

Lean Thinking in the Compressed Gas Industry

By Paul Matlock & Al Coulter

The most fundamental concept of business is to make money. In the Compressed Gas Business, one of the best ways to accomplish this is by being a premier supplier. But what makes your business “premier”? How can your company differentiate itself in a highly competitive marketplace?

The Compressed Gas Business involves companies that buy liquid product from a major supplier, put it in a storage vessel, pump it through manifolds into cylinders, and then deliver these cylinders on trucks. Many compressed gas operations are quite similar, with profitability directly linked to costs. So how can you differentiate your costs — and therefore your ability to become the premier supplier — from that of your competitor? TAP Resources recommends that you bring Lean Thinking to your business.

AND LEAN THINKING IS ...

Lean Thinking is a philosophy of “No Waste.” It calls for a hundred small improvements every day rather than a major overhaul once a year. It is a concept based on making system-wide improvements to bring your customer greater product or service value.

Lean Thinking (also known as Lean Manufacturing) had its origins with Toyota Motors Company in Japan. It is “East-Meets-West” in a melding of diverse philosophical and production concepts, a unified system that aims for both high productivity and superior quality. Since its introduction in manufacturing in the United States and Europe, Lean Thinking has proven to be successful in both of these categories. Putting Lean Thinking to work for you enables continuous improvements of every function and can put the “premier” label on your company.

As a unified system for improving productivity and quality, as well as an overall philosophy for running a business, Lean Thinking becomes part of your company’s culture and is used to develop and support your business plan. Lean thinking is not an employee reduction program; it is not a program to make people work more; it is not a piece-meal program. It is a program that requires employee commitment on all levels — from management to maintenance crew.

The key elements of a Lean Thinking operating system are waste elimination, the streamlining of flow processes, and customer satisfaction. Waste needs to be identified and eliminated within every function of your company — from sales efforts to production processes to service and invoicing. Flow processes have to work at high velocity and customer satisfaction has to be a priority.

Waste negatively impacts a business by slowing down revenue generation and by adding unnecessary cost to production processes. Identification of waste is, of course, key to eliminating it. So think — what is your company doing that adds to costs without generating profit or customer satisfaction?

You make something and sell it for more than it costs to make. Essential to the selling of the product is the customer, and at the cen-

ter of Lean Thinking is the philosophy that you measure all your activity from the customers’ point of view. You give your customer what they want and produce exactly that — no more, no less.

Why no more? Don’t those “extras” put a company at a competitive advantage? While customers may appreciate extras, they do not value them, and they will not pay for them. The company adding the extras is adding to its production costs without generating revenues.

DO YOU SEE WHAT I SEE ...

Activities that make a product more complete and create value in the customers’ eyes are Value Added. Non-value added activities are waste. Can you see the waste in your business?

Lean Thinking looks at seven basic categories of waste within a business operation.

WASTE NOT WANT NOT

The Seven Basic Categories of Waste

1. Overproduction
2. Unnecessary Production
3. Unnecessary Transport of Goods
4. Unnecessary Processing
5. Defects & Correction Processes
6. Waiting
7. Unnecessary Motion

Overproduction. This involves producing more than you need or making it earlier than is required. Overproduction is caused by “just in case logic,” or an unbalanced workload, and creates too much inventory. Excess inventory takes up space and, like all inventory, needs to be tracked. Tracking is expensive, as is space in many operations, and

overproduction means you have used capital, or borrowed money, to generate no immediate return. Control your production.

Unnecessary Inventory is inventory not needed now. So why is it so common? There is logic to stockpiling — it keeps employees busy and equipment running. But there are significant costs associated with this logic and Lean Thinking seeks to eliminate these. When you create unnecessary inventory, you purchase materials and tie up capital. You use people, space and equipment to manage the unnecessary inventory — all of which represent real costs to the company. With inventory costs representing about 30 percent of total costs in a compressed gas operation, excess inventory is an expensive proposition.

Transportation Waste. Transporting parts and materials around the workplace is a cost. Poor workplace layout or a lack of process flow that creates many stops and starts in your production cycle is transportation waste. Moving cylinders via forklifts or cylinder trucks takes time. Every movement should have a purpose. Interruptions to work flow can substantially add to your transportation costs. Look for the potholes!

Processing Waste. Like transportation waste, kinks in your process flows add no value to the product or service from the customers’ point of view. Faulty equipment, not enough equipment, or overtaxed equipment are not acceptable in the world of Lean Thinking. Either are faulty procedures or doing things the “easy way” as opposed to the right way. Refining your processes and eliminating waste result in lower production costs.



Control inventory by filling only the cylinders you need.
Photo courtesy of Luxfer Cylinder Gas Cylinder.



The proper layout of a work area is an opportunity to save on costs.
Photo Courtesy of Weldcoa.

Rejects. It cost the same to produce a reject as it does to produce your prize product. Besides the obvious losses, there are many other costs associated with rejects that make this a particularly important category of waste to eliminate. There is the time that customer service has to spend to resolve the problem. The added cost of sending a replacement. The costs of rechecking for quality including reviewing your inventory, checking the inventory of your other customers, and determining the root cause. New procedures to handle rejects have to be implemented and verified. Outside agencies like the FDA may be involved. And most importantly, your reputation has to be guarded and guaranteed. Lean thinking trains employees to identify a quality problem or reject at the earliest possible moment to minimize or eliminate these costs.

Waiting — What a Waste. Idle time created when waiting for raw materials, quality assurance results, engineering, maintenance, scheduling or equipment is a form of waste. Eliminate it.

Unnecessary Motion. With the proper layout of a work area, the unnecessary motion of employees can be minimized, creating an opportunity for saving on costs. Traveling too far within a work site to accomplish assigned tasks is a waste of time and effort and creates increased opportunities for accidents, injuries, and their associated costs. Lean Thinking looks to eliminate poor housekeeping, a lack of organization, inefficient layout of machinery, and inconsistent or ineffective work methods. No one make any unnecessary moves!

THE TOOLS OF LEAN THINKING

With the seven deadly sins of waste carefully outlined, we turn our attention to the tools that help you get rid of the waste. In the Compressed Gas Business, these tools can be broken down into two categories — Planning Tools and Workplace and Process Improvement Tools.

Operations Planning in Lean thinking means you tie your operations plan to the overall objec-

tives of the business. To support growth and profit objectives, your operations plan must be aligned with the elimination of waste. Your objectives might be to reduce product loss by 25 percent, increase cylinder utilization by 12 percent or bring your on-time delivery stat to 98 percent plus. When selecting your objectives, choose the Lean Thinking Tool that will move your business in those directions.

Value Stream Mapping is the process of identifying and charting process flows, information, and physical goods across the entire supply chain — from the raw material supplier to the end-user. It is a basic planning tool for identifying waste, designing solutions, and communicating concepts. Value Stream Mapping focuses on what is valued as opposed to what is done. It enables businesses to highlight dependencies and identify opportunities for the application of Lean Tools and strategies. It allows for an improved understanding of complex processes and can assist in prioritizing continuous improvement activities.

Root Cause Analysis looks for the “WHY” behind the waste. This analysis finds problems, describes them, implements temporary solutions and generates a long-term plan to problem solving. Root Cause Analysis also seeks to verify the effectiveness of proposed solutions and adopts best solutions as Best Practices.

Quality at the Source places responsibility for meeting customer requirements at every point in the work process. It emphasizes changing processes to make it impossible for defects to occur. It stresses the importance of early problem recognition and fast solutions as a way of saving costs in production processes. Those costs become exponential when defects are delivered to the customer.

5S WORKPLACE ORGANIZATION

With planning tools in place, your company will need an efficient workplace that is safe, clean, and

PLANNING TOOLS
Operations Planning Process
Value Stream Mapping
Root Cause Analysis
Quality at the Source
WORKPLACE AND PROCESS IMPROVEMENT TOOLS
5S Workplace Organization
Visual Management
Kaizen & Kaizen Events
Cellular Production
Batch Size Reduction
Kan Ban & Pull Production
Standardized Work
Production Leveling
Point of Use Systems
Total Productive Maintenance
Best Practices

well-organized in order to implement these plans. "5S Workplace Organization" is Lean Thinking jargon for just such an arrangement. The "Ss" stand for Sort, Set in Order, Shine, Standardize and Sustain, and together they define what is needed to create and sustain a Lean Thinking Workplace.

THE FIVE Ss OF WORKPLACE ORGANIZATION

- Sort** — Get rid of the clutter
- Set in Order** — Organize the workplace
- Shine** — Clean the workplace
- Standardize** — Establish WRITTEN standards for order and cleanliness
- Sustain** — Maintain standards through training, empowerment, commitment and discipline.

Visual Management — signs, signs and more signs. On the premise that "What gets measured and displayed gets done," Visual Management makes information about processes and daily activities visually available. Clear and careful signage leads employees through all steps of the production process.

Kaizen and Kaizen Events. Kaizen is the Lean Thinking philosophy of continuous improvement that emphasizes employee participation. With Kaizen, every process is continuously evaluated and improved by the employees involved in the process. It is a very effective way to eliminate work that adds no value to your business.

A Kaizen event is a one-time affair that involves a specific group of employees across several business functions. This group creates a Value Stream Map of the area that has been selected for continuous improvement and develops a scope of work and a detailed process flow analysis. An "As-Is" process map is created and the group brainstorms on how to make improvements to that process. The team selects the opportunities it wants to address and utilizes Lean Thinking tools to create the new and improved "To-Be" process. This new process is shared company-wide and once implemented, becomes a Best Practice.

Cellular Production is a system that organizes equipment and workstations in order to facilitate production process. Since many plants and production systems "evolve" over time, they are not necessarily designed for greatest efficiency. Cellular production seeks to identify weaknesses and road blocks in current systems and processes. These can then be corrected to create the best possible workflow for production.

Batch Size Reduction emphasizes producing only that which is needed. This is a critical tool in controlling inventory. Despite the fact that inventory involves material, cylinder and labor costs, many companies still make a full manifold of cylinders or fill every pallet, because that is the way its system is designed or, simply because that is the way it has always been done. By eliminating system constraints that require fixed batch sizes, companies can reduce batch size and create a more efficient production process.

Kan Bans and Pull Production. Kan Ban is a Lean Thinking inventory concept that can improve cylinder utilization. The Kan Ban system seeks to minimize idle inventory/cylinders. By maximizing the use of cylinders by paying customers, you maximize your gains on this large capital investment. To establish a Best Practice of 98 + percent for on time delivery, TAP Resources recommends a five-day stocking factor or, 5DSF. The 5DSF applies to both full and empty cylinders. Kan Ban organizes production scheduling with visual signals to com-



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municate to employees what quantity to pull into inventory. Nothing is filled until the Kan Ban signals a need and you only replace what has been used. This system, known as Pull Production, is a simple and flexible method of controlling and balancing the flow of your resources. Production is based on actual consumption and using smaller lots wherever appropriate. The overall effect is lower inventory costs while maintaining the service level your customers' value.

Standardized Work is the process of documenting and standardizing tasks throughout the value stream (process instructions, maintenance requirements, and standard operating procedures.) All tasks are written down, published, used for training, tested and made visually available where appropriate. Standardized work eliminates the guesswork and any redundancy in workflow processes.

Production Leveling is a strategy of redistributing production volume and mix over time in order to minimize extremes. It breaks batches into smaller lots while maintaining productivity. Producing emergency lots is only in response to real emergencies, not a way of life.

Point of Use Systems involve positioning required resources for a task as close as possible to the site of the task. Tools and equipment are placed where they are used. Resources are immediately available and there are visual task reminders. Useless motion - walking, running, riding — is eliminated and opportunities for injuries and mistakes reduced.

Total Productive Maintenance can create higher levels of equipment availability through enhanced utilization, performance, maintenance, and employee involvement. Expensive equipment should always be available for use. With Lean Thinking you get everyone involved in understanding the need for maintenance, making observations and reporting maintenance needs in a timely manner. There should be a realistic long-term maintenance program and one that spans the life of the equipment.

Best Practices is the system of management that identifies and puts in place the most efficient way of doing a particular task. Best Practices are developed from continuous feedback, reflection, analysis and documentation of the workplace experience. A Best Practice is always applied throughout the company and can originate from internal and external sources.

The Metrics of Lean Thinking. What you measure dictates what you do and your measurements are the foundation of continuous improvement. Lean Thinking measures everything from the customers' standpoint and these metrics will control your companies performance and business decisions. To make the most of customer satisfaction, you need good metrics.

WHY GO LEAN?

The successful implementation of Lean Thinking involves considerable effort. You must prepare employees by creating an understanding of business needs and motivate them by demonstrating measurable

benefits. Your employees need to be involved in the continuous process of sharing information and Best Practices. An environment of experimentation can encourage employees to develop new processes and performance measures can help link employees to meaningful evaluations and a legitimate system of rewards.

The implementation of Lean Thinking can take months or even years. A company begins by educating everyone about planning tools and workplace organization to create a common language. The principles of Lean Thinking, like 5S Workplace Organization, Value Stream Mapping and Best Practices, can then be initiated. Once in place, Lean Thinking quickly translates into less waste, lower production costs, increased customer satisfaction, and greater profits for your company.

Getting started - which involves change - can be difficult but Lean Thinking creates profits that can not be ignored in today's competitive business environment. With Lean Thinking planning and organization, the quality of your production can be 100 times higher, costs can be cut by 50 percent, inventory turns can be 3-5 times greater and productivity in your company can double. While the Thinking may be Lean, the profits can be hefty. So get out your KanBans and pull your company's production into the premier supplier's position in your marketplace. □



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