

# QUALITY MANAGEMENT IN ENGINEERING PROJECTS

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## INTRODUCTION

As competition for engineering projects increases in a highly competitive business environment caused by changing market conditions and new technologies, the pressure is on industry to focus and improve the quality of its final products and services. Quality in the management of engineering projects has traditionally been associated with conforming to prevailing standards and practices. Gaining insights from customers is considered the bailiwick of sales and marketing staff. Quality management in the 1990s must start with a thorough understanding of the customers' requirements and end with the customers' evaluation of our performances against those requirements. Thus, quality management approach demands a dynamic, continuously improving performance to satisfy the customer by constantly and incrementally achieving higher quality products and services resulting in improvement in engineering project management practices, superior quality products, customer satisfaction and thus, enhance long-term competitiveness. The purpose of this paper is to present the implementation of a customer-focused quality management process to achieve total customer satisfaction by ensuring that the products and services delivered conform to customers' requirements as well as fully meet their expectations and needs. This can only be accomplished by implementing a

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quality improvement process and establishing a partnership based on mutual trust and confidence with the customers.

## **CUSTOMER FOCUSED APPROACH TO QUALITY MANAGEMENT PROCESS**

The process is a journey of continuous quality improvement from the customers' point of view ...ie... what the customers say quality is. It starts with an understanding of what customers require and how the competitors can give it to our customers. Consequently, to provide the customers with products and services that consistently meet their needs and expectations. Customers' needs are technical performance parameters, delivery on schedule and at acceptable cost so that the products or services delivered can solve their problems. Being customer-focused means using our own creativity to bring insights and expertise to help uncover and solve our customers' problems. Customers expectations are usually not stated, conditioned by the market and the competition. What the customers know, assume and recognize will be merged to become their expectations. Today's customers are a lot more demanding and have a lot more choices than before. Their expectations are high. Customers, in engineering quality management process, must include subcontractors. The quality of suppliers/subcontractors



management affects the final products or services we deliver to our customers. We must treat subcontractors as customers in all working stages particularly during front-end work. Thus, every task performed is a link in a chain of activities that winds its way from customer needs and expectations; the starting point of a company's marketing work, to customer satisfaction; the culmination of our combined effort. Each link in the chain right down to the end users is as important as the next. Engineering quality management, therefore, involves everyone in a company to continuously improve the work processes used to design and build the final products — those involved in marketing, engineering, manufacturing, procurement, construction, etc. It should be pro-active ...ie... it should prevent problems, not just take care of them after they happen. It means planning the requirements to do the job right the first time according to customers' project requirements. Every process is carried out by the person or individual who is in the best position to improve the process. Specific process changes will be implemented for ongoing customer-tailored improvement of processes and services to increase quality and meet the stringent requirements set by the customers. This should improve customer satisfaction, reduce the cost of operations and decrease the costs associated with scrap and rework. Customer-focused quality management process not only involves people to improve the tasks they must perform by doing it and

then doing it better, but also builds a good relationship with the customers based on trust by meeting the following customers' expectations:

1. Products or services offered will meet the customers' needs, delivered on time or earlier, according to the agreed to prices, demonstrated appropriate levels of reliability and safety.
2. Responsive, listen to feedback and provide an appropriate level of service.
3. Manage the work done by subcontractors and suppliers to ensure that the products and services they provide meet the requirements of those we deliver to our customers.
4. Being friendly to and interested in customer representatives, express courtesy and adherence to high ethical standards. Being open when contract or technical concerns are presented by the customers.
5. Listen to customers' problems seriously before proposing solutions. Address complaints quickly, seriously and respectfully.



6. Recognize the technical, cost and schedule pressures the customers face. Negotiate reasonable engineering change costs for products and services.
7. Take steps to correct and eliminate, as soon as possible, the cause of problems identified by the customers.

Quality management, towards our customers, means to conform to established requirements reflecting customers' needs and expectations. It is, however, our responsibility to flag unrealistic, unnecessary or inappropriate requirements in order to concentrate our effort on meeting actual customers' requirements on a project. The customers also expect engineering companies to have efficient subcontractors / suppliers management systems resulting in their final, acceptable products requirements. The management of subcontractors' activities is critical for any project's progress and success. Too often project objectives are not accomplished on time, meeting technical parameters and within prescribed budgets due to unsuccessful management of what suppliers and subcontractors are to deliver ...ie... the materials or services to support the accomplishment of project objectives of their main contractors. Correct quality requirements must be flowed down to subcontractors. Subcontractors, therefore, must strive to meet the main

contractor's needs. This requires a subcontractor-management process that has the following characteristics:

1. Work with subcontractors to agree on a continuous improving process. Identifying the process of how and when they interact to make a product or provide a service constantly changing in response to what our customers need and expect.
2. Work with subcontractors towards defining the management relationship.
3. Ensure subcontractors' management systems are understood.
4. Ensure their consistent understanding of specifications and early understanding of all aspects of designs / testings required.
5. Ensure all deliverables are agreed along with documentation and objective evidences.
6. Ensure subcontractor review process is agreed as well as agreement to a realistic cost / schedule plan.

7. Establish day-to-day team relationship to ensure timely delivery of a quality product ...ie... equipment, hardware, software and all associated documentation (specifications, drawings, design documents, etc.)

As a result, this process will help to improve quality on projects by allowing project staff to work closely with subcontractors to ensure that the products or services they provide fully meet the requirements of those to be delivered to the customers. In order to better the quality management process, engineering companies must provide the training, techniques and resources that their employees need to continuously improve their products and services. Employees at all levels of the project must be involved in making quality as part of their daily work process since any process could be improved because there is always a better way to do things. They must always participate in the drive to become customer-focused. This requires senior management's commitment and support which are extremely important for a project to become customer-focused. To obtain maximum results, the customer-focused mindset must invade the entire project's staff ...ie... people throughout the project must be involved in finding better ways to work, to challenge the status quo by applying their insights, experience and judgement to become more active participants than they have ever been before in order to make their paying customer their number one priority.



Every project's staff must be responsible for customer-focused quality management aspect of his/her work, through continuous improvement ...ie... the way one works, the ethical standards one follows, the internal systems and processes one uses, the way one serves the customers, the costs of improvements one makes, the productivity one achieves, the products and services one delivers to the customers to meet their stringent requirements, as well as the way one works with the other within the project team. Project team members must work on the presumption that engineering processes can be continuously improved over time to eliminate most errors and defects. Continuous improvements by each member represents a better, permanent change to a process which drives down the defect rate. Every reduction in the defect rate makes the process better and better, and enhances our ability to satisfy our customers. Quality management, therefore, encourages engineering excellence in the project rather than coping with the existence of errors which must be corrected resulting in cost and schedule impacts.

**Teamwork** is an important component in quality management in a project since all project staff must share a common quality vision ...ie... working together to apply our combined skills and talents to achieve total customer satisfaction and the most effective way of dealing with customers' problems is to make them everybody's problems. Quality problems are best

identified, analyzed and solved by teams of motivated people, possibly with different skills and backgrounds having the best daily knowledge of the process. Project teams should be seeking better ways to work, based on consensus and within their authority and responsibility, to improve the process. This will help our customers get the increased, high-quality performance products and services they need and the project teams can reduce the wasteful costs inherent in poor quality. Quality can't thrive in a "non-teamwork" environment where every action is directed; where people are not encouraged to collectively think, to communicate, to experiment with change, to examine the things they do and the processes with which they work. It can only thrive in a project environment where staff can influence the decisions and directions of the project ...ie... greater staff involvement in the decision-making processes that affect them. To successfully implement an effective customer-focused quality management process, it is imperative that project management must encourage the teamwork concept and lead by example. Senior management's commitment and participation in the teamwork concept are critical for successful quality management approach.

## CONCLUSION

Faced with new competitions, opportunities arising from new standards, as well as the need to find new markets for their

products and services, engineering companies must re-engineer the way they do business by successfully implementing a customer-focused quality management process to be successful in the new technological environment.

Quality management in engineering projects in the past has been conforming to prevailing engineering standards and practices, obsessing with improving methodologies — better design, value engineering, quicker cycle time, defect reduction, etc., resulting in customer concerns falling by the wayside.

Successful engineering quality management of the future must reflect customer-dedicated operations ...ie... working in close partnership with customers, targeting all project efforts on understanding and anticipating customer business needs so as to develop fast, cost-effective, value-added solutions to these needs. Project managers must stress improved quality techniques, commit themselves to client satisfaction, promote strong teamwork within the project, between project staff and suppliers, and most importantly between project staff and customers. The customers will expect project staff to be prepared to work closely with them, being accountable for the work they do and the products and services they delivered. Thus, customer-focused quality management is competitor-driven because customers will judge



quality in terms of their requirements, expectations and available alternatives. Project managers must convince project staff that every process must contribute to satisfying the customers by constantly and incrementally achieving higher quality as quality management is people-dependent. This will culminate in attaining the two most powerful forces that shape customer satisfaction in any engineering project, namely, the excellent quality of products and services delivered by the project team and the ability to deliver these products and services within the cost and schedule parameters.

Customer-focused quality management in engineering projects, therefore, will result not only in customer retentions, which should be a less expensive way to build any engineering company's market share than luring business away from competitors, but also better financial performance through improved sales and profits of engineering projects. Successful quality management, thus, should not be delivery of products and services to satisfy customers expectations today, but the ability to understand and improve customer's value over time in the execution of engineering projects. Aiming for anything less than this customer-focused approach in today's extremely competitive business environment will make the management of engineering projects a less effective process in today's project management environment.

## REFERENCES

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# FRIDAY, APRIL 28, 1995

SESSION 5

8:00 am - 10:00 am

## TITLE: UPDATE ON QUALITY/TQM

**FOCUS:** Proper implementation of quality management programs in the competitive environment is vital to the design and construction industry. This session provides an overview of component and implementation of these programs. It also presents survey results of six firms who have utilized formal quality management programs. Finally, a case study reviews preparation for ISO 9000 certification.

**MODERATOR:** RAY DARVISH,  
Post, Buckley, Schuh & Jernigan, Inc., Herndon, VA

- **"Total Quality Management Implementation and Results"**  
JOHN A. KUPRENAS, Vanir Construction Management, Inc., Downey, CA
- **"Engineered Quality"**  
MICHAEL T. KUBAL, Chas. H. Tompkins Company, Washington, DC
- **"Quality Management in Engineering Projects"**  
NGHI M. NGUYEN, Paramax Systems Canada, Montreal, Quebec, Canada
- **"ISO 9000 Certification"**  
MIKE McAREAVY, Lester B. Knight & Associates, Chicago, IL

**COFFEE BREAK**  
10:00 am - 10:15 am

SESSION 6

10:15 am - 12:15 pm

Leadership Workshop

## TITLE: MANAGERS AS FACILITATORS

**FOCUS:** This workshop will help managers see the value of learning facilitator skills, and how they apply to many management tasks. Also, participants will gain basic principles to guide them as facilitators. Some participants will also have the opportunity to facilitate a small task group on a topic related to our goal. Then, these small task groups will offer us further insights into "Managers as Facilitators".

**WORKSHOP LEADER:** MEL HENSEY, Owner and Principal, Hensey Associates, Cincinnati, OH

## FRIDAY'S HIGHLIGHTS

### LEADERSHIP WORKSHOP



**MEL HENSEY**  
*Owner and Principal,  
Hensey Associates*

**"MANAGERS AS FACILITATORS"**

### PANEL DISCUSSION- TECHNOLOGICAL LEADERSHIP



**RALPH WEHNER**  
*Executive Director,  
Illinois State Toll Highway  
Authority*

**"STRATEGIES FOR  
TECHNOLOGICAL  
LEADERSHIP"**



**CHARLES PARTHUM**  
*President Elect of ASCE,  
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