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CYCLE TIME MANAGEMENT INC.

CYCLE TIME MANAGEMENT INC. BUSINESS ASSESSMENT

Keeprite

EXECUTIVE SUMMARY

The Keeprite is more than a record of dramatic productivity improvement. It is also the tale of an extraordinary culture change within the workplace. It describes how employees from all levels learned to work as a team. The Evolution Plan was accepted by the Approval Team in October 1989. From that time to March 1991, the teams reduced company cycle time from 22 days to 7 and slashed inventories from $18 million to $3 million.

COMPANY BACKGROUND

Founded in 1948 with a commitment to build the very best air-conditioning products, Keeprite has consistently met the industry challenge of quality and reliability. It is the indisputed industry leader in Canada. Today as a part of Inter-City Products, Keeprite Canada manufacturers a complete range of air-conditioning products for residential and light commercial applications, as well as a comprehensive line of gas, oil, and electric-fired furnaces, space heaters, and unit heaters.

The total yearly sales, both domestic and foreign, has grown from $1 million in 1948 to about $200 million in 1989. Keeprite executives feel they have achieved this growth by adhering closely to the company's original philosophy, to build better-quality products through solid engineering and to back them up with technical competence and good service.

A TRADITIONAL BATCH PLANT

"Keep the lines operating at any cost," use to be the main objective of plant manager Don Kivell. Each machine – in fact, each department – was a discrete unit that was scheduled separately and measured independently. Listen to how lead hand and union steward Ron Sakardi describes the old production practices: "Setups were too long – I'd do a job for an hour and then had to do a two – or three hour setup. Quality was bad. There was inventory all over the place and the plant wasn't safe. Looked like we were producing more scrap than production, but employees didn't give a damn."

As production manager and 20-year veteran Roy Winger recalls, "Line stoppages and parts shortages were common. We had three or four warehouses to cope with excessive inventories. While we scrambled for parts, people would be sent home for two to three days because we couldn't run product for the eight hours. We had no time for quality. We had lost control. Everyone was pretty defensive." The union was upset because one of the unique features of this plant was an elaborate piecework compensation scheme that had been an integrated part of the culture for many years. Consequently, many members' wages were dramatically affected when they were sent home.

Control was not easy to recover. Kit Staley, the eventual CTM coordinator, explains that "the organization had no way of controlling the flow or costings because the MRP was out of control. Inventory accuracy was 35 percent to 40 percent. Bill-of-material accuracy was 15 percent to 20 percent. As a result, I used to spend two to three hours each morning in meetings discussing data accuracies."

The impact of the poor computer system was far more pervasive. Penny Pickering in Materials Planning recalls that "people didn't trust the computer; consequently, they did things manually."

A TRADITIONAL BATCH PLANT (CONT'D)

These parallel information systems inevitably led to a situation in which "office and plant personnel didn't talk to each other, or if they did, no one was really listening. There was a lot of frustration – everyone was doing their own thing."

Against that backdrop of confusion, frustration, and distrust, one group had created excitement by their actions in the paint shop. The "Linebackers" team had identified the outdated paint booth as a bottleneck and then designed a new booth and had it built by an outside company. The cost of the booth was $280,000. The overall savings, however, was significantly greater: $480,000 per year and reduction of changeover time to 10 minutes. The Linebackers won a quality award with the project.

This project would later be cited as evidence of what teams could accomplish. In spite of its success, however, people remained skeptical about the depth of senior management's commitment to change.

A TRADITIONAL BATCH PLANT (CONT'D)

It was at this point that senior managers called for help – outside help. They realized that to become a world-class organization, they would have to abandon traditional batch processing and move toward linear-flow pull manufacturing, which their Japanese competitors were using. While they would have to initiate the change process and provide constant support themselves, they would need outside facilitation skills to guide the evolution. They also concluded that the fastest way to get the company through such a major "culture shock" was to involve all their people. Consequently, they chose a change process in which they, as well as all their employees, would have to participate and be trained.

In doing so they made a strong commitment to

- understanding new manufacturing techniques such as cycle time and linear pull systems
- investing in similar workshops for all employees
- involving all levels of personnel in planning
- implementing the changes required to reduce cycle time dramatically
- allowing people enough time to understand the process
- a participative management style, which meant giving up their roles as autocrats to become facilitators and coaches

The objective throughout the process was to reduce overall cycle time – from receipt of customer order to delivery of and payment for the product.

SUMMARY OF THE EVOLUTION PROCESS

The first step was to get all managers who were on either the approval team or the planning forum trained in the new operating techniques. The approval team, which consisted of senior managers, was expected to assign the resources on the basis of recommendations from the planning forum. The planning forum participants were middle managers and key employees whose job was to prepare the evolution plan – the frame work by which to manage the transition to CTM.

As soon as the management training session ended, the planning forum established 15 review teams of middle managers and key employees. Those who needed it were trained quickly. All teams were then brought together, given their mandates, and sent off in search of opportunities to reduce cycle time.

The objective of each training session was to give everyone an understanding of the new concepts. There were other benefits too. At the first coffee break of the management session some observed that this was the first time that senior managers and all operating department heads had sat down in one room to discuss the business. Some senior managers suggested afterward that the improved communications alone would more than justify the training sessions' cost.

Yet while communication between all levels improved, only a few managers were initially willing to make a commitment to change. Most adopted a wait-and-see stance. Penny Pickering describes the middle managers' attitude best: "People were interested but skeptical at first. They were watching to see if the executives meant it." However, each director knew, as Kit Staley points out, that "Brian Bennett, the V.P. of manufacturing, was totally committed from the start."

Employees on the shop floor had mixed feelings. As Ron Skardi explains: "They wanted to help themselves but not the company." However, most workers' information was sketchy since only the union representatives had any training. Don Kivell sensed the concern on the floor. He took advantage of the waiting period to "build trust and credibility" by staging many informal meetings with supervisory and shop-floor employees and committing resources to cleaning up the bill of material, resolving some of the safety issues, and establishing good housekeeping practices. His actions sparked interest.

This was a trying period because nothing appeared to be happening. Some of the most creative in the rank and file grew impatient because they were still not involved in the process. After three months, however, the evolution plan was ready to be presented to the approval team.

IMPACT OF THE APPROVAL TEAM MEETING

The approval team meeting, which lasted for a full day, turned out to be the most important meeting in Keeprite's history. All 120 people involved with the 15 review teams were present; each team made presentations. In all, the evolution plan comprised 120 cycle time reduction projects ranked according to team priorities.

The meeting exceeded everyone's expectations. As John Chambers, manager of quality assurance, puts it, "Everyone burst into flower." Kit Staley remembers that "approval team members were blown away by the caliber of the presentations." They were also startled that most require little money and could be completed quickly. Furthermore, the initial skepticism of both senior managers and other employees were capable of working in teams to plan and implement improvements. Similarly, employees were convinced that senior managers were totally committed to reducing cycle time.

ACTION TEAMS

Action teams were organized within two weeks and then trained. Where needed, special training was provided in areas such as pull systems, project planning, preventive maintenance, blueprint reading, and team building.

WORKING ON THE FIRST PROJECTS

After the approval team meeting, the base of employee participation was moved down to operators and clerical staff. As Don Kivell puts it, "credibility was cemented when people at the bottom were asked to become involved with teams and contribute their ideas. There were more volunteers than teams. A couple of teams got quick success, and we found lots of ways to celebrate those successes."

As an example, Ron Sakardi grabbed the chance to eliminate a major safety hazard – the degreaser. By eliminating the degreaser, Ron and some of his colleagues stopped the deterioration to the roof and reduced maintenance and repair of boilers. Furthermore, as a result of an operator's suggestion, they installed a bank of fans under the conveyor system and thus were able to reduce the new decreasing process from three days to 20 minutes. To those involved, the project indicated that management was serious about reducing cycle time.

Kit Staley reports on the overall success of the projects: "Results achieved were way beyond expectations. We had planned over five years, but in every area immediate dramatic improvement was evident."

THE NEW SPIRIT OF TRUST

At the same time that project teams were starting on their projects, the company realized that they would have to slash production in response to a changed market. The result was a dramatic layoff of about 40 percent of shop floor personnel.

Normally, this kind of catastrophe would have killed enthusiasm. Yet, because people had a new trust in management and faith in the company, the momentum remained and morale stayed positive.

Roy Winger was impressed that "we became less defensive and supervisors got together on problems in a common bond and stopped trying to point fingers." John Chambers adds, "People have started to look, question, and talk about things in a cooperative way." For Penny Pickering, the projects produced an "excitement in the air. People were talking about their presentations and ideas."

Even union-management relations had improved. As Ron Sakardi notes, "The company understands us better and we understand them."

Between October 1989 (when the approval team accepted the Evolution Plan) and March 1991, employees had produced

the results shown in Table 1-1 on the following page.

Keeprite Accomplishments	Baseline October 1989	March 1991
Reductions		
Overall cycle time	22 days	7 days
Inventory	$18 million	$3 million
WIP	12%	6%
Storage space	150,000 square feet	30,000 square feet
Order entry time	7 days	18 hours
Setup to presses	5 days	54 minutes
Work orders to presses	6 days	10 hours
Processing to presses	3 days	4 hours
Forklifts	28 trucks	16 trucks
Downtime	1200 hours	600 hours
Improvement (%)	50%	95%
Inventory accuracy	100 hours	47 hours
Productivity core & header	207 drawing	21 drawings

Redraw drawings		
Starting point is August 1988		
Productivity improvement	up 17%	
Operating profits	up 219%	
Delivery schedule	96% on-time delivery	
Shipments	up 29%	
Overtime	50% below budget	
Inventory	25% ($5 million) below budget	

EPILOGUE

Two years after producing such successful results, Roy Winger observes, “It’s hard not to feel proud of the accomplishments and to feel good about ourselves.” Don Kivell agrees: “Terrific progress is still being made. Over 50 percent of our employees are actively involved in cycle time reduction teams covering our total business cycle from order entry to shipping.”

In the best summary of the consequences, Don continues: “It’s a paradox. The recession reduced work 25 percent. If we had not come as far as we have in cycle time reduction, we might not be sitting here discussing it. Because of our success, we remain in business. We’ve been recognized by the head office, and also numerous industries in the region. Despite the business downturn, people still believe in us.”

IMPACT OF CYCLE TIME REDUCTION ON PROFITS

Overview

The goal of entitlement – the cycle time that can be achieved simply through elimination of nonessential activities across the company. We outlined a cycle time reduction sequence that begins with the elimination of nonessential activities and impediments to linear flow in the manufacturing cycle. We showed that as nonessentials are eliminated, buffer inventories can be reduced dramatically.

We will show how reaching entitlement affects not only profits but also most of the functions and responsibilities of the chief financial officer (CFO). Traditionally, CFO’s have avoided getting involved in cycle time reduction, but in the fast track process their involvement is essential. Once involved, they will realize that continuous cycle time reduction

- improves profits dramatically
- improves the balance sheet
- reduces the working capital cycle
- introduces new asset-valuation criteria
- simplifies internal controls
- requires a new cost model

Improvement of Profits

Eliminating nonessential activities such as changeovers and travel time may not reduce costs. However, it may reduce inventories and their many associated costs are the cost if those jobs necessary to buffer nonessential activities, such as expediting, cycle counting and shepherding engineering changes.

Keeprite Canada's performance provides an example of how a significant drop in cycle time produces a similar reduction in inventories. Recall that in the first year employees reduced cycle time from 22 days to 7 days and inventories from $18 million to $3 million. As Keeprite's profit and loss statement shows, the triple effect of such a major inventory drop extends across a large spectrum of expense accounts. Some examples follow.

Interest charges. As inventories diminish, loans (and corresponding interest charges) are reduced.

Facilities expenses. The linear flow process requires much less space because there is no inventory and no travel between machines. Whether the extra space can be rented out or used for other purposes is up to the company. Often, operations in other buildings can be brought in to fill he excess space, after which the other buildings can be sublet. In any event, better use of space reduces expenses for rent, taxes, heat, light, and power.

Material handling. While forklift trucks, storage racks and bins, and pallets or containers may be needed as part of the receiving and shipping process, they will not be needed in the plant linear process. Every forklift truck that can be eliminated reduces costs by about $60,000 per year. At Keeprite, the number of towmotors has already dropped from 33 to 22, for a savings of about $660,000 and further eliminations are expected as the company tries to keep pace with one of its Japanese competitors, which has no towmotors on its shop floor.

Administrative costs. Indirect labor costs go down when people eliminate specialized functions such as expeditors and changeover teams. They also drop when internal control procedures are simplified. An obvious example is the cycle counter. Internal control processes can become bottlenecks in the drive to achieve total linear flow. Many of these nonessential procedures create other costs related to computer time and paper forms.

Quality improvement. As quality defects are reduced to parts per million, costs diminish in the following expense accounts:

- warranties
- obsolescence
- scrap
- rework

Direct labor clerical costs. Since direct labor in most operations will account for 5 to 10 percent of the total cost, it will not likely be segregated from overheads with the same degree of accuracy as a traditional cost system requires. Time tickets and separate printouts will then be redundant. At that point, all the costs of the clerical activities associated with segregating direct labor will disappear.

Organizational structural changes. Other costs will disappear as operators take control of the linear flow process, which leads to fewer management levels and job classifications. Depending on their size, companies will probably end up with two to four classifications and four to six levels of management.

Workers' compensation costs. High workers' compensation costs may drop dramatically. Most worker injuries are to the back, and are caused by moving inventory.

Expenses That Increase in CTM

Some expenses will increase during the evolution to CTM:

1. Maintenance will increase significantly. Whereas preventive maintenance will be done by operators, planned maintenance (to decrease the chances for total system shutdown) will increase markedly.
2. Education and training expenses will increase. The amount will depend on the number of employees.
3. Sundry small expenditures may be required to fix tools and move equipment to reduce changeover and travel times.
4. Revenue increases may occur. If the company is in an expanding market, it may increase throughputs during the same accounting period, and in turn increase revenues.

Despite the expenses associated with a transition to CTM the net increase in profits can be substantial . One of our original clients went from $2.5 million loss to a $2.5 million profit in about 18 months – “the most spectacular achievement in the company’s history,” said a former controller. Unfortunately, since the company treated cycle time reduction as a project rather than a way of life, its subsequent performance slipped dramatically.

IMPROVEMENT OF THE BALANCE SHEET

While most people will focus on the improved profits, they should not overlook the positive impact of significant inventory reduction on the balance sheet and working capital indicators. Remember that in the first year KeepRite Canada reduced its inventories from $18 million to $3 million.

Since no new investment in technology is required in the effort to reach entitlement, the only things likely to change are current assets and, if there is a bank loan, current liabilities. If you follow the KeepRite path, the balance sheet will change significantly during the first year of CTM. Inventories will have dropped dramatically, leading to either increased cash or decrease bank loans. This pool of credit or cash will then be available to finance the drive to reach benchmark or become best in the industry. Such goals are attainable only if you engineer out nonessential components and processes or use technology to reduce the time taken by essential activities.

IMPROVEMENT OF THE BALANCE SHEET (CONT’D)

As a side benefit, when inventories cease to be a material factor in a profit-and-loss statement, outsiders can be more confident of the statement’s accuracy. Large and material inventories have traditionally served as logical hiding places for poor performance – and sometimes even for good performances. Since inventory valuation is an art, not a science, personal judgment plays an important part in the valuation process. As a result, an inventory value of plus or minus 10 percent is easy to justify. Obviously, 10 percent of $18 million is more material than 10 percent of $3 million.

Reduction of the Working Capital Cycle

Traditionally, the balance sheet and the source and application of funds have been used to keep track of the working capital requirements. Some companies have also used the cash flow statement. This statement is important in a CTM evolution, because it helps to expand the cycle time concept to include the receipt of payment. To this point, cycle time could be seen as starting with the order and finishing with shipment of the product. However, running in parallel with this process is a working capital that needs to be included in the definition of total business cycle time.

Let’s assume that your working capital cycle is 84 days, which includes 42 days from order to shipment and another 42 days to collect the accounts receivable. Suppose you reduce processing cycle time from 42 days to 2 days, while the present customer payment schedule is around 42 days. Then the business cycle time will be 44 days, or the length of time it takes to collect the receivables. How will this scenario affect the working capital for of funds? Since companies normally pay suppliers in 40 to 4 days, your customers will cover your payments to suppliers. This arrangement can apply to 50 percent or more of your disbursements. You will need to cover the management and office monthly payroll for about 4 to 6 days and about 6 to 8 days of the shop employee’s weekly payroll. While most manufacturers cannot conceive of having such a working capital cycle, we know a company that has had one like it for years. A manufacturer of

corrugated boxes get a customer order ready for delivery in 15 days. It orders raw materials to be delivered during the afternoon of the14th day, produces the product and delivers it together with an invoice on the 15th day. This company has to contend with key suppliers that also perceive it as a direct competitor. Instead of the usual 30 days credit, the suppliers only allow 15 days. The company's response is to extend only 10 days' credit to its customers, which the customers have paid willingly. Such working capital targets are unthinkable with a traditional manufacturing process. They are possible in a CTM operation.

Introduction of New Asset-Valuation Criteria

In the traditional system, the usual requisition was for a stand-alone piece of equipment, a total process, or a plant. The instinct was to buy excess capacity, the fastest equipment, and (starting in the early 1980's) the most electronic gadgetry available.

Inevitably, the new machines were expensive. Volume of output and costs per widget were the performance measures used to determine payback period. The payback period and amount of capital plus the projected costs of money were plugged into discounted cash flow models, and the project was evaluated and ranked according to priority. In a traditional process, the major emphasis is to determine payback and the money implications of the investment. Since each machine or process is an independent cost centre, there is not perceived need to study the impact of the new machine on the whole process.

Introduction of New Asset-Valuation Criteria

In a linear flow process, where all the machines are interdependent, the criteria for evaluating new machine purchases are necessarily different. For example, the following questions are critical:

- Is the equipment a replacement? Would the old machine still be useful in a dedicated role?
- What impact will new machines have on the effort to reduce cycle time? Does the machine reduce the time required to do the essential activities and not increase the nonessentials, such as maintenance? Are all the gadgets essential to meet the line requirements? If the machine is complex, are training courses for operators and maintenance people available?
- How long and how much investment will be required to get the equipment operating efficiency?
- Will the machine create or reduce the impact of bottlenecks? Implicit in this question is that if the machine is too fast and creates a line-balancing bottlenecks, then it is not going to help the process. Further, it may be possible to get a smaller, less complex machine, that is less expensive and does the job better.
- How reliable is the machine? Remember, in a linear flow process if one machine breaks down, the whole process stops. Reliability is therefore an imperative criterion in the evaluation of new equipment. It is better to spend more money to get the most reliable machine available.
- Is the machine easy to maintain? If a critical machine's vital parts are inaccessible, hampering both lubrication and repair the machine will be a major weakness in a linear flow process.

The cost of money is still an important factor in the evaluation process. However, the new criteria are essential because they insure that the linear flow process is not impeded. Therefore, the capital budget process must include people who can properly assess the impact of new equipment on the linear flow process.

Simplification of Internal Controls

Fast-track cycle time reduction raises a new concern for finance. As traditional operations became larger and more complex, control procedures became more essential and more costly. In CTM Operations, however, the complexity diminishes and many of those procedural controls are exposed as bottlenecks. The main task is to determine what procedures are essential to assurance that proper controls are in place. A secondary task is to determine when to change internal control procedures and reduce the related costs.

Protecting company assets will continue to be a key CFO responsible. Only finance can decide which internal controls to modify and when. To do so, it needs to participate in designing the evolution process so it becomes aware of potential bottlenecks caused by existing internal control procedures and understands the new control tools that are available.

Linear Flow as an Internal Control Tool

Recall the following characteristics of a CTM linear flow process that uses the pull approach:

- Planners will only schedule final assembly. The system will schedule each individual machine from that point on.
- Inventories will be relatively insignificant, and turning over daily. There will be no inventory lying on the shop floor.
- The whole process will be visible from start to finish.
- If the process is not fed properly, it will shut down.
- If the right engineering drawings are not at the right station at the right time, the process will shut down.
- If one station in the process starts producing defects, the process will shut down.

Financial managers will accept the linear flow system as an integrated control check only when they can

- Appreciate why the system cannot do rework or have pallets of unfinished material on the floor
- Determine when the system can replace many of the present inspection points
- Determine when inventories are small enough so that the system can replace the old physical controls

Bottlenecks Created by Internal Controls

Some of the most obvious bottlenecks created by traditional controls occur in the following areas:

Secured stores areas. Since these areas are the most glaring bottlenecks, they are usually among the first internal controls to disappear. As part of the linear process, bins with small quantities are instead set up close to the operators that need the items. In our experience , pilferage has not been a problem. This is probably because first, not many units are in the bins at any given time and, second, the units are under the watchful eye of the operators who need them to do their job.

This change is often the first indicator to management that employees are willing and able to take responsibility for company.

Purchasing and accounts payable. Many purchasing departments have already begun to eliminate some of their internal control bottlenecks. They continue to keep the basic functions of requisitioning, ordering, receiving, and paying for the goods separated, but change the way those functions are performed. For example, they have replaced the purchase order with one blanket order negotiated annually with major suppliers. As part of that order, both sides agree to an annual quantity of a specified material or component, at a predetermined price and quality, to be delivered daily or weekly as specified on a weekly release. Accounts payable still has to ensure that the company receives the right goods in the right quantity and match this information to supplier invoices. However, instead of filling out a paper form, many companies feed the receiving information into a computer and then match it to the supplier invoice when accounts payable enters it.

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Another possible change is to reduce the number of suppliers. As part of the new relationship, the key suppliers will be involved in the product design process, which includes creating the quality standards for their components. Then they will be expected to accept responsibility for meeting those standards. As soon as suppliers demonstrate that they are meeting the quality standards, you can move the receiving location for materials and components from one specific receiving dock to the spot where the material or components enter the process. A line that is operating in proper conjunction with an accredited vendor will provide the assurance that the right quantity is shipped at the right time to the right spot. Quality checks will still be required. The issue then becomes, who should do the control checks?

In some cases the process itself can provide the necessary internal control checks and balances. For example, suppose all material is delivered daily to the point of use. It is fair to assume that a line with uninterrupted operation is the best indicator that suppliers have met their obligations.

For internal controllers to reach that level of confidence in the system, purchasing, engineering, and quality control must have worked with the supplier to ensure that specifications are right, that tolerances are tighter, and that material and components are meeting those specifications and tolerances.

Capital approval system. Approval of a capital budget item usually requires many signatures. Again, the issue is not whether an approval process is necessary. The issue is how to minimize the approval process and still maintain proper control. Remember that in a CTM plant the management of approval team, as a group, has to approve beforehand any change requiring an appropriation.

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