INDUSTRY
COMMISSION

The Machine Tools and Robotics Industries

Report No. 52

13 August 1996

Forming the Productivity Commission

The Federal Government, as part of its broader microeconomic reform agenda, is merging the Bureau of Industry Economics, the Economic Planning Advisory Commission and the Industry Commission to form the Productivity Commission. The three agencies are now co-located in the Treasurer's portfolio and amalgamation has begun on an administrative basis. While appropriate arrangements are being finalised, the work program of each of the agencies will continue. The relevant legislation will be introduced soon. This report has been produced by the Industry Commission.

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INDUSTRY COMMISSION

Forming the EPAC BIE IC Productivity Commission

Head Office
LB2 Collins Street East
MELBOURNE VIC 8003

Level 28 Collins Tower
35 Collins Street
MELBOURNE VIC 3000

Telephone **(03) 9653 2100**
Facsimile **(03) 9653 2199**

Canberra Office
Telephone **(06) 240 3200**
Facsimile **(06) 240 3399**

13 August 1996

The Honourable Peter Costello, MP
Treasurer
Parliament House
Canberra ACT 2600

Dear Treasurer

In accordance with Section 7 of the *Industry Commission Act 1989*, we have pleasure in submitting to you the report on The Machine Tools and Robotics Industries.

Yours sincerely

Maurice Joyce
Presiding Commissioner

Keith J Horton-Stephens
Commissioner

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Terms of reference

INDUSTRY COMMISSION ACT 1989

I, GEORGE GEAR, Assistant Treasurer, in pursuance of Part 2 of the Industry Commission Act 1989 hereby:

1. refer the Australian machine tools and robots industries to the Industry Commission for inquiry and report within nine months of the date of receipt of this reference*;

2. specify that in making its recommendations the Commission aim to improve the overall economic performance of the Australian economy;

3. specify that the Commission examine and report on the appropriateness of the current definitions of eligible equipment and eligible recipients in the Bounty (Machine Tools and Robots) Act 1985 and on any possible anomalies in the treatment of different goods in particular, the provisions of the bounty scheme which:

   (a) allow bounty to be paid on certain parts (viz parts for robotic machines, computer controllers and Goods AA ie certain goods designed for use solely or principally as a part for a computer controlled machine) without requiring them to be used in the manufacture of bountiable equipment; and

   (b) provide for bounty payments on modifications to certain systems (viz conveying and assembly equipment and computer hardware and software which are not necessarily associated with machine tools or robots);

4. Request that the Commission:

   (a) report on the effectiveness of the Machine Tools and Robots Bounty Scheme;

   (b) identify and report on areas of overlap between this form of assistance and other measures which are available to the industry;

   (c) identify and report on key factors affecting industry development and ways to encourage and improve efficiency and international competitiveness of the industry; and

   (d) advise whether assistance should continue to be accorded to the production of machine tools and robots after the current bounty scheme terminates on 30 June 1997 and, if so, the nature and extent of such assistance, including capitalisation of bounty;

5. Specify that the Commission:

   (a) take account of any recent substantive studies undertaken elsewhere; and

   (b) have regard to the established economic, social and environmental objectives of governments.

GEORGE GEAR * Received 29 January 1996

SUMMARY

The machine tools and robots bounty scheme has evolved over the past quarter of a century. It began in 1972 as a production subsidy to maintain a core capacity to produce metal working machine tools for defence purposes. In 1985, the objective changed to promoting advanced technology in Australian manufacturing by encouraging production, use and export of 'high tech' machine tools and robotics.

Since 1989, the rate of bounty has fallen from 40 per cent to 5 per cent (from 1 July 1996) and bounty payments have more than halved, from about $16 million to $8 million a year. The bounty is due to expire on 30 June 1997. The question for this inquiry is whether it, or other assistance, should continue after that time and, if so, in what form.

The machine tools and robotics industries

The machine tools industry produces a diverse range of equipment, from such basic metal working machines as lathes or power operated saws to complex computer controlled machining centres. These products form a critical input to manufacturing industry. Much of the Australian industry's activity involves designing and producing custom-made manufacturing machinery that often incorporates sophisticated imported machinery for which there is no locally produced substitute. Imports have long accounted for the majority of machine tools sales.

Table 1: Australian Machine Tools and Robotics, Production and Trade, 1994–95

	Total	*Bountiable*
	($ million)	
Production	370	144
Imports	757	398
Exports	104	69

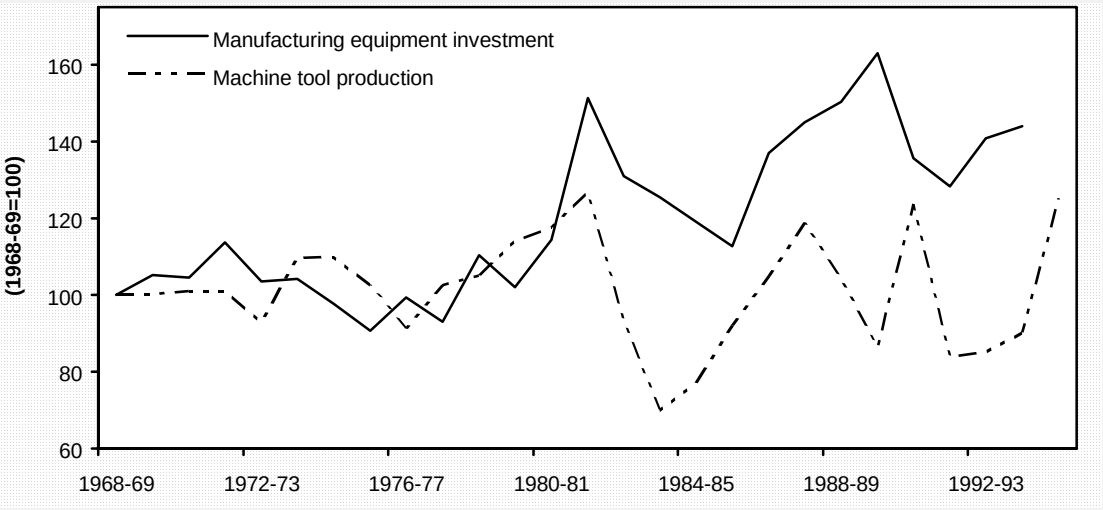
Source: ABS and IC

Costs can range from tens of thousands of dollars to millions for sophisticated machines and systems. Australian machine tool producers are relatively small and often form long term relationships with major customers. This keeps technological know-how in-house. Because machine tools are key inputs for manufacturing, quality and technology are the most critical factors in purchasing decisions.

Until quite recently, the Australian machine tools industry catered almost exclusively to the domestic market. The domestic industry is small. While production has fluctuated considerably, it has exhibited virtually no overall growth in real terms for over twenty years. In contrast, manufacturing industry investment in plant and equipment has shown a significant increasing trend (see Figure 1).

From the mid eighties, the machine tools industry faced severe pressures as a result of both the rationalisation of Australian manufacturing industry and macroeconomic factors affecting investment generally. Many companies left the industry as its traditional customers, particularly the automotive and whitegoods industries, rationalised their operations. Import penetration, which was already high, increased as the Australian industry failed to capitalise on the growth in the domestic market.

Figure 1: Indices of real manufacturing equipment investment and machine tools production and consumption, 1968–69 to 1994–95



Note: 1994–95 constant prices
Source: ABS

This was a turning point for the Australian machine tools industry. Some companies looked to increasing their international competitiveness. They diversified into new markets, particularly for export and automated systems for industries outside manufacturing such as mining, distribution and transport. The result has been an encouraging increase in production and exports in the last three years.

While there is little production of standard industrial robots in Australia, robotic machines are being developed for uses in many industries, including medicine, agriculture, forestry, minerals, films and services including transport and distribution.

The bounty scheme

The bounty scheme covers stand-alone machine tools and robotics as well as automated systems containing machine tools and robots as long as they are sold for use in the production of other goods. Machine tools and systems must be used for working metal or advanced materials. The scheme also provides duty-free entry of imports of these goods and inputs to their production.

With the bounty scheme restricted to certain types of machine tools, bountiable production covers less than half of the output of the machine tools industry. However, the performance of the bountiable sector has been much the same as that of the wider machine tools industry. Australian production of bountiable machine tools increased from about $95 million in 1992–93 to $144 million in 1994–95. A large proportion of the increase in production was exported; exports grew from $37 million to $69 million.

Bounty is calculated as a percentage of certain, limited factory costs of producing eligible goods. Neither the eligibility criteria and definitions in the Bounty Act, nor the prescribed processes for administering the bounty, have kept pace with technological change and modern commercial and administrative practice.

A small number of companies receive most of the bounty. In the seven years to 1994–95, the top 15 of the 261 recipients obtained over half of the total, each with payments between $1.1 million and $7.5 million. Around 30 per cent received less than $20 000 each.

In line with the general reductions in tariffs, the bounty rate has fallen to 5 per cent. Many producers now query the cost effectiveness of the scheme. Participants told the Commission that, while they were pleased to get it, they now treat it more as a supplement to overheads, training and research and development.

Economic effects of the bounty scheme

The original bounty scheme was designed to provide a high level of assistance to the machine tools industry; assistance from the bounty and the tariff totalled twice the manufacturing industry average. While the tariff was later removed,

the assistance provided by the bounty remained twice the manufacturing average tariff throughout the 1980s. In 1989 it was still 40 per cent. Not until the 1990s did the bounty rate fall into line with the general level of tariffs.

This high assistance did not lead to substantial growth in the machine tools industry. Even when the bounty rate was high, the performance of the machine tools industry was sluggish. There was no real growth in output for two decades. Only in the last few years, when the bounty rate has been falling to a low level, have there been signs of real growth. Recent increases in exports are encouraging but have been limited to a small number of companies.

Demand for capital goods is largely dependent on demand for user industries' goods and macroeconomic factors such as interest rates. Much local production concentrates on custom designed machinery and adapting imports. Removing the tariff in 1980 made machine tools available for Australian industry at world prices and may well have benefited user industries. However, this appears to have had little effect on trends in either local production or imports of machine tools. To a large extent, local production is complementary to, rather than competitive with, imports.

The major economic effect of the bounty has been to bolster the revenue of machine tool producers. When the rate was high, bounty payments cushioned recipients against market downturns and provided a source of start-up funding to new companies, some of which have since expanded into successful businesses. Major users of machine tools, such as the automotive industry, were also able to benefit. However, the Commission has not been able to identify any special factors which would justify such significant transfers of revenue to this particular sector of industry. While metal working machine tools and robotics are important inputs to production in a wide range of industries, so too is the production of other types of capital equipment, much of which receives no assistance at all.

In summary, even when the bounty was high, the scheme does not appear to have had much effect on production and resource use. Its impact is even less today. The most significant economic effect is to redistribute revenue from taxpayers to the machine tools industry with little net benefit to the community as a whole.

Effectiveness of the bounty scheme

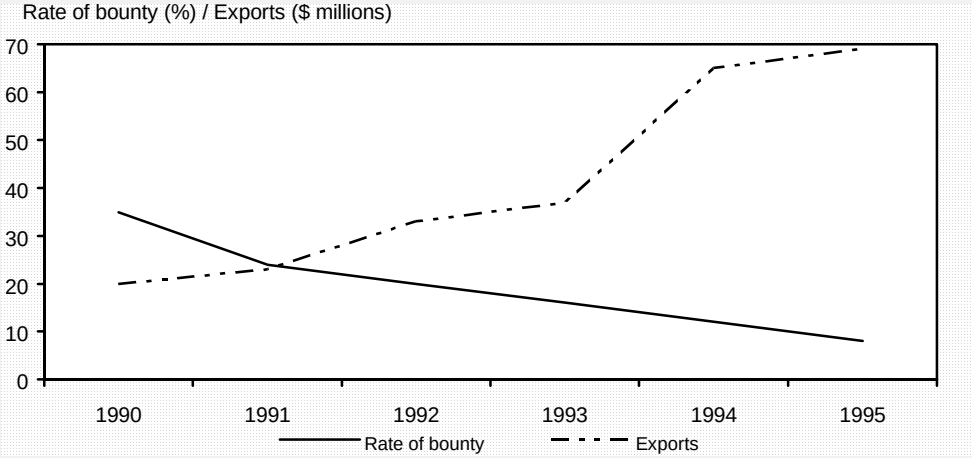
Over the years, a number of objectives have been added to the bounty scheme in addition to its basic one of encouraging a viable machine tools industry in Australia. Has the scheme been effective in achieving these other objectives?

Exports

The objective of promoting exports of 'high tech' machine tools and robots was added to the scheme in 1985. The Government was keen to encourage development of advanced technology machines, but appreciated that the domestic market for such equipment was relatively small.

Exports of machine tools have grown rapidly in the past five years (see Figure 2), largely in response to factors other than the bounty. Rationalisation of traditional user industries encouraged companies to diversify into new markets and some have been successful in moving into niche markets.

Figure 2: Rate of bounty and bountiable exports



Source: *Bounty (Machine Tools and Robots) Act 1985* & ABS

At current rates, the bounty is insignificant compared with the costs of exporting such as exchange risk, transport and marketing. It is not an effective measure for promoting exports of machine tools and robotics.

Supporting robotics development

Australian robotic machines use many imported parts that are modified locally to suit particular applications. The novelty in these Australian machines lies not so much in simple manipulation of objects but in other aspects such as vision systems or application to new areas such as transport, distribution, mining and agriculture.

As the bounty scheme's definitions date from the early 1980s and as designs and applications have changed, it is difficult to predict whether robotic machines produced using new technology or employed in non-manufacturing operations will be eligible for bounty payment until production is well advanced.

The bounty scheme has provided some assistance to the development of metal working machine tools and systems incorporating imported robots. However, it is so dated and uncertain in its application to more novel designs that it seems to have had little effect on the development of advanced robotic technology in Australia.

Encouraging the use of advanced technology in Australia

The scheme has assisted metal using industries like motor vehicles and whitegoods to obtain some of their capital equipment at duty free prices. However, because of its narrow boundaries, the scheme does not apply to most advanced automated systems in industries and activities outside of metals manufacturing. It has provided little incentive for investment in equipment for the vast majority of Australian industries.

Companies introduce advanced technology when it is likely to be profitable as part of their investment strategy. The bounty could have some influence on the cost of a small proportion of a company's total investment in new capital equipment. But this would be dwarfed by the main factors affecting investment in plant and equipment, particularly interest rates and expected demand for user industries' output.

Manufacturing industry investment in plant and equipment has been growing substantially in real terms for the past fifteen years, while production of machine tools has not increased. Even when the bounty was high during the 1980s, bountiable production did not keep pace. It is unlikely that the scheme's incentives would be sufficient at recent levels to have much effect on the demand for capital equipment even in its traditional user industries.

Overlapping assistance

The bounty scheme is only one program in the total mix of assistance measures available to industry generally or to relevant sectors of manufacturing, including assistance for research and development and, for some firms, assistance under the passenger motor vehicle export facilitation scheme. The interactions of these measures can be quite complex. When the bounty was high, it encouraged companies to 'shop' for assistance in the most advantageous way. As a consequence, eligibility rules were tightened and the value of all other government grants deducted from the amount of bounty otherwise payable. Furthermore, for those machine tool producers eligible for the motor vehicle export facilitation scheme (which provides assistance at rates higher than the bounty), the value of bounty payments is deducted from the value of credits received under the scheme.

In contrast, the assistance for research and development (R&D) provided by the bounty scheme does overlap with the assistance provided by the 150 per cent tax deduction for R&D expenditure. As the benefits of R&D in the machine tools and robotics industries are to a large extent retained in-house, there does not appear to be justification for special assistance for R&D in a bounty scheme in addition to that which is provided generally.

The Bounty Act

The Bounty Act has been amended almost every year. The scheme is complex, difficult to understand and uncertain in its application. Eligibility criteria are difficult to interpret and have not kept pace with technological change, requiring some resort to Ministerial Determinations to try to keep the Act relevant to its objectives. Once eligibility is established, the calculation of the bounty is needlessly complex, increasing the costs of administration for Government and compliance costs for industry. The Commission estimates these costs could be up to $1.25 million a year, or 15 per cent of the annual value of the bounty.

If a bounty scheme were to continue, it should be simplified with a new enabling, rather than prescriptive Act and it should apply to Australian value added rather than particular elements of factory cost.

Tariffs and by-laws

The bounty scheme also provides for duty free entry of imported eligible machine tools, robots and parts. This aspect of the scheme should remain, to ensure Australia's continued access to this equipment at world prices.

However, there is a need for some change to the tariff provisions relating to machine tools and robots. The complex and uncertain definitions and end-use restrictions of the Bounty Act are mirrored in the tariff provisions and four policy by-law items. This means that the Australian Customs Service(ACS) faces the same definitional problems when determining whether certain imported machine tools and robots are eligible for duty free entry. It would be sensible for the ACS to review the definition of a robot with a view to finding one which is commonly used in international trade.

Using the by-law items is also administratively cumbersome; they have been relatively little used except for robots. The policy by-law items of the scheme have not been efficient in ensuring duty free entry of imported machine tools and robots.

The Commission's recommended approach

The machine tools and robots bounty is no longer effective. In view also of its high administrative and compliance costs, the bounty is not delivering net benefits to the Australian community. It should be allowed to lapse on 30 June 1997.

Given the small amounts involved, the Commission does not expect that the costs of adjustment will be significant for the machine tools and robotics industries as a whole. This is not to say that individual companies will not be affected. But there is nothing to suggest that any adverse effects from removing the final 5 per cent of bounty would not be outweighed by continuing improvements in competitiveness and further export growth.

Duty free entry of machine tools and robots should be retained. Reducing the tariff to zero on certain items would enable three out of the four policy by-law items to be removed and would provide a more certain outcome than reliance on the Tariff Concession System.

Recommendations

The machine tools and robots bounty scheme should lapse on 30 June 1997.

The tariffs on those machine tool items in Schedule 3 to the Tariff that are set at zero should remain so.

The tariff on parts falling to items 8466.10, 8466.20, 8466.30, 8466.93 and 8466.94 of Schedule 3 to the Tariff should be reduced to zero from 1 July 1997.

The machine tools and robots bounty scheme by-law items 48, 49 and 55 of Schedule 4 to the Tariff should be rescinded from 1 July 1997.

Duty free entry for robots and parts under by-law item 30 should be retained; the current definition of a robot should be replaced with one commonly used in international trade.

The Commission draws attention to its remarks on:

- the availability of skilled labour (section 2.3);
- the Tariff Concession System (section 4.3); and
- capitalisation of the bounty (section 6.6).

1 THE INQUIRY

1.1 Scope of the inquiry

In January 1996 the then Assistant Treasurer referred the Australian machine tools and robotics industries to the Industry Commission for inquiry and report by 29 October 1996.

The terms of reference for the inquiry ask the Commission to:

- report on the effectiveness of the Machine Tools and Robots Bounty Scheme;
- identify and report on areas of overlap between this form of assistance and other assistance measures which are available to the industries;
- identify and report on key factors affecting industry development and ways to encourage and improve efficiency and international competitiveness of the industries; and
- advise whether assistance should continue to be accorded to the production of machine tools and robots after the current bounty scheme terminates on 30 June 1997 and, if so, the nature and extent of such assistance, including capitalisation of bounty.

The terms of reference also ask the Commission to examine and report on the appropriateness of the current definitions of eligible equipment and eligible recipients in the *Bounty (Machine Tools and Robots) Act 1985* and on any possible anomalies in the treatment of different goods and modifications to certain systems.

The full terms of reference are set out on page iii.

1.2 Background

The metal working machine tools industry has a long history of assistance through bounty and tariff arrangements. Bounty assistance has been provided to the metal working machine tools industry since 1972. The current scheme commenced in 1985 and, after a review by the Bureau of Industry Economics in 1990, it was extended with some modifications in 1991. Appendix D presents a more comprehensive history of the machine tools and robots bounty.

The machine tools and robots bounty assists Australian manufacture of certain machine tools, advanced technology machines, robots and machinery modifications and retrofit activities. Generally, the bounty is payable on the eligible in-house value added component on specified equipment designed for use principally for working of metals or advanced materials (ceramics, composites or polymers) and robotic machines. Because of the 1988 Closer Economic Relations Agreement, bounty is not payable on goods exported to New Zealand.

The rate of bounty until 30 June 1995 depended on the classification of the equipment and goods. The rate is now uniform. On 1 July 1996 the rate fell from 8 per cent to 5 per cent. The bounty scheme is due to expire on 30 June 1997.

The objectives of the bounty arrangements have changed over time. When the original scheme was introduced in 1972, the objectives were defence-related and the aim of the scheme was to help maintain a viable machine tools industry without encouraging its expansion (Hansard, 17 August 1972, p. 2148).

When the current scheme was introduced in 1985, the Government announced its key objectives as being to:

> ... encourage the development of a modern competitive metal working machine tools industry, facilitate development of an Australian robot industry and assist modernisation of user industries. (Hansard, 18 November 1985, p. 2987)

Thus, the major thrust shifted from defence. This shift was consistent with the Government's move in 1984 (and which has been maintained to this day) to base defence industry policy on broader defence objectives rather than economic or industry development objectives (IC 1994).

The 1985 scheme was renewed with amendments in 1991. The objectives of the current scheme can be summarised as being to:

- encourage the restructuring toward high technology areas and new areas of metal cutting technology;
- help maintain a modern viable metal working industry;
- encourage development of high technology associated with robot production;
- enable user industries to have ready access to modern machines at world prices; and
- foster processing technology for new materials, such as ceramics, polymers and composite materials.

Since 1991, the *Bounty (Machine Tools and Robots) Act 1985* has been amended numerous times to modify the definition of goods covered by the bounty.

1.3 Inquiry issues

The principal issue for this inquiry is whether assistance should continue and, if so, in what form. This requires an assessment of the effectiveness of the current bounty scheme, as well as whether assistance remains appropriate.

The terms of reference also require the Commission to report on factors affecting the industries' structure and competitiveness. So the Commission has examined the industries' strengths and weaknesses, the influence of technology, research and development, labour market issues and the various assistance arrangements available to the industries.

As the assistance environment has changed significantly for manufacturing since the Act was introduced, the Commission has also examined the bounty arrangements in the context of the current assistance environment, where tariffs on most imported goods (except for passenger motor vehicles and textiles, clothing and footwear) have been 5 per cent or less since 1 July 1996.

1.4 The inquiry process

On receiving the reference, the Commission advertised that it was about to undertake an inquiry into the bounty arrangements. It also sent a circular to all companies that received bounty payments between 1992–93 and 1994–95, major producers and users of bountiable machine tools and robots, and other identifiable interested people inviting them to participate in the inquiry.

The Commission visited a range of organisations to obtain some first hand knowledge of machine tools and robots and their applications prior to preparing an issues paper which was sent to all bounty recipients and those who registered an interest in the inquiry. The Commission then undertook further visits to broaden its knowledge of the industries.

Of the 116 companies that received bounty payments in 1994–95, only 15 made a submission prior to the Commission releasing a draft report on 18 June 1996. The Commission invited people with an interest in the inquiry to comment on the draft report in the form of a submission and/or attendance at a public hearing. The Commission received a further 8 submissions commenting on the

draft report. A public hearing was held in Melbourne on 25 July and was attended by most of the leading bounty recipients.

A list of organisations visited, those that made submissions and those that attended the public hearing appears in Appendix A.

1.5 Industry survey

Because of the paucity of up-to-date information on the machine tools and robotics industries, particularly in respect of bountiable equipment, the Commission undertook a survey of bounty recipients. A questionnaire was sent to 170 firms that received a bounty payment between 1992–93 and 1994–95. Much of the information sought had already been provided to the Australian Customs Service (ACS) in support of bounty claims. However, as the information supplied to the ACS is confidential, it was not available to the Commission. A copy of the survey questionnaire and a list of those who completed it appear in Appendix C.

1.6 Structure of the report

The following chapter focuses on developments in the machine tools and robotics industries, particularly on recent trends, supply and demand conditions, strengths and weaknesses of the industries and labour market issues.

The key features of the bounty scheme are analysed in Chapter 3 including its coverage, some of the definitional issues, and administrative and compliance costs.

Tariff and concessional arrangements for imports are discussed in Chapter 4.

Chapter 5 looks at the extent of overlap between the bounty scheme and other assistance arrangements available to the machine tools and robotics industries, particularly for research and development.

In the final chapter, the Commission provides an assessment of the effectiveness of the bounty scheme and its recommendations for future policy.

2 THE MACHINE TOOLS AND ROBOTICS INDUSTRIES

The term ‘machine tools’ refers to machines that work materials such as metal, wood, stone, or plastics. These include manually controlled ‘low-tech’ equipment such as simple wood or metal working lathes, large machines for cutting, welding and machining metal, advanced computer controlled machines used for complex precision operations, and flexible manufacturing systems which perform several tasks as part of a production line or in a manufacturing module.

Machine tools are a core component of the manufacturing and engineering sectors, providing other manufacturers with critical productive technology. The machine tools industry also has skilled labour and technological linkages with user industries with a consequent improvement in manufacturing capability in Australia. Within the manufacturing sector, the automotive and whitegoods industries have traditionally been the major users of machine tools and robotics. While these sectors remain important, in recent years advances in computer controls and other technology have seen new applications of sophisticated equipment in a wider range of industries, including mining and agriculture.

The range of applications has also increased. In metal working industries, single function machine tools are used for milling, grinding, cutting, pressing, welding and roll forming of metal. More sophisticated multi-function tools combine several of these operations. In other production processes, combinations of robotics and computer controls have allowed automation and integration of a number of sequential tasks, such as scanning for product type, sorting according to product orders, then palletising and dispatching orders.

The ongoing development of computer technology remains a major influence on the industries’ expansion. While numerically controlled machine tools and robots were first developed in the 1950s, applications have grown rapidly since the late 1970s. The advent of minicomputers in the 1970s was a significant milestone, resulting in the widespread use of computer numerical controllers (CNCs). These made numerically controlled machine tools cheaper, more reliable, and easier to program. Programmable logic controllers (PLCs) also represented another step in the evolution of electronic controllers, allowing, among other things, more sophisticated sequencing of manufacturing processes.

At the lower end of the machine tools market (in terms of technology and price), tools such as basic grinders and lathes are bought off the shelf. As they are highly substitutable with other brands (and easy to manufacture), there is strong import competition, as was indicated by Epic Industries (sub. 27).

At the sophisticated end of the market, while price matters, competition is based more on factors such as product performance and quality. Specific tenders are sought based on the purchaser's technical or performance specifications and price is then negotiated. Machine Development Centre commented:

> [at the high tech end of the market] Machine tools and robots tend to be relatively price inelastic ... (sub. 10, p. 4)

What 'robots' cover is more difficult to define. There is no generally accepted definition of what constitutes a robot. The Australian Science and Technology Council (ASTEC 1982) report specified three characteristics, including that of versatility, required for such equipment to be called a robot:

> ... a machine for handling objects (including materials, parts or tools) which:
> - is versatile (able to carry out several tasks);
> - is programmable; and
> - operates independently of human control. (p. 10)

Since then, continued technological advances have led to the development of 'second generation' robots. These robots, rather than undertaking repetitive tasks, use computerised systems to gather external data which is used to co-ordinate and control operations. Such input may come from, for example, vision and mobility systems. An example is a product made by Forbio Robotics which uses imaging systems to instruct a robotic cutting system for plant seedlings. The question of what constitutes a robot within the bounty scheme is discussed in Chapter 3.

Robots are used in manufacturing industries: for example, in the automotive industry they are involved in welding, drilling and assembly operations. Like machine tools, robotic machines are increasingly being used in other types of manufacturing including food processing, materials handling and distribution, as well as activities in such diverse areas as pathology laboratory equipment, transport and mining. The ongoing development of computer technology remains a major influence on the changing scope of the industries. As Australia produces few if any standard metal working robots, these are imported for incorporation into production systems.

Australian robotic production tends to be concentrated in new types of applications which often involve convergent technologies from fields as diverse as genetic engineering, telecommunications, sensing, pathology and

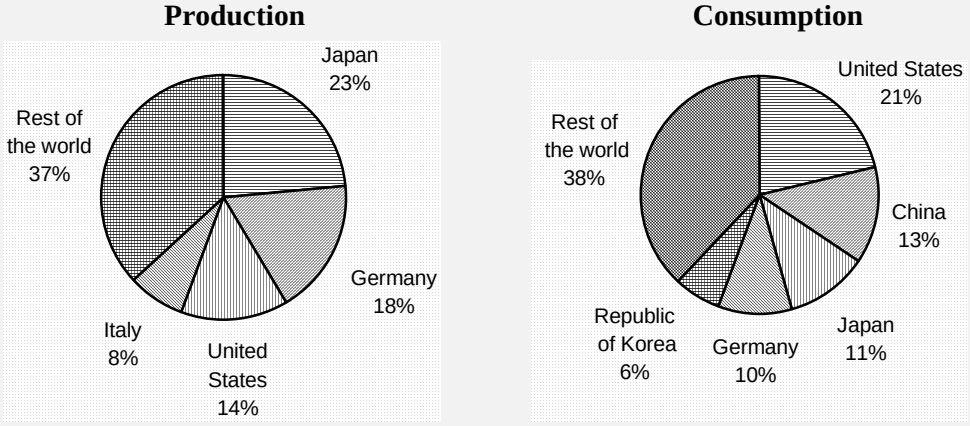
engineering. These technologies are being combined with leading edge vision, mobility and computing systems to develop robots for use in a variety of industries.

2.1 The world market

World production and consumption of machine tools, particularly the more sophisticated products, has traditionally been concentrated in the more highly developed economies — especially Japan, Germany and the United States. World production was estimated at around $40 billion in 1994 (American Machinist 1995).

Strong domestic and regional demand for low-technology machine tools, and relatively low costs of production, have seen developing economies such as China and Taiwan emerge as major producers and consumers of machine tools. Recent figures indicate that China is the sixth largest producer and second largest importer of machine tools in the world (American Machinist 1995). The United States, and to a lesser extent, China, Japan and Germany, account for the majority of consumption (see Figure 2.1).

Figure 2.1: World machine tool production and consumption, 1994



Source: American Machinist 1995

World production of off-the-shelf industrial robotic equipment is highly concentrated and dominated by several large companies in Japan, Sweden, and the United States. This reflects the highly developed in-house expertise necessary for these products, and in some cases the economies of scale in production of these machines. World production was estimated to be around $5 billion in 1994 (UN 1995).

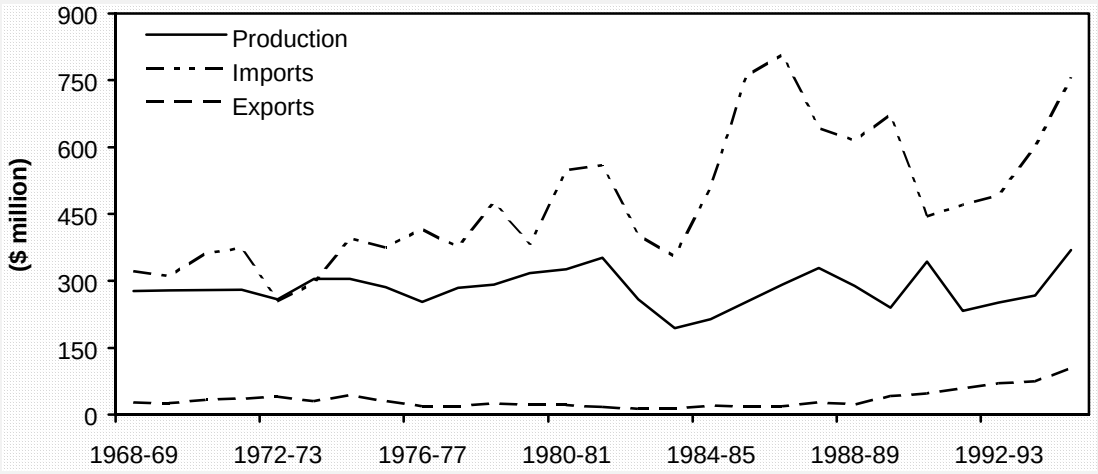
Volatility is a strong feature of both the industrial robotics and machine tools markets. For example, between 1990 and 1993, the world market for industrial robots halved. Conditions in Japan strongly influenced this outcome, and accounted for over four-fifths of the decline.

2.2 The Australian market

2.2.1 Production and consumption

The Australian market for machine tools now amounts to about $1 billion, up from less than $700 million in 1992–93. About three quarters is supplied by imports. The trend in the real value of domestic production of machine tools remained relatively constant for many years, with variations in consumption met largely by imports (see Figure 2.2).

Figure 2.2: Real machine tools production and trade, 1968–69 to 1994–95

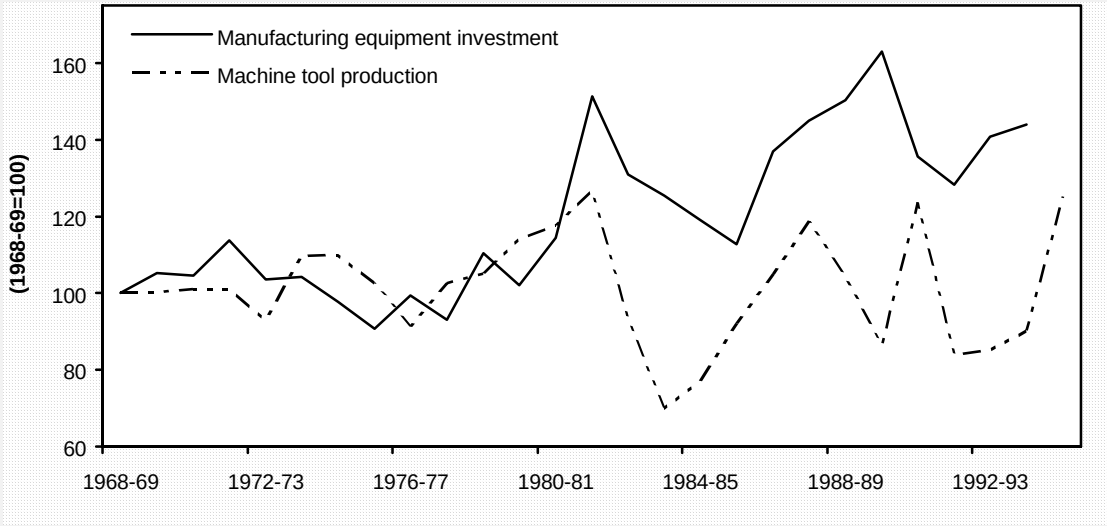


Note: 1994–95 constant prices
Source: ABS, Cat. No. 8203.0, 8221.0 and 5464.0

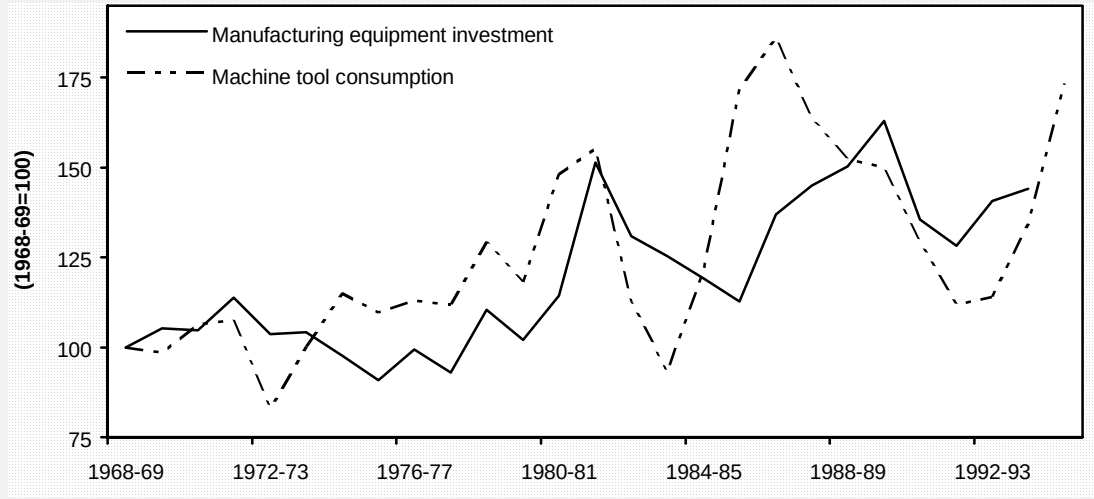
Machine tools are capital goods. Activity in the Australian machine tools industry is therefore subject to the same kind of cyclical volatility that characterises investment generally. The strong links between expenditure on machine tools and expenditure on plant and equipment by the manufacturing sector for the period since 1968–69 are illustrated by Figure 2.3.

Figure 2.3: Indices of real manufacturing equipment investment and machine tools production and consumption, 1968–69 to 1994–95

a: Production



b: Consumption



Note: 1994–95 constant prices

Source: ABS, Cat. No. 8203.0, 8221.0 and 5221.0

Macroeconomic factors, such as aggregate output, have been important determinants of manufacturing investment in plant and equipment in recent years. The restructuring of manufacturing associated with reductions in protection also led to higher aggregate investment in manufacturing sector plant and equipment (Marks and George 1995).

Both investment in manufacturing plant and equipment and the market for machine tools have shown a similar trend throughout the period. During the 1970s, there was virtually no real growth in investment or domestic production of machine tools.

However, in the 1980s, investment in manufacturing plant and equipment started to grow in real terms. Imports of machine tools increased in real terms as well, so that the trend rate of growth of consumption of machine tools and investment in plant and equipment increased at about the same rate. In contrast, domestic machine tool production became more volatile while showing no overall growth.

In the last few years, Australian production of machine tools has increased significantly for both the domestic and export markets. The Commission estimates that production had risen to about $370 million by 1994–95, from less than $250 million two years before. While much of this increase appears to be recovery from recession, some of the growth represents a lagged response to the high levels of bounty assistance available to high technology exports through the late 1980s. This is reflected in the four-fold growth of exports from 1988–89 to 1994–95 in real terms.

This recent growth in exports shows a remarkable transformation by a section of the Australian machine tools industry. Within a few years, a small number of companies in the industry, which have developed expertise in certain types of machinery, have shifted their focus from the domestic to the world market. Faced with a decline in demand from traditional customers, they decided to improve their products and diversify. They are not only catering for a wider market, but are producing world class machinery which can hold its own against the traditional sources of supply from Japan, Germany and the United States.

ANCA argued that a commitment to exports was essential for an Australian producer to be successful:

> It is not possible to build a significant machine tool manufacturing business without commitment to export. During periods of recession local machine tool consumption almost disappears. (sub. 17, p. 2)

Most of the growth in the Australian market, including imports, has been in high precision, flexible automated machinery and systems. Some of it includes robotic elements. The value of Australian robot consumption was estimated to be around $25 million in 1995. The number of robots installed each year in Australia has increased from about 150 in 1990 to over 200 in 1995 (ARA 1996).

2.2.2 Bountiable production

Lack of up-to-date information on the industry — particularly the bounty sector — led to the Commission undertaking a survey of bounty recipients. On the basis of the survey, some indicative industry-wide estimates have been calculated. These include factors such as production and company size, and the significance of bountiable activities as a proportion of all activities.

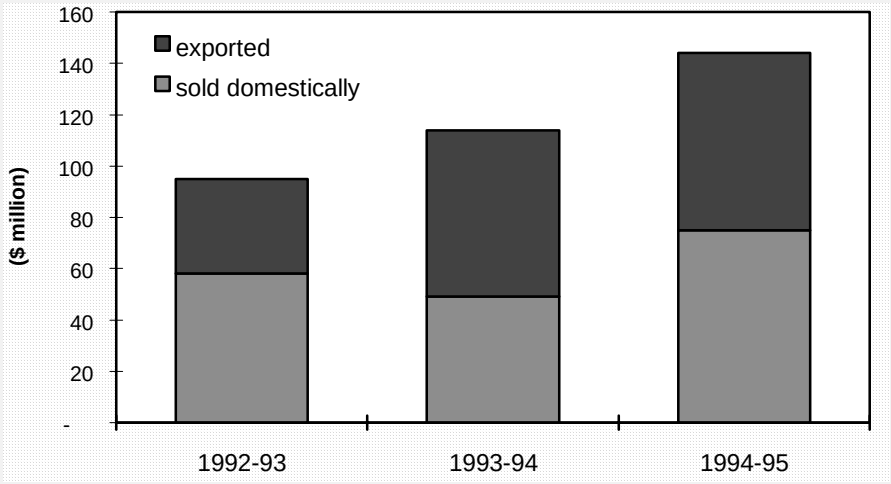
In 1994–95, bountiable production of machine tools and robots was estimated to be around $144 million of which about $70 million was exported, mostly to Asia and the United States. Sixty per cent of output was of 'high tech' equipment. Like the machine tools industry as a whole, much of the increase in bountiable production was accounted for by growth in exports (see Figure 2.4).

Table 2.1: Bountiable exports, 1990–91 to 1994–95

Year	*Exports $m*
1990-91	23
1991-92	33
1992-93	37
1993-94	65
1994-95	69

Note: Figures are based on tariff codes 8456–8463, 8479
Source: ABS, Cat. No. 5464.0

Figure 2.4: Bountiable production for domestic and export markets, 1992–93 to 1994–95



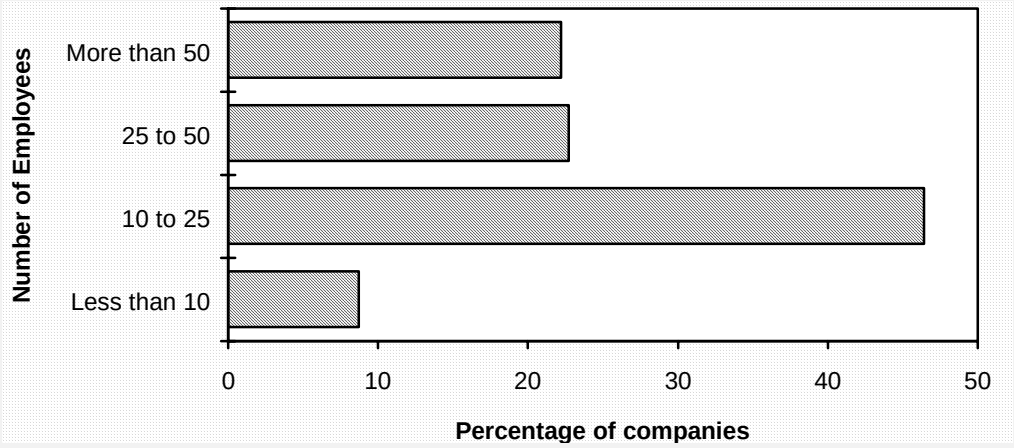
Source: ABS, Cat. No. 5464.0 and IC estimates

2.2.3 Industry characteristics

The Australian machine tools and robotics industries consist mainly of small companies. In a small market such as Australia's, there may only be one or two manufacturers capable of meeting a user's job requirements.

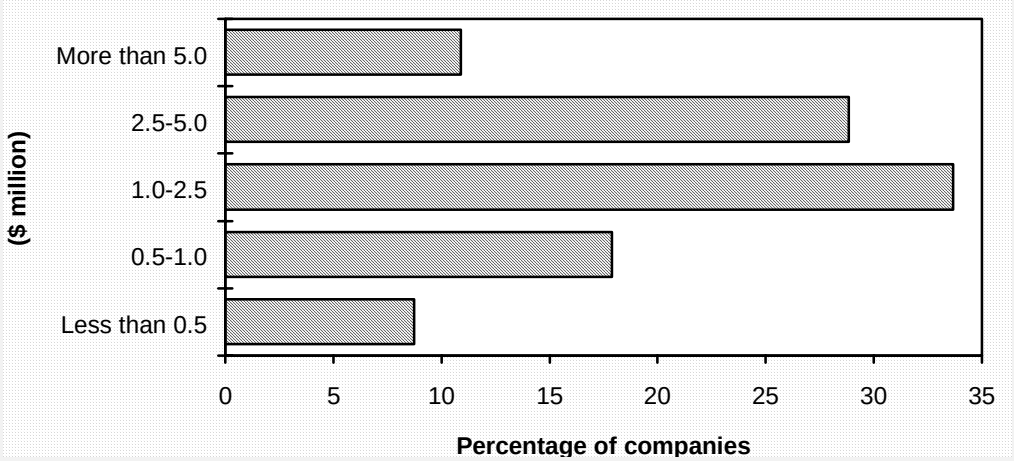
Over half the companies producing bountiable goods were estimated to employ 25 or less people in 1994–95 (see Figure 2.5), while annual sales of well over half of companies were estimated to be less than $2.5 million (see Figure 2.6) and varied between $0.5 million and $22 million.

Figure 2.5: Estimate of distribution of company size by employment, 1994–95



Source: Estimates derived from Industry Commission survey

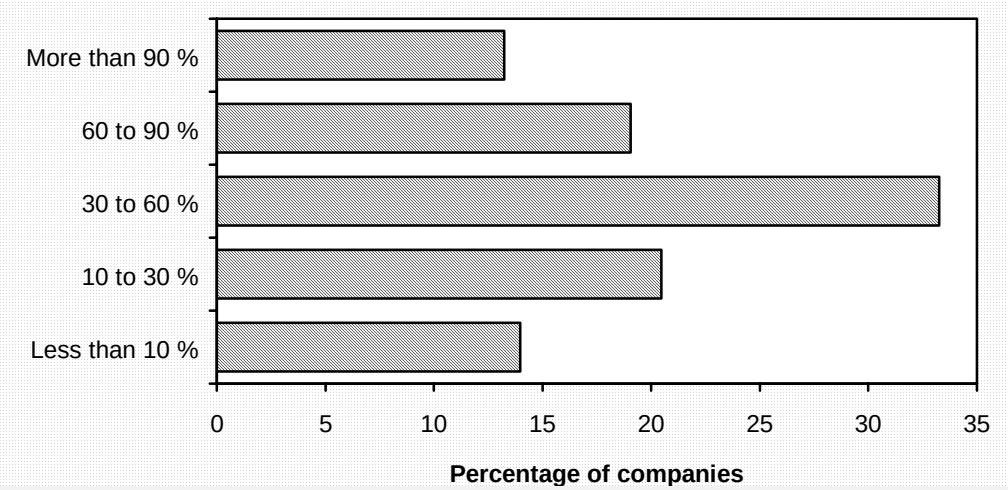
Figure 2.6: Estimate of distribution of total sales, 1994–95



Source: Estimates derived from Industry Commission survey

For most companies, the proportion of bounty sales in their total sales was less than 60 per cent. However, for over 10 per cent of companies bountiable sales represented over 90 per cent of their total sales (see Figure 2.7).

Figure 2.7: Estimate of bountiable sales as a proportion of total sales for bounty recipients, 1994–95



Source: Estimates derived from Industry Commission survey

2.2.4 User industries

The Australian machine tools industry has focused on providing equipment for a few main customers in the domestic market, such as the automotive and fabricated metal products industries. For example, in 1990 over half of the industry's output went to the automotive and whitegoods sectors. Participants indicated that, while innovation and technological change have seen a growth in applications in a wider range of industries, makers of machine tools and manufacturing systems are still heavily reliant on these traditional users.

A similar story exists for industrial robotics. Between 1992 and 1995, motor vehicles and fabricated metal products accounted for around two-thirds of new industrial robotic installations in Australia.

This historical reliance is illustrated by the link over time between machine tool production and production in the fabricated metal products sector (see Figure 2.8).

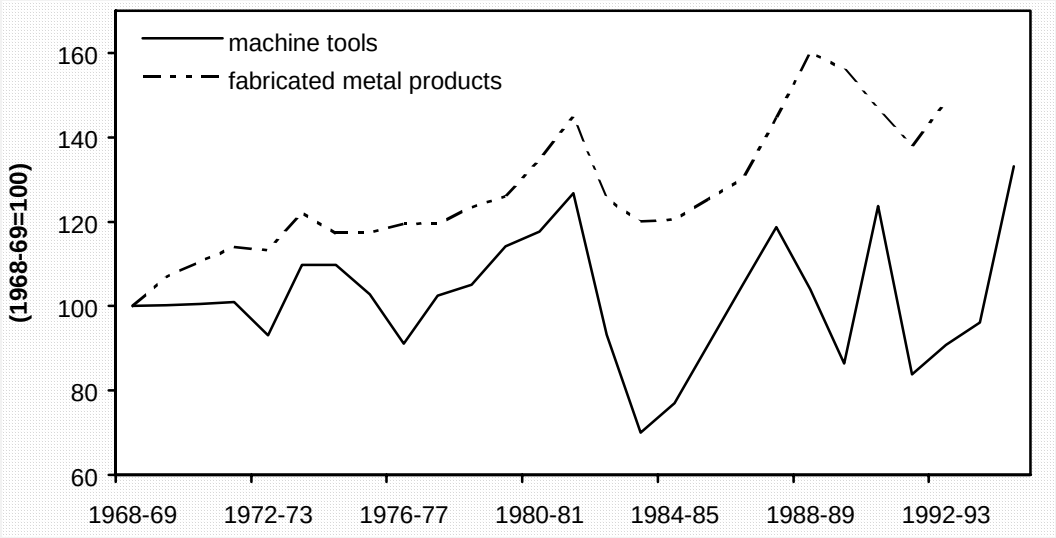
All the same, this reliance on a few customer industries is changing as technology allows a wider range of applications. The machine tools and robotics industries are actively exploring opportunities in non-traditional sectors such as mining and agriculture.

Factory Automation + Robotics said it had:

> ... sought actively to become less reliant on the automotive industry. This has led us into other industry sectors such as food processing, timber, building products and warehousing and distribution. (sub. 11, p. 1)

Lewis Australia (sub. 13) indicated that, while the automotive industries were currently the major user of machine tools, this source of demand was falling. It saw material handling and packaging applications, and applications in the mining and metals industries as growth areas.

Figure 2.8: Indices of real machine tools and fabricated metal products production, 1968–69 to 1994–95



Note: 1994–95 constant prices

Source: ABS, Cat. No. 8203.0 and 8221.0

Recent robotics data support this view. While the motor vehicle industry continues to be the largest user of robots, in 1995 the food and beverage industry accounted for around 20 per cent of new robot installations.

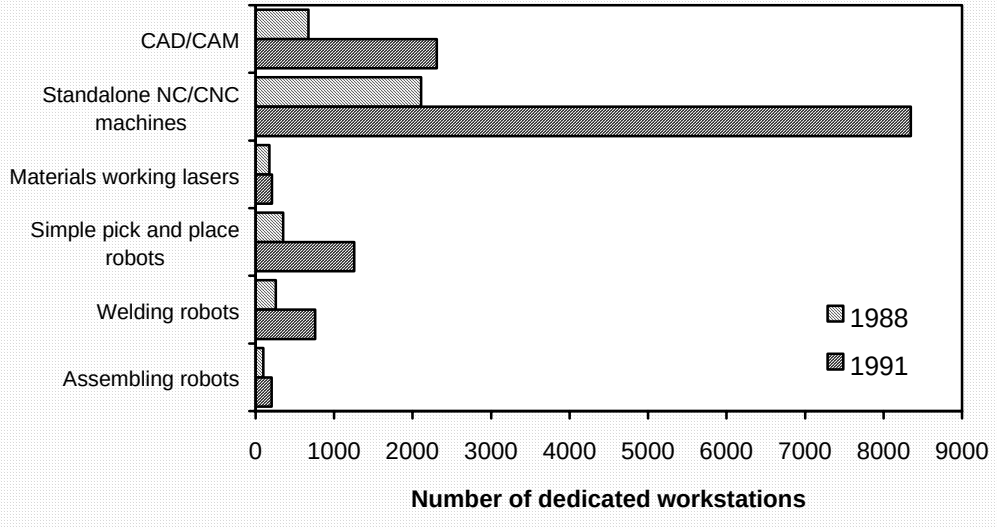
There is evidence of increased take-up of advanced machine tools and industrial robotic equipment throughout the manufacturing sector. Information on the number of manufacturing sector establishments with 'advanced technology' indicates that between 1988 and 1991 (the latest year available) the use of, for example, CNC machines and robotics increased significantly (see Figure 2.9).

Australian companies are also involved in research and development for so-called 'second generation' robotics, with potential applications in a broad

range of industries. Michael Kassler and Associates noted:

> Australian researchers and industrial companies possess internationally recognised skills in relevant areas such as methods of navigation for mobile robots, machine vision, automatic handling of soft materials such as plants, textiles, live animals and food, and software development. (sub. 2, p. 3)

Figure 2.9: Australia's changing technological base — 1988 to 1991



Note: CAD: computer aided design
CAM: computer aided manufacturing
NC: numerically controlled
CNC: computer numerically controlled

Source: ABS Cat. No. 8123.0

The links between the level of automation and the performance of the economy as a whole was an issue raised by some participants. The Australian Robot Association (sub. 21) argued that automation was a key to the competitiveness of many industry sectors and called for the development of a national automation policy. Whether such a policy would be helpful is one question, but Australian companies are increasingly investing in advanced automation technology where it is profitable to do so.

2.3 Factors affecting the industries' development

Table 2.2 summarises the strengths and weaknesses of the machine tools and robotics industries in Australia. These have been discussed above and are developed in more detail in this section. They reflect the isolation and small size of the Australian market, the expertise that has developed in flexible

systems and catering for niche markets, technological sophistication, and the shortage of labour with the appropriate skills.

Table 2.2: Factors affecting the competitiveness of Australia's machine tools and robotics industries

Strengths	*Weaknesses*
• natural protection in some market segments • innovative companies operating in niche market segments • expertise in flexible manufacturing systems for low to medium scale plants • highly developed technical design and research capabilities	• small scale of local industry • narrower scope of local markets • reliance on a few industry sectors • lack of linkages with similar operations in a small domestic market • shortage of appropriately skilled tradespeople • shortage of appropriately skilled engineers • restricted access to finance

The nature of the Australian market

The relatively small scale of the Australian manufacturing sector was seen by participants as a significant disadvantage to the local machine tools and robotics industries.

Factory Automation + Robotics commented:

> The most difficult aspects of running an engineering business in Australia are ... lack of volume sales of a product on which to amortise R&D costs ... (sub. 11, p. 5)

Similarly, John Heine and Son indicated that size of the local market was a major problem:

> The machine tool industry in Australia has a number of unique problems ... the Australian market is very small and this inhibits development. (sub. 7, p. 1)

Lewis Australia considered that larger scale overseas manufacturers had an advantage over Australian competitors in terms of both the scale and scope:

> ... overseas manufacturers having access to larger local markets are able to obtain greater use of established designs for equipment produced for other customers ... also ... larger suppliers have considerably greater financial muscle ... (sub. 13, p. 4)

Having a small domestic market is a significant constraint on the industries' development in Australia. Unless export opportunities are fully exploited, it means that opportunities to develop a reliable sales base are more limited than in the large domestic markets available in some other countries. This can

result in an unpredictable cash flow and so restrict access to finance. Machine Development Centre (MDC) said:

> Banks will not lend to MDC except by security held over the owners' assets due to the perceived risk of MDC activities. ... the key impediment to growth of MDC is [lack of] capital. (sub. 10, p. 1–2)

Crib Point Engineering commented:

> Our experience would suggest that our industry is severely disadvantaged [in accessing funds for research and development]. (sub. 3, p. 2)

Another consequence of the small market is the small number of machine tool and robotic producers in Australia. These fewer producers have more limited opportunities to form 'clusters', unlike the thousands of closely engaged machinery and engineering companies in Japan, Europe and the United States. This close association encourages spillover of expertise and skill development between companies to improve substantially the overall technical level of the industry.

Specialisation and niche markets

As the level of product sophistication increases, the market for machine tools becomes more highly differentiated. One aspect of this is a distinction between generally available equipment that can be purchased off the shelf, or with some relatively minor modifications, and equipment that must be dedicated to individual requirements. Generally available equipment is freely traded, allowing technology transfer with the machine. In contrast, there may be a high degree of in-house specialised knowledge involved in the development of dedicated machinery.

The production of sophisticated general purpose equipment requires substantial resources at the development phase, involving many years of expert technical input. There are often also other economies of scale in production. The combination of these factors means that production of these machines is usually concentrated in Japan, Europe and the United States. Consequently, Australian industry depends heavily on imports of these machines.

This point was recognised by participants. John Hart noted:

> Commercial articulated robots are currently beyond the capability of Australia to design and build commercially ... general CNC machine tools will probably never be an option for Australia to produce. (sub. 4, p. 3)

In some cases participants indicated that local customers were prepared to pay a premium for imported equipment, for reasons of perceived quality differences. Factory Automation + Robotics said:

> ... our customers will pay a premium of 30 per cent to 40 per cent for an imported machine or system ... as it represents a lower risk. (sub. 11, p. 5)

Lewis Australia also noted:

[there is] ... a perception in certain areas that Australian technology cannot measure up to overseas technology. (sub. 13, p. 6)

A small number of Australian companies have successfully developed world-wide niche markets for generally available equipment, for example ANCA's development of high technology machine tools (see Box 2.1).

Participants mentioned several barriers to exporting, including significant tariff barriers. Laser Lab commented:

> ... there isn't a level playing field and we're severely disadvantaged with tariffs in other countries ... (transcript, p. 51)

Payroll tax was another impediment identified by participants. ANCA stated:

> ... when you ... export ... you are paying duty on the payroll tax. ... that worked out to about $3,000 per machine that we exported. (transcript, p. 66)

While many of the specialised machine tools used in Australia are imported, Australian companies have been successful in adding value by adapting and developing equipment for specific purposes (see Box 2.1).

An important application for such modified equipment is as an alternative to large scale, dedicated machines on a production line. This means they are well suited to the relatively small scale (in world terms) of Australian manufacturing production. For example, in the motor vehicles sector, Australian manufacturers now use flexible manufacturing systems for high precision vehicle assembly tasks (such as welding). These systems can be easily adapted to producing different models and products within the one production line. In larger scale plants overseas, individual models would normally be produced on dedicated production lines.

Opportunities for Australian companies in these areas arise both from their technical and design skills and their proximity to the market.

Participants stressed the technical design and development capabilities of sections of the Australian industry. For example, Machine Makers Australia acknowledged that Australia has advantages in products such as systems software and one-off manufactures for special purposes, and that the sources of these advantages related to:

> ... technically educated personnel ... entrepreneurial owner managers with high level technical skills ... (sub. 20, p. 3)

Box 2.1: Australian companies operating in niche markets

Australian companies have had success operating in niche markets domestically and overseas, both through the production of high-precision machines for specific tasks and in the modification of general purpose equipment for particular applications.

In the first category, an example is ANCA. This company is involved in the design and production of sophisticated grinders working to extremely fine tolerances. ANCA sells internationally to companies such as Boeing and General Motors in the United States.

Another example is Farley's development of advanced cutting systems for alloys used in the production in Australia of high speed catamarans. This has enabled more efficient production of these craft and has contributed to Australian builders capturing a large share of the world market for these vessels.

Other companies have had success in developing systems using available technology to solve particular problems. Lewis Australia is an example. In one case, through an international linkage, Lewis purchased a basic resistance seam welder design. This was modified and the CNC controls and servo-drives upgraded to make it faster. This product was then successfully sold to a domestic company producing automotive catalytic converters for domestic and export sales.

Invetech (sub. 8) observed that competitiveness in the development of sophisticated equipment stemmed from, among other things, the availability of well educated technologists and technicians and an innovative nature.

Similarly, Factory Automation + Robotics said:

> Australian engineers are inventive, and ... have developed an ability to customise solutions to a particular problem. (sub. 11, p. 12)

Designing and installing modified equipment typically requires substantial high level engineering input, especially in electrical, mechanical and computer engineering. Australian engineering skills are well suited to these applications. K D Binnie Engineering commented:

> Australia is well placed to develop specialist machines for niche markets ... (sub. 18, p. 4)

The opportunities for Australian companies are further enhanced by the sometimes poor technical support offered by overseas producers of general purpose equipment.

Participants acknowledged that in some circumstances local suppliers have significant advantages over international competitors particularly for smaller-scale applications. For example, a small company providing machine tools for the wine industry mentioned its advantage being closer to customers. This gave it a better understanding of the production processes and requirements, and the opportunity to offer innovative solutions to problems.

Lewis Australia indicated that knowledge of local requirements provided an advantage in some situations:

> As is the case in each country, machine tool manufacturers providing retool capabilities have some degree of advantage over overseas suppliers due to having a local labour force and a better knowledge of local requirements. (sub. 13, p. 4)

For custom-made machinery, a strong relationship between producer and consumer is necessary. John Hart suggested:

> It is a supplier/user relationship not a supplier/market situation — in most cases of automation equipment there is no real market — the situation is very much a build to specific purposes requirement. (sub. 4, p. 2)

Australian companies with superior design and other engineering skills are in a position to apply more automation to expanding Australian operations, especially in mining and food processing, and also in rapidly growing Asian markets, where many emerging manufacturing operations are at a scale and technology level similar to Australia.

Major international changes in user industries also present opportunities for Australian companies. The globalisation of the automotive sector is one example. Automotive companies world-wide are rationalising their supplier bases, and are looking to make greater use of companies able to supply subsidiaries all around the world. In addition, head offices are seeking to influence decisions on supply to local subsidiaries. For suppliers to be successful in this environment, they must be efficient in world terms — competitive in terms of cost and quality. If Australian suppliers can qualify for international contracts, large markets will potentially open up. However, if they do not meet the requirements, they will no longer be able to rely on supplying the Australian automotive sector.

Skilled labour shortage

One of the consequences of the relatively small size and the recent rationalisation of the Australian manufacturing sector is a relatively small pool of labour highly skilled in manufacturing technology, at both the professional engineer and trades levels. As the machine tools and robotics industries are at the most highly skilled end, these industries are particularly sensitive to changes in the demand for and supply of skilled labour.

The small size of the companies means that it is difficult for them to retain the benefits of training that they undertake. The small size of the industries and the limited number of jobs available also inhibits the development of specialised training to overcome these problems.

These issues were frequently cited during the inquiry by participants. For example, Factory Automation + Robotics indicated:

> Over the last decade there has been a lack of investment by many companies in apprenticeship training ... In addition, universities are teaching the engineering students the wrong material, and as employers we have to spend between one and five years training the graduates ... (sub. 11, p. 5)

Similarly, ANCA said:

> There exists a significant shortage of trained and capable CNC machine tool operators. ANCA's growth has forced it to advertise for machine operators in UK, Switzerland and South Africa. (sub. 17, p. 2)

ANCA also felt that the outlook for the supply of skilled tradespeople was bleak:

> The education system and industry no longer appear capable of training enough apprentices. Most of the traditional large company based apprentice training schools have been shut. ... The number of trade skilled migrants has also dropped dramatically. (sub. 17, p. 2)

Kirby Engineering pointed to skill shortages in particular areas given the difficulties it experienced in finding qualified machinists. However, it dealt with the problem by continuing with its in-house training program.

Similar concerns were expressed regarding graduate engineering qualifications. For example, Lewis Australia said that there was:

> ... an acute shortage of electrical engineers with experience in servo systems and high level machine control. (sub. 13, p. 6)

The problem is not fully explained by the quantity of engineering graduates. It may also be that the skills are inappropriate — at least in the area of high-technology manufacturing. Manufacturing technology is not a major

component of the engineering courses of most graduates. Machine Development Centre indicated:

> ... the type of training undertaken by university and TAFE students falls short in preparing them for the labour market ... [this problem] is most apparent in problem solving and thinking processes involved in mechanical design. (sub. 10, p. 3)

Some participants said they used bounty payments to fund training. Laser Lab commented:

> ... the level of bounty assistance that we have obtained has gone to assisting us in employing qualified engineers and particularly young graduates. (transcript, p. 30)

Kirby Engineering said:

> ... it certainly assisted us ... to train apprentices and engineers. (transcript, p. 29)

The Commission considers that using the bounty to fund training in a particular industry is inappropriate, and that training should be addressed more generally, as Governments have recognised.

The previous Commonwealth Government developed a National Training Reform Agenda, and subsequently a suite of policies known collectively as the National Vocational Education and Training System. The current Commonwealth Government's industrial relations and training policy includes the new Modern Australian Apprenticeship and Traineeship System. One element is the introduction of a wage guarantee for all apprentices and trainees under new workplace agreements (Kemp 1996).

A number of industry and company level programs have been set up to address skill shortages. For example, as part of its process of award restructuring, in 1991 Ford began developing a company-wide training program for both its trade and non-trade employees. In both cases, pay progression is linked to on-the-job competencies and formal knowledge. Some of these training components are TAFE-accredited. For non-trade employees, the structure is linked to a Vehicle Industry Certificate in different parts of the business (such as engine assembly, vehicle assembly). In addition to these programs, Ford has also developed several general education programs (from TAFE certificate to degree level) open to all staff relating to technology and management.

Another example is the Australian Chamber of Manufactures Training Centre which provides metals and engineering traineeships, an accelerated apprenticeship program in metal engineering and electronics, workplace trade skills for engineering graduates and courses designed to assist in the multi-skilling of existing trades persons.

Many companies are not large enough to undertake comprehensive training programs in-house, particularly given the need for flexible technical skills in both trade and engineering employees — in particular, the need for combined electronic and mechanical skills in a manufacturing environment. The Productivity Commission (PC 1996) recommended the institutional and regulatory arrangements for vocational education and training in Australia be reviewed.

Restrictive work practices

Participants raised few examples of restrictive work practices affecting their operations. However, several complained of the additional costs involved where worksites require union membership. For companies involved in the short-term installation of equipment at their clients' premises, their employees have to be members of the *client's* nominated union to work on-site.

* * *

This chapter has reviewed the market for machine tools and robotics and factors affecting the industries' development. The next chapters deal with policy issues facing the industries including the bounty, tariffs and other available assistance measures.

3 THE MACHINE TOOLS AND ROBOTS BOUNTY ACT

The machine tools and robots bounty assists Australian industry in the manufacture of certain machine tools and advanced technology machines, machinery modifications and retrofit activities. Box 3.1 provides a history of the bounty scheme.

Box 3.1: A history of the machine tools and robots bounty

The metal working machine tools industry has been receiving bounty assistance since 1972 with the introduction of the *Metal Working Machine Tools Bounty Act 1972*. Under this scheme the Government sought to maintain the metal working machine industry, mainly for defence purposes.

In 1978 the scheme was altered on the advice of the Industries Assistance Commission (IAC) to a bounty paid on local production of all power operated, metal working machine tools, used for cutting or forming.

A new scheme began in 1985, following another IAC inquiry. Given the close relationship between robots and machine tools, the Government agreed that robots should also be afforded bounty assistance in the same bounty scheme.

The 1985 scheme also introduced differential assistance for high and low technology goods in order to encourage producers to move into high technology goods (including robots), and bountiable activities were extended to include computer controlled machines such as welders, robots and flexible manufacturing systems as well as certain retrofitting activities. High technology exports were also declared eligible for bounty. The major thrust of the scheme shifted to industry development and promotion of technology.

In its 1990 review, the Bureau of Industry Economics recommended that the differential treatment of high and low technology goods, both in terms of bounty rate and eligibility of exports, be removed because of the distortions created by differential assistance, and that the assistance afforded equate to the assistance across manufacturing generally.

In 1991, the Government made exports of all bountiable goods eligible for bounty. Coverage was also extended to machine tools for working advanced materials such as ceramics and polymers. Bounty rates were reduced in line with the general reductions in tariffs.

Bounty is payable on goods designed for use principally or solely for the working of metals or advanced materials (ceramics, composites or polymers)

and robotic machines when they are sold for the production of other goods. As a result of the 1988 Closer Economic Relations Agreement, bounty is not payable on goods exported to New Zealand.

Bounty is calculated as a percentage of eligible in-house value added content in eligible goods made by a manufacturer. For bounty eligibility purposes, there is a requirement for value added to be at least 20 per cent of the factory cost and, in the case of modifications and retrofitting, no bounty is payable where the cost of carrying out modifications or retrofitting of the machine is less than $20 000.

The present bounty scheme is due to expire on 30 June 1997.

Goods equivalent to bountiable goods and parts for bountiable goods can be imported duty free (see Chapter 4).

3.1 Trends in the bounty

In recent years, tariff assistance to Australian industry has declined significantly in most industries. Phased programs of tariff reductions were initiated in 1988 and 1991. With some exceptions relating to the motor vehicle, textiles, clothing and footwear industries, tariffs on manufactured goods have been 5 per cent or less since 1 July 1996.

Bounty rates have been reduced along with these tariff reductions. For this bounty, the rate has been 5 per cent since 1 July 1996 (see Table 3.1).

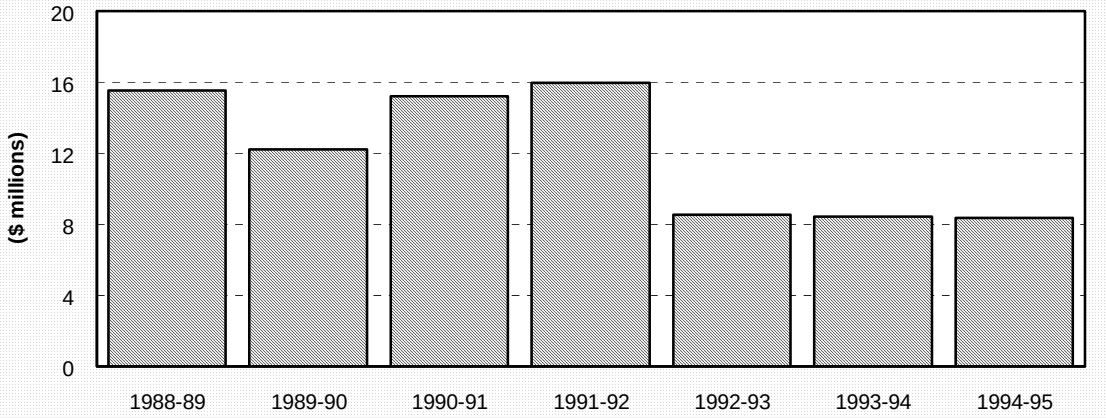
Table 3.1: Rate of bounty for machine tools and robots, 1988 – 1996

From	*High technology equipment AA[1] scheme (%)*	*Low technology equipment AB & B[2] scheme (%)*
1 July 1988	40	30
1 July 1989	40	30
1 July 1990	35	25
1 July 1991	24	20
1 July 1992	20	17
1 July 1993	16	14
1 July 1994	12	11
1 July 1995	8	8
1 July 1996	5	5

1 AA refers to high technology equipment.
2 AB refers to low technology equipment and B refers to modifications.
Source: *Bounty (Machine Tools and Robots) Act 1985*

Since 1988, 261 organisations have received about $85 million in bounty payments. Payments peaked in 1988–89 and 1991–92 at about $16 million, and were constant at just over $8 million for the three years to 1994–95 (see Figure 3.1). The drop in payments in 1992–93 was due to an amendment to the Act making production for in-house use no longer eligible for bounty. Although bounty rates have fallen in recent years, bounty payments have remained steady, largely due to an increase in bountiable exports.

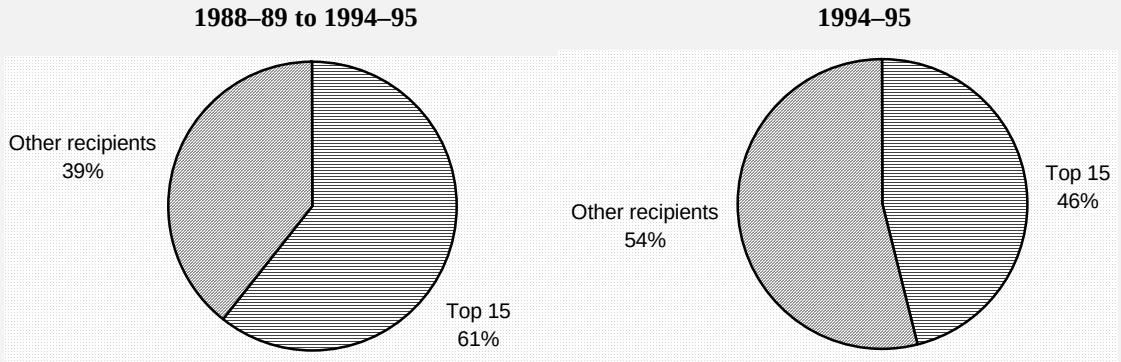
Figure 3.1: The value of bounty payments, 1988–89 to 1994–95



Source: Australian Customs Service Parliamentary Returns

Payments have been unevenly distributed, with the top 15 bounty recipients accounting for around 60 per cent of all bounty payments over this seven year period — and about 45 per cent of all bounty payments in 1994–95 (see Figure 3.2). Payments to the top 15 bounty recipients are listed in Table 3.2.

Figure 3.2: Distribution of bounty payments



Source: Australian Customs Service Parliamentary Returns

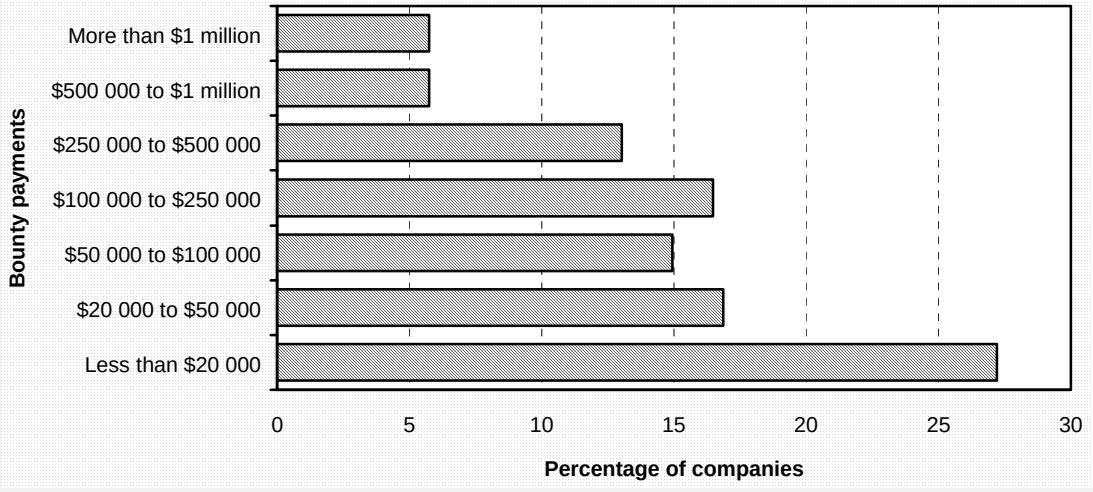
Table 3.2: Top 15 bounty recipients, 1988–89 to 1994–95

Company	*State*	*Payments ($ millions)*
James N Kirby P/L	NSW	7.5
Laser Lab International P/L	VIC	7.2
ANCA P/L	VIC	6.8
Farley Cutting Systems – Farley Manufacturing	VIC	5.9
Ford Motor Company (Aust) Ltd	VIC	3.6
Lewis Australia P/L	VIC	3.5
John Lysaght (Aust) Ltd	VIC	2.4
Kirby Zenford P/L – Zenford Zeigler P/L	VIC	2.4
Simpson Ltd - Kelvinator Australia Ltd	SA	2.1
FW Hercus P/L	SA	1.6
S & E Engineering P/L	WA	1.6
Nova Machinery P/L	WA	1.5
ANI Corporation	QLD	1.4
Australian Biomedical Corporation Ltd	VIC	1.4
Marand Precision Engineering P/L	VIC	1.1

Source: Australian Customs Service Parliamentary Returns.

While 15 companies (about 6 per cent of all recipients) each received over $1 million in bounty payments between 1988–89 and 1994–95, around 30 per cent received less than $20 000 (see Figure 3.3). Appendix E lists all bounty recipients from 1992–93 to 1994–95.

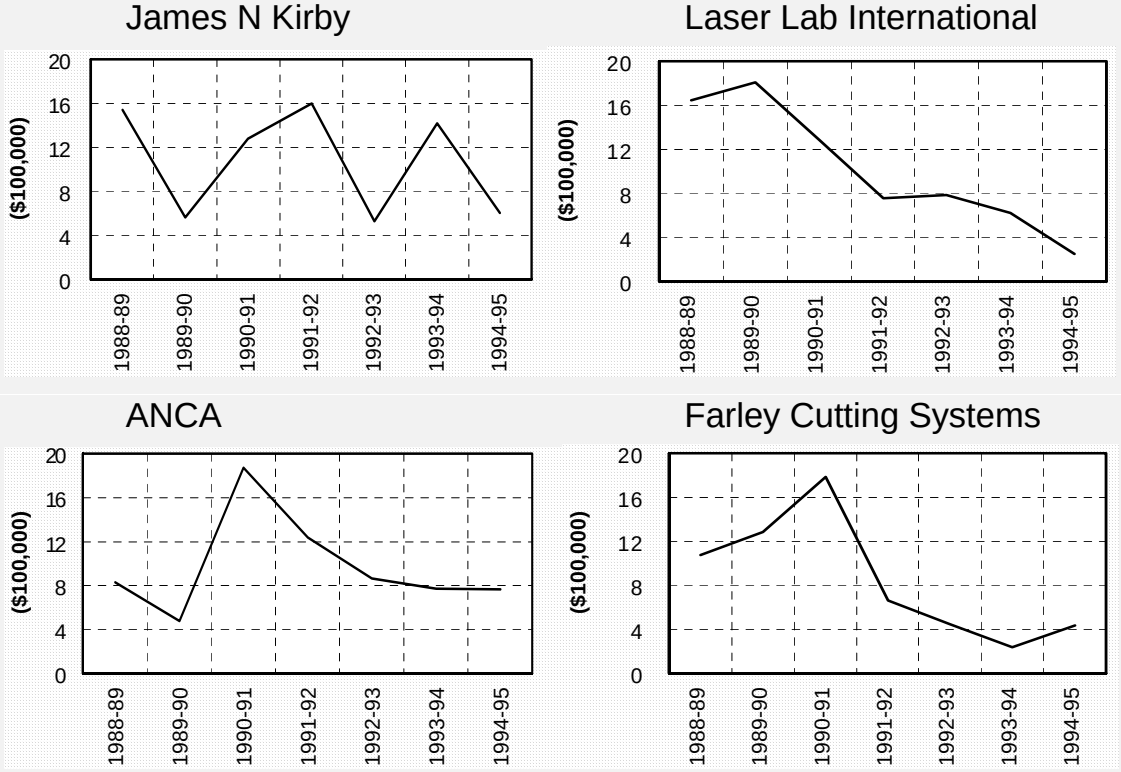
Figure 3.3: The distribution of bounty payments, 1988–89 to 1994–95



Source: Australian Customs Service Parliamentary Returns

Not only were the majority of payments low in value; many companies received them spasmodically. Of the 261 companies that received payments in the past seven years, only 29 did so every year. Payments were also volatile, with very few companies receiving consistent payments from year to year (for example, see Figure 3.4). Part of the reason for this volatility is the treatment of research and development costs (see Chapter 5), which creates 'lumpy' payments.

Figure 3.4: Changes in bounty payments to the top four recipients



Source: Australian Customs Service Parliamentary Returns

3.2 The Act

The *Bounty* (*Machine Tools and Robots) Act 1985* is a highly prescriptive piece of legislation which defines and specifies bountiable activities, procedures for determining value added and factory costs, calculations of bounty payments and how these payments are made — as well as other administrative arrangements. The Australian Customs Service (ACS) administers the bounty scheme.

Activities eligible for the bounty are outlined in Box 3.2. Many of these categories are broad and overlapping. The Act has been amended almost every

year since 1985, often to keep up with technological developments in machine tools and robots.

Box 3.2: Bountiable activities

Bountiable activities include production of:

- independent machines — a machine tool designed solely or principally for the working of metal or advanced materials;
- computer controlled machines — must be a completed machine requiring no human control for use in working metals or advanced materials only;
- flexible manufacturing systems — is a powered conveyor and assembly system that may include a robot, controlled by a integrated computer controller, designed to systematically transfer or arrange materials or components that consist wholly or mainly of metals or advanced materials. This includes system equipment (meaning conveying equipment, assembly equipment, computer hardware or software for use in a flexible manufacturing system);
- numerically controlled machines — a machine tool controlled by independent numerical control, for use in metals or advanced materials;
- robotic machines — must include an integrated computer controller, and a structure with mechanical linkages and joints capable of handling objects by simultaneous movements in two or more axis (or other prescribed structure declared eligible by the Minister); and
- computer controllers — must be completed machines, include a numeric servo-control loop (aimed at rapid and multiple movement control) and be reprogramable.

The bounty also covers goods and parts for use in bountiable machines, and the modification and retrofitting of equipment to upgrade the capacity of machine tools already in use in Australian factories.

For bounty to become payable, the equipment must be sold for use in the production of other goods. It is not available for machines used in-house.

When equipment does not meet the specific requirements of the Act, the Minister can declare it eligible for the bounty.

Source: *Bounty (Machine Tools and Robots) Act 1985*

The ACS described the Act as complex and convoluted:

> Any consideration of the Bounty (Machine Tools and Robots) Act immediately leads to the conclusion that it is a complex and convoluted enactment that does not readily lend

> itself to interpretation by either officers of the ACS or by current or potential claimants. (sub. 19, p. 5)

3.2.1 Definitional issues

In accordance with the terms of reference, the Commission has examined the appropriateness of the current definitions in the Act and it suggests some improvements for consideration if the bounty is continued.

Grey areas associated with the bounty have created a complex set of administrative and definitional problems — for both those overseeing the bounty and potential claimants. This highlights the problems associated with drafting prescriptive legislation to cover such technologically diverse and rapidly changing activities.

Restrictions on use

'Sold and used in production'

For bounty to become payable, the goods must be sold for use in the production of other goods.

This requirement raises two problems.

Firstly, the goods must be sold. Therefore companies which produce, or modify, goods and technology for their own in-house use do not receive bounty. For example, a company that produces machine tools or robotic goods for use in its own factory will not receive bounty — while a company selling similar goods will receive assistance.

Secondly, the requirement that goods be used in production creates definitional problems. Difficulties arise trying to define 'production'. The ACS described the requirement as creating perverse effects:

> Customs has experienced considerable difficulties in dealings with claimants and their representatives in defining what exactly production constitutes. The current interpretation of this provision has the perverse effect of including, for example, a robotic machine that might form part of a production line, but excludes a similar machine because it might be involved in for example, palletising or shrink wrapping functions which could be peripheral to the production process. The level of technology included in each machine could well be identical, yet one would be eligible for bounty and the other machine would not be eligible. (sub. 19, p. 10)

Factory Automation + Robotics observed:

> The definition of production is limited to exclude operations which in reality form part of the production cost of manufacturing a product. Operations such as handling or packing have been classed as not part of production, which is clearly illogical.
>
> ... the current limited application of the definition of what constitutes production can mean that a metal working machine will be eligible for bounty, even if fairly simple and of low risk, while a risky robotic development for packaging and handling product is not eligible. (sub. 11, p. 3)

To complicate matters further, for retrofitted goods to be bountiable they must satisfy an additional requirement — that the original goods have been used in the 'commercial' production of goods. The rationale for requiring retrofitted goods to undergo two different production tests is not clear. This requirement has had the effect of limiting the availability of the bounty to companies that modify imported machine tools.

Metal working machine tools and manufacturing systems

With the exception of robots, bountiable activities have an additional restriction on use — that is, they must be associated with working metal or advanced materials (such as ceramics and polymers).

The metal working restrictions mean that non-metal working machine tools and automated systems for use in other industries such as transport and distribution and other parts of the service sector, mining, agriculture, forestry, and food processing are not covered by the scheme.

While some machine tools used for metal working are bountiable, such as machines used for cross cutting, others, such as uncoiling machines, are not. Machine Makers Australia commented on the perverse incentives this creates:

> There have been problems of interpretation, for example, combination cross cutting and uncoiling machines. A cross cutting machine on its own is bountiable. When attached to an uncoiler it is not. We now separate the two elements and sell them as two machines.... The separation of the machine elements is a needless cost. (sub. 20, p. 2)

The bounty is not paid on wood-working machine tools although the technology is similar. Woodfast Machinery explained:

> ... both our manufacturing plant and technical skills are the same as those who would be producing metalworking machinery (machine tools) and more often than not sell to the same markets as we do. (sub. 1, p. 1)

Advanced materials

There have been no claims to date for machines working advanced materials. Advanced materials requiring machining, such as ceramics and metal matrix composites, are only produced in small quantities in Australia. Some advanced

materials do not necessarily require 'working' as do metals. One advantage of these materials is that they can be formed precisely through techniques such as moulding, extrusion or blowing, reducing the need for additional working.

Companies trying to cut steps out of the manufacturing process by producing products that do not require further working do not receive bounty, as the advanced materials used are not 'machined'. The lack of relevance of the current provisions is supported by several participants' criticism of the narrow focus of the scheme in excluding machinery for working plastics. Hi-Tech Automation noted:

> Our direction has gone from covering all fields to one specialising in the joining of plastics. As a result we have been excluded from the bounty. (sub. 28, p. 2)

Boundaries of eligibility

Definition of a robot

The definition of a robot under the Act is 'a computer controlled structure with mechanical linkages and joints capable of handling objects by simultaneous movement in two or more axes'. These types of robots are described in the Act as pick and place, playback (point to point), playback (continuous path), and any robots declared eligible by the Minister.

However, since the Act was introduced in 1985, advanced robotic developments have been rapid and the definition under the Act is no longer relevant. As Michael Kassler and Associates (sub. 2) stated, the definition of a robot in the Act differs from international standards and practice in two significant respects (see Box 3.3). Factory Automation + Robotics commented:

> The definition of robots is too limited. There should be an expansion to the definition to include all equipment having digital closed loop control, whether they be single axis or multiple axis. The definition of a robot as having 'linkages' is also now primitive, and should be deleted, as it ignores the fact that gantry robots don't have linkages but 'drive trains'. (sub. 11, p. 4)

The definition is also rather narrow and dated if the focus of the scheme is technological advance. The definition focuses on the programmable mechanical movements of standard industrial robots rather than higher technology, later generation robotics characteristics such as vision or mobility systems. These limitations have led to piecemeal modifications to eligibility criteria through Ministerial Determinations. Given the open-ended nature of the bounty scheme, further Determinations can be expected if the scheme continues in its current form.

Box 3.3: What is a robot?

The definition of a robot in the Act differs from international standards and practice in two significant respects. In 1994, the International Organization for Standardization adopted International Standard ISO 8373 for the vocabulary of manipulating industrial robots operating in manufacturing environments..... ISO 8373 requires that a robot be programmable in three or more axes whereas the Act allows machines with only two programmable axes to be considered robots for purposes of bounty assistance.

The International Federation of Robotics and the United Nations recognise that robots are increasingly being developed and installed for non-manufacturing applications such as delivering supplies in hospitals. Such robots do not utilise the 'pick and place' or 'playback' systems which are characterised by robot 'arms' used in manufacturing applications — indeed they may possess no mechanical arms. The current Act appears not to allow assistance in respect of such robots.

Source: sub. 2, pp. 1–2

In contrast to machine tools, robots are eligible for bounty as long as they are to be used in the 'production of other goods', not just in the working of metal. Thus, a tissue culturing robotic machine is bountiable because it produces plants — as is a robot for creating pathological specimen slides because it produces slides. However, robotic machines for automated warehouses or for use in transport would not be eligible as they do not produce 'other goods'. While this distinction between goods and services does not promote economic efficiency and is difficult to administer, it does mean that the bounty scheme can conceivably provide assistance to a considerably wider range of automated engineering systems than it can to machine tools.

Given rapid and ongoing technological change, and the vast array of robotic machines and even wider variety of applications, it is difficult to provide a workable definition of a *robotic machine*. This issue is discussed further in Chapter 6.

Modifications and retrofitting

Bounty is payable on the value added in modifying machine tools already in use, provided the modification substantially improves the design capability of the machine. There is no bounty payable where the cost of carrying out modifications or retrofitting of the machine is less than $20 000. But determining what is a 'substantial improvement' can be difficult.

Several participants suggested that, although modifications they made to imported machine tools substantially improved output, these modifications were not eligible for the bounty because the machine is required to be already in 'commercial' production before the modifications are bountiable.

Parts for bountiable equipment

Bounty is also payable on the production of certain parts. While the parts must be designed solely or principally for use in machines such as robots, computer controllers and computer controlled machines, they do not actually need to be used in bountiable machines. This removes the difficult task of verifying end-uses of parts.

By offering bounty assistance to parts without end-use verification, there is potential for assistance to be given to sectors beyond the objectives of the scheme. However, it does remove the absurdity of different assistance being given to identical components because they are used in different machines.

Definition of a flexible manufacturing system

The Act describes a flexible manufacturing system as a powered conveyor and assembly system that may include a robot, controlled by an integrated computer controller, designed to systematically transfer or arrange materials or components that consist wholly or mainly of metals. However, the restriction that the system must deal with metal discriminates against systems designed for non-metal working technology.

A useful analogy is the production of refrigerator doors. A flexible manufacturing system that cuts, bends and shapes the metal components of a fridge door (that meets the requirements of the Act) would be bountiable. However, a system that places the seals, stoppers and fills the inside of the door with foam would not be bountiable as it is not working metal — even though this system may be more technologically advanced than the metal working system.

Definitional problems arise when determining boundaries where a flexible manufacturing system starts and ends. For example, if a machine tool or robot is placed on a conveyor belt within a production line, are the conveyor belt and other aspects of the production line eligible for bounty? What is the process for determining bounty eligibility when calculating value added if a machine tool or robot is part of a system?

Discretion in administration

As the last three examples have shown, the ACS has a difficult job handling the definitional problems that arise in the Act.

Application of the Act is also subject to Ministerial discretion. This has occurred on occasion when the Department of Industry, Science and Tourism advised the Minister that a bounty claim appeared to meet the intention of the Act, but did not coincide with the definitions in the Act. The discretionary power has also been invoked in one case where the claim met the definition under the Act, but did not meet the intentions.

As the objectives of the Act are not set out in the Act, it is difficult to determine its intentions. The ACS must rely on judgement to determine what is 'technologically innovative' and if claims meet the intentions of the Act. John Hart commented:

> We experience some difficulty in the eligibility assessment process. This arises due to the unique and special nature of our robots and the relative lack of robotic knowledge of those required to assess eligibility. (sub. 8, p. 2)

This means that companies may not know whether a new machine is eligible for bounty until well into the development or even the production stage. This uncertainty impairs the bounty's effectiveness as an assistance measure.

Other bounties

The ACS commented that similar definition problems exist in the administration of other bounties — such as the book, computer and shipbuilding bounties. It suggested that all bounty Acts be condensed, rewritten and simplified into one single Act:

> As all bounties have been or are being reviewed, and if the government decides to extend or continue with these bounties, there would be an opportunity to introduce a single simplified Act covering the administration of bounties generally, and containing a schedule describing the goods eligible for bounty payment. (sub. 19, p. 5)

The Commission draws attention to the potential benefits of such simplification.

3.2.2 Calculating the bounty

Bounty is paid as a percentage of 'value added', as defined in the Act. The amount of value added is determined by subtracting purchased materials from *eligible factory costs* (see Box 3.4). The definition of value added under the bounty scheme is narrower than under other assistance schemes, such as the export facilitation scheme for passenger motor vehicles (see Chapter 5).

Box 3.4: Calculating value added

Value added under the bounty scheme is calculated using the following formula:

$$VA = A - (B + C + D + E)$$

Where: VA is value added
A is eligible factory costs associated with the manufacture of bountiable goods
B is the cost of parts and materials
C is the cost of any process not performed in-house
D is interest on borrowed money for research and development purchased off-shore
E is such costs (if any) as are prescribed

Source: *Bounty (Machine Tools and Robots) Act 1985*

The use of *factory costs* to determine the level of value added means that it does not include costs incurred outside the factory. This differs from more traditional value added calculations — selling price less costs of all inputs — and does not include such costs as transport and commissioning costs, and allowances for profit. However, it does allow most interest paid on borrowed monies (except for overseas R&D) to be included in factory costs. The excluded costs can be substantial, particularly for the custom-made machinery sector, where commissioning costs can be high.

Excluding the costs of any processes not performed in-house from the level of value added may create perverse incentives. Organisations visited by the Commission suggested manufacturers may undertake activities in-house that could be performed more economically elsewhere in order to maximise their bounty payments. Factory Automation + Robotics said:

> The emphasis on in-house labour input would likely cause companies to do work themselves when it is more effectively done outside. (sub. 11, p. 4)

The ACS considered that the definition of value added in the Act needed to be amended:

> A fundamental rewrite of the 'value added' provisions of the legislation is required. At present, value added is calculated in a complex manner by taking into account salaries and other wage related costs as well as other factory costs related to manufacturing. The determination of value added using these categories is confusing to clients and leads to conflict and, in some cases, to administrative review processes. (sub. 19, p. 6)

Simplification of value added calculations

Basing the bounty on factory costs may have been appropriate when the scheme was originally designed. The present method of calculating the bounty appears

to be unnecessarily complex and the Commission believes that the current value added calculation could be simplified. The ACS said:

> ... a simpler method of claiming bounty is achievable... That is, it is possible to determine an alternative method of establishing 'value added' which is simpler for clients and will be easier and more cost effective to administer. Customs considers that a method which takes the selling price of each piece of equipment that is manufactured less the cost of raw materials and the cost of imported components and the cost of any services purchased from overseas suppliers, would achieve the same result in a much simpler manner. (sub. 19, pp. 6–7)

The Commission agrees with the ACS. It considers the most appropriate measure of Australian value added in this case is the selling price less the cost of materials and the cost of imported goods and services.

Risk management

The ACS risk management of the bounty scheme would be more effective, and costs reduced, if the rules governing the bounty were made clearer and administrative penalties then introduced for over-claiming. As the ACS commented:

> .... to be a fully effective risk management regime, there is a need for greater clarity in the rules governing the application of the bounty, and the provision of administrative penalties which may be applied where there has been a history of significant over-claiming of bounty. (sub. 19, p. 4)

3.3 Bounty administration and compliance costs

Bounties impose direct and indirect costs. Direct costs to government arise from funding and administering the bounty, while organisations incur costs applying for the bounty.

3.3.1 Government costs

Bounty payments are met from consolidated revenue. In 1994–95, payments amounted to $8.4 million.

The ACS informed the Commission (sub. 19) that it dedicates 3.7 full-time staff equivalents in administering the bounty, at a direct cost of $230 000 a year.

However, the actual costs to government and the taxpayer are higher as the Commission understands that this figure covers only salaries and some on-costs of dedicated staff. It does not include a number of other ACS costs, nor costs of the Department of Industry, Science and Tourism, nor those costs associated in

the past with amendments to the Act. It is hard to put a figure on the actual cost of administering the scheme, but it could be some half a million dollars a year.

Increasing numbers of claims

There is evidence that, due to the complexity of the Act, consultants seek out eligible companies and (for a fee) make applications on their behalf. The ACS has seen increasing numbers of claims from consultants acting on behalf of companies trying to claim bounty on robotic and flexible manufacturing system manufacture, while the level of machine tool claims has remained fairly constant. The ACS said:

> It is also a process which draws third parties into the equation where claimants who do not understand the complexities of the legislation will seek the services of consultants who will complete the necessary formalities. The ACS has found the performance of these consultants has been variable. (sub. 19, p. 6)

This has led to some increase in administrative costs to the ACS as robotic machine and flexible manufacturing systems are in many cases much harder to assess.

Registration of premises

Before bounty is payable, potential claimants must register their premises with the ACS. The greater involvement of consultants in claiming bounty has been associated with an increasing number of registration of premises — many of which never actually claim bounty. The ACS said that this requirement was superfluous and added to administrative costs. For example, the ACS explained:

> ... the registration provisions of the Act are superfluous to modern administrative practice and as a result should be deleted from the Act. These provisions are an administrative burden on both claimants and Customs. They serve a limited purpose of providing details about the operation of the company and company personnel. These are details which can be captured when a manufacturer lodges a first claim with Customs. (sub. 19, p. 11)

3.3.2 Industry costs

Companies incur costs in applying for the bounty, including paperwork and record keeping, and liaison with the ACS.

Variations in compliance costs

Discussions with participants suggest that such compliance costs relative to the amount of the bounty received vary significantly, between companies and

between years for the same company. In addition, cost is not always related to the number of claims. This may, in part, reflect uncertainty regarding eligibility in industries dominated by custom-designed goods.

Invetech observed it has:

> ... received an average amount of approximately $75 000 annually over the last six years. This has involved a significant amount of our time in preparation of submissions, eligibility review and final preparations of claims. We would estimate this cost at $10 000 per annum. (sub. 8, p. 1)

Factory Automation + Robotics estimated its compliance costs at around 15 per cent:

> In the 1995–96 fiscal year, our company will spend approximately $20 000 to $25 000 in meeting the bounty requirements. This will be made up of in-house documentation preparation, and the cost of hiring consultants to assist with preparation of annual returns and with claim preparation. (sub. 11, p. 5)

Other bounty recipients considered that compliance costs are a minor issue. Many recipients said they have internal accounting mechanisms in place in order to monitor costs that could be used to derive the necessary figures for bounty compliance. John Heine and Son commented:

> The cost to us of administering the bounty is low, approximately $1000 pa. [about 1.2 per cent a year] (sub. 7, p. 1)

The major recipients noted that these accounting mechanisms would be in place regardless of whether the bounty existed, as they form a necessary internal management and cost containment tool. They suggested that compliance costs may be particularly high for small companies that do not maintain comprehensive accounting and management information systems.

Based on the material available, including the survey returns, the Commission estimates private bounty compliance costs to be about three quarters of a million dollars a year.

Compliance costs and declining bounty rates

Administration and compliance costs for the ACS and claimants appear to be high relative to the value of the bounty. Cost-effectiveness has been declining as the rate of bounty has fallen to 5 per cent. Millform Products suggested:

> the rate of bounty has been reduced to such a low level that it is almost pointless for our business to claim it, as it barely covers our administrative costs. (sub. 5, p. 2)

John Hart added:

> At bounty levels of five to eight per cent of value added it is barely worth the time and cost to apply, particularly if that time can be applied to gaining further work. (sub. 4, p. 2)

Following the draft report, it commented further:

> ... the cost of the claim may exceed the return, particularly if there is any difficulty processing the claim. (sub. 25, p. 2)

K.D. Binnie Engineering suggested that, at rates of 8 per cent, bounty costs exceed the benefits:

> The true cost of collecting bounty would far exceed 8% and it would not make the slightest difference to cancel it now. (sub. 18, p. 4)

ACS personnel changes

Some participants commented that frequent personnel changes within the ACS exacerbate the uncertainties in the scheme. For example, Lewis Australia said:

> Lewis Australia has encountered very minimal problems with current bounty arrangements. Minor problems of procedure for calculating factory cost have occurred. This seemed to be caused by a frequent rotation of personnel in Customs Department. (sub. 13, p. 2)

John Hart observed, in response to the draft report:

> A significant difficulty, only recently encountered, is the changing of staff within the bounties area of ACS. We now find that claims which have been acceptable in the past, following guidance from what was then DITAC and the Brisbane Office of ACS, which was the responsible area, are now being questioned on exactly the same grounds as those which caused the original ruling to be obtained. (sub. 25, p. 2)

3.3.3 Total costs

Based on calculations of government (Section 3.3.1) and private costs (Section 3.3.2), the Commission estimates bounty administration and compliance costs at around one and a quarter million dollars — consisting of about half a million dollars in bounty administration costs and about three quarters of a million dollars in private compliance costs. This represents about 15 per cent of total bounty payments.

These costs could be reduced by introducing thresholds so as to remove small claims. The existing bounty scheme requires that value added be at least 20 per cent of factory cost and modifications or retrofits cost over $20 000 before bounty is payable. ANCA (sub. 24) suggested a $25 000 (bounty payable) qualifying amount per claimant. While that approach would reduce the

costs associated with small claims, it would discriminate against smaller firms and also perhaps against new entrants.

3.4 Conclusion

Since 1988, 261 organisations have received about $85 million in bounty payments. Bounty rates have been reduced in line with tariff reductions, and total payments have been constant at just over $8 million in each of the three years to 1994–95. The majority of individual payments have been low in value, and most companies received bounty spasmodically. Payments were also volatile, with very few companies receiving consistent payments from year to year.

The *Bounty* (*Machine Tools and Robots) Act 1985* is a highly prescriptive piece of legislation. Definitional problems, complexities in calculating value added payments and compliance costs all reduce the effectiveness of the bounty scheme.

Several major problems would need to be resolved if a bounty scheme were to continue after 1997:

- the restrictions on use appear arbitrary and are not based on efficiency considerations;
- definitions in the Act, particularly defining robotic goods, create uncertainty and in some cases are out of date;
- the Act does not provide clear-cut guidelines for administering the bounty scheme and determining eligibility, forcing the ACS to exercise discretion in many cases;
- value added calculations are complex but could be simplified; and
- administration and compliance costs represent about 15 per cent of bounty payments.

4 TARIFFS AND CONCESSIONAL ARRANGEMENTS

A fundamental part of the machine tools and robots bounty scheme allows duty free or concessional entry of machine tools, robots and certain parts that would be bountiable if produced domestically. Duty free entry of finished goods seeks to ensure that users can access goods at world prices. Duty free or concessional entry of parts seeks to ensure that those assisted by the bounty are not concurrently hindered by tariffs.

Duty free entry is achieved by setting some tariffs at zero and using concessional entry (specifically four policy by-law items) where the goods are not readily identifiable in the Tariff but are subject to import duty. Policy by-law items allow importers to seek concessional entry of otherwise fully dutiable imports where it is in accordance with government policy — in this case the policy of assistance to the machine tools and robotics industries.

Further concessional entry currently occurs under the Tariff Concession System (TCS) and may also be achieved through duty drawback and the Tariff Export Concession Scheme (TEXCO). These are not specific components of the bounty scheme but may have coincidental effects.

4.1 Tariffs

Machine tools, robots and parts fall under many classifications within the Tariff. Table 4.1 describes the four digit tariff codes of most relevance to the goods under reference in this inquiry. However, not all goods that fall under these four digit codes are bountiable if produced domestically.

Most items of interest are in Chapter 84, the machinery chapter of the Tariff. That chapter encompasses a wide variety of machinery and parts, most of which have had a substantive tariff rate of 5 per cent since 1 July 1996.

Standard metal working machine tools are identified under items 8457 to 8463. Tools for working cermets (sintered metal compacted with a ceramic) also appear under these items. Domestic production of most goods of this type is bountiable and therefore can be imported duty free. Equivalent but non-power operated machines are not bountiable. These are identified in the Tariff at finer classification levels and are generally subject to 5 per cent duty.

Table 4.1: Tariff treatment of four digit codes containing bountiable and related items

Tariff code	*Summary tariff item description*	*Rate %*
8424	Mechanical appliances including spraying equipment	4–5[1]
8428	Other lifting and loading equipment	5
8431	Parts for use solely or principally with 8425 to 8430	0–5
8456	Machine tools for working any material by removal of material by laser, ultrasonic, electron beam, etc	0
8457	Machining centres, single and multi-station transfer machines for working metal	0
8458	Lathes for removing metal	0
8459	Machine tools for drilling, boring, etc by removing metal other than lathes in 8458	0–5
8460	Machine tools for grinding, sharpening etc by stone or abrasives other than the gear cutters of 8461	0–5
8461	Machine tools for planing, shaping, gear cutting by removing metal	0
8462	Machine tools for working metal by forging, hammering, bending, folding, shearing etc	0–5
8463	Other machine tools for working metal without removing material	0
8464	Machine tools for working stone, ceramics, concrete, etc	5
8465	Machine tools (including for nailing, stapling, glueing or assembling) for working wood, cork, bone, hard rubber, hard plastics, etc	5
8466	Parts for use solely or principally with 8456 to 8465	5
8468	Machinery for soldering, welding other than 8515	0–5[2]
8479	Other machines not elsewhere specified in Chapter 84	0–5[3]
8515	Electric, laser or other electromagnetic soldering or welding machines	0–5
8537	Boards, panels, etc for electric control or distribution of electricity	0–5
8542	Integrated circuits and micro assemblies	0
9032	Automatic regulating or controlling instruments	0–5

1 most developing country imports in this table are 5 per cent, some are at 3 or 4 per cent.
2 for example, for metal working, incorporating a computer control — Free.
3 for example, gas operated for cutting metal, incorporating a computer control — Free.
Source: Schedule 3 to the Tariff

The laser type machine tools in item 8456 are not confined to metal cutting (and thus may include non-bountiable machine tools), but are all duty free.

The goods falling to items 8464 and 8465 are largely wood and stone working machine tools and therefore domestic production is not bountiable; imports of these are subject to a duty of 5 per cent. However, machine tools for working certain advanced materials other than cermets (for example, plastics and ceramics) would also enter under items 8464 and 8465. A policy by-law item exists to allow for concessional entry of these as they are not separately identified in the Tariff.

The tariff structure for machine tools means that there is potential for duty free entry of imported machines that would not receive bounty if produced domestically. However, the import data indicates that imports of such machines are not significant.

Parts for machine tools are classified under item 8466 and have a substantive rate of 5 per cent. A policy by-law item exists for duty free entry of those parts destined for use in bountiable machines. Two of the seven lower classifications of item 8466 (items 8466.93 and 8466.94) relate almost entirely to bountiable equipment as they are parts for use in machines of items 8456 to 8463. Two more (items 8466.91 and 8466.92) relate almost entirely to non-bountiable equipment. The trade data in Appendix B include imports for item 8466 at the six digit level.

A number of other machines, especially welders, enter under items 8468, 8479 and 8515. Some computer controlled metal working machines are identified at lower levels and enter duty free. This has been achieved by splitting tariff items to the eight digit level.

Robots may enter under a number of classifications, only some of which are readily identifiable as robots in the Tariff. Because of this, robots and their parts enter duty free under a policy by-law item. The trade data show these entering under a wide variety of tariff items. For example, in 1994–95, entry occurred under 96 different tariff items at the six digit level, with around one-sixth of the value being from items other than those in Table 4.1.

Electronic parts for machine tools and robots enter largely under tariff items 8537, 8542 or 9032. There are a wide variety of parts that enter under these classifications and those for use in goods under reference in this inquiry cannot be separately identified. However, programmable controllers (of all types) do appear and enter duty free.

The ability to identify goods under reference in the Tariff clearly varies. Machine tools and parts are relatively easy to identify, while robots and parts are difficult. The Australian Customs Service (ACS) (sub. 19) suggested altering the eligibility conditions of the bounty scheme to link it more closely with the Tariff. While this might move the eligibility conditions to more familiar ground for the ACS, robots and parts cannot be readily identified in the Tariff. Therefore, this would do little to ease the complications of the scheme.

4.2 Concessional arrangements

Four policy by-law items exist as part of this bounty scheme and are listed in Table 4.2.

Policy by-law items allow concessional or duty free entry of goods that match the description in a by-law written to that item. The by-law may be a standing by-law, which allows automatic[1] duty free entry of those goods, or the importer may need to apply for a by-law to match the goods to be imported. Therefore, using these items is not necessarily costless and can be relatively cumbersome.

Table 4.2: Policy by-law items

Item	*Summary of goods*	*Rate %*
30	Robots and parts suitable for use solely or principally with robots	Free
48	Parts and accessories imported under 8466.10, 8466.20, 8466.30, 8466.93 or 8466.94 used in the manufacture or assembly of machine tools for working metal	Free
49	Parts imported under 8468.90, 8479.90 or 8515.90 of machines incorporating a computer controller	Free
55	Machine tools and parts thereof for working advanced materials	Free

Source: Schedule 4 to the Tariff

Items 30, 48 and 49 allow for automatic duty free entry of goods that fit the descriptions in the corresponding standing by-laws. However, imports under items 48 and 49 are held under security, meaning that the duty otherwise payable must be lodged or guaranteed until the end-use conditions are met and verified. (In Section 3.2.1 it was noted that certain parts are bountiable even though they may not end up in bountiable equipment.) Importers may prefer not to use these items for individually small value imports.

Item 55 is part of the Policy By-Law System. Importers must apply for a by-law for concessional entry on each occasion of import. The process includes attempting to source the goods locally, verifying that the goods will be used for export or import replacement activity and that it fits the goods described in the item.

The use of these particular policy by-law items is further complicated as they are part of the bounty scheme. This means that all of the definitional difficulties identified in Chapter 3 apply to determining whether goods are eligible for duty free entry under the by-laws.

[1] Subject to the ACS's normal audit and verification procedures.

The other means of entry that may be used by importers in this field is the Tariff Concession System (TCS). The TCS applies across industries and is not a specific part of the bounty scheme. However, some bounty-related materials do enter under the TCS.

Under the TCS, a Tariff Concession Order (TCO) may be issued for concessional entry (now at 3 per cent duty) of goods where there are no local substitutes (the substitute test). Once a TCO has been granted, it can be used for all imports of those goods. This differs from a policy by-law item, which can require an application each time.

Table 4.3 shows the levels of concessional entry in 1994–95 under the four policy by-law items and under TCOs (which enter under item 50). Imports under each policy by-law item (except item 55 which has never been used) for the past five years appear in Appendix B.

Table 4.3: Concessional entry for policy by-law items 30 48 49 55 and item 50 (TCOs), 1994–95, ($'000)

Tariff codes	*30 robots*	*48 MT parts*	*49 parts*	*50 TCO*	*55 advanced*
8424/28/31	2 476	0	0	174 062	0
8456–63	0	0	0	613	0
8464–65	0	0	0	77 148	0
8466	5	264	0	20 092	0
8468/79/8515	8 427	0	218	221 130	0
8537/42/9032	127	0	0	24 065	0
Others	1 370	0	0	n/a	0

n/a not applicable
Source: ABS, Cat. No. 5464.0

There is little use of the policy by-law items apart from item 30 (robots), under which over $12 million was imported in 1994–95. Imports under items 48 and 49 occurred but both are small compared with the value of goods imported under TCOs. The data in Appendix B show that, over the past five years, the use of item 48 has declined from over $11 million in 1990–91.

However, these policy by-law items could be used instead of TCOs. For example, there are 30 TCOs that apply to goods imported under item 8466.10, many of which appear to be applicable to bountiable goods. It is generally easier to import goods already described in a TCO under that TCO, rather than use a policy by-law item. Similarly, it is generally easier to use a TCO where repeat imports are expected.

Concessional entry arrangements such as policy by-law items and TCOs are often used when goods cannot be identified in the Tariff. This is the case for robotics with the previously noted entry under 96 different six digit codes in 1994–95 alone. It would be difficult to justify lowering all 96 tariff items to zero, when the value of robotic-related imports under them may be a minuscule proportion.

However, the concessional arrangements themselves are not costless and, while by-law entry may appear preferable, it may not be practical for imports of some goods. For instance, parts may be imported by persons other than the users, with end-uses that are not known at the time of import.

There is less incentive to use concessional entry as general tariffs fall to 5 per cent. This is because the gains from reduced duties are less likely to outweigh the expense of claiming concessional entry.

4.3 Implications of policy change on concessional entry

In May 1996, the Minister for Industry, Science and Tourism announced the Government's decision to modify concessional entry arrangements (Moore 1996). Enabling legislation became effective in July 1996.

In terms of the bounty, the changes have meant:

- altering TCO entry from free to 3 per cent;
- making existing TCOs subject to revocation under the new conditions, meaning those that existed because of the 'market test' will disappear; and
- maintaining duty free entry under items 30, 48, 49 and 55.

In terms of 1994–95 imports of machine tool parts (tariff item 8466), the extra cost imposed on importers by the TCS changes would be over $600 000. Laser Lab commented on the scope of the impact on its business:

> The 3 per cent tariff increase that we're all paying ... between 60 and 70 per cent of our product is imported. (transcript, p.36)

These changes could prompt importers to shift from TCOs to items 30, 48 and 49 in order to avoid the 3 per cent duty and avoid the need to meet the requirements of the new TCS. The extent of the shift will depend on the extra costs involved in applying under these policy by-law items, such as lodging security or identifying end-use.

Prior to the Government's decision, a number of participants expressed concern that the TCS could be completely scrapped, and pointed to the adverse effect

that rises in their input costs would have on their competitiveness. Invetech commented:

> A 5 per cent tariff on imported inputs ... would worsen our competitive position overseas. (sub. 8, p. 4)

Lewis Australia suggested that scrapping the TCS would:

> ... on occasions have the effect of causing our customers to defer or shelve plans to purchase advanced equipment .... (sub. 13, p. 8)

Similar sentiments were expressed by ANCA (sub. 17); Applied Machine Tools (sub. 9); John Hart (sub. 4) and Michael Kassler and Associates (sub. 2).

Machine Development Centre (sub. 10) and Factory Automation + Robotics (sub. 11) were happy to see higher tariffs on imported finished products result from changes to concessional arrangements as they considered this would give some support to local producers. However, given that most machine tools already have a substantive rate of zero, the impact of concessional changes at this end of the market will be small.

In net terms, the Commission expects the policy change to impose an extra burden on producers of machine tools and robotics.

4.4 Duty drawback and TEXCO

Duty drawback enables exporters to claim a refund of import duties, excise duty or sales tax paid on goods that are subsequently exported or incorporated into exported goods.

The Tariff Export Concession Scheme (TEXCO) permits duty free entry of goods imported for industrial processing and subsequent export. TEXCO is only available to the actual importer of the goods.

Given the growing export orientation of some parts of the industries under reference, as described in Chapter 2, these mechanisms could enable producers (though only those that export) to lower their import duty burden. They may also be able to offset some of the negative impacts of changes to concessional arrangements outlined in Section 4.3.

However, given the complicated and custom-built nature of much of these industries' output and the fact that the importer of parts may not be the maker of the exported good, duty drawback and TEXCO may not be an effective means of reducing the effects of tariffs on these industries.

As Applied Machine Tools stated, when discussing the implications of the Government's earlier proposal to remove the TCS entirely:

> ... Australian Machine Tool and Robots manufacturers will be further disadvantaged. This will either be in the form of the duty payable on imports or the cost of paper work to get duty drawback. (sub. 9, p. 3)

ANCA commented:

> A large percentage of the components are imported. ... Although most of our products are exported it is doubtful how much of the duty we will be able to "draw back". For many components the importer will not reveal the imported cost. For others typical distribution involves a chain of several handlers which makes claiming the duty drawback impractical. (sub. 17, p. 10)

Similar sentiments regarding the prohibitive costs of using drawback in respect of these industries were expressed to the Commission during industry visits. Only one survey respondent reported using duty drawback or TEXCO.

4.5 Effectiveness of the tariff treatment of bountiable goods

In the past it was not considered practical to achieve duty free entry solely by lowering items in the Tariff to zero because of poor concordance between bountiable goods and the Tariff. This problem has been tackled by using concessional entry through four policy by-law items for certain types of goods.

Policy by-laws can be administratively cumbersome and those resulting from this bounty scheme are not heavily used. Recent changes to concessional arrangements further reduce the scope to import goods duty free. However, importers of many robots and parts using the TCS could still import duty free by shifting to policy by-law item 30.

Allowing duty free entry for robots and parts requires a definition for robots. As stressed in Chapter 3, the current scheme's definition is not suitable. It would be sensible for the ACS to review the current definition with a view to finding one that is commonly used in international trade.

Machine tool parts, which enter under item 8466, are more readily identifiable in the Tariff. It would be easier to permit duty free entry of these goods directly rather than use a policy by-law item (item 48).

This part of the bounty scheme, in combination with other general schemes such as the TCS, duty drawback and TEXCO, has delivered a modest amount of duty free entry of parts and finished products. Apart from item 30, the low use of the policy by-law items shows that they have not been effective.

The Commission's recommendations on tariff matters relating to this bounty scheme are in Chapter 6. However, the Productivity Commission has presented a broad reform agenda in its *Stocktake of progress in microeconomic reform* (PC 1996), including a recommendation to lower general tariff rates to zero in July 1998. This would remove the problems associated with the design and use of concessional entry systems such as by-laws, the TCS, TEXCO and drawback.

5 OVERLAP BETWEEN THE BOUNTY AND OTHER ASSISTANCE MEASURES

The terms of reference for this inquiry require the Commission to identify and report on areas of potential overlap between the bounty and other forms of assistance. This chapter does so.

Bounty recipients can obtain assistance through the 150 per cent research and development (R&D) tax concession, the Automotive Export Facilitation Scheme (EFS) and assistance available more generally to Australian industries. For example, John Hart said:

> We have registered under the R&D 150 per cent taxation scheme and have benefited therefrom. (sub. 4, p. 4)

Recipients perceive a major benefit of the bounty as assisting R&D and export market development. Millform Products said:

> ... the bounty has been accessory to helping finance research and development by Australian firms, establishing new technology and helping Australian firms to compete within the domestic market as well as foreign markets. (sub. 5, p. 2)

Factory Automation + Robotics had a similar view:

> The Bounty provides our company with additional funds which are used to support R&D efforts. (sub. 11, p. 11)

5.1 Assistance arrangements for R&D

The machine tools and robotics (MT&R) industries currently receive assistance for R&D from a number of assistance schemes including the bounty.

As discussed in Chapter 3, the bounty is payable on the company's value added including R&D expenditure. This alone can encourage bounty recipients to undertake R&D. In addition, the way R&D is defined in the bounty Act gives bounty recipients further encouragement to undertake R&D. For example, R&D expenditure undertaken outside the registered premises (including in other countries) is eligible for the bounty. In contrast, any production process relating to the bountiable goods, if undertaken outside the registered premises, is not bountiable. The Australian Custom Service (ACS) stated that the inclusion of off-shore R&D is generous and appears to be inconsistent with the general policy thrust of encouraging R&D expenditure in Australia (sub. 19).

Further, expenditure on R&D activities that is not directly related to current production of bountiable goods is also included, if it is incurred in respect of potentially bountiable goods.

5.1.1 Overlap with other R&D assistance

The bounty Act specifies that the bounty payable is to be reduced by *grants* received from the Commonwealth, State and Local Governments, relating to the manufacture (or modification) of the bountiable equipment. This means that there is no overlap in R&D assistance between the bounty and R&D grants from other sources. However, *non-grant* R&D assistance is not deducted from the bounty payable. In this situation an overlap in R&D assistance does occur.

The main support vehicle for industrial R&D is the Industry Innovation Program, which currently comprises:

- the 150 per cent tax concession — available to companies generally;
- competitive grants for R&D — awarded selectively; and
- concessional loans for the commercialisation of technological innovation.

150 per cent R&D tax concession

The 150 per cent R&D tax concession is the main mechanism of the Commonwealth Government to stimulate R&D by companies. It allows companies to deduct against their taxable income up to 150 per cent of eligible R&D expenditure in the year it is incurred. To be eligible, annual expenditure on R&D must be at least $20 000. The Government announced on 23 July 1996 that syndicates newly formed to take advantage of the 150 per cent R&D tax deduction would be ineligible to claim the deduction, and that the tax concession would be 'fine-tuned' (Costello and Moore 1996).

The tax concession is not regarded as a grant under the Act and the value of the concession is not deducted from the bounty payable. The bounty recipient therefore can obtain assistance from both the bounty and the 150 per cent tax concession.

A number of participants, John Hart, ANCA and Farley, said that they receive the R&D tax concession in addition to the bounty. The Commission's survey of the MT&R bounty recipients indicated that, in 1994–95, approximately 36 per cent of them obtained a benefit from the tax concession.

The R&D tax benefit is of significantly greater value than the bounty (see Box 5.1). This applies, however, to companies making profits. If a company is not making a profit it will still receive the bounty, but will have to defer the tax

benefit until it becomes profitable. In the past, the bounty has been of benefit for start-up companies committing funds to R&D while in a loss-making situation. However, the falling rate of the bounty has reduced the significance of this benefit.

Box 5.1: Comparisons of assistance for R&D received from the bounty, the 150 per cent tax concession and both combined

Bounty	
R&D expenditure	$20 000
Bounty paid	$ 1 000 (5% of $20 000)
150 per cent tax concession	
R&D expenditure	$20 000
Tax deduction on R&D	$30 000
Concessional tax saving	$ 3 900 (39% of $10 000)
Bounty and 150 per cent tax concession (assuming company is making profits)	
R&D expenditure	$20 000
Bounty benefit (after tax at 39%)	$ 610
Concessional tax saving	$ 3 900
Total benefits	$ 4 510

Participants like Factory Automation + Robotics said the bounty 'help[s] to smooth out the cash supply' and evens out the 'very peaky nature of our income'. (sub. 11, p. 3)

In the Commission's 1995 report on *Research and Development*, it found there was a case for supporting R&D undertaken by tax loss companies. It recommended that:

> ... [a] generally available non–taxable grant should be introduced in place of competitive grants for tax loss companies, at a rate equal to the nominal value of a tax deduction of 50 per cent of the cost of undertaking R&D (18 cents in the dollar for a 36 per cent company tax rate). (IC 1995a, p. 33)

The previous Government did not accept the recommendation.

At the draft report public hearing in July 1996, Farley Cutting Systems generally endorsed the Commission's approach for tax loss companies.

Competitive Grants Scheme

The scheme applies to projects involving R&D, product development (including development of prototypes) or trial or demonstration and related market research. The maximum grant available is 50 per cent of project costs.

The total value of grants committed for 1994–95 was $37 million. A number of MT&R companies were recipients of grants for R&D in the years 1988–89 to 1994–95 (IR&D Board, Annual Reports). The amount of grants they received ranged from $10 000 to $380 000.

Any competitive grants received by bounty recipients are deducted from bounty payable. Therefore there is no overlap in assistance between the bounty and the Competitive Grants Scheme.

Concessional loans for commercialisation of technological innovation

The aim of the loans is to assist technology-oriented small companies to commercialise technological innovations. Commercialisation activities supported by the loans are limited to activities relating to marketing of the new product such as product or process design, trial production runs, regulations and standards compliance and trial and demonstration activities.

The Commission's survey did not reveal any bounty recipients receiving assistance from this scheme since its inception in October 1994. The Annual Report of the Industry Research and Development Board also showed no bounty recipient used the scheme in 1994–95.

5.1.2 Continuing R&D assistance through a bounty scheme

With assistance available to the MT&R industries for R&D from both the 150 per cent R&D tax concession and the Competitive Grants Scheme, the question arises whether assistance should also be available through a bounty scheme.

The Commission is of the view that the benefits generated by R&D in the MT&R industries are neither unique nor significantly greater than benefits from other industries. As such, there appears to be no justification to provide additional assistance for R&D through any bounty scheme to the machine tools and robotics industries.

5.2 Automotive Industry Export Facilitation Scheme

The EFS allows passenger motor vehicles (PMV), automotive component and specialised automotive machine tool producers to earn export credits which can be used to reduce duty payable on eligible automotive imports.

Companies that are not automotive importers have the option to sell their export credits to other companies wishing to import automotive goods. As most machine tool manufacturers specialise in the manufacture of machine tools and not automotive components, they normally sell their credits to automotive importers. The Federation of Automotive Parts Manufacturers provides a brokerage service in which companies can sell their export credits.

In 1994–95, about $1.2 million of duty offset or revenue forgone was claimed by machine tool exporters under the EFS scheme. This represents value added of automotive machine tool exports of about $4.4 million.

The level of assistance provided under the EFS is higher than that available under the bounty scheme (see Box 5.2). As demonstrated in Box 5.2, for $100 value added of automotive machine tool exports, export credits would be worth five times the level of bounty payments.

Box 5.2: Export facilitation versus bounty payments

Assume $100 of value added in automotive machine tool exports. For 1996 the value of EFS credits is the amount of duty (based on 25 per cent) that can be saved on imports of a value of $100. The value of the bounty is 5 per cent of value added.

Export facilitation scheme:

$100	@	25 per cent	=	$25
value added		*tariff schedule*	=	*duty offset*

Bounty:

$100	@	5 per cent	=	$5
value added		*level of bounty*	=	*bounty payment*

Note: This is a notional example. The formula for calculating value added for the bounty differs from the EFS.

There is no overlap in assistance provided by the bounty and the EFS. Both the EFS and the bounty scheme are administered by the ACS. If bounty is paid on exports, the value of any duty reduction derived from export credits is reduced (dollar for dollar) by the amount of bounty paid.

5.3 Export Market Development Grants (EMDG)

The Commonwealth Government provides assistance to exporters in the form of grants to develop export markets. These are a maximum of $200 000 per year.

The Commission's survey of bounty recipients showed that about 9 per cent of companies receiving the bounty also received EMDG in 1994–95. The ACS deducts any EMDG from bounty payments.

5.4 Other assistance measures

In addition to the assistance arrangements discussed above, the industries have access to other Commonwealth and State assistance programs. They provide information, advisory and referral services and financial assistance, and are designed to improve the performance of industries in areas such as export development, product and business development, and technology. Unlike the bounty, these assistance programs are not directed at specific industries.

Commonwealth assistance programs that are of particular interest to the MT&R industries are:

- Export Finance and Insurance Corporation — Department of Industry Science and Tourism (DIST);
- Enterprise Improvement Programs — State Government agencies;
- Intelligent Manufacturing Systems — DIST; and
- Co-operative Research Centres — DIST.

At least one company received assistance from the National Industries Extension Scheme (NIES). Machine Development Centre said that it:

> ... is receiving assistance from NIES to improve management systems through the employment of a consultant. (sub. 10, p. 5)

NIES was renamed the Enterprise Improvement Programs in 1995 when it came under the umbrella of Ausindustry.

Assistance programs are also available through State Governments. Examples include:

- Business Expansion Program — State and Regional Development NSW;
- Export Manager Program — Victorian Department of State Development;
- Business Plus Incentive Scheme — Queensland Small Business Corporation;
- New Exporters Challenge Scheme — South Australian Department of Manufacturing Industry, Small Business and Regional Development; and
- Export Market Support Scheme — Western Australian Department of Trade and Commerce.

6 FUTURE ARRANGEMENTS

The machine tools and robots bounty scheme has evolved over the past quarter of a century, its objectives changing with Government policy directions[1]. But what effect has it had on the efficiency with which resources are used in the Australian economy? Has it achieved its objectives cost effectively for both industry and Government and do those objectives remain appropriate in the current environment? Should this bounty scheme or other assistance measures for the machine tools and robots industries continue after 1997? These are the fundamental questions for this inquiry.

6.1 Economic effects

Since 1968–69, assistance to Australian production of machine tools has ranged from high tariffs alone, to high bounty plus tariffs, to bounty alone. For most of the period, assistance to the machine tools industry has been at least twice the manufacturing average. Over the 1980s, nominal assistance was more than halved, but still remained relatively high compared with other industries. In 1989 the bounty was still 40 per cent. Only in the 1990s has the rate fallen into line with the general level of tariffs.

The provision of such generous assistance might be expected to result in significant expansion of the industry compared with others receiving less assistance. However, Chapter 2 has demonstrated that, although production has fluctuated considerably, it showed little overall growth in real terms. In contrast, manufacturing industry investment in plant and equipment has shown a significant increasing trend.

From the mid eighties, the machine tools industry faced severe pressures as a result of both the rationalisation of Australian manufacturing industry and macroeconomic factors affecting investment generally. Many companies left the industry as its traditional customers, particularly the automotive and whitegoods industries, rationalised their operations. Import penetration, which was already high, increased as the Australian industry failed to capitalise on the growth in the domestic market.

[1] See Appendix D for a history of the bounty scheme, its changing objectives and reviews of its effects.

Only in the last few years, when the bounty has fallen to a low level, have there been signs of real growth. Recent increases in exports are encouraging but have been limited to a small number of companies.

It would appear that assistance to the machine tools and robotics industries in general, and the bounty scheme in particular, have had little effect on resource use in these industries. There are a few reasons for this.

First, while price matters, sophisticated equipment is chosen largely on the basis of quality and technology. Demand for capital goods is largely dependent on demand for user industries' goods and macroeconomic factors such as interest rates. Consequently, the demand for machine tools is sensitive to changes in the general strength of the economy but relatively insensitive to the sorts of changes in prices that would result from assistance measures like the bounty. While the bounty scheme may have had some direct effect on the amount of resources devoted to the machine tools and robotics industries at the margin, this effect would have been small even when the bounty was high. At current rates, it would be insignificant.

Second, domestic production is concentrated on custom designed machinery and adapting imports. This means that much of local production is complementary to, rather than competitive with, imports. In these circumstances, providing assistance for local producers to compete with imports through tariffs, bounties or both, would not have been likely to stimulate output. Making machine tools available to Australian industries at world prices by removing the tariff might have been expected to have a greater effect. However, removal of the tariff in 1980 had little effect on trends in consumption or production of machine tools in Australia, emphasising the relative insensitivity of demand in this industry to price changes.

While the effects of the bounty scheme on resource use have been insignificant, the scheme has bolstered the revenue of companies receiving the bounty, particularly when it was high. It provided useful start-up funding for some new ventures and some insulation from cyclical downturns for others. Ultimately, some of the bounty payments flowed indirectly to major users such as the motor vehicle industry. However, the Commission has not been able to identify any special factors which would justify such significant transfers of revenue to this particular sector of industry. While metal working machine tools and robotics are important inputs to production in a wide range of industries, so too is the production of other types of capital equipment, much of which receives no assistance at all.

Finding

Even when the bounty was high, the scheme does not appear to have had much effect on production and resource use. Its impact is even less today. The most significant economic effect is to redistribute revenue from taxpayers to the machine tools industry with little net benefit to the community as a whole

6.2 Effectiveness of the bounty scheme

Over the years, a number of objectives have been added to the bounty scheme in addition to its basic one of encouraging a viable machine tools industry in Australia. The aim of the scheme changed to include promoting advanced technology in Australian manufacturing by encouraging production, exports and use of 'high tech' machine tools and robotics. Has the scheme been effective in achieving these other objectives?

Promoting exports

The objective of promoting exports of 'high tech' machine tools and robots was added to the scheme in 1985 to provide a broader market to encourage development of advanced technology machines. As indicated in Chapter 2, the growth of exports has been a key feature of the Australian machine tool industry in the last few years.

Some of the growth in exports may have originated in the late 1980s when the bounty rate was still quite high, and may be a lagged response to the bounty scheme. However, factors other than availability of the bounty have stimulated interest in export markets, particularly the limited opportunities of the domestic market for advanced equipment, and the need to diversify into new markets as a consequence of rationalisation in traditional user industries. At current rates the bounty is relatively unimportant compared with the costs of exporting such as exchange risk, transport and marketing, distribution and customer support.

In addition, the bounty's application to exports runs a risk that it could be seen as an export subsidy under the GATT. The damage that countervailing action could do to Australia's developing machine tool exports in even one significant market could cost the industry much more than the total value of the bounty.

Advanced materials

Although the machine tools scheme was extended to include working of advanced engineering materials, no applications for bounty have been received,

and no imports have been recorded under Policy By-law Item 55 set up to provide for duty free entry of such machine tools.

This may be because the notion of 'working' certain advanced materials such as polymers as if they were metals is not applicable. One advantage of some of these materials is that they can be formed precisely through techniques such as moulding, extrusion or blowing without the need for additional working. The irrelevance of the current provisions is supported by several participants' criticism of the narrow focus of the scheme in excluding machinery for plastics manufacturing.

Even where advanced materials do require working, such as precision grinding of engineering ceramics, Australian production of such materials is small and the scope for development of domestic machine tool production specialised for these materials is limited. If these ceramics are 'cermets', that is, they contain metal, Chapter 4 has shown that By-law Item 55 is redundant as machine tools for working such materials are already substantively duty free.

The Commission concludes that the bounty scheme has been irrelevant in terms of its stated objective of promoting the development and use in Australia of machinery for working advanced materials.

Developing robotics

Chapter 3 outlined how the bounty scheme can conceivably provide assistance to a wider range of systems incorporating robots than it can to machine tools. However, it is still restricted to machines that produce goods and thus does not cover many other robotic applications, for example, in areas like distribution and service industries generally.

Chapters 3 and 4 also indicated that the definition of a robot in the Act is inconsistent with international practice, creating difficulties for the Australian Customs Service in administering the scheme. The definition is also rather narrow and dated if the focus of the scheme is technological advance. It turns on the programmable mechanical movements of the 'first generation' of standard industrial robots rather than higher technology, later generation robotics characteristics. These limitations have led to piecemeal modifications to eligibility criteria through Ministerial Determinations and frequent amendments to the Act to try to keep it relevant to its objectives. Such changes have increased the complexity and uncertainty of the scheme.

While robotics have been receiving an increasing, but still small, share of bounty payments in recent years, the scheme seems to have had little effect on the production of robotic machines in Australia. Few, if any, standard industrial

robots are produced in Australia. Bountiable robotic machines that require robotic arms, for example, use imported parts which are modified locally to suit particular applications. The novelty in advanced Australian robotic machines lies in other aspects such as vision systems or the application to new areas of production such as laboratory equipment or horticulture.

The scheme is not well known outside of the metal working machine tool area. While consultants are active in searching for potential bounty applicants, production of such machines tends to be at an advanced stage before producers find out about the scheme and make application. They must then apply for registration and await determination from the ACS as to whether they will be eligible for bounty or not. Even if they get the bounty, the method of calculating the payment does not provide for machines by new claimants that require a long developmental phase, as most of these new types of robotic machines do. In such cases, the bounty does not cover costs incurred prior to the year in which bountiable equipment is sold.

Because of all these restrictions, the significance of the bounty scheme in assisting the development and commercialisation of Australian robotics systems is limited. The bounty scheme has provided some assistance to the development of metal working machine tools and systems incorporating imported robots. However, it is so dated and uncertain in its application to more novel designs that it has had little effect on the development of advanced robotic technology in Australia.

Encouraging the use of advanced technology in Australia

The scheme has assisted metal using industries like motor vehicles and whitegoods to obtain some of their capital equipment at duty free prices. However, because of the narrow boundaries of the scheme, it does not apply to most advanced automated systems in industries and activities outside of metals manufacturing The bounty scheme has therefore provided little incentive for investment in equipment for the vast majority of Australian industries. Agriculture, forestry, mining, transport and distribution and services generally are important sectors where the introduction of innovative automated systems might achieve substantial gains for the economy.

Companies introduce advanced technology when it is likely to be profitable as part of their investment strategy. While the bounty scheme could have had some marginal influence on the cost of a small proportion of new capital equipment, this would be dwarfed by such factors as interest rates and expected demand for user industries' output.

Manufacturing industry investment in plant and equipment has been growing substantially in real terms for the past fifteen years, while production of machine tools has not increased. Even when the bounty was high during the 1980s, bountiable production did not keep pace. It is unlikely that the scheme's incentives would be sufficient at current levels to have much effect on the demand for capital equipment even in its traditional user industries.

Findings

Overall, the bounty scheme cannot be judged a success in achieving its objectives.

The current bounty scheme is not effective in promoting production of metal working machine tools in Australia or the development of machinery for working advanced materials.

The bounty scheme has generally not been a significant stimulus to export of machine tools and robotics.

While it has provided some assistance to the development of some robotics systems in Australia, the bounty scheme is so dated and uncertain in its application that it has been of limited use in the field of robotics.

The narrow boundaries of the bounty scheme and the overwhelming influence of broad economic factors means the scheme has not been effective in encouraging Australian industry to invest in advanced technology machinery.

6.3 Administration and compliance costs

Chapter 3 analysed how, from a purely administrative point of view, the scheme is complex, difficult to understand and uncertain in its application. Eligibility criteria are difficult to interpret and have not kept pace with technological change, requiring Ministerial Determinations to try to maintain the relevance of the Act to its objectives.

Once eligibility is established, the calculation of the bounty is needlessly complex, increasing the costs of administration and compliance for Government and industry. The Commission estimates these costs could be up to $1.25 million a year, some 15 per cent of the annual value of the bounty. Cost-effectiveness will decline further as the rate of bounty has now fallen to 5 per cent. A number of participants commented that many smaller firms find the costs incurred in applying for bounty excessive.

Finding

The definitions and procedures specified in a complex, overly prescriptive and dated Act create significant uncertainty and needlessly high administrative and compliance costs to Government and industry.

6.4 Tariffs and by-laws

The bounty scheme also provides for duty free entry of imported eligible machine tools, robots and parts, as discussed in Chapter 4. The complex and uncertain definitions and end-use restrictions of the Act are mirrored in the tariff provisions and four policy by-law items. This means that the ACS faces the same definitional problems when determining whether imported goods are eligible for duty free entry.

Using the by-law items is administratively cumbersome and they have been relatively little used except for robots. However, the Commission understands that duty free entry of robots cannot easily be achieved by reducing the duty substantively in the Tariff and that maintaining the robots by-law is the simplest method of maintaining duty free entry. It would be sensible for the ACS to review the definition of what constitutes a robot with a view to finding one that is commonly used in international trade.

Duty free entry for machine tool parts covered by item 48 could be achieved by reducing the tariff to zero. As items 49 and 55 have had little if any use, they serve little purpose. These three by-law items could then be abolished.

Finding

The by-law items of the scheme have, in most cases, not been efficient in ensuring duty free entry of imported machine tools and robots.

6.5 Overlapping assistance

The bounty scheme is only one program in the total mix of assistance measures available to industry generally or to specific sectors of manufacturing, for example the motor vehicle export facilitation scheme. The interactions of these measures can be quite complex. When the bounty was high, it encouraged companies to 'shop' for assistance in the most advantageous way. As a consequence, eligibility rules were tightened. The value of all other government grants is now deducted from the amount of bounty otherwise payable. Furthermore, for those machine tool producers eligible for the motor vehicle

export facilitation scheme, the value of bounty payments is deducted from the value of credits under the scheme.

In contrast, the assistance for R&D provided by the bounty scheme does overlap with the assistance provided by the 150 per cent tax deduction for R&D expenditure. As the benefits of R&D within the machine tools and robotics industries are to a large extent retained in-house, there does not appear to be justification for special assistance for R&D in addition to that which is provided by the 150 per cent tax deduction. This overlap could be overcome by excluding R&D costs from the basis of bounty calculation.

Finding

The special provision of assistance for research and development in the bounty scheme overlaps with the 150 per cent tax deduction for R&D.

6.6 Future policy

The Commission's recommended approach

The machine tools and robots bounty is no longer effective. In view also of its high administrative and compliance costs, the bounty is not delivering net benefits to the Australian community. It should be allowed to lapse on 30 June 1997.

Given the small amounts involved, the Commission does not expect that the costs of adjustment will be significant for the machine tools and robotics industries as a whole. This is not to say that individual companies will not be affected. But there is nothing to suggest that any adverse effects from removing the final 5 per cent of bounty would not be outweighed by continuing improvements in competitiveness and further export growth.

The lapsing of the bounty would require some complementary action on the tariff and concessional entry aspects of the scheme. Under the current scheme, the bounty on domestic production is mirrored in duty free entry of imports of certain finished machine tools, robots and parts. Many of these items are substantively duty free while others enter under policy by-law items or other tariff concessions.

Should the bounty now be replaced by the tariff of 5 per cent that will be generally applicable to dutiable goods from 1 July 1996? It would be a retrograde step to raise tariffs when the thrust is generally to reduce them. Whether and when all tariffs should be reduced to zero (leaving aside industries

subject to sectoral policy, such as passenger motor vehicles and textiles, clothing and footwear) is a matter beyond the scope of this inquiry. However, the Productivity Commission has presented a broad reform agenda in its *Stocktake of progress in microeconomic reform* (PC 1996), including a recommendation to lower general tariff rates for most goods to zero in July 1998.

The bounty scheme is not equivalent to a tariff. Bounties are not identical in their effects to tariffs, as they provide cash to recipients whereas tariffs impose a tax on imports and provide an opportunity to raise prices of domestic products. Conditions in the marketplace significantly affect a producer's ability to benefit from tariff assistance, while receiving the bounty is certain once eligibility is established.

The machine tools and robots bounty has a number of additional distinctive features which differ from a tariff. It does not provide similar assistance to value adding in Australia, as it applies to a limited range of in–house factory costs. The bounty also differs in its treatment of R&D expenditures which would not receive similar assistance from a tariff. In addition, the bounty applies to exports as well as to production for the local market.

A tariff therefore could not provide similar assistance to local producers. However, by raising the costs of both imported and local products, a tariff would increase costs to user industries, albeit by a small amount. Participants have indicated that for complex, highly differentiated equipment such as this, duty drawback on exports is often not feasible and a tariff would therefore impose an additional cost. The Commission therefore considers that the tariff on those machine tools and parts that are already substantively free of duty should remain so.

The Commission also considers that the duty on robots should remain at zero. As Chapter 2 indicated, there is little if any local production of standard industrial robots. This measure should not disadvantage local production of robotic machines incorporating imported robotic parts and is unlikely to have adverse effects on Australian producers of the new generation of robots.

If the assistance afforded the production of machine tools and robots is removed, it would be desirable that duty free entry of inputs continue. If all tariffs cannot yet be reduced to zero, it would be desirable to get as close as possible to that outcome selectively. This can be achieved by reducing substantive rates or through concessional entry or a combination of both.

Certain parts for machine tools are identified separately in the Tariff Schedule. As production of most parts is not in practice assisted by the bounty now, the

status quo could be maintained simply by reducing the rate of duty on those items to zero. This would allow the by-law items 48, 49 and 55 to be abolished.

Recommendations

The machine tools and robots bounty scheme should lapse on 30 June 1997.

The tariffs on those machine tool items in Schedule 3 to the Tariff that are now set at zero should remain so.

The tariff on parts falling to items 8466.10, 8466.20, 8466.30, 8466.93 and 8466.94 of Schedule 3 to the Tariff should be reduced to zero from 1 July 1997.

The machine tools and robots bounty scheme by-law items 48, 49 and 55 of Schedule 4 to the Tariff should be rescinded from 1 July 1997.

Duty free entry for robots and parts under by-law item 30 should be retained; the current definition of a robot should be replaced with one commonly used in international trade.

Capitalisation of the bounty

The terms of reference require that the Commission report on the merits of capitalising expected bounty payments into a once off payment and terminating the scheme. While this would provide transitional assistance to the industry, it would not be desirable. It would continue assistance when this inquiry has found that the scheme is not providing net benefits to the community.

Nor would capitalisation be practical. As Chapter 3 demonstrated, output by individual companies in this industry is volatile, so that is difficult to predict the future pattern of bounty payments. Rapid growth in bountiable goods production by some firms, and moves to diversify into related, but non-bountiable, equipment production by others, does not provide a reasonable basis for estimating the expected value of the scheme. There is neither a good historical nor prospective basis for calculating a capitalised value of the bounty.

Definitional issues

If the Government decided to continue with a bounty scheme for the machine tools and robotics industries, a simpler, more economically efficient and cost-effective scheme is required. The current Act should be repealed and new legislation prepared. The new bill should contain the purpose and objectives, and be enabling rather than prescriptive. Eligibility criteria and definitions

should be prescribed in regulations. The definition of a robot could then be altered to reflect technological change. This enabling form of legislation would remove the need for Ministerial discretion in the day-to-day operation of the scheme.

Unless the new Act was quite clear about what it was trying to achieve, it would end up with similar administrative problems to the current scheme. Simpler, more efficient administrative systems must be developed, based on a selling price based concept of value added, and excluding R&D costs. This would remove the overlap in assistance on R&D expenditures.

The ACS should not be expected to make judgements about the technological merits of equipment. If technological development remained an objective, a source of technical advice should be available to the administering authority.

The rationale for the coverage of the scheme should be made clear and eligibility rules simplified and clarified. If the objective of assisting production of machinery for producing advanced materials were to be retained, the scheme should also be designed in a way which would achieve that objective.

APPENDICES

A INDUSTRY VISITS AND SUBMISSIONS RECEIVED

A.1 Industry visits

In preparation of this report, the Commission met with representatives from the following organisations.

New South Wales

Australian Customs Service
Bison Engineering Pty Ltd
Kirby Engineering
Michael Kassler and Associates Pty Ltd

Queensland

Australian Customs Service
Forbio Robotics
Radius Benders Pty Ltd
RL Windsor & Son Pty Ltd

ACT

Australian Customs Service
Metal Trades Industry Association
Department of Industry, Science and Tourism

Victoria

Advanced Engineering Centre for Manufacturing
ANCA Pty Ltd
Australian Biomedical Corporation Ltd
Australian Customs Service
CSIRO Division of Manufacturing Technology
Factory Automation + Robotics Pty Ltd
Ford Motor Company
Holden's Engine Company
Institution of Engineers
John Hart Pty Ltd
Laser Lab International Pty Ltd
Lewis Australia Pty Ltd

South Australia

Email Ltd
FW Hercus Pty Ltd
Polytech Technical Services Pty Ltd
Woodfast Machinery Co
Wybrow Engineering Pty Ltd

A.2 Submissions received

Organisation	Submission number
ANCA Pty Ltd	17, 24
Applied Machine Tools Pty Ltd	9
Australian Customs Service	18
Australian Robot Association	21
Broens Toolmaking Pty Ltd	12
Crib Point Engineering Pty Ltd	3
Epic Industries Pty Ltd	27
Factory Automation + Robotics Pty Ltd	11
Hi-Tech Automation (Aust) Pty Ltd	28
Invetech	8
John Hart Pty Ltd	4, 25
John Heine & Son Pty Ltd	7
KD Binnie Engineering Pty Ltd	18
Kelvin Thomson MHR	26
Lefco Pty Ltd	23
Lewis Australia Pty Ltd	13
Machine Development Centre Pty Ltd	10
Machine Makers Australia Pty Ltd	20
Metal Trades Industry Association	22, 29
Michael Kassler and Associates Pty Ltd	2
Millform Products	5
Polytech Technical Services Pty Ltd	16
RL Windsor & Son Pty Ltd	15
System Dynamics Pty Ltd	6
Trade & Tariff Consulting Services Pty Ltd	14
Woodfast Machinery Co	1

B STATISTICS

B.1 ABS Manufacturing data

Table B.1: Wood and metal working machinery industry

Year	*Turnover ($ million)*	*Imports ($ million)*	*Exports ($ million)*	*Employment*
	1988–89 prices			
1968–69	235.2	272.4	22.8	4 504
1969–70	235.8	263.7	22.5	4 392
1970–71	nc	306.4	27.9	nc
1971–72	237.6	315.9	30.7	4 350
1972–73	218.8	216.1	34.3	3 549
1973–74	258.0	251.3	25.5	3 921
1974–75	258.4	336.4	36.3	4 159
1975–76	241.7	317.3	26.2	3 740
1976–77	214.4	352.9	15.3	3 559
1977–78	241.2	318.4	16.1	3 673
1978–79	247.3	403.4	20.2	3 269
1979–80	268.5	323.1	18.9	3 664
1980–81	276.6	464.2	18.2	3 670
1981–82	298.1	473.4	14.7	3 814
1982–83	219.4	341.2	11.2	2 841
1983–84	164.6	302.1	12.0	2 200
1984–85	181.2	431.0	16.5	2 400
1985–86	nc	644.1	15.3	nc
1986–87	246.6	683.6	15.3	3 000
1987–88	279.3	543.9	23.0	3 288
1988–89	244.7	521.1	19.8	3 200
1989–90	203.1	569.4	34.7	2 300
1990–91	290.9	375.9	39.7	2 591
1991–92	197.2	398.5	49.5	2 259
1992–93	nc	416.3	59.8	nc

nc not collected

Source: ABS, Cat. No. 5464.0, 8203.0 and 8221.0

Table B.2 Manufacturing Technology Statistics — 1988 and 1991
Establishments with advanced technology, Australia (per cent)

Technology Type		*Food beverages tobacco*	*Textiles*	*Clothing & footwear*	*Wood & Wood products*	*Paper & printing*	*Chemical petroleum & coal products*	*Non-metallic mineral products*	*Basic metal products*	*Fabricated metal products*	*Transport Equipment*	*Other machinery & equipment*	*Misc. manufact.*	*Total manufact.*
CAD/CAM[1]	1991	2	6	6	7	4	2	3	10	9	11	18	7	8
	1988	2	6	3	3	3	1	1	5	4	7	9	7	4
Standalone NC/CNC	1991	5	9	11	16	6	5	10	33	23	26	33	16	17
machines[2]	1988	3	12	7	12	7	3	8	19	15	25	34	10	13
FMC/FMS[3]	1991	5	4	2	1	1	6	6	7	1	5	4	4	3
	1988	1	2	0	0	1	1	2	1	0	3	3	2	1
Materials working laser(s)	1991	0	0	0	0	1	0	1	3	1	3	2	1	1
	1988	0	0	1	1	2	0	1	1	1	2	2	1	1
Advanced cutting tech.	1991	5	2	3	1	0	4	2	11	14	20	14	3	7
(excl lasers)	1988	4	2	1	1	1	3	2	8	9	13	8	2	5
Advanced joining & coating	1991	0	0	0	1	0	0	0	2	0	3	1	2	1
(excl lasers)	1988	na	na	na	na	na	na	na	na	na	na	na	na	na
Advanced heat treatment	1991	0	0	0	0	0	0	0	3	2	3	1	1	1
	1988	na	na	na	na	na	na	na	na	na	na	na	na	na
Simple pick and place robots	1991	1	1	1	0	1	3	4	6	2	6	4	5	2
	1988	2	1	1	0	0	2	4	4	2	8	4	5	2
Robots for spot and	1991	0	0	0	0	0	0	0	1	4	9	3	0	2
arc welding	1988	0	0	0	1	0	0	0	2	2	7	4	0	2
Robots for assembly	1991	0	0	1	0	0	0	1	2	0	4	1	0	1
finishing other	1988	0	1	0	0	0	0	1	2	0	3	1	2	1
Computers for control	1991	10	8	3	4	4	21	14	22	8	17	14	8	9
on factory floor	1988	10	4	4	3	3	17	11	16	4	11	12	7	7

1 Computer-Aided Design/Computer-Aided Manufacture

2 Numerically Controlled/Computer Numerically Controlled

3 Flexible Manufacturing Cell/Flexible Manufacturing System

Source: ABS, Cat. No. 8123.0

B.2 International data

Table B.3: Installations of industrial robots (number)

Industry		*1992*	*1993*	*1994*	*1995*
Motor vehicles	Australia	32	35	76	87
	Japan	6 489	3 268	799	na
Fabricated metal products	Australia	46	66	46	29
	Japan	2 119	956	538	na
Food beverages tobacco	Australia	12	10	12	46
	Japan	502	485	479	na
Mining	Australia	0	0	5	3
	Japan	0	0	0	na
Chemicals petroleum plastics	Australia	2	1	4	0
	Japan	2 398	1 453	396	na
Basic metals	Australia	2	1	3	7
	Japan	159	61	-125	na
Textiles and leather	Australia	1	0	2	0
	Japan	45	53	55	na
Paper printing & publishing	Australia	1	1	2	0
	Japan	126	42	60	na
Electrical machinery	Australia	0	7	2	25
	Japan	7 869	6 684	4 606	na
Non-metallic mineral products	Australia	3	5	1	0
	Japan	235	75	36	na
Non-electrical machinery	Australia	0	3	1	0
	Japan	1 937	1 414	1 348	na
Wood & wood products	Australia	0	2	0	12
	Japan	32	0	-13	na
Transport equipment excl. motor vehicles	Australia	3	1	0	0
	Japan	1 290	1 120	913	na
Other manufacturing	Australia	5	3	0	3
	Japan	965	2 445	-217	na
Other	Australia	11	10	2	2
	Japan	397	540	96	na
Australian Total		118	145	156	214
Japanese Total		24 563	18 596	8 971	na

Source: UN 1995 and Australian Robot Association estimates

Table B.4: Tariff item 8466 imports ($'000s)

Tariff item	*1990–91*	*1991–92*	*1992–93*	*1993–94*	*1994–95*
8466.10	7 468	6 613	8 034	8 452	9 369
8466.20	2 924	2 210	3 790	3 578	3 878
8466.30	1 542	835	1 535	1 404	1 700
8466.91	550	998	994	786	1 361
8466.92	4 030	3 552	3 980	5 926	10 815
8466.93	8 038	5 556	7 429	9 223	9 688
8466.94	21 604	27 036	15 636	37 660	13 873
Total	46 155	46 800	41 399	67 029	50 685

Source: ABS, Cat. No. 5464.0

Table B.5: Goods imported duty free under by-law items ($'000s)

	1990–91			*1991–92*			*1992–93*			*1993–94*			*1994–95*		
By-law	*30*	*48*	*49*	*30*	*48*	*49*	*30*	*48*	*49*	*30*	*48*	*49*	*30*	*48*	*49*
tariff item															
8424	5	0	0	378	0	0	0	0	0	133	0	0	92	0	0
8428	517	0	0	176	0	0	416	0	0	1 131	0	0	1 576	0	0
8431	55	0	0	6	0	0	100	0	0	110	0	0	808	0	0
8456	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8457	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8458	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8459	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8460	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8461	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8462	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8463	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8464	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8465	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8466	0	11 271	0	0	1 049	0	38	390	0	0	34	0	5	264	0
8468	0	0	5	0	0	4	0	0	2	2	0	14	110	0	0
8479	4 094	0	5	1 803	0	201	2 623	0	22	4 723	0	70	8 008	0	128
8515	776	0	5	1 284	0	0	1 312	0	0	1 567	0	47	309	0	90
8537	18	0	0	11	0	0	12	0	0	17	0	0	124	0	0
8542	0	0	0	0	0	0	0	0	0	0.5	0	0	0.6	0	0
9032	0	0	0	2	0	0	0	0	0	18	0	0	2	0	0
Other	825	0	0	1 277	0	0	1 094	0	0	1 687	0	0	1 370	0	0
Total	6 290	11 271	15	4 937	1 049	205	5 596	390	24	9 387	34	131	12 405	264	218

Source: ABS, Cat. No. 5464.0

C SURVEY QUESTIONNAIRE AND RESPONDENTS

C.1 Purpose and methodology

Because of the paucity of up-to-date information on the machine tools and robotics industries, particularly in respect of bountiable goods, the Commission undertook a survey of bounty recipients. A questionnaire was sent to 170 firms that received a bounty payment in the last three years. Much of the information sought had already been provided to the Australian Customs Service (ACS) in support of bounty claims, but that is confidential to the ACS.

The Commision received completed questionnaires from 22 bounty recipients. These recipients received 36 per cent of the 1994–95 bounty payments.

In order to obtain population estimates of bountiable activity, the responses to the survey were treated as a representative sample of the industries. Questionnaires were received from many large recipients together with a representative number of smaller recipients. This permitted the sample to be stratified to give statistically acceptable results.

C.2 Survey Questionnaire

Survey of machine tools and robots bounty recipients

Notes:

1. All information requested relates only to the establishment at the given address. If your company operates more than one establishment, please complete a separate questionnaire for each establishment.
2. Actual data should be supplied where possible. Otherwise, estimates can be supplied. Please refer to your previous years' Claim for Payment forms for answers to many of the questions.
3. Where questions relate to the years that you have received a bounty payment, if you have not received a bounty payment in any of the years, write "NA" in the appropriate boxes.
4. Please complete and return the questionnaire in the enclosed reply paid envelope by **17 April 1996**.
5. If you have any queries about this questionnaire, please contact:

   Michael Smiddy

   (03) 9653 2201

Please supply the following background information about your firm.

1. Registered name of establishment:

_____

2. Address of establishment:

_____

3. Please nominate a contact person in your establishment for future correspondence:

Name:_____

Telephone no: _____

1. For the financial years 1989/90, 1992/93, 1993/94 and 1994/95, please provide details of the number of people* employed in the following activities:

   *Based on working standard hours in a working year.

	1989/90	1992/93	1993/94	1994/95
Production				
Research & Development				
Admin and Sales				
Total				

2. For the financial years 1989/90, 1992/93, 1993/94 and 1994/95, please provide the value (exclude sales tax) of the following for **all activities**:

	1989/90	1992/93	1993/94	1994/95
Domestic Sales	$	$	$	$
Exports	$	$	$	$
Value Added	$	$	$	$
Factory Cost	$	$	$	$
Parts and Materials Cost	$	$	$	$
Salaries, Wages and on-costs	$	$	$	$
R&D Expenditure	$	$	$	$

3. Please provide the value of the following for the financial years 1989/90, 1992/93, 1993/94 and 1994/95. Exclude sales tax:

a: all machines tools and robots

	1989/90	1992/93	1993/94	1994/95
Domestic Sales	$	$	$	$
Exports	$	$	$	$
Value Added	$	$	$	$
Factory Cost	$	$	$	$
Parts and Materials Cost	$	$	$	$
Salaries, Wages and on-costs	$	$	$	$
R&D Expenditure	$	$	$	$

b: all bountiable goods

	1989/90	1992/93	1993/94	1994/95
Domestic Sales	$	$	$	$
Exports	$	$	$	$
Value Added (Item T*)	$	$	$	$
Factory Cost (Item R*)	$	$	$	$
Parts and Materials Cost (Item Q*)	$	$	$	$
Salaries, Wages and on-costs	$	$	$	$
R&D Expenditure	$	$	$	$

* Relates to Customs Bounty Claim for Payment form.

4. Please provide the following for **each bountiable good** produced/modified in 1994/95. Also provide the costs you incurred in claiming the bounty:

	1st good	2nd good	3rd good	etc
Description of Equipment (Item I				
Category of Equipment (Item J)				
Conversion (Item K)				
Specific Sub-category (Item L)				
Amount of bounty $				
Cost of claiming bounty $				

* Items I to L of Customs Bounty Claim for Payment form

5. Please provide amounts of other government assistance received in 1994/95 for all **machine tools and robots**:

R&D Tax Concession	$
Competitive Grants Scheme for R&D	$
Concessional loans for commercialisation of technological innovation	$
Duty Drawback and TEXCO	$
Export Market Development Grant	$
Automotive Export Facilitation Scheme - value of credits	$
Other Commonwealth Government assistance (specify)	$
State and Local Government assistance	$

C.3 Respondents

Accurate Manufacturing (1993) Pty Ltd

ACL Bearing Company

ANCA Pty Ltd

Archer Hydraulics Pty Ltd

Automation and Process Control Services Pty Ltd

Broens Toolmaking Pty Ltd

Chalmers & Corner Engineering Pty Ltd

Citydel Engineering (Adelaide) Pty Ltd

Email Ltd

Farley Cutting Systems Australia Pty Ltd

FW Hercus Pty Ltd

High Technology and Control

Hilleng Pty Ltd

Hi-Tech Automation (Aust) Pty Ltd

Kirby Engineering

Lewis Australia Pty Ltd

McGrath Machinery Pty Ltd

Millform Products

Polytech Technical Services Pty Ltd

Protoblast Company

S & E Engineering

System Electronics Pty Ltd

D DEVELOPMENT OF THE BOUNTY SCHEME

The machine tools and robotics industries originally received assistance as part of the assistance to Australian manufacturing industry generally. The machine tools bounty scheme began in 1972 and was replaced by the current machine tools and robots bounty in 1985. A number of legislative amendments have occurred since that time, reflecting changing technologies and objectives.

D.1 The 1972 bounty scheme

Bounty assistance for the metal working machine tools industry began in 1972 with the introduction of the *Metal Working Machine Tools Bounty Act 1972*. Under this scheme the Government's objectives, mainly for defence purposes, were to help maintain a viable machine tools industry without encouraging its expansion (Hansard 17 August 1972, p. 2148).

The Tariff Board (1972) estimated that an effective rate of assistance of around 70 per cent was necessary to meet this objective. This effective rate was twice the manufacturing average at the time (35 per cent in 1971–72). The Board recommended a bounty scheme that would maintain some tariff protection and pay a bounty of 25 per cent of the ex-factory selling price (net of taxes) on the local production of various metal cutting machines (but not metal formers, for example, benders) sold for local use.

The Tariff Board considered the use of tariff-only assistance as inappropriate for this industry due to the impact on users' costs. The Board also noted that machine tool purchases were not strongly price driven, reducing the effectiveness of tariff protection.

The Government adopted the Board's tariff recommendations but, because of administrative concerns, chose to pay the bounty on a factory cost basis, with the payment reducing to nil when the Australian content of factory costs fell below 55 per cent. The Government introduced the bounty at $33^{1}/_{3}$ per cent, based on the Board's estimate that this would deliver a rate of assistance equivalent to 25 per cent of selling price.

1978 Review and changes

In 1978 the scheme was altered on the advice of the Industries Assistance Commission (IAC 1977) to a bounty paid on local production of all power-operated metal working machine tools, whether they be for cutting or forming. This was to ensure neutral assistance across the industry.

The Government also reduced tariffs on bountiable machines and parts to zero in order to meet an effective rate of assistance target of 40 to 45 per cent. This rate was still nearly twice the manufacturing average (23 per cent in 1977–78).

A new objective of maintaining Australian design activity was added as a complement to the original objective of maintaining the nucleus of a machine tools industry. To achieve this, local design costs became bountiable at 25 per cent. The objective of not encouraging expansion of the industry disappeared.

D.2 The 1985 bounty scheme

A new scheme began in 1985, following another IAC inquiry. The IAC was still guided by the objective of maintaining a nucleus in machine tools for defence purposes. It also reported on robots and, given the close relationship between robots and machine tools at that time, decided that robots should also be afforded bounty assistance in the same bounty scheme (IAC 1984).

In the second reading speech, the Government announced the key objectives of the new scheme as being to:

> ... encourage the development of a modern competitive metal working machine tools industry, facilitate development of an Australian robot industry and assist modernisation of user industries. (Hansard 18 November 1985, p. 2987)

As previously, the Government supported the use of a bounty as it would reduce the impact of assistance on user industries. It also represented a shift toward industry development objectives.

For example, the scheme introduced differential assistance for high and low technology equipment to encourage producers to move into high technology equipment (including robots). It reduced assistance for low technology equipment to the manufacturing average and offered higher assistance to high technology equipment. This included an extension to high technology exports as this was seen as the major market for this type of equipment.

Thus, the major thrust shifted from defence. This shift was consistent with the Government's move in 1984 (and which has been maintained to this day) to

base defence industry policy on broader defence objectives rather than economic or industry development objectives (IC 1994).

The basis for bounty payments was changed to in-house value added (as defined to mean factory, design, administration and software costs). Bountiable activities were extended to include computer controlled machines such as welders, robots and flexible manufacturing systems as well as certain retrofitting activities.

1991 Review and changes

The Bureau of Industry Economics (BIE) conducted a review of the scheme in 1990. This review found that the scheme had been largely effective in both maintaining the machine tools industry and encouraging a move to high technology areas. Bounty assistance and duty free imports had given users access to technology as world prices.

The BIE (1990) recommended that the differential treatment of high and low technology equipment, both in terms of bounty rate and eligibility of exports, be removed because of the distortions created by differential assistance, and that the assistance afforded equate to the assistance across manufacturing generally.

In 1991, the Government made exports of all bountiable equipment eligible for bounty. Coverage was also extended to machine tools for working advanced materials such as engineering ceramics and polymers, against the advice of the BIE.

The Government also required that high technology goods be sold or otherwise disposed of before bounty became payable, thus stopping payment to goods produced and used in-house. While this change took effect on 1 July 1991, the Act allowed previously eligible projects that were already underway to receive bounty.

Also in 1991, as part of *Building a Competitive Australia* (DPM&C 1991), the Government announced a phased reduction in general tariffs to reach five per cent on 1 July 1996. Accordingly, a decline in the rate of assistance provided through the bounty scheme began, with all classes of bountiable goods to receive 5 per cent from 1 July 1996.

D.3 Legislative amendments to the *Bounty (Metal Working Machines and Robots) Act* 1985

Bounty and Subsidy Legislation Amendment Act 1986

Bounty and Subsidy Legislation Amendment Act (No. 2) 1986

Customs Tariff (Miscellaneous Amendments) Act 1987

Bounty and Subsidy Legislation Amendment Act 1988

Statutory Instruments (Tabling and Disallowance) Legislation Amendment Act 1988

Bounty Legislation Amendment Act 1990

Bounty Legislation Amendment Act 1991

Bounty Legislation Amendment Act 1993

Customs, Excise and Bounty Legislation Amendment Act 1995

Bounty Legislation Amendment Act 1995

E BOUNTY RECIPENTS

1992–93 to 1994–95 ($)

	Firm	*Total*	*1994/95*	*1993/94*	*1992/93*
1	James N Kirby P/L	2 552 505	603 037	1 420 796	528 672
2	ANCA P/L	2 406 684	768 999	771 722	865 964
3	Laser Lab International P/L	1 660 554	252 152	623 970	784 432
4	Australian Biomedical Corporation Ltd	1 189 271	684 628	44 992	459 650
5	Simpson Ltd - Kelvinator Australia Ltd	1 122 082	371 700	525 522	224 859
6	Farley Cutting Systems	1 121 621	435 996	238 870	446 755
7	W &D Engineering P/L	766 579	251 934	418 009	96 636
8	Lewis Australia P/L	703 040	186 521	151 844	364 675
9	Factory Automation Syntech P/L	500 710	131 811	294 995	73 903
10	FW Hercus P/L	495 415	138 304	121 189	235 922
11	Nova Machinery P/L	360 332	81 539	170 826	107 967
12	Brobo Waldown P/L	358 551	97 294	116 057	145 200
13	Smale J C & Co	355 797	355 797	0	0
14	Marand Precision Engineering P/L	342 883	151 330	37 459	154 094
15	Welding Industries Ltd	341 302	341 302	0	0
16	Crib Point Engineering P/L	323 862	133 223	108 880	81 760
17	S & E Engineering P/L	279 219	82 167	68 581	128 471
18	Able Engineering P/L	277 594	25 121	92 786	159 687
19	Hilleng P/L	259 922	75 405	81 524	102 994
20	Centurion Industries Ltd	255 896	98 151	82 245	75 500
21	J&E Hofmann Engineering P/L	254 353	95 097	67 380	91 876
22	Diecraft Engineering P/L	251 271	79 438	113 060	58 773
23	Parkanson P/L	241 921	38 017	55 390	148 515
24	Sturton-Gill Engineering P/L	239 716	78 263	61 393	100 060
25	Imperial Machinery & Manufacturing Industries	237 075	98 731	87 789	50 555
26	Clyde Industries Ltd	231 577	97 023	127 725	6 829
27	John Hart P/L	210 956	0	69 412	141 544
28	Hagenmuller H	210 823	54 473	78 472	77 878
29	Bison Engineering P/L	206 960	93 394	0	113 565
30	Tronics P/L	201 338	201 338	0	0
31	Epic Industries P/L	189 845	54 184	65 744	69 916
32	Australian Tooling Company P/L	185 277	0	176 190	9 087
33	CNC Design P/L	184 791	0	70 034	114 757
34	Polytech Technical Services P/L	178 902	74 361	68 213	36 329
35	Wybrow Engineering P/L	171 270	97 844	13 780	59 645
36	Priority Engineering P/L	171 167	54 213	116 954	0
37	Colrol P/L	168 897	59 745	38 630	70 523
38	Invetech Operations P/L	168 598	98 842	69 756	0
39	Accurate Manufacturing (1993) P/L	165 142	67 895	39 639	57 609
40	Digital Arts Film And Television P/L	162 098	85 488	0	76 611
41	Andrew Engineering (Aust) P/L	158 754	70 680	17 060	71 014
42	Bundy Tubing Company (Aust) P/L	156 983	328	156 655	0

	Firm	*Total*	*1994/95*	*1993/94*	*1992/93*
43	John Heine & Son P/L	144 616	68 192	13 991	62 433
44	W Granowski P/L	142 194	142 194	0	0
45	Automation And Process Control Services P/L	137 400	32 045	105 355	0
46	Manufacturing Technologies P/L	132 707	0	0	132 707
47	Consolidated Tool & Die P/L	124 403	0	0	124 403
48	Broens Toolmaking P/L	117 302	4 331	64 685	48 286
49	A E Bishop & Associates P/L	116 397	6 263	59 602	50 532
50	Megami Corporation P/L	114 302	0	0	114 302
51	Marco Engineering P/L	113 312	78 271	14 765	20 276
52	Turn-Key Automation P/L	113 100	48 980	43 131	20 989
53	Warren & Brown & Staff P/L	113 020	3 039	51 200	58 780
54	R L Windsor & Son P/L	112 674	112 674	0	0
55	Machine Developmenmt Centre P/L	108 969	62 332	12 519	34 118
56	Citydel Engineering (Adelaide) P/L	105 516	0	105 516	0
57	Machinemakers Australia P/L	104 982	28 211	30 749	46 022
58	Powertrol Automation P/L	104 860	(24 109)	26 319	102 651
59	K D Binnie Engineering P/L	103 670	7 482	43 094	53 094
60	Pongrass Operations P/L	97 715	0	0	97 715
61	Tonto Engineering P/L	94 660	45 949	15 751	32 960
62	Automated Handling & Packaging	94 585	94 585	0	0
63	Ted Engineering Group Australia Ltd	93 051	88 686	4 365	0
64	Renay P/L	85 857	0	85 857	0
65	Stramit Engineers P/L	85 181	4 255	0	80 926
66	Australian Rollform Enterprises	83 983	0	9 458	74 525
67	McGrath Machinery P/L	81 348	26 597	35 758	18 993
68	Adept Group P/L	78 541	5 533	56 446	16 562
69	System Electronics P/L	77 776	23 896	33 380	20 499
70	Machine Technology (Aust) P/L	77 530	7 624	43 355	26 552
71	Electro Hydraulic Industries P/L	74 347	7 839	37 325	29 183
72	Williamson Engineering P/L	70 017	18 626	26 080	25 310
73	Supero P/L	68 612	36 214	0	32 398
74	Qutec P/L	66 503	12 565	11 627	42 312
75	Presew P/L	65 506	27 396	18 502	19 607
76	Tabgarde P/L	63 768	3 635	11 914	48 219
77	Powerline International P/L	60 464	0	47 701	12 763
78	Radius Benders P/L	57 722	17 644	18 072	22 006
79	Fabro Engineering P/L	55 531	7 599	5 080	42 852
80	AJM Machinery P/L	55 336	18 067	12 704	24 565
81	Steel Tank & Pipe Consolidated P/L	54 271	38 079	16 192	0
82	Euro-Tech Design & Engineering P/L	53 916	0	7 612	46 304
83	Rollformers Australia P/L	53 538	32 083	21 455	0
84	Universal Engineering Development Co P/L	52 964	0	0	52 964
85	Bailey Aluminium Products P/L	52 915	0	52 915	0
86	Chalmers & Corner Engineering P/L	51 289	11 032	23 148	17 109
87	Millform Products (Shore CJ & JR)	49 729	24 396	3 787	21 546
88	Nepean Engineering P/L	46 716	41 261	0	5 455
89	System Dynamics P/L	45 154	0	27 040	18 115
90	Carrier Machinery Co P/L	43 329	6 762	13 211	23 355
91	Adenford Investments P/L	42 396	0	16 067	26 329
92	Stratco (SA) P/L	41 795	25 607	0	16 188
93	Parken Engineering Equipment	40 322	6 379	30 253	3 690

	Firm	*Total*	*1994/95*	*1993/94*	*1992/93*
94	Alfon Industries P/L	38 999	38 999	0	0
95	Industrial Hydraulic Services	37 650	37 650	0	0
96	Henka Engineering P/L	37 376	12 169	13 925	11 281
97	Bliss Corporation Ltd	36 874	0	0	36 874
98	Boral Johns Perry Industries P/L	34 376	0	0	34 376
99	W E Jagger (Aust) P/L	34 186	10 879	9 999	13 308
100	Apparel Robotics P/L	33 839	0	1 608	32 231
101	McMillian P/L	32 171	0	0	32 171
102	High Technology Control P/L	31 788	31 788	0	0
103	Active Engineering P/L	31 586	31 586	0	0
104	Automotive Components Ltd	29 272	0	29 272	0
105	Integrated Engineering P/L	26 366	0	13 432	12 934
106	Archer Hydraulics P/L	26 224	22 931	3 292	0
107	Mills John A L & Assoc. P/L	25 904	0	25 904	0
108	Sorensen Automation P/L	25 878	7 595	6 527	11 756
109	Nupress Tools P/L	24 915	0	24 915	0
110	Cridland Automation Consulting Engineers P/L	24 895	18 518	6 377	0
111	Illawarra Technology Corp. LTD	23 865	0	23 865	0
112	G J Dix & Sons P/L	23 296	0	23 296	0
113	Surrey Beatty & Sons P/L	23 191	19 131	6 571	(2 511)
114	L J Dettmann Engineering P/L	21 757	3 792	2 269	15 696
115	P & H Tools P/L et al	21 395	4 773	10 700	5 922
116	Waddell Engineering Services P/L	21 154	11 369	4 466	5 319
117	A P Lever P/L	20 406	1 186	1 784	17 435
118	Fiora A & M	19 758	6 825	6 315	6 618
119	BTR Engineering (Aust) Ltd	19 289	0	0	19 289
120	Collier Packaging Machines P/L	17 371	15 417	1 954	0
121	Emco Wheaton Aust. P/L	16 532	0	16 532	0
122	Clarke S P & B	15 845	1 176	3 132	11 538
123	Project Technology (Aust) P/L	15 751	15 751	0	0
124	Maiorana R	15 239	2 415	12 824	0
125	W G Goetz & Sons Ltd	13 494	0	7 700	5 794
126	Western Machinery Co P/L	13 461	0	0	13 461
127	Panelteck International P/L	13 437	13 437	0	0
128	Toirkens W D	13 367	0	0	13 367
129	Fennell Engineering P/L	12 253	4 881	7 372	0
130	Gillies JE & SD	12 036	12 036	0	0
131	Hi-Tech Automation (Aust) P/L	12 023	3 764	0	8 259
132	Robert Cameron & Co P/L	11 150	11 150	0	0
133	Mulgrave Engineering Services	10 459	0	0	10 459
134	Tommotek (WA) P/L	9 760	9 760	0	0
135	O'Neill Machine Tools P/L	9 533	0	165	9 368
136	Garvary P/L	9 159	9 159	0	0
137	Vergola International P/L	8 729	0	0	8 729
138	MacDonald B M Group P/L	8 101	0	8 101	0
139	Engorra Holdings P/L	8 052	0	1 766	6 286
140	Extrusion Machine Co (Aust) P/L	7 984	0	7 172	812
141	C H Clutterham (Eng) P/L	7 634	0	0	7 634
142	Chryrate P/L	7 537	7 537	0	0
143	Applied Production Technology P/L	7 065	0	7 065	0
144	H & E S Engineering P/L	6 332	3 042	1 421	1 869

	Firm	*Total*	*1994/95*	*1993/94*	*1992/93*
145	Whittlesea Scientific & Engineering P/L	6 290	0	2 668	3 622
146	William Wallbank & Sons P/L	6 097	0	0	6 097
147	Die-Cut Engineering P/L	5 964	0	(1 451)	7 415
148	Davey Products P/L	5 600	0	0	5 600
149	Hytec Engineering P/L	5 308	0	5 308	0
150	Levey Engineering	5 185	0	0	5 185
151	Brent & Warburton (N'cle) P/L	4 914	4 914	0	0
152	Automated Electrical P/L	4 781	4 781	0	0
153	Advanced Rollforming Technology P/L	4 353	0	0	4 353
154	Harkins P W	4 105	0	664	3 441
155	Hiband P/L	3 814	0	0	3 814
156	Comtool P/L	3 813	0	3 813	0
157	Shortco Engineering P/L	3 632	3 632	0	0
158	Larkhill Farm P/L	3 191	0	0	3 191
159	Sekwah P/L T/A Austveyors (SA)	2 841	2 841	0	0
160	Hidas Manufacturing P/L et al T/A Lake Tooling	2 215	2 215	0	0
161	Heavymech P/L	2 194	0	0	2 194
162	Applidyne P/L	1 969	1 969	0	0
163	Pass Engineering P/L	1 824	0	0	1 824
164	HGC Industries P/L	1 193	0	0	1 193
165	Heard B.A.G. And J.M.	1 097	0	0	1 097
166	R & N Lemon P/L	757	0	757	0
167	Stamco Tool & Die Co P/L	(445)	0	0	(445)
168	John H Dodd P/L	(1 000)	0	0	(1 000)
	Total	***25 335 732***	***8 357 049***	***8 421 006***	***8 557 676***

Source: Australian Customs Service Parliamentary Returns

F CUSTOMS TARIFF SCHEDULE 3

Rates shown are general rates as of 1 July 1996.

Developing country (DC) rates are free except where indicated in the Table.

Some Developing Countries (eg China, Indonesia, Malaysia) have special rates marked as DCS.

Rates for New Zealand, Papua New Guinea and Forum Islands (eg Fiji) are free unless shown otherwise. CAN refers to imports from Canada.

Reference Number	Goods	Rate
8424	MECHANICAL APPLIANCES (WHETHER OR NOT HAND-OPERATED) FOR PROJECTING, DISPERSING OR SPRAYING LIQUIDS OR POWDERS; FIRE EXTINGUISHERS, WHETHER OR NOT CHARGED; SPRAY GUNS AND SIMILAR APPLIANCES; STEAM OR SAND BLASTING MACHINES AND SIMILAR JET PROJECTING MACHINES:	
8424.10.00	- Fire extinguishers, whether or not charged	5% DCS:5%
8424.20.00	- Spray guns and similar appliances	5% DCS:4%
8424.30.00	- Steam or sand blasting machines and similar jet projecting machines	5% DCS:4%
8424.8	- Other appliances:	
8424.81.00	-- Agricultural or horticultural	5% DCS:5%
8424.89	-- Other	
8424.89.10	--- Devices for washing motor vehicle windscreens, headlamps or windows	15% DC:10%
8424.89.90	--- Other	5% DCS:4%
8424.90.00	- Parts	15% DC:10%
8428	OTHER LIFTING, HANDLING, LOADING OR UNLOADING MACHINERY (FOR EXAMPLE, LIFTS, ESCALATORS, CONVEYORS, TELEFERICS):	
8428.10.00	- Lifts and skip hoists	5% DCS:5%
8428.20.00	- Pneumatic elevators and conveyors	5% DCS:5%
8428.3	- Other continuous-action elevators and conveyors, for goods or materials:	
8428.31.00	-- Specially designed for underground use	5% DCS:5%
8428.32.00	-- Other, bucket type	5% DCS:5%
8428.33.00	-- Other, belt type	5% DCS:5%
8428.39.00	-- Other	5% DCS:5%
8428.40.00	- Escalators and moving walkways	5% DCS:5%
8428.50.00	- Mine wagon pushers, locomotive or wagon traversers, wagon tippers and similar railway wagon handling equipment	5% DCS:5%

8428.60.00	- Teleferics, chair-lifts, ski-draglines; traction mechanisms for funiculars	5% DCS:5%
8428.90.00	- Other Machinery	5% DCS:5%
8431	PARTS SUITABLE FOR USE SOLELY OR PRINCIPALLY WITH THE MACHINERY OF 8425 TO 8430:	
8431.10.00	- Of machinery 8425	5% DCS:5%
8431.20.00	- Of machinery of 8427	5% DCS:5%
8431.3	- Of machinery of 8428:	
8431.31.00	-- Of lifts, skip hoists or escalators	5% DCS:5%
8431.39.00	-- Other	5% DCS:5%
8431.4	- Of machinery 8426, 8429 or 8430:	
8431.41.00	-- Buckets, shovels, grabs and grips	5% DCS:5%
8431.42.00	-- Bulldozer or angledozer blades	5% DCS:5%
8431.43.00	-- Parts of boring or sinking machinery of 8430.41.00 or 8430.49.00	5% DCS:4% CAN:Free
8431.49	-- Other	
8431.49.10	--- Of machinery of 8430.3	Free
8431.49.90	--- Other	5% DCS:5%
8456	MACHINE-TOOLS FOR WORKING ANY MATERIAL BY REMOVAL OF MATERIAL, BY LASER OR OTHER LIGHT OR PHOTON BEAM, ULTRASONIC, ELECTRO-DISCHARGE, ELECTRO-CHEMICAL, ELECTRON BEAM, IONIC-BEAM OR PLASMA ARC PROCESSES:	
8456.10.00	- Operated by laser or other light or photon beam processes	Free
8456.20.00	- Operated by ultrasonic processes	Free
8456.30.00	- Operated by electro-discharge processes	Free
8456.90.00	- Other	Free
8457	MACHINING CENTRES, UNIT CONSTRUCTION MACHINES (SINGLE STATION) AND MULTI-STATION TRANSFER MACHINES, FOR WORKING METAL:	
845710.00	- Machining centres	Free
8457.20.00	- Unit construction machines (single station)	Free
8457.30.00	- Multi-station transfer machines	Free
8458	LATHES FOR REMOVING METAL:	
8458.1	- Horizontal lathes:	
8458.11.00	-- Numerically controlled	Free
8458.19.00	-- Other	Free
8458.9	- Other lathes:	
8458.91.00	-- Numerically controlled	Free
8458.99.00	-- Other	Free
8459	MACHINE-TOOLS (INCLUDING WAY-TYPE UNIT HEAD MACHINES) FOR DRILLING, BORING, MILLING, THREADING OR TAPPING BY REMOVING METAL, OTHER THAN LATHES OF 8458:	
8459.10.00	- Way-type unit head machines	Free
8459.2	- Other drilling machines:	
8459.21.00	-- Numerically controlled	Free
8459.29	-- Other	
8459.29.10	--- Power operated	Free

8459.29.90	--- Other	5% DCS:5%
8459.3	- Other boring-milling machines:	
8459.31.00	-- Numerically controlled	Free
8459.39.00	-- Other	Free
8459.40.00	- Other boring machines	Free
8459.5	- Milling machines, knee-type:	
8459.51.00	-- Numerically controlled	Free
8459.59.00	-- Other	Free
8459.6	-- Other milling machines:	
8459.61.00	-- Numerically controlled	Free
8459.69.00	-- Other	
8459.70.00	- Other threading or tapping machines	Free
8460	MACHINE-TOOLS FOR DEBURRING, SHARPENING, GRINDING, HONING, LAPPING, POLISHING OR OTHERWISE FINISHING METAL, SINTERED METAL CARBIDES OR CERMETS BY MEANS OF GRINDING STONES, ABRASIVES OR POLISHING PRODUCTS, OTHER THAN GEAR CUTTING, GEAR GRINDING OR GEAR FINISHING MACHINES OF 8461:	
8460.1	- Flat-surface grinding machines, in which the positioning in any one axis can be set up to an accuracy of at least 0.01 mm:	
8460.11.00	-- Numerically controlled	Free
8460.19.00	-- Other	Free
8460.2	- Other grinding machines, in which the positiong in ahy one axis can be set up to an accuracy of at least 0.01 mm:	
8460.21.00	-- Numerically controlled	Free
8460.29.00	-- Other	Free
8460.3	- Sharpening (tool or cutter grinding) machines:	
8460.31.00	-- Numerically controlled	Free
8460.39	-- Other	
8460.39.10	--- Power operated	Free
8460.39.90	--- Other	5% DCS:5%
8460.40	- Honing or lapping machines:	
8460.40.10	--- Power operated	Free
8460.40.90	--- Other	5% DCS:5%
8460.90	- Other:	
8460.90.10	--- Power operated	Free
8460.90.90	--- Other	5% DCS:5%
8461	MACHINE-TOOLS FOR PLANING, SHAPING, SLOTTING, BROACHING, GEAR CUTTING, GEAR GRINDING OR GEAR FINISHING, SAWING, CUTTING-OFF AND OTHER MACHINE-TOOLS WORKING BY REMOVING METAL, SINTERED METAL CARBIDES OR CERMETS, NOT ELSEWHERE SPECIFIED OR INCLUDED:	
8461.10.00	- Planing machines	Free
8461.20.00	- Shaping or slotting machines	Free
8461.30.00	- Broaching machines	Free
8461.40.00	- Gear cutting, gear grinding or gear finishing machines	Free
8461.50.00	- Sawing or cutting-off machines	Free
8461.90.00	- Other	Free

8462	MACHINE-TOOLS (INCLUDING PRESSES) FOR WORKING METAL BY FORGING, HAMMERING OR DIE-STAMPING, MACHINE-TOOLS (INCLUDING PRESSES) FOR WORKING METAL BY BENDING, FOLDING, STRAIGHTENING, FLATTENING, SHEARING, PUNCHING OR NOTCHING; PRESSES FOR WORKING METAL OR METAL CARBIDES, NOT SPECIFIED ABOVE:	
8462.10	- Foring or die-stamping machines (including presses) and hammers:	
8462.10.10	--- Power operated	Free
8462.10.90	--- Other	5% DCS:5%
8462.2	- Bending, folding, straightening or flattening machines (including presses):	
8462.21.00	-- Numerically controlled	Free
8462.29	-- Other	
8462.29.10	--- Power operated	Free
8462.29.90	--- Other	5% DCS:5%
8462.3	- Shearing machines (including presses), other than combined punching and shearing machines:	
8462.31.00	-- Numerically controlled	Free
8462.39	-- Other:	
8462.39.10	--- Power operated	Free
8462.39.90	--- Other	5% DCS:5%
8462.4	- Punching or notching machines (including presses). including combined punching and shearing machines:	
8462.41.00	-- Numerically controlled	Free
8462.49	-- Other	
8462.49.10	--- Power operated	Free
8462.49.90	--- Other	5% DCS:5%
8462.9	- Other	
8462.91.00	-- Hydraulic presses	Free
8462.99.00	-- Other	Free
8463	OTHER MACHINE-TOOLS FOR WORKING METAL, SINTERED METAL CARBIDES OR CERMETS, WITHOUT REMOVING MATERIAL:	
8463.10.00	- Draw-benches for bars, tubes, profiles, wire or the like	Free
8463.20.00	- Thread rolling machines	Free
8463.30.00	- Machines for working wire	Free
8463.90.00	- Other	Free
8464	MACHINE-TOOLS FOR WORKING STONE, CERAMICS, CONCRETE, ASBESTOS-CEMENT OR LIKE MINERAL MATERIALS OR FOR COLD WORKING GLASS:	
8464.10.00	- Sawing machines	5% DCS:5%
8464.20.00	- Grinding or polishing machines	5% DCS:5%
8464.90.00	- Other	5% DCS:5%
8465	MACHINE-TOOLS (INCLUDING MACHINES FOR NAILING, STAPLING, GLUEING OR OTHERWISE ASSEMBLING) FOR WORKING WOOD, CORK, BONE, HARD RUBBER, HARD PLASTICS OR SIMILAR HARD MATERIALS:	

8465.10.00	- Machines which can carry out different types of machining operations without tool change between such operations	5% DCS:5%
8465.9	- Other	
8465.91.00	-- Sawing machines	5% DCS:5%
8465.92.00	-- Planing, milling or moulding (by cutting) machines	5% DCS:5%
8465.93.00	-- Grinding, sanding or polishing machines	5% DCS:5%
8465.94.00	-- Bending or assembling machines	5% DCS:5%
8465.95.00	-- Drilling or morticing machines	5% DCS:5%
8465.96.00	-- Splitting, slicing or paring machines	5% DCS:5%
8465.99.00	-- Other	5% DCS:5%
8466	PARTS AND ACCESSORIES SUITABLE FOR USE SOLELY OR PRINCIPALLY WITH THE MACHINES OF 8456 TO 8465, INCLUDING WORK OR TOOL HOLDERS, SELF-OPENING DIEHEADS, DIVIDING HEADS AND OTHER SPECIAL ATTACHMENTS FOR MACHINE-TOOLS; TOOL HOLDERS FOR ANY TYPE OF TOOL FOR WORKING IN THE HAND:	
8466.10.00	- Tool holders and self-opening dieheads	5% DCS:5%
8466.20.00	- Work holders	5% DCS:5%
8466.30.00	- Dividing heads and other special attachments for machine-tools	5% DCS:5%
8466.9	- Other	
8466.91.00	-- For machines of 8464	5% DCS:5%
8466.92.00	-- For machines of 8465	5% DCS:5%
8466.93.00	-- For machines of 8456 to 8461	5% DCS:5%
8466.94.00	-- For machines of 8462 or 8463	5% DCS:5%
8468	MACHINERY AND APPARATUS FOR SOLDERING, BRAZING OR WELDING, WHETHER OR NOT CAPABLE OF CUTTING, OTHER THAN THOSE OF 8515; GAS-OPERATED SURFACE TEMPERING MACHINES AND APPLIANCES:	
8468.10.00	- Hand-held blow pipes	5% DCS:4%
8468.20	- Other gas-operated machinery and apparatus:	
8468.20.10	-- For working metal, incorporating a computer control	Free
8468.20.90	--- Other	5% DCS:4%
8468.80.00	- Other machinery and apparatus	5% DCS:4%
8468.90.00	- Parts	5% DCS:4%
8479	MACHINE AND MECHANICAL APPLIANCES HAVING INDIVIDUAL FUNCTIONS, NOT SPECIFIED OR INCLUDED ELSEWHERE IN THIS CHAPTER:	

8479.10.00	- Machinery for public works, building or the like	5% DCS:4%
8479.20.00	- Machinery for the extraction or preparation of animal or fixed vegetable fats or oils	5% DCS:4%
8479.30.00	- Presses for the manufacture of particle board or fibre building board of wood or other ligneous materials and other machinery for treating wood or cork	5% DCS:4%
8479.40.00	- Rope or cable-making machines	Free
8479.8	- Other machines and mechanical appliances:	
8479.81.00	-- For treating metal, including electric wire coil-winders	Free
8479.82.00	-- Mixing, kneading, crushing, grinding, screening, sifting, homogenising, emulsifying or stirring machines	5% DCS:4%
8479.89	-- Other	
8479.89.10	--- Gas-operated machinery and apparatus for cutting metal, incorporating a computer control	Free
8479.89.90	--- Other	5% DCS:5%
8479.90.00	- Parts	5% DCS:5%
8515	ELECTRIC (INCLUDING ELECTRICALLY HEATED GAS), LASER OR OTHER LIGHT OR PHOTON BEAM, ULTRASONIC, ELECTRON BEAM, MAGNETIC PULSE OR PLASMA ARC SOLDERING, BRAZING OR WELDING MACHINES AND APPARATUS, WHETHER OR NOT CAPABLE OF CUTTING; ELECTRIC MACHINES AND APPARATUS FOR HOT SPRAYING OF METALS OR SINTERED METAL CARBIDES:	
8515.1	- Brazing or soldering machines and apparatus:	
8515.11.00	-- Soldering irons and guns	5% DCS:5%
8515.19	-- Other:	
8515.19.10	--- Electric or laser operated brazing or soldering machines and apparatus, of a kind used for working metal, incorporating a computer control	Free
8515.19.90	--- Other	5% DCS:5%
8515.2	- Machines and apparatus for resistance welding of metal:	
8515.21	-- Fully or partly automatic:	
8515.21.10	--- Electric or laser operated, incorporating a computer control	Free
8515.21.90	--- Other	5% DCS:5%
8515.29.00	-- Other	5% DCS:5%
8515.3	- Machines and apparatus for arc (including plasma arc) welding of metals:	
8515.31	-- Fully or partly automatic:	
8515.31.10	--- Electric or laser operated, incorporating a computer control	Free
8515.31.90	--- Other	5% DCS:5%
8515.39.00	-- Other	5% DCS:5%
8515.80	- Other machines and apparatus:	
8515.80.10	--- Electric or laser operated welding machines and apparatus of a kind used for working metal, incorporating a computer control	Free
8515.80.90	--- Other	5% DCS:5%

8515.90.00	- Parts	5% DCS:5% CAN:Free
8537	BOARDS, PANELS (INCLUDING NUMERICAL CONTROL PANELS), CONSOLES, DESKS, CABINETS AND OTHER BASES, EQUIPPED WITH TWO OR MORE APPARATUS OF 8535 OR 8536, FOR ELECTRIC CONTROL OR THE DISTRIBUTION OF ELECTRICITY, INCLUDING THOSE INCORPORATING INSTRUMENTS OR APPARATUS OF CHAPTER 90, OTHER THAN SWITCHING APPARATUS OF 8517:	
8537.10	- For a voltage not exceeding 1 000 V:	
8537.10.10	--- Programmable controllers	Free
8537.10.90	--- Other	5% DCS:5% CAN:Free
8537.20	- For a voltage exceeding 1 000 V:	
8537.20.10	--- Programmable controllers	Free
8537.20.90	--- Other	5% DCS:5% CAN:Free
8542	ELECTRONIC INTEGRATED CIRCUITS AND MICRO-ASSEMBLIES:	
8542.1	- Monolithic integrated circuits:	
8542.11.00	-- Digital	Free
8542.19.00	-- Other	Free
8542.20.00	- Hybrid integrated circuits	Free
8542.80.00	- Other	Free
8542.90.00	- Parts	Free
9032	AUTOMATIC REGULATING OR CONTROLLING INSTRUMENTS AND APPARATUS:	
9032.10	- Thermostats:	
9032.10.10	--- Of a kind used with electrically operated domestic appliances	5%
9032.10.90	--- Other	Free
9032.20.00	- Manostats	Free
9032.8	- Other instruments and apparatus:	
9032.81.00	-- Hydraulic or pneumatic	Free
9032.89	-- Other	
9032.89.10	--- Goods, as follows: (a) automatic voltage regulators of a kind commonly used with motor vehicles, for 6 V or 12 V systems; (b) incorporating, or designed to incorporate, thyristors, power transistors or the like, of a kind used for controlling electric motors	5%
9032.89.20	--- Of a kind commonly used with dies or moulds to automatically control their temperature, being apparatus the control function of which is achieved by the temperature of the circulating fluid responding to changes in the temperature of the goods being controlled	5%
9032.89.90	--- Other	
9032.90	- Parts and accessories:	
9032.90.10	--- For programmable controllers	Free
9032.90.90	--- Other	5%

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