Improving Quality to Reduce Cost

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Improving the quality of asphalt and aggregate products may increase the cost of those products, but that does not tell the entire story. That small increase in product cost will pay dividends throughout an organization. Improving quality is like selecting the right-sized piece of equipment for the job. A larger piece may cost twice as much to operate per hour, but it does the job in a fourth of the time. The cost to do the job is half, and you get an opportunity to go do another job.

The effect is the same in asphalt production. Reducing the number of product failures by improving quality will increase the number of paving days a crew delivers, increases the tons through a plant, reduces run time at a plant to produce those tons, and more. Producing consistent aggregates may increase the cost to produce slightly, but it will also lead to reduced waste and improved reserve utilization. With improved quality, the benefits to an organization far outweigh the incremental production cost increases.

The key is to invest resources to improve quality in areas that will give the highest return on investment. There are many tools available to identify the opportunities for improvement and to execute that improvement. LEAN six sigma describes a method of continuous improvement where an organization makes small incremental changes that, over time, add up to big improvements. Improvement can be efficiency gains or quality gains, or both.

Let's separate LEAN six sigma into to two parts: LEAN manufacturing and statistical process control. Both look to improve, "waste" through a disciplined systematic process. Interestingly, both six sigma statistical process control and LEAN manufacturing have their roots in Japanese auto manufacturing.

HERE IS AN EXAMPLE OF A LEAN PROBLEM STATEMENT TOOL.

RAPID PROBLEM SOLVING TOOL		
Date		Participants
Owner		
Area		

Current Condition	Target Condition

MAP the Problem–Draw the systems, issue, part of the process

Qualifying Questions		Notes
Circle yes or No		
Is there corrective (temporary) action(s) in place?	Yes-No	
Is there a standard?	Yes-No	
Is there a standard visible to the Operator?	Yes-No	
Have all of the respective parties been trained?	Yes-No	
Is the equipment clean?	Yes-No	
Is the equipment functioning correctly–no broken parts?	Yes-No	
Are the materials in spec?	Yes-No	

Focused Problem Statement – Description (Who, What, Where), Metric, Timeframe, Magnitude (How Often, How Much)

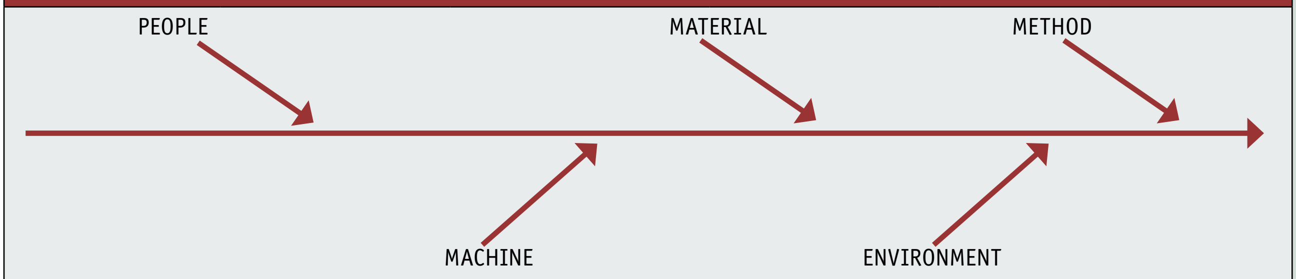
GEMBA-GO TO THE PROBLEM

LEAN Manufacturing

LEAN aims to improve efficiency by eliminating waste that results from disorganized process. For example, LEAN manufacturing would be used to incrementally increase a plant's tons per hour without sacrificing quality and ensuring every ton produced is sold. Process, in this case, could be the equipment to produce asphalt, the sales program, plant scheduling, the billing of products, the quality control program, and any step before, after and in between. LEAN projects start with a simple statement of

THE PROCESS INCLUDING PEOPLE, EQUIPMENT, ENVIRONMENT, MACHINERY AND MATERIALS IS MAPPED. HERE IS AN EXAMPLE ANALYSIS FORM.

PROBLEM SOLVING



ANALYZE

CAUSE	WHY	WHY	WHY	WHY	WHY
	BECAUSE	BECAUSE	BECAUSE	BECAUSE	BECAUSE
CAUSE	WHY	WHY	WHY	WHY	WHY
	BECAUSE	BECAUSE	BECAUSE	BECAUSE	BECAUSE
CAUSE	WHY	WHY	WHY	WHY	WHY
	BECAUSE	BECAUSE	BECAUSE	BECAUSE	BECAUSE

ACT

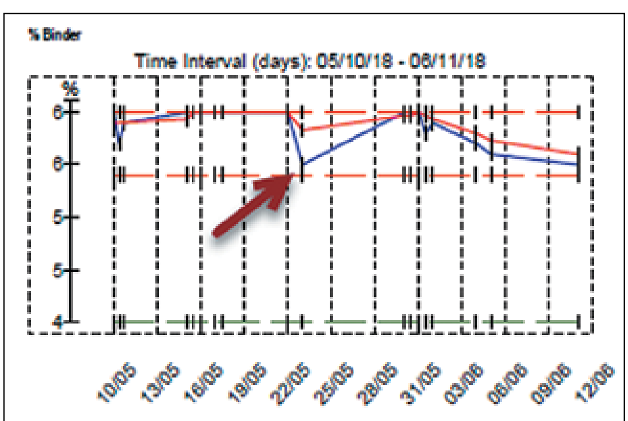
Issue	Action	Owner	Due Date	Due Comp.	CHECK RESULTS – REAPPLY
If "No" What is the issue	What is the action?				

This form deploys an evaluation technique called the five whys where you do exactly as the name states—you keep asking why.

current condition and a description of the target condition.

An example use of this technique might be getting to the root of why trucks are backing up in the yard waiting to be loaded. Ask yourself, why are trucks backing up in the yard? Because customers are sending their trucks all at once. Ask why? Because they are scheduled that way. Ask why again. I think you get the point. Speaking from personal experience, when using the five whys the outcome is simple and insightful.

Other LEAN techniques include Bottleneck Analysis, Kanban (optimizing production, customer and supplier schedules), Muda (optimizing products from the customer perspective), Kaizen (incremental improvement), and many more. The internet is full of articles and techniques for LEAN manufacturing. There is a LEAN technique to aid in improving nearly any production process.



Six Sigma Statistical Process Control

The term six sigma relates to the number of standard deviations (sigma) where nearly 100 percent of the results are within a desired range. Simply stated, six sigma intends for a process to have zero failures. Quality control team members will recognize this emphasis on consistency.

A six sigma statistical process control (SPC) is data driven. The godfather of six sigma SPC, W. Edwards Deming, is quoted as saying, "Without data, you're just another person with an opinion." Data is key is SPC. It is important to not make assumptions, but rather let data describe what is happening.

In HMA production we regularly measure aggregate gradation, binder content, and volumetric properties like voids in mineral aggregates (VMA) and air voids. These properties are required by specification to be maintained within a certain consistency level, because they relate to pavement performance. SPC starts by looking at data in sets of data. Here is a real-world example.

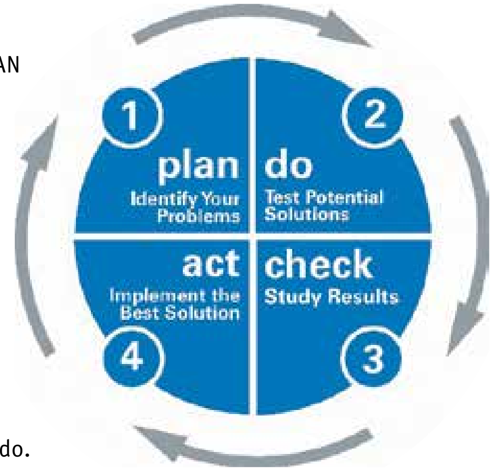
On May 22, an HMA plant produced HMA with 6.0 percent binder. The next day that same plant produced the same HMA with 5.5 percent binder. You might conclude the plant is out of control with a 0.5 percent swing. When we apply basic SPC and we evaluate 18 results including the data from May 22 and May 23, you get a different perspective. In the SPC chart below the blue line represents each test, the solid red line is a rolling average of tests, and the red dashed lines are the specification range.

When you look at the May 23 test in context of the other tests, we conclude that the test is odd, because the plant had been consistently producing HMA at 6.0 percent binder. Another test should have been run to confirm there was no sampling error.

In addition to charts, statistical measures of test results like average, standard deviation, percent with limit, confidence interval, and more all describe the consistency of measured values and help predict likely future values. It is logical to see how using control charts and statistical measures can be used to help understand a plant's ability to make a product within specification.

Continuous Improvement

Either independently or together a LEAN manufacturing project and a SPC program are used to transform businesses through a continuous improvement process. A continuous improvement process systematically makes incremental improvements that over time add to big changes to an operation. A common continuous improvement process is a plan—do—check—act process (PDCA).



You start by identify what you want to improve; plan. Apply a solution; do. Measure the results; check. Decide what to do next; act. A PDCA process helps a plant eat the elephant one bite at a time.

Performing or investing in process control at the HMA plant offers a producer an all-encompassing tool, a mindset if you will, for bringing higher quality control into the picture. By implementing systems of the LEAN six sigma, the producer can find and correct areas of inefficiency, and can bring the information of data sets to bear on decisions that affect all the elements of mix design and production. The goal for the process control system is to increase quality, of course, and should bring continuing improvement in reduced waste, fewer failures, and enhanced value for your plant customers. All of which will improve the financial performance of an HMA plant.

LASTRADA Partners help plants improve quality and reduce cost by implementing statistical process control programs in LASTRADA™ QC software. Learn more at www.lastradapartners.com. ✪