Aerospace

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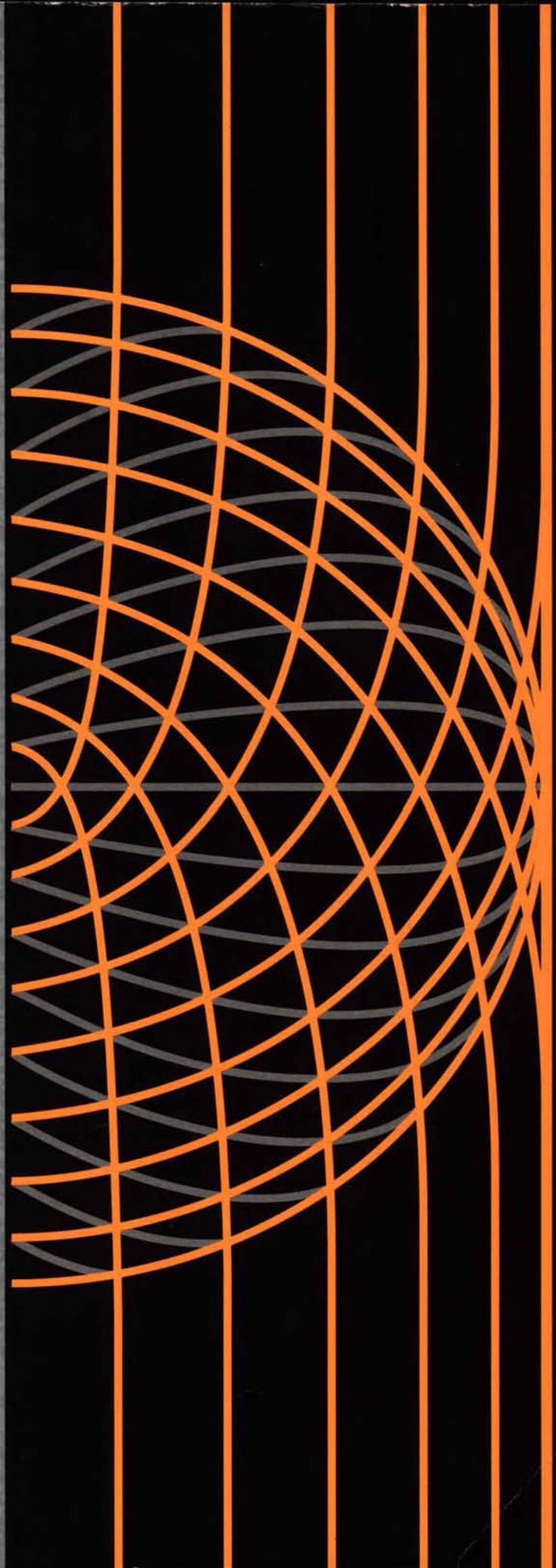
INDUSTRY PROFILE



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Northwest Territories

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10th Floor
P.O. Bag 6100
YELLOWKNIFE
Northwest Territories
X1A 2R3
Tel.: (403) 920-8568
Fax: (403) 873-6228

Headquarters

C.D. Howe Building
1st Floor East, 235 Queen Street
OTTAWA, Ontario
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Tel.: (613) 952-ISTC
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Canada

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I N D U S T R Y P R O F I L E

1990–1991

AEROSPACE

FOREWORD

In a rapidly changing global trade environment, the international competitiveness of Canadian industry is the key to growth and prosperity. Promoting improved performance by Canadian firms in the global marketplace is a central element of the mandates of Industry, Science and Technology Canada and International Trade Canada. This Industry Profile is one of a series of papers in which Industry, Science and Technology Canada assesses, in a summary form, the current competitiveness of Canada's industrial sectors, taking into account technological, human resource and other critical factors. Industry, Science and Technology Canada and International Trade Canada assess the most recent changes in access to markets, including the implications of the Canada-U.S. Free Trade Agreement. Industry participants were consulted in the preparation of the profiles.

Ensuring that Canada remains prosperous over the next decade and into the next century is a challenge that affects us all. These profiles are intended to be informative and to serve as a basis for discussion of industrial prospects, strategic directions and the need for new approaches. This 1990–1991 series represents an updating and revision of the series published in 1988–1989. The Government will continue to update the series on a regular basis.

Michael H. Wilson
Minister of Industry, Science and Technology
and Minister for International Trade

Structure and Performance

Structure

The Canadian aerospace industry offers specialized capabilities for research, development, manufacture, worldwide marketing and support of complete aircraft, propulsion-related systems and components, as well as space[1] equipment, aircraft navigational and defence electronics[1] and defence systems. The industry's markets include transport and general aviation aircraft manufacturers, regional airlines, business aircraft users, major civil and defence aerospace contractors and governments. In 1988, about 70 percent of sales were to civilian markets, while the remainder were defence-related. Characteristically, the industry is oriented towards niche markets and is heavily reliant on access to export markets. Consequently, it concentrates selectively on specific products, processes and market segments that combine its technical expertise with good economic potential.

The present Canadian aerospace industry is technology-intensive and is a leading exporter of manufactured advanced technology equipment; as such, it is a major contributor to Canada's trade balance. The United States is the principal export market for the industry's products. The relatively limited demand in the Canadian market for aerospace goods and services during the 1950s forced the industry to undergo a major restructuring from an inward-looking supplier of defence products into a strong export-oriented industry. The principal factors allowing it to do this include: the industry's proximity to the large U.S. market, the favourable trade arrangements between Canada and the United States for aerospace and defence goods as well as the ownership linkages that exist between major U.S. aerospace firms and Canadian counterparts.

[1]This profile should be read in conjunction with two companion profiles entitled *Space* and *Defence Electronics*. The trade and employment statistics in the *Aerospace* profile include those for the space and defence electronics subsectors.

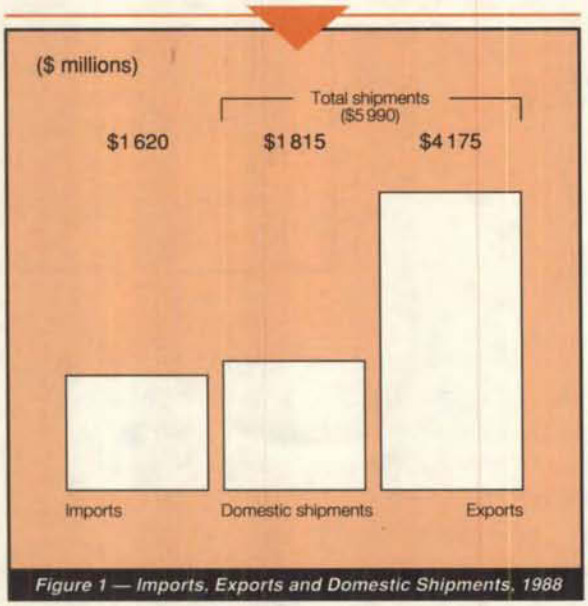

Figure 1 — Imports, Exports and Domestic Shipments, 1988

At the same time, the industry focused on the civilian markets largely to compensate for the small Canadian defence market and the protectionist practices embedded in the major defence acquisition programs of foreign governments.

In 1988, the industry employed 63 650 people and had sales worth $6 billion. Domestic sales during that period were close to $2 billion, of which $1.16 billion were Canadian government purchases, mainly made through the Department of National Defence. Canadian government domestic procurement of aerospace goods and services generally accounts for 20 percent of total industry output. Exports in 1988 totalled $4 billion, of which 70 percent was destined for the U.S. market (Figure 1). Imported content of the industry's shipments was approximately 30 percent, or $1.8 billion.

The companies that make up the Canadian aerospace manufacturing industry can be divided into a three-tiered system. The first tier accounts for some 45 percent of the industry's annual output and consists of the largest companies (over 2 000 employees). These companies have integrated design, development, manufacture, marketing and product support facilities for either complete aircraft, aero-engines, space systems or avionics systems, including defence electronics. The principal first-tier companies are Pratt & Whitney; Boeing Aircraft Canada, de Havilland Division; Canadair; Spar; and the recent additions of Bell Helicopter Canada and MBB Helicopter Canada.

Pratt & Whitney is the only manufacturer of complete aero-engines in Canada, currently producing the PW100 series of turboprop engines for commuter/regional transport aircraft, the PW200 turboshaft engine for helicopter applications, the PW300 turbofan engine for business jet and military trainer aircraft, and a series of auxiliary power units for large transport aircraft. Boeing Aircraft Canada, de Havilland Division manufactures the 30- to 50-passenger Dash 8 commuter/regional turboprop transport aircraft. Canadair manufactures the Challenger series of corporate jet aircraft and is currently developing a regional jet transport aircraft. Canadair's secondary products and services include a series of unmanned aerial reconnaissance vehicles such as the CL289 and subcontract manufacturing services for large civil transport and military aircraft manufacturers, such as Boeing and Aérospatiale. Spar is the industry's prime manufacturer of communications satellite and space systems, including the Canadarm remote manipulator system used on the U.S. space shuttle. Bell and MBB are the two Canadian helicopter manufacturers. Bell has a product mandate for all its parent's civil helicopter product lines, and MBB has a mandate for the higher-powered versions of its parent's model BO105 helicopter series.

The second tier of the Canadian aerospace industry is composed of about 40 medium-sized companies, which collectively account for about 45 percent of the industry's output. These companies are primarily suppliers of proprietary products and build-to-print components, most of which are sold to foreign aerospace principal manufacturers. This tier also includes companies that provide repair and overhaul services.

The main products of the second-tier companies include aircraft navigational and defence electronic systems, aircraft simulators, anti-aircraft defence systems and major sub-assemblies, such as wings, fuselage components, flight controls and landing gears for all types of aircraft. Major second-tier firms include Garrett Canada, whose primary product is electronic controls for aircraft environmental control systems; Rolls-Royce Canada, Standard Aero and Orenda Division of Hawker-Siddeley Canada, three of Canada's aero-engine repair and overhaul companies; CAE Electronics, whose primary product is aircraft simulators; and Bristol Aerospace, the industry's only missile propulsion system manufacturer. Also included in this tier are McDonnell Douglas Canada, Fleet Aerospace, Canadian Aircraft Products and Amherst Aerospace, the industry's major airframe structural component manufacturers. Oerlikon Aerospace is Canada's only air defence weapon systems company.

The third tier is composed of more than 100 companies, mostly small businesses with annual aerospace output worth less than $20 million. Collectively, these companies account for the remaining 10 percent of the industry's total output. With the exception of a small number of firms which have an integrated capability to design, develop, manufacture,

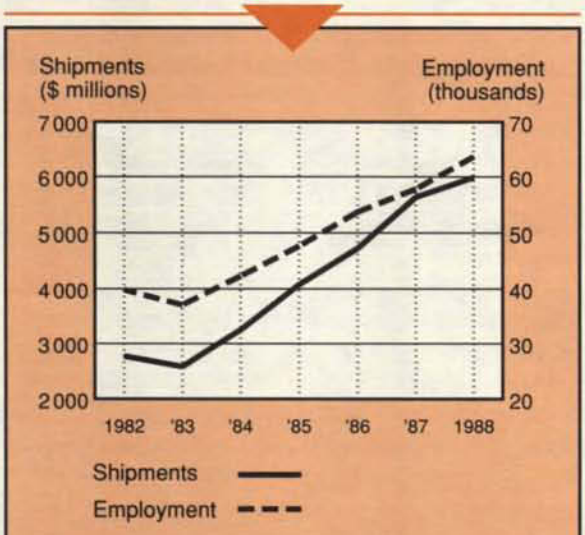

Figure 2 — Total Shipments and Employment

market and support proprietary products, the third-tier companies are predominantly suppliers of subcontract products and services. Services they supply include precision machining, metal coating, heat treating, fabrication and casting. Most of their work is done in support of the first- and second-tier companies.

The largest firms within the first- and second-tiers are mainly foreign owned. Major exceptions are Spar, CAE, Fleet and Canadair. Most third-tier companies are Canadian owned.

In spite of its high degree of rationalization and its wide range of specialized products, services and skills, the three-tiered hierarchy of the Canadian industry, unlike the industries of the United States and other world-power nations, emerged from the 1950s with only a limited degree of vertical integration. Consequently, first- and second-tier companies sell mainly to external rather than Canadian customers. For instance, in 1988, the Canadian aerospace intra-industry sales accounted for only 5 percent of the industry's total sales.

The industry is highly concentrated in terms of location as well as ownership. Ontario and Quebec accounted for 89 percent of the total industry value of production in 1988, with the Prairie provinces, mainly Manitoba, accounting for about 7 percent and the remainder divided between British Columbia and the Atlantic provinces. The three largest firms, de Havilland, Canadair and Pratt & Whitney, accounted for 37 percent of the value of production in Canada.

Although each of the larger firms within the Canadian aerospace industry maintains and operates its own development and test facilities, the industry also uses government-operated research facilities. These include the National Research Council's wind tunnel and structural test laboratories, and the research establishments of the Department of National Defence and the Department of Communications. In addition, some of the foreign-owned companies have access to external research and development facilities operated by their parent companies.

Performance

Canada typically produces about 7 percent of the Western world's freely traded aerospace requirements, and this share has essentially remained constant since the 1960s. In terms of sales growth, the decades of the 1960s and the 1970s were relatively lean years for the Canadian aerospace industry. In the 1980s, however, the industry experienced a healthy average annual real growth rate of 10 percent, most of which occurred after the 1981–1982 recession (Figure 2).

During the 1980s, the world aerospace sector experienced an increase in U.S. defence spending, rapid growth in the regional and large civil transport aircraft markets, but a significant decline in the helicopter, general aviation and corporate aircraft markets.

Most of the Canadian aerospace industry benefited from these growth markets and also from the industrial benefits associated with Canada's defence acquisitions such as the new fighter aircraft (CF-18) program. Furthermore, the government's divestiture of de Havilland and Canadair, coupled with the market turnaround, assisted in the growth of these two companies during that period. The introduction by Pratt & Whitney of its PW100 series of regional aircraft engines improved its performance by enabling it to become less dependent on the declining general aviation market sector, which had sustained the company during the 1970s.

During the decade ending in 1988, the industry achieved an average annual sales growth of approximately 9 percent in constant terms, compared with zero average growth in the previous decade. The airframe subsector led the industry, with an average growth rate of 13 percent, followed closely by the avionics and the propulsion subsectors with 12 percent and 8 percent average growth rates, respectively. Published comparative data in current dollars for the period 1984 to 1988 indicate that sales in the American and British aerospace sectors grew by 37 percent and 50 percent, respectively, compared with the 84 percent growth achieved by the Canadian aerospace industry. The higher Canadian level is due partly to the progressively enlarged aerospace industrial base (brought about in part by the addition of Bell Helicopter Canada and MBB Helicopter Canada) and partly to the industry's concentration in civil markets, which fared relatively better than the defence markets.

The level of employment in the Canadian aerospace industry achieved an average annual growth rate of 6.8 percent in the 1980s, compared with an average decline of 2.6 percent during the 1970s. Although employment suffered three consecutive years of decline from 1981 to 1983 as a result of the recession, it exhibited rapid growth over the remaining years of the 1980s to achieve the respectable average growth cited above.

In 1988, the average level of employment in the industry grew by 10 percent relative to the 1987 level. Engineering and scientific employment, which accounted for 17 percent of the industry's 1988 employment level, is expected to grow more rapidly than the production component throughout the 1990s. This is because the first-tier principal manufacturers are expected to increase their capabilities for knowledge-intensive activities while seeking low-cost international subcontractors for the lower-technology production activities.

Strengths and Weaknesses

Structural Factors

One major structural characteristic of the aerospace industry is that first- and second-tier firms are predominantly foreign-owned, giving rise to both strengths and weaknesses. On one hand, indigenous research and development (R&D) capabilities may tend to be underdeveloped. On the other hand, subsidiary firms may have world-product mandates for certain products or access to state-of-the-art technology, marketing and management assistance that they would not otherwise have. Moreover, foreign ownership has eased access to foreign markets.

Aerospace is one of the most R&D-intensive industry sectors in the world. The Canadian industry traditionally invests about 10 percent of revenue from total sales in R&D, with Pratt & Whitney leading the industry in R&D investments. Though the level is high relative to other Canadian manufacturing industry sectors, it has always been lower than R&D in the aerospace industry of the United States, France and the United Kingdom. The comparable U.S. figure is 17.5 percent, while the average for member countries of the Organization for Economic Co-operation and Development (OECD) is 16 percent. These nations have large defence requirements that generate the higher level of their industry's R&D activity, whereas Canadian R&D expenditures tend to be driven by international civil market opportunities.

Many third-tier companies are handicapped by their small size. Such companies lack the financial resources or experience necessary to penetrate export markets and to rapidly adopt new manufacturing and process technologies. This handicap, together with the lack of proprietary products and processes within that tier, tend to render some of these companies potentially vulnerable to competition from the low-cost newly industrialized countries (NICs) such as the Republic of Korea and Taiwan. The small companies that do not fall into this category typically have highly specialized knowledge-intensive skills.

New product development by the prime companies in the aerospace sector entails significant costs relative to their net worth and, hence, high risks. Adequate capital to cover front-end risks in product development activities is essential for the industry's survival. However, the civil aerospace industry is generally characterized by narrow profit margins because of extensive price competition. Profitability in military and space programs is easier to achieve because the highly specialized nature of government requirements is satisfied only by custom design and manufacture. Consequently, companies within the industry, except for those having a dominant market position or a significant involvement in ongoing military and space programs, often have difficulty generating adequate internal funds or private capital to finance high-cost product development activities.

Private investors generally view the aerospace manufacturing sector as a relatively unattractive investment opportunity because of the high risk and the relatively lengthy investment/return cycle. Most of the companies within the world's aerospace industry rely on government support in one form or another. As a result, the involvement of national governments in the aerospace industry as owners, financiers and principal customers has been more extensive than in most other industries, largely because of the industry's strategic significance in national defence and its contributions to trade balances, economic growth and regional development. Canadian government support to the Canadian aerospace industry through the Defence Industry Productivity Program, although lower relative to that provided by Italy, France, the United States and the United Kingdom to their respective aerospace industries, has been instrumental in assisting the industry to maintain a high level of new product development activities over the past two decades.

Availability of skilled production labour, experienced technologists and engineers still remains a concern for the Canadian aerospace industry. The industry, to some extent, lacks the infrastructure required to train newly graduated technicians and engineers to replace the aging technical staff. In the past, the industry, particularly first- and second-tier firms, recruited experienced technical staff almost entirely from Europe, especially from the United Kingdom. Most of

these technical staff are approaching retirement and must be replaced. The industry is currently working with various universities and educational institutions, to establish curricula and training programs that are attuned to the industry's needs.

Trade-Related Factors

Tariff barriers do not have any real impact on trade in either commercial or defence aerospace products. Signatories to the General Agreement on Tariffs and Trade (GATT) Agreement on Trade in Civil Aircraft, which include most of the nations with aerospace industries, have formally bound tariffs on commercial products to zero.

However, when major foreign governments invest heavily in national aerospace industries in support of defence policies, they tend to keep defence R&D and procurement spending at home in order to maintain their defence industrial base, secure domestic sources of supply and protect strategic defence technologies by invoking preferences for indigenous products in contracts. Such non-tariff barriers (NTBs) make it difficult for Canadian firms to penetrate foreign markets when they are competing directly with a domestic industry.

Canada has achieved some measure of relief from NTBs with the United States through many reciprocal defence production agreements, including the Defence Production Sharing Arrangement (DPSA). The DPSA allows Canadian companies to compete with U.S. firms in supplying the U.S. armed forces with a wide range of goods and services by setting aside the "Buy America" NTB. This arrangement has opened portions of the U.S. defence market to the Canadian industry since its implementation in 1959.

Some foreign governments have criticized Canada for its pursuit of industrial and regional benefits (IRBs) through procurement policies. Canada regards its IRB policy as an instrument that complies with the terms and conditions of all the multilateral trading arrangements, including the GATT and the Canada-U.S. Free Trade Agreement (FTA).

The FTA contains few elements that will affect the Canadian aerospace industry. The commercial aerospace market is less affected by trade-related barriers than the defence market. The principal barriers are primarily related to government procurement methods. These methods tend to apply to both civil and defence procurements. While the FTA does not call for removal of NTBs such as the small business set-asides, which reserve a portion of contract volumes exclusively for small domestic businesses, it does anticipate further discussions once the ongoing multilateral negotiations of the GATT agreement on government procurement have been completed.

Technological Factors

The ability to develop and incorporate technology into new designs is fundamental to successful competition in the aerospace market. The Canadian industry has a product development capability that is highly regarded in world markets. This reputation has been established over the years as a result of independent product development undertaken by Canadian firms, government-supported R&D, technology transfer, and innovative Canadian engineers and managers. Each of these elements has been and will continue to be critical to industry competitiveness.

Advanced manufacturing technologies are becoming increasingly important. In order to meet the demand for quality, delivery and price, Canadian and foreign aerospace firms are adopting modern manufacturing systems and methods to lower production costs. Canadian first- and second-tier companies, and at least 20 percent of the third-tier firms, have computer-assisted design/computer-assisted manufacturing (CAD/CAM) capability. Flexible manufacturing methods have recently been adopted by some of the companies. The industry is also beginning to adopt techniques such as continuous improvement, just-in-time (JIT) inventory control principles, statistical process control and concurrent engineering. However, led by Japanese firms, foreign competitors are adopting these new best-practice concepts. The Canadian industry is therefore striving to make progress towards improving its competitiveness through increased emphasis on R&D, the adoption of new manufacturing technologies and new management concepts.

Evolving Environment

The Canadian aerospace manufacturing industry faces a number of market constraints, opportunities and threats that will challenge its ability for sustained success in international markets through the 1990s and beyond.

The most significant factors affecting the economic environment are the forecast reductions of defence budgets in Canada, the United States and elsewhere; the booming and fiercely price-competitive civil transport aircraft markets; the improving corporate aircraft and helicopter markets; the potential impact of the economic integration of Europe in 1992; the competitive threats from the fast-growing Southeast Asian aerospace industries together with the globalization of aircraft components production; and the ongoing imperatives of innovation and technology. The environment in which the aerospace industry operates is marked by the dynamics of domestic and foreign government policies on market access,

technology transfer, defence and investments. Such changes will continue to be significant throughout the 1990s. In particular, the symbiotic relationship that exists between national governments and their aerospace industries is expected to continue throughout the 1990s and beyond.

The world defence aerospace markets are forecast to contract as a result of planned defence budget reductions in the United States, Canada and elsewhere. This trend is being driven primarily by the ongoing peace initiatives between the superpowers and by public pressure on Western governments to reduce their deficits. Hence, reduced procurement of new defence equipment suggests that some ongoing programs will experience either stretched-out schedules or outright cancellations. For example, the defence component of Canadian industry sales, which over the past several years averaged 33 percent or typically half that of the American and British industries, is expected to decline in the 1990s as NATO defence budgets decline and civil markets grow. In addition to this, the protectionism Canada faces is expected to increase as countries seek to protect domestic defence firms against foreign competition.

The higher proportion of the civil component of its business base should help insulate the Canadian industry from the impact of a shrinking defence market. Nevertheless, the secondary effects following the entry of previously defence-oriented U.S. firms into the civil market sector may increase the competition facing the Canadian industry, particularly in the U.S. market. On the other hand, increased opportunities in defence equipment repair and overhaul and the attendant spare parts production business may help offset part of the negative impact of a reduction in new equipment acquisition.

In contrast to the defence market, the world demand for large civil transport aircraft is currently booming, with the Pacific Rim forecast to show the greatest air traffic growth through the 1990s. The world demand for air travel, and consequently for commercial transport aircraft, is forecast to grow at an average annual rate of between 5 and 7 percent until the year 2000. However, a world recession, originally forecast to occur in the mid-1990s, appears to have emerged early. Recessionary conditions prevail in Canada and the United States in 1990. These conditions are expected to moderate the demand for commercial transport aircraft. Consequently, the Canadian industry, and particularly some first-tier companies in the regional transport aircraft business, are facing significant cyclical pressures that may result in adjustments and restructuring. The eventual impact, however, will depend on the duration and depth of the current weak conditions.

The planned implementation of airline deregulation in Europe by 1992 is expected to increase the volume of intra-regional traffic, thus adding further impetus to this growing aircraft market. Europe is rapidly moving towards a unified market in 1992. The prospects of this have spawned an increase in the trend of joint ventures, mergers and partnerships within the European Community (EC) as the EC companies seek to strengthen their competitive position. Also, similar alliances between some foreign companies and European companies are being formed as foreign firms seek to establish a presence in what could become the world's largest single market. Some Canadian first-tier companies are actively pursuing similar strategies through acquisitions, joint ownership companies or other forms of business linkages in Europe to ensure a foothold in that market.

Demand for light to medium-sized helicopters is also showing signs of recovery from the decline during the 1981–1982 recession and is expected to grow throughout the 1990s. The helicopter industry is also undergoing restructuring worldwide, as suggested by the recently proposed merger of the helicopter businesses of Messerschmidt-Bolkow Blöhm (MBB) of Germany and Aérospatiale of France.

A number of the second-tier firms in the Canadian aerospace industry are subcontractors for some of the large civil aircraft development programs such as the McDonnell Douglas MD11, Boeing B767, and the Airbus Industries A330/340. Canadair is also developing a new regional transport aircraft, which is providing subcontract work for a number of second- and third-tier companies. The civil aircraft markets are becoming increasingly price-competitive as the already small profit margins are being squeezed further, forcing production costs continuously downward. In particular, firms that do not have proprietary products and/or processes will be the most vulnerable because principal contractors, who are also exposed to severe price competition, will seek lower-cost sources of supply for build-to-print components. Canadian second- and third-tier firms will be especially vulnerable to such low-cost suppliers as the Republic of Korea, Taiwan and Indonesia, whose governments, recognizing the key role that an aerospace industry can play in advancing their economies, have targeted aerospace as a key industrial sector for development assistance. These emerging Southeast Asian countries regularly demand offsets in the form of component manufacture on purchases of civil transport aircraft, thus foreclosing the competitive process on international markets.

The world aerospace industry will remain one of the most R&D-intensive manufacturing sectors. Rapid gains in technological progress, however, appear unlikely as the civil industry sector becomes increasingly mature. Nonetheless, investments in incremental technology development, supported by a sound

infrastructure of basic research together with a technologically competent and flexible work force, will be critical to continued competiveness in the aerospace industry.

The pace of the development, application and adoption of advanced materials in aerospace systems is expected to accelerate throughout the 1990s, particularly as the leaner U.S. defence industry seeks to re-establish technological and competitive leadership in the aerospace and electronics sectors. The development and application of new advanced materials such as light-weight, high-temperature, high-strength alloys, ceramics and composites will continue to respond to market and regulatory requirements for safety, durability, lower operating cost, greater fuel efficiency, passenger comfort and pollution abatement. The time needed to develop new products will become shorter as advanced analytical simulation techniques and concurrent engineering principles are applied.

Increased competitive pressure to adopt Total Quality Management (TQM) techniques can be expected for companies at both the principal manufacturer and subcontractor levels doing business with the U.S. Department of Defense (DOD) and its defence suppliers. This will result from the DOD's insistence on the adoption of TQM from its main suppliers, who in turn will pass the requirement on to their own suppliers. TQM practice is also rapidly being adopted in the civil business sector and will become a factor in competitive positioning.

The FTA is not expected to have an appreciable effect on the first- and second-tier aerospace companies. The third-tier companies, on the other hand, are more likely to experience increased competition. The possibility of some relaxation of U.S. restrictive practices, such as the small business set-asides, should provide increased opportunities for the Canadian third-tier companies.

Competitiveness Assessment

Over the past two decades, investment in R&D, advanced capital equipment and facilities have produced a Canadian aerospace industry that employs modern design and manufacturing techniques and that produces innovative, quality products in all tiers. By design and necessity, the industry does not provide a complete range of aerospace products but is highly competitive in certain specialized market niches. The consistently strong export sales performance of the Canadian aerospace manufacturing industry is a good indication of its competitive strength in international markets.

Companies in the first and second tiers operate within narrow but technology-intensive market niches characterized by high development and learning costs. Over the past three decades these companies have developed specialized product design, development and manufacturing capabilities that give them a competitive advantage in international markets over new entrants.

Canada is a world leader in small aircraft gas turbine engines and has a significant market share in the 30- to 50-passenger turboprop aircraft market. Canada is also gaining market share in the large corporate jet aircraft market sector, which until recently has been dominated by France and the United States.

The first-tier and most second-tier companies are expected to sustain their competitive strengths in the 1990s through continued high levels of R&D activities to maintain technical excellence, through the implementation of continuous process improvement practices to drive down production costs, as well as through the development of strategic alliances to facilitate access into new markets. However, some second- and third-tier firms within the industry, particularly those involved in build-to-print activities, will need to strengthen their competitive positions by accelerating their adoption and adaptation of best-practice production techniques to enhance productivity and to improve product quality, delivery and cost structure in order to remain competitive through the 1990s and beyond.

For further information concerning the subject matter contained in this profile, contact

Aeronautics Branch
Industry, Science and Technology Canada
Attention: Aerospace
235 Queen Street
OTTAWA, Ontario
K1A 0H5
Tel.: (613) 954-3340
Fax: (613) 998-6703

PRINCIPAL STATISTICS[a]

	1973	1982	1983	1984	1985	1986	1987	1988
Establishments	N/A	165	165	180	190	200	210	200
Employment[b]	31 700	39 800	37 100	42 300	47 627	53 678	57 804	63 650
Shipments ($ millions)	662	2 769	2 580	3 253	4 078	4 725	5 631	5 990
Canadian content (%)	N/A	N/A	N/A	77	70	72	72	70
Investment ($ millions)	N/A	413	374	413	586	774	837	817

[a]All figures are ISTC estimates.

[b]Employment statistics include airframe, propulsion, defence electronics and space subsectors.

N/A: not available

TRADE STATISTICS[a]

	1973	1982	1983	1984	1985	1986	1987	1988
Exports ($ millions)	516	2 456	2 048	2 535	2 841	3 447	3 852	4 175
Domestic shipments ($ millions)	146	313	532	718	1 237	1 278	1 779	1 815
Imports[b] ($ millions)	546	1 523	1 814	1 874	1 138	1 328	1 537	1 620
Exports (% of shipments)	78	89	79	78	70	73	68	70

[a]All figures are ISTC estimates.

[b]Imports by sector companies (does not include aircraft, engines and parts directly imported by users, such as DND).

SOURCES OF IMPORTS (% of total value)

	1981	1982	1983	1984	1985	1986
United States	91	91	95	95	94	93
European Community	5	5	5	4		
Asia	3	3	–	–	6	7
Other	–	–	1	1		

DESTINATIONS OF EXPORTS (% of total value)

	1981	1982	1983	1984	1985	1986
United States	76	69	78	76	73	70
European Community	9	9	9	8		
Asia	3	5	4	5	27	30
Other	12	17	9	11		

REGIONAL DISTRIBUTION (average over the period 1987 to 1988)

	Atlantic	Quebec	Ontario	Prairies	British Columbia
Employment (% of total)	1.4	44.9	46.0	6.0	1.7
Shipments (% of total)	1.9	41.5	47.8	7.3	1.5

MAJOR FIRMS

Name	Country of ownership	Location of major plants
Bell Helicopter Canada Ltd.	United States	Mirabel, Quebec
Boeing Aircraft Canada, de Havilland Division	United States	Downsview, Ontario
CAE Electronics Ltd.	Canada	Montreal, Quebec
Canadair Group of Bombardier Inc.	Canada	Dorval, Quebec
Litton Systems Canada Limited	United States	Rexdale, Ontario
MBB Helicopter Canada Limited	Germany	Fort Erie, Ontario
McDonnell Douglas Canada Ltd.	United States	Mississauga, Ontario
Oerlikon Aerospace Inc.	Switzerland	Saint-Jean-sur-Richelieu, Quebec
Pratt & Whitney Canada Inc.	United States	Longueuil, Quebec
Spar Aerospace Limited	Canada	Saint-Anne-de-Bellevue, Quebec Mississauga, Ontario

INDUSTRY ASSOCIATION

Aerospace Industries Association of Canada
Suite 1200, 60 Queen Street
OTTAWA, Ontario
K1P 5Y7
Tel.: (613) 232-4297
Fax: (613) 232-1142

SECTORAL STUDIES AND INITIATIVES

The following publication is available from Industry, Science and Technology Canada (see address on page 7).

Statistical Survey Report on Aerospace and Defence-Related Industries
This survey provides statistical data and aggregate five-year projections of industry sales, investment intentions, employment, cost of sales and other indicators.

Printed on paper containing recycled fibres.