

Sizing up the impact of globalization on engineering

Globalization makes the work world a smaller but more complex place, since diverse economies and cultures affect how we do business. Whether they stay at home or work abroad, engineers are profoundly affected by the global marketplace. The factors at play include free trade, industrialization of developing nations, new technologies, harmonization of engineering standards and practice, and faster communication via the Internet.

Engineering Dimensions talked to seven Ontario engineers in various industries about the impact of globalization on their jobs.

by Karen Hawthorne

More markets, higher production volumes and more sources for parts are the results of globalization in the rapidly-evolving telecommunications field, says **Steve Carkner, P.Eng., of Research In Motion (RIM) in Waterloo.** The company, whose clients include IBM and Panasonic, manufactures two-way pagers and other telecommunications products. Carkner is the director of product development, in charge of high-level design and planning.

He monitors new technologies continually, so they can be applied to RIM's products. "Since our industry is driven by small devices with more functions, we need access to as many suppliers as possible so we can leverage their specialties and advantages. The global market is a great place to do this," he says.

Making inroads in the global market means extensive travel and savvy awareness of cultural differences, Carkner says: "We try to find out about a country's customs before visiting it or having someone from that country visit us. But in the business community, we have seen that mistakes in culture and etiquette are tolerated because the ultimate goal is to do business and make everyone stronger, not to make sure you used the right fork to eat your salad."

Differences in technical standards in other countries do not significantly affect RIM, he adds, because the electronics industry recognizes international standards developed by the Canadian Standards Association and other well-regarded standards bodies.

What has changed his business is the Internet and email—important tools of the trade. The Internet has expanded buying and selling opportunities, he says, making "shopping for components from a company in Asia almost the same as shopping for components from a company in Canada." The advantages of email are multiple. If sales and engineering staff have email, then time-of-day differences do not affect communication.

Transforming utilities with information technology

"The utilities industry is becoming increasingly competitive," says **Sarah Shortreed, P.Eng., a business transformation management consultant with the IBM Consulting Group.** Classed as a "mobile employee," she requires only her laptop and a phone line to access her "desktop." Shortreed works one day a week at her home office and four days at client sites across Canada.

Because utilities generally lack experience in operating in competitive markets, consultants like Shortreed help customers, such as Toronto Hydro's new mega-utility (for the new unified City of Toronto), find new ways of conducting business. "With a global view of the world, a utility in Canada will be able to sell energy to a homeowner or business anywhere in the world," she says. "The real bonus is that Canadian consumers will have their choice of energy suppliers."

The Consulting Group is part of IBM Global Services, one of the largest IT ser-

vices providers worldwide and also IBM's fastest growing business. Belonging to a diverse, global organization translates into "access to a multitude of intellectual capital and skills expertise throughout the IBM organization, which helps me better serve my customers," Shortreed says.

But it also makes it difficult to find the right person to talk to for information. "Knowledge networks" within IBM have helped link people with similar expertise and interests, so they can work collaboratively. "IMBers" communicate through a variety of media, says Shortreed, including email, the Lotus Notes software package, conference calls and face-to-face meetings.

Increasingly, Shortreed's work involves helping clients develop Internet-based technologies—one of the key drivers of business transformation today. If a company wants to focus on its customers, maximize its internal knowledge and compete in the global market, they look for some type of intra/Internet solution, she notes. Consumers are driving the use of these technologies as they pay bills from home, renew their licence plate sticker at the mall kiosk, and book their vacations without using travel agents. As companies provide for these changes, their internal processes change.

"In the past, reengineering was considered the same as downsizing," Shortreed says. "However, we now hear the phrase 'reengineering for growth' a lot more. My work in business transformation will continue to grow, as businesses continue to

explore the unlimited opportunities associated with e-business."

Making wheels for international roadways

With globalization, it is no longer sufficient to be competitive in local markets, says **John Mann, P.Eng., director of engineering for Chrysler Canada Ltd. in Windsor.** As a result, automotive research and development has shifted its focus from satisfying the demands of Canadian and North American consumers, to satisfying the demands of international consumers.

Consumer trends and preferences are driving the design of automotive products, Mann says: "What people value in terms of convenience, features, quality, performance and even cost can vary widely from one country to another, and sometimes even from one region to another."

Another issue the auto industry faces is lack of harmonization of regulations. "The complexity of global automotive regulations is staggering," he notes, adding that unique regulations impede progress and drive up manufacturing costs, which are ultimately passed on to the consumer. "Countries must learn to cooperate to the benefit of consumers everywhere with regulations that make sense, and that are harmonized around the world," he says.

Given the economic importance of the automotive sector in Canada (12 per cent of GDP, \$65 billion in exports, 15 per cent of employment and Canada's largest trade sector), automotive research and development are critical to promoting Canada's economic development in the face of globalization. Industry, academe and government must work together to be globally competitive, Mann says, since "we simply cannot afford the high cost of working separately." To that end, in 1996, Chrysler Canada partnered with the University of Windsor to form the \$25-million University of Windsor/Chrysler Canada Ltd. Automotive Research and Development Centre (ARDC), which promotes R & D investment and high-tech employment.

Forming manufacturing networks for electronics

Lisa Leong-Poi, P.Eng., coordinates the development, manufacturing and sales of new products for **Celestica, Inc. in Toron-**

to. Serving the computer and communication sectors, the company provides manufacturing technology and service solutions for printed circuit assemblies, the complicated electronics found inside computers. Leong-Poi is responsible for evaluating product design data to determine the manufacturing process required.

"Globalization has allowed companies that have previously manufactured their products in-house to contract the business to original equipment manufacturers like Celestica, since they are now a cheaper and more convenient alternative," she says. It also allows Celestica to provide lower prices to customers by manufacturing in various countries.

Remote manufacturing brings its own set of demands. Leong-Poi has to smooth out the logistics of transferring data, knowledge and skills to various sites, and she has to be aware of different equipment, materials and procedures in other countries. Language and cultural differences must also be accommodated to train the people who work at Celestica's various manufacturing sites.

Collaborating to explore the solar system

The International Space Station represents a unified, global effort in space exploration, says **Ross Gillett, P.Eng. of Spar Aerospace Ltd. in Mississauga.** As a senior systems engineer, Gillett designs the performance and human control of ground-based systems for the remote manipulation of space robotics like the Canadarm.

Detailed circuits are designed by Canadian companies contracted by Spar, and Gillett's team uses these circuit boards to engineer robotic systems. "The real technical expertise, innovation and creativity comes at the system level," he explains. His job is affected by high-level strategic planning by the U.S. National Aeronautics and Space Administration (NASA) and space agencies in Japan and Europe.

Since NASA is often the end user of Spar's systems, NASA representatives have input into these systems' design and safety review—requiring communication and collaboration between the two organizations. "I've been thrilled to speak with people from NASA who worked on the

Apollo 13 project," Gillett adds, proud of Canada's contribution to the aerospace field. "Canada is recognized as a leader in space robotics."

Kristiina McConville, P.Eng., manager of space systems for AlliedSignal Aerospace Canada, oversees the design and manufacture of electronic controllers and sensors for the environmental control system on the International Space Station. AlliedSignal Aerospace Canada of Mississauga provides the aerospace industry with products ranging from engines, to landing systems. McConville also looks for new business opportunities and establishes AlliedSignal's strategic direction.

"Globalization has created a level playing field for all players in a given industry by creating access to customers and suppliers worldwide," she says. "This has changed the face of competition, allowing new competitors to emerge with inexpensive, alternative solutions. Globalization has made our customers more demanding of good value, and it is our challenge to work closely with them to understand how to provide that value."

Even in the wake of new Internet capabilities, McConville emphasizes the need for face-to-face contact with clients. This was particularly important for ensuring the success of the company's work on the Japanese and European modules of the International Space Station, she says, since "language barriers are not always easily overcome. It can be difficult to see the other party's viewpoint. We found that by traveling to France or Japan, or by having customers visit us, the personal contacts formed facilitated communication for the work that followed."

A shared vision of global engineering excellence

Clearly, globalization brings many challenges to engineers in all fields. But it also brings the potential for the best in engineering to be shared across borders and cultures. As John Mann says: "Globalization and free trade agreements among nations have provided an opportunity for industry to harmonize products for numerous markets, in order to reduce costs, speed development and improve quality—all to the benefit of consumers everywhere." ♦