Quality Management System Implementation at KELTEC–A Case Study

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ABSTRACT

The scenario of quality is expanding exponentially. In the present-day world, quality is now in the driver's seat. With this globalisation of industrial products, many problems and opportunities have risen, primarily due to inconsistent standards existing in the market. The International Standards Organisation has tried (and seem to be very successful in doing so) to standardise a minimum level of quality norms. These norms act as the foundation to implements total quality management (TQM). TQM has been identified as a philosophy of interdependent characteristics, such as customer focus, commitment, measurement, systematic support, and continuous improvement. This paper presents a case study on the implementation of ISO 9002: 1994 at Kerala Hitech Industries (KELTEC), with the benefits, hurdles faced, and shortcomings. Upgradation of KELTEC's quality management system to the requirements of ISO 9001: 2000 is currently under progress.

Keywords: Quality management system, KELTEC, total quality management, ISO 9000 certification, ISO 9000 quality system, quality control

1. INTRODUCTION

1.1 ISO 9000 Quality System

ISO 9000 is a set of quality system standards and guidlines internationally accepted. These guidelines and procedures help industry/service organisation to achieve a very high level of quality in its products/services. These standards must be met to achieve ISO 9000 certification.

At present, the International Organisation for Standardisation (ISO) is the specialised international agency for standardisation, comprising the national standards bodies of more than 90 countries, including India. ISO is made up of approximately 180 technical committees. Each technical committee is responsible for one of the many areas of specialisation. The objective of ISO is to promote the development of standardisation and related activities globally with a view to facilitate international exchange of goods and services and to develop cooperation in the sphere of scientific, technological and economical activities. The outcome of ISO technical work is published as international standards.

1.1.1 *Salient Features*

*   Products cannot meet ISO 9000 as it is not a product standard. It does not contain any requirement with which a product or service can comply. ISO 9000 standards pertain to the quality management system in an organisation.

*   It is not a mandatory system. It is not a government regulation. It is a very important customer regulation.

- ISO certification is not a permanent certificate. Quality audit is to be done by independent assessors once in every three or six months.

- It provides a platform for continuous improvement in quality.

- It covers the whole quality-management system, right from identification of customers' needs, to ensuring customers' satisfaction by supplying the required product/service. That is, it includes non-manufacturing areas as well.

1.2 Significance of ISO 9000 Certification

- *Competitive edge*: Competition will force you to get it; customers will require suppliers to get ISO 9000 certifications, especially in global markets.

- *Export promotion*: European community comprising 12 members has already adopted the ISO 9000 as its quality system standard. Europe accounts for 25 per cent of India's exports. All contracts in Hong Kong must have ISO 9000 system standards. It has become pre-qualification for bidding in international markets.

- *Changing customers' needs and credibility*: Customers' needs are changing fast. Hence, product credibility alone is not enough. The systems should be credible to deliver what the customers want. ISO 9000 is thus a credibility passport.

- *Marketing advantages*: ISO 9000 is a powerful marketing weapon. A company with ISO 9000 certification has a distinct competitive edge.

- *Organisational efficiency and increased profits*: ISO 9000 streamlines and improves the working environment in the organisation. There is better job-satisfaction, and increased self-confidence in the employees. Panic, hassle, and confusion are eliminated. Rejects, re-work, and scrap are far less. Administrative error, delivery-failures and sales return diminish sharply. Inspection and testing are minimum. Thus ISO 9000 helps to cut costs and improve profits.

- *Quality improvement down the line*: ISO 9000 series certified organisations can motivate their suppliers to go for ISO 9000, thereby contributing to chain of quality improvements.

- *International product recognition*: ISO 9000 facilitates mutual recognition of any product legally produced or marketed in one country, to be accepted, in principle, in another country. It helps to harmonise technical specifications.
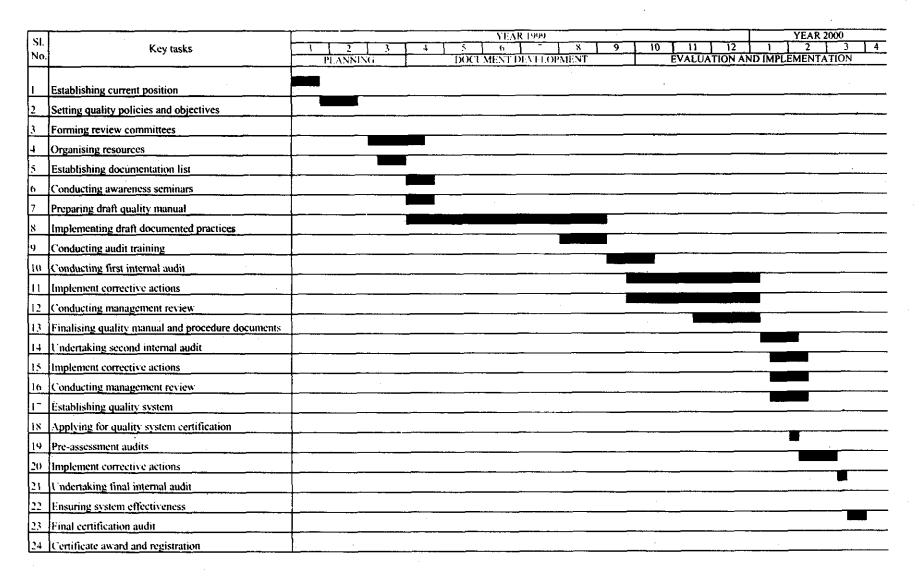
2. MANAGING QUALITY SYSTEM DEVELOPMENT

The development of the quality system involves orchestration, coordination, and direction of resources and activities towards a common goal; and this requires the art of management. This involves planning the development, organising the resources, developing the system, and controlling the development.

A typical quality system development programme involves the following key tasks(refer Fig. 1):

- Establish current position

- Setup purpose and objectives

- Form and conduct steering group meetings

- Organise resources and appoint key staff

- Define business processes

- Establish documentation lists

- Conduct awareness seminars

- Prepare document specifications

- Draft quality policy manual

- Draft control procedures

- Draft operating procedures and standards

- Implement documented practices

- Conduct audit training

- Finalise quality policy manual

- Undertake audit programme

Figure 1. Graph showing quality system development programme

Sl. No.	Key tasks	YEAR 1999												YEAR 2000			
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
		PLANNING			DOCUMENT DEVELOPMENT						EVALUATION AND IMPLEMENTATION						
1	Establishing current position	▰															
2	Setting quality policies and objectives		▰														
3	Forming review committees																
4	Organising resources			▰													
5	Establishing documentation list			▰													
6	Conducting awareness seminars				▰												
7	Preparing draft quality manual				▰												
8	Implementing draft documented practices				▰▰▰▰▰▰▰												
9	Conducting audit training							▰									
10	Conducting first internal audit								▰								
11	Implement corrective actions										▰▰▰						
12	Conducting management review										▰▰▰						
13	Finalising quality manual and procedure documents											▰▰					
14	Undertaking second internal audit												▰				
15	Implement corrective actions												▰				
16	Conducting management review												▰				
17	Establishing quality system												▰				
18	Applying for quality system certification													▰			
19	Pre-assessment audits													▰			
20	Implement corrective actions													▰			
21	Undertaking final internal audit														▰		
22	Ensuring system effectiveness															▰	
23	Final certification audit															▰	
24	Certificate award and registration																

- Conduct management reviews

- Prepare documents for various procedures

- Apply for quality system certification

- Conduct pre-assessment audit

- Undertake corrective action

- Formal assessment

- Certification award and registration.

3. IMPLEMENTATION AT KELTEC

3.1 Company Profile

Kerala Hitech Industries Ltd, (KELTEC), is engaged in the manufacture of aerospace products invloving parts, sub-assemblies, and system having complex machining requirements, critical weld joints of low margin of safely, requiring stringent heat treatment, surface treatment, and metal forming processes.

These requirements are met by modern manufacturing facilities consisting of computer numerically controlled (CNC) and conventional machines, metal forming equipment, automatic computer-controlled tungsten inert gas welding machine, electron beam welding machine, microprocessor-controlled pit furnace, vaccum furnace, surface treatment facility for anodising, chromium plating, etc.

This is equally well supported by a modern quality control division with metrology, NDT lab, mechanical testing and pressure testing facility having state-of-the-art equipment. Their major customers include Indian Space Research Organisation, Defence Research and Development Laboratory, Gas Turbine Research Establishment, and Hindustan Aeronautics Limited. The products are generally manufactured as per customer's design and specification. Because of prototype designs, complex requirements for small batch quantity, different types of advanced materials and tight schedule of delivery, certain deviations on the products are not available during pre-production/post-production stages. These are resolved in consultation with experts from the customer side. For the effective implementation of quality system, KELTEC followed a systematic approach.

3.1.1 Stages of Implementation

To determine the current position, one has to assess their performance in a number of key areas, such as customers' complaints, receipt rejects, assembly rejects, test failures, time to process product or information, and above all, the quality cost.

For self-assessment, KELTEC adopted the strength, weakness ,opportunity, threats (SWOT) analysis carried out by the top-level management, comprising the managing director, the general managers, and all the functional heads.

The strengths and weaknesses in each of the following areas were assessed:

- Management style

- Technology

- Relationship with customers, suppliers, and employees

- Quality awareness

- Organisation

- Inter-functional communications

- Performance measurement

- Handling problems.

In spite of certain shortcomings, the overall environment in the organisation was found conductive to the implementation of ISO 9000 quality system. Since product design function is not relevant to this organisation, the management decided to work towards ISO 9002 certification.

3.2 Setting Quality Policy & Objectives

As the initial step towards implementing ISO 9000 quality system, the management decided to establish the quality policy and quality objectives.

It was decided that the quality policy should be expressed in one sentence so that the employees can remember and understand it easily. After many

deliberations, the quality policy finalised was: 'customer satisfaction through continuous quality improvement'.

It was decided to display the quality policy at different locations in all the departments to ensure that this policy is understood, implemented and maintained at all levels in this organisation.

The objective of the quality system is:

(a) To have a disciplined approach during production through proper process, tooling, measurements, and analysis to eliminate non-conformances and wastage as much as possible.

(b) To work as a team so as to achieve leadership in quality.

(c) To bring awareness among individuals so that the quality is built in the products by everyone by untiring approach.

3.3 Forming Review Committees & Conducting Meetings

The effectiveness of any planned system requires corrections and improvements in the connected procedures. This can be done by reviving the shortcomings observed during implementation stages of the system. Improvement is a continuous process which leads towards perfection. To understand the shortcomings, to have effective interaction, and to do necessary corrections, periodic management reviews are essential.

To conduct the periodic management review, standing review committee and the management review committee were formed.

3.3.1 *Standing Review Committee*

Standing review committee meeting is held at least once in a fortnight. The members include all general managers, functional managers, lead internal auditor and concerned invitees. This is chaired by the management representative. The management representatives at KELTEC is general manager (design).

The general topics are:

(a) To review quality system implementation progress, monitoring and controlling

(b) To review information received through other sources on the shortcomings of the system

(c) To review and approve the amendments to the documents put by the issuing officer

(d) To review the resources requirements

(e) To review the satisfactory implementation of the corrective actions identified in previous meetings, if any.

3.3.2 *Management Review Committee*

Management review committee meeting is held at least once in two months. The members include management representatives, general managers, lead internal auditor, functional managers and concerned invitees. This is chaired by the managing director.

The general topics are:

(a) To review effectiveness of the quality system being practiced

(b) To review management issues and resource requirements

(c) To review the corrective actions taken for the problems identified.

The input for the above reviews include:

• Internal/external quality audit reports

• Customers' complaints

• Monthly reports, etc.

The management representatives closely follow up the implementation of the decisions taken in the Management Review Meetings.

The minutes of both the standing review committee and the management review committee meetings are duly recorded and maintained.

3.4 Organising Resources

Once the activities are planned, it is required to determine the resources required in terms of funds, manpower, equipment, materials, space, etc. A development budget is to be established and means provided to mobilise the finance.

3.5 Establishing Document List

It was decided that the structure of documentation sytem at KELTEC will be a three-tier system as shown:

* LEVEL 1 – Quality manual

* LEVEL 2 – Overall procedures–shop-wise, entity-wise

.* LEVEL 3 – Procedure documents relevant to instrument, calibrations, NDT procedure, work instructions, etc.

The respective department heads were entrusted with the responsibility of generating the relevent documents in consultation with the functional heads. After deliberations, the structure of the documentation system was finalised (Table 1).

3.6 Conducting Awareness Seminars

The management decided to conduct awareness programmes at all levels in the organisation (from top-level management to operators) to make them aware of the relevance and benefits of quality system and ISO 9000 standards.

The standardisation, testing, and quality control (STQC) under Electronic Regional Test Laboratory (ERTL) assisted KELTEC in conducting awareness seminars. The administrative officer was entrusted with the responsibility of ensuring that the awareness programmes are conducted for all the levels in the organisation.

Table 1. Structure of the document system at KELTEC

	Resource consultants	Justification	Budget allocation
Space	Sufficient racks for storing raw materials, finished products, etc. non-available in the following departments: - Fabrication - Quality - Production shop - Surface treatment	For compliance of raw material/product identification and traceability and to ensure orderliness	Rs 60,000 Total quantity of MS rounds required 470 kg. Rs 14,100
Raw material	Raw materials required for machine tool calibration not available	This is a requirement for system implementation	
Equipment calibration	Equipment calibration is required (10 Nos.) (not possible in-house)	This is a requirement for system implementation	Rs 60,550
Tool shortage	Toolings/fixtures which are not in use lying in shop floor (200 Nos.) No seperate storage space for these tools and most of these are customers' properties	These toolings/fixtures are to be traced out any time, either for returning to customer or while receiving repeat orders. Hence, trace-ability is very important.	A seperate space with roof covering requires Rs 2,34,650
Manpower	Manpower constraints found in the following departments: (i) Stores (ii) Fabrication	For effective stores function for indenting, correspondence, loading, unloading, issue of materials, recording maintenance, clearance, and packing.	

3.7 Preparing Draft Quality Manual, Control Procedures & Operating Procedures

3.7.1 *Quality Manual*

A quality manual should consist of references to the documented quality system procedures intended for the overall planning and administration of activities which impart quality within an organisation. It should also cover all the applicable elements of the quality system standards adopted.

At KELTEC, responsibility for preparation, distribution, and issue and control of the manual was entrusted with the management representatives.

KELTEC Quality System Manual (KQSM) consists of: (i) title, (ii) table of contents, (iii) company profiles, (iv) introduction to the manual, (v) quality policy and objectives of the organisation, (vi) description of the organisational structure, responsibilities, (vii) description of the elements of the quality system, ie., the 19 clauses as applicable to ISO 9002 Quality System Standards* and any references to documented quality system procedures.

3.7.2 *Control Procedure Documents*

The responsibility for preparation, review, and approval, amendments, issue and control of other procedure documents was entrusted with the respective departmental heads. The procedure documents were prepared consistent with the requirements of ISO 9000 standards and it's stated quality policy. Each procedure document contains some or all of the following elements:

(a) A flow chart of the procedure depicting the regulations and decisions, input and interfaces with other procedures

(b) A paragraph describing the action and decisions required

(c) The minimum information and equipment needed to perform each activity or to make each decision

(d) The criteria for making decisions

(e) The criteria for choosing optimal routes

(f) The entry conditions for starting the procedure, in terms of the minimum input and approvals to be obtained before the commencement of an activity

(g) The exit condition for ending the procedure, in terms of the minimum output and approval to be obtained

(h) The routing instructions for information or products

(i) Precautions needed, if any, to prevent rejections, errors, etc.

(j) Rules that have to be followed to ensure that the task is carried out in a uniform manner.

(k) Controls needed to verify the quality of any product with feedback loops

(l) Controls needed to verify that the procedure achieves its purpose and that critical activities and decisions are taken when rquired

(m) Any form to be completed, together with form-filling instructions and responsibilities, the numbering system to be used, and the registers/log books to be maintained.

(n) Cross-reference to other documents in which supplementary information can be found.

Responsibility for preparing the operating procedures documents was entrusted with the respective departmental heads/focal points. These documents contain detailed work instructions pertaining to respective procedures.

3.8 Implementing Draft Documented Particles in Respective Shops

The resepective officers issuing the documents were given the responsibility to hold reviews in their functional area and device methods for their implementation.

The general managers prepared the training course material for their respective departments. Small groups of technicians were formed and group discussions, coordinated by general manager and organised by engineers, were conducted. The course material was communicated to the operators in

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* Clause 4.4 and 4.19–design control and servicing is not applicable to KELTEC.

the local language. This training programme was subjected to periodic reviews.

To measure the effectiveness of the implementation, a feedback mechanism was introduced. A slip was circulated along with each job card (a card showing the production route and moving along with the job). On the slip, the employees were asked to put down the non-conformances observed during the implementation to the documented practices. The management representative was responsible for undertaking corrective and preventive actions for closing all non-conformances traced through the feedback proforma. This was done either by: amending the document to suit the existing practice or instructing the employees to adapt themselves to the documented requirements.

3.9 Conducting Audit Training

A team of 15 engineers were selected as internal auditors to carry out internal quality audit, not related to their work area. It was decided to keep the team in rotation. The ERTL conducted the awareness programme and training for the internal auditors. Mock-up audit were also conducted to aid the training. One of the members of the team functioned as the lead auditor to lead this team and organise sub-groups to carry out the audit in different areas.

3.9.1 *Undertaking First Internal Audit*

The purpose of quality audits is to establish, by unbiased means, factual information on quality performance. A person was appointed in each department as the focal point for assisting the internal auditors to carry out audit and to ensure easy identification of non-conformances and quick implementation of corrective action. The first internal quality audit was undertaken in October 1999. The auditor's observations were recorded in the audit report format.

More attention was given to clauses/areas having frequency of non-conformance above a particular baseline (the base line was selected on the assumption that those areas which are below the line require

lesser efforts to be brought to the level of compliance to the implemented quality system).

4. BENEFITS OF ISO 9000 CERTIFICATION

There are manifold benefits, direct as well as indirect, resulting from ISO 9000 quality system standards. Some of these are:

- It provides a competitive edge in the domestic and global markets.

- It provides a platform for consistent improvement in quality.

- It reduces waste and repair, enhancing profits in turn.

- It maintains streamlined records.

- It maintains streamlined material–handling and storage.

- It changes the attitude of workforce, the result is the improved housekeeping, work atmosphere, and quality awareness.

- Process of quality improvement is maintained.

- Products up to the required quality at the first instance, no re-work and nothing for rectification.

- ISO 9000 gives international recognition on ability, credibility, and expertise, thereby increasing the number of customers.

- Supplier without ISO certification can face higher insurance rates, or even denied insurance in some markets.

- Suppliers potentially gain from a decrease in the assessment enquiries and visits, and this may be a factor of offset against the cost of ISO 9000 to meet customers' insistence.

- A restricted range of close suppliers is generally considered to be more effective in the long run.

- Obtaining ISO 9000 may open up new business, particularly to smaller companies which obtain the standard. The standard is a public commitment to take issues seriously.

- ISO 9000 is an international standard, and this aspect may offer marketing advantages overseas.

- The standard provides a model for a quality system which, if implemented properly, should produce benefits, whether or not it is assessed independently.

- It gives an additional incentive for adhering to the system; assessment and surveillance ensure that the system is followed all the time, and not just when it is easy to do.

- One important benefit that is often missed is that the process of obtaining ISO 9000 can have a strong positive effect. The staff at all levels in a company will be deeply invloved in designing an effective system and will share the sense of achievement on obtaining the standard.

- The commitment to solving problems and the specific mechanisms provided in a quality system will also encourage long-term participation.

5. NEED FOR CHANGE–REVISING STANDARDS PERIODICALLY

- ISO protocol requires standards review after every five years

- Current 20–element model is more oriented towards manufacturing (requirement generic in nature)

- Results of survey done on 1120 users depict:

  - Process-oriented management

  - Should have standard which looks beyond certification, i.e., continual improvement

  - Should not have manufacturing focus

  - Should be compatible to ISO - 14000 structure

  - ISO 9000 (for effectiveness) should be having same numbering system, that of ISO 9004 (for effectiveness and efficiency) consistent pair of standards.

6. SUMMARY OF CHANGES

- Process model focus

  INTENT – A desired result is achieved more efficiently when related resources and activites are managed as processes.

- Supplier and sub-contractor terminology

- Quality objectives at each function and level (intent proper development)

- Legal requirements added

- Internal communication added

- Legibility, readily indentifiability and retrievability of documents added

- Agenda for management review includes product and process conformance analysis, needs of process and product audits, and resource allocation

- Management representative (s) will also ensure awareness of customers' requirements

- Ensure plan, do, check, act (PDCA) approach in procedure writing and putting measurable outputs in system-level the procedure to see that the purpose of procedure is met

- Channels for customer communication

- Impact of design changes

- The word specified from traceability removed as it can come from other requirements besides customer/contractual requirements

- Measurement of customer satisfaction and/or dissatisfaction

- Continual improvement

- Accuracy versus precision clarified

- Infrastructure and work environment made very elaborate.