

Can information systems save u.s. steel?



Case Study–Can Information Systems Save U. S. Steel? In capacity U. S.

Steel (USS) is the 10th largest integrated steel manufacturer in the world and the largest in the United States. Headquartered in Pittsburgh, Pennsylvania, it can produce about 14 million tons annually. The world's largest steel maker, Europe's Arcelor, produces more than 40 million tons annually, while South Korea's POSCO, the second largest, produces about 30 million tons. In fiscal 2001 USS's total revenue was \$6.

38 billion, with a net loss of \$218 million. Its information technology budget was about 1.1 percent or \$70 million, a very low number for that industry. Its third largest customer is the Ford Motor Company, an automobile manufacturer that requires an immense amount of steel. In 1996, Ford viewed USS as the worst in performance amongst its leading suppliers, and it threatened to turn elsewhere for its steel supplies despite their 70-year relationship. "We were in danger of losing Ford's business," explained Gene Trudell, USS's Chief Information Officer.

"It was that serious. Ford's biggest complaint, among many, was that it was not notified when its steel shipments would arrive, leaving Ford unable to operate efficiently. To USS, Ford's threat was a wakeup call causing it to examine its whole production cycle. USS identified a number of challenges beyond its notification system. It knew it needed to lower production costs, including its cost per ton of steel and the number of hours per person required to produce a ton, as well as the costly size of its steel inventory. It had to return to profitability, and to accomplish that it needed to increase its share of the high-end steel market.

Internally it needed to centralize management of the various USS businesses and factories and their information technology infrastructures, which in 1996 were locally controlled. USS's major problems were reflected in its order-taking process. Orders were often manual, very imprecise, and filled with errors. Moreover, once an order arrived, USS was unable to track it during processing. Processing began when one of its four plants transformed the raw materials into steel coils, which were then sent to USS's processors to be turned into finished products. USS has over 120 processors (35 to 40 of which work on Ford products).

A single piece of steel might be processed by up to five different processors as they treat, shape, and finish the products. The reason for the complexities is that these orders require blending and shaping of the materials, including manipulating such characteristics as heat and tensile strength. USS was unable to follow each order as it was processed and delivered. One problem was that each processor had its own tracking and order systems, and each assigned its own inventory codes, making tracking impossible for USS. In addition, each processor communicated its processing data to USS over a dialup system.

When the data arrived, they then had to be manually translated into a format that could be used by USS's own system before the information could be sent to the customer. This translation took about 90 minutes per message. It was a very expensive and inefficient system, and it left USS's customers without enough information for their own production planning. USS did send advanced shipping notices (ASNs) to customers notifying them

of the arrival time, but the ASNs often arrived after the steel, too late to benefit the customers.

Late shipments made customers such as Ford more inefficient. Some Ford plants are only 20 minutes away from the processors. If a truckload of steel arrived without an ASN, Ford employees would have to record the delivery information manually, a process requiring excess labor while increasing errors. The tracking system's inadequacies also created forecasting and inventory problems, forcing the company to hold too much inventory, which in turn raised USS's costs even higher. It needed to modernize its order taking, tracking, and inventory systems.

USS moved rapidly to solve these problems. One objective was to enable customers to enter orders electronically so that they would be accurate. Using the Web, customers now can specify the product, quantity, price, composition, size, thickness, and even delivery date for their orders. To achieve all of this, the system had to handle information on production limitations such as metallurgical rules and production capabilities.

It even had to calculate cost and delivery date. All of this had to be done rapidly so the customer knew cost and dates immediately after entering the order. USS even connected DecisionExpress software from LiveCapital to speed up credit authorization, enabling USS to reduce uncollectible debts while approving most orders. To track orders, USS developed an event-driven system that recorded each step in processing an order, automatically triggering the next step when the current step was finished, including the

steps performed by the external processors. The new system even triggered ASNs and the delivery of the order.

One benefit was that USS was able to handle processor messages in 12 minutes rather than 90. Both USS and the customers knew exactly where the supplies were and how the processing was proceeding. USS now found that when customer orders and ASNs were correct, its customers were more likely to give the steel company repeat orders. You need a way to differentiate your business,” said Tom Zielinsky, senior director of IT strategy at competitor Weirton Steel, “ and I think you can do that with repeatability of customer orders. ” David Sherwin, USS director of order fulfillment, agreed, saying, “ Everyone was producing the same steel; how to fulfill orders would be different. ” All of this required very complex software, much of it home grown.

In addition to information about price, quantity, and delivery date, an order must capture information on each steel product’s composition, size, and thickness. USS used order fulfillment and data management software supplied by the Oracle Corporation, a product configuration system from Concentra, plus its own software for capturing very complex business rules and procedures for handling the intricate mix of product specifications and prices for customers. The business rules “ required thousands of hours of interviews and logic revisions,” because “ much of the knowledge was resident in the minds of our metallurgical engineers,” explained Trudell. When the system was completed, USS’s need to revise orders dropped by two-thirds while greatly reducing order-taking staff time. USS replaced its order fulfillment system with i2 Technologies’ Factory Planner forecasting

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software, which the programmers connected to their order system. They also connected three homegrown systems, including iTrac, which tracks orders as they go to processors or customers and an automatic order generation system for repeat customers called MIGS (Mechanical Item Generation System).

MIGS reduced inventory by improving the forecasting of demand for finished goods at the customer's location. When MIGS was first used, it reduced inventories from 33, 500 to 24, 000 tons. The system has been upgraded and is now called MOGS (Mechanical Order Generation System). While in 2000, \$946 million inventory was needed to support \$6. 1 billion in revenue, in 2001 only \$870 million was required for \$6. 4 billion in revenue.

U. S. Steel now keeps only 20 days of inventory on hand to meet demand, while it required 33 days of inventory on hand in 2000. Overall, this whole system, known as continuous flow manufacturing, made the company the vanguard of the industry. According to Michael Shanahan, a consultant to USS from the Boston Consulting Group, the sweep of these order tracking and inventory systems for a continuous flow manufacturing business such as steel is “ astonishing.

” These systems can go from the shop, through U. S. Steel's own production facilities and third-party service centers to the customer, managing the entire supply chain through a single integrated system. Once USS started deriving benefits from its new supply chain management system, its management concluded that the system could provide a new source of profits.

It could be adapted to serve smaller companies who bought USS products through service centers and could be sold to other steel and non-steel companies. In 2001, USS created Straightline Source, a new division that sells steel products directly to smaller customers such as the Pate Company, a \$5 million metal roofing products manufacturer, bypassing service center intermediaries. Straightline was set up like an independent company so that it could compete for the steel service center business (which sold steel to small companies) without alienating the 15 percent of USS's business that already came through other service centers. In essence the smaller customers could place their orders directly to USS through Straightline. Straightline gave customers the ability to know when their orders would be delivered as soon as they were placed, a source of competitive advantage over service centers.

The software manages customer inventories, handles shipping to the customers, and includes order fulfillment and supply chain management. Registered customers can check the status of their order any time. Straightline added other features that would be difficult for conventional service centers to match, such as online credit checking and order aggregation. For order aggregation, Straightline implemented software called SmartTrim from Strategic Systems International, which combines similar orders and routes them through its processors in chains that minimize waste and scrap. USS found that reducing apparently insignificant amounts of waste saves the company millions of dollars each year. Straightline uses LiveCapital's DecisionExpress software for online

authorization of credit, helping customers speed up their steel purchases while reducing USS's uncollectible debts.

The combined power of all of Straightline's information systems makes it possible for Straightline to take into account everything that will affect the price of an order when pricing a product for a customer. While traditional service centers might take several days to develop price quotes, Straightline can quote competitive prices in seconds. Many service centers are angered that USS is competing against them. USS created a subsidiary called USS Engineers and Consultants (now called UEC Technologies) in 1969 to generate additional revenue from the technology and services USS developed in-house. UEC's principal products are an order-fulfillment system for businesses in the metals, glass, and pulp and paper industries; a set of supply chain software toolsets jointly marketed with i2 Technologies that can help other steel companies manage their suppliers; and a tool to help companies set up an extranet for customers to place orders, check status, exchange electronic contract documents, and provide shipping information.

To maintain USS's competitive edge, UEC sells technology that is one generation behind what USS actually uses. According to UEC President Chris Navetta, the venture has been highly profitable. USS has continued to upgrade itself. One example is Mon Valley Works, one of its four plants, which is located on the Monongahela River valley 10 miles south of Pittsburgh. It was originally built in 1875 and upgraded several times since, the last project occurring from 1998 to 2000. This was a \$36 million project that replaced the computer controls and the mechanical equipment,

including, for example, its laser sensors that are central to current steel making.

The plant's output had been boosted from 270 tons per hour to 335 tons per hour. It had needed 9,300 steel workers to tend the blast furnaces and presses, but that number has been reduced to only 2,100 in this half-mile long plant. In 2001, the U. S. Department of Energy's Office of Industrial Technologies named Mon Valley Works the " Plant of the Year.

" Has U. S. Steel's use of information technology solved its problems? The company has become very efficient, as shown by the time it takes to produce a ton of steel. USS requires about three person hours for one ton while in Germany it is 4 hours (a 33 percent increase), Japan 4.5 hours, and POSCO 4.

8 hours (a 63 percent increase). Although countries like India need 34 person hours, their hourly labor rate is much lower. However " Everybody has access to the same technology [referring to both information technology and advanced equipment]," says Richard Fruehan, a Carnegie Mellon University professor of metallurgy, and " These can be purchased. " And still, USS's labor costs remain high—\$66 per ton higher than POSCO's.

In fact, USS estimates it lost \$57 per ton in the fourth quarter of 2001. Many observers claim that one reason is that USS spends \$40 per ton for retiree health care costs and has only about 130,000 employees supporting over 600,000 retirees and their dependents. However, Thomas Usher, USS's chairman, claims its pension liabilities are well-funded. Ikenson says USS is quite efficient but is simply not large enough to equal its foreign competitors.

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According to Daniel Ikenson, the senior trade analyst at the Cato Institute, a conservative Washington, D. C. , think tank, “ U. S.

Steel’s biggest problem is it doesn’t have the same economies of scale that its foreign competitors have. ” In addition, in July 2001, when the Straightline system was completed, the United States was in a recession, prices had fallen to all-time lows, and USS was experiencing its worst losses in ten years. USS pushed for an industry bailout, and President George W. Bush did grant a 30 percent tariff on flat-rolled steel in March 2002 despite his strong commitment to free trade. Many analysts believe the tariff solves nothing but only delays the inevitable consolidation. Analysts also point out that worldwide the steel industry annually produces 200 million more tons of steel than the world consumes.

Another issue for USS is that Nucor and other innovative U. S. steel makers use scrap steel as inexpensive raw material, forcing USS to make higher-grade steel from coal and iron, the type of steel used in automobiles and skyscrapers. USS has stated it would like to combine with Bethlehem Steel, National Steel, and maybe even Weirton Steel, but only if the U. S. government takes over about \$10 billion of their cost of benefits.

These “ mini-mills” oppose this because they are non-unionized and don’t have the medical and pension expenses of the bigger companies. Dan Dimicco, Nucor’s CEO, said that the U. S. Steel proposals are “ nothing more than an attempt to get the government to help a couple of companies at the expense of the rest of the U. S. steel industry and the taxpayers.

” Comparison with South Korea’s POSCO might further help explain USS’s problems. In the nineteenth and early twentieth centuries, U. S. steel companies located themselves near the sources of iron and coal. However half the cost of producing a \$210 ton of steel today is for purchasing and shipping raw materials, while energy is 6 percent, labor 6 percent, and the remaining costs of 38 percent are for such factors as maintenance, information technology, and administration.

Today companies locate themselves on Atlantic, Pacific, and Mediterranean coastlines to reduce their largest single cost. In 1966, as South Korea was attempting to modernize and rise out of third world status, its government decided to establish a steel industry, even though it has almost no domestic iron or coal. It invested \$296 million (U. S.

), eventually named the company POSCO, and situated the factory at Pohang on its Pacific coastline to keep its costs low. Pohang has the harbor depth to handle the largest container ships. South Korea later built a second production facility nearby. It built very modern facilities, and then 18 years later upgraded them.

In 1999, according to Sang-Boo Yoo, POSCO’s chairman, the company undertook a \$247 million project, named Process Innovation. Its purpose was to enable the company to use the Internet for all aspects of the company’s activities, including booking and monitoring its fleet of 44 ships. In 2000, POSCO became the largest steel producer in the world, although it was surpassed in 2001 when Arcelor was created by merging three large

European companies. POSCO's costs are about \$175–\$180 per ton versus \$240 a ton at USS and about \$210 a ton at Arcelor.

Its advantages are its seaport location and its late start, enabling it to start with more modern equipment and information technology. Frank Voelker, CEO of Alstom Power Conversion, who has worked on both POSCO and USS systems, says USS's are every bit as good as POSCO's and better than most of its competitors. But USS cannot do anything about its lack of a seaside location because of the high cost of moving its facilities. " I'd love to have a seaport paid for by the government, just like POSCO," but it would cost too much, said Usher. Case Study Questions: 1.

Summarize U. S. Steel's current competitive situation. 2. How are information systems related to the way U. S.

Steel runs its business? What role is played by supply chain management systems? How do these systems provide value for USS? 3. What management, organization, and technology factors were responsible for USS's inability to compete with other steel manufacturers? . Describe how USS has responded to its global and American competition. 5.

How helpful were information systems in addressing USS problems? 6. Evaluate the decision by USS to sell its software to other companies. Could it help or hinder USS? Explain your answer. Case Study – Can Information Systems Save U.

S. Steel? 1. Summarize U. S.

Steel's current competitive situation. Despite its innovative (new) information systems and significant investments in information technology, U. S. Steel still faces stiff (hard) competition. Several issues facing USS include: Economies of scale • producing higher-grade steel • Significant losses due to a recession (????) and low prices • an industry that produces more steel than the world consumes • One of the key problems that USS has is its location As the case mentions, USS spends \$240 to produce a ton of steel, and half of that cost is spent on purchasing and shipping raw materials.

In contrast, one of its major competitors, South Korea's POSCO, incurs \$175-\$180 per ton, is located on the Pacific coastline, has very modern facilities, and uses the Internet for the company's activities. 2. How are information systems related to the way U. S. Steel runs its business? What role is played by supply chain management systems? How do these systems provide value for USS? Currently, USS's continuous flow manufacturing system is a critical (key) component of its business.

As mentioned in the case, USS manages its entire supply chain via a single integrated system. The continuous flow manufacturing system facilitates order entry by customers, credit authorization, automatic order generation, order tracking, product configuration, order fulfillment, order delivery, and demand forecasting. The supply chain management system allows the customer to enter his order via the Web, specifying product limitations and capabilities. Once the order is entered and customer credit is approved, an accurate price quote is quickly delivered back to the customer. The order tracking system triggers each step in the ordering process, ASNs, and deliveries. The product configuration system uses complex business rules

and procedures to determine the right mix of product specifications and prices.

3. What management, organization, and technology factors were responsible for USS's inability to compete with other steel manufacturers? In 1996, USS faced several management challenges. USS

- Needed to drastically (????) improve its notification system,
- Accurately monitor and track orders
- Lower production costs (cost of steel and number of hours per person),
- Lower inventory costs, and reduce the size of its inventory
- USS needed to make a profit
- increase its share of the higher-grade steel market,
- centralize the management of its various businesses and factories
- The exchange of information between the plants (????? ?????????? ?????? ?? , processors, customers (such as Ford), and USS management was inflexible, error-prone, and cumbersome. Technology factors include:
- Incompatible technology
- manual order taking methods
- a dialup system
- different tracking and ordering systems for each processor
- different inventory codes
- the necessity to translate processing data into USS's own system, and the delay and delivery of advanced shipping notices (ASNs).

4. Describe how USS has responded to its global and American competition. USS has gone from having a poor performance track record to being a vanguard in (?????) the industry. After Ford threatened to drop USS as one of its suppliers, USS completely reengineered its supply chain management.

Its new continuous flow manufacturing system now manages USS's supply chain through a single integrated system. USS's innovative (new) use of information technology enabled the company to become very efficient.

However, other factors, such as labor costs, production costs, being a higher-grade steel producer, its location, and economies of scale are just a few reasons why the company still has trouble competing in a global market. To help alleviate (improve ?????), some of its problems, USS wants to combine with Bethlehem Steel, National Steel, and possibly Weirton Steel.

However, these companies appear to be opposed (?????) to the merger. Additionally, to remain competitive and to generate additional revenue, USS uses its subsidiary, UEC Technologies, to sell its technology and services. 5. How helpful were information systems in addressing USS problems? The information systems were very helpful in addressing USS problems.

The information systems have sped (speed) up credit authorization, provided more accurate ASNs and orders, handled processor messages in less time, provided management with the ability to know where supplies are and how the processing is proceeding, reduced order revisions by two-thirds, aggregated (total) orders, reduced waste, and helped reduced inventory. Although the information systems enabled USS to operate more efficiently and have made the company a vanguard in the industry, USS still faces stiff (hard) competition. . Evaluate the decision by USS to sell its software to other companies. Could it help or hinder USS? Explain your answer. The sale of USS's information technology and software to other companies is an additional source of revenue for the company.

With an eye to the competition, USS sells systems that are one-generation behind the technology that it uses. Because the company is facing stiff competition, it needs to generate revenue and profits for the company. Since

USS sells software that is one generation behind, it can still maintain a competitive edge with the development of new software innovations. Since several smaller companies now use Straightline Source, USS has enticed these companies away from service centers. Because a company is likely to make a substantial investment in the software and related technology, that company will probably give due consideration before it switches to a new technology.

Therefore, USS can “lock-in” its customers with the software.