B2B e-Commerce Adoption Across the Global Steel Industry

The global steel industry has undergone significant restructuring and consolidation in recent years. Globalization of operations has forced companies to adopt new technologies in order to do business with partners around the world. This has led many steel companies to review their strategies for B2B infrastructure management.

The steel industry has been slower than others to adopt B2B technologies for many reasons. First, most employees within a steel company can perform their job functions without Internet access. As a result, steel companies have invested far less in their networking infrastructures than companies in other manufacturing industries. Also, there have been very few employees within the steel industry with general information communications technology (ICT) skills. In an e-Business Watch study, only 24% of small European steel companies had employees with ICT infrastructure skills.[1] Medium and large companies had only 38% and 61%, respectively. Making matters worse, the industry is perceived by many as being old-fashioned. The perception makes it that much harder for companies to attract employees with the ICT skills needed to take the industry forward.

Given these factors, it is not surprising that many steel companies are beginning to outsource ICT and B2B functions. In the report mentioned above, one in five companies had allowed external service providers to manage certain functions previously conducted in-house.

Adoption of B2B commerce technologies in the steel industry is best explained in two parts—buy-side and sales-side processes.

Buy-Side Processes

Electronic Procurement
Typically, a steel mill manages the procurement of raw materials such as iron ore, coal and coke, and energy supplies such as electrical power. Additionally, steel producers must produce and stock spare parts and maintenance for blast furnaces and rolling mills. In large steel mills, many goods are procured in huge volumes by dozens of specialized buyers who are dedicated to the procurement process.

Electronic sourcing platforms help to streamline procurement processes and reduce costs in the steel industry. One example given in the *e-Business Watch* report discusses Thyssen-Krupp in Europe, who has established a multilingual online procurement platform that is open to suppliers anywhere in the world. Within one and a half years of implementation, ThyssenKrupp realized significant price reductions and process enhancements amounting to millions of dollars. In addition, procurement costs were reduced due to enhanced market transparency and improved purchasing conditions. Processes were also streamlined because buyers no longer had to print inquiries and send them to potential suppliers via mail, fax or email. However, ThyssenKrupp is a rare example of automation in e-procurement. In general, buy-side e-business is not very prevalent in the European steel industry. The root cause is that most suppliers are relatively small, and the medium enterprises want to avoid expensive investments in B2B solutions.

1 - "ICT and e-Business Impact in the Steel Industry." e-Business Watch. 2008.

Electronic Invoicing

In North America and Europe, procurement activities are generally followed by order fulfillment, shipping, receiving and financial settlement. Automating financial settlement becomes challenging as steel companies have many different ways of describing what an e-invoice actually consists of. For example, a PDF document attached to an email is the most common way to exchange invoices within the industry. More advanced forms of e-invoicing, such as utilizing computer-to-computer integration or dedicated websites, are relatively rare within the steel industry—providing a significant growth opportunity for B2B technology.

According to the *e-Business Watch* report, only 36% of European steel firms reported sending invoices electronically, while 12% still manually sent invoices directly from their computer systems to their customers. Fiscal dematerialization, or the conversion of paper-based invoices to digital invoices, is starting to gain traction in Europe. However, the process is complicated by the fact that, for the digital invoice to be recognized as a legal document, it must contain a digital signature. The use of digital signatures is relatively low across the industry, with only 7% of companies using them on a regular basis. There are 27 different countries in the European Union, and therefore 27 different tax laws to account for. These country-specific regulations are a key reason why e-invoicing has seen slower adoption levels in Europe when compared to the rest of the world. In North America, for example, almost half of the steel firms surveyed sent invoices as PDF documents, 40% sent directly from computer systems to their customers, and 13% accessed invoices via a web-based solution.

Sales-Side Processes

In general, sales-side business processes involve activities like order management and customer support. In Europe, steel firms sell to both national and international markets, with 41% of companies selling primarily to domestic customers. Steel is typically sold in three different ways:
1. By the steel-producing company itself
2. Through a third-party enterprise such as steel service centers
3. Via an exchange market such as the London Metal Exchange

Baosteel, the largest steel producer in China, stated that the main driver for implementing and extending e-business applications was the need to align processes toward customer-centric operations. Baosteel successfully improved workflow operational efficiency by 60%, reduced order cycle time by 20%, and drove down process costs.

One of the key areas where e-commerce has been used to support sales-side processes has been to help with the development of e-marketplaces. e-Marketplaces have been in use across many different industry sectors for nearly 10 years. At the height of the dot com boom in 2000, it was estimated that there were nearly 211 e-marketplaces in use within the steel industry alone. These marketplaces were established at specific points across the steel value chain to service both individual groups of companies as well as the entire chain. The primary benefit of e-marketplaces was that they provided a very simple way to exchange electronic documents with business partners using only a web browser.

> The steel industry is largely driven by requirements from customers, therefore the sell-side interfaces are vitally important. B2B solutions should facilitate communication with customers, including negotiation, product specification, scheduling, shipping and invoicing.

In North America, one of the only e-marketplaces to survive, SteelPartner.com, was established in 2001 by the American Iron and Steel Institute (AISI) who commissioned Northrop Grumman to re-invent the way in which metals inventory was managed. The marketplace, which was effectively sponsored by a consortium of steel producers, has since grown into an electronic supply chain community allowing mills, processors, warehouses and customers to communicate and track material across multiple locations. The subscription-based environment supports setup of product and processes, shipment of materials and associated receipts, reapplication of coils to new orders, inventory reconciliation between processes and mills, and output of a variety of standard reports. Because Northrop Grumman handles all of the system maintenance and upgrades, none of the users have to worry about maintaining their own systems—a key factor in the success of this e-marketplace.

In Europe, however, e-marketplaces have not survived despite steel producers' efforts to establish marketplaces. The last active European steel e-marketplace, Steel24-7, closed in 2007. Steel24-7 was established in 2001 by the three largest steel producers in Europe—ThyssenKrupp, ArcelorMittal and Corus. The marketplace was tasked with creating a virtual communications hub to facilitate collaboration between buyers and sellers across the steel industry. The hub offered two processes: transaction management and follow-up services. Transaction services included modules for forecasts, selling, auctions and order entries. Follow-up services included material call-off, document management and order progress. Associated integration services offered customers the ability to integrate the Steel24-7 portal into their own back-office business systems.

In addition to implementing electronic data interchange (EDI) solutions, some steel enterprises use online sales platforms to sell smaller volumes to specific customers. For example, in 2007 ThyssenKrupp North America purchased the Seattle-based firm OnlineMetals.com, which functioned as an online retailer of hot-rolled, cold-rolled and stainless steel-based products. Online metals will act as a counterpart to the company's high volume distribution segment. With the acquisition, ThyssenKrupp was seeking to widen its customer base to include low volume commercial customers, as well. Another customer interface, e-Arbed.com, attempted to establish an electronic sales platform for all suppliers and customers of Arbed's distribution branch. Arbed was one of Europe's largest steel manufacturers before it was taken over by the ArcelorMittal group. However, the system was shut down in 2003 due to a number of problems.

In retrospect, there are a number of reasons why e-marketplaces failed to gain traction within the European steel industry:

- **Steel Product Specifics**—Steel products tend to have numerous specifications related to product types, qualities, lengths and measures, mass tolerances, types of distribution, and accompanying certificates. Such specifications are difficult to translate into electronic processes.

- **Personalized Nature of the Steel Business**—Personalized customer care remains important for selling steel in a market environment that is largely driven by powerful buyers.

- **Price Reductions Sought by Customers**—Customers used electronic marketplaces mainly to lower prices. They were reluctant to pay adequately for portal services.

In other regions of the world, like China, e-marketplaces continue to act as one of the main methods for conducting business electronically across the steel industry value chain. However, due to the impending industry consolidation, it is expected that many of these marketplaces will disappear over the next few years. Additionally, Chinese manufacturers may follow the example set by the European steel producers and establish their own sell-side infrastructures for conducting business electronically with customers.

B2B e-Commerce Standards

The steel industry began conducting e-commerce with customers in the 1970s via EDI and, later, email. Today, most steel companies use customer-facing EDI to exchange only a few messages electronically, such as delivery instructions, dispatch advices and invoices. Electronic invoicing, however, is critically important as it can facilitate and speed up payment processing across the steel industry. The steel industry was one of the first to adopt EDI, driven by customer requirements for electronic business exchange.

In addition to the more traditional EDI standards, such as ANSI X12 and EDIFACT, a number of other standards have appeared in recent years. The two most significant standards to emerge are COMPORD and ESIDEL.

The COMPORD (computer order) EDI standard, based on ANSI X12, was initially developed by AISI in the 1980s to support EDI communications in the North American steel industry. COMPORD and ANSI X12 EDI standards remain central to many business processes within the steel industry today. One such business process devised by AISI, the evaluated receipts settlement (ERS) process, is a payment method designed to remove paper-based invoices from transactions conducted between steel producers and processors
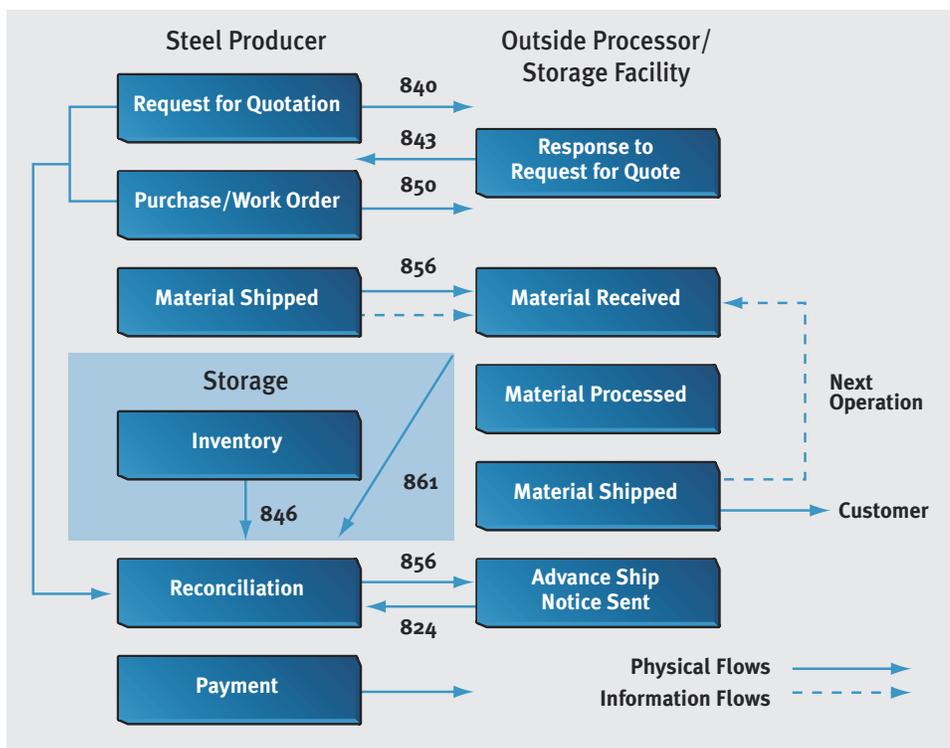

Figure 1 – Evaluated Receipts Settlement Process

(see Figure 1 below). The benefits of ERS include a reduction in clerical personnel and associated errors, elimination of duplicate and lost orders, decrease in mailing costs and improved cash flow. This business flow, derived from a similar model developed by the Automotive Industry Action Group, has been widely adopted as a standard across the entire North American steel industry—demonstrating how the steel industry follows the lead set by key customers in the area of innovation.

The ESIDEL (European Steel Industry Data Exchange Language) was originally created in 2000 by a committee formed by the European Federation of Iron and Steel. The new committee, called EDIFER (comprised of nine major European steel companies), was tasked with deriving the new ESIDEL standard in support of the growing interest in using the Internet to send electronic business documents. The ESIDEL standard supports ordering, scheduling, shipping, invoicing and payment business processes across the European steel industry. In total, 32 different business documents and messages were identified for XML schemes development (see Figure 2 below).

Business Process	Business Documents
Basic	Party information; sales catalog, including product specification
Ordering	Request for quote; orders; order change; order response; sales list; sales list - capacity selling; sales list bid; sales list bid response; order status request; order status report
Scheduling	Delivery schedule; just-in-time delivery
Shipping	Dispatch advice; packing list; receiving advice; inventory request; inventory balance; inventory movement; inventory switch; instruction to dispatch; goods ready for dispatch request; goods ready for dispatch balance; goods ready for dispatch movement, certificate request; certificate; return of goods notice; return of goods instruction
Invoicing	Invoice
Payment	Remittance advice

Figure 2 – Typical Message Types Used Across the Steel Industry

Based on change requests from steel companies in Europe and Australia, an upgraded version of ESIDEL (1.1) was published at the end of 2005. Unfortunately, while the goal was to continue development of ESIDEL, it was ultimately abandoned since the original founding companies could not commit resources. ESIDEL was the right approach in developing an Internet-based standard for the steel industry. However, although actively sought, a single standard requires international collaboration in order to be adopted globally. At this time, many of the aforementioned steel companies have reverted back to using more traditional EDI standards, such as ANSI X12 and EDIFACT.

Steel industries in other regions of the world, such as Japan, have developed a number of homegrown EDI standards, once again primarily driven by their customer requirements. XML has seen some significant traction in China. However, a recent report compiled by the automotive industry's ODETTE organization concluded that automotive companies in China would continue to use both EDIFACT and XML-based standards until such time that XML matured to support all business processes within that particular industry. In the future, it is expected that the Chinese steel industry will follow suit and adopt both EDIFACT and XML as their preferred standards.

Automating Efficiency Through B2B Adoption

Although B2B adoption across the global steel industry has been relatively slow compared with other industry sectors, progress is being made in many areas. North America remains the most advanced user of B2B solutions, followed by Europe and Asia Pacific. However, with the impending industry consolidation process in China, business process improvement must be made in order to secure the country's position as the world's top steel-producing nation.

Across all regions, there are numerous deployment opportunities where B2B automation could drive significant efficiencies throughout the steel value chain:

- **B2B Network Consolidation**—As a result of extensive mergers and acquisition activity, there is a continuing demand for consolidating ICT infrastructures. Consolidating B2B networks and moving to a single B2B provider can help to improve supply chain efficiencies. Global connectivity via a single B2B platform is especially important for steel producers operating in different regions of the world.

- **Back-Office Integration**—Many manufacturers are connecting external B2B integration platforms directly into back-office ERP systems, such as Oracle and SAP. This level of integration helps to improve the visibility of enterprise-wide information and ensures that all users across the extended enterprise have a single view of business-related transactions.

- **SME Enablement**—B2B adoption, especially across small- to medium-sized companies, is relatively low within the steel industry. Many employees who work within the sector will need access to simple and basic B2B solutions. Simple applications for small businesses are especially important in emerging markets like the Chinese steel industry.

- **Improved Visibility of Steel Shipments**—The move towards providing steel products as part of a just-in-time process has led to a need for improved supply chain visibility into steel shipments and stock levels held at storage and service centers. Improved visibility into steel shipments and stock levels ensures high levels of product availability and minimizes the likelihood of production stoppages.

- **Aging Workforce Across the Steel Industry**—Due to extensive restructuring in the 1980s and a limited focus on recruiting younger engineers and ICT professionals, the steel industry will face an unprecedented shortage of skilled engineers over the next few years. With many steel industry employees nearing retirement age, steel companies will have to find alternative ways to manage their ICT and B2B infrastructure projects. Outsourcing the management of B2B infrastructures could be one way of addressing this problem.

- **Industry Trend Towards Green Operations**—The steel industry is under extreme pressure to develop green and sustainable steel production and business processes. Replacing paper with electronic business invoices and developing green B2B infrastructures will help companies improve their green sustainability credentials.

Due to the highly-fragmented nature of the global steel industry, many companies will continue to see immense levels of restructuring over the next few years. During this period of transition, it is important for companies to maintain continuity of supplier relationships across their trading community.

With further industry consolidation on the way, it will be more important than ever for steel companies to ensure that they have the correct B2B infrastructure in place.
For those companies wishing to focus on their core competency, namely, steel production or processing, outsourcing the management of a B2B infrastructure to a vendor such as GXS can help to lower costs and improve operational efficiencies across their supply chains.

**NORTH AMERICA AND
GLOBAL HEADQUARTERS**
GXS
9711 Washingtonian Blvd.
Gaithersburg, MD 20878
US
+1-800-503-9190 t
+1-301-340-4000 t
+1-301-340-5299 f
www.gxs.com

**EUROPE, MIDDLE EAST AND
AFRICA HEADQUARTERS
UNITED KINGDOM**
GXS Limited
18 Station Road
Sunbury-on-Thames
Middlesex TW16 6SU
England
+44 (0)1932 776047 t
+44 (0)1932 776216 f
www.gxs.eu

**ASIA HEADQUARTERS
HONG KONG**
GXS International
Room 1609-10
16/F China Resources Building
26 Harbour Road
Wanchai, Hong Kong
+852 2884-6088 t
+852 2513-0650   f
www.gxs.asia.com

**JAPAN HEADQUARTERS
TOKYO**
GXS Co., Ltd.
3F Akasaka 1-Chome,
Minato-ku, Tokyo 107-0052
+81-3-5574-7545 t
+81-3-5574-7560 f
www.gxs.co.jp

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