DEVELOPING A QUALITY CULTURE FOR ASPHALT COMPANIES

Dale Steven Decker
Dale S. Decker, LLC

ABSTRACT

"The first step in developing a quality control system is establishing management's commitment to begin the process." This report presents an outline for developing a Quality Management Plan for asphalt contractors. The intent is to "Grow Quality" within the organization, thereby ensuring quality of products produced and placed by the company.

Achieving quality in all products and processes is the responsibility of every employee of the company. Quality products are not produced by the Quality Control Department. The role of technical services personnel is to document that quality work is being done in all elements of the corporation. Lastly, quality products reduce penalties and rework, thereby improving profitability for the company.

There are several key elements for the development of a Quality Management Plan: 1) Perform an assessment for each laboratory facility to evaluate personnel qualifications, equipment, procedures and to establish standard operating procedures; 2) Perform an assessment for each asphalt plant and aggregate facility to evaluate material handling, plant practices and record keeping to ensure Best Practices are being followed; 3) Perform an assessment for each paving operation to evaluate material handling, paving practices, and record keeping; and 4) Develop a Quality Management Plan with appropriate measurement criteria.

An internal and external Quality Management Audit system will be developed. The purpose of the Audit is to determine if the QMP is being followed.

These are the key elements that need to be established to ensure the consistency and quality of the products produced by the asphalt contractor.

Keywords: Quality Management, asphalt production, asphalt placement, Quality culture

1. INTRODUCTION

"The first step in developing a quality control system is establishing management's commitment to begin the process." [1] This report presents an outline for development of a Quality Culture for asphalt contractors. The intent is to "Grow Quality" within the organization, thereby ensuring the quality of products produced and placed by the company.

Achieving quality in all products and processes is the responsibility of every employee of the company. Quality products are not produced by the Quality Control Department. The role of technical services personnel providing quality control testing is to document that quality work is being done in all elements of the corporation. Lastly, but certainly critical to the success of the company, quality products reduce penalties and rework, thereby improving profitability for the company.

There are several key elements for the development of a Quality Culture. They are: 1) Perform an assessment for each laboratory facility to evaluate personnel qualifications, equipment, and procedures including establishing standard operating procedures for every test procedure; 2) Perform an assessment for each asphalt plant and aggregate facility to evaluate material handling, plant practices and record keeping at the plant to ensure Best Practices are being followed; 3) Perform an assessment for each paving operation to evaluate material handling, paving practices, and record keeping at the job site; and 4) Develop a Quality Management Plan with appropriate measurement criteria.

An internal and external Quality Management Audit system must be developed. The purpose of the Audit is to determine if the QMP is being followed.

This report discusses the key elements that need to be established to ensure the consistency and quality of the products produced by the asphalt contractor.

2. What is Quality?

2.1 It Depends on Who You Ask

Phillip Crosby, the author of Quality is Free and one of the early proponents of quality production in North America, states that « Quality is meeting customer requirements. » Given the myriad of specification requirements that the asphalt contractor must satisfy, it is certainly no secret that the customer is always right (even if the specifications make no practical sense).

An easy analogy to consider for any contracting company is that the organization is like a three-legged stool. The three legs of the stool that are necessary for success of the company are: Production, Safety and Quality. Successful contractors are quite good at production so a culture of Production is well established within every contracting company. Contractors are capable of producing and placing materials. The culture of Safety has evolved over the last 20 years or so as being another key element of every contracting firm. Safety has two significant elements – the first is to maintain health and welfare of employees and the second is a financial impact to the company when employees aren't working safely. The third leg of the imaginary stool is Quality. Overall, as a worldwide asphalt industry, a culture of Quality has not become well established. The objective for every contractor is to have every employee perform every task right the first time. If you get a paycheck from a company, it is your responsibility to ensure Quality in all efforts, whether your job is the bookkeeper, the dispatcher, the plant manager or the paver operator.

2.2 Creating a Culture of Quality

How do you create a culture of Quality in a contracting operation ? Everyone knows that changing the culture of any organization is not an easy task. Fundamentally, we humans do not like to change. So any impetus to change the culture of the company must be driven from the senior management of the organization. Creating a culture of Quality cannot be a grass-roots driven initiative.

In any project, there are six principal phases of the project :

1. Enthusiasm – at the start, everyone is intrigued about something new.
2. Disillusionment – during the effort, it is easy to lose enthusiasm due to the myriad of activities of the normal workday.

3. Panic – deadlines and expectations have been established – will we be able to meet them ?
4. Search for the Guilty – if activities are not going as planned, it must be someone's fault (other than me).
5. Punishment of the Innocent – someone has to be blamed.
6. Praise and Honors for the Non-Participants – when the effort is finally completed, it is not always the people who made it happen that get the credit. (Anonymous)

The process needed to create a culture of Quality has four key elements :

1. Establish the expectations for every employee. Contractors usually do a good job of this element. When employees are hired, the expectations of the employment are usually well defined.
2. Train the employees to do the job correctly. Again, contractors usually do a good job with this activity. People are given the right tools, both physical and intellectual, to accomplish the job they are given.
3. Create a sense of responsibility for the expected task. This is an element that contractors are often not successful in ingraining into employees. If a Quality Culture is to exist, everyone must accept a sense of responsibility to do their job correctly every time.
4. Hold employees accountable for the work that they perform. Again, contractors are often not successful in accomplishing this element. Blame may be assessed when something goes wrong but the blame may be misplaced due to prior lack of accountability on the part of the supervisors. In other words, not holding people accountable for proper work essentially breeds poor quality among all employees.

2.3 Effect of Specifications on Quality

In the United States alone, it is estimated there are over 35,000 specification writing agencies, ranging from Federal Highway Administration, to State Departments of Transportation, to Cities/Counties to Federal Aviation Administration and Department of Defense, to name a few. The manufacturing sector has long ago established the efficiencies of uniformity and production of scale. So the challenge for a contractor is how to produce materials that meet a wide variety of specification requirements profitably.

There are four principal types of specifications for projects: Proprietary Products, Method, End Result, and Performance. In many parts of the world, proprietary product specifications are not widely used due to the commercial nature of the specified product. In the U.S. as an example, legal requirements make the use of proprietary products difficult for the agency. The method specification, while still in common use, is slowly disappearing due to the potential for legal issues if a problem arises. With the method specification, the contractor is told what materials to use, how to produce the product and how to place the material. In this situation, the agency assumes all responsibility for performance of the product. Many agencies are moving towards end result specifications wherein final characteristics of the product are specified and the contractor is given considerable freedom in achieving those characteristics. The Holy Grail of the asphalt industry is to achieve a true performance test of the product. While many approaches have been attempted, no single, definitive approach has to date proven completely acceptable.

While Quality Control and Quality Assurance activities have somewhat different objectives (QC for the contractor and QA for the owner), it is in the best interest of both the contractor and the owner to have Quality processes in place. No one wins when a pavement fails.

2.4 Comments on ISO 9000

This paper addresses the Quality process for the U.S. ISO 9000, while used in some parts of the world, is not used by asphalt contractors in the U.S. ISO 9000 is primarily used in the U.S. by mechanical manufacturing companies, systems in which far fewer variables impact the production process.

This paper focuses on issues specific to the asphalt industry. Explaining to a contractor what the cost of not doing quality work is an effective tool to get a Quality Culture initiated. The Quality Culture is above and beyond the ISO 9000 process.

3. Is the Process in Control ?

A variety of methods are available to monitor the status of any production process. The simplest and most

easily understood approach is the use of process control charts. In this approach, a running average or range is used to assist production managers in understanding the consistency of the process and to identify when adjustments to the production are necessary. More difficult to understand by the layman, but used quite frequently, is a statistical approach (using Percent Within Limits (PWL)) to analyzing the uniformity of the data. While more difficult to understand for the average worker, the PWL approach can be effectively used to evaluate consistency of production.

4. How Does Quality Affect My Business ?

The true cost of Quality has both tangible and intangible elements. Tangible costs include the time and expense of doing the work the first time, time spent to meet with owners to solve a problem of poor Quality, time spent to accomplish any required rework, cost associated with rework in future bidding and potential penalties on the work done. Intangible costs include loss of company reputation, potential for greater scrutiny by the owner's inspectors and decrease in morale within the company (nobody wants to be on a losing team !)

A simple example illustrates the financial impact of rework on a company. If a $1,000 project with a 10% margin (maximum profit = $100) resulted in $500 of rework, what is the big deal ? Most people would pull out the checkbook and pay the $500. Looking more closely at the situation however reveals disturbing facts. How much revenue needs to be generated to overcome this $500 in rework. The company would need to get an additional $5,000 in revenue at the same 10% margin to just break even, with no profit. $10,000 in revenue with a 15% profit margin would be necessary to create a profit for the company. The bottom line is that the company would need to generate $10,000 in additional revenue to overcome a mere $500 in rework costs. $*500 in rework = $10,000 in additional work! In many areas, the referenced profit margins are significantly* higher than current economic conditions permit.

Clearly, this example is quite simplistic and the financial impact quite small. However, when you start adding zeros to the costs, the impact to the contractor gets very significant very quickly. The moral to the story is quite clear : Rework is quite costly to a company and is 100% preventable if the proper Quality processes are in place for the contractor.

5. Balancing Production Creates Quality

By balancing plant, trucking, paving and rolling operations, the contractor is able to achieve a smooth, uniform, cost efficient operation. The following is an example of the potential cost savings :

Estimate Plant and Paving Crew Hourly Costs as follows :

Plant Costs (@1500 tons per day) = $1,200

Trucking (10 Units) = $750
Paving Labor = $275
Equipment = $305

Total Hourly Cost : $2,530
Total Cost per Minute : $42.00

Again, a very simple example to illustrate a very significant cost to the contractor. If the paving train has to wait 10 minutes for a truck to arrive or if the plant is down for 10 minutes due to a preventative maintenance issue, the cost to the contractor is $420. In addition to breakdowns, scheduling and the way the job was estimated can also create inefficiencies in the operation. With profit margins at the current low level for most contractors, can the company afford to waste money in this manner ?

6. What are the Steps to Create a Quality Culture ?

There are several key elements for the development of a Quality Culture. The following identifies the necessary steps for the process:

Perform an assessment for each laboratory facility

- Evaluate Personnel Qualifications

This element is intended to document technician certifications, training and attitude. It is unrealistic to expect quality test results if the right people with the right skills are not in place.

- Evaluate Equipment

The intent of this element is to ensure that appropriate equipment is available at each facility to perform the necessary tests. Equipment calibration schedules must be established and documented. Round robin testing between laboratories should be performed to ensure consistency.

- Evaluate Procedures

Every technician at **every** location must perform **every** test in **exactly** the same way. Even though "standard test methods" are nominally used, technicians often make slight variations in the procedure thereby violating the intent of standardization. Such variations are not acceptable.

- Standard Operating Procedures need to be established for all facilities, procedures, equipment and personnel. This includes record keeping and database management. Some test methods allow variations within the procedure. Within a given company, a single approach should be established and used by all personnel.

Perform an assessment for each HMA plant and aggregate facility.

- Evaluate Material Handling at the plant. Are Best Practices in place to ensure uniformity of the product through the plant?
- Evaluate Plant Practices. Are plant operations conducive to achieving uniform production?
- Evaluate Plant Record Keeping. Are all changes in operations properly documented?

Perform an assessment for each paving operation.

- Evaluate Material Handling at the job site. Are poor practices negatively impacting the uniformity of the material delivered to the jobsite?
- Evaluate Paving Practices. Are Best Practices being used in both paver and roller operations to ensure that the Quality of the mix placed is acceptable?
- Evaluate Paving Record Keeping. Are paving conditions significantly different than described in the plans and specifications? Do soft base areas exist? Documentation through daily diaries and photographs are great insurance for the contractor.

Quality Management Plan

- A Quality Management Plan (QMP) must be developed. This plan will be an evolving document as experience is gained with the process. Contractor personnel will need to be actively involved with this process. The laboratory, plant and paving assessment items previously discussed are the key elements of the QMP. The QMP will be based on the specifications that are routinely required for materials produced.
- Measurement criteria must accompany the QMP. It is not possible to evaluate current or future operations if appropriate measurement criteria are not in place. If you don't measure **it** (whatever it is), you can't control **it**.
- An internal and external Quality Management Audit system must be developed. The purpose of the Audit is to determine if the QMP is being followed – in short, are we doing what we say we are doing? The assessments will establish the criteria for the audit. A Quality Audit is no different than a financial audit – someone outside the company comes into the operation to validate conformance to the QMP and to identify potential areas for improvement.
- A Quality Management Code of Conduct should be developed by the contractor, if one does not currently exist. The QM Code should be signed by **all** employees, signifying they understand that honesty and integrity are core values of the company. The definition of integrity is doing the right thing when no one is watching. The Code of Conduct must be viewed as a zero tolerance issue for all employees.
- Communication is a critical issue in any organization. It is vital that open communication is practiced within every organization. This is easily said but quite difficult in execution. Different groups within the company have different performance targets. A classic example is the communication between aggregate production and asphalt production. The aggregate folks are producing for several different markets – aggregate, asphalt and concrete. It is essential that good communication occur to know when processes change and the potential impact on any specific product.
- Quality is to be defined as the new company culture. It can't be turned off and on for private versus agency work. A common comment is that production today is *only* for a parking lot so we don't need to worry about testing the product. In reality, either everything produced by the company is a Quality product or nothing is.

These are the key elements that need to be established to ensure the consistency and quality of the products produced by the HMA Contractor.

7. Closure

Quality Management is not a cost…it's a commitment. While somewhat of a cliche`, in order to create a culture of Quality, the statement is absolutely true. The commitment of senior management to create and sustain a culture of Quality is vital. Middle managers in the company must embrace and support the initiative by holding employees responsible and accountable for the work they do. And finally, every employee must understand that nothing less than high quality work is acceptable.

REFERENCES

[1] "Quality Control for Hot Mix Asphalt Operations," National Asphalt Pavement Association, 1997