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AEROSPACE AND DEFENCE-RELATED INDUSTRIES

STATISTICAL SURVEY REPORT 1993

Canada

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INTRODUCTION

The 1993 Aerospace and Defence Related Industries Statistical Survey Report marks the 9th annual report published by Industry and Science Canada (ISC) and its predecessor departments since 1984. The compilation and publication of the survey is made possible with the co-operation of participating companies and the ongoing support of the Aerospace Industries Association of Canada (AIAC).

The report is based on questionnaires sent out in November 1992 to 92 companies with sales in excess of \$10 million annually; 72 complete and partial responses have been received. The tables and charts presented in this annual report show a series of economic indicators summarizing the performance of the sector in 1991 and 1992 as well as the forecast outlook for the five year period 1993 to 1997.

Measures have been taken within ISC to compensate for missing data entries in the survey returns through reference to other data sources. Allowance was also made for the small business element, which was not captured completely by the survey.

In recent years the scope of the survey has been widened in order to develop a more comprehensive definition of the defence sector and to gain a better representation of the geographic distribution of the industry as a whole.

As in previous years, companies have been assured that their individual returns will be held in the strictest confidence within ISC and that the data will be employed and released in aggregate form only.

SUMMARY

Gross Sales in the Aerospace and Defence Sector declined 2.5% between 1991 and 1992. The latest decline marked the reversal of an upward trend that had continued for almost a decade. The decline in Gross Sales in 1992 was a considerably larger decline than that forecasted in the 1992 survey (i.e. 1.2%). This clearly indicates that the recession, which became evident in the sector in 1991, is turning out to be deeper than originally anticipated. The forecast also indicates that the recovery from the recession will be more protracted than had been indicated in the 1992 survey. For instance, Gross Sales are anticipated to rise by 0.9% 1993, which is well below the 8.4% rise predicted last year.

The overall weakness in demand for the sector's output in 1992 can best be seen by examining changes in the year-end order backlog. The year-end order backlog fell 10.5% in 1992 following a small decline in 1991. Manufacturers responded to the weak demand by reducing inventories and laying off employees in 1992. Beginning inventories fell more than 12.0% in 1992 while total employment dropped 3.9%.

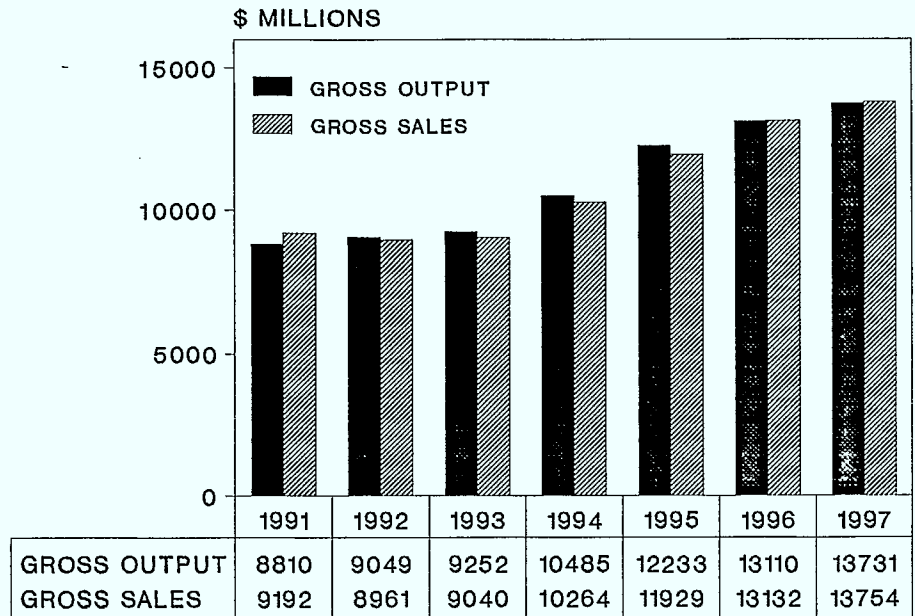
Looking further out, the forecast indicates that a recovery from the current recession in the sector is anticipated to begin in 1993, but it will be 1994 before growth in sales and output begin to gain momentum. An early sign of a recovery is presented by the year-end order backlog indicator which is forecasted to rebound upward in 1993 signalling a recovery in demand for the sector's output. Given the long lead times required to respond to changes in demand, output and sales in the sector are expected to show a lagged response to the improving market conditions. Nonetheless, by 1995, sales are expected to be above pre-recession levels and to continue to show robust gains through the 1997 forecast period.

In preparation for the recovery in demand, companies began to increase investment spending. Total investment which fell in 1991, turned upward in 1992 and is forecasted to continue rising through 1997. Employment, on the other hand, fell in 1992 for the second consecutive year and is forecasted to decline again in 1993 before resuming upward growth in 1994. However, there is clear evidence from the survey that employment changes occurring in the sector are being influenced both by cyclical demand factors and structural adjustments to the size and composition of the workforce.¹ The structural adjustments appear aimed at improving productivity and international competitiveness and are forecast to go forward in parallel increasing expenditures on employee training as firms in the sector increasingly move to implement Total Quality Management programs.

In summary, the survey results reveal that the recession in the Aerospace and Defence Sector as a whole will be deeper and more protracted than forecast last year, with the recovery from the current recessionary trough not gaining much momentum until 1994. Nevertheless, once the cyclical upswing gets underway survey respondents anticipate a strong recovery with sales and output showing robust gains.

INDUSTRY OUTPUT VS SALES 1991 TO 1997

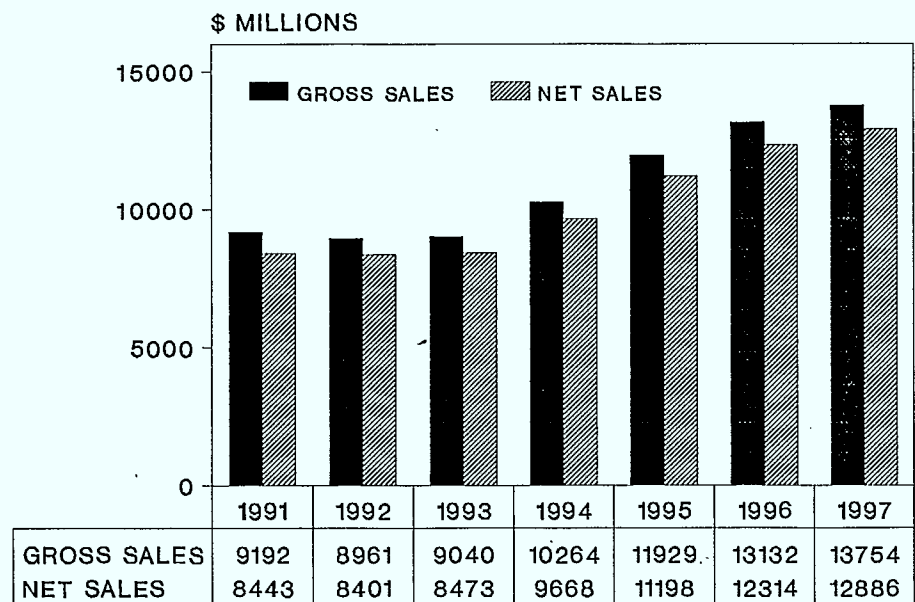
The forecast growth in Gross Sales and Gross Output² provide an indication of survey respondents' expectations regarding the depth and duration of the current economic downturn and ensuing recovery. Gross Output, which declined in 1991, moved up slightly in 1992 but is expected to remain flat until 1994 when it will begin to strengthen noticeably. By 1995 respondents expect Gross Output to return to the longer term trend rates of growth prevailing prior to the recession. Gross Sales are forecast to exhibit much the same pattern. They were expected to bottom out in 1992, begin to recover in 1993, strengthen in 1994 and continue upward throughout the remainder of the forecast period.



NET SALES VS GROSS SALES 1991 to 1997

Gross Sales in the sector fell 2.5% between 1991 and 1992, while Net Sales³ fell 0.5%. The declines marked the first declines in sales in the sector in nearly a decade.

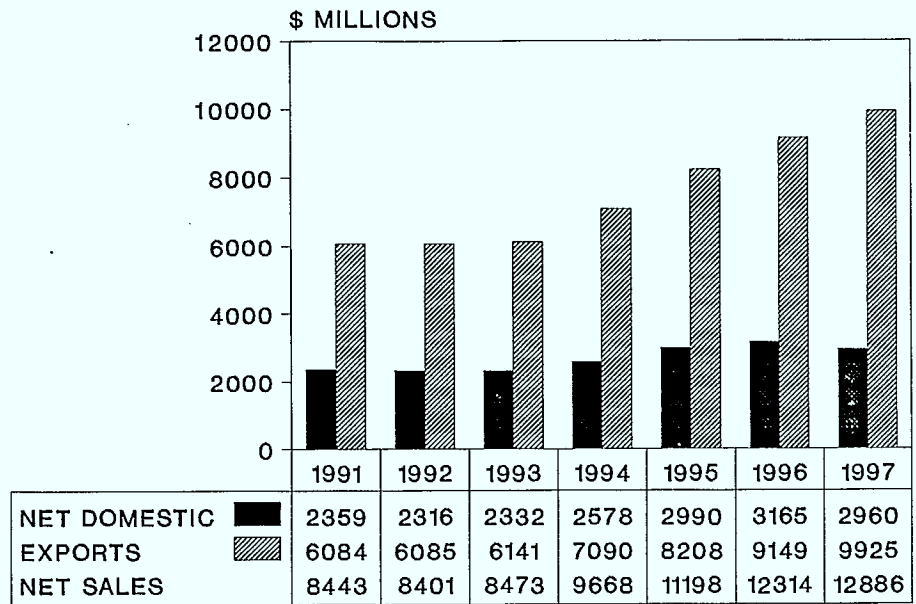
Respondents anticipate Gross and Net Sales to move up in 1993, but the growth will be rather weak until 1994. The strengthening of sales growth in 1994 is expected to confirm that the upswing in business cycle is underway. Once the recovery becomes more firmly established, respondents anticipate a continued upswing that will push sales higher from 1995 through 1997.



CANADIAN VS EXPORT SALES 1991 TO 1997

The survey indicates that Export Sales edged up 0.1% between 1991 and 1992 while Net Domestic Sales³ declined 1.8%. The decline in domestic sales was attributable mainly to weakness in sales to the Canadian government and domestic airlines.

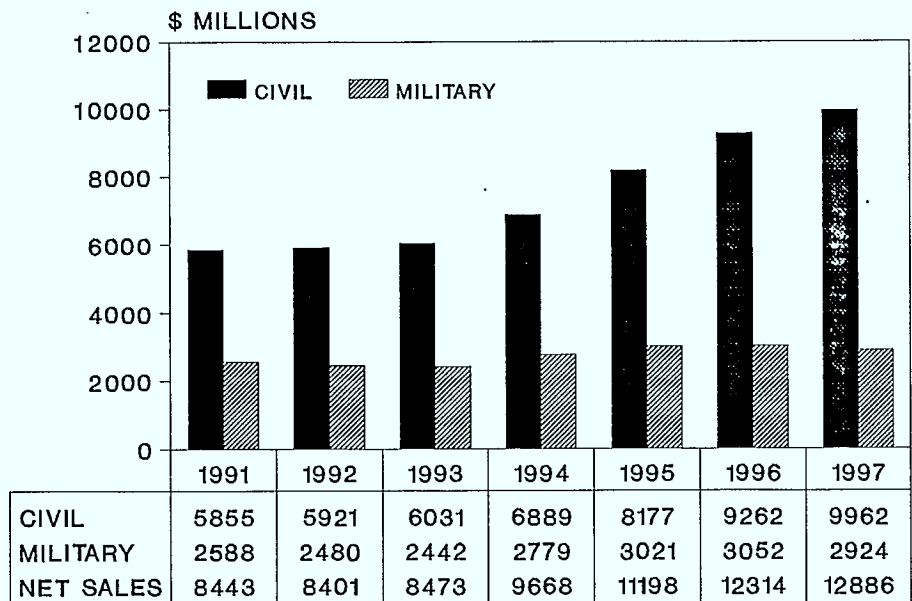
Both Export and Domestic Sales are expected to edge up in 1993, but will begin to show stronger gains in 1994. Export growth will lead the recovery and by 1997 Export Sales will account for 77% of Net Sales compared with 72% in 1992.



CIVIL VS DEFENCE SALES 1991 TO 1997

Following a sharp jump in 1991, (due largely to the addition of major defence contractors to the survey) Military Sales slumped 4.2% in 1992. They are forecast to continue to move downward in 1993 before beginning a recovery in 1994.

In contrast, Civil (largely Aerospace) Sales registered a 1.1% gain in 1992, and they are expected to be up slightly again in 1993. In the ensuing four years, 1994 through 1997, Civil Aerospace Sales are expected to make a strong recovery and by 1997 account for 77% of Net Sales compared with 70% in 1992.

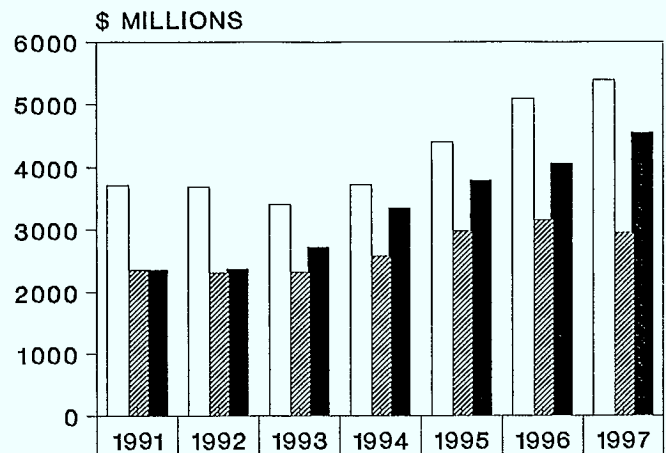


SALES BY GEOGRAPHIC AREA 1991 TO 1997

The geographic distribution of sales indicates that Net Domestic Sales³ fell 1.8% between 1991 and 1992. Sales to the U.S. were down 0.6% while sales to other Foreign Countries rose 1.0%. The U.S. remained the principal market for Canadian Aerospace and Defence Products in 1992 and will continue to remain so throughout the forecast period.

In 1993, both Net Domestic Sales and Non-U.S. Sales are expected to move up, but sales to the U.S. are expected to decline.

Sales to the U.S. and other countries will begin to recover in 1994 and continue to increase through 1997.

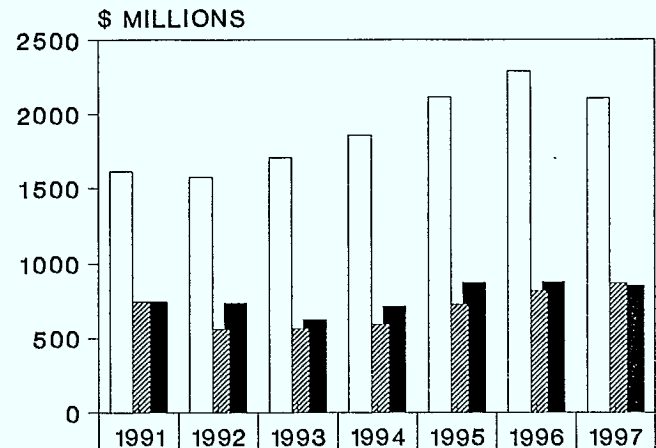


	1991	1992	1993	1994	1995	1996	1997
NET SALES	8443	8401	8473	9668	11198	12314	12886
UNITED STATES	3726	3703	3423	3733	4403	5085	5382
NET DOMESTIC	2359	2316	2332	2578	2990	3165	2960
OTHER COUNTRIES	2358	2382	2717	3357	3805	4064	4543

GROSS DOMESTIC SALES: 1991 TO 1997

Gross Domestic Sales, which include intra sector sales among Canadian Aerospace and Defence manufacturing firms, fell 7.5% in 1992 as intra sector sales to Canadian Aerospace and Defence Manufacturers plummeted 25.3%. Canadian government sales were also down (2.2%) while sales to other Canadian customers (primarily airlines) fell 1.0%. Intra sector sales fell as prime contractors moved to reduce material purchases from supplier manufacturers to bring inventories into line with market demand, and cut back on subcontracting of existing work to more effectively utilize excessive "in-house" capacity.

Gross Domestic Sales are expected to resume growth in 1993 and continue to rise through 1996 before weakening somewhat as some of the major defence contracts wind down reducing sales to the Canadian government.



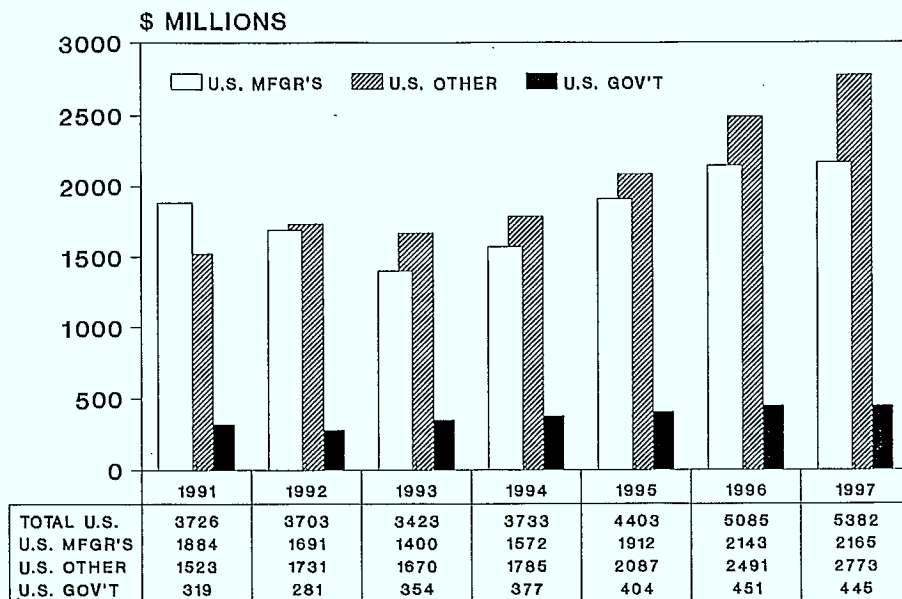
	1991	1992	1993	1994	1995	1996	1997
GROSS DOMESTIC	3108	2876	2899	3175	3721	3983	3829
GOVERNMENT	1613	1578	1708	1860	2117	2287	2108
MANUFACTURERS	749	560	567	597	731	818	868
OTHER CUSTOMERS	746	738	624	719	874	879	852

U.S. SALES: 1991 TO 1997

Sales to the U.S. market fell 0.6% between 1991 and 1992 primarily as a result of lower sales to U.S. Aerospace and Defence Manufacturers, and to the U.S. government. Sales to other U.S. customers (primarily airlines) increased in 1992.

U.S. sales are forecast to tumble by 7.5% in 1993 led by a 17.2% drop in sales to U.S. Aerospace and Defence Manufacturers. Sales to other U.S. customers will also be down 3.5%. U.S. sales are expected to turn around in 1994 as sales to U.S.

Aerospace Manufacturers and other U.S. customers begin to recover. Gains in sales in these categories are expected to continue through the remainder of the forecast period. Sales to the U.S. government are also expected to show a strong recovery however, they account for a relatively small proportion of U.S. sales.

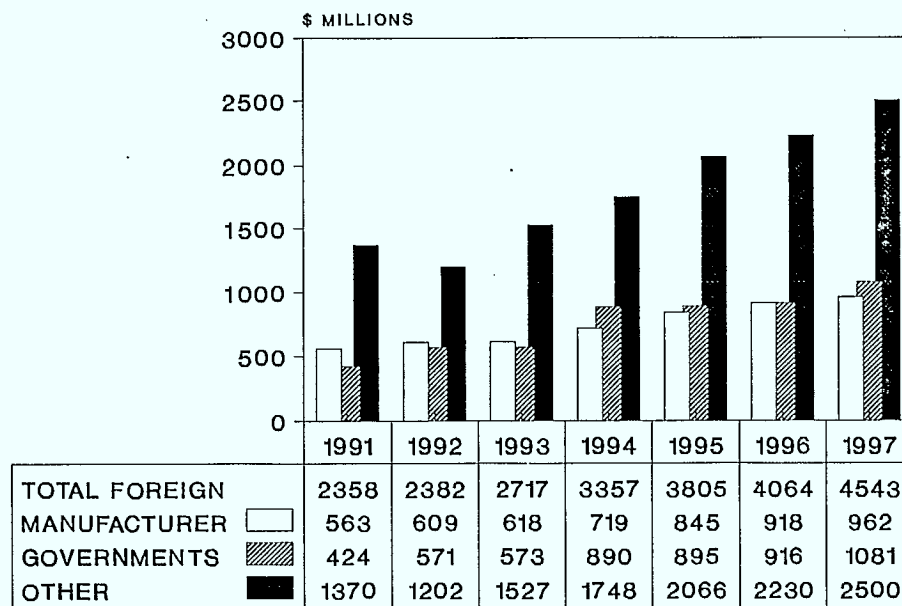


FOREIGN SALES (EXCLUDING THE U.S.): 1991 TO 1997

Total sales to Foreign Customers (other than the U.S.) rose 1.0% between 1991 and 1992 largely because of strong sales to foreign governments and Non-U.S. Aerospace and Defence Manufacturers. Sales to other foreign customers (principally airlines) were off sharply.

The outlook for Foreign Sales over the period 1993 to 1997 is for an impressive gain in sales to other foreign customers (mainly airlines) and foreign governments. Smaller gains are expected in sales to foreign

Aerospace and Defence Manufacturers. Foreign government sales predictions may distort the outlook for aerospace somewhat since they contain a mix of defence related components.

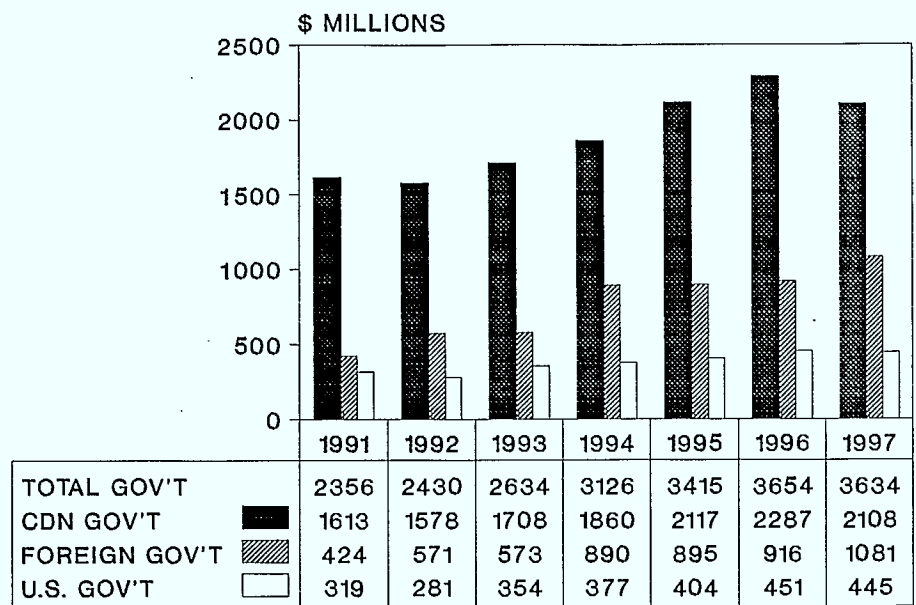


SALES TO GOVERNMENTS: 1991 TO 1997

Combined sales to all governments rose 3.1% between 1991 and 1992. The entire increase was due to a gain in sales to foreign governments. Sales to the Canadian and U.S. governments declined in 1992.

Sales to governments are expected to show a strong recovery in 1993 and continue to increase at fairly high rates of growth through 1996. The gains in government sales will be largely attributable to sales to the Canadian government which is the largest government customer.

However, sales to governments in countries other than the U.S. are also expected to rise significantly during the period 1993 through 1997.

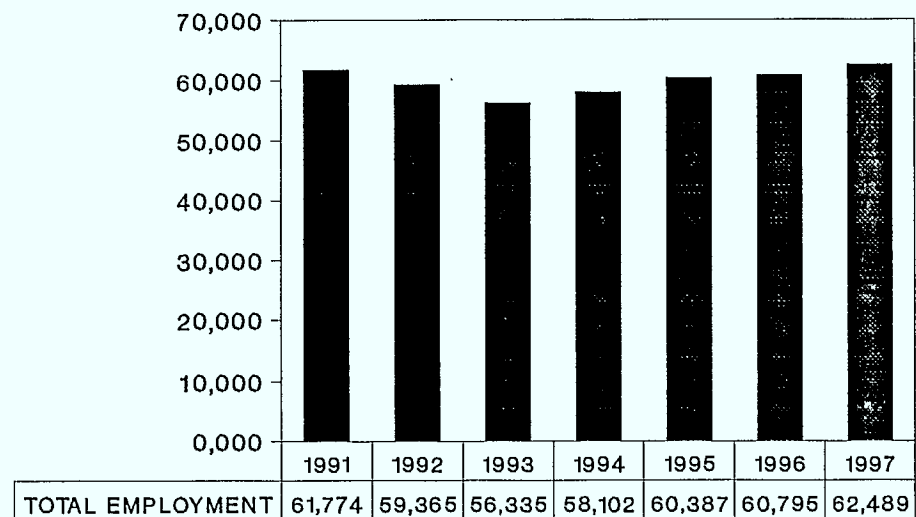


EMPLOYMENT 1991 TO 1997

Total employment in the Aerospace and Defence Sector fell 3.9% in 1992 following a 2.4% drop the previous year.

Employment is forecasted to fall sharply (5.1%) in 1993 before beginning a recovery in 1994 that will last through 1997.

Employment in the sector is currently being affected by both cyclical demand factors¹ and structural adjustments to size and composition of the sector's workforce. Although employment is expected to recover as the cyclical upswing in demand in the sector proceeds, by the end of the forecast period employment will have been downsized from pre-recession levels as the industry strives to improve productivity and international competitiveness.



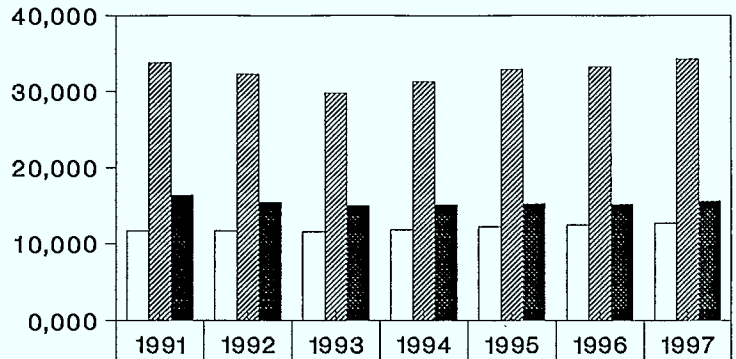
■ TOTAL EMPLOYMENT

EMPLOYMENT BY CATEGORY: 1991 TO 1997

The sector expects changes in both the size and composition of its workforce to occur over the forecast period. Employment losses during the recession will primarily be the result of layoffs of production and other workers (i.e. administration, overhead, marketing, etc.). Engineering employment will remain steady.

As the recovery begins in 1994, total employment will begin to rise, but it will remain below its pre-recession (1990) peak of 63,269. The brunt of the apparent downsizing of the workforce during the recovery

period is expected to fall primarily on "Other" non-production and non-engineering employees. The cuts in this component of the labour force appears to be directed at reducing overhead costs, improving labour productivity and strengthening the engineering components of the workforce.



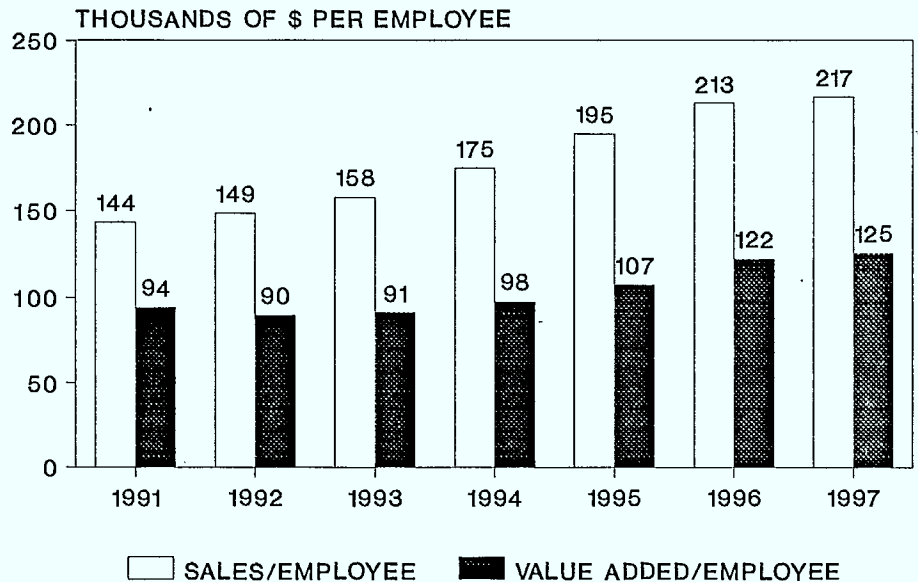
	1991	1992	1993	1994	1995	1996	1997
ENGINEERING	11,576	11,637	11,562	11,806	12,180	12,414	12,706
PRODUCTION	33,799	32,295	29,780	31,258	32,944	33,241	34,232
OTHER	16,399	15,433	14,993	15,037	15,263	15,140	15,550
TOTAL EMPLOYMENT	61,774	59,365	56,335	58,102	60,387	60,795	62,489

□ ENGINEERING ▨ PRODUCTION ■ OTHER

SALES AND VALUE ADDED: 1991 TO 1997 PER EMPLOYEE

Sales and Value Added (VA)⁴ per employee may be indicative of labour productivity⁵ trends in the sector (depending on the strength of inflation in the sector). Both sales per employee and VA per employee are expected to increase significantly once the recovery gets under way.

Whether continued improvements in labour productivity can be realized as the recovery proceeds, will depend on the strength of inflationary pressures in the sector and the effectiveness of productivity enhancing work force adjustments.



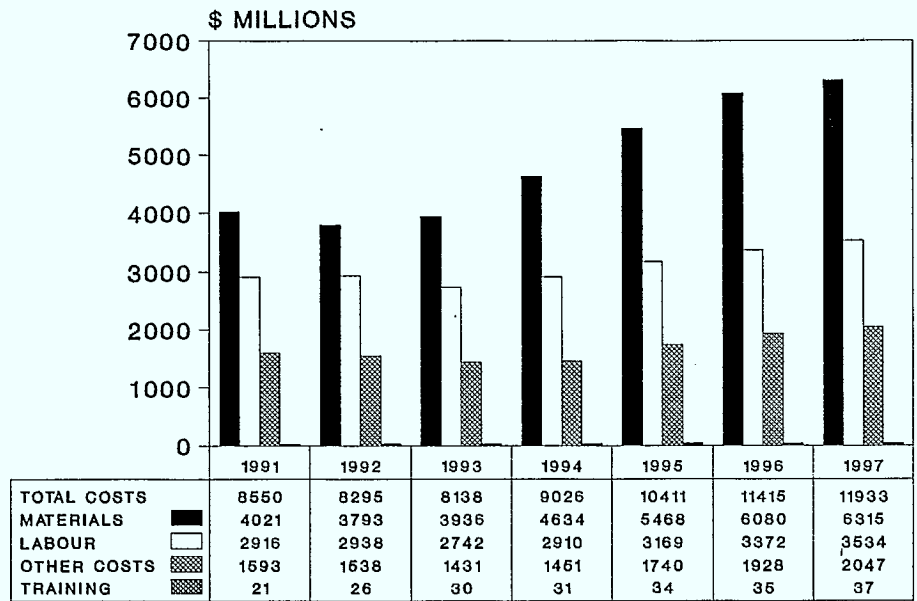
□ SALES/EMPLOYEE ■ VALUE ADDED/EMPLOYEE

COST PERFORMANCE: 1991 to 1997

Total manufacturing costs in the sector declined 3.0% in 1992 largely as a result of lower material and "Other" costs. The growth in labour costs also slowed noticeably. Training costs, on the other hand rose sharply.

Total costs are expected to fall 1.9% in 1993 mainly because of lower labour and "Other" costs. Material and training costs are expected to rise .

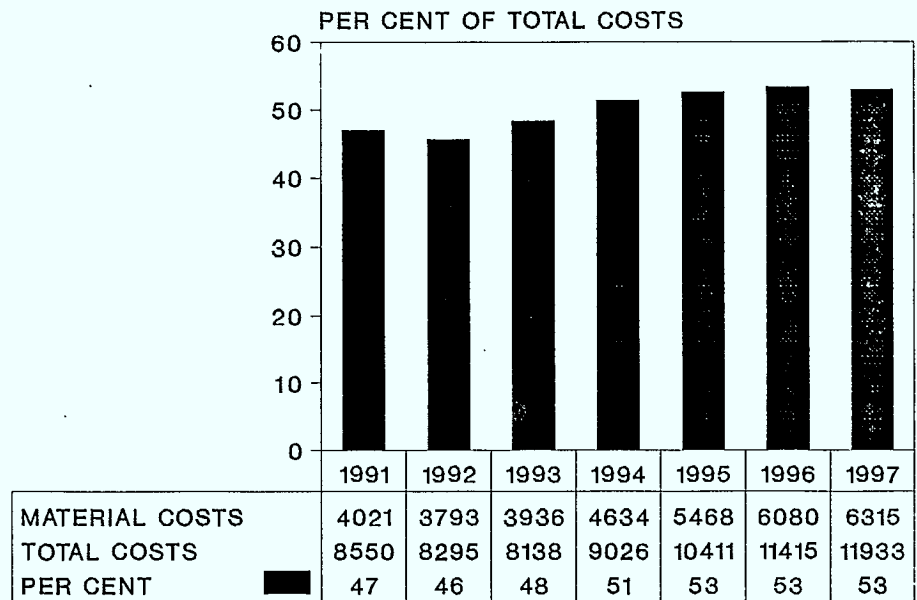
As demand for the sector's output recovers in 1994, costs are expected to resume upward growth in all four cost categories although material and training costs are expected to show the largest gains over the forecast period as a whole.



MATERIAL COSTS: 1991 TO 1997

Total material costs fell 5.7% in 1992 as purchases from Canadian Aerospace and Defence companies and Non-U.S. sources fell 26.0% and 6.9% respectively. The cost of purchases from U.S. sources edged down 0.1% while the cost of purchases from other Canadian suppliers moved up slightly.

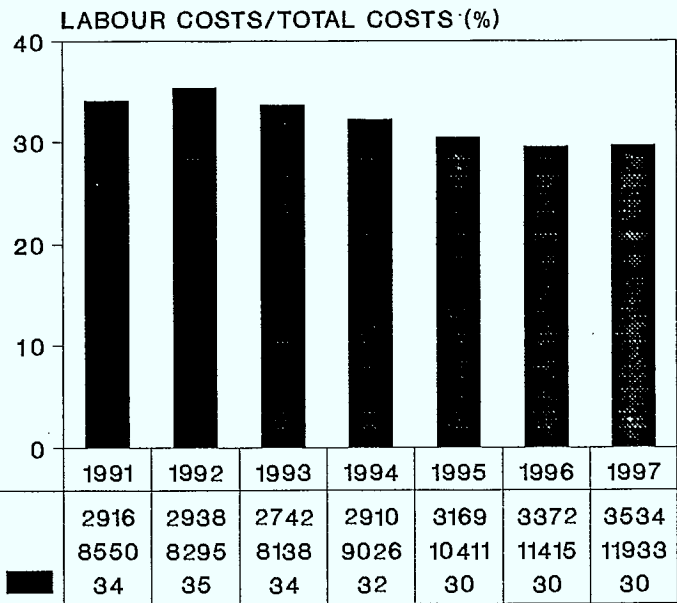
Material costs are expected to resume an upward trend in 1993 as material purchases from all sources except the U.S. begin to rise. By 1994 they will begin to rise in all categories and continue to move up throughout the remainder of the forecast period. By 1997 material costs are expected to account for 53% of total costs compared with 45.7% in 1992.



LABOUR COSTS: 1991 TO 1997

Labour costs rose 0.8% between 1991 and 1992. The modest rise, compared with previous years, was mainly due to declines in employment in the sector. Employment is expected to fall sharply in 1993 resulting in a 6.7 % drop in labour costs.

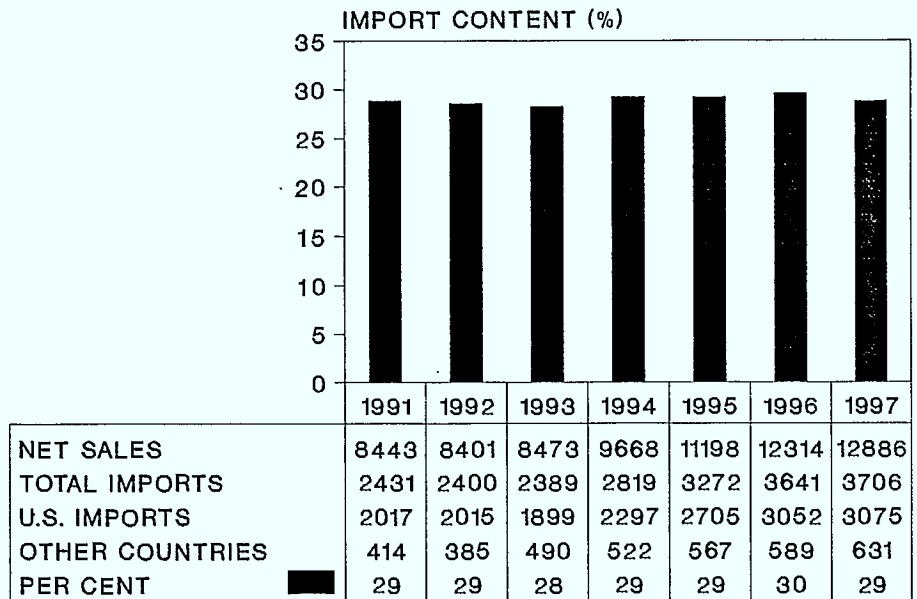
As employment begins to recover in 1994, labour cost will also begin to rise. This pattern will continue throughout the forecast period, however, the growth in labour cost is expected to lag the growth in material costs and the share of labour costs in total costs is expected to fall from 35% in 1992 to 30% in 1997.



IMPORTS OF PARTS, COMPONENTS, ETC: 1991 TO 1997

The import content of Net Sales was about 30% in 1992 and remained largely unchanged from 1991 levels. The import content is expected to remain fairly stable at about 30% of Net Sales throughout the remainder of the forecast period.

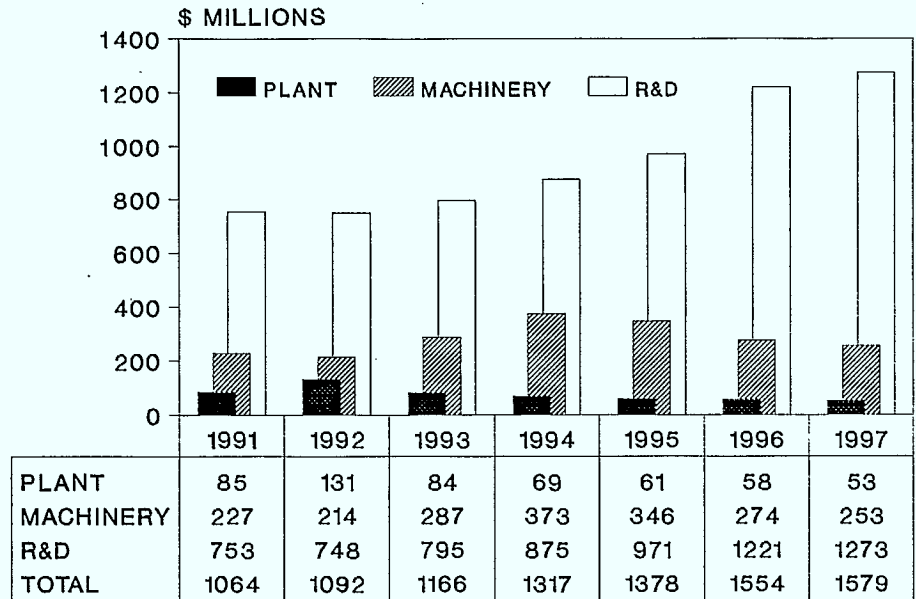
The shares of total imports from the U.S. and Non-U.S. sources in total imports are also expected to remain largely unchanged over the forecast period.



NEW INVESTMENT BY CATEGORY: 1991 TO 1997

Investment spending in the Aerospace and Defence Sector rose 2.7% in 1992 following a drop of 10.7% in 1991. The rise was entirely due to a 54.2% jump in spending on Plant as spending on R&D, and Machinery & Equipment registered small declines in 1992.

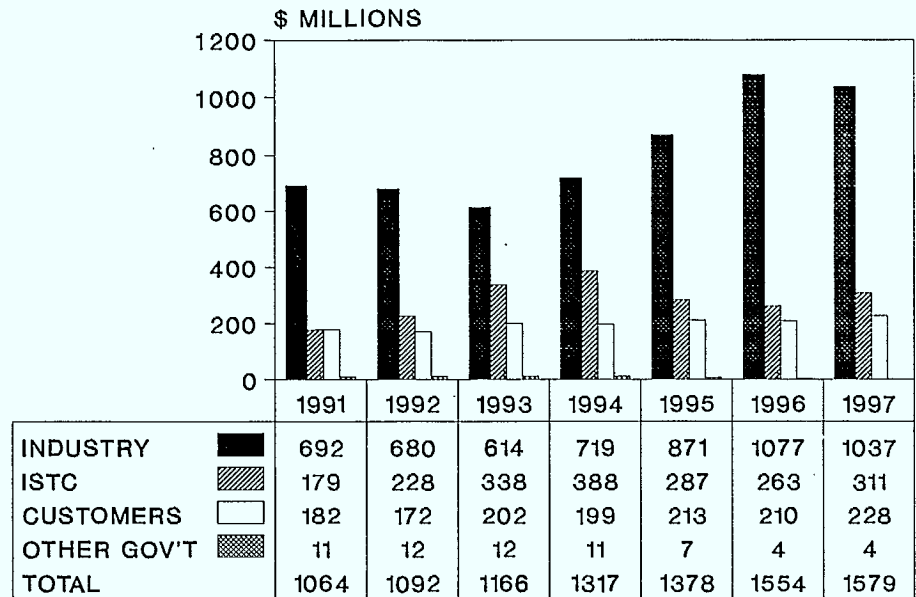
The outlook for 1993 and beyond is for significantly stronger investment spending than forecasted in last year's survey. The improvement is expected to be led primarily by growth in R&D spending as well as by increased expenditure on Machinery & Equipment.



SOURCES OF NEW INVESTMENT 1991 TO 1997

Manufacturing companies are the main source of new investment in the sector followed by Governments and Customers. Between 1991 and 1992, industry's share of total investment fell while the Government's share increased. The share funded by Customers remained largely unchanged.

Manufacturers expect their share of total investment to fall once again in 1993 while the Government's share is predicted to increase. As the sector recovers from the recession manufacturers are expected to account for an increasing share of total investment spending, particularly on R&D.

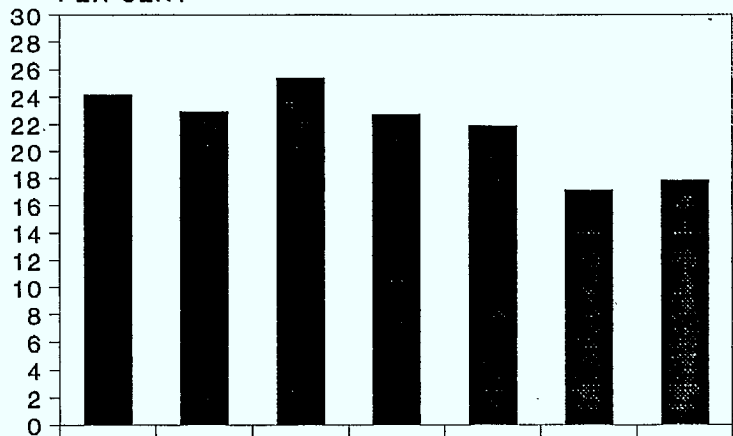


R&D FUNDING BY CUSTOMERS : 1991 TO 1997

Research and Development funded by Customers fell from 24.1% of total R&D spending in 1991 to 22.9% in 1992. The share funded by Customers is expected to move up to 25% of total R&D expenditure in 1993. However, from 1994 onward, Customers are expected to fund a decreasing proportion of R&D spending.

The declining share of Customer funded R&D is consistent with trends in the sector towards consolidation of supplier bases, and increasing requirements by Customers that suppliers fund an increasing share of the risks on new development projects.

PER CENT



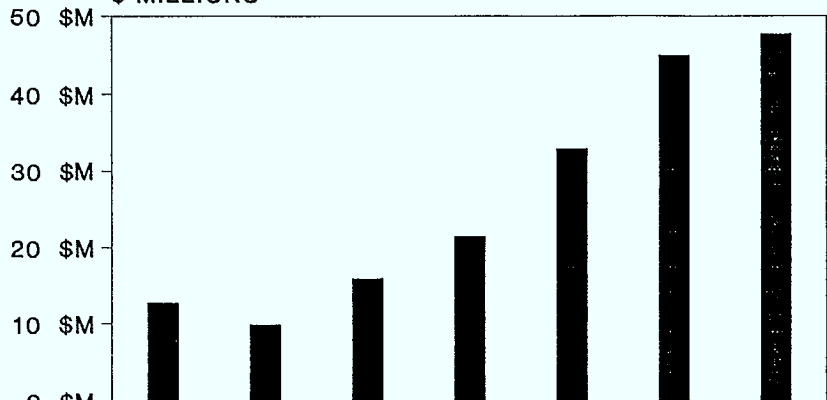
	1991	1992	1993	1994	1995	1996	1997
CUSTOMER	182	172	202	199	213	210	228
TOTAL R&D	753	748	795	875	971	1221	1273
PER CENT	24	23	25	23	22	17	18

REPAYMENTS: 1991 TO 1997

Industry forecasts of the repayments of federal government funding of investment spending in the Aerospace and Defence Sector between 1991 and 1997 are shown in the chart opposite.

Most of the repayments shown are for assistance provided through the Defence Industry Productivity (DIP) Program of ISC. The DIP Program provides repayable assistance on high risk aerospace and defence projects on a shared cost basis with industry.

\$ MILLIONS



	1991	1992	1993	1994	1995	1996	1997
REPAYMENTS	13 \$M	10 \$M	16 \$M	22 \$M	33 \$M	45 \$M	48 \$M

REPAYMENTS

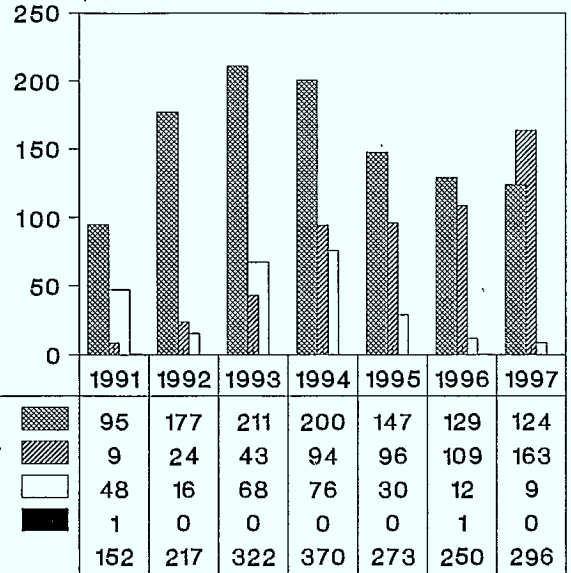
ISC SUPPORT: 1991 TO 1997

Conditionally repayable contributions received by survey firms under the DIP Program increased by 43.9% between 1991 and 1992. The latest rise follows a decline of (10.9%) in 1991⁶. Most of this increase was attributable to increased support for R&D and Source Establishment investments. Funding for Capital Equipment and Feasibility Studies fell.

As the sector moves out of the recession, its estimated requirement for shared cost DIPP funding is expected to show an initial surge and continue to

remain well above current program funding levels as the recovery proceeds. The strong demand reflects a number of large new development projects planned by industry during the forecast period.

\$ MILLIONS



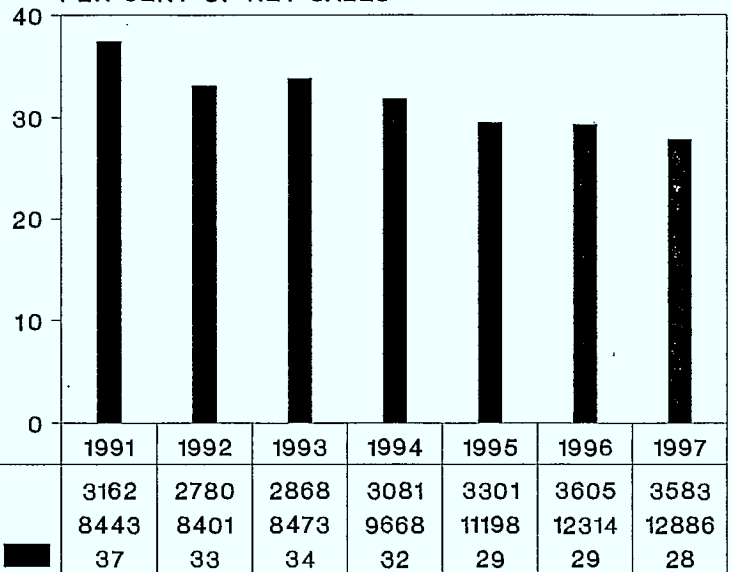
	1991	1992	1993	1994	1995	1996	1997
R & D	95	177	211	200	147	129	124
SOURCE ESTABLISHMENT	9	24	43	94	96	109	163
CAPITAL ASSISTANCE	48	16	68	76	30	12	9
FEASIBILITY STUDIES	1	0	0	0	0	1	0
TOTAL	152	217	322	370	273	250	296

OPENING INVENTORIES: 1991 TO 1997

Following a sharp 11.9% jump in opening inventories as the sector moved into recession in 1991, manufacturers moved to reduce inventories between 1991 and 1992 to bring them more into line with market demand requirements. As a result, opening inventories in 1992 stood 12.1% below 1991 levels.

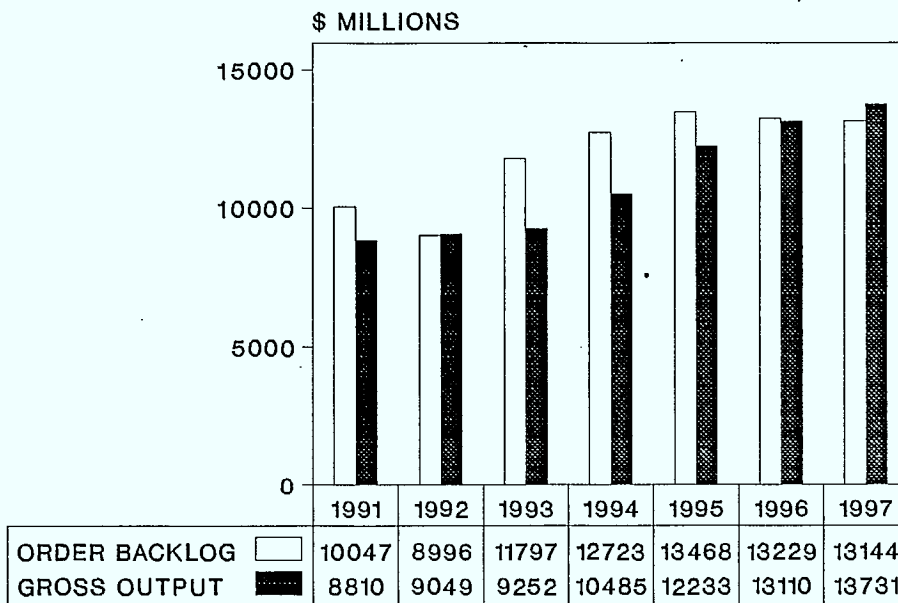
Opening inventories are expected to be up by 3.2% in 1993. This may signal industry's intentions to resume inventory accumulation in anticipation of a recovery in sales. Inventory accumulation will continue as the recovery proceeds, however, inventory/sales ratios are expected to fall over the forecast period. This may reflect a more widespread adoption of more efficient inventory practices in the sector.

PER CENT OF NET SALES



YEAR END BACKLOG: 1991 TO 1997

The chart opposite compares the year end order backlog in the sector with Gross Output. It may be noted from the chart that there tends to be about a one year lag between a change in the order backlog and a response in output. As noted in last year's survey the order backlog fell in 1991, yet gross output continued to rise leading to a large accumulation of unsold inventories. However, in 1992 manufacturers moved to reduce inventories and keep output more in line with the order backlog.

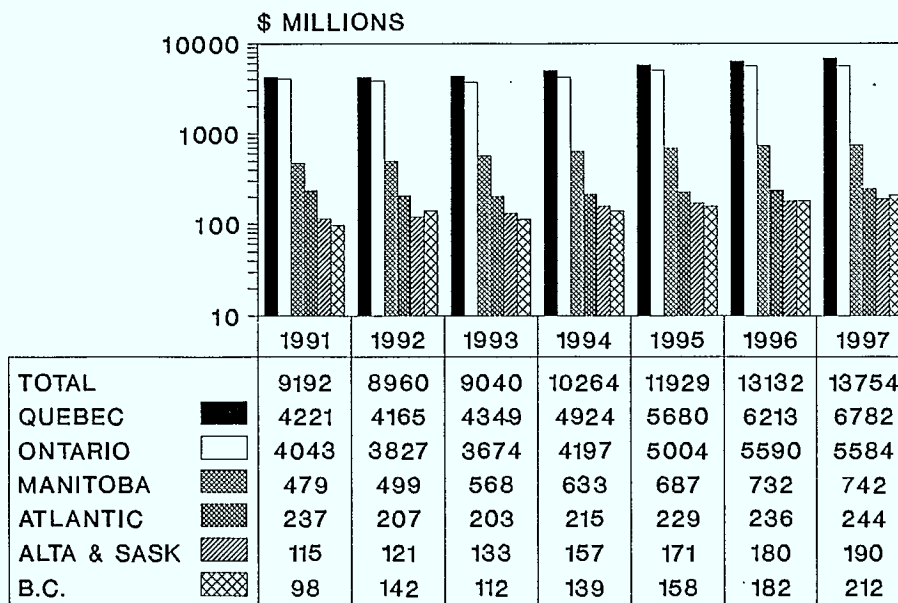


The order backlog is expected to improve in 1993, however, gross output will remain largely flat showing little improvement until 1994.

REGIONAL DISTRIBUTION OF SALES: 1991 TO 1997

The Regional Distribution of Sales shows that Quebec and Ontario will continue to account for the largest share of sales. However, sales declined in all regions except the Western provinces in 1992.

In 1993, sales are expected to be up in all provinces except Ontario and B.C. As the recovery from the current recession begins to gain momentum in 1994, sales are expected to improve in all regions and continue to move upward through the 1997 forecast period.

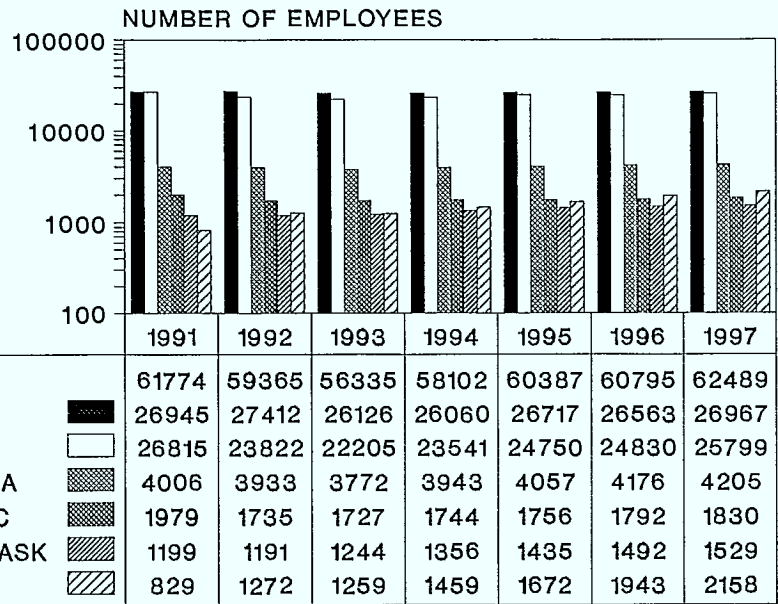


Note that a logarithmic scale is used on the Y axis of this chart.

REGIONAL DISTRIBUTION OF EMPLOYMENT: 1991 to 1997

The Regional Distribution of Employment indicates that companies in the Ontario, Manitoba, Atlantic and Prairie regions experienced declines in employment in the sector in 1992.

Even as the recovery gets underway in 1993, employment is forecast to remain flat. Improvements are expected only in the Alberta and Saskatchewan region. In 1994, employment is expected to improve in all regions except Quebec. As the recovery proceeds, all regions except the Atlantic region are forecast to experience employment growth.

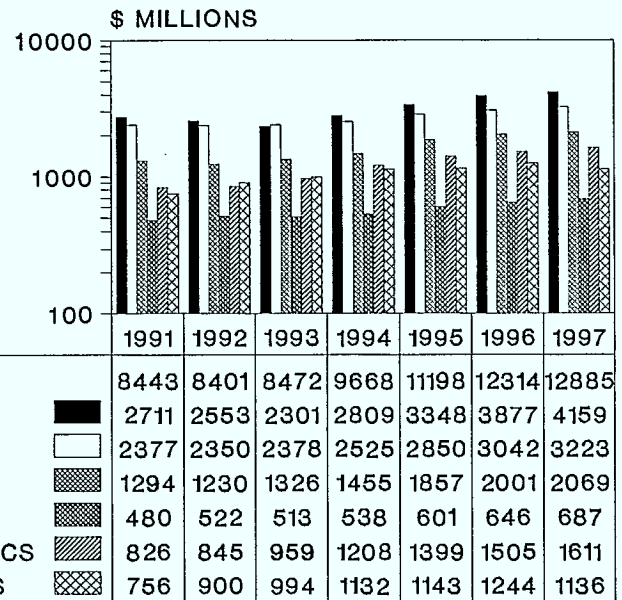


Note that a logarithmic scale is used on the Y axis of this chart.

SALES BY SUB-SECTOR: 1991 to 1997

The breakdown of Net Sales by Sub-Sector indicates that the recession in the industry impacted most heavily in the Airframe, the Propulsion Systems, and the Avionics sub-sectors in 1992.

Net Sales in the Airframes sub-sector are expected to continue downward in 1993 whereas most other sub-sectors should show slight improvements in net sales. As the recovery proceeds into 1994, all sub-sectors are expected to show gains in sales and in most sub-sectors this turnaround will continue through 1997.



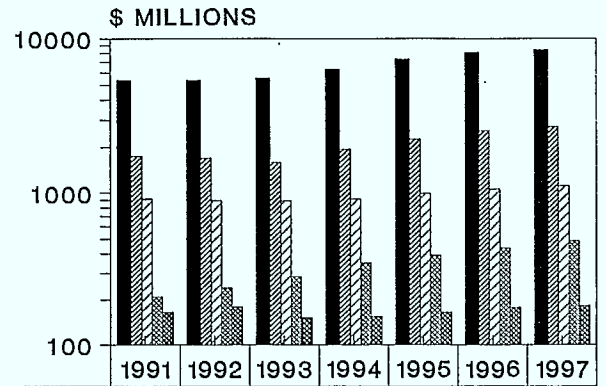
Note that a logarithmic scale is used on the y axis of this chart.

SALES BY PRODUCT CATEGORY: 1991 to 1997

The breakout of Sales by Product Category indicates that sales declined in all product categories except Services and Agency sales between 1991 and 1992. The forecast for 1993 indicates that lower sales are expected in the sub-contracting and agency sales categories. Sales of proprietary parts are expected to show a strong recovery in 1993.

Looking further out, growth in sales is expected to resume in all product categories in 1994 and continue throughout the remainder of the forecast period.

Over the period as a whole, the sector is expected to continue to be focused primarily on the production of Proprietary Parts and Sub-Contract sales, yet Services, a relatively small sector, will grow rapidly.

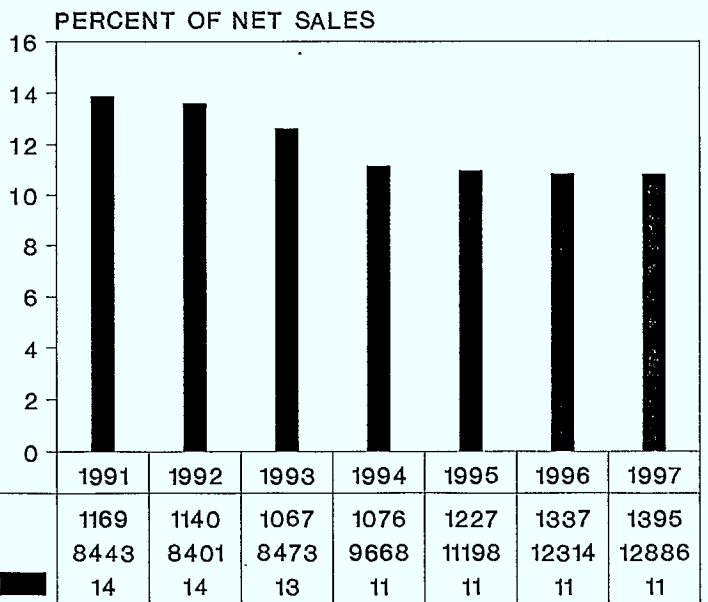


PROPRIETARY PRODUCTS	5401	5370	5555	6306	7370	8076	8395
SUB CONTRACTS	1751	1715	1596	1944	2276	2563	2710
REPAIR & OVERHAUL	915	894	884	911	993	1059	1112
SERVICES	210	241	285	351	394	438	483
AGENCY SALES	166	180	152	156	166	178	185
TOTAL	8443	8401	8472	9668	11198	12314	12885

Note the logarithmic scale on the Y axis of this graph

SPARE PARTS: 1991 TO 1997

The percentage of Spares Parts in Net Sales is expected to decline slightly over the next two years and then remain steady at about 11% of sales for the remainder of the forecast period. The decline in the proportion of Spare Parts in Net Sales is believed to be attributable to a number of factors, including: manufacturing quality and reliability improvements; the implementation of better inventory control by customers using "Just In Time Inventory" practices; and, increased inclusion of Spares Parts costs in original purchase contracts as part of the product life cycle costs.



ESTABLISHMENTS THAT PARTICIPATED IN 1993 SURVEY

ALLIEDSIGNAL AEROSPATIALE CANADA INC.	HAVLIK TECHNOLOGIES INC.
ALLIEDSIGNAL AEROSPACE CANADA (TORONTO)	HAWKER SIDDELEY CANADA
AMPTECH CORPORATION	HEROUX INC.
ANDREW CANADA INC.	HUGHES LEITZ OPTICAL TECHNOLOGIES LTD
AVCORP INDUSTRIES INC.	IMP GROUP LTD. AEROSPACE DIVISION
BALLARD BATTERY SYSTEMS CORPORATION	IMP AEROSPACE COMPONENTS LIMITED
BELL HELICOPTER TEXTRON	INDAL TECHNOLOGIES INC.
BOEING CANADA TECHNOLOGY LTD. - ARNPRIOR DIVISION	INVAR MANUFACTURING
BOEING CANADA TECHNOLOGY LTD. - WINNIPEG DIVISION	INVENTRONICS LIMITED
BOMBARDIER de HAVILLAND INC.	IRVIN INDUSTRIES CANADA LTD
BOMBARDIER INC. GROUPE CANADAIR	JOHN T. HEPBURN, LIMITED - MECHANICAL DIVISION
BRISTOL AEROSPACE LIMITED	LES CAOUTCHOUCS ACTON LIMITEE
C.P.S. INDUSTRIES INC. (LES)	LITTON SYSTEMS CANADA LIMITED
CAE ELECTRONICS LTD.	LOCKHEED CANADA INC.
CAL CORPORATION	LUCAS AEROSPACE INC. - CONTROL SYSTEMS DIVISION
CALIAN COMMUNICATIONS SYSTEMS, LTD.	MACDONALD, DETTWILER & ASSOCIATES LTD
CANADIAN MARCONI COMPANY	MCDONNELL DOUGLAS CANADA LTD
CHAMPION ROAD MACHINERY LTD.	MENASCO AEROSPACE LTD
CHICOPEE MANUFACTURING LIMITED	NORTHWEST INDUSTRIES LIMITED
COLUMBUS MCKINNON LIMITED	OERLIKON AEROSPACE INC.
COM DEV LTD.	PARAMAX SYSTEMS CANADA
COMPUTING DEVICES COMPANY	PRATT & WHITNEY CANADA INC.
DEVTEK CORPORATION	RAYTHEON CANADA LIMITED
DOWTY AEROSPACE MONTREAL DIVISION	REMTEC INC.
DOWTY AEROSPACE LANDING GEAR - TORONTO	ROCKWELL INTERNATIONAL OF CANADA
DY 4 SYSTEMS INC.	ROLLS ROYCE (CANADA) LIMITED
EBCO AEROSPACE	SED SYSTEMS INC.
EUROCOPTER CANADA LIMITED	SPAR AEROSPACE LIMITED - GEARS & TRANSMISSIONS
FAG BEARINGS LTD. - AEROSPACE PRODUCTS DIVISION	SPAR AEROSPACE LIMITED - AVIATION SERVICES DIVISION
FIELD AVIATION COMPANY INC.	SPAR AEROSPACE LIMITED - SATELLITE & COMMUNICATION SYSTEMS
FLEET INDUSTRIES	SPAR AEROSPACE LIMITED - APPLIED SYSTEMS GROUP
GABRIEL OF CANADA LTD	SPAR AEROSPACE LIMITED - ADVANCED TECHNOLOGY SYSTEMS GROUP
GENERAL ELECTRIC	STANDARD AERO LIMITED
GENERAL MOTORS OF CANADA LIMITED - DIESEL DIVISION	TECHNOLOGIES INDUSTRIES SNC INC.
GODFREY AEROSPACE INC.	VADEKO INTERNATIONAL INC.
HALEY INDUSTRIES LIMITED	WALBAR CANADA INC.

ESTABLISHMENTS THAT DID NOT PARTICIPATE IN 1993 SURVEY

AIRCRAFT APPLIANCES & EQUIPMENT LIMITED	MPR TELTECH LIMITED
ATS AUTOMATION TOOLING SYSTEMS INCORPORATED	SHELLCAST FOUNDRIES INCORPORATED
CANADA FORGINGS INCORPORATED	STANDEN'S LIMITED
CANADIAN FOREMOST LIMITED	STEDFAST INCORPORATED
EXCO TECHNOLOGIES LIMITED	THORDON BEARINGS INC.
GENERAL KINETICS ENGINEERING CORPORATION	UDT INDUSTRIES INCORPORATED
HOWMET CERCAST CANADA INCORPORATED	ULSTEIN MARITIME LIMITED
INNOTECH AVIATION LIMITED	VALCOM LIMITED
LINAMAR CORPORATION	ZENON ENVIRONMENTAL SYSTEM INCORPORATED
MPB TECHNOLOGIES INCORPORATED	

TOP 20: 1992, 1993, 1997.

LEADING AEROSPACE AND DEFENCE COMPANIES

Ranked by 1992 Total Sales	1992	1993	1997
PRATT & WHITNEY CANADA INC.	1	1	2
BOMBARDIER INC - CANADAIR LTD	2	2	1
DE HAVILLAND	3	5	3
MCDONNELL DOUGLAS CANADA LTD	4	10	8
SPAR AEROSPACE	5	3	7
CAE ELECTRONICS LTD.	6	8	5
BELL HELICOPTER TEXTRON	7	4	4
ROLLS-ROYCE (CANADA) LIMITEE	8	9	10
GENERAL MOTORS OF CANADA; DIESEL DIVISION	9	7	11
PARAMAX SYSTEMS CANADA	10	6	6
LITTON SYSTEMS CANADA LIMITED	11	14	--
ALLIEDSIGNAL AEROSPACE	12	13	14
BOEING CANADA	13	12	12
OERLIKON AEROSPACE INC.	14	--	--
COMPUTING DEVICES COMPANY	15	11	9
BRISTOL AEROSPACE LIMITED	16	15	13
CANADIAN MARCONI CO. (AVIONICS DIV.)	17	18	15
TECHNOLOGIES IND. SNC INC.	18	16	18
CANADIAN GENERAL ELECTRIC / RCA CANADA	19	19	--
STANDARD AERO LIMITED	20	17	--

Annex I

Footnotes

- 1) The pattern of employment changes in the current recession and the forecast period indicate that in addition to cyclical demand factors, the sector's workforce is experiencing a period of structural adjustment which will impact its size and composition.

Cyclical factors generally reveal themselves in the early stages of a recession through a decline in labour productivity which is followed by productivity gains in the early stages of a cyclical recovery. Labour productivity falls because of a phenomena, known as "labour hoarding", in which industry postpones laying-off employees in the face of weakening market demand until demand reaches a point where industry has little choice but to begin laying-off employees to reduce costs. As the sector begins to enter the early stages of a recovery from the recession increasing output with a reduced workforce leads to labour productivity gains. The reasons for labour hoarding generally involve consideration such as: a desire to avoid the permanent loss of skilled workers; recover the sunk costs of investments in employee training; or, a desire to avoid the administrative cost and disruptions of lay-offs. One would expect this phenomena to be particularly pronounced in a sector like Aerospace and Defence where long lead times are required to respond to changes in market demand.

Although the impact of cyclical demand factors on employment and productivity are evident in the current survey, (i.e. the sharp drop in employment expected in 1993 is believed, at least in part, to mark an end to labour hoarding), there is also evidence of underlying structural adjustments occurring in the size and composition of the sector's workforce. Evidence of structural adjustment is indicated by the evidence of lay-offs of production and "Other" personnel early on in the current recession. Although labour productivity (i.e. Gross Output/Employee) fell as expected in the early stages of the cyclical downswing, the fall was mitigated by reductions in employment. As expected labour productivity (Gross Output/Employee) is anticipated to recover in the early stages the upswing in the business cycle but, it is also anticipated to continue to rise throughout the remainder of the forecast period. Depending on inflation in the sector, some of this apparent productivity gain may reflect a real productivity improvement brought about through changes in the size and composition of the sector's workforce will change. Not only is total

employment expected to be below pre-recession peaks at the end of the forecast period, but most of this reduction will be in the number of other workers (i.e. overhead) rather than engineering or production workers.

- 2) The value of Gross Output has been approximated by sales plus ending inventory minus beginning inventory. Since the beginning inventory for any particular year is also the ending inventory for the previous year, it was possible to calculate inventory changes for all years except 1997 where there was no ending inventory. To estimate ending inventories for 1997 the following formula was used (opening inventory 1996/order backlog 1996)*(order backlog 1997).
- 3) Net Sales equals Gross Sales minus sales to Canadian Aerospace and Defence firms in the sector. It avoids double counting of sales between manufacturers.
- 4) The sector's Value Added (VA) has been approximately estimated by subtracting the cost of material purchases from Gross Output. It should be noted that this year's calculation differs from that used in past surveys where Net Sales rather than Gross Sales were used in the VA formula. Upon review it was found that the use of Net Sales tended to lead to an understatement of VA. (Readers who wish to continue using Net Sales in the Calculation should calculate and substitute a corresponding figure for net material purchases to the VA formula).
- 5) Although sales and value added per employee may be indicative of labour productivity in the sector, they could be somewhat misleading since sales and value added should really be shown in real terms (i.e. deflated to take account of changes in the price of output).
- 6) The Defence Industry Productivity Program (DIPP) expenditures shown in the table are based on survey responses and do not include all companies receiving DIPP assistance.

