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## **Manufacturing of interconnection device**

### **Industry:**

- Global Market industry
- Threat is low for new competition entry.
- Segmented markets includes Consumer products, Commercial/ Industrial, and Military/ Aerospace.
- Higher competition in connectors existed in consumer and industrial electronics segments
- Giant competitors included AMP and Thomas & Betts (United States), Augat (Europe), and (Hirose and Fujitsu in Japan).
- Demand for connectors were high in the 80's.

### **Raychem company background:**

- In 1988, Raychem Corporation was a billion-dollar manufacturer of specialty products built around Raychem's core expertise of creating and modifying specialty plastics using electron beam technology.
- Raychem's Interconnection Systems (ICD) Division designed, manufactured, and marketed specialty connectors.

- Supply chain operation manager, and manufacturing engineer of ICD are Steve Marsland and Mike Vrcelj, respectively.
- Raychem's core expertise evolved creating and modifying specialty plastics using electron beam technology. (i.e. closures that seal and protect signal-carrying copper, fiber-optic cables for telephone and television networks, aerospace equipment, and conductive polymer coatings found in oil pipelines and mass transit systems.)
- The corporation's revenues came from over 50,000 different products.
- Product lines: (1) multi-contact connectors (plugs and receptacles) (2) data buses; (3) individual wire connectors such as plugs, jacks, and bus; and (4) frames that facilitated the secure mounting and soldering of integrated circuit packages directly onto the surface of circuit boards.
- ICD focused primarily upon military and aerospace electronics markets.
- Products functioning purpose: were used to make fly-by-wire connections in aircraft and missiles, carry electronic signals to multi-wire cables or wiring harnesses, or used to connect single or coaxial electronic cables.

### **Facts about the case: Qualitative analysis**

#### *Manufacturing of IDC connection devices*

- In 1990, ICD's operations were housed in five neighboring buildings which comprised about 9,700 square meters (104,000 ft<sup>2</sup>) of manufacturing, storage, and office space.
- ICD was only partially vertically integrated.
- Most of the plastic components required in its products were made in the injection molding department. Majority of other parts were designed by ICD engineers and made under contract by external vendors.
- ICD bought components and materials in larger sizes to amortized fixed set-up cost.

*Changing the system: One Man's Attempt*

- Mike Vrcelj was appointed manager of manufacturing engineering at ICD (1987).
- With the new position, Vrcelj attempted to implement Just in Time (JIT) principles.
- ICD employed about 285 people in engineering and manufacturing operations when Vrcelj assumed his responsibilities (half were involved in assembly and parts manufacturing; the other half performed various supervisory, support, and development roles).
- Vrcelj conducted an experiment using a cellular JIT system to address some of the company's cost problems. (Experiment: six batch workers were cross-trained in a CBA Cell. Results: 300 connectors were produced; lead times for product production was reduced to 8 hrs (start to finish) instead of the normal four weeks it took to complete the product.)
- Vrcelj didn't have enough results to convince upper level management to change their current operations because the experiment only improved their throughput time and that was enough, so the experiment was abandoned.
- ICD's financial performances grew steadily worse through the remainder of 1988 and 1989.
- In late 1989, management considered the sale of ICD.

*Planning for a turnaround*

- Steve Marsland was appointed operations manager at ICD. He and Vrcelj forged a consensus with senior management began to attack the elements of performance that were most important. Those elements included reducing manufacturing throughput time, improve on-time delivery, inventory reduction, cost reduction, improve outgoing quality, utilize space better, and absenteeism reduction.

- Using Beckman Instruments Corporation as a reference under JIT operations, Marsland was able to compare ICDs data, they saw it took ICD 123 days to fill a customer's order.

#### *Redesigning Material and Information Flow*

- Preliminary design begin with layouts for cells with enough space house workers for an inventory limit of 300 parts per cell.
- Three of the five buildings they originally produced products were useless.
- Renovations were done to remove interior walls and a new air conditioning system was installed throughout the entire building oppose to just having ac in the offices.

#### *Organizing Teams*

- Management disbanded manufacturing engineering, maintenance, production control, and quality control groups, and integrate those employees into the teams that would operate each cell.
- Employees who originally handled manufacturing engineering, maintenance, production control, and quality control were useless because of the new system structure because assembly workers could do their own quality inspections, process improvements, and equipment maintenance.
- Members of management were converted from a functional structure to a team structure, so all managers became cell leaders.

#### *Starting production in the Cellular System*

- All existing WIP inventories were drained out of the plant, based on build-to-order philosophy of all products.
- Inventory dropped steadily by 7 million over the two years.
- In 1991, large military programs ended, and production volume declined drastically, but Marsland was committed to keeping his people employed.

- With the new team structure implementation, a third of ICD's employees (professional employees) went to other divisions of the company or chose to leave ICD altogether.
- ICD saw the benefits of cellularization because the overhead employees left the company, in which they avoided the cost of layoffs.
- Direct labor employees became more motivated, as they were cross-trained and their jobs broadened increasing their productivity.
- ICD values were implemented so that conflicts amongst team members could be resolved autonomously.

#### **Fact about the case: Quantitative Analysis**

- Interconnection industry (1980-1990) averaged approx. \$10, 250 (in millions) dollars.
- ICD averaged revenues of approx. \$46 million dollars.
- COGS averaged about \$26.2 million dollars.
- Gross profits percentages averaged aprox. 41%.
- Operating income averaged about \$4 million dollars.

#### *Results of Cell-based JIT Manufacturing (1990 -1993)*

- Marsland and Vrcelj successfully engineered a performance turnaround at ICD.
- By 1993, the number of employees decreased from 289 to 183 (-36%).
- By 1993, overhead costs decreased from \$7.1 million to \$2.8 million.
- By 1993, Inventories costs on hand decreased from \$13.7 million to \$6.1 million.
- Revenues per employee increased by 44%, in 1990 from \$125,000 to \$180,000.
- Inventory turns increased from 1.2x to 2.8x
- ICD orders fulfillment decreased from 16 to 11 weeks.
- Profits rebounded to 6 million and gross margins increased as well.

- Most importantly, ICD generated \$13 million in cash.

**Raychem Company Problems Identification:**

**Preliminary statement of the problem:**

- ICD needed to get upper level management to attack issues related to the high overhead, inventory, and manufacturing costs and reevaluate some of the job positions and job functions ICD offered. They needed to figure out a solution that could increase their division profit margins, thus reducing overhead cost.

**ICD Competitive situation:**

	Low cost	Differentiation
Broad	Cost leadership	
Narrow	Cost Focus	Differentiation Focus ICD

- ICD exist in the private sector, specifically to the military. ICD is considered to be differentiation focused company.

*Strengths:*

- Product differentiation
- ICD had greater Economies of scale in the military aerospace market.
- Little to no Competition in the military segment.

*Weakness:*

- Lead time were too long.
- High manufacturing and operating cost.
- ICD's current strategy was sufficient enough to increase profits

**Problem Statement:**

ICD management recognized that the complexity of managing ICD's ballooning product line was associated with the trends in inventories, overhead and engineering costs that had driven division profits downward, an ICD was surrounded by larger competitors who, because of greater manufacturing volumes could make similar products at lower cost. ICD needed to reorganize their manufacturing operations to reduce a large percentage of their total costs, which came from overhead costs. ICD also needed to figure out the best approach to maximize the value of their product with minimum internal restructuring cost. A proposal using a cellular-based JIT system would be the solution to improving ICD's operations and financial performance.

**Evaluation of alternatives:**

- ICD could go back to their traditional operation strategy, thus allowing Employees who originally handled manufacturing engineering, maintenance, production control, and quality control to continue their job functions.

- A. Overhead cost will continue to go up, ICD profit margins will decrease, and a possible sale of the company can occur.
  - B. There will be no benefits in their former operational methods.
- ICD could maintain their current operational approach (cell-based JIT). With this strategy, ICD could continue making improvements in other divisions of the company. They could also provide innovative solutions and help other companies along their supply chain.
  - A. All the entities (raw materials manufactures, distributors, etc.) within ICD's supply chain can be in sync with each other, which will level or decrease some of the their operational costs overall all.
  - B. The benefits of doing this will increase the overall supply chain surplus, thus creating synergy for ICD's supply chain network, while increasing the supply chain profitability as a whole.
- ICD could reopen a division that focused on creating new innovative products.
  - A. ICD's total costs will increase, with the addition of an R&D sector.
  - B. Benefits of doing such ICD could rehire the professionals they once had and fully utilize their skills and abilities, while continuing to stretch the other employees' talents.
- ICD could enter the commercial and industrial markets as well.
  - A. Profits in this segment will be even lower with higher costs, because of the intense competition and the firms in these segments are much larger.
  - B. There will be no instant benefits because of the rate of saturation in the industrial and commercial segments.

## **Conclusion and recommendations**

- ICD should continue improvements in other divisions of the company with their current cell-based JIT strategy, based on their recent performance and following ICD's benchmark to increase the company's overall performance.
- Now that they have implemented the JIT system, and proved it to be successful, the focus is on strategically aligning their entire supply chain network with the JIT system.
- Once their supply chain network is synchronized and all entities are aligned, ICD should consider all three options concerning the company's future growth. (1) View ICD as a source of cash and talent for Raychem, (2) Enter the commercial connector markets, and (3) Acquire a related company.
- Incorporating ICD's strategic rationale in each of the options and making adjustments to their benchmark will continue to increase ICD's overall sales performance.
- First, acquiring a related company could be a trial run for ICD entering the more competitive segments (industrial and commercial) with a possible increase in their market share.
- Before entering the commercial or industrial segment ICD should conduct some more research on those segments.
- Most importantly, ICD should only make rational decisions that will affect their company's strategic fit, organization culture, company mission objectives, and capabilities in a positive manner. As ICD's company growth continues, the company's goals, strategies, and operational processes will have to change, and new benchmarks will be set as well.