<b>Risk / Opportunity</b>
<b>Strategic level</b>	Budgets and profitability
<b>Program level</b>	Performance and efficiency
<b>Department level</b>	Resources and targets
<b>Process level</b>	Evaluation and assurance



Kaiser has classified its 'risk appetite' as the amount of risk that we are willing to accept in pursuit of an opportunity or the avoidance of risk where each pertains to product and/or system conformity, and which reflect the following considerations:

- Risk management philosophy per product or process;
- Capacity to take on or mitigate risk;
- Objectives, business plans and respective stakeholder demands;
- Evolving industry and market conditions;
- Tolerance for failures.

Kaiser uses registers to help record, assess, respond, review, report, monitor and plan for the risks and opportunities that we perceive to be relevant. The registers allow the organization to methodically assess each risk and to study each opportunity associated with the organizational

context, and the needs and expectations of interested parties. The register records the controls and treatments of risks and opportunities and preserves this knowledge as documented information. Refer to SP-5600 (Management Review) for Risks and Opportunities discussed at the executive level.

#### 4.5 Organizational Roles, Responsibilities, and Authorities

Through the Organizational Chart (F-5510-01), Kaiser ensures that all key responsibilities and authorities have been defined and communicated within the organization. Furthermore, responsibility and authority for each process and individual process steps are identified within each documented process.

There are also specific responsibilities that must be identified, according to the standards, by individual within the organizational chart. These include:

##### 4.5.1 Quality Management Representative

In addition to normal responsibilities, the Quality Management Representative is responsible for:

- Ensuring the establishment, implementation, and maintenance of the QMS
- Reporting QMS performance to senior management. Performance reporting shall include results of internal audits, adverse trends or indices related to non-conformance, quality objectives, and other key quality and operational indicators.
- Ensuring the promotion of awareness of customer requirements throughout the organization.
- Liaison with the notified body with respect to changes in the quality system.

##### 4.5.2 Product Compliance Representative

In addition to normal responsibilities, the Product Compliance Management Representative is responsible for.

- Coordination of activities with respect to hazardous area products.
- Liaison with the notified body with respect to any changes to design or technical documentation related to an EC Type Certificate.
- Initial approval and changes to related drawings and authorizing of concessions for product compliance.
- Communicating special conditions of safe use and any certificate schedule limitations with customers.

##### 4.5.3 Environmental Health and Safety Representative

In addition to normal responsibilities, the Environmental Health and Safety Representative is responsible for:

- Ensuring the establishment, implementation, and maintenance of the ESHMS

- Reporting ESHMS performance to senior management. Performance reporting shall include results of internal audits, adverse trends or indices related to non-conformance, ES&H objectives and targets, and other key ES&H and operational indicators.
- Ensuring the promotion of awareness of ES&H legal and other requirements throughout the organization.

## 4.6 Communications

### 4.6.1 Internal Communication

Kaiser communicates information internally regarding our QMS and its effectiveness, through documented training, internal audit reports, and continual improvement processes. All managers are responsible for establishing regular formal and informal communications as needed to convey to their employees the relevance and importance of their activities. Typically, this information is conveyed through team meetings and cross-functional improvement projects.

Communications regarding how employees contribute to the achievement of objectives are also conveyed and reinforced during employee performance reviews. Issues pertaining to our QMS that may be communicated internally include:

- Day-to-day operations and general awareness;
- Quality Policy;
- Information on achieving objectives and targets;
- Risk and opportunities.

Top management and their direct reports are responsible for communicating the corporate policies, as well as, the importance of meeting customer, statutory and regulatory requirements to employees within their respective departments. They ensure the quality policy is understood and applied to the daily work of the organization through the establishment of measurable goals and objectives. Internal communication occurs on an on-going basis and is achieved through various mechanisms as appropriate:

- Regular meetings and briefings;
- Training sessions and training material;
- Display boards, memorandums, letters;
- Website, intranet, internal emails;
- Product and process performance data analysis and audit results;
- Targets, objectives, scorecards, KPIs, management system manual and procedures;
- Corrective action and non-conformance reports;
- Minutes of ad-hoc and scheduled meetings.

Refer to document 4004747 (Communication Plan) for guidance on avenues to communicate specific information at Kaiser.

### 4.6.2 External Communication

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Kaiser determines the need to communicate information externally to interested parties, as defined in Section 4.2, regarding the effectiveness of the QMS/EHSMS. In most instances, external interested parties (such as customers, stockholders, neighboring communities, etc.) are the main driving force for the organization to implement its QMSEHSMS. The various processes or means of external communication may include as appropriate:

Interested Parties	Needs & Expectations	Possible modes of Communication
<b>Customers</b>	Price, reliability & value	Publications in the media and focus groups
<b>Owner/shareholders</b>	Profitability & growth	Annual reports or newsletters of performance
<b>Suppliers</b>	Beneficial relationships	Publications on Kaisers website, meetings or questionnaires
<b>Regulatory &amp; statutory</b>	Compliance & reporting	Regulatory compliance submissions or results of audits.

Kaiser ensures that all external communications are authorized prior to release. Where required, advice appropriate to the context of the communication may be sought concerning the content and dissemination of certain external communications. Responses to external communications are recorded if they are transmitted by email or letter. In each case the response is retained and controlled in accordance with the requirements for documented information.

Where necessary to communicate externally for EHSMS purposes those communications shall be documented on company letterhead.

#### 4.7 Documents and Records control

The control of documents of all forms throughout the plant ensure that employees are following the most recent work instructions, vendors are building to the most recent drawings, specifications of the product are controlled, etc. Refer to SP-4230 (Document Control) and AA-ADM-P-112 (Records Retention and Destruction Policy) for additional guidance.

Kaiser ensures that their QMS includes the documented information that is required to be maintained and retained by ISO 9001, and additionally, any documented information identified by the organization that demonstrates the effective operation of the QMS. Kaiser applies the following criteria to all types of documented information to assess whether the information is necessary for demonstrating the effectiveness of its QMS, and whether it should be formally controlled.

- Communicates a message internally or externally;
- Provides evidence of process and product conformity;
  - Provides evidence that planned outputs were achieved;
  - Provides knowledge sharing.

Should any of the above criteria apply, Kaiser ensures that this information is retained and/or maintained as a form of 'documented information'.

##### 4.7.1 Creating and Updating Documents

Kaiser ensures that when we create documented information it is appropriately identified and described (e.g. title, date, author, reference number) and is available in an appropriate format (e.g. language, software version, graphics, etc.) and on an appropriate media (e.g. paper, electronic). All documented information is reviewed and approved for suitability and adequacy.

#### 4.7.2 Records Management

The corporate information of Kaiser is important to how it conducts business and manages employees. International, federal, and state laws, as well as, other regulatory authorities require Kaiser to retain certain records for certain specified periods of time and to destroy certain protected information (personal and otherwise) after certain specified periods or circumstances, or upon request. The accidental or intentional destruction of records during a period of required retention, or the failure to destroy records when required to do so, could result in consequences for Kaiser and/or its employees, including but not limited to:

- Fines and penalties;
- Loss of rights;
- Obstruction of justice charges;
- Inference of spoliation of evidence and spoliation of tort claims;
- Contempt of court charges; and
- Disadvantages in litigation and other legal proceedings.

In addition, Kaiser maintains certain records because they contain information that:

- Serves as Kaiser's official corporate records;
- Has enduring business value; or
- Must be kept satisfying legal, accounting, or other regulatory requirements.

### 4.8 Resources Management

It is the responsibility of department manager to ensure that the resources needed to achieve Kaisers objectives, including implementing, maintaining and improving the QMS and ESHMS and their policies, and enhancing customer satisfaction or environmental health and safety performance, are identified during the planning processes. Resource requirements are usually planned during the budgeting process and adjusted during the year in response to sales growth, profit plans, capacity constraints, changing customer or regulatory requirements and other internal needs. Management reviews the adequacy of resources and makes adjustment based on identified business needs.

#### 4.8.1 People and Competence

Kaiser has a system to ensure that personnel performing work affecting product quality are competent based on appropriate education, training, skills and experience. This is accomplished by having a sound new hire selection and orientation process. Each employee is trained on changes and updates to the QMS and/or ESHMS. Additionally, training is provided in areas such as Ethics, EH&S and the like. Where necessary, employees are provided with specialized

training require to serve a specific need of the company. These types of trainings can include auditor training, advanced environmental training, Automated External Defibrillator (AED) training, Statistical Process Controls (SPC), etc. Refer to SP-6200 Training.

#### 4.8.2 Organizational Knowledge

Kaiser has a system to ensure that the organizational knowledge is maintained. As needs change this knowledge will be evaluated and adjustments are made as required.

### 4.9 Infrastructure and Environment for the Operation of Processes

Kaiser strives to maintain and continually improve upon a work environment that fosters a positive influence on motivation, satisfaction, product safety, ergonomics, heat, light, humidity, airflow, hygiene, cleanliness, noise, vibration and other forms of pollution. Facilities, including workstations and associated equipment, are maintained in a state of order, cleanliness, and repair appropriate to the product or service being provided. All work areas must comply with established safety, regulatory and environmental standards and codes.

#### 4.9.1 Infrastructure

Kaiser has a formal preventative maintenance program for all production equipment, relevant utilities / building equipment, company vehicles, production forklifts, and all supporting hardware and software for the organization. Refer to SP-6300 Preventative Maintenance.

## 5. Product Realization

Kaiser has a planning process that ensures all quality objectives and product requirements have been determined; all processes, documents and resources have been provided; and all process and product measurements have been identified and documented with reference to all associated records. All processes associated with significant environmental safety and health impacts have been identified and the operating criteria called out in the process. Refer to Appendix A for visual representation of the sequence and interaction of Kaiser processes.

### 5.1 Control of Externally provided Processes, Products & Services

Kaiser ensures that all outsourced processes (including weldments, painting, anti-reflectivity coating, fiber cable assembly and part modifications) are monitored through part specifications and vendor item-controlled drawings as necessary. Any outsourced parts contain appropriate identification and traceability and are validated by subsequent monitoring and measurement during their production processes. Furthermore, Kaiser monitors outsourced vendors using their Supplier Qualification (CP-7401) and Purchasing (CP-7400) processes, and any product found to be nonconforming (NC) is captured by our NC Product (SP-8300) process.

Suppliers of key components and services are encouraged, and may be required, to implement an ISO 9001 QMS, and have their systems certified by an accredited registrar. Purchasing and Quality jointly decide which suppliers shall be required to be ISO 9001 registered. When applicable, suppliers are

notified to implement and register, within a given timeframe, an ISO 9001 QMS and to regularly report on their progress toward achieving this goal. Due to fact that Kaiser has been in operation of over 30 years and it's Quality Management System has only been in place since 2005; Kaiser has grandfathered the qualification of some vendors.

## 5.2 Supplier Initiated Changes

Kaiser ensures that for contracts that require it, customers will be notified prior to any change and obtain written approval prior to shipping products with changes in product, processes, components, sub-suppliers/sub-contractors, manufacturing facility locations, packaging, shipping method or outside processors. Kaiser will also provide (on contracts that require it) notification of any change in top management, ownership, QMS, a major change in the number of employees, or resources used to provide product or materials.

## 5.3 Production & Service Provision

To control the planning, administrative support and implementation of work, Kaisers policy is to describe work methods, the controls applied; and the records required. The process control activities are similar with many aspects that also relate to quality control. The following controlled conditions are applied where applicable:

- Quality control check are performed;
- Evidence of completed inspections;
- Detailed process work instructions and specifications for all products;
- Criteria for workmanship and competence.

In cases where special processes are employed where the results cannot be easily checked, including processes where deficiencies become apparent only after the component is in use, validation demonstrates the ability of these process to achieve planned results by:

- Defining qualification criteria and approval of special processes (deviations) prior to use;
- Defining criteria for review and approval of the processes;
- Approval of equipment and qualification of personnel;
- Requirements for records;
- Revalidation.

Kaiser ensures appropriate identification and traceability of product at all stages of product realization: e.g. at receiving, inventory, work in process, inspection, testing, finished goods, shipping and delivery. This system includes the following at a minimum: part numbers, lot numbers, work order numbers, sales order numbers, project numbers, etc.

## 5.4 Measurement Traceability

Kaiser has many areas within the production process where measurement traceability is required. Kaiser also provides calibration/verification services for those customers that request it on the Raman



Holographic Calibration Accessory (HCA) product line. This product is used to validate the performance of Kaiser Raman Systems.

#### 5.4.1 Measurement Traceability for Production Lines

Kaiser maintains a calibration program for those tools within the manufacturing line that require regular calibration. These tools and equipment will be marked with a calibration identifier. For those tools and equipment that do not require calibration, for what ever reason, they will either have a "For Reference Only" sticker or not be marked at all.

#### 5.4.2 Measurement Traceability for HCA Products

Kaiser has designed and built an HCA calibration system supporting maintaining the performance of our customers purchased products. While Kaiser is not certified to ISO 17025, the HCA Calibration program strives to meet as many of the requirements of that standard as possible. The source equipment on this calibration station is regularly sent to NIST for validation as the verification source. Kaiser provides effective documentation to the customer base on their HCA to meet their own internal measurement traceability requirements.

### 5.5 Customer Owned Property or External Providers

Customer property, including products, tooling, equipment, returnable packaging, and intellectual property, is normally identified, verified, stored, used, and controlled in the same manner as company-owned property, unless there are other specific requirements. Customer property is also entered into the Customer Property Log (F-7540-01) for purposes of identification and traceability. Customer-owned tooling and equipment are also tagged so that the ownership of each item is visible; and can be determined.

Products (including purchased material and components, customer-owned products, parts and subassemblies, and the finished products) are protected and preserved during all stages of production, packaging, storage, and delivery to the intended destination.

### 5.6 Product Design and Development

The development of new products is of decisive importance for the future of Kaiser. The goal of development is the realization of products with characteristics recognizable by and relevant to customers and this at the lowest possible cost and the shortest development period. In addition, the process is to create the possibility of leading development projects to success in a reproducible fashion. Kaiser utilizes a Product Lifecycle Management System (PLCM) that supports this concept.

PLCM is an approach for innovation, new product development, product introduction, product information management and product phase out. The process systematically transfers general market and specific customer requirements into product specifications and assures sustainable product quality.

PLCM is an all-encompassing strategic business architecture that applies a consistent set of business solutions in support of the collaborative creation, management, dissemination, and use of product definition information across the extended enterprise and spanning from ideation to end of life of the

product, integrating people, processes, business systems, and information. PLCM forms the product information backbone for the company and its extended enterprise.

The PLCM, implemented by Kaiser, sufficiently provides for flexibility to cover small scale and large-scale projects. Its principal purposes are:

- Define a clear process for New Product Developments from idea/concept through business case, delivery to customer and ongoing management.
- Sets out the process by which all products are to be managed and monitored.
- Gives support and guidance to product teams to ensure a consistent approach.
- Provides templates, checklists and toolkits for best practice.
- Details roles and responsibilities for parties involved, governance, and authorization steps.
- Provides a reference source for management disciplines.

Kaiser's PLCM is supported by several Core Design processes each designed to implement specific sections of the overall PLCM process. Appendix "B" provides a basic flow of the PLCM process at Kaiser.

## 6. Measurement, Analysis and Continual Improvement

Kaiser's methodology for planning and implementing measurement, analysis, and improvement integrates the DMAIC (Define, Measure, Analyze, Improve, Control) approach into the fabric of the QMS (see figure 4), and integrates use of Deming's Plan, Do, Check, Act concepts where appropriate. Process owners and process users are familiar with basic statistical concepts, such as variation, stability, process capability, and over-adjustment, as appropriate. Where applicable, explanation and discussion of these concepts is included in individual training.

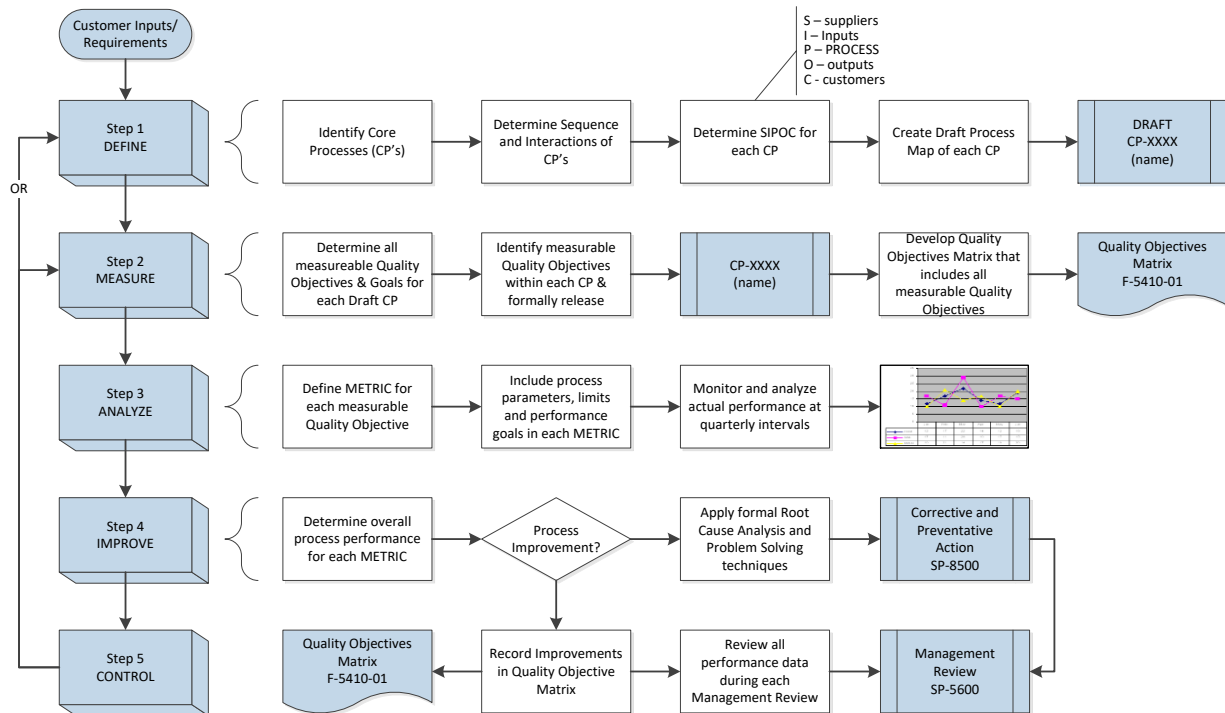


Figure 4: DMAIC structure

Kaiser has defined process measurables (in the form of quality and/or ES&H objectives and metrics) within each process of the QMS/ESHMS as necessary to ensure effectiveness of the process. Furthermore, QMS/ESHMS processes are monitored by a variety of approaches and techniques, as appropriate for a particular process and its importance. These include:

- Internal audits.
- Monitoring trends in corrective and preventative action requests.
- Measuring product conformity and monitoring quality performance data and trends (quality objectives and associated metrics).
- Measuring and monitoring customer satisfaction.
- Measuring actual parameter outputs to legal limits.

When a process does not conform to requirements, corrective action is initiated to address the problem.

## 6.1 Release of Products and Services

Kaiser has defined and depicted in-process and final inspection criteria for product measurement at specific points within each production process. All product that does not meet the defined inspection criteria is processed through the NC Product process (SP-8300).

## 6.2 Analysis and Evaluation

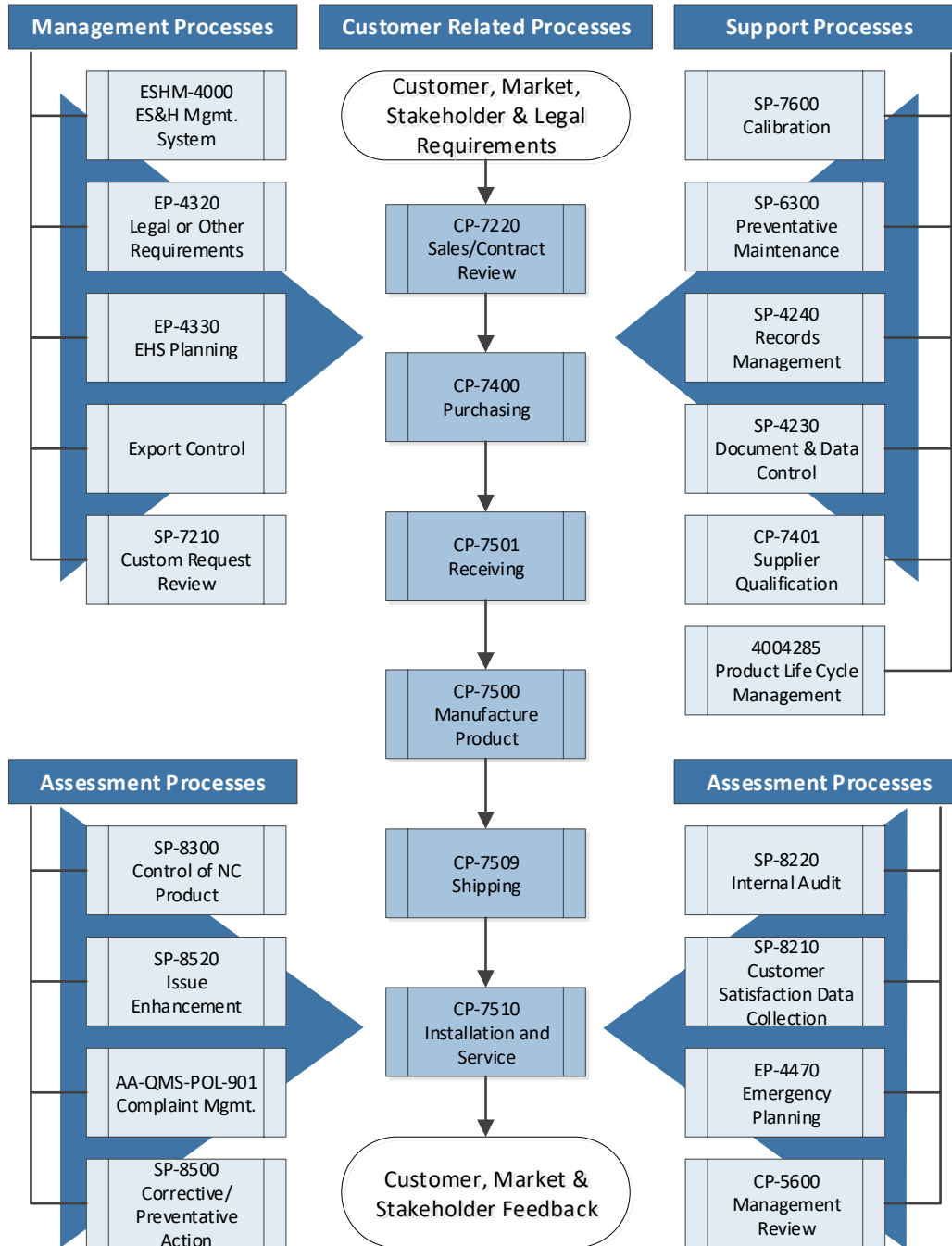
Kaiser determines, collects and analyzes appropriate data to demonstrate the suitability and effectiveness of the QMS and/or ESHMS to evaluate where continual improvement can be made. The main areas of focus are: suppliers, internal process metrics, sustainability footprint and customer experience. These data are used to determine; trends, customer satisfaction, interested party feedback, process effectiveness and efficiency, supplier contribution, quality objective performance, benchmarking, and competitiveness.

## 6.3 Continual Improvement

Kaiser continually seeks to improve the effectiveness and efficiency of the QMS and ESHMS through use of the quality and environmental safety and health policy, quality objectives, ES&H objectives and targets audit results, analysis of data, corrective and preventative actions and management review. Internal audit results and quality performance data are analyzed by management review to assess the effectiveness of the QMS/ESHMS and current organizational performance. Opportunities and priorities for improvement are identified by comparing present quality, safety, and environmental performance to goals and aspirations defined in the quality or environmental safety and health policy. Improvement projects are defined either as corrective and preventative actions or as quality or ES&H objectives.

**APPENDIX "A"**

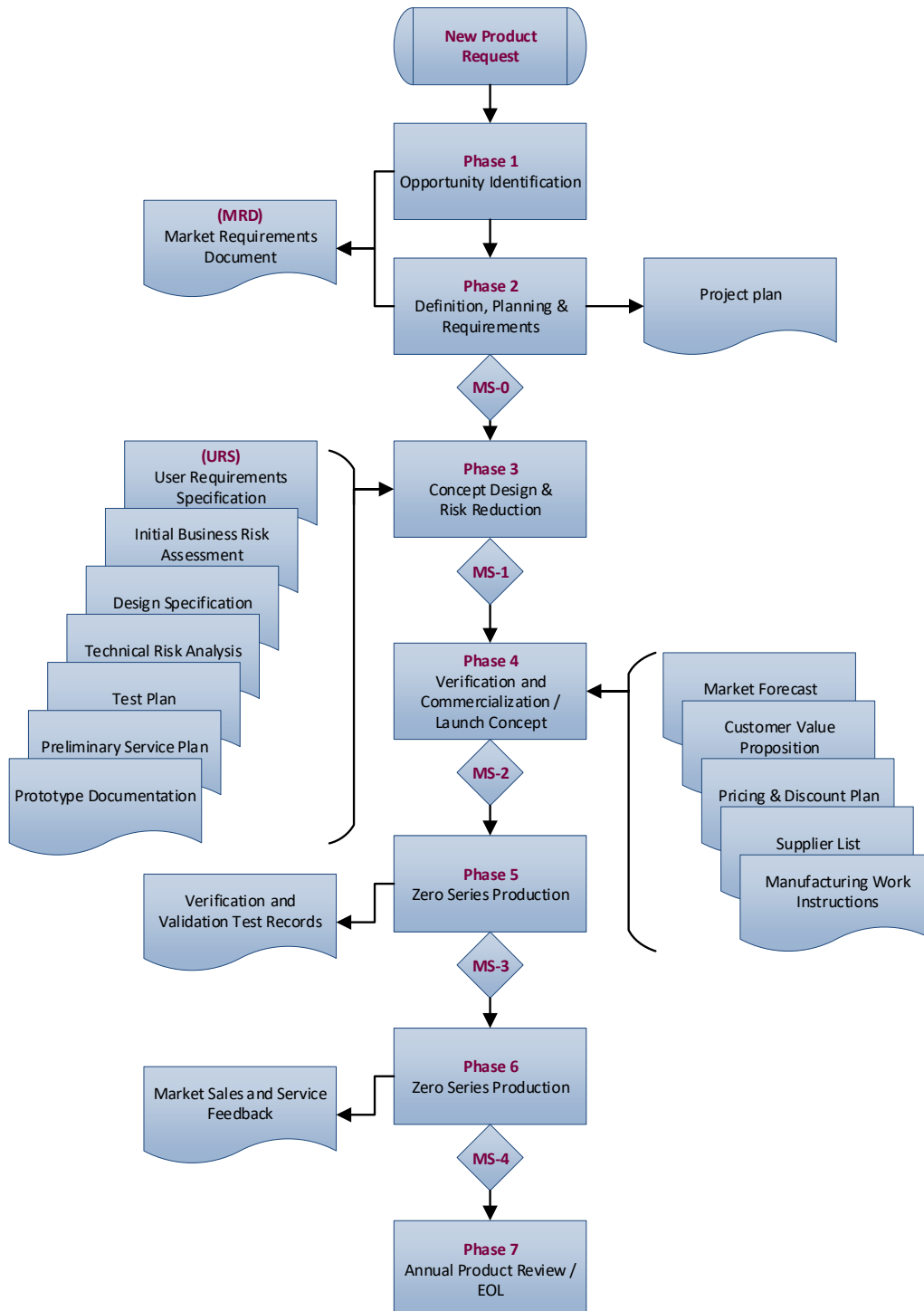
Sequence and Interaction of Processes



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**APPENDIX "B"**

**Product Life Cycle Management Process**



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