

## Introduction

This report examines the use and adoption of Electronic Commerce in some of Canada's leading-edge plastics sector companies. The report focuses on transaction marketplaces in the supply chain and the extent to which Electronic Commerce is changing the nature of the transactions conducted therein. Customers and suppliers and intermediaries are examined for eight of Canada's Plastics Sector firms.

## Profile of the Canadian Plastics Industry

The plastics sector encompasses resin producers, compounders, machinery and mould manufacturers, and processors that make plastic products. The statistical profile of the Canadian plastics sector, for 1999, is shown in the following table.

	Establishments	Employment	Shipments, \$B	Imports, \$B	Exports, \$B
Synthetic resins*	110	8800	6.3	5.0	4.0
Machinery	80	4400	1.8	0.7	0.9
Moulds	360	8600	1.7	0.5	1.1
Plastic products	1375	83000	13.6	6.1	5.5
<b>Total</b>	<b>1925</b>	<b>104,800</b>	<b>23.4</b>	<b>12.3</b>	<b>11.5</b>

\* Data for compounders is embedded in the data for synthetic resins.

Industry Canada estimates that there are 2460 of these companies, shipping \$223 billion in plastics and employing 103,000 people. This exceeds the principal statistics of the plastics products industry as defined by the standard industrial classification. The reason for this apparent discrepancy is that resin processing is a secondary activity for many firms not classified as plastics processors. Some of the equipment used (e.g. printing machinery to print on plastics) is not captured within the traditional SIC codes for plastics, being allocated instead to printing or other sectors.

The plastics industry is among the fastest-growing manufacturing sectors worldwide. In developed markets, this is propelled by the development of new products made possible through the unique performance attributes of plastics, combined with increased growth via substitution for traditional materials like metal, glass, wood and paper. In developing countries, consumption rates of all types of products, including plastics, is rapidly expanding and offers tremendous export opportunities. For example, in countries like China, per-capita consumption of plastics is of the order of 8 kg per year. Compare this to consumption rates in excess of 100 kg per year in western countries, and it becomes apparent that developing countries offer huge growth potential.

## Resins

Resin manufacturers convert petrochemicals to resins. Their customers are manufacturers of paints, plastic products, and adhesives. There is a major market to firms who undertake plastics manufacture as a secondary activity. Toy companies, and electronics firms are examples.

Resin producers with Canadian manufacturing sites include NOVA Chemicals, Dow Chemical, Imperial Oil, Oxy Vinyls, Basell, Petromont, KoSa, AT Plastics, DuPont, Royal Group and Eastman Chemical. The United States is the destination for 80 percent of exports and the source of 90 percent of imports of resin products. Canadian exports of resins are expected to continue to increase as new capacity is added in Alberta, and capacity expansions are completed in Ontario and Quebec

Resin producers continue to rationalize globally, becoming more focused on their core polymer technologies. Global alliances are being formed to acquire and expand on new technology, such as applying metallocene technology into a rapidly broadening range of end-use markets. New resin-production capacity continues to come on-stream, particularly along the U.S. Gulf Coast and in Asia-Pacific. Despite its increase in production capacity, Asia-Pacific remains a large net importer of resins.

The Canadian resin industry continues to increase its production capacity through both new plant construction and expansion at existing sites. Increasing Canadian demand cannot consume this new capacity, and so exports of resins from Canada will continue to increase. The main challenges for this sector are to continue to invest in state-of-the-art technology in order to maintain high productivity rates in Canadian plants; to continue to supply an increasing proportion of U.S. demand, and to strengthen the Canadian position in offshore and emerging markets.

At the moment electronic commerce is not widely applied by resin producing companies. Transactions are relatively infrequent and large scale, offering only a modest scope for cost savings. The resin companies are large compared to their customers and thus have not been driven by customer transaction practices. Many do make use of website to provide datasheets and other product information. Prospects are however, bright as transaction systems become more standardized.

### **Compounders**

Compounders are intermediaries between resin producers and plastics processors involved in the blending of resins with functional additives such as pigments, stabilizers and plasticizers. These companies account for an estimated 50% of the establishments and 10% of the shipments and employment in the resins sub sector. Major companies in this category include Aclo, Albis, A. Shulman, Colortech, GEON and Wedtech.

### **Machinery and moulds**

This equipment is used to form resins into plastic products by a variety of processes, including injection moulding, extrusion, blow moulding and thermoforming. Major firms in this industry include: Alpha Marathon, Brampton Engineering, Compact Mold, Corma, Engel, GN Plastics, Heins PCM, Husky Injection Molding Systems, Macro Engineering, Mold-Masters, Ryka Blow Molds, StackTeck, and Wentworth Mold and Die. This is a highly export-oriented sub sector; with about 60 percent of production being shipped to global markets. Eighty percent of exports are destined for the United States, and 65 percent of imports originate from there.

As consumption of plastics continues to grow, demand for machinery and moulds also increase. Through corporate consolidation, the major international machinery manufacturers are becoming fewer and larger. The principal machinery-producing countries include the United States, Germany, Japan and Italy. Plastics machinery and moulds are considered part of an advanced manufacturing technology (AMT) sector or intelligent manufacturing equipment. This

equipment is characterized by having a high content of automatic or robotic control. Canada is the fourth largest supplier of AMT equipment, with plastics-forming machinery and moulds playing a leading role.

Export growth in these sub sectors is fuelled by specialized Canadian expertise combined with expanding worldwide demand for plastics-processing machinery and moulds. Challenges for this sub sector include continued investment in advanced manufacturing technologies in order to remain at the leading edge of companies worldwide, building market share in countries where they already have a solid presence, and making more substantial inroads into developing markets in South America and Asia-Pacific.

The machinery and mould companies have made extensive and creative use of electronic commerce. Mould makers have used their websites to convey information, and to speed the design process. It is a way for an individual company to distinguish themselves from the other precision machining companies that are in this business. Machinery companies can now offer remote support of their equipment via the Internet and so enhance the value of their product.

### **Plastic Products**

Plastic products are used in a broad range of applications, the largest being packaging (34%), construction products (26%), and automotive parts (18%). This industry is primarily domestic in nature, as it is very sensitive to transportation costs and input prices. Resin costs account for 30 to 50% of the final value of the good. However, the industry is becoming more export-oriented. Some of the larger firms in the industry are ABC Group, AT Plastics, Canadian General-Tower, Decoma, Great Pacific Enterprises, Intertape Polymer, IPEX, Royal Group Technologies, Amcor-Twinpak-Twinpak, Uniplast, Winpak and Woodbridge Foam.

Approximately 90 percent of export trade and 80 percent of import trade has been with the United States, reflecting the impact that transportation costs have on product movement.

Worldwide, a few large companies and many SMEs characterize this industry. An Industry Canada analysis suggests that on average, U.S. plastics processors are more productive than those in Canada, and this may be linked to a higher rate of capital investment in the United States. In recent years, the Canadian industry seems to have closed this investment gap, and as a result this productivity differential is expected to disappear.

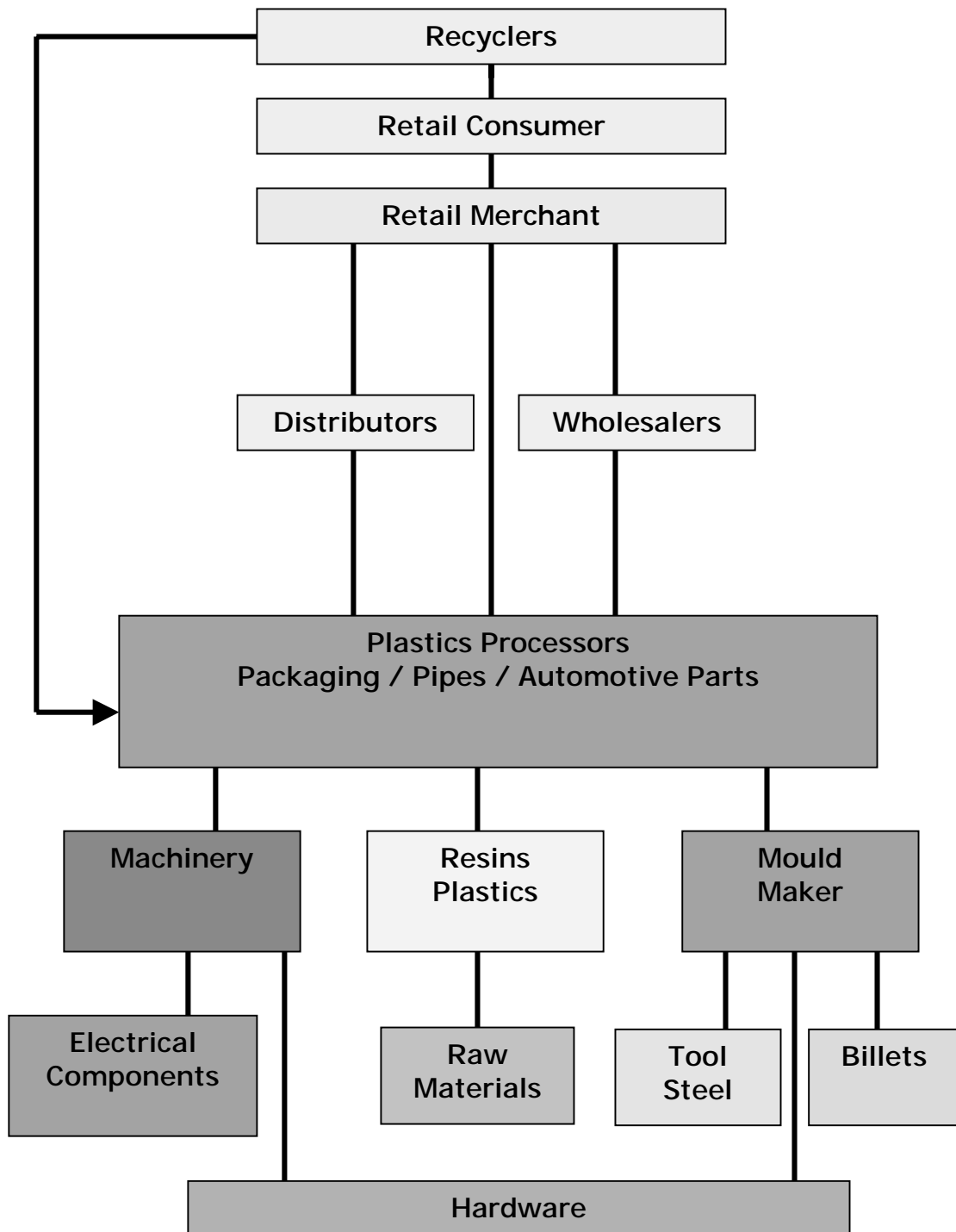
The strong export growth observed in recent years is expected to continue as Canadian companies improve their competitive position, especially with respect to U.S. firms, by investing more heavily in leading technologies and developing the skilled work force that can effectively use these technologies. The challenges for this sub sector include expanding its market share in U.S. markets, and becoming more active in global markets.

Relations with customers condition the use of electronic commerce by plastic products companies. Some companies have a few very large customers. Transactions are few, large and infrequent, often making the investment in electronic commerce difficult to justify. Others have a large number of customers some of whom demand electronic commerce and many, particularly the smaller ones, preferring manual means. The company is obliged to maintain parallel systems and to encourage customers to go electronic because of the savings involved. Many companies also use electronic intermediaries for travel, payments and project management.

## Plastics Sector Value Chain

Each of the firms studied in this report is a manufacturer of intermediate goods in the capital goods sector.

In all cases the customer is the driving force behind the relationship.



## Summary Conclusions

There are five companies in this study that can be described as early adaptors of E-commerce. Amcor-Twinpak-Twinpak, IPEX, and CPI are plastics processors; Mold-Masters and Ryka Blow Molds are equipment and mould suppliers respectively to plastics processors.

There are three companies in this study that can be described as later adaptors of E-commerce. Accord Plastics is a plastics extruder; AT Plastics processes bags and plastic films; Nucon Systems supplies bulk handling systems for resin pellets.

Processors, mold-makers, and heating element or other equipment suppliers have different value chains that determine, in turn, the nature of their customers and suppliers.

The customer profile is the most important single element. Companies range from having a few large customers to having thousands of customers, large and small. In this latter case, the determining factors driving E-commerce use relate to the number of transactions.

If IPEX can switch from a \$100 + paper-based transaction to a \$1.19 EDI-based transaction, the savings over almost 40,000 transactions per year are enormous. Given that IPEX's EDI system is already in place, the incremental cost of adding another link is minimal - more savings accrue from expansion of the EDI network that IPEX understandably promotes as a win - win for all its customers. IPEX's concern is essentially efficiency-based. As customers switch from EDI to EDI over Internet, IPEX must operate parallel systems. Whereas the customer saves on VAN costs, IPEX actually pays more as it maintains dual parallel streams.

IPEX experimented with a more complete integration of its systems with one of its major customers only to find that the customer wasn't ready internally with consistent inventory and pricing systems to proceed as planned. This project will proceed when the customer has its internal house in order.

Amcor-Twinpak-Twinpak has a small number of very large customers. Transactions are few, the relationship stable and the key contact occurs every two to three years when the contract is renegotiated. In this context, Amcor-Twinpak uses E-commerce heavily to assess the transportation costs for potential competitors to deliver packaging (e.g. plastic bottles) to key clients and ensures that its delivered price is lower. Amcor-Twinpak Twinpak also uses E-commerce to reduce cycle times for routine transactions thereby reducing costs.

CPI produces extruded thermoplastic systems, components and trims for a large number of very large foreign customers. E-commerce is used extensively in all facets of customer transactions in direct response to very large customer demands. Whereas the investment costs were larger than forecast, results are satisfactory with lower costs and shorter cycle times throughout being described as the main benefits. CPI's supplier base is largely domestic and transactions are much less E-commerce intensive than are those with customers. CPI is not mandating E-commerce supplier interfaces now but hopes to increase their use over time.

The supply chains for both IPEX and Amcor-Twinpak-Twinpak are similar to that of CPI - resins and some machines. Resins are commodity purchases in trainload quantities with transactions taking place essentially by telephone and/or fax. None of these firms is in a position to control the resins market. As one example, CPI buys 10% of the polystyrene sold in Canada, about 50

million pounds annually. This compares to North American total polystyrene sales in the order of 7 Billion pounds annually.

Machinery purchases are too rare for E-commerce networks such as EDI to be required although Web-based information on suppliers is commonly sought.

Ryka Blow Molds and Mold-Masters produce blow moulds and mould components respectively. They have a much more expanded list of suppliers.

Mold-Masters is using an E-commerce intermediary for order delivery to its supply chain. The aim is reduced cycle times and lower costs. Even though Mold-Masters is paying the intermediary costs, their net savings are still in the 50% range over traditional systems.

Mold-Masters has also developed a proprietary customer design interface that is E-commerce based, Merlin. Merlin allows customers complete access electronically to engineering advice, component costs and delivery schedules, which, in turn, allows the customer to design their own system and order it electronically with predetermined delivery schedules and costs. This system is a clear differentiator for Mold-Masters making it easier to do business and establishing a simple channel for repeat business, thereby encouraging customer lock-in.

Ryka Blow Molds has a small supply chain but a broad customer base. Ryka has focused on its customers using E-commerce extensively with innovative applications enabling virtual outsourcing of selected customer operations including design, testing and sampling, production run issues and quality control.

Using a mini-plant and innovative applications of video-conferencing, Ryka Blow Molds is designing molds, producing packaging (plastic bottles) in an actual sample production run, recording quality control aspects of the production and testing the final product. This enables Ryka to ship pre-approved molds with no testing required in the customer's facility.

RYKA's other value-added bundled service offering is project management of the entire design and testing process. This turnkey service differentiates RYKA from its competitors and encourages longer-term relationships with customers.

Accord Plastics makes custom PVC profile extrusions. Accord is a small firm in the midst of an internal modernisation program with imminent plans to increase its E-commerce transactions interfaces. Currently, it relies on an innovative ICQ-type E-mail distribution system as its customer transaction E-commerce interface. Within a year, customer E-commerce interfaces will be significantly expanded. The small size of Accord plastics limits its ability to influence E-commerce adoption in its supply chain.

AT Plastics produces resins, films and plastic bags. AT Plastics has an E-commerce transactions interface but it is reserved for its largest customers only (fewer than 10). The system is based upon a limited access Web Site.

Most of AT plastics customers and suppliers are small to medium sized firms that do not use E-commerce extensively. AT Plastics is prepared to move further into E-commerce interfaces, but only as realistic demands warrant.

Nucon Systems is another small company selling specialised systems to plastics processors. Its customer and supplier bases are large but stable. There are some E-commerce transactions, but most are by telephone or fax. The low intensity of E-commerce adoption reflects lack of customer demand and satisfaction with the efficiency of current operations.

None of the companies studied is forcing the supplier base to adopt E-commerce, although Mold-Masters is actively encouraging the transition. At times, suppliers suggest E-commerce transaction structures but analysis indicates a disproportionate distribution of accrued benefits to the supplier.

Customer interfaces tend to exhibit more E-commerce intensity, always driven by customer demand. Some firms are very active in promoting E-commerce transactions as a win-win proposition and have developed sophisticated arguments in support of this contention.

## **Corporate Case Studies**

Eight firms were surveyed in this study. The surveys consisted of personal interviews based on the OECD methodology using the data recording templates as requested. These interviews were supplemented by telephone interviews for suppliers and customers of the eight target firms.

### **Amcor-Twinpak Case**

#### **1. Sub Sector Effects – Dynamic of Specific Industry**

Amcor-Twinpak is a plastics fabricator. Its largest product line is polyethylene-terephthalate (PET) packaging. This includes beverage containers; squeeze tubes, rigid plastics and flexible plastic tubing. They also provide blanks for blow molding. The market is stable. Resin producers do not often enter and exit the market. Some new machinery suppliers have entered the market. There is some movement of customers in the US.

#### **2. Management Effects – Specific Business Situation**

Amcor-Twinpak makes beverage containers for a few major customers, notably Coca-Cola, Pepsi-cola and some vendors of spring water. They are an Australian company with 6 plants in Canada and plants in a total of 4 countries. They employ 550 people in Canada and 1400 worldwide. Revenues are about US \$400 million worldwide and US\$ 250 million in Canada.

Amcor-Twinpak buys resin, converts it to single use packaging and sells it to a major brand owner. Amcor - Twinpak also offers a range of technical services complementing this that include design and product testing.

#### **3. Customer Relations**

Amcor-Twinpak has between 10 and 100 customers. They are mostly very large corporations, (50%), large enterprises (25%) and SME's (25%). There are less than 5 intermediaries on the selling side. Most customers are domestic (>75%).

Amcor-Twinpak has key customers such as Coca-Cola and Pepsi with long-term contracts. The customer designs and owns the moulds and specifies only certified resins. The major issue is quality control. Contracts are bid competitively, and are renegotiated every three years. These contracts are important and these are major events. The customers are well informed and are careful to negotiate at the minimum feasible price.

Amcor -Twinpak has an advantage in the location of its plants in close proximity to customers, as transportation is a major cost. Quality and effective asset utilization are other major factors.

Extensive use is made of e-commerce. E-mail is used for catalogues and stock lists, negotiation, ordering, billing, finance, and delivery. The WWW is used for catalogues. Catalogues and information services use videoconferencing.

## **4. Supplier Relations and Management**

There are between 10 and 100 suppliers. Suppliers are SME's (33%), large corporations (34%) and very large corporations (33%). There are fewer than 5 intermediaries on the supply side. Most supplies (>75%) are based abroad.

The major supply item is resin. Amcor-Twinpak currently buys all of its resin from Eastman-Kodak. However, because of high forecasted growth rates, Amcor-Twinpak feels it will have to add a second supplier. Resin is a commodity, with a lot of producers and the price is competitively determined. A few machinery producers have overwhelming market dominance and there is only a moderate opportunity for negotiation.

Eastman, the primary resin supplier, is electronically intensive. An initiative to align with them has been started but placed on the back burner. Mould designs are transmitted electronically.

Suppliers provide catalogues and stock lists by e-mail and on the WWW. Information services are also provided by e-mail and the WWW.

## **5. Path of E-commerce Development**

On the customer side, Amcor-Twinpak wishes to migrate e-mail activities to EDI and EDI over Internet (ordering, billing and payment) and to an Extranet (information services, ordering, finance and delivery). This is easiest for large customers who tend to be electronically sophisticated. Smaller customers tend to prefer manual systems.

Suppliers are moving to provide ordering via e-mail and extranets. Catalogues and deliveries are also moving to extranets.

Amcor-Twinpak expects to move to e-commerce transaction systems as it expands into new markets. It also expects to expand its supplier base and use e-commerce with new suppliers.

## **6. Impact of E-commerce**

### **a. Experience of Implementation**

It was expected that transaction costs and cycle times would be reduced. Expectations have been met, but the implementation has proceeded more slowly than originally hoped.

Telecom networks posed no constraints. There was some concern over the adequacy of legal measures. In-house technologies had to be expanded and staff trained. Customers and suppliers used a variety of transaction systems that increased the complexity of e-commerce development.

### **b. Justification of Costs**

E-commerce facilitated the management of business relationships. It decreases the cost of reaching new customers and suppliers.

### c. Emergence of New Intermediaries

Amcor -Twinpak uses I Travel 2000 a web-based travel service.

## **IPEX Case Study**

### **1. Sub Sector Effects – Dynamic of Specific Industry**

IPEX is a plastics fabricator. It produces pipe, pipefittings, carpet liners and mats. These are final goods with a wide market. This is a stable market with little movement of firms in and out.

### **2. Management Effects – Specific Business Situation**

IPEX is a subsidiary of Glynwed in the UK. It has plants in Canada and the USA. It employs 1800 in Canada and 150 in the US. Revenues are around \$500 million. IPEX deals with more than 1000 customers and suppliers. Customers and suppliers are evenly distributed as to size. They are split evenly between domestic and foreign. This large and diverse group conditions much of IPEX's approach to e-commerce.

Logistics is a major strategic element in IPEX management. Locating plants close to their markets minimizes transportation costs. Plans are in place to drop ship products from alternate plants, and to meet large spikes in demand.

IPEX integrates information from their computerized and non-computerized systems to provide market intelligence.

### **3. Customer Relations**

As noted above there are more than 1000 customers evenly distributed as to size. E-commerce is used with 45 mid to large sized customers. Sales are primarily through distributors, including large building materials retailers. Municipal sales are direct with a large design service component.

Inventories are located near key markets with 15 plants in Canada. Each plant is oriented to its geographical area to minimize transportation and simplify logistics. Contingency plans exist to drop ship products from other plants and to meet unusually large demands.

E-commerce techniques are widely used. EDI is used for information services, ordering, billing, and delivery. E-mail supports advertising, catalogues, information services, negotiation, ordering, finance and delivery. The WWW supports advertising, information services and delivery. An extranet supports information services. E-commerce is used with all sizes of customers in North America. There is less take-up abroad. IPEX uses EDI networks where customers demand it.

## **4. Supplier Relations and Management**

Resins are the main item of supply. The size of an order is a trainload. These are negotiated infrequently and uniquely. There are few e-commerce links with suppliers. Producers' websites provide information sheets and in some cases allow for payment. IPEX moves to e-commerce when volumes warrant.

E-mail and the WWW support information transfers with suppliers. The WWW also provides a means of payment with suppliers.

## **5. Path of E-commerce Development**

It is hoped to move catalogues to EDI over the Internet and the WWW. More crucially, IPEX hopes to move more customers to e-commerce. With a large customer group, which varies by size and location, they must maintain a wide range of systems to service them. As there are economies to both sides in e-commerce, IPEX is continually seeking to have their customers use electronic techniques.

In terms of suppliers, ordering would move to the WWW and e-mail, and delivery to EDI over the Internet. There are few suppliers with electronic systems. IPEX is waiting on suppliers to make suggestions on further integration.

## **6. Impact of E-commerce**

### **a. Experience of Implementation**

The costs and benefits of moving to e-commerce were accurately estimated. IPEX began EDI with three or four large customers. Adding another customer is relatively inexpensive. Moving to EDI over the Internet is a mid to long-term objective. They would move faster if customers demand it. There is not a great demand for it at the moment.

In-house technologies had to be expanded to implement EDI. Governments were criticized for not training enough e-commerce personnel. In the main, internal factors, the telecommunications network, and regulatory factors supported the move to EDI.

Transaction costs were reduced and competitiveness enhanced.

### **b. Justification of Costs**

EDI processing of orders costs about 1% of the cost to process orders manually. EDI systems have a high operating cost, but if scales are large, savings run to the millions of dollars annually. This is a pot of gold to both IPEX and the customer.

### **c. Unique Items**

IPEX faces a large number of customers, varying in size and location. They maintain parallel e-commerce and manual systems and an ongoing effort to move their customers to EDI. Their concern is that uneven movement by customers to EDI over Internet will require yet another parallel stream system for IPEX to maintain.

## **CPI Plastics Case**

### **1. Sub Sector Effects – Dynamic of Specific Industry**

CPI is a public Canadian plastics processor. It produces extruded thermoplastic systems, components and trims. It supplies parts to the appliance, automotive, furniture and window fashion industries. It produces Extrudawood, a lumber substitute and a line of plastic bags for the consumer market.

The market is stable with few customers and suppliers entering and exiting the market. Competitors enter and exit the market more frequently. This is because extruded plastics and metal components are strong substitutes in many cases and metal fabricators have more flexibility to enter and leave markets.

### **2. Management Effects – Specific Business Situation**

CPI employs 600 people in 7 plants in Canada. Revenues are \$100 million. There are no foreign subsidiaries.

CPI uses an ERP system to track production and financial information. It is called Visual Manufacturing from Lilly Software. It supports sales and engineering. This package has contributed substantially to process innovation and productivity.

### **3. Customer Relations**

CPI has between 100 and 1000 customers. Intermediaries are less than 5. Customers are mostly very large enterprises (80%) and large enterprises (10%). Almost all customers are based abroad.

E-commerce is extensively used. EDI is used for ordering, billing and payment, delivery and forecasting. E-mail supports advertising, catalogues, information services, negotiation, ordering, and delivery. The WWW supports advertising, catalogues, information services, ordering and delivery.

Larger customers have better access to e-commerce and are demanding web-based systems. Smaller customers do not make these demands. When large customers such as Wal-Mart or Canadian Tire use EDI, CPI has no choice but to go along with it.

### **4. Supplier Relations and Management**

CPI has between 10 and 100 suppliers. There are less than 5 intermediaries. Suppliers are mostly large enterprises (50%) and SME's (30%). Over 75% of suppliers are domestic.

CPI buys 10% of the polystyrene sold in Canada or 50 million pounds. North American polystyrene sales amount to 7 billion pounds. Thus polystyrene is a sellers market with users being price takers. CPI subscribes to trading indexes to obtain market intelligence on resins.

CPI is planning to participate in electronically managed projects. In such projects, the original equipment manufacturer, will act as the lead tying various participants together electronically.

E-mail and the WWW are used with suppliers. E-mail supports advertising, catalogues and stock lists, negotiation, and delivery. The WWW supports advertising, catalogues, information services, negotiation, ordering and delivery. Currently, there are few e-commerce relations with suppliers.

## **5. Path of E-commerce Development**

In servicing customers, CPI is seeking to migrate ordering from EDI to the WWW, billing and payment from EDI to the WWW and an extranet, delivery from EDI to the WWW and project management to an extranet.

With suppliers, CPI would like to migrate catalogues to EDI, e-mail and the WWW, advertising to the WWW and information services to EDI and the WWW. They would like ordering to move to EDI and the WWW, billing to EDI and delivery to the WWW. Most CPI suppliers lack the staff expertise and technology to adopt e-commerce. Presently, CPI is not insisting on an e-commerce model with suppliers. Although it is a low priority, they hope to move their supplier base to e-commerce over time.

## **6. Impact of E-commerce**

### **a. Experience of Implementation**

Three years ago CPI had only a small EDI system. They had high expectations concerning better information flows, less processing staff time, and higher productivity. Communications were expected to improve throughout the value chain. Design cycles, delivery cycles were expected to be shorter.

CPI wished to move into electronic commerce in parallel with its largest most sophisticated customers to maintain supplier-customer relationships, and to maintain margins while offering reduced prices.

Telecom and regulatory issues were not a problem. Internal technologies had to be upgraded and staff trained.

### **b. Justification of Costs**

The investment cost could not be easily justified. The move was primarily defensive in nature. Costs of reaching new customers and suppliers have fallen. CPI management feels the effort was worthwhile.

CPI has grown by 50% per year for the last three years. Staff has increased by a total of 20%, over the same period, and mostly in high value occupations. Collaborative project management has shortened most business cycles.

## **Mold-Masters Ltd. Case**

### **1. Sub Sector Effects – Dynamic of Specific Industry**

Mold-Masters is a plastics equipment manufacturer. They make hot runner systems for injection molding systems. There is little movement in or out of the market. The product is a capital good with a long life and high support requirements. It is customized to a fair degree to customers' production lines.

The customer's main objective is to maintain a high level of utilization of their equipment and thus place a premium on fast and efficient support.

### **2. Management Effects – Specific Business Situation**

The company is based in Canada; It has manufacturing facilities in 5 other countries and sales representatives in 62 countries.

Internal production and control is performed by a SAP-based electronic system. Only invoice preparation is not integrated.

To provide support Mold-Masters maintains a presence in the USA, Europe, Latin America and Asia. Regional inventories of parts support local technicians. Local technicians are also supported by an on-line system providing factory personnel and experience. This allows problems other than those with Mold-Masters equipment to be solved.

### **3. Customer Relations**

There are more than 1000 customers. They are primarily large and very large enterprises (90%). Most are based abroad. The customers are technically knowledgeable and demand a high level of service and support.

Sales are direct by salesmen, independently generated by the customer, or "Hands-Off" through a web-based collaborative system. (See unique item below.)

Extensive use is made of e-mail and the WWW relating to customers. EDI is used for finance and delivery. E-mail is used for advertising, negotiation, and billing. The WWW is used for advertising, catalogues, information, negotiation, ordering, finance, and delivery. Extranet is used for ordering, finance and delivery. Mold-Masters is required to interface with its customers' systems, hence a wide range of options. They are well developed in e-commerce.

Customers may directly access the internal SAP system to verify order status.

Local technicians supported by an online system deliver support.

### **4. Supplier Relations and Management**

Mold-Masters has over 1000 suppliers and deals with over 20 intermediaries. The inputs are steel, and heating element materials. Capital goods such as machining systems are used.

Extensive use is made of e-mail and the WWW relating to suppliers. EDI is used for finance and delivery. E-mail is used for advertising, negotiation, and billing. The WWW is used for advertising, catalogues, information, negotiation, ordering, finance, and delivery. Extranet is used for ordering, finance and delivery. Mold-Masters uses a third party provider (see new intermediary below) to facilitate purchase orders via "EDI over the Internet".

## **5. Path of E-commerce Development**

The path of customer-relations development is to move billing and payment activities to EDI over the Internet, the WWW and an extranet. They are currently on EDI. Negotiations would move to videoconferencing.

The Customer Relations Management System will be integrated to allow buying trends captured by the SAP to be fed into market analysis research.

The development of supplier relations involves moving advertising, catalogues, and information services from the WWW to an extranet. E-commerce activities are highly evolved.

## **6. Impact of E-commerce**

### **a. Experience of Implementation**

It was expected that all aspects of the business cycle would be speeded up. The costs of transactions would be reduced.

The process was slower and more expensive than forecast. Costs were about double the original estimates. Take-up was slower than anticipated. There were unknown legal and technical factors that had to be resolved in the process.

Customers were delighted with the new systems.

### **b. Justification of Costs**

Customers were delighted with the new system. Mold-Masters' supplier ordering costs were reduced by 50% even after paying a third party intermediary.

### **c. Emergence of New Intermediaries**

All of Mold-Masters most active suppliers are linked through a third party "EDI over the Internet" website operated by [EC Webworks of Burlington Ontario](#). The internal SAP system generates a purchase order that goes to Webworks' site. Suppliers are notified by e-mail of the purchase order and download it from the site.

### **d. Unique Items**

Mold-Masters uses a web-based collaborative system called Merlin to allow customers to enter technical requirements, and obtain prices, and lead times. It also allows order placement. This substantially reduces the time and cost of sales to both the vendor and the customer. Merlin is an E-commerce based design system enabling customers to interact with Mold-Masters

engineering staff as needed as well as to design to their own requirements without Mold-Masters involvement.

## **Ryka Blow Mold Case**

### **1. Sub Sector Effects – Dynamic of Specific Industry**

Ryka is a mould maker. It is a small company serving world markets. The moulds are a product of precision machining and are a critical component in the manufacture of plastics products. The market is stable, with a low rate of entry and exit by suppliers, customers, competitors, and intermediaries. Customers and suppliers drive the market.

The price structure is competitive. Bids are solicited by telephone , by fax and by e-mail.

### **2. Management Effects – Specific Business Situation**

The company is based in Canada. It employs 78 people and has revenues of \$10.5 million. Ryka produces moulds for packaging, automotive and general industrial sales. Ryka will design the mould and in some cases the package (plastic bottle) as well. A typical order is for 100 or so moulds to go to three or four related plants. A larger order would be 600 to 800 molds distributed worldwide. The lead-time would be 18 months.

There is pressure to increase the speed to market.

There is an iterative process involving testing, prototyping, sampling and market testing. Managing this process is essential to controlling the time to market. While major customers often do this themselves, Ryka has a mini packaging plant to test products for a customer.

Ryka uses a central scheduling and production control program to manage its plant. They are developing an interface to their website to allow customers to access production data directly.

Thus Ryka has moved beyond the precision machining origins of mould makers, to project management and virtual vertical integration, due primarily to e-commerce.

### **3. Customer Relations**

There are between 100 and 1000 customers. They are primarily large (60%) and very large (30%) enterprises. Approximately half of their customers are based abroad.

Ryka makes extensive use of e-commerce techniques. EDI is used for negotiation and payment. EDI over the Internet is used for advertising, catalogues, information services, and ordering. E-mail supports advertising, catalogues, information services, negotiation, ordering, delivery and design and engineering. The WWW supports advertising catalogues and information services. Videoconferencing supports information services, negotiation and design and engineering.

E-commerce interfaces are limited to large globally oriented customers who have the appropriate technology. Ryka encourages e-commerce adoption by its customers.

## **4. Supplier Relations and Management**

Ryka is a price taker for supplies. They purchase high quality aluminum billets as a major input. Other inputs are hydraulic, pneumatic and electronic sensors.

There are many e-commerce supplier relations. EDI is used for catalogue, information services, billing, and finance. E-mail supports negotiation and ordering. The WWW supports catalogues, information services, negotiation and ordering.

Large suppliers are generally e-commerce ready, small suppliers are not.

## **5. Path of E-commerce Development**

Ryka would like to migrate negotiation and billing to EDI over the Internet, and ordering to the WWW. They are also integrating videoconferencing into the design and engineering process. This is a leading edge application.

On the supply side, Ryka would like to migrate catalogues, information services, negotiation and ordering to EDI.

## **6. Impact of E-commerce**

### **a. Experience of Implementation**

Ryka expected faster, less expensive processes, integrated with the requirements of their largest customers. They also set out to be early adopters to gain a competitive advantage.

The telecom network was sufficient for their purposes. There were concerns over legal structures and intellectual property measures. In-house technologies and staff training had to be upgraded. Government policy played a minor role.

The image of the firm as a technological leader was enhanced.

### **b. Justification of Costs**

Costs are easily justified. CAD and e-commerce is necessary to have a global presence. Because of e-commerce Ryka has achieved a 65% reduction in lead times. Customers frequently benchmark Ryka. This is facilitated through videoconferencing.

### **c. Unique Items**

Ryka sends weekly e-mail newsletters to its customers describing developments in CAD/CAM systems and other related information. This leads to virtual integration with customers, and to demonstrating Ryka's efforts to remain abreast of technology, as well as to soliciting views of customers. Test files are also often included.

Ryka uses videoconferencing to support design and engineering. This allows customers to view the operation of the molds in real time and comment on them. It also allows for real time review and approval of design changes with the best information regardless of distance and time differences.

## **Accord Plastics Case**

### **1. Sub Sector Effects – Dynamic of Specific Industry**

Accord Plastics is a plastics processor making custom PVC profile extrusions, for office furniture, automotive and other sectors. The market is stable with little entry and exit of suppliers, customers, competitors and intermediaries.

### **2. Management Effects – Specific Business Situation**

Accord is a privately held Canadian corporation. It employs 67 people and has revenues of \$ 10 million. It has one plant in Canada and none abroad.

The products are material as opposed to virtual in nature. There is no bundling of services with the products.

Production is managed through a central ERP system. The interface between the ERP system and the e-mail system is manual.

Accord subscribes to a daily electronic newsletter for market information.

### **3. Customer Relations**

Accord has between 10 and 100 customers. There are less than 5 purchasing intermediaries. Customers are mostly SME's (60%) and large enterprises (20%). Sales are mostly domestic with less than 25% of customers based abroad.

Multiple year contracts are the norm with routine annual price reviews. Proximity to the customer is very important because of short delivery times.

E-mail is the primary means of communication with customers. It supports advertising, catalogues, information services, negotiations, ordering, finance and delivery. The WWW (using other companies' web sites) provides information services.

Each customer has a unique e-mail address that automatically routes incoming e-mails to each department and individual ensuring that all necessary contacts are made simultaneously.

### **4. Supplier Relations and Management**

Accord has between 10 and 1000 suppliers. There are between 5 and 10 supplier intermediaries. Suppliers are mostly SME's (60%) and large enterprises (10%). Suppliers are mostly domestic (>75%).

Production inputs are resins, custom compounds, tapes, machinery and steels.

Contact is made with suppliers through e-mail for catalogues, negotiation, ordering, billing, and delivery. The WWW provides some advertising, catalogues and information.

Accord would like to migrate supplier relations to an Extranet. Larger suppliers are Accord's primary focus.

## **5. Path of E-commerce Development**

On the customer side, Accord would like to migrate advertising, catalogues, information services, negotiation, ordering, and delivery to the WWW and an Extranet. They view EDI as essentially a bilateral approach and prefer the public nature of the WWW and an Extranet.

Summarily, they would like to migrate all supplier relations to an Extranet. They are small compared to their suppliers and only have a moderate amount of leverage for this.

Customer demands take absolute priority. Large customers demand EDI or other systems compliance as part of their supply management process. Accord schedules e-commerce implementation for their supplier base.

## **6. Impact of E-commerce**

### **a. Experience of Implementation**

Accord hopes to reduce transaction costs and speed up business cycles. The move is in process and it is too early to see results.

## **AT Plastics Case**

### **1. Sub Sector Effects – Dynamic of Specific Industry**

AT Plastics is a plastics processor. It produces resins, films, and plastic bags. The plastic bags are customised with customer names on them. There is no bundling of services. The sector is stable. There is little movement of suppliers, customers, competitors and intermediaries in and out of the market.

### **2. Management Effects – Specific Business Situation**

The company is based in the U.S. and has a Canadian subsidiary. It employs 720 people and has revenues of \$350 million.

Manufacturing involves using resins and extrusion machinery.

### **3. Customer Relations**

There are between 100 and 1000 customers. There are between 10 and 20 purchasing intermediaries. Customers are primarily SME's (55%) followed by large enterprises (30%). They are primarily based abroad.

AT maintains a limited access website, (fewer than 10 customers) for order review. There is no order placement facility or real time information.

E-mail is used for information services, negotiation and ordering. The WWW is used for advertising, information services and negotiations.

#### **4. Supplier Relations and Management**

AT has between 100 and 1000 suppliers. They are also primarily SME's (50%), and large enterprises (20%). There are 10 to 20 intermediaries as purchasers. Over half are based abroad.

Negotiations are still largely by telephone or other traditional means. There is no online purchasing unless the supplier offers a catalogue.

The WWW is used for supplier catalogues and information services where available.

#### **5. Path of E-commerce Development**

No e-commerce development is planned on either the customer or supplier side at present. Customer demands for electronic commerce interfaces have already been accommodated (for large key customers only at this point). Absent further demand, AT Plastics will continue to operate traditional interfaces that accord with customer preferences.

#### **6. Impact of E-commerce**

##### **a. Experience of Implementation**

Management is reluctant to introduce e-commerce absent a clear demand from key customers. There are no telecommunications obstacles. Security and intellectual property measures are a concern. Some training of staff would be required.

## **Nucon – Wittman Case**

### **1. Sub Sector Effects – Dynamic of Specific Industry**

Nucon manufactures auxiliary equipment for the plastics industry. It is classified as an equipment manufacturer. It is a small company with \$16.5 million in revenue. Their product is a fairly standard item with moderate levels of support required.

### **2. Management Effects – Specific Business Situation**

The company is based in Austria and operates in 10 countries. The market is stable with little entry and exit of new companies.

### **3. Customer Relations**

Nucon-Wittman has between 100 and 1000 customers. They are mostly distributed among SME's (25%), large enterprises (50%) and very large enterprises (25%).

E-commerce services for customers are moderate. E-mail is used for information, negotiation and ordering. The WWW is used for advertising, catalogues, and information services. Faxes are mostly used for transactions and negotiation.

### **4. Supplier Relations and Management**

They have between 100 and 1000 suppliers. Suppliers are mostly very small enterprises, (25%) and SME's (50%). Most are domestically based.

EDI is used for catalogues, information services, and ordering. E-mail is used for information services. The WWW is used for catalogues and information services. Transactions are primarily fax based.

### **5. Path of E-commerce Development**

There are no plans to expand e-commerce based services to customers. There is no demand in the customer base for this development.

There are no plans to expand e-commerce relations with suppliers.

### **6. Impact of E-commerce**

#### **a. Experience of Implementation**

Existing staff and technologies are not sufficient to support e-commerce. Investment costs could not be easily justified.

#### **b. Justification of Costs**

The current level of e-commerce has facilitated business relationships.