VENDOR-MANAGED INVENTORY AT NIBCO

Headquartered in Elkhart, Indiana, NIBCO is a worldwide provider of flow control products (valves, fittings, hangers, supports, seismic bracing, and struts) with over $400 million in revenues and a 100-year history. As a privately held firm, by 2003 NIBCO had about 3000 employees (referred to internally as *associates*) and manufactured more than 20,000 different stock-keeping units (SKUs) in manufacturing facilities primarily in the United States, but also in Mexico and Central Europe.

NIBCO's flow control products (made from plastics and metals manufacturing processes) are used in several industries, including the residential and commercial construction, industrial, and irrigation markets. Two-thirds of its sales are in commodity markets, and its major customers include large wholesalers such as F. W. Webb; large ("big box") retailers such as Home Depot, Lowe's, and Menard's; hardware cooperatives such as Ace Hardware and True Value; and a substantial number of smaller customers. The remaining one-third of its sales are from make-to-order products. These make-to-order products are marketed and sold by a direct sales force that works with engineering firms, architectural firms, and contractors that require specialized flow control products for custom projects.

NIBCO's mission is to be the worldwide choice in flow control products, competing on both low price and differentiation. Because of the low growth opportunities within its commodity markets, there is fierce competition for retaining existing customers and increasing market share. NIBCO therefore strives to be the manufacturer of choice not only as a result of its reliability as a supplier and low costs, but also as a result of its value-added services. Competing on service has therefore become an even more important way for the company to distinguish itself in commodity markets: Competing on superior product quality alone is not enough.

Initial SAP R/3 Implementation Project

> Every time someone would stand up and [present their long-range plan], they'd say we could do this wonderful thing, *"but..."* and the "but" would be that we needed good systems. This led to a fundamental change in the way we viewed IT.
>
> —Rex Martin, Chairman, President, and CEO, NIBCO

In 1995, the firm developed a long-range strategic plan that called for radically improved information flows in an attempt to ensure company survival and growth. A business operations manager was released full time by early 1996 to develop task force recommendations for an enterprise resource planning (ERP) package and implementation partner selection. NIBCO's executive leaders endorsed the internal recommendation that SAP R/3 be purchased and implemented by December 1997. Its selected implementation partner was IBM. By the end of 1996, NIBCO had become one of the first midsized manufacturers in North America to begin planning a "big bang" SAP implementation for R/3 modules to replace most of its legacy systems—at its headquarters, 10 domestic manufacturing plants, and four newly consolidated distribution centers.

The internal project team was led by a trio of senior managers with accountabilities for business process, technology, and change management. Other company directors participated as business process experts (business review leaders), and power users from the various business functions were dedicated full time to the project team or played part-time roles as extended team members from October 1996 through the end of 1997. On December 30, 1997, NIBCO went live with version 3.0f of SAP R/3 sales and distribution, production planning, materials management (including warehouse management), and financial and controller modules. All company employees normally included in the bonus program were rewarded with a one-time project bonus for a successfully functioning system that was implemented as planned, on-time and within the approved $17 million budget.

In the four years following its initial SAP R/3 implementation (see Exhibit 1), NIBCO implemented new functionality (human resources modules and e-business) and also implemented

EXHIBIT 1
Timeline of NIBCO's Major Projects Following Initial SAP R/3 Implementation

1998	1999	2000	2001
01/98 NIBCO implements SAP R/3 in all locations with wide variety of core functionality	**03/99** Upgrades SAP R/3 to 4.0b	**01/00** Implements NIBCO E-Commerce	**03/01** Upgrades SAP R/3 to 4.6c
		04/00 Implements Human Resources	**12/01** Purchases mySAP SCM and other SAP business licenses

two SAP R/3 upgrades (to 4.0b and then to 4.6c). At the end of 2001, it also purchased mySAP SCM modules and other licenses. Instead of being a cost of doing business that would continuously be restricted, IT became a strategic investment in the business.

NIBCO's initial implementation of SAP R/3 resulted in a totally different focus for the company, improving the way it does business, facilitated by the integrated processes and information facilitated by its SAP systems. IT spending on an annual basis was almost doubled: New integrated systems were needed to enable a new cross-functional process orientation and greater returns on business and IT assets.

The two SAP upgrades (in 1999 and 2001) were treated as separate information systems (IS) projects with no new business functionality.

> We made a strategic alignment decision to stay relatively current on both hardware and software. We try to upgrade SAP every 18 to 24 months. We have done it efficiently, although it is going to become more complex [because of integrating non-North American operations and a recent domestic acquisition].
>
> —Gary Wilson, Vice President and Chief Information Officer, NIBCO

All other projects have had significant business management involvement.

Business Process Improvement Projects

Since the initial SAP R/3 implementation, the company has engaged in a series of continuous improvement projects that have involved business innovation initiatives. The following quotes from Ken Eme, VP of *Supply Chain* at NIBCO in the second half of 2002 articulated the company's vision:

We took the SAP implementation as an opportunity to redefine our supply chain business processes. The implementation was the trigger to make it happen. It also helped us define and communicate our supply chain philosophy.

Having a standardized system across our network of plants helps us do many more things remotely than before. Further, it reduces our personnel training expenses and helps us leverage expertise across our plants. Personnel can move from one factory to another and be ramped up very quickly—this makes our associates even more agile and flexible.

The standardization brought about by the SAP system provides us with complete, real-time visibility into inventory levels, production order status, and sales orders, helping us gain a better understanding of our total position and opportunities.

As part of its initial SAP R/3 implementation, NIBCO consolidated its distribution centers from 17 to 4 to better manage inventory and improve order fill rates. The improvements NIBCO made to its work processes involved all aspects of both its internal and external (both supply-side and customer-side) supply chains. Gordon McCrory, Director of Metals Manufacturing at NIBCO, highlighted the achievements that had been gained and the future benefits envisaged from changes in work processes:

> Some of the side benefits from SAP may potentially be of the greatest benefit: For example, the things that SAP can do for us from a high performance work organization standpoint . . . . If you believe that people closest to the work have the best ideas and can make improvements, then you need to be able to get the information to them.

When NIBCO had received a customer order in the past, it had been filled by a divisional distribution center closest to the customer. Traditionally, NIBCO had collected demand forecasts from customers and constructed an aggregate forecast of future demand. These forecast figures, in turn, drove medium-term and short-term production planning decisions in which the bulk of the manufacturing activity focused on make-to-stock production. This product was then pushed from NIBCO manufacturing plants to NIBCO distribution centers (DCs) regardless of emerging short-term demand patterns—information on immediate actual sales demand was not considered or even commonly available through NIBCO's stovepipe legacy systems.

The SAP implementation enabled the company to replace its long-established *forecast-push* approach to supplying product to customers, with a *demand-pull* approach. The new approach involved a complete change in the corporation's mind-set:

> That was a huge cultural shift for NIBCO: going from a push to a pull system. It took a while to get that ingrained.
>
> —Clyde Hayes, Director of Supply Management, NIBCO

Now, product would be "pulled" through the supply chain, with the customer triggering the pull process. A customer

purchases product from NIBCO, which is supplied or "pulled" from the appropriate DC. Should the supply of the given product fall below a preestablished level (the reorder point), the DC places a replenishment order with the appropriate NIBCO plant. Here the DC "pulls" product from the plant. The plant then replenishes the stock of that product, either through provision from its own finished goods inventory or through rapid production and shipment of that finished good, often in *kanban quantities* (which are predetermined, fixed order quantity levels, often based on storage and shipment container sizes). In turn, the plant "pulls" raw materials and components from its own inventory and from suppliers for subsequent materials conversion at the plant. The pull philosophy embraced by NIBCO is consistent with tenets of *just-in-time manufacturing* and *lean supply chains*.

The new system is notable in two ways: first, the reliance on actual customer orders as the driver for day-to-day replenishment and production activity (versus demand forecasts as the *driver*) and, second, the direction of triggers for the movement of product (from the marketplace rather than from the manufacturer). The demand forecasts employed previously to guide supply of product to customers were necessarily speculative, typically inflated, and often inaccurate. In contrast, actual customer orders represent true immediate customer demand. NIBCO embarked on this radical change to its supply chain processes with two overriding goals: to significantly increase customer service through greater product availability (in turn further differentiating NIBCO's product/service bundle to customers in the marketplace) and to drastically cut inventory and other operating costs.

To make the demand-pull process possible, NIBCO implemented a system of *inventory zones*. Inventory zones are numerical values or ranges specifying desired inventory levels. The end product (an SKU) is typically stored at a specific DC, but in special cases, it may be stored at a manufacturing plant or even at a customer site (such as for vendor-managed inventory customers, as described in the next section). Statistical analyses are used to determine the maximum level of end product to maintain, the reorder point quantity, and the safety-stock level. This approach was implemented initially by evaluating the prior year's historical demand pattern for a given SKU and aiming for a 99 percent product availability service level. Currently, a rolling 12-month sales demand history, along with seasonality information and customer-specific inputs, is assessed periodically to reevaluate the zone levels. Zone levels may change as often as twice a year for a given end product.

This initiative has had a massive influence on all aspects of NIBCO's supply chain, cutting across customer service, the distribution system, manufacturing operations, and procurement. It also enabled the firm to embark on a new external supply-chain initiative: vendor-managed inventory.

The VMI Initiative

In order not only to retain customers but also to increase its market share, NIBCO needed to develop innovative ways to provide additional value-added services, particularly for key customers of its commodity products. NIBCO's objective was to become the easiest, most valued supplier with which to do business, and the company looked for ways to use mySAP SCM to develop electronic partnerships with its customers, which would increase customer loyalty and decrease its customers' switching costs.

One of its most successful innovations has been a vendor-managed inventory (VMI) program for its large wholesalers. VMI requires a large amount of transaction data on a daily or weekly basis across thousands of SKUs per customer. It therefore requires a robust enterprise system.

NIBCO's first VMI customer was a leading wholesaler whose president had challenged all current and potential copper suppliers to provide an efficient customer response capability. The company with the successful proposal would become their sole-source provider of copper products.

NIBCO captured the contract and developed first a manual process and then a fully automated replenishment process driven by mySAP SCM. Under VMI, the customer no longer places an order; instead, the customer provides a daily inventory level report electronically. NIBCO uses that report to monitor the customer's inventory levels on a daily basis, and inventory is replenished weekly. NIBCO guarantees that its customer will never run out of NIBCO products and that the customer's orders can therefore always be filled. Backup plans are developed to deal with extraordinary events.

By mid-2002, NIBCO had developed competency in VMI, providing these value-added services to eight strategic wholesale customers who entered into sole-sourcing agreements with NIBCO for specific, high-moving products. One of the primary benefits to NIBCO has been the smoothing of demand. One of the biggest difficulties in NIBCO's supply chain is that the demand from some of its large customers tends to fluctuate, which can create a *bullwhip-effect* type of response to a false demand, despite the fact that the yearly demand of its largest customers is fairly stable. Price changes, orders from a new large customer, or other events can create extreme fluctuations when the marketplace really does not need the product for 30 to 60 days.

> VMI has taken a tremendous amount of the bullwhip effect out of the supply chain response: our demand pull coming through the plants is now more related to what the final customer buys than it is to what our wholesaler buys.
>
> —John Hall, Director of Supply Chain Systems, NIBCO

NIBCO has developed a business model to identify potential VMI customers based on sales levels and the attractiveness

of a sole-sourcing arrangement to both parties. A targeted customer also typically has a centralized inventory system servicing multiple branches.

> We have a very diverse customer base out there . . . and their ability to make investments in information technology is radically different. A $10 million or $20 million business in a single location has a radically different ability [to make investments] than a $5 billion or $10 billion firm, or a Home Depot at $60 billion.
>
> —Jim Drexinger, Vice President of Sales and Marketing, NIBCO

Many of NIBCO's domestic wholesale and retail customers have already made an investment in EDI. For those that need to start from scratch, the investment includes not only technology (hardware, software, and sometimes ongoing value-added network operational costs) but also ongoing technical support personnel. The alternative is outsourcing to an EDI trading partner. Four EDI transactions are currently involved: product data activity (transaction number 852), product order acknowledgment (855), advanced ship notice (856), and invoice (810).

> We replenish millions of dollars worth of inventory. But the first human intervention is literally when our distribution center gets the picking list out of SAP to fulfill an order to be shipped to our VMI customer.
>
> —Jim Drexinger, Vice President of Sales and Marketing, NIBCO

NIBCO and a few of its VMI partners work with a center of technology excellence in the American Supply Association (ASA), with whom the EDI standards for wholesale distributors were developed (ASA Express). For example, NIBCO has participated in the development of standards for electronic product catalogs.

> We are really dealing with an industry that is working hard to embrace technology.
>
> —Jim Drexinger, Vice President of Sales and Marketing, NIBCO

Since 1999, NIBCO's VMI team has honed its processes and systems so that a new VMI partnership can be established within a period as short as two to three weeks, once customer buy-in is achieved. A marketing team provides the initial presentation for the customer, informing them of the types of improvements that other VMI customers have already achieved; then, if there is buy-in, a statistical analysis is performed to model their purchase landscape and determine the potential benefits for the customer. The customer's past 24-month purchase activity is typically analyzed in conjunction with customer inventory data, growth forecasts, and seasonality effects. It is not uncommon for 300 to 600 SKUs to be involved. This approach is followed by a proposal for mutually agreed upon aspects of the contract, including reorder point levels for automatic replenishment. Implementing VMI in the short time frame is facilitated by the fact that mySAP SCM allows for multiple cross-references for Universal Product Code

(UPC) bar codes to accommodate a specific customer's product name and labeling needs.

> Before SAP, that was difficult. Now we can have a call in the morning . . . and by the end of the day we have a new trading partner. It can be that easy.
>
> —Diane Krill, Director of Customer and Marketing Services, NIBCO

After a new VMI implementation, the NIBCO core team typically stays on the project for three to four weeks to monitor issues on a weekly basis. Then, on a quarterly basis, NIBCO communicates to customers the benefits that have *been delivered*. The idea is to create a unique service that is available *from NIBCO* alone. Having a well-honed SAP architecture to build on, as well as the experience resulting from several years of internal SAP experience, gives NIBCO an initial competitive advantage in its industry.

> Without the SAP platform as the backbone, we would never have been able to get to that level of e-commerce commitment within the time frame that was being mandated [by the customer].
>
> —Jerry Whiteford, Vice President of Finance and Treasurer, NIBCO

The benefits of the VMI program have been compelling. The critical business metrics used by NIBCO's customers are the success measures that are tracked for the VMI program; the program, for example, is sold primarily on the basis of gross margin return on inventory (GMROI). Other metrics that are tracked are the increase in the customer's inventory turns, the decrease in the customer's inventory items and dollars, and the decrease in pallet or physical storage requirements. The proposed improvement levels for all VMI customers to date have been realized or exceeded.

> In some cases, we cut their inventory levels quite significantly because there was a lot of hedging on their part before this [VMI] process.
>
> —Chris Mason, Manager of Supply Chain Systems, NIBCO

Benefits Realized: 1997 to 2002

NIBCO became an IT leader within the flow control industry as a result of its early (1996 to 1997) investment in an ERP package (SAP R/3) to replace its legacy systems. By 2002, NIBCO had also positioned itself as a leader in business process innovation within its industry. The company had developed closer relationships to key customers as a result of its initiation of value-added services based on electronic integration capabilities, and it was the first company in its industry to leverage its IT infrastructure to offer VMI.

NIBCO also leveraged the project management knowledge that it had gained for two integration projects. These two projects involved replacing legacy systems of one of its international business units and a new acquisition, with little outside consulting help. In the company's Polish operations, SAP solutions were

implemented in May 2002. This project was viewed as an internal pilot for integrating a new acquisition, and the project team created templates for future use. Five months after a domestic acquisition (TOLCO) in California was finalized in June 2002, a dedicated project team of business and IT associates implemented SAP in the acquired company as well. Although new make-to-order processes were also added, about 60 percent of NIBCO's business processes were used without configuration changes.

> We have been able to effectively take 60% of our business operating processes defined in SAP and implement them unchanged. . . . It standardizes them with our business functionality almost immediately.
>
> —John Hall, Director of Supply Chain Systems, NIBCO

By leveraging the capabilities of its SAP investments, NIBCO has measurably:

- Improved customer service by focusing on order accuracy and product availability
- Developed multichannel customer service capabilities and electronic partnerships for customers and suppliers
- Increased the effectiveness and reduced the costs of doing business through continuous business process improvements in both its internal and external supply chains

Looking Ahead

What other initiatives should NIBCO embark on to leverage its IT lead?

One of the CIO's first assignments when he joined NIBCO as an IS director almost a decade ago was to implement a data warehouse capability to improve business decision making. This initiative was abandoned when the decision was made to invest in an ERP package. Now there was an opportunity to implement a data warehouse capability with its SAP platform. Could NIBCO's business managers gain greater insights into its product manufacturing and distribution costs with an information warehouse? Could it improve its customer relationships? Could it selectively increase prices and achieve other increased revenues with investments in new CRM and business intelligence tools? Or should it focus instead on a more aggressive growth-by-acquisition strategy to both increase revenues and achieve cost savings, such as achieved with TOLCO?

When its customers or suppliers increase their own IT investments, NIBCO should also be in an even better position to leverage its enterprise system platform with expanded electronic linkages to them:

> We see cost reductions and some nice growth opportunities [by leveraging] our SAP engine.
>
> —Rex Martin, Chairman, President, and CEO, NIBCO