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Performance Measurement in a Lean Organization:
The Case of The Wiremold Company

Abstract

Under the leadership of Art Byrne, The Wiremold Company is transformed into a Lean business in order to pursue a time-based competitive strategy. Wiremold's strategy is outlined and the nature of Wiremold's operations during the lean transformation is described. The performance measures (largely non-financial) used by Wiremold and their performance measurement philosophy are also presented.

Students have the opportunity to compare Wiremold's performance measurement system to the Balanced Scorecard approach, noting similarities and differences. They can also create a Strategy Map and Balanced Scorecard for Wiremold and evaluate the potential benefits the Balanced Scorecard approach for Wiremold. The case also provides the opportunity to see Lean as a management system applicable to the entire business rather than as a system applicable only to production.

Performance Measurement in a Lean Organization: The Case of The Wiremold Company

Background

The Wiremold Company, based in West Hartford Connecticut, manufactured wire-management and power conditioning products. The company primarily sold its products through electrical distributors to serve power needs in commercial and industrial building renovation.[1]

In 1988 Wiremold's management attempted to implement total quality management (TQM) using Deming's principles and a Just-in-Time (JIT) production model to overcome the lag in   sales and profits they had encountered during the 1980s. Unfortunately, nobody at Wiremold had any experience implementing a JIT system. As inventory levels dropped, production and delivery problems appeared. On time deliveries and customer service fell. Fearing loss of customers and market share, Wiremold abandoned their initial attempt at JIT in 1990 and rebuilt inventories to improve customer service. Nevertheless, the senior managers continued to believe that TQM and JIT were a better approach to business. Art Byrne, who had had helped lead the systematic conversion of all thirteen of Danaher's businesses units to Lean business practices, including JIT, was recruited to replace Wiremold's retiring president. Byrne accepted and assumed the position of President and CEO of Wiremold on September 23, 1991.

Establishing New Goals and Strategies

Wiremold's managers and directors had viewed TQM and JIT as a means of improving product quality and manufacturing efficiency. Art Byrne believed that JIT and TQM should be viewed as important elements of a comprehensive Lean business system.

The basis of the Toyota Production System is the absolute elimination of waste (Ohno, 1988). The philosophy behind the Toyota Production System has, since James Womack coined the term, come to be known as Lean. The label "production system" is unfortunate, because the system is actually a management system. (Ohno, 1988). The Lean approach to management is to find the "least waste way" to create value from the perspective of the end use customer (Emiliani et al, 2003). From a Lean perspective, all business processes contain waste. Reducing the waste in any business process means that the same customer value can be delivered at a lower cost. The gains can be shared among all the stakeholders in the organization. The Lean approach is not a search for a perfect, zero-waste end state but a never-ending journey toward perfection through continuous improvement – constantly seeking and implementing ways of performing processes that are better, less wasteful, than the ways we knew previously. Ohno identified seven types of waste (Emiliani et al, 2003, p. 40):

- Overproduction   *Making more products than can be sold*
- Waiting   *Operators or machines waiting*
- Transportation   *Transporting parts*
- Processing   *Processing itself*
- Inventories   *Raw materials, work-in-process and finished goods*
- Moving   *Operator and machine movement*

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[1] This description applies to Wiremold's business in 1991. As of the time of this writing, Wiremold's business has expanded to provide total wire management solutions (electrical, telecommunications, and data transfer) and custom lighting fixtures. They have also expanded the markets they serve and the number of distribution channels they use to sell their products. For more information on the company and their products visit http://www.wiremold.com.

- Defects   *Making defective products*

Art Byrne knew Lean principles and practices could be applied to any business and any business process. Lean was not merely an inventory reduction system or a means to improve manufacturing operations. The same principles and tools could also be used to improve service and support functions. Art said:

> This [Lean] is not some manufacturing thing, it is a strategy. It is how do I beat the other guy by serving the customer better. It is a set of tools and an approach that allows you to do that on a pretty consistent basis.

One of the key aspects of serving the customer better was time. With the Lean approach, Wiremold would eliminate defects and improve product quality, but they would also acquire the flexibility to quickly deliver products to customers. He realized that many customers will pay a significant premium for rapid delivery. The U.S. mails will deliver a letter anywhere in the U.S for the price of a first class stamp, but millions of customers per year are willing to pay express services thirty or more times that amount to guarantee delivery in 24 hours. Art Byrne would use Lean to make Wiremold a time-based competitor.

Art Byrne began Wiremold's transition to Lean by reorganizing the company. Like most companies, Wiremold had a traditional hierarchical structure with a functional orientation. The functional orientation extended to the factory floor, where machines and the associates who operated and serviced them were organized by machine function. Byrne's new organizational structure focused on product families. The leaders for each of the six product families led cross-functional teams responsible for the entire production process, purchasing, inventory management, quality, and customer service for all the products in their family. The teams were responsible for the inventory for their product family from the receipt of raw materials and parts to the delivery of the finished product to the customer. Buyer planners from purchasing and manufacturing (process) engineers were assigned directly to the product family teams. The new structure also included a JIT Promotion office to implement follow-up and train associates in kaizen.

Art Byrne introduced the new structure to Wiremold management and associates. He told them the purpose of the restructuring was to:

- Create cross-functional teams.
- Speed decision-making and implementation.
- Improve communication.
- Push decision making downwards.
- Develop a feeling of ownership and a "we" attitude.

Art also gave the product family team leaders initial objectives to work on immediately and strategic objectives for 1992. The initial objectives for the product family team managers were:

- Define and begin to track defects for your team.
- Clean up and organize all areas of the plant, and establish discipline to keep it clean.
- Establish a detailed plan for December, January, and February objectives.

The 1992 strategic objectives for the product-family team leaders were:

- 100% on time delivery to customers.
- 50% reduction in defects.
- 20 times inventory turns
- 20% gain in productivity
- Establish visual control and the 5 C's.[2]

Art Byrne also provided all the leaders with examples of "other objectives" all the leaders should address while pursuing their goals.

- Eliminate waste.
- Identify value-added versus non-value-added activities.
- Be leaders, not bosses.

Early in 1992, Art Byrne presented the following strategy to Wiremold associates at an all-employee meeting and to the board of directors and shareholders at the annual meeting.

- Strengthen existing operations.
- Profitably double the business over the next five years.
- Become one of the premiere time-based competitors in the USA with world-class manufacturing and product development skills.

The three strategic objectives are interrelated. Wiremold could not become a premiere time-based competitor if it did not strengthen existing operations. Sales growth was the means of capitalizing on the time-based competitive advantage in product development and in getting new products to market. Art Byrne believed sales growth was also necessary for a successful lean implementation. Employees would not work to achieve continuous improvement if they believed the results would be layoffs. Sales growth would allow Wiremold to profitably re-deploy employees as efficiency increased.

He also presented a set of goals related to the objective of strengthening business operations. The goals were essentially the goals Art had presented to the team leaders in October restated to apply to 1992 and beyond.

- 100% customer service.
- 50% annual reduction in defects.
- 20% annual increase in productivity (as measured by sales per employee).
- Annual inventory turnover equal to twenty times.
- Establish visual control and the 5C's.

For sales growth, Art Byrne set equally challenging goals. Despite the customer service problems caused by the failed implementation of TQM and JIT prior to Art Byrne's arrival, many

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[2] The 5C's are Wiremold's version of the 5S's, shorthand for the five essential components of good housekeeping and organization in the work place, an essential component of the Toyota Production System (See *Gemba Kaizen* by M. Imai, McGraw-Hill, New York, NY, 1997. Chapter 5). The 5S's in (Japanese and English) along with their Wiremold equivalents are: seiri (sort) categorize, seiton (straighten) clear, seiso (scrub) clean, seiketsu (systematize) consistent, and shitsuke (self-discipline) continuous coaching and discipline.

Wiremold products were market share leaders. However, Wiremold's products were also concentrated in mature, slow-growing segments of the market. Most of the sales growth would have to be driven by new products internally generated and products acquired through selective acquisitions. Art Byrne set a goal of 3-6 months for new product development time (compared to the 2-3 years Wiremold was taking at the beginning of 1991). In addition, Wiremold should have a steady stream of new products, with new product rollouts occurring every calendar quarter. Another dimension of time-based competition was introducing new products that better served the customer faster than the competition.

Restructuring the Factory and Establishing Visual Control

Before the transition to Lean began, Wiremold's factories (like most factories) were organized as machine processing centers. All machines performing the same process (e.g., all the lathes, all the punch presses, all the extruders) were grouped together in the same department. It was, Art said, "as if the machines wouldn't be happy or work properly unless they were placed next to machines of their own kind." Large batches of each product were processed in one machine center and then transported across the factory, where they waited their turn at the center where the next process was performed. Operators specialized in running a particular type of machine. They made every effort to perform their process at a high level of quality and efficiency, but soon as their process was completed, the product was no longer their concern. The arrangement promoted an "over-the-wall" mentality, a focus on the single process at hand with little thought about what came before and even less thought about what would follow. Everybody was responsible for a process but nobody was responsible for the entire product.

Many of the earliest kaizens at Wiremold were devoted to reducing machine setup times and reorganizing the factory into production cells for the product line families. Reducing machine setup times is critical to achieving the flexibility to engage in small batch production and reduce overall inventory levels.[3] Production cells minimize waste in motion and distance traveled and they discourage inventory buildup.

In production cells, all processes required to produce products in a family occur in view of the team members. The team members can see when downstream processes are ready to accept products for processing. The entire team can see how upstream processes affect downstream processes, so suggestions for improvements can be drawn from the collective wisdom, experience and creativity of everyone on the team. The manufacturing engineer is located with the team on the factory floor. He or she can regularly watch the process as it takes place without a special trip from the engineering department. The buyer-planner can see when parts or materials are running low, rather than relying on inventory reports and forecasts made months before that will inevitably diverge from the actual amounts required.

In production cells with minimal levels of work-in-process inventory, many defects created in an upstream process are immediately detected as the product enters the next process. Defects are detected before they are unwittingly repeated. In addition, the defects cannot be tolerated. They must be corrected. The defective unit cannot be set aside and replaced with another from inventory. There is not another unit available in inventory. The true cause of the defect may be much easier to discover while the trail is still warm. Workers from other

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[3] Ideally, each manufacturing cell operates with one-piece flow. Products are processed one unit at a time, and as processing is completed at one machine or process, the unit is immediately moved into the next machine or process. Work-in-process inventory is limited to one unit per machine or process.

downstream processes can be brought in if necessary to help solve the problem, because the downstream processes will have no further units to process until the problem in the upstream is solved.

Lean business practices do not apply only to the factory floor. To fully realize the benefits of Lean in executing a time-based competitive strategy, all business processes must be subject to a Lean transformation through kaizen. In fact, the first Kaizen Art Byrne led at Wiremold focused on the order entry process. A sample of results from support function kaizens is presented in Table 1.

Table 1. Some Results of Kaizens on Support Processes

Accounts Payable Processing
- Conversion from batch processing to one-piece flow.
- Staffing reduced by 50%.
- Most invoices processed within 24 hours of receipt.
- Backlog down 64% despite 32% greater invoice volume.

Accounting
- Month-end financial closing time reduced by 25%.

Relationships with Suppliers

In 1991, Wiremold's main plant in West Hartford did business with over 340 production materials suppliers. It was too many to manage effectively. The number of suppliers increased transaction costs and fragmented volumes, making Wiremold's business less important to any of their suppliers. The suppliers provided varying levels of quality and service performance. Multiple suppliers increased material variability and made it more difficult to trace material quality problems to their source. As Orry Fiume (VP of Finance) noted:

> We used to play one steel supplier against another to get a better price, but in reality this was costing us more in terms of quality and rework. When you buy steel, you give the suppliers a specification that contains upper and lower tolerances. If you set your machine up and Supplier A delivers steel at the high end of the tolerance and Supplier B delivers steel at the low end of the tolerance, and then you start switching rolls of steel, the variation within tolerance causes expensive quality problems.

Frank Giannattasio (VP Operations) described how Wiremold reduced its supply base.

> The first 150 or so suppliers that were cut just never got another purchase order from us again. Going from 150 suppliers to 100, then 100 to 75 was a 'make the cut' type of process. We invited suppliers to participate in kaizen. Some suppliers quickly demonstrated that they had no interest in working with a company that was going to place those kinds of demands on them, and so they didn't make the cut. Then there were some suppliers that sent in their top management and quickly saw merit in what they were participating in and embraced it. Those suppliers were part of the last 75. The last 25 or so that were cut offered the least value in their overall package. They were good suppliers, but they lacked technical capabilities to participate in our product development, or we were such a small part of their business that we didn't get enough attention.

Orry Fiume talked about Wiremold's relationship with the remaining suppliers.

> We look at our Tier 1 suppliers as partners. You have to be good partners, which means that we don't play games like pitting one supplier against the other, not paying on time, or stretching payment terms. Those are not things partners do to each other. Instead, we educated them. We invited them to see what we were doing, invited them on kaizen teams, etc. We wanted our suppliers to understand what we were trying to accomplish and the reasons for it, so that when we start asking them to behave differently, they understand why it's important to them. They also understand that if we are going to reduce the number of suppliers by 90 percent, there will be winners and losers in that process. If they want to be a winner they have to get on board. But once they do, they win work for a long period of time.

Art Byrne reflected on Wiremold's supplier relationships.

> Your suppliers are happier because for example, we took our raw material supplier base from like 340 companies down to about 40. So some of them weren't too happy because they lost what business they had, but the other ones that were willing to work with us in this area have enjoyed a lot of growth and a lot more business, etc. In those cases, not all of them, but quite a few of them we have actually gone and done kaizens in their operations to try to help them to keep up with where we wanted to go, so they get some gain from that. Most of them I must admit, haven't taken what we have showed them and moved it on much further but they did accept some training, so we got some gains from that.

> The real important thing I think here is to how do you take these gains to your customers. Because that is where you are going to gain market share, where you are going to get growth, where you are going to distinguish yourself from your competition is by translating these kinds of gains to your customers. Now some of these gains occur naturally with your customer. The quality is better. You're in a better position on a cost basis so your pricing can be better if you want it to be, or it needs to be. Delivery times are much better. You're just a much better supplier from doing this stuff. And that stuff just occurs naturally. The next thing however, is to try and do something with the customer that makes the customer get better as well.

Relationships with Customers

Scott Bartosch provided an example of a customer gain that did not just occur naturally. This example also illustrates the importance of having sales people that understand Lean and are aware of the entire value chain.

> Let's say we have a contractor who's remodeling a college or a university, that's a big job, half a million dollars worth of raceway, a lot of stuff, trailer loads of stuff. Well, in the old days, he'd send us an order and we'd back up all the trailers and fill them up and send him all that stuff. He figured out a place to storage, store it, damage 5 or 10% of it in the process, I mean, that's the way it worked. Now, because of our flexibility, if we get a job like that, we go to the contractor and say, 'Okay, what's the construction schedule on this job?' And he says, 'What are you

talking about?' We say, 'Well, you just bought 50,000 feet raceway, what are you going to do with it?' He says, 'Well, we'll store it.' We say, 'How about if we send you 10,000 feet every 2 weeks? We'll bring it up on our truck, you unload it and put in the building where you want it, you don't have to store it anywhere. And, oh, by the way, you don't have to pay us all at once, either. You haven't got your money tied up with a bunch of crap that's sitting in trailers for a year.' Those are the kinds of things that come from lean that people don't think about. But the salesman's working on commission, he gets a 50,000 foot order, he wants it shipped and he wants to get paid. So that's the transition that you have to go through, in which you teach people that such behavior, in reality, is not good for our customers or us.

That's why we do kaizens in the field, that's why they're in here for kaizens, that's why they operate on the same set objectives and goals as the rest of the company.

You can't be successful if someone in the link just decided they aren't going to be on the program.

Wiremold sells much of its product through distributors. They had always shipped to distributors using common carriers, but they found these deliveries were unpredictable because some shippers would off load material and wait until they could accumulate a full truckload to send to a particular location. In addition, there were frequent disputes about the responsibility for damaged product.

To minimize these problems Wiremold developed a cycle shipping system, delivering 60-70 percent of its shipments in their own small fleet of cycle trucks. The trucks would deliver to Wiremold's larger customers once per week on the same day of the week. The truck would backhaul raw materials to Wiremold's factories on the return trip. This system was only possible when Wiremold had developed the production flexibility to produce most products to meet actual customer demand. When Wiremold's own inventory turnover exceeded 16 times and their line item fill rate exceeded 90 percent they had the ability to consistently provide weekly deliveries to their key distributors.

The next step was to teach the distributors (Wiremold's "customers," but more accurately, Wiremold's sales partners) how to use the cycle trucks to their advantage. The distributors, relying on MRP systems determining order quantities based on forecast demand, continued to re-order materials in large batches. Rich Levesque (VP Marketing & Engineering of a Wiremold subsidiary) lays out the proposal Wiremold made to its distributors.

We said, 'If we are going to deliver to your store 50 times a year, once a week, then why do you need carry three months of inventory? If we deliver there once a week what we want you to do is don't carry as much depth in Wiremold product lines, but carry more breadth instead. You'll be able to provide more solutions for your customers, but you don't have to tie up your inventory on the depth of product. We will take care of that by delivering product to you every week. Those who came on board are getting 10 or 11 inventory turns. So it is a training process to get them to understand.

Scott Bartosch discusses the competitive advantage the cycle shipping system gave Wiremold.

Distributors are a bank and a warehouse, that's their business. They buy from us and resell to a contractor or an end user. So their business is the cost of money that they need and the amount of inventory and how much money they can make off that inventory. So, we were turning our inventory at about the industry average, 2 and a half, 3 maybe if we were really good, and that's about the industry average in our industry today, between 2.8 and 3.8. Now we're turning our inventory about 16 times a year. So we go to our distributors and say, 'Look,

we're going for 20 turns on our inventory and we think you ought to be getting 10, well, when you look at his GM ROI[4] based on 10 inventory turns on a product line he's getting between 3 and 4 now, now you're talking to the guy about his pocketbook in a way that no one else can talk to him. So when a competitor marches through the door, this guy's going to say, 'Yeah, I really like your product, but …' If you can get your distributors to 10 turns, they won't want to return to a competitors' product line because they'll be back to 3 or 4 turns which will tie up their cash. And that's all time. If you cannot be a time-based competitor, you can't do that. If it takes you 14 hours to set up a rolling mill, forget it, you can't do it.

This is what people don't understand and where lean education begins to break down. Nobody takes the time to go from the back door of the factory to understand how this can be leveraged in the marketplace, and we've made that leap, I mean, we're out there every day talking to distributors about getting their inventory out. We go right to our distributors and say, Alright now, we've been talking about this for a couple of years, we've got our act together, you know how reliable we are, let's start on your end of the thing.

Wiremold developed a six-step process for improving the distributors' ordering process (Emiliani et al, 2003, p. 195).

1. Clean up the inventory.
2. Determine a target inventory 50 percent lower than before.
3. Broaden the inventory offered to customers.
4. Cut the inventory another 25 percent.
5. Adjust reorder to weekly.
6. Begin to order only what was sold in the prior week.

The Human Factor

Bob Emiliani notes that the two pillars of the *Toyota Way* are: "Continuous Improvement" and "Respect for People" (Emiliani et al, 2003, p. 8). Art Byrne realized that Lean was more about people than about tools. He said:

The reality is that business is really simple. It is just my collection of people is going to compete with your collection of people to satisfy the same customer. If I hire better people, if I train them to be better, if I empower them better so that I get all the people thinking about how to do this approach, if I do all those things –

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[4] GMROI is Gross Margin Return on Investment – Gross profit on sales of inventory divided by average annual inventory dollars.

you [the competitor] are dead. I'll kill you because you know it is just people, my people against yours.

You can talk about technology and all of this kind of stuff, but the reality is it is the people that utilize the technologies. If senior management goes away on a business trip or takes a vacation that is ok. If half the shop floor goes on vacation, you can't produce anything and nothing goes out the door and you don't have a business. So really, the valuable people are the ones that are doing the value-added work, going to the customer etc, and if you can get all of them on the same page and all understanding why we want to do something differently then I think you have a lot of leverage. That's where the acknowledging is. We have award ceremonies here all the time for service awards.

You know people who have been here 10 years, 20 years and it's amazing when you add up the number of years of experience that we have in Wiremold of all these people, so you have a lot of knowledge and you really want to kind of tap the knowledge. You want to understand. If you can get those people thinking about how to do this a little differently, it is amazing what you can get. We know from our kaizen experience that all the really good ideas and a lot of the great solutions come from the people who are doing the job, all the time. It is always that way. The barrier to doing this is almost always middle management. Because their roles change, they wind up having to be leaders and other things as opposed to just bosses in the traditional way, you know, I'll tell you what to do and when to do it. The boss approach doesn't work in this very well.

Restructuring the organization would help Wiremold empower its associates and tap into their knowledge and creative capacity, but restructuring would not be enough. Wiremold had to train all their associates in Lean principles and have them experience kaizen. They had to develop cross-functional teams that would appreciate and understand the entire value stream for each product line. Most important of all, Wiremold management had to be trusted by the associates. Associates had to believe their suggestions would be taken seriously and that they would not be suggesting themselves out of a job. Art Byrne and his management team built trust by showing through their actions that they were willing to listen to the associates and respond to their suggestions. Art and all senior management participated in kaizens and associates could witness first-hand management listening to and acting on criticism and suggestions.

In fact, Art Byrne himself led the initial training activities and the first kaizens. As Judy Seyler, former VP of Human Resources relates:

Art did the training. He was the only one in the company who knew what to do. He put together the training notebook about three inches thick. He developed a three-day training program for about 150 of our associates including foremen, supervisors, and the Union leadership. They would know what this was all about. No mystery. And in that first session of training, he did three different classes. At the end of each one, he would lead a kaizen for the class so that we immediately could see what he was teaching in the classroom. I remember because I was on a program that went over to Rocky Hill, which was at that point our major shipping area and we did a kaizen there. It was just, really hands on, all of it.

In Lean production, everyone within a production cell should be capable of performing all the cell processes, so it is important to cross-train employees to perform multiple tasks. The importance of cross-training, however, extends well beyond the production cells. The value stream for any product or service is a system that depends on all functional areas. The better employees understand the entire value stream, the more capable they will be of finding ways to eliminate waste and add value. Traditional companies often want employees to focus on a single task or skill. Information about the bigger picture is divulged only on a need to know basis. Lean companies find it desirable for all employees to understand the entire value stream. The cross-functional kaizen teams provide an opportunity for employees to broaden their understanding of the business, but exposure in a three or five-day event is not enough. Wiremold emphasized creating opportunities for their most promising employees to experience all phases of the business. Art Byrne discusses the way Wiremold develops design engineers and the importance of cross-functional training at Wiremold.

> I wanted to add engineers to the business, even when we didn't have any money to pay for them, I said that we've got to start adding engineers to this business so we can get the new products and so we can have the engineering support on the floor to do the kaizen stuff. So I made a rule that said, when we hire new engineers we will pretty much hire them right out of school and train them ourselves so that we don't get someone else's bad habits. So what we said is that if you want to come here and be a Design Engineer, we will hire you out of school first of all and then you will spend two years on the shop floor before you can get into the design. Two years doing manufacturing stuff so that you understand that what you do in design affects what we do on the shop floor. At least four or six months of that time will be in tool design, because if you're going to design a product you have to have some understanding of how do the tool maker designs the tool to build the product so you are not getting yourself screwed up.

> You know a lot of times the engineers got through the two years and they kind of liked it so they stayed there. Some of them would just say, 'I don't want to go into Design now, can I just stay doing this, I'm having a great time and I'm learning a lot of stuff.' So we have a regular rotation of Engineers like that and it is all a part of the process of how do you build up the caliber of people that can really go fast and do good things and are not hung up on traditional kind of values.

> We also do a lot with cross-training people. We are very aggressive compared to what most companies will do. Because Wiremold is growing through both new products and through acquisition, I always wanted enough players on the bench. If the [existing management at a new acquisition] all quit or something, I like to have players who understand the lean stuff and QFD [quality function deployment] and whatever. We will take somebody who is in the field sales force and bring them into the factory and give them a factory supervisory job. We have taken a guy who was a team leader in the factory and put him out in the field sales force. We have done a lot of that kind of cross-functional movement of people from one discipline to another if we think they are good people and we think that we can grow them beyond where they are right now.

Scott Bartosch (VP of Sales) elaborated on cross-functional training.

Frank Gianttasio (VP Operations), Ed Miller (VP Marketing) and I decided we'd swap some people who were interested in a new experience. So I took a salesman and gave him to Frank for 2 years and he took Tom Fairbank, who is now our plant manager here and gave him, gave him to me for 2 years. I put Tom out selling, just put him out on the street, said here's your bag, Tom. We put Rob Riccitelli, who's now our southeastern regional sales manager out there managing the rolling mill department, he was a foreman in the rolling mill. We told them both if you cannot tolerate this you have got to tell us. You can go back to where you were and it's as if nothing happened.

We have people doing things they never dreamed they were going to be doing, and in a completely different discipline than they were five years ago or two years ago or ten years ago. It's about trying to teach people they have talent that they never even though about using.

Scott gave some examples to illustrate the advantages of developing cross-functional knowledge.

Say Rob Riccitelli (SE Regional Sales Manager) is out in the field and he's talking to a customer. The customer starts asking him, 'Well what about the Model 4000 raceway product?' Rob will say, 'Well, when I was foreman in 4000 raceway … Or if all of a sudden you wind up talking to Rich Levesque (VP of Marketing & Engineering at a Wiremold Subsidiary) about a product, he can help you understand an installation problem because he used to be head of maintenance at West Hartford. He can tell you how our products work because he installed them.

This does a couple things for you. First, it puts your high potential people on a path to learn the whole business. It also gives people [prospective or new employees] coming in the door the understanding that there are other places they can go to. And it motivates people, whether they want to do a job in another location or if they prefer not to move.

Tom Fairbank also emphasized the value of cross training.

We've got accountants running manufacturing cells, we've got people from sales getting trained as product line team leaders, we've got manufacturing people going out into field sales to learn that part of the business. That has allowed differences of opinion to emerge and the ability for change to happen.

Art Byrne also established three mechanisms for improving communication with the associates. First, he leveraged the existing profit sharing award as a communication opportunity. Wiremold had long had a profit sharing plan distributing 15 percent of pre-tax consolidated income in proportion to straight time wages. Judy Seyler describes the change:

Profit Sharing had always been paid quarterly in cash. You know, a separate check from you paycheck. Warren Packard [the previous President] always had a quarterly meeting, but it was only of the managers and officers. They got the results, but the people in the plant just got their checks. Now when Art came in he had apparently seen or tried or inherited several different kinds of plans. When he saw this one he thought it was the best one he had ever seen. Therefore, he

didn't change it at all. He builds on that. Those quarterly profit sharing meetings started taking place in the plant with everybody. He would make a presentation. He would have the charts. He would show the sales volume. He would show the error rates. He would show the delay times in shipping. He would show everything that was contributing to the [profit sharing] formula. So then he would say now next quarter, here is what we have to do. We are going to increase the inventory turns by another two times in the next three months, etc. And he would say, now it is not shipping's fault, but here is what we have to do … and that is why people were so intensively involved and knowledgeable about it.

Second, Art established an employee attitude survey. Judy Seyler describes what happened:

The first fall that Art got here when he told me that he wasn't hearing the truth. He didn't think that he was getting the truth from the people and so he said I want you to go to Memphis, TN and visit Federal Express and talk to their people about their survey because their President has been doing this for 17 years, the same survey, and it is pretty good. So I want and spent a day with the Senior VP of HR and he showed me their survey and he gave it to me. I came back with it and we implemented it in 1992.[5]

We gave it out, totally confidentially. When I figured out that half of the people couldn't read English, we got 7 translations immediately. The employees would meet in groups of 30 out in the plant, come in, take the survey, put it in a box and leave. Nobody saw it. They had no identification on it. The identifying number was a number assigned to their supervisor.

The employee attitude survey was first so that Art could hear the voice of the people directly from them to him and not through any intermediary. Art is just an incredible leader in the sense that he did not just listen to all that feedback, but he did something about it. A couple of months after we got the results) I would schedule meetings with every team out there for him to go and sit and talk with them for anywhere from 45 minutes to an hour, or an hour and a half. He'd meet with groups of 6, 8 or 10 production workers out on the factory floor and he would say, 'you know, this thing tells me that this is a problem here. I want to hear about it,' you know, and get the feedback. Then we would sit and look at all the things that they had to say and see what we could change. What we could make better.

The employee attitude survey was also used to evaluate supervisors. Responses to the first ten questions of the twenty-question survey by all the direct reports to a supervisor were used to compute a leadership score for the supervisor. This was especially important early in the Lean transition in order to identify supervisors accustomed to a command and control leadership style who could not adapt to the Lean environment. Judy Seyler explains how the results were used:

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[5] The twenty survey items used by Wiremold are listed in Emiliani et al (2003: 132 end note 13). For more information, see the Center for Values Research, Inc. http://www.cvrdallas.com.

In the process of getting employee feedback, we also got feedback on their leaders. We had a part of the survey with indexed to give a rating on the leader. Anybody that had less than three direct reports or less then three surveys didn't get a score. Supervisors only saw their own index scores and scores for leaders [subordinates who themselves had direct reports] who reported to them. They would give the results to the leaders and talk to them about the results. And then the leaders had to meet with their people and ask what they could do to improve. That first year, because the leaders hadn't been trained in how to do that, my staff and I met with the teams in total confidence and took their feedback about their leaders and their problems. They [the responding employees] remained anonymous, and we gave the leaders feedback. But in the meantime we trained the leaders how to get that feedback.

They [the supervisors and leaders] were trained to raise the issues that were dealing only with their group and those that were germane to others, you know, across teams. And then the leaders had to go back and they had to look at every issue and they had to show me whether they themselves could solve them. If they could they did, and if they couldn't then they would send those results back to me and I would put them together and take them to Senior Management Group and we would decide whether there was anything that could be changed based on that feedback. Then when that was all done, that is when Art would then go back and he would talk to each group about what the company could and couldn't do.

   Third, Art Byrne established regular meetings between team leaders and senior management as an additional communicating network.

Early on we established some team leader meetings, which we still conduct twice a month, where all these team leaders report to my staff and me what's going on, so there is another communication loop that occurs there.

Performance Measurement and Reporting

At the time Art Byrne unveiled his strategy for Wiremold, he also introduced a set of key performance measures, shown in Table 2. Gary Brooks describes the importance of Wiremold's key performance measures in setting company direction:

Art brought to us the key measurements that help make a company become a world-class performer. We had a company meeting and he said this is what we're going to do, this is how we are going to do it, this is why we're going to do it, and these are the key measurements that I want you to drive. And there were just a few key measurements. Without them it would be like sailing a ship without a compass. The key measurements allowed us to say: 'If you're going to do something today, your activities need to positively affect those key measurements. If you're not doing that, then don't do it.' And that really drove the organization. Art came along and gave us the direction. This wasn't the program of the month or some crazy thing that the CEO read in a book over the weekend."

In addition to presenting the results on these key measures to all employees at the quarterly profit sharing meetings, results were posted in the factory on a monthly basis. Judy Seyler describes the employee's response to the posted information.

Every month he [Art Byrne] would put a report up on the bulletin boards all over the plant so that people were looking at it month-to-month and they'd be saying things like, 'boy we are going to have to have a really great third month or we are not going to have as much of a bonus as we had last time.' You know, this was the conversation. You go out to post the reports out on the bulletin board and people would practically swamp you. You've heard about those crushes at the soccer games in South American; it was about the way it was in the plant on profit sharing day.

Table 2 Wiremold's Strategy and Key Performance Goals and Measures

Be the leading supplier in the industries we serve and one of the top ten time-based competitors globally		
	Goal	**Measure***
1. Constantly strengthening our base operations	• 100% on time customer service • 50% reduction in defects per year • 20% productivity gain – each year • 20X inventory turns • 20% profit sharing • Visual control and the 5C's	• First shipment fill rate • Number of defects • Sales per FTE employee • COGS/FIFO inventory value • Actual profit sharing dollars / actual straight time wages • 1-5 Likert scale rating
2. Double in size every 3-5 years	• Pursue selective acquisitions • Use Quality Function Deployment to introduce new products every month	• N/A • New product development cycle time • Number of new products

* FTE = full-time equivalent; COGS = cost of goods sold; FIFO = first in, first out

Wiremold also uses a set of business process measures. Regardless of the business process, whether it is within a function, between different functions, or across several functions (i.e. value stream), the key measures are generally the same. Wiremold's business process measures are shown in Table 3. Performance results were posted on display boards in the production cells. Support areas (e.g., shipping and accounting also displayed their performance results. Judy Seyler talks about the effect of visual controls at Wiremold.

The visual factory concept came a long way and I could see [the evolution]. The very hardest problem in the plant, I think, was getting people to post their numbers. They never had to do it before and they found it terribly threatening. They might keep [track of their numbers], but they wanted it secret. They didn't want it up on the wall. They didn't want it over their machines. Over time we went from nobody wanting to do that [post their results] to some fantastic visuals. Different departments came up with glossys, and charts and high charts and you know, all kinds of visuals. Part examples with part numbers for learning aides. I guess that in my mind the visuals would show you where the workers were

mentally or emotionally about their work. We got to the point where they were proud to put those numbers up.

Table 3 Wiremold's Business Process Measures

• Customer service
    -    Schedule performance (takt time)
    -    Delivery performance (request vs. promise date)

• Set-up time (minutes from the final good unit of the previous product to the first good unit of the new product)
• Lead time (in days)
• Cycle time (in minutes)
• Defects (number of defects)

• Inventory (cell level)
    -    Pieces
    -    Turnover

• Productivity (sales per FTE employee)
• Worker involvement (number of suggestions and percent of people that make suggestions)
• Profit sharing (total dollars)
• Degree of 5C's and visual controls (average score)

Wiremold also established goals and measures for the cycle shipping system as shown in Table 4.

Table 4 Wiremold's Cycle Shipping System Measures and Goals

Measure	Performance Goals
Weekly deliveries of product per year	52 weeks
Weekly deliveries occur same day each week	52 weeks
First time fill rate	100%
Shipments per order	1

Orry Fiume described the basic principle that guides Wiremold's use of business measurements:

"One of the principles when it comes to performance measurement is that measures have to be expressed in a way that people understand how their job relates to that metric. And if they do something good, it shows up in the metric in a way that they can see it. If you believe that is one of the qualities of a good measure, then you understand that the metrics have to be pretty simple. If they are too complex, then you will lose the link between the job and the metric. A good

example of a metric that is too complex is return on investment [ROI][6]. I pick on that one only because it is one that business schools focus on. The ROI metric has many layers to it; the ratio is net income divided by average total assets. If I'm an associate working in the factory or in the office, how do I relate what I do to improving the ROI number? The reality is that he or she can't. We don't use ROI as a metric because we don't want people to focus on it.

We want people to focus on the key measures at the lowest possible level in various activities of the business. You have the same problem with high-level indices. If the index goes up, it means we're doing well and if the index goes down, it means we're not doing well. But how do I relate the job that I am doing to that index? You have to get the measure down to the level so that it changes people's behavior; where people see that they can have some influence and see the impact caused by their work. On a day-to-day basis, people work with the measurements that are relevant to their particular area. In the factory, each of the teams has a visual display that shows performance to takt time, inventory turns, customer service, unfilled shipments, etc. You have to have measurement systems at that local level that track the things that people can affect, and then that all feeds up into higher level metrics."

Because the performance measures directly reflect process improvement at the local level, the reporting system reinforces the kaizen experience. The associates actively participate in a kaizen process that yields significant improvement, and they see the improvement quickly and clearly reflected in their performance reports. The effect is not just a rounding difference in an aggregated higher-level measure. Their performance is not obscured by changes in price levels or absorption levels. The performance reporting supports the transformation to a Lean culture (Emiliani, et al, 2003, p. 218).

Wiremold also emphasized team, rather than individual performance. Eliminating systemic waste requires optimizing performance over the entire value chain. Art Byrne wanted to use the profit sharing day meetings to recognize outstanding performance, but he wanted to avoid creating internal competition. Judy Seyler recounts the care taken in creating "awards" to recognize outstanding performance.

Art wanted to recognize high performers. We kept having this debate all the time about the fact that you get people nominating other people and then you're getting the competitive thing. That became a problem at the quarterly meetings. You're constantly pulling back and say; no we're not going to award individuals. We want to reward teams. We don't want to reward teams against other teams; we want to award teams against their own numbers. We worked very hard at that, because people are quite naturally competitive. If they knew somebody had a

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[6] Return on investment (ROI) is a measure of the earning power of a company's assets, in percent. ROI = net income ÷ invested capital = margin x turnover. ROI is also referred to as the "DuPont Formula". In conventional business practice, ROI is used as a measure for performance evaluation and goal setting. For additional rationale on why Lean businesses tend to avoid using ROI, see "A Japanese Survey of Factory Automation and Its Impact on Management Control Systems" by M. Sakurai and P. Young in *Japanese Management Accounting: A World Class Approach to Profit Management*, by Y. Monden and M. Sakurai, Editors, Productivity Press, Portland Oregon, 1989, p. 274-276.

score, they wanted to beat it, and so on. We had to be very careful when we implemented awards. They were not awards that who beat whom. Everything, you had to go back to the basics and say you beat yourself. You did this much better than last month or last year in this team. And not let the teams compete against each other.

The leadership index described earlier was also used as a performance metric to evaluate the leadership performance of managers, supervisors, and team leaders. Judy Seyler describes how the metrics were used:

We let the leaders know in no uncertain terms that if these figures, their scores if you will, were below an acceptable level then they would have to come up with an action for improvement and that the next scores had better be better. If they didn't get their scores up acceptably in two years then the understanding was very clear that they would not be a leader anymore. We did terminate some people who were definitely not in favor of the [Lean] program and were not in favor of being leaders instead of heavy-handed bosses, but we also did an awful lot of reassignments. Those who were valuable contributors or had valuable knowledge we moved into non-leadership positions. That led into a new kind of job structure and a new kind of compensation program.

The leadership index also allowed Wiremold to benchmark their leadership performance against other companies. Judy Seyler explains:

We found out that the survey was originated in Texas [the Center for Values Research, Dallas Texas] and the first 10 questions were still the same, in fact most all our questions were the same, there were few variations. We found that if we went back to the original survey done by the group in Texas, they had a database of 700 companies, both union and non-union and so we could put our company results against others. So we were measuring not only our improvement year-to-year, but [also our performance] against a wider population.

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