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TQM — AN INTRODUCTION

by Steve Revay

Today's construction contractor in Canada is facing a myriad of problems. His risks in competing for and performing construction work are higher than ever. There is fierce competition for the relatively few construction contracts available, forcing a drop in profitability. Because many construction projects are "fast-tracked", contractors are still being asked to supply lump sum bids based on designs which are anything but complete and on open-ended scopes of work. During the execution of the work, the contractor must expect high percentages of scope increases, low quality of design information when it does become available, late delivery of and other deficiencies with supplied materials and equipment, poor coordination of contractors on the job site and late turnover of workfaces. All of these factors disrupt his work and increase his costs significantly.

Even without "fast-tracking" the construction contractor is faced with more onerous contract terms (which increase his risk). To protect his interests he must also be skilled at interpreting his contract and using it to his advantage. In short, to stay in business, his team must be skilled in many areas, have the right systems in place providing the right data to effectively manage the work and satisfy the Owner and finally he cannot afford to make significant mistakes.

Unfortunately, reality suggests that, by and large, many experienced contractors are not able to properly cope with the situation as the record number of bankruptcies, construction claims and liens, project cost overruns and delays demonstrate. This suggests that these contractors are faced with a choice, either they continue with their present approach to doing business (and risk going out of business) or they do something to increase their competitiveness and profitability. This is the overall objective of a well proven and established approach to turning a business around called Total Quality Management, commonly referred to as TQM. The success of TQM cannot be disputed as the thousands of successful business turn-arounds can attest. The emergence of Japanese industry as world leaders in many business sectors is attributed to TQM. The re-emergence of Xerox as a world leader in its business after it was almost forced to shut down due to competition from Japan is due to its adoption of TQM.

Because fundamentally TQM is based on good management practices, it is applicable to any size or type of enterprise. Naturally, the specific approach and implementation plan must be custom designed for each organization for TQM to be successful. At the last meeting of its Board, the Canadian Construction Association adopted a resolution:

> *"CCA consider a total quality management program which will include the distribution of presently prepared manuals and/or videos, providing such material can be obtained economically."*

The lead article of this issue describes the advantages and disadvantages of TQM in a brief summary. A more complete version of the article, dealing with the implementation of TQM, is available on request.

J. Revay

RAL President

THE CONCEPT OF TQM

by Peter E. Maidment, M.Eng.
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Before it is possible to investigate the concept of Total Quality Management (TQM) in a meaningful way, it is first essential to appreciate what quality really is. Quality is a word most people believe they understand (e.g. a high quality automobile vs. a low quality car) until they are confronted with being asked to define specifically what is "high" quality in the general sense and with considerably more difficulty, how does one achieve it. Such are the problems faced by much of today's industry.

Returning to the example of the automobile, we all know that while most people will perceive that a Toyota, say, is a high quality car, there are some who will only consider a Mercedes-Benz or even a Rolls-Royce as the minimum quality automobile acceptable to them. Therefore, it is important to remember that in defining quality, the perceptions (or more accurately, the needs and expectations) of the customer are paramount, and in the final analysis, the only measurement of quality.

Therefore, the overall managerial implications of quality mean that there must always be a very strong focus on the customer, i.e. the needs, expectations and requirements of each customer must be fully identified, a pro-

cess established to deliver/fulfill them (conformance to requirements), if not to surpass them, and mechanisms instituted to measure how well these are being met. Quality also implies:

- Freedom from deficiencies;
- Suitability for use in the user's environment throughout the expected life of the product;
- Doing the right things right, at the right time, the first time — this includes providing sufficient time and resources to do the work right the first time, not when the work has to be done over;
- A continuous and never-ending process of improvement, innovation and re-invention at all levels of the organization;
- The entire organization consists of individuals who truly care about the work they are performing and have the proper tools, training and instruction to perform the work; and
- There exists, in the organization, positive leadership with an established, consistent vision/direction which is fully supported by members of the organization.

It then becomes management's overall objective to ensure all the goods and/or services supplied to their customers will, at the very least, consistently meet the current needs and expectations of these customers. True leaders in any industry anticipate and meet the future needs and expectations of their customers before the customers themselves perceive that their needs and expectations have or must change. Hence, the overall task becomes to operate or manage the business to achieve this overall objective. For a contractor, this means he must operate his company so that he not only ensures high quality workmanship and a safe working environment on the construction site, but also that all the work is completed on or before the date and at or below the cost expected by his client.

Further, he must ensure that he has satisfied every contract provision in a timely way and has maintained cordial relations with all other parties involved in the project. Of course, he must make sufficient money to properly pay all his employees, subcontractors and suppliers, cover his overhead costs and still have a fair profit. Needless to say, he ought not to have any claims against his client. However, all this is *much* easier said than done, especially if he was asked for a lump sum bid on a sketchy incomplete design, the CFC drawings are weeks late and still contain errors and omissions, critical equipment supplied by the client is months late, there are many "unofficial" extras, there is no site coordination between contractors, there are revised startup priorities, he is given no time extensions, there is late turnover of workfaces, etc.

The main problem faced by a construction contractor (as in virtually all companies) is each aspect of his business operation impacts, to a greater or lesser extent, the perceived level of quality of the construction service provided. Even an inappropriately handled telephone call can tarnish an otherwise gleaming reputation in the eyes of his client.

More specifically, the output from each process in the business operation (e.g. accounting, purchasing, office services) has a domino effect throughout the system which finally impacts the quality of the goods and/or services provided to the client. This includes not only internal processes but also external "inputs" such as subcontractors, purchased materials and equipment, construction equipment rentals, hiring and management of the field labour force.

It is therefore the job of the contractor's management team to influence or control each of these internal processes, as well as all external inputs which collectively encompass his entire business operation, to ensure that his client's needs and expectations are always met.

Probably the most important aspect of controlling or influencing each of these business processes is the appropriate leadership of the people involved in these processes. Therefore, top management must provide long lasting positive motivation and job environment to all staff and employees so that they will, in turn, be able to and want to provide the desired results. Although top management believe that they are, by and large, already doing this within the fiscal constraints of their company, detailed evaluations of most companies show there is room for improvement. This is what TQM is fundamentally all about:

- Improving the operations of all business processes and systems, and
- Improving the job environment and motivational level of all staff and employees, so that
- The quality of goods and services provided to the company's client is improved.

To achieve this, the various TQM schools of thought introduced a number of simple, but powerful concepts to assist in successfully establishing a TQM program in the organization. Note that each TQM school has its own set of precepts which may or may not "fit" a particular company's ways of thinking and doing business. However, the TQM principles do reflect well-tested, good management practices in spite of their "radical" appearing nature. As indicated earlier, TQM is anything but new and untried, indeed many Japanese companies adopted early versions of various TQM programs in the early 1950's and have extensively and irrefutably demonstrated their success in the manufacturing and service sectors. Certain American companies have also demonstrated the successful use of TQM, while others have failed. The evidence shows that a principal cause of failure of TQM programs is that management fails to truly believe, or accept as "articles of faith", these fundamental principles and fully integrate them into the organization. Other obstacles to the successful implementation of a TQM program are discussed later in this article.

Some of the more important TQM principles which are fundamentally common to most schools of thought are:

a. All business consists of interdependent and, to some extent, integrated processes. Each process has inputs and outputs. In the same general sense that each organization has clients or customers, each process within that organization also has "customers" whether they be internal or external to the organization.

b. All business processes become "controllable" when the proper quality parameters have been established along with a monitoring system which defines the conformance to the established standard, i.e. quality is achieved through prevention (not after the fact inspection) and controlling the process which produces the products, not after the product has been produced. This means that quality is best controlled by the person performing that item of work and therefore that person must be given some influence over

all the issues which affect the quality of that work — the greater the influence, the potentially higher the quality. Hence quality is a line responsibility and not the sole responsibility of the QC department.

c. Because quality starts and ends with *all* customers (both internal and external) of an organization, the requirements of all these customers must be met. It must be also realized and acknowledged that the power to assign value to products/services rests entirely with the customer. Consequently, the only acceptable performance standard for quality is totally meeting the requirements of all one's customers.

d. Management must realize that people are the most important element in the process as they control, create, innovate and are the source of quality solutions. It is only the people doing the work who really know where the waste and inefficiencies are. Hence management must ask them, listen to them and then quickly take proper remedial action.

e. It has been found that in virtually all organizations that do not have mature TQM programs, there is first a lack of understanding at all levels of what quality and TQM is all about. Second, it has been found that most individuals do not have sufficient background training and education to allow them to properly function in their positions/job functions. Therefore, a key element of all TQM programs is that everyone must receive adequate training in quality and in all areas related to their work functions.

f. The final responsibility for quality in any organization lies at the very top. Therefore, if management is truly serious about quality, it must be consistent in establishing quality as a top priority item, right along side the bottom line profit and earnings. However, unlike trying to manage a company by using the bottom line, which has been aptly likened to driving a car down a busy highway while only looking through the rear-view mirror, properly managing quality defines all the real inputs necessary to generate the desired outputs (e.g. total customer satisfaction, high level of competitive advantage, bottom line/profit, low operating cost, high morale). However, before these outputs can be realized, management must consistently demonstrate its long term commitment to quality by openly "living" these principles.

g. It must always be remembered that TQM is not a destination but a never ending journey or quest for ways to continuously improve and to consistently meet the ever changing needs of one's customers.

While it is not intended that the foregoing list of TQM principles is by any means complete, it was intended to provide a reasonable flavour of some of the more critical underlying concepts inherent in any successful TQM program. A review of this list also shows that it is easy to appreciate why companies find it difficult to first truly accept these principles and second to fully comprehend all the implications of the way the organization is managed — not to mention: how does one ever start to implement such a program?

BENEFITS OF TQM

Before discussing general implementation strategies, it is instructive to examine some facts and benefits resulting from the application of TQM programs. Extensive studies in many organizations have irrefutably demonstrated that:

a. The costs accumulated from poor quality always significantly exceed the total cost invested to conform to the specified quality standards; i.e. quality is not only free, but shows a profit;

b. Companies that have not achieved a mature TQM program are losing between 15% to 40% of their gross sales revenue through their lack of quality;

c. Generally, the individuals performing the work are the source of less than 15% of the "quality problems" which exist, the "system" is the source of the remainder. Because the "system" was implemented by management, it is management who must take the responsibility for more than 85% of these problems.

These results demonstrate the potential effectiveness of a quality management program and that senior management must take the lead role in the pursuit of quality with a very visible "hands-on" approach, i.e. they must "walk the talk".

Feedback from companies which have mature TQM programs established demonstrates the following benefits have been obtained:

a. Improved competitive advantage;

b. Repeat business from customers;

c. Increased profit due to reduced operating or overhead costs, higher productivity and a larger volume of business;

d. Improved morale as staff know precisely what is expected and have all the tools, training and instructions to perform the work competently;

e. Reduced management hassles thus management time is freed up to spend on more productive work;

f. People feel proud to work there;

g. Commitment and mutual respect are improved;

h. Improved customer relations; and

i. Increased job security.

GENERAL OBSTACLES TO TQM

Many obstacles to the successful implementation of a TQM program have already been implied in the foregoing discussion. However, it is instructive to highlight the more important problems and pitfalls so that they may be easily recognized and avoided.

a. Failing to accept and live up to the quality management principles before initiating the TQM program;

b. Initiating a quality program before senior management is ready to actively and consistently support it properly;

c. Failing to appoint and actively support a "quality" or TQM champion to direct the program;

d. Failing to act upon the findings or recommendations of the quality improvement projects or teams;

e. Failing to customize the TQM implementation process to meet the requirements of the organization, i.e. attempting to use an "off-the-shelf" process;

f. Expecting immediate bottom line results from TQM;

g. Rewarding only individuals, especially if they sacrifice quality to stay on schedule or on budget;

h. Failing to include a quality and teamwork component in assessing performance or in the reporting process;

i. Failing to include all employees in the program;

j. Failing to supply the right tools, training and instructions to those performing the work;

k. Minimizing the communications with the company's customers and never asking for feedback on their satisfaction with the goods and services provided;

l. Trying to "fast-track" the process;

m. Finding excuses for not pursuing the program (too expensive and time consuming, it needs more study, do not know where to start, cannot decide on goals);

n. Shooting the messenger;

o. Supporting the status quo, resisting change;

p. Maintaining and supporting "empires";

q. Creating a quality "empire", hierarchy or bureaucracy;

r. Keeping problem-solving and decision making the exclusive right of top management;

s. Neglecting urgent business to pursue quality;

t. Focusing on everything at once rather than a few critical success factors at a time;

u. Getting bogged down in the detailed mechanics;

v. Failing to obtain tangible/measurable results;

w. Failing to define problems in terms of their root causes and their costs (and other applicable impacts) and then to analyze;

x. Failing to concentrate on eliminating the "problems" on the major work processes first;

y. Punishing failures;

z. Failing to have the faith and determination to see the program through to maturity.

In summary, it is seen that the potential benefits are great, but the path is fraught with pitfalls and obstacles. However, construction contractors are probably one of the most experienced business sectors when it comes to risk taking. It is worth remembering John Scheer's words when assessing potential opportunities:

"the future is not someplace we are going to, but one we are creating. The paths are not to be found, but made..."

AVOIDING THE COURTROOM BATTLE OF EXPERTS

by Paul Sandori, V.P. — RAL

More and more, the construction industry is seeking alternatives to customary forms of litigation. Small wonder: litigation is expensive, slow and rather unpredictable — particularly so, it seems, in construction. One of the main reasons for this state of affairs is the all-too-common battle of expert witnesses in the courtroom, orchestrated by lawyers usually with little understanding of the technical matters involved in the dispute.

One of the witnesses summed it all up very eloquently in the recent case *Bell Canada v. Olympia & York Developments Ltd.* while responding to the lawyer who was cross-examining him: *"...of course, this is justice and I think it's great, but I must say that I never had any idea in my life that you could ask so many questions for so long about so little."*

Anyone who has served as an expert witness would agree with this sentiment. The process of examination and cross-examination is excruciatingly slow, with an endless number of sometimes pointless questions. The witnesses — even though their function, in principle, is to assist the court — rarely have a chance to present their opinions properly. They are almost totally dependent on their lawyer asking the right questions, especially so in response to cross-examination.

No doubt, the process is even more painful for the parties who are paying the experts, at an hourly rate much in excess of what they would normally pay a construction expert, plus, of course, the lawyer's fee at a rate which is often astronomical.

Is there a remedy for this mess? Recently, the search for more streamlined methods of dispute resolution received a boost from unusual quarters: the court itself. In a somewhat convoluted dispute between a contractor and an owner, the judge got tired of the usual courtroom antics involving adversarial expert witnesses and tried an alternative: he decided to appoint his own expert witnesses to advise him directly. The parties to the dispute agreed that Revay and Associates Limited should be the experts. Pursuant to receiving the mandate RAL sought out all relevant documentary information as well as had a joint meeting with the parties with a view to filling out the

existing gaps in the available information. Upon analyzing all information, RAL submitted its findings which were eventually adopted by the judge in rendering his decision.

Not much can be said about the dispute itself, for obvious reasons. But let us look in more detail at the idea of court-appointed experts as a means of easing the legal logjam.

There is general agreement that litigation is expensive, slow and unpredictable. But, on the positive side, the legal game has its rules and a judge ready, willing and able to enforce them. Above all, the system has "teeth". Unlike the alternatives, it cannot be easily blocked or avoided by an unwilling or uncooperative party.

It may be that the approach adopted by Mr. Justice X in appointing "court experts" combines the best of both worlds: the legal expertise and the "teeth" of a court, plus the technical expertise and analytical tools of construction experts working in a supportive environment rather than on a battlefield.

It is essential that the judge receive clear and unbiased expert advice because his or her decision on questions of fact is almost unshakable once it is handed down. If there is an appeal, the findings of fact will be treated with great respect. The authority regularly and reverently quoted for this principle is Lord Kingsdown in the milestone case *Bland v. Ross,* going back to 1860. His Lordship made the following pronouncement: *"In all cases...we must, in order to reverse, not merely entertain doubts whether the decision below is right but be convinced that it is wrong."*

The major reason generally given for this attitude is that the trial judge has seen and heard the witnesses, and from their demeanor is best able to weigh their credibility, including, in the case of professional witnesses, the degree of their conviction in their own opinions. Hence the importance of not only how "expert" an expert is, but also how "impressive" he is as a witness. Hence also the uncertainty of the outcome.

It is interesting, however, to read what really happened in *Bland v. Ross.* The case shows, first, that Lord Kingsdown's major reason for showing such great respect to the trial decision was not the trial judge's astute observation of the witnesses and, second, that the concept of court-appointed experts has a long and impressive history.

The case was in a "technical" field of great economic importance at the time, with many disputes — just as construction is today. In the early 19th century, that field was seamanship. Here is what happened. In 1859, a sailing ship called *Julia* rammed the steam-tug *Secret* which was towing it into port. The Admiralty Court of England had to decide who had caused the collision.

The Admiralty judge was assisted by a group of nautical experts called Trinity Masters who were part of the court. He decided that the captain of the *Julia* was to blame. The court records state: *"...the decision, after full consideration, was arrived at by the Trinity Masters, and approved by the Judge."* Please note: the experts decided what must have happened, and **then** the judge took over.

The owner of the Julia, Mr. Bland, appealed to the Privy Council. Lord Kingsdown delivered the decision. Their Lordships, he said, entirely agreed with the opinion of the court below. Then he delivered the pronouncement quoted above: where a disputed fact involving **nautical** questions is raised by an appeal from the Admiralty Court, the appeal court will require very compelling evidence of error to reverse the judgement.

The real reason why Lord Kingsdown had so much respect for the findings of the lower court was the fact that they were reached by a judge assisted by an impartial team of experts.

In *Bland v. Ross,* no experts were called by the litigants. No time or money was spent by one side trying to discredit the opposing experts, and vice versa. The experts worked directly for the court to assist the judge. The effectiveness of this approach is illustrated by the speed with which justice was administered: the Julia accident occurred in November, 1859. The case was heard in July of the following year, and the appeal decision handed down in December.

It would be wildly optimistic to expect such expediency today, but the action of Mr. Justice X in appointing RAL is obviously based on sound precedent and has, no doubt, resulted in lower costs and a shorter trial.

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