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Advanced Manufacturing Technology



THE OPPORTUNITY

The Mexican market for advanced manufacturing technology offers important opportunities for Canadian suppliers.

- The Mexican market for industrial automation equipment, software and services has been growing rapidly, and is heavily dependent on imports. In spite of the recent economic crisis, the need to modernize is expected to lead to a quick recovery for automation products.
- The strongest demand is for technologies to automate existing production systems, with quick results and relatively low capital costs. Computer software that can run on high-end personal computers (PCs) rather than workstations is particularly popular.
- Increasingly, Mexican consulting firms will need technological partnerships with foreign firms to stay competitive, especially in the area of systems integration services.
- The best prospects are industries with a heavy reliance on exports as well as those which face intense domestic competition.
- A stronger local presence through partnerships with Mexican firms, combined with better use of Mexican university research centres, could help to overcome Canada's low profile in the industrial automation field.

MODERNIZING MEXICO'S MANUFACTURING INDUSTRY

Advanced manufacturing technologies (AMTs) are computer-controlled or microelectronics-

based products and systems used in the design, scheduling, production, storage and distribution of manufactured products. They include "hard" technologies such as computer aided design (CAD), numerically controlled machine tools (DNC) and robotics as well as "soft" technologies such as concurrent engineering and "just-in-time" (JIT) production. In Mexico, these technologies are referred to as "industrial automation" and they are in growing demand.

The Mexican manufacturing sector developed in a highly-protected environment. The result was an industrial structure characterized by small family-controlled firms, combined with a group of much larger state-owned factories. Both types of producer were focused on the domestic market and were highly inefficient.

Beginning in the late 1980s, the government began to reverse the industrial policies that created this structure. It liberalized trade, deregulated the economy and privatized government enterprises. It rescinded the "decrees" that formerly prevented the importation of most computer products. The result has been rapid and sweeping industrial re-organization.

SUMMARY REPORT

In addition to this market summary, the Department of Foreign Affairs and International Trade (DFAIT) has prepared a market profile entitled **Opportunities in Mexico: Industrial Automation**. This market information on the Mexican Industrial Automation Market has been produced and published by Prospectus Inc. under contract with DFAIT, along with other market profiles and summaries on business opportunities in Mexico. It is available from:

InfoCentre

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Department of Foreign Affairs and International Trade / Ministère des Affaires étrangères et du Commerce international

This trend has been inhibited to some extent by a shortage of capital, especially since the abrupt devaluation of the peso in December 1994. On the other hand, the devaluation has had the effect of dramatically stimulating Mexican export demand. This means that Mexican manufacturers need to modernize to meet export standards, but must do so at minimum capital cost. This is creating a demand for technologies that can be adapted to existing equipment, with relatively fast results.

Notwithstanding the economic crisis and capital shortage, the Mexican industrial automation market provides good opportunities for Canadian companies, particularly those that specialize in systems integration. The strongest need is for technologies that can increase productivity while taking maximum advantage of existing facilities. Opportunities for more advanced, fully-integrated systems exist, but are likely to develop fully only in the longer term.

THE INDUSTRIAL AUTOMATION MARKET

There are no official statistics to demonstrate either the size of the Mexican industrial automation market or the degree of import penetration. Computer and related equipment is not identified by its intended use in the international trade statistics. Moreover, the very large service component involved in industrial automation is excluded from the trade data.

Informal estimates by knowledgeable observers place annual imports of industrial automation equipment and software at more than US \$400 million annually. One expert assessed the total industrial automation market, including services, at US \$700 million for 1994, and projected a drop to about US \$450 million in 1995. Annual growth was predicted to be in the 15 to 20 percent range beginning in 1996.

Estimated Industrial Automation Market Size, 1994

Component	US \$ millions
Computer software	40
Professional services	150
Support	80
Numerical control hardware	430
Total	700

Note: hardware is defined as including the numerical control component of machine tools, but not the machine itself.

There are no domestic producers of advanced automation equipment in Mexico and only a few computer software developers. On the other hand, many types of services are available from domestic companies. Locally-available services include training and support as well as systems integration. Most industrial automation equipment suppliers have Mexican subsidiaries and can provide support services through a combination of local and imported resources.

The bulk of automation technology used in Mexico is imported from the United States or Germany. According to one estimate, those countries each have a 40 percent market share. France, Spain, Holland and Austria are also significant competitors. Japan is a major supplier of specialized robotics technology.

Several Canadian software products are available in Mexico, including those from Speedware and Cognos. Specific Canadian products that were mentioned in interviews were MOOPI, MAXIMA and DESCARTES. On the other hand, several industry participants said they were unaware of any Canadian products.

Prior to the devaluation of the peso in December, 1994, market growth for 1995 had been forecast at about 25 percent in real terms. However, now the market is expected to contract in 1995, even though

automation technologies have not been as hard hit by the crisis as some other products.

Most experts believe that the market will have to recover soon because the solutions are needed for survival. They are predicting a return to growth rates in the range of 15 to 20 percent per year beginning in 1996. Services offer the best prospects for increased import penetration, because the Mexican industrial automation industry does not have enough well-trained professionals who can use the latest technologies to develop creative solutions.

CUSTOMERS

Customers for industrial automation products are found throughout the manufacturing sector, as well as in electricity generation and petrochemicals. The best prospects are industries with a heavy reliance on exports as well as those which involve intense domestic competition.

AUTOMOTIVE INDUSTRY

Almost all of Mexico's automobile manufacturing is conducted by five companies: The "Big Three" of the United States, Volkswagen and Nissan. For the most part, these companies manage their sourcing on a global basis. The automotive parts industry is a more likely prospect for most Canadian suppliers. This industry is made of medium- to large-sized firms that supply the major original equipment manufacturers (OEMs).

ELECTRICITY GENERATION AND DISTRIBUTION

The *Comisión Federal de Electricidad (CFE)*, Federal Electricity Commission, uses industrial automation products for controlling maintenance, parts distribution, vehicles and warehouse inventories. The company has also developed a national program for managing electrical service contracts, electricity

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ills, cuts and reconnections. Several major new generating facilities are planned over the next few years.

METAL PRODUCTS

The metalworking industry has been contracting out since 1992 as a result of domestic recession and an inability to meet international quality standards. Many products are still made with conventional machine tools, resulting in unacceptable variations in quality. Revitalization depends heavily on the industry's ability to take advantage of export opportunities stemming from the market changes due to the lower peso.

PETROCHEMICALS

Petróleos Mexicanos (PEMEX) is the national oil company. The government recently passed legislation to privatize *PEMEX's* petrochemical operations. Some of these plants use out-of-date technologies, and therefore the newly-privatized enterprises will be under intense pressure to modernize, especially since they will no longer enjoy guaranteed markets and prices.

PLASTICS

Computer aided design (CAD) and engineering technologies have begun to gain wide acceptance in the plastics industry. Imports of plastics machinery increased by more than 250 percent between 1990 and 1994. Nonetheless, only the largest firms have adopted these technologies. Per capita consumption of plastics is only one-quarter of the level in the United States, so sustained growth is predicted.

PROCESSED FOODS AND BEVERAGES

The beverage industry is an exception to the general finding that computer integrated manufacturing (CIM) has not yet been adopted by Mexican companies. For example, *Fomento Económico Mexicano (FEMSA)*, of which Canada's John Labatt owns 22 percent, has implemented a highly-integrated

automation program. It incorporates planning and forecasting, material resource planning (MRP), quality control and process automation as well as robot-operated storage. Likewise, packaged food producers are beginning to see automated packaging, warehousing and distribution systems as competitive tools.

HOME APPLIANCES

The home appliances industry is a good prospect for automation products. It is about 70 percent foreign-owned and is, therefore, relatively sophisticated. The industry is a major exporter, with shipments going to some 30 countries, and thus it must meet international standards. In addition, the government has recently imposed new product standards based on the norms set by the U.S. Department of Energy. As a result, many manufacturers will have to modernize so as to comply.

COMPETITION

Most of the major international manufacturers of computers and industrial automation equipment are active in Mexico, and the largest of them have Mexican subsidiaries. The biggest computer software producers have local offices, but many companies distribute their products through partnerships with hardware providers or local consulting companies. For example, IBM, Digital Equipment Corporation and several other major computer companies distribute software created by other foreign companies.

Experts involved in the industrial automation industry say that except for ability to pay, access to the latest technology is not a limitation for Mexican industry. However, they invariably comment that the nation lacks people who are skilled and creative enough to integrate the new technologies and develop effective solutions. Systems integration services are presently provided

both by university research centres and private consulting firms.

UNIVERSITY RESEARCH CENTRES

University research centres have played a major role in developing advanced technology applications in Mexican manufacturing. They are both users and developers of advanced technologies and have access to a wide range of equipment and software as well as trained personnel. They are heavily subsidized, which means that they can be very cost-effective in their offerings to the private sector.

National Autonomous University of Mexico

The *Universidad Nacional Autónoma de México (UNAM)*, National Autonomous University of Mexico, is home to the Centre for Technological Innovation (CIT). This is a technological development institution which channels industrial projects to the appropriate departments or faculty within *UNAM*.

UNAM concentrates exclusively on design. Its product is a prototype, which must be manufactured elsewhere if additional units are required. Projects are headed by a project manager, a teacher, a researcher or laboratory staff, and staffed by students.

Technological Institute of Superior Studies of Monterrey

The *Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM)*, Technological Institute of Superior Studies of Monterrey, provides technology consulting services to Mexican companies through the Centre of Integrated Manufacturing Systems. This centre is entirely devoted to solving production automation problems. Its main areas of specialization include design of manufactured products, flexible automation, industrial materials, production engineering and manufacturing systems administration.

National Polytechnic Institute

The *Instituto Politécnico Nacional (IPN)*, National Polytechnic Institute, is relatively specialized. It offers industrial consulting services and its expertise includes laser-beam technology. In addition, the IPN's Centre for Research and Advanced Studies is developing robot prototypes.

SYSTEMS INTEGRATION CONSULTANTS

According to interviews with industry participants, there are anywhere from 15 to 20 firms in Mexico that provide systems integration services for industrial automation applications. The staff are mostly Mexican, although some consultants are brought in from abroad for specific needs or projects. Many of them have foreign partners.

Most of these firms provide automation hardware and software as well as services. Some firms concentrate on individual industries, but specialization is more typically defined by discipline or type of solution offered. Specialization, however, has become more difficult since the 1994 devaluation of the peso. Even where a firm is very strong in a particular industry or discipline, it will be forced to look for new niches in order to survive in the present environment.

Large-scale integrated systems based on the computer integrated manufacturing (CIM) model can be developed by only a handful of computer hardware suppliers. They include IBM, Hewlett Packard, EDS and Digital Equipment Corporation. Some experts commented, however, that none of these companies is providing truly integrated systems that go all the way from production to manufacturing resource planning.

PRODUCT TRENDS AND OPPORTUNITIES

The market for industrial automation has grown rapidly over the past few years, as Mexican companies struggle to modernize and maintain their competitive positions. Traditionally, low labour costs and protected markets led to a labour-intensive approach to design and production control. Recently, however, the influx of foreign competition, combined with the need to export, have added product quality, flexibility and consistency to increased efficiency as reasons for automating. The high cost of capital is driving efforts to minimize inventory and streamline distribution.

For all of these reasons, industry experts predict that the market will continue to grow at a healthy rate, even though the economic crisis has cut the rate of expansion.

The devaluation of the peso in 1994 dramatically increased the cost of capital, which was scarce even before the crisis. This has forced many companies to look for quick solutions. Normally, the automation of a plant is a long-term investment. But, in today's economic environment companies are worried about survival, so they have much shorter planning horizons.

In many cases advanced automation systems are implemented at the request of a manufacturer's customers. Ford, for example, requires suppliers to have computerized design systems because they allow the electronic communication of designs. Advanced systems are also necessary for just-in-time (JIT) delivery, which is increasingly being demanded by customers. It is now almost impossible to be a supplier to the large multinational manufacturers without the new computer aided design/computer assisted manufacturing (CAD/CAM) technologies.

All of the experts interviewed for this study believed that the industrial automation market will continue to be dominated by imports. There are a few local companies that provide specific solutions for small companies, but there are no local firms with the resources to provide integrated solutions to the large firms. Some observers believe that import penetration will rise as foreign service providers, such as systems integrators and trainers, begin entering the Mexican market.

BEST SALES PROSPECTS

Business leaders in the Mexican industrial automation sector were asked which equipment and services they considered to be the best prospects over the medium term. In general, they agreed that a trend towards computer integrated manufacturing (CIM) is only in its infancy in most industries. Experts say that there will be a gradual shift towards fully-integrated systems. But in the short run, they agree that smaller-scale projects with fast results will dominate the market. The specific products mentioned include the following:

Automation Hardware

- The full range of equipment control products includes presence sensors, PLC's, starters, drives, intelligent sensors and interfaces. There is particular demand for equipment that can be adapted to existing production machinery.

Computer Hardware

- UNIX-based client-servers. These are now replacing larger computers as the standard for higher-end systems.
- Communications network products.

Design/Engineering Software

- Products that can be run on high-end personal computers rather than workstations. The majority of companies have access to PCs but cannot afford workstations. Solutions in the US \$6,000 range will have the greatest potential.

- Computer aided design (CAD) software, especially products that build on an AutoCad base. For production, most companies start with CAD and then move on to computer aided engineering (CAE) and computer assisted manufacturing (CAM) applications. Currently, AutoCad dominates the market for entry-level systems.

Manufacturing Software

- Material resource planning (MRP) solutions, especially SAP and related products. The new, user-friendly versions are in particular demand.
- Products at level II of the computer integrated manufacturing (CIM) model.

Distribution Applications

- Systems for managing distribution from manufacturer to end user.
- Electronic data interchange (EDI) products.
- Inventory management systems.
- Highly-replicable integrating solutions that can be applied easily to separate units in the production chain.

Consulting

- General technical services, including training.
- Systems integration services.

MARKET ENTRY STRATEGIES

There are several Canadian software tools available in Mexico. Although they are not widely known in Mexico, these products enjoy a favourable reputation. Mexican observers believe that Canada's reputation for advanced technology has not been exploited by Canadian producers.

Interestingly, while some of the experts interviewed for this study were unaware of any Canadian products, they still had a very favourable impression of Canadian technology. Many Mexican students attend Canadian universities and

learn of Canadian-developed technologies. They carry back a favourable impression, but Canadian products have not generally been aggressively presented in the Mexican market.

Canadian suppliers who have made sales visits to Mexico have also left behind a generally good impression. The prevailing opinion is that Canadian suppliers are interested in Mexico and are more culturally compatible than most suppliers from the United States.

Industrial automation experts in Mexico believe that Canadian products would be well-received if they were more persistently promoted. It was pointed out, however, that for Canadian companies to compete with the worldwide corporations that presently serve the Mexican market, they will have to concentrate on market niches.

University research centres play a major role in introducing new technologies in Mexico and offer promotional opportunities for Canadian companies. Mexican industrialists often turn to the universities to find solutions to production problems. Industrial automation providers from the U.S., Japan, Germany, and other countries compete for the opportunity to test or demonstrate their equipment at these labs. Distributing software to universities at reduced prices is a common way of introducing new products.

Automation solution developers and systems integrators in Mexico may be interested in representing new products. The more advanced companies already have technological alliances, but small- to medium-sized companies may still be interested in partnerships with Canadian suppliers.

To introduce their products, Canadian suppliers might also approach Mexicans studying in related fields at Canadian universities. Many Mexicans attend

university in Canada, and this is an untapped, if long term, approach.

Participation in trade shows is an inexpensive means of making contacts and introducing products to the Mexican market. However, several experts expressed the view that they do not find these shows very useful, because industrial automation products tend to be very specialized. Most agreed that the best opportunities are at industrial shows directed to industries in which the exporter has particular expertise.

THE REGULATORY ENVIRONMENT

There are no regulations that would interfere with the importation of any Canadian industrial automation product into Mexico. However, products must meet relevant labelling and quality certification standards.

A decree of March 7, 1994, provides a list of products which are subject to *Normas Oficiales Mexicanas (NOMs)*, Mexican Official Standards. This list, however, is subject to frequent changes. Technically, the *NOMs* are binding on the Mexican importer rather than the Canadian exporter. The assistance of the exporter will be necessary so as to obtain the necessary certificate of compliance, but the importer should be asked to provide details of the latest regulations.

The North American Free Trade Agreement (NAFTA) provides that testing may be done at laboratories in any of the three countries. Mexico has four years from January 1, 1994 to comply. Meanwhile, products must be tested in Mexico and they must comply with the applicable *NOM*. Only then will they be granted the certificate of compliance which must accompany the goods when they are imported.

KEY CONTACTS

CANADA

Department of Foreign Affairs and International Trade (DFAIT) is the Canadian federal government department most directly responsible for trade development. The **InfoCentre** is the first contact point for advice on how to start exporting. It provides information on export-related programs and services; helps find fast answers to export problems; acts as the entry point to DFAIT's trade information network; and can provide companies with copies of specialized export publications.

InfoCentre

Tel.: 1-800-267-8376 or
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Department of Industry (DI)
Advanced Manufacturing
Technologies Directorate
235 Queen Street
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Tel.: (613) 954-3249
Fax: (613) 941-2463

Commercial Division of the Embassy of Canada in Mexico City promotes trade with Mexico. There are several trade commissioners at the Embassy, and there is a satellite office in Monterrey. Trade commissioners can provide a range of services including introducing Canadian companies to potential customers in Mexico; advising on marketing channels; assisting those wishing to participate in trade fairs; helping identify suitable Mexican firms to act as agents; and compiling credit and business information on potential foreign customers.

Note: to telephone Mexico City, dial: 011-52-5 before the number shown below. For contacts in other cities in Mexico, consult the international

code listing at the front of your local telephone directory for the appropriate regional codes, or contact the international operator.

Commercial Division
The Embassy of Canada in Mexico
Schiller No. 529
Col. Polanco
Apartado Postal 105-05
11560 México, D.F.
México
Tel.: 724-7900
Fax: 724-7982

Canadian Business Centre
Centro Canadiense de Negocios
Av. Ejército Nacional No. 926
Col. Polanco
11540 México, D.F.
México
Tel.: 580-1176
Fax: 580-4494

Canadian Consulate
Edificio Kalos, Piso C-1
Local 108-A
Zaragoza y Constitución
64000 Monterrey, Nuevo León
México
Tel.: 344 3200
Fax: 344-3048

International Trade Centres have been established across the country as a convenient point of contact to support the exporting efforts of Canadian firms. Co-located with the regional offices of the Department of Industry (DI), the centres operate under the guidance of DFAIT and all have resident trade commissioners. They help companies determine whether or not they are ready to export; assist firms with marketing research and market planning; provide access to government programs designed to promote exports; and arrange for assistance from the Trade Development Division in Ottawa and trade officers abroad. Contact the International Trade Centre nearest you.

World Information Network for Exports (WIN Exports) is a computer-based information system designed by DFAIT to help Canada's trade development officers abroad

match foreign needs to the capabilities, experience and interests of more than 30,000 Canadian exporters. To register on WIN Exports, call: (613) 996-5701.

Market Intelligence Service provides Canadian businesses with detailed market information on a product-specific basis. The service assists Canadian companies in the exploitation of domestic, export, technology transfer, and new manufacturing investment opportunities. The intelligence is used by Canadian businesses in decisions regarding manufacturing, product development, marketing, and market expansion. The information includes values; volume and unit price of imports; characteristics of specific imports (e.g. material, grade, price range, etc.); names of importers, major countries of export; identification of foreign exporters to Canada; Canadian production; Canadian exports; and American imports. Two-thirds of the clientele for this service are small businesses. Call: (613) 954-4970.

Canadian International Development Agency (CIDA) is an important possible source of financing for Canadian ventures in Mexico. A special fund is available through the CIDA under the Industrial Cooperation Program or CIDA/INC. CIDA's Industrial Cooperation Program provides financial contributions to stimulate Canadian private-sector involvement in developing countries by supporting long-term business relationships such as joint ventures and licensing arrangements. INC supports the development of linkages with the private sector in Mexico by encouraging Canadian enterprises to share their skills and experiences with partners in Mexico and other countries. A series of INC mechanisms help enterprises to establish mutually beneficial collaborative arrangements for the transfer of technology and the creation of employment in Mexico.

Industrial Cooperation Division
Canadian International Development
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200, Promenade du Portage
Hull, PQ K1A 0G4
Tel.: (819) 997-7905/7906
Fax: (819) 953-5024

Export Development Corporation

(EDC) is a unique financial institution that helps Canadian businesses to compete internationally. EDC facilitates export trade and foreign investment by providing risk management services, including insurance and financing, to Canadian companies and their global customers.

EDC's programs fall into four major categories:

- export credit insurance, covering short- and medium-sized credits;
- performance-related guarantees and insurance, providing coverage for exporters and financial institutions against calls on various performance bonds and obligations normally issued either by banks or surety companies;
- foreign investment insurance, providing political risk protection for new Canadian investments abroad; and
- export financing, providing medium- and long-term export financing to foreign buyers of Canadian goods and services.

Ottawa (Head Office):
151 O'Connor Street
Ottawa, ON K1A 1K3
Tel: (613) 598-2500
Fax: (613) 237-2690

International Financing

Institutions, including the World Bank and the Inter-American Development Bank, provide funds to Mexico for a wide variety of specific projects. These banks can provide details of upcoming projects and identify the Mexican executing agencies.

Embassy of Mexico, Mexican trade commissioners in Canada, and Mexican consulates can provide assistance and guidance to Canadian

companies in need of information about doing business in Mexico.

Embassy of Mexico
45 O'Connor Street
Suite 1500
Ottawa, ON K1P 1A4
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Fax: (613) 235-9123

SPONSORING ORGANIZATIONS

Baker & McKenzie is one of the largest international law firms with offices in 35 countries. They presently have four offices in Mexico, in the cities of Juárez, Mexico City, Monterrey and Tijuana. In addition to providing legal advice, the firm's offices in Canada and Mexico work to assist Canadian companies to find the right partner to enable them to establish or expand their activities in Mexico.

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**Machinery and Equipment
Manufacturers Association of
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**The Canadian Council for the
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Tel.: (416) 367-4313
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Canadian Exporters' Association
99 Bank Street
Suite 250
Ottawa, ON K1P 6B9
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Fax: (613) 563-9218

**Canadian Manufacturers'
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**The Canadian Chamber of
Commerce**
55 Metcalfe Street
Suite 1160
Ottawa, ON K1P 6N4
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**Forum for International Trade and
Training Inc. (FITT Inc.)**
155 Queen Street
Suite 608
Ottawa, ON K1P 6L1
Tel.: (613) 230-3553
Fax: (613) 230-6808

Language Information Centre
240 Sparks Street RPO
Box 55011
Ottawa, ON K1P 1A1
Tel.: (613) 523-3510

Open Bidding Service
P.O. Box 22011
Ottawa, ON K1V 0W2
Tel.: 1-800-361-4637 or (613) 737-3374

Canadian Standards Association
178 Rexdale Blvd.
Rexdale, ON M9W 1R3
Tel: (416) 747-4000
Fax: (416) 747-4149

Standards Council of Canada
45 O'Connor Street
Suite 1200
Ottawa, ON K1P 6N7
Tel.: (613) 238-3222
Fax: (613) 995-4564

KEY CONTACTS MEXICO

MEXICAN GOVERNMENT

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Secretaría de Comercio y Fomento Industrial (SECOFI)

Subsecretaría de Comercio Exterior

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Secretariat of Commerce and Industrial Development

Bureau of Standards

Secretaría de Comercio y Fomento Industrial (SECOFI)

Dirección General de Normas

Av. Puente de Tecamachalco No. 6

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53950 Tecamachalco, Estado de

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Tel.: 729-9300

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Federal Electricity Commission

Comisión Federal de Electricidad (CFE)

Río Ródano No. 14

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National Commission for Energy Saving

Comisión Nacional para el Ahorro de Energía (CONAE)

Francisco Márquez No. 160, Piso 1

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National Oil Company

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National Association of the

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Asociación Nacional de la Industria

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03100 México, D.F.

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Tel.: 559-7833/2338

Fax: 559-5589/1979

Mexican Association of Engineers

in Electric and Electronic

Communications

Asociación Mexicana de Ingenieros

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Fax: 512-5300

National Association of the

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