RUNNING STEEL "LEAN"

Achieving "World Class" Operating Performance in A Capital Intensive Industry…
Fast!

"Even If You're On The Right Track,
You'll Get Run Over If You Just Sit There!"

Will Rogers

What Is Lean Manufacturing?

While there are a whole set of techniques and related disciplines, the general concept of "Lean" is that of **continuous product flow**, without interruption, through the entire value stream. Inventory is seen as an equivalent to cycle time (the more inventory, the longer any one item must wait for "its turn"). An underlying philosophy is that the **reduction of cycle times and inventories** will force waste to be exposed, and create the urgency for its elimination (see the classical "water & rocks" analogy on the back cover). Waste is re-defined as "anything that does not add value from the customer's perspective".

The results of a successful transformation to this powerful operating philosophy can be staggering: Huge reductions in inventory and cycle times (i.e. improved responsiveness); Order of magnitude gains in quality; Quantum improvements in delivery reliability; And dramatic reductions in total operating costs.

Begin your journey to World Class operations, today!

Transitioning to Lean: Our Core Beliefs

- **The Process Begins At The Top:** It is critical that top management understand the Lean concepts and implications up front. They must set the top-level expectations, and revise the reward systems accordingly.
- **Goals Drive the Process:** Goal curves force the Continuous Improvement Process. A consistent set of goals unifies priorities and direction. Top level goals are

supported by division, plant, department, and work center goals. They must be commitments. People must be held accountable.

- **Customer Focused:** Every customer wants low Cost, high Quality, short Lead-Time, and On-Time every time. All education, and each initiative, should be focused on improving some aspect of customer value.
- **Just Do It!** Results beget results. Try something. See if it works. If it works, do more of it. If it doesn't, try something else!
- **Do The Easy Stuff First:** Get the immediate bang for the buck. Quick results generate momentum and furnish the cash needed to solve some of the more difficult problems. *Do what you can, with what you've got, where you're at, right now!*
- **Iterative education:** Provide people with enough tools to get started. Put that education to work immediately. Make something happen. Then, teach the applicable solution techniques when a problem arises, i.e. utilize the "teachable moment".

Metal Producers ARE Unique

Metal producers have a set of uniqueness' that make the traditional approach to implementing "Lean" very difficult. Some of the more obvious ones include:

- Equipment is often monumental in size, making rearrangement unrealistic.
- Some processes absolutely must be performed in large batches. This fact, combined with the size and weight of the products produced, make "single piece flow" extremely difficult.

- Equipment set-up / changeover costs can be substantial, not only in time and effort, but in yield loss and equipment wear as well.
- Bottleneck operations are true bottlenecks (24 x 7) and thereby require some protective inventory to avoid a costly "out of metal" condition.
- Some mills have a wide variety of routings, and multiple passes on the same equipment. In these circumstances, traditional kanban controls may not be suitable.
- Strong unions and/or less than cooperative labor relations make employee empowerment and natural work teams difficult to install and maintain.
- Metallurgical constraints may limit how aggressively heat-up and cool-down cycles can be accelerated.

The Basic Philosophy

What To Do first?

While it is the objective of Lean Manufacturing to dramatically improve **all** of the basic customer requirements; i.e. cost, quality, lead-time, and on-time; it is important that they be pursued in the correct sequence.

Contrary to intuition, we will encourage you to go after the last two, first! By reducing lead/cycle times, and forcing on-time completions, substantial cost and quality improvements will automatically be generated. As one of our clients succinctly put it, "It's difficult to spend as much money making something in three days, as you can in three weeks!" Another obvious cost reduction comes from reduced material handling, and the associated damage.

Quality is greatly enhanced by reducing the amount of potential defects (smaller WIP inventory means fewer

defects to be repaired or scrapped when a defect is discovered.) And less Work In Process inventory means that defects are discovered quicker, thereby improving the likelihood of uncovering the root cause of such defect.

Let's establish some basic definitions and relationships before getting into the actual transition techniques. First, we will often refer to "inventory" and "cycle time" as essentially one and the same thing. The reason for this is best explained by referring to the "boxes on the conveyor" illustration on the back page of this booklet.

There are 10 boxes on the conveyor. If we remove and process one box off the bottom, and put another box on the top each day, how long will it take for the new box to get through this operation? Needless to say, without expediting, it will take ten days. Note: if our production rate were two boxes per day, the cycle time through this operation becomes simply the inventory, 10 boxes, divided by the daily output, 2 boxes/day, equals a 5 day cycle time.

What's the point? **Cycle Times Correlate Directly With Work In Process (WIP) Inventory Levels**. Notice that even with expediting, the average cycle time does not change. Every box that is moved ahead simply delays the other boxes a proportional amount.

Another, not so obvious relationship, deals with the impact that high WIP levels have on on-time delivery. Since high inventories equate to long cycle times, large amounts of WIP force our customer to predict further into the future. His crystal ball gets foggy, so he frequently calls in change-orders (which screws up our delivery performance and costs us money for expediting and rescheduling).

You'll also note that if we were to expedite box 10, i.e. move it around the other boxes down to position one, we would potentially make every other box late!
Expediting is a major cause of missed deliveries.

Now here's the big question: Will you do more expediting with ten boxes on the conveyor (10 day lead-time), or with two boxes on the conveyor (2 day lead-time)?

Because our lead times are long, and our reliability suspect, our good customer has even been known to over-order or order early, and then delay delivery (which adds to finished goods inventory, moving and storage costs, and handling damage).

You are no doubt beginning to see the large, but difficult to measure, cost and quality improvements that can be attained simply by becoming more responsive and reliable.

Our Rapid Impact Process:
We have found that a two-pronged approach produces the greatest gains in the shortest amount of time. Macro gains are achieved via global lead-time and on-time initiatives. While specific productivity and quality initiatives are pursued at the operational level in the form of concentrated blitzes. Blitz team participants also form the foundation for on-going continuous improvement teams.

The Transition Methodology

Well, we've discussed why some traditional transition methods won't work. Now let's look at a method that does work. The process described below was not inspired by any "divine inspiration". It was a culmination of many trials, failures, course corrections, and adjustments. Is it perfect? Hardly! Does it work? Exceptionally well!

Attain Top Level Understanding and Commitment:
Our normal process begins with a two day "Visioning" session, preferably offsite, with the entire top management staff. This is where the management team gets a chance to discuss and truly understand the philosophy and techniques

of Lean Manufacturing. It is an interactive meeting, and includes a short simulation exercise that, to quote a CEO of a large integrated aluminum company, is "very compelling". On day two, the discussion focuses on the "implications". These are the subtle, "gotcha's" that can blind-side top management if they're not forewarned. They are discussed in more depth in our booklet "Transitioning to Lean, Top Management Implications".

We'll also attempt to get agreement on a set of company ground rules such as: "We will never, knowingly, overbook the mill. When an unforeseen overbooking does occur, the Commercial Department will decide which orders get rescheduled out, and will inform the affected customers".

Considerable time is spent discussing the impact of "lean" on traditional internal and external measurements (short term profits, tons/hr, etc.). The CFO may be tasked to do a proforma to estimate the impact on quarterly reported profits (typically reduced) and cash flow (typically significantly improved) when inventories are substantially reduced. If the profit impact is large, a separate presentation may be scheduled for the board of directors, and even key analysts.

Next, macro corporate level **goal curves** are set and committed to by the entire staff (generally for inventory / lead–time reduction, and on-time shipments improvement). Note: A goal curve is a goal (e.g. 95% on-time delivery) with a date for achievement (e.g. 6 months from today), and a line (the actual goal curve) drawn from our current performance level to that target/date. Similar goal curves may also be set at this time for the major 1st level business segments (plants, divisions). The commercial department may also be pushed to establish a finished goods inventory reduction goal curve.

We will request that one or more full-time **internal facilitators** be assigned. They should be from high in the organization, know the people and processes, and be well

respected (the successful mills have re-assigned plant managers or vice president level persons for this critical task). While top management cannot delegate the responsibility, the facilitators become the day-to-day champions for the cause. The facilitator position reports directly to the C.E.O.

Two Basic Methods Of Implementation:

Different methodologies are utilized in mills that have a regular, linear flow from those with convoluted, multi-path routings. We'll explain the process for both. Note: It is not uncommon to use both methods in the same company. Consider each method as a tool in your "toolbox". Our job is to help you choose the appropriate tool for each application.

Method 1: Install Kanban Controls and Get On-Time

Kanban is a Japanese word meaning "signal". It is commonly used in production environments as a signal that authorizes the production or movement of a product.

In metal producing companies, this "signal" is typically represented by an amount of space allocated for product storage between operating units.

As was pointed out earlier, there is a direct correlation between inventory and cycle time. Reducing the amount of inventory between operating units therefore reduces the time it takes to get any product through the process.

Kanbans provide an upper limit to the amount of inventory that is allowed between units. Let's use a steel company that processes coils as a simple example. The Kanbans might take the form of a restricted number of coil cradles, or allowable locations, between any two operating units.

The operating rules are extremely simple and powerful. The feeding operation, e.g. the pickle line, is authorized to process the next coil on the schedule, as long as there is an empty cradle to accept the coil. By definition, if all of the

allowable cradle spaces are already occupied by coils, the downstream operation, e.g. the cold mill, doesn't **need** another coil. It hasn't used the ones it's already got!

Kanbans are extremely controversial due to the actions that this signal demands. In our example, the pickle line would be required to either slow their production rate to match that of the cold mill, or stop its' production until one or more coil cradles are emptied. In most mills, this action is totally contrary to past practice, and adverse to our traditional measurement and reward systems.

As one plant manager put it "In the past, stopping a unit was a "career decision!"

What Are The Benefits Of Kanban Controls?

Kanban controls provide some very large benefits. They put upper limits on the inventory, and thereby lead-time. Putting limits on inventory allows you to increase the physical spacing between products, and thereby dramatically reduce handling damage. And reduced lead-times provide a competitive edge in customer service; i.e. quicker delivery.

Kanbans also put an upper limit on the number of potential defects. At a recent client mill, the day after discussing this concept, a defect was discovered that involved 1600 tons of coils. The defect was not detectable until processed on the next downstream operation. Prime product had to be downgraded to non-prime, at a $300/ton price penalty. Total cost: half a million dollars! Note: in less than three months, kanban limits had been put in place, and the maximum quality exposure was cut by 60%!

Another often overlooked impact of kanbans on quality is in its' impact on speed of discover of a defect. As any quality guru will tell you, the faster you discover a defect, the more likely you are to be able to ascertain a root cause. By

reducing the inventory between operations, kanbans speed the discovery of any defects.

Kanbans force us to attempt to pace every operation to the speed of the bottleneck. In so doing, the mill begins to take on the characteristics of an assembly line. Product begins to FLOW, rather than stop and start. **Management focus moves from optimizing the individual units, to optimizing the TOTAL MILL.** Units are forced to communicate, and coordinate like never before.

And, perhaps the most powerful aspect of kanban controls is that it provides an extremely simple, visual means to **force continuous improvement.** Reducing the size of the kanban forces the next level of "rocks" to the surface. Resolving each rock improves cost and/or quality.

In our Rapid Impact® process, teams are formed between each pair of operating units. The teams are asked to set a goal curve for the reduction of the kanban size (in this example, coil spaces). These teams meet regularly, and must provide "cause and corrective action" reports to plant management anytime the kanbans are exceeded.

These inter-unit teams are initiated via a "kanban blitz". The teams typically include representatives from operations, planning / scheduling, technical/metallurgical, and maintenance. We also advocate the involvement of the material handling people, i.e. the ram truck and/or crane drivers.

The blitz begins with a short education session / review of the basic concepts and techniques. A goal curve is then agreed upon, i.e. "reduce the allowable number of coils in front of the cold mill from 100 to 40 over the next four months". Unless there are extenuating circumstances, the "curve" is simply a straight line from 100 (today) to 40 (four months from today). This curve is plotted along with the actual kanban size. Teams are required to report "cause and

corrective action" when the goal curve is exceeded for any reason.

The "blitz" portion involves the entire team physically walking the floor, agreeing on the initial locations for the starting kanban quantity, and physically marking off these spaces. We always attempt to remove any other possible places to put inventory. Again, using our coil producer example, we'd set a rule that no coil can be place on the floor. It must be in a coil cradle. Then we'd limit the number of cradles to the kanban quantity. We also advocate painting the kanban area a specific color, and doing a thorough housekeeping as part of this process. You want it glaringly obvious that "things have changed. Business as usual is no longer acceptable"

The team then creates the "kanban rules", documenting the new process. These are then "bulletized" and posted throughout the work place. All operators are then put through an education/discussion session where the new operating philosophy and rules are explained. The inter-unit team typically schedules and conducts such classes for all crews.

Note: We also recommend that any "held" material also be required to be kept inside the kanbans. Doing so will force quick dispositioning and reworking of discrepant material.

Historically, in most mills, an upstream operation would continue to produce as long as there was a place to put the product. You can think of the kanban controls as a way to "shrink the building size". If the building were smaller, we'd have had to stop sooner!

A simple first step toward kanban controls, in a coil producing mill, is to put out the edict, no stacking of coils, and no placing coils beyond the isle markers. The next step is to then "squeeze" the WIP inventory further by implementing formal kanban controls.

On-Time Delivery Goal Curve

We mentioned earlier that we ask clients to accomplish two simultaneous goal curves: Inventory reduction (cycle time) and On-Time Delivery.

Truthfully, it really isn't very difficult to accomplish the inventory reduction objective… if you don't have to be on time! We consider on-time delivery as the "stake in the ground" that makes all other measures relative. In our introductory classes we speak of our original delivery date commitment as a PROMISE. "How do you feel when someone breaks a promise they made to you?"

One critical culture change that must take place is the sanctity of the delivery commitment. "We ship on time. All the time."

Once again, the goal curve drives the improvement process. Detailed cause and corrective action is demanded any time the actual delivery performance fall below the goal curve.

Let's take a look at the kinds of problems that may surface at your mill:

- **Overbooking of all, or some pieces of equipment.** By overbooking we mean accepting orders in excess of "demonstrated capacity" (the average amount of work that the unit in question has "demonstrated" that it is capable of producing). Theoretical, or "peak performance" capacity numbers are a pipe dream. While rough capacity planning tools generally exist in most mills, it is the lack of discipline to establish loading rules, and to follow such rules, that are the usual problems.
- **Unreasonable promise commitments**. The expression is "tell them what they want to hear". This needs to be replaced with "Say what you'll do, and do what you

say." Making realistic delivery commitments will often require a company to "rank" their customers. Capacity is reserved for the "A" customers, thereby assuring short lead times, whereas lead times "float" for the "B" and "C" customers, depending on the current backlog of orders.

- **Poor planning and/or scheduling**. As work-in-process inventory, and the corresponding product lead times, get shorter, scheduling becomes easier. Planners discover that "FIFO"; first in, first out; allows things to flow. Inventory reduction forces the resolution of the major constraints to FIFO.
  Kanban controls further simplify scheduling.
- **Poor adherence to schedule.** Sometimes it isn't the schedules that are the problem. It's the fact that operations doesn't follow the schedule! Discipline must be mandated. Demand "cause and corrective action" any time there is a deviation from schedule.
- **Un-reliable equipment.** Many U.S. mills are caught in a catch 22. They don't have the cash to adequately upgrade critical equipment. And they often load such equipment to capacity, leaving inadequate time to perform even the required routine maintenance.
  The good news is that there is a heap of cash tied up in inventory. And, as we reduce that inventory, not only do we free up cash, we also free up capacity.
  During the inventory reduction period, for some period of time, we will need to produce <u>less</u> than we ship.
- **Un-reliable processes (quality failures).** Most mills have people dedicated to process control. Yet, it is amazing the things you'll discover as you begin driving down the inventory between operations! Lean, will force the identification of "standard settings", and standard procedures, across all shifts. And, with low inventory,

defects are discovered rapidly. This greatly improves the likelihood of linking true "cause to effect."

One "rock" that you will likely encounter is the disruption caused by extensive down periods due to scheduled maintenance. Needless to say, if the kanban between two units is sized at 12 hours, a scheduled maintenance period of 24 hours is going to cause a problem! The solution:

Modularize and Cascade Planned Maintenance.

To "modularize" planned maintenance means to split the maintenance process into smaller chunks, done more frequently. For example, instead of scheduling one 24-hour maintenance down period, every three weeks, we'd like to get the same amount of work done in 8-hour modules, done every week. One way to accomplish this is to hold targeted "maintenance blitzes".

A select group of "experts" is gathered for a short period of time (2 – 10 days) with a clear objective to simplify and modularize planned maintenance on one specific operating unit. The group typically includes representatives from maintenance and operations as well as a facilitator and one or more "outsiders". The outsiders are tasked to challenge all the "norms". One often-encountered obstacle to modularizing planned maintenance is the time required to isolate equipment. Solving this issue may require some capital spending. The funds for such investment are generated from the inventory reductions.

The blitz team is empowered by management to change processes and procedures as required to accomplish the objective. They are also provided with a spending budget, under which no additional approvals are required.

The objective is not only to identify and suggest, but to implement as many of the changes as possible before the end of the dedicated blitz period. Those items that cannot

physically be accomplished during this period are left in action item form, complete with names, due dates, and review process. The team also writes any new documentation required, and conducts any re-training classes needed to put the new procedures into practice.

In addition to reducing the length of time that any scheduled maintenance requires, each individual unit's maintenance must be sequenced (planned) such that the inventory "hole" that has been created flows, **cascades,** down through the process. For example: maintenance on the pickle line causes the kanban in front of its' customer, the cold mill, to empty. Maintenance is then performed on the cold mill, allowing the pickle line to refill its' kanban, and causing the kanban in front of the anneals to empty. Maintenance is then done on the anneals, and so on.

Needless to say, adherence to the planned maintenance schedule must also be enforced.

Due to the simplicity and power of kanban controls, we advocate using them wherever possible. The payback is enormous. The concept is easily understood by all levels inside the organization. And, the visibility for management to monitor progress, and readily spot "exceedances" make kanban controls the easiest means to truly transform the company.

However, there are mills where kanbans cannot be effectively utilized. For these circumstances, an alternate method has been developed:

Method 2) Cut Planned Lead Times and Get On-Time:

Most mills have some form of planning/scheduling system that allows them to determine operational due dates. The method we will use to cut WIP inventory, and get reliability, deals with these dates. First, the lead-time offsets for each operation are reviewed. All obvious excesses are

immediately cut out (this is the low hanging fruit). Since lead-time equals inventory, cutting the planned lead times will automatically cut inventory proportionally.

Reliability is achieved by holding each operation/department accountable to hit their operational due date. Once again, a goal curve is utilized (it isn't reasonable to expect an operation to go from 30% to 90% overnight!). Teams composed primarily of operations, planning, and technical people are tasked with bringing the on-time performance, in their area, up the curve. As long as they are above the curve, no further reporting is required. When they fall below the curve, formal "cause and corrective action" reports are required.

The only way to reduce WIP is to "put fewer boxes on the conveyor than you take off". When lead-times are cut in the planning system, the front-end operations will experience a temporary drop in their workload (the metal doesn't need to started yet). Planning for this occurrence can provide some valuable resources to be reallocated to short term projects. Or, if the shop has been working extensive overtime, this occasion may be used to provide some temporary relieve.

The Key Role Of The Planning Department:

It's not, however, quite as easy as it sounds. Sometimes the planning system plans in weekly "buckets". Needless to say, it's difficult to cut an operation's lead-time to 2 days, when the smallest planning increment is a week! Here, you'll either have to revise the software or go around the system.

Some systems don't record the operational due date on the shop paperwork, making it difficult for the scheduler to line up the jobs appropriately. Luckily, this is a normally a minimal programming effort to fix. A means must also be found to track the actual date the operation was performed vs. the planned operation due date from the system.

A different obstacle that you will likely encounter, is the "week think" syndrome. When an operation does not require more than fifteen shifts (turns) per week, the normal crewing practice is to schedule all crews, all shifts, to work Monday through Friday. When the operation planning lead times are long, i.e. integer quantity of weeks, this crewing practice isn't a problem. However, when we try to cut inter-unit lead times to less than a week, this rock is sure to surface. Due dates will fall on Saturday or Sunday. And attempting to "blank out" the weekends, in the scheduling system, simply extends your customer response times and adds inventory.

At first blush, the "week-think" issue doesn't sound like such a big deal. Believe me, it is! Again, think about the "lead-time equals inventory" formula. Where would you rather hold inventory? In front of a bottleneck operation? Or in front of a non-bottleneck? The answer is obvious. We can not afford to risk an "out of metal" situation at a bottleneck. Well, if we're going to carry inventory (lead-time) in front of the bottleneck, and we want to cut total inventory/lead-time, we must remove it from in front of the non-bottlenecks. Well, if you're going to keep from piling inventory in front of a non-bottleneck over the weekend, the operation will also need to be manned Saturday and Sunday. Note that this does NOT necessarily mean higher operating costs. The first step usually involves spreading the manned shifts across all seven days, i.e. instead of operating 15 shifts over a five day period, we might man 2 shifts over the full seven days.

Ideally, the mill is "slowed down" and the crew size adjusted accordingly. Thus a 3 person crew operating 14 shifts/week might be replaced with a 2 person crew operating 21 shifts per week.

The key point is this: The shorter the lead-time for an operation, i.e. the lower the inventory kept in front of an operation, the more critical it is that said operation be

available seven days/week! Non-bottleneck operations should, theoretically, be standing there waiting for the steel to arrive!

Begin now to plan on ways to cover ALL operations seven days per week. Some mills have alleviated the problem by using a "four crew" schedule for two or three crews. Others have had success combining operating units (the crews move between operating units as needed). Some shops have done some creative things like 10 or 12 hour shifts, alternating 3 days on & 4 days off, "eight day week" (4 on, 4 off), etc.

NOTE: This same problem will be encountered when installing kanbans. You will reach a minimum inventory level required to "cover" the weekend. To advance beyond this limit will require operational coverage on all 7 days of the week.

Another subtle inhibitor that you will likely encounter deals with the "promise day" of the week. It is a common practice in many metal producing companies to promise "week of" (note: in other industries, promising to the hour is becoming the norm! But that's another discussion!). In the formal scheduling system, all orders are therefore typically given the same due day of the week, e.g. Saturday. Once again, when lead times are long and we think and plan by the week, this is not a problem.

However, when you begin measuring each operation to it's operational due date, and when you have many similar routings, a problem occurs. The operational due dates tend to "lump" on certain days of the week, creating an unrealistic schedule. One obvious solution is to begin promising to the day. However, this step requires many cultural and systemic changes that may be difficult to overcome at this time. That being the case, another solution has been effectively used in several client mills. It involves the use of some form of scheduling "randomizer". The randomizer arbitrarily

spreads the order completion due dates across the days of the promise week, thus minimizing the problem. The promise to the customer remains "week of", but the internal planned completion dates are "smoothed" via the randomizer.

Note: Many companies currently use a customer promise "buffer week" to help assure delivery performance, i.e. they schedule the order to complete in week 28, but promise shipment in week 29. With the change of focus to operational due dates, this buffer can now be reduced gradually, day by day. Part of our strategy for the reduction of finished goods inventory thus becomes a goal curve to reduce the "days of buffer".

In either approach: Kanban or Cutting planned lead times, you will need to do the following:

Attain and Sustain Top Level Involvement:
We ask, during our initial Top Management "Visioning Session" that key staff members be assigned to a Top Management Advisory Committee (TMAC). This group meets weekly, often as an extension of their normal staff meeting. At this meeting, the goal curves, with the most recent "actuals" posted, are presented by their appropriate managers for review. If actuals fall below the curve, "cause & corrective action reports" are also presented.

The TMAC provides top management an ongoing "finger on the pulse". It provides the lower level teams a decision making forum and an opportunity to request resources when required. Action items are also assigned and tracked as the occasion arises.

Educate Middle Management:
Four-hour classes are held for all salaried employees.

Each class is introduced by a member of top management. The corporate goals, and the compelling reasons for change,

are explained. The transition to "lean" must be seen as the new way that the company intends to be run. This cannot be seen as "optional", or "the fad program for the year".

We always try to get at least one sales or customer service person in each class. They tend to represent the customer's perspective. The class provides an overview of "lean" concepts and covers a few of the key techniques. A one-hour "paper house" demonstration provides an entertaining way to convey the competitive advantages derived by operating "lean". The class ends with "go around the room" questions for each attendee. "Is this something we should do?" "Is this something we can do?" This wrap-up discussion brings out individual concerns, and helps to gain commitment.

Introduce Key Concepts to the Entire Workforce:
A series of one and a half hour awareness sessions are held for all employees. These, too, are kicked-off by a member of management (the higher the better). In one company the C.E.O. & Senior Vice President of Operations video-taped a three minute "state of the company" introduction to kickoff each education session.

Basic concepts, as seen from the customer's perspective, are presented. The corporate goals are shared. And the participative demonstration is held. The class concludes with "What's Lean mean to me?" Operators will see less inventory on the floor. "This doesn't mean we're going out of business!" They will also experience a much greater emphasis on hitting the operational due date.

An additional purpose is to short-circuit the rumor mill. Whenever top management goes to a two-day offsite, the rumors are bound to fly!

Attacking Cost and Quality:
Usually by the third or fourth month we are ready to begin focused area blitzes. This is the most effective way we've found to attack and implement process improvements. Teams are formed, composed of both hourly and salaried employees (plus an occasional outsider: i.e. equipment supplier, customer, office worker, executive). A specific area and objective are generally targeted in advance, e.g. "this team will attempt to cut the change-over time on the wide-line shear by 50% by the end of the week".

Each blitz lasts from three to ten days. The focus is on generating ideas and implementing improvements NOW. Any tasks that cannot be accomplished during the blitz will have action items assigned, with responsibility and due date commitments.

The initial blitzes will typically generate huge returns with minimal capital spending required. In most mills there are literally millions of dollars in "low-hanging fruit".

Office area blitzes will also generate significant efficiencies.

Phase II Expand And Institutionalize:
About six months into the transformation process, the need arises for another Top Management "re-visioning" session.

Some new "rocks" will have been exposed and additional techniques will likely need to be introduced, such as putting limits on early production, limits on "reach out" allowed for campaign groupings, and establishing "A" customer capacity reserves. The concept of "opportunity tons" will be introduced (the reservation of a portion of capacity, during periods of a "full mill", to allow the ability to take a high margin order for quick delivery).

Goal curves will likely need to be reset for another six to twelve months. New goals may also need to be established. As the company progresses up the various goal curves, gains

become harder to achieve (and more and more "fixes" will require capital spending). The goal curves begin to flatten. This is the time to add goal curves for cost and quality.

It's also a good time to expand the process to include select customers and suppliers. This can be done through a group event, such as a "supplier day", or through one-on-one visits with individual customers / suppliers.

Our job, as consultants, is to wean ourselves from your operation in such a way as to leave an institutionalized process behind us. This is best done as a phase out, and not "cold turkey". Frequency of visits begins to space out in the second year, from monthly to every other month, to quarterly, etc. We have many long-term clients that we still visit annually for a "tune-up".

You will also need internal mentors. The internal facilitator, and one or two others, should be "grooming" during the entire time we're working with you. They will need to be able to conduct future classes for new hires, and lead a Rapid Impact blitz. They need to become the "resident experts". These people should be "glued to our side" during each visit. The payback on these individuals can be great.

Goals Drive The Process:

While every company attests to believing in "continuous improvement" (it's in their mission statement!). Truly establishing Continuous Improvement as a part of the culture is extremely difficult. The best mechanism we've found, after working with hundreds of companies, is the continued use of goal curves. As long as the goal curves are not horizontal, continuous progress will be required. The curves, however, will become meaningless if people are not held accountable. The goals must continue to be realistic (although a stretch) and jointly established. Then all focus must switch to "HOW", not "IF", we attain them.

LET'S TAKE A LOOK AT SOME ACTUAL CLIENT RESULTS:

- Tin Mill: $15,000,000 inventory reduction. On-time delivery improved from 80% to 95%. Dramatic cost & quality gains. Accomplished in 9 months.
- Integrated Carbon Steel Plate Mill: 40% inventory reduction. Product cycle times reduced 35%. Missed deliveries cut by 70%. Productivity initiatives generated savings of $3.6 mil/yr. Accomplished in six months!
- Stainless Steel Finishing Plant: Product cycle times cut by 70%. Inventory reduced by 60%. On-time deliveries raised from 80% to 95%. Eliminated a complete separate finished goods warehouse. Done in eight months!
- Aluminum Finishing Plant: Inventory cut by $17,000,000. Annual cost savings of $2,200,000. Accomplished in seven months!
- Integrated Stainless Steel Mill (Multi-Plant): Total inventories cut by $120,000,000! On-time deliveries raised from 62% to 90%. Product cycle times cut by 35%. Achieved in sixteen months!

"I hate consultants;
But I'd recommend you guys to anyone."
Larry Furguson, General Manager, GE Transformers

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Inventory Hides Waste!

Reducing Inventory Exposes the Waste and Forces Correction.