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NATIONAL SECURITY COUNCIL
WASHINGTON, D.C. 20506

March 25, 1986

MEMORANDUM FOR:

DONALD GREGG
Assistant to the Vice President
for National Security Affairs

PHILIP DuSAULT
Acting Associate Director for
National Security &
International Affairs
Office of Management and Budget

NICHOLAS PLATT
Executive Secretary
Department of State

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Executive Secretary
Central Intelligence Agency

SHERRIE COOKSEY
Executive Secretary
Department of the Treasury

JAMES FRIERSON
Chief of Staff
U.S. Trade Representative

COLONEL DAVID R. BROWN
Executive Secretary
Department of Defense

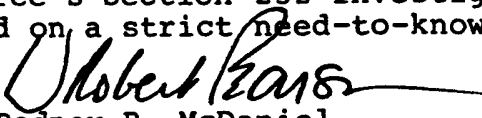
REAR ADMIRAL JOHN W. BITOFF
Executive Assistant to the Chairman
Joint Chiefs of Staff

HELEN ROBBINS
Executive Assistant to the
Secretary
Department of Commerce

SUBJECT: NSC Meeting on Commerce's Section 232 Investigation
of Machine Tools, March 26, 1986, 11:00 a.m. (S)

At Tab A is the Agenda for the meeting. Attendance is principal plus one. (S)

At Tab B is the Department of Commerce's Section 232 investigation and recommendations, it is to be handled on a strict need-to-know basis. (S)


Rodney B. McDaniel
Executive Secretary

Attachments

- Tab A - Agenda
- Tab B - Commerce Investigation

cc: Donald T. Regan
John A. Svahn
Beryl Sprinkel

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NATIONAL SECURITY COUNCIL MEETING

Friday, March 21, 1986
The Cabinet Room
11:00 a.m.-12:00 noon

COMMERCE DEPARTMENT SECTION 232
INVESTIGATION AND RECOMMENDATIONS REGARDING
MACHINE TOOLS

Agenda

- | | | |
|------|-----------------------------|--|
| I. | Introduction | Admiral John Poindexter
(5 minutes) |
| II. | Briefing Commerce 232 Study | Secretary Baldrige
(20 minutes) |
| III. | Interagency Views | Richard Levine
(10 minutes) |
| IV. | General Discussion | All Participants
(20 minutes) |
| V. | Summary | Admiral John Poindexter
(5 minutes) |

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THE SECRETARY OF COMMERCE
Washington, D.C. 20230

MAR 17 1986

The President
The White House
Washington, D.C. 20500

Dear Mr. President:

In February 1984, I forwarded a report to you under Section 232 of the Trade Expansion Act of 1962, as amended, that concluded that machine tool imports threaten to impair the national security. Your former National Security Advisor Bud McFarlane requested that I review my findings in this investigation in light of the newly developed planning assumptions of the NSC Stockpile Study. I have completed my review and conclude that imports pose a greater threat to our national security today than they did two years ago.

Specifically, I recommend that you find that imports of machining centers, lathes, milling machines and punching and shearing machines threaten to impair the national security.

The machine tool industry is a vital component of the U.S. defense industrial base because machine tools are used to manufacture virtually all military and associated industrial hardware. We are on the verge of losing our industry due to high import levels which exceed 70 percent in certain high-technology product lines.

We are now at the juncture where you must decide whether the United States needs a machine tool industry for national security purposes or whether you are prepared to rely on foreign sources to meet our critical needs.

I have reviewed this issue with Secretary Weinberger and we agree that prompt action must be taken to address this critical national security problem. I recommend the following course of action:

- We should ask our major trading partners to restrict their imports of machining centers, lathes, milling machines and punching and shearing machines to 1981 levels for five years. (1981 was the last year that the domestic industry was adequately profitable.) The proposed level of import relief, although substantially less than requested by the petition, will enable the U.S. industry to gain a reasonable market share. It will also allow the industry to restructure and improve its competitive position and production base.

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-2-

- I propose to monitor industry performance on an annual basis. If the industry does not take the necessary steps to improve its competitive position, I will recommend that the import restraints be discontinued and that we develop an alternate strategy to address the national security threat.
- Since our major trading partners are allies and friends who depend on the U.S. defense umbrella, we should be able to obtain their cooperation in addressing this collective security matter. In this regard, we already have firm indications that Japan is willing to take positive steps in this direction if we ask them to do so.
- In the unlikely event that our trading partners are unwilling to restrict machine tool imports to 1981 levels within six months, we should inform them that the United States will be compelled to impose quotas. This signal will provide the incentives for our trading partners to cooperate and for the industry to begin making the needed investments to modernize facilities and improve production capabilities.
- The Government should support the establishment of a private sector manufacturing technology research facility as recommended by the National Academy of Sciences. The machine tool industry must increase its research and development efforts and modernize its facilities for the express purpose of enhancing their ability to meet national security needs. Although the industry must take primary responsibility and initiative for its own restructuring, the Government can and should support this process for national security reasons.
- You should establish an inter-agency task force to study the industry's ability to improve its situation through the negotiation of "voluntary agreements" as defined in Section 708 of the Defense Production Act. These agreements could include joint basic and applied research and other forms of cooperation that will improve the industry's competitive position.
- I recognize that there will be some costs to machine tool consumers resulting from this action. However, the national security benefits of maintaining a viable machine

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-3-

tool industry are substantial especially since technological developments in this industry have spin-off applications in other manufacturing sectors. Such benefits are not subject to precise quantification.

Sincerely,

Secretary of Commerce

Enclosures

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SUPPLEMENTARY REPORT ON THE EFFECT OF IMPORTS OF
MACHINE TOOLS ON THE NATIONAL SECURITY

Report to the President on an Investigation
Conducted under the authority of Section 232
of the Trade Expansion Act of 1962, as amended (19 USC 1862)

U.S. Department of Commerce
International Trade Administration

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Section 232 Supplementary Machine Tool Report

SUPPLEMENTARY REPORT ON THE EFFECT OF IMPORTS OF MACHINE TOOLS ON THE NATIONAL SECURITY

TABLE OF CONTENTS

	Executive Summary.....	I
I.	Introduction.....	1
II.	Current Industry Analysis.....	3
III.	Mobilization Requirements.....	9
IV.	Mobilization Capacity.....	12
V.	National Security Analysis.....	16
	Alternative A.....	20
	Alternative B.....	32

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EXECUTIVE SUMMARY

The Machine Tool Industry:

The machine tool industry produces a wide range of power driven equipment designed to cut, form or shape metal to produce items of all sizes, used principally as parts or components of other machines.

The United States is the largest user of machine tools in the world, consistent with its role as the world's leading manufacturer. In 1983 almost 2.2 million metal working machine tools were functioning in American factories, twice the machine population in Japan. Over 70% of these were 10 or more years old.

Without products such as lathes, drilling machines, milling machines, boring machines and presses, neither factory production equipment nor defense or consumer products made of metal would be possible. The industry thus lies at the heart of America's mechanical competence, just as semiconductors now lie at the heart of its electronic competence.

In recent years the industry has been undergoing rapid change.

Traditional mechanically controlled individual machines, each with its own skilled operator, are being gradually replaced by larger, more productive, precise, and flexible machines that are computer or electronically numerically controlled (NC).

Groups of these newer NC designs are increasingly inter-connected to create a flexible manufacturing system directed by a central computer. In 1984, about half of U.S. production and imports of metal cutting equipment were numerically controlled.

To design and fabricate these newer machines the industry must add electronic knowledge to traditional mechanical engineering and machinist skills traditionally required in its work force.

In addition to radical changes in its product line, the machine tool industry is shifting its geographic base. In 1970 the U.S. was the world leader, producing almost 3 times the output of Japan, and double that of the USSR. In 1982, the base year for this study, the U.S. still led by a very narrow margin. By 1984 it had dropped to fourth place, with a world market share of 12% behind Japan, West Germany and the USSR.

This decline was most pronounced in the newer NC categories -- in 1984 Japan produced 3.2 times the value of U.S. production; the United States imported 59% on a unit basis.

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II

As a result of these trends, the industry has changed significantly since 1980. Some companies have consolidated operations with layoffs of workers and management (e.g. Cincinnati Milacron); some companies have discontinued product lines (e.g. Ex-Cell-O, Brown & Sharpe); some companies have gone out of the machine tool business (e.g. Houdaille). In sum, Commerce Department machine tool industry experts estimate that domestic production capacity has declined by 25% since 1982. These trends are continuing.

History of Investigation:

On March 10, 1983, the National Machine Tool Builders' Association (NMTBA) of McLean Virginia, petitioned the Secretary of Commerce to conduct an investigation under Section 232 of the Trade Expansion Act of 1962, as amended (the Act), to determine the effect of imports of metalworking machine tools on the national security.

The NMTBA asserted that current machine tool import trends will result in a critically weakened industry which will be incapable of meeting U.S. national security needs.

The petition requested that a five year regime of quotas be imposed limiting imports to 17.5% of the market in the broad metal cutting and metal forming categories, and to no more than 20% in any of the eighteen individual product categories.

The Department of Commerce accepted the petition and initiated an investigation on March 14, 1983.

The Act provides authority for the President to adjust imports in order to remove a national security threat based on recommendations from the Secretary of Commerce. In evaluating the impact of imports on the national security under the Act, the Secretary is required to consider the following dynamic factors:

- o the capacity of domestic industries to meet national security requirements;
- o existing and anticipated availabilities of skilled labor and materials essential to national defense;
- o the requirements of growth for such industries, including the investment and technology development necessary to assure such growth;

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III

- o the importation of goods and their effect on the production capacity of such industries of the United States to meet national security requirements; and
- o the impact of foreign competition on the economic welfare of individual domestic industries and the serious effects resulting from the displacement of any domestic products by excessive imports.

On February 27, 1984, the Secretary of Commerce submitted his report to the President which concluded that imports in five of the eighteen product categories of machine tools posed a national security threat.

On March 3, 1984, former National Security Advisor McFarlane informed Secretary Baldrige that "the President has decided to defer his final decision in this case until the National Security Council (NSC) has completed its review of United States economic requirements in wartime... After this NSC study is complete, its findings should be integrated into the Section 232 machine tools report."

This study is the result of that instruction.

Findings:

The Department of Commerce has completed its supplementary machine tool investigation and has determined that imports of boring machines, drilling machines, gear cutting machines, grinding and polishing machines, station type machines, other metal cutting machines, numerically controlled (NC) and non-NC bending and forming machines, pressing machines, forging machines, and other metal forming machines do not threaten to impair the national security.

With regard to the remaining machine tool categories, two analyses are presented for Presidential review and decision:

- The first concludes that imports of machining centers, milling machines, NC and non-NC lathes, and NC and non-NC punching and shearing machines threaten to impair the national security, (positive findings).
- The second concludes that machine tool imports in these categories do not threaten to impair the national security, (negative findings).

The analyses leading to the two alternative findings are summarized below.

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IV

Analysis Leading to Positive Findings:

1. The U.S. must maintain a technologically sophisticated machine tool industry for national security purposes.

-- The machine tool industry is one of the most critical elements of the U.S. defense industrial base. Machine tools are used to manufacture virtually all military and associated industrial products made of metal. From a national security perspective, machine tools must be evaluated on a different basis than raw materials because they reflect continuing changes in technology, engineering and design. Raw materials, on the other hand, can be readily stockpiled for future use.

2. National security requirements for machining centers, milling machines, non-NC lathes and non-NC punching and shearing machines cannot be met by anticipated supplies.

-- This conclusion is based on a quantitative comparison of projected wartime requirements provided in the NSC Stockpile Study and DOC 1982 estimates of U.S. emergency machine tool production capabilities collected for the original DOC Section 232 investigation. As can be seen from table ES-1 found on the following page, post-1982 trends (which reflect capacity losses) lead even more strongly to this conclusion.

-- The estimates are based on optimistic projections of U.S. domestic production capacity. The 1982 DOC capacity estimates project mobilization year production capabilities at 175 percent of the industry's best year's output, and exceed 1984 actual production by three to thirteen times in individual product lines.

-- These estimates do not incorporate a lag time to reach maximum production levels. They also do not reflect recent capacity losses and assume immediate availability of skilled labor and materials. DOC considers these assumptions to be dangerously optimistic.

-- This analysis accounted for reliable imports as specified in the NSC Stockpile Study.

-- The Defense Department (DOD) recommended that old tools held in storage not be included in supply estimates. The Department of Commerce accepted the DOD recommendation based on obsolescence of these machines and time needed to rehabilitate them.

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COMPOSITE INDUSTRY PROFILE FOR SELECTED MACHINE TOOLS*
1980 to 1985
(Millions of \$)

	1980		1981		1982		1983		1984		1985 (est.)	
	UNITS	VALUE	UNITS	VALUE	UNITS	VALUE	UNITS	VALUE	UNITS	VALUE	UNITS	VALUE
Consumption	58,561	\$2,217.0	56,255	\$2,480.4	34,553	\$1,779.7	25,256	\$1101.8	34,320	\$1396.2	39,893	\$1590.8
U.S. Shipments	30,923	1,744.2	29,783	1,849.7	16,209	1,265.9	13,162	752.6	15,762	821.0	14,992	799.7
Imports	31,133	674.2	29,884	867.5	20,723	676.3	13,680	435.1	20,423	684.4	27,068	904.0
Imports Market Share	53.28	30.48	53.18	35.08	60.08	38.08	54.28	39.58	59.58	49.08	67.98	56.88
Capacity Change Per Year (Units)	+1000		+2000		-1000		-2000		-7000		-3000	
Industry-wide Profitability (Loss): on Sales	12.98		12.28		5.08		(9.61)		(3.28)		(1.08)	
on Assets	19.48		18.08		6.18		(8.78)		(3.48)		(1.08)	

* Covers machining centers, NC and non-NC lathes, milling machines, and punching and shearing machines valued over \$2500 each.

Sources: U.S. Bureau of the Census, Barry E. Miller Company, ITV/Trade Development estimates by Tom Gallaghy 1/29/86.

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v

- This analysis is based on the NSC Stockpile Study assumption of complete intra-industry substitution of machine tools and no inter-industry substitution. Although both fungibility assumptions are overstated, the NSC Stockpile Study notes that errors in one direction would tend to cancel errors in the other.
 - Use of supplies from inter-industry substitution cannot be considered by the study without an offsetting recalculation of the intra-industry substitution potential that is incorporated in the NSC Stockpile Study model.
 - Machine tool industry experts consider the potential for inter-industry substitution to be extremely limited due to physical, technological and labor constraints.
3. Imports of NC lathes and NC punching and shearing machines also threaten to impair the national security.
- This conclusion is based on qualitative analysis of rising import penetration levels, the decline of U.S. shipments, and the increasing importance of NC capacity to both manufacturing technology and military programs.
 - U.S. technological competitiveness is the foundation of our national security edge. Technological developments in the machine tool industry have spin-off applications in other defense sectors. The erosion of the U.S. technological base in machine tools will harm technological advances in other defense industries as well.
 - Increasing foreign penetration of U.S. machine tool markets risks the possibility that U.S. advanced technical data will be transferred from U.S. manufacturers to foreign machine tool builders. The technological lead is shifting out of the United States and preventing technological advances from being quickly incorporated in defense products.
 - Japan is now the leader in NC machine tool manufacture. The USSR has provided the Japanese with a "wish list" of 14 technologies they would like to purchase. The top 3 items are microprocessors, NC machine tools, and flexible manufacturing systems (all of which are COCOM controlled.)

Based on this analysis, imports of machine tools threaten to impair the national security.

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VI

4. Post-1982 industry trends further reinforce these positive findings.

- Unit import penetration has risen from 53 percent in 1980 to 68 percent in 1985 in the categories where imports represent a national security threat. Import penetration of NC lathes and machining centers rose to over 70%. Over the same period, the value of import entries in these categories have risen from 30 percent to 57 percent of the market indicating that imported tools are expanding penetration of more expensive high-technology product markets.
- From 1980 to 1985, domestic unit shipments in the above categories declined 52 percent. Dollar shipments declined 54 percent over the same period.
- As a result, the industry lost money in 1983 (9.6% of sales and 8.7% of assets), 1984 (3.2% of sales and 3.4% of assets) and 1985 (1.0% of both sales and assets). During this period there was a boom in capital spending, but increased demand was filled mostly by increased imports.
- The industry continues to lose its skilled labor force. Such a decline is cause for deep concern in light of the many years necessary to develop machine tool production skills.
- Since 1982, industry-wide production capacity has declined by an estimated 25 percent as many companies have moved offshore or gone out of business entirely. Industry experts estimate that capacity has declined by about 14,000 units in the cited categories.
- The U.S. has already lost its ability to manufacture certain product lines along with the associated technological know-how.
- The U.S. now faces the risk of total loss to imports of the market for machining centers and NC lathes, the heart of flexible manufacturing systems (FMS).
- DOC mobilization capacity and industry expansion potential is based on 1982 data. The above trends indicate that this optimistic estimate is no longer reliable.

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VII

Alternative Analysis Leading to Negative Findings:

1. Although the domestic machine tool industry is facing significant challenges, the preceding picture may be too bleak.

-- The future of the industry lies increasingly in supplying highly automated systems of machines and other tools. The critical element of such a system is not any particular tool but the computer hardware and software that links them. A high import share for particular machine tools does not necessarily impair U.S. ability to supply automated systems of machine tools.

-- Although there may have been some changes in the industry since the DOC survey was taken, capacity is unlikely to be significantly affected. Further, the DOC 1982 industry survey represents a conservative estimate of capacity.

2. It is Administration policy to depend on imports from allies to meet national security requirements. Imports of machine tools do not threaten the national security if emergency requirements can be met by any combination of domestic production, inventories, substitution and reliable imports.

3. The preceding analysis does not sufficiently take into account the additional supplies that could be available. These additional supplies will meet national security needs.

-- More productive NC tools can compensate on a wide scale for shortages of non-NC tools.

-- Underutilized or idle tools in nonessential industries can be transferred to critical defense industries where they are needed.

-- Production facilities that manufacture product lines that are deemed to be in surplus can, to some extent, be converted to manufacture product lines that are in short supply. In the event of a national emergency, the Federal Government will invoke authorities under the Defense Production Act to provide incentives to facilitate such plant conversions.

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VIII

- The U.S. will be able to obtain additional imports from reliable foreign suppliers.
- Old tools held in storage by the Defense Department can be refurbished under emergency conditions.

Based on these analyses, machine tool imports do not threaten to impair the national security.

The Secretary of Commerce, having reviewed the above analyses and consulted with the Department of Defense and other relevant agencies, finds that imports of machining centers, NC and Non-NC lathes, milling machines and NC and Non-NC punching and shearing machines threaten to impair the national security.

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I. INTRODUCTION

On March 10, 1983, the National Machine Tool Builders' Association (NMTBA) of McLean, Virginia, petitioned the Secretary of Commerce to conduct an investigation under Section 232 of the Trade Expansion Act of 1962, as amended (the Act), to determine the effect of imports of metalworking machine tools on the national security. The Act states that:

The Secretary shall report the findings of his investigation ... with respect to the effect of the importation of such article. ... The President shall take such action, and for such time, as he deems necessary to adjust the imports of such article ... so that such imports will not threaten to impair the national security.(U)

In its petition, the NMTBA asserted that current machine tool import trends will result in a critically weakened industry which will be incapable of providing an adequate supply of machine tools during a national emergency.

The petition focused on imports of eleven categories of new metal-cutting and seven categories of new metal-forming machine tools valued at greater than \$2500 per unit. The NMTBA requested that a five year regime of quotas be imposed limiting imports to 17.5 percent of the market in the broad metal-cutting and metal-forming categories.

The Department of Commerce (DOC) reviewed and accepted the NMTBA petition and initiated its investigation on March 14, 1983. Under statute, the Secretary of Commerce had one year in which to conduct an investigation and forward a report to the President. (U)

On February 27, 1984, the DOC submitted its investigation report to the President. This report concluded that imports represent a threat to the national security in five of the eighteen categories under study (specifically - boring machines, horizontal numerically controlled lathes, vertical numerically controlled lathes, machining centers, and forging machines). The report recommended that percentage quotas be imposed on unit imports of the first four categories of machines, that the Department of Defense (DOD) stockpile forging machines, and that a number of other non-trade options be considered as well. (U)

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SECRETSection 232 Supplementary Machine Tool Report

2

During its investigation, the DOC participated in the work coordinated by the National Security Council (NSC) to update mobilization planning assumptions. The NSC and the agencies that assisted in the development of the study were unable, however, to complete their work and provide revised planning assumptions in time to meet the DOC's statutory deadline. Therefore, the DOC's original machine tool report was completed using the prevailing mobilization planning assumptions and DOD expenditure patterns which had been the basis of previous DOC Section 232 investigations. (U)

On March 3, 1984, National Security Advisor McFarlane wrote to Commerce Secretary Baldrige informing him that "the President has decided to defer his final decision in (the machine tool) case until the NSC has completed its review of United States economic requirements in wartime." Mr. McFarlane further stated that, "after this NSC study is completed, its findings should be integrated into the Section 232 machine tools report." On July 14, 1984, Mr. McFarlane again wrote to Secretary Baldrige asking that a "technical level interagency group ... be established to integrate the working group reports' findings into the machine tools report." Copies of these letters are attached as Tab A. (S)

On November 15, 1984, after extensive analysis of the NSC study and per Mr. McFarlane's request, the DOC convened an interagency Machine Tool Working Group (MTWG) including representatives from the Departments of Commerce, State, Defense, and Interior; the National Security Council, the Office of Management and Budget (OMB), the Council of Economic Advisors (CEA), [redacted] and the Federal Emergency Management Agency (FEMA).

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The great bulk of material contained in this revised machine tool report is based on the work done by the MTWG and its technical level task forces. This report uses methodologies suggested by the OMB and approved by the MTWG to disaggregate broad machine tool categories into the 18 categories that are the subject of this study, to convert the 18 category dollar requirements into unit requirements, and to continue to estimate capacity using the DOC's survey of 1982 mobilization capacity. (U)

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Section 232 Supplementary Machine Tool Report

3

II. CURRENT INDUSTRY ANALYSIS

Section 232 of the Trade Expansion Act of 1962, as amended, provides that:

For the purposes of this section the Secretary shall, in the light of the requirements of national security and without excluding other relevant factors, give consideration to domestic production needed for projected national defense requirements, the capacity of domestic industries to meet such requirements, existing and anticipated availabilities of the human resources, products, raw materials, and other supplies and services essential to the national defense, the requirements of growth of such industries and such supplies and services including the investment, exploration, and development necessary to assure such growth, and the importation of goods in terms of their quantities, availabilities, character, and use as those affect such industries and the capacity of the United States to meet national security requirements. In the administration of this section, the Secretary shall further recognize the close relation of the economic welfare of the Nation to our national security, and shall take into consideration the impact of foreign competition on the economic welfare of individual domestic industries; and any substantial unemployment, decrease in revenues of government, loss of skills or investment, or other serious effects resulting from the displacement of any domestic products by excessive imports shall be considered, without excluding other factors, in determining whether such weakening of our internal economy may impair the national security. (U)

As time has passed since the DOC's submission of its original machine tool report, questions arise over the validity of making national security recommendations based on data from 1982. In the interest of expediting the interagency process, however, the MTWG unanimously agreed not to repeat the survey of machine tool producers and importers undertaken for the original DOC machine tool investigation. To bridge the data gap between the 1982 data and the present, the following section discusses recent industry trends. (U)

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SECRETSection 232 Supplementary Machine Tool Report

4

Despite an upturn in orders, the industry continues to face significant economic difficulties that are eroding its production capabilities. The industry's mobilization capacity remains threatened by increasing imports, stagnant exports, low profitability, plant closures, and the exodus of production capacity to offshore operations. (U)

During 1984, the U.S. machine tool industry experienced a mild recovery with respect to new orders, shipments, employment and exports:

- o New orders increased from the 1982 recessionary low of \$1.5 billion to \$2.9 billion in 1984. However, 1984 orders accounted for only slightly more than half of the 1975-79 average adjusted for inflation. During the first eleven months of 1985, new orders declined 11 percent. The machine tool industry is sensitive to business cycles. (U)
- o Foreign manufacturers have been the principal beneficiaries of the recent upturn in machine tool orders. Although their new orders increased 72 percent between 1983 and 1984, shipments by domestic producers increased only 15 percent to \$2.4 billion in 1984 after two years of solid decline from the 1981 peak of \$5.1 billion. Current operating rates are estimated to be about 60 percent of capacity, with metal cutting capacity utilization even lower. (U)
- o There continue to be deep concerns regarding the erosion of the industry's skilled labor force, especially in light of the fact that machine tool production skills take many years to develop. The Department of Labor asserts that, for critical machine tool specialties, minimum on the job training and/or experience required ranges from 1 to 3 years for test technicians to a maximum of 4 to 10 years for tool makers. Optimum proficiency levels are achieved at from 3 to 5 years for electrical or computer engineers to a maximum of 10 to 14 years for tool makers. (U)

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SECRETSection 232 Supplementary Machine Tool Report

5

- o The Department of Labor further states that essentially no fungibility exists in the transfer of labor between industries which could assist the machine tool industry in meeting increased production requirements pursuant to the mobilization scenario. Labor asserts that while there are no other industries directly related or comparable to the machine tool industry; some labor could theoretically be shifted from the aerospace, electronics and heavy electrical equipment industries to the production of machine tools during an emergency. However, such conversions would be time-consuming as such displaced workers would require extensive training, which would be difficult to accomplish during a mobilization. Furthermore, the very industries providing labor comparability would also be tasked to maximize production in a mobilization effort. (U)
- o In 1983, U.S. machine tool industry employment stood at 62,200, well below the 1980 peak of 99,700. The Labor Department has indicated that displaced workers in this industry are unlikely to find new employment that will permit them to retain their specialized skills. (U)

Although there has been a recovery in some of the machine tool industry's economic indicators, there has also been a continued deterioration of its position relative to export markets, import penetration, price competition, profitability, and individual firm viability.

- o The U.S. has lost many of its export markets. While in 1977 the industry had a trade surplus, the dollar value of exports was only half that of imports in 1982 falling to one-fourth in 1985. The U.S. machine tool balance of trade was in deficit by an estimated \$1.26 billion in 1985, following deficits of \$947 million in 1984 and \$540 million in 1983. (U)
- o The import share of the U.S. market continued its uninterrupted growth, reaching an estimated 42.9 percent of the market in 1985. U.S. machine tool imports reached \$1.6 billion in 1985 - their highest level ever. This represents a significant increase over the 34.4 percent market share recorded in 1983 and the 27.7 percent recorded in 1982. The leading sources of U.S. machine tool imports in 1984 were Japan (\$683 million), West Germany (\$206 million), Taiwan (\$99 million) and Switzerland (\$78 million). (U)

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SECRETSection 232 Supplementary Machine Tool Report

6

- o One reason for the rise in import penetration has been the strong price competition which developed during the last recession, as importers worked to reduce inventories. Liquidations of metalworking establishments have also added to machine tool supply. Price cutting is still prevalent in the market as domestic producers attempt to compete with lower cost imports. Domestic producers frequently cite the strong U.S. dollar as an important factor working against the U.S. industry's price competitiveness in its home market. The recent decline in the dollar should alleviate some of this problem. (U)
- o In addition, a recent Japanese Machine Tool Builders Association (JMTBA) report warned its members about Japanese overcapacity and predatory price-cutting in the low-end of the machining center and numerically-controlled lathe markets. The JMTBA cited margins averaging only 1.47 percent during a six month period in 1984. Clearly, overcapacity in Japan has increased the pressure on Japanese producers to export to the United States, putting further pressure on the U.S. industry. (U)
- o Reflecting an environment of increased foreign competition and higher import penetration, the U.S. machine tool industry lost money both in 1983 (9.6 percent of sales and 8.7 percent of assets) and in 1984 (3.2 percent of sales and 3.4 percent of assets). Although some of the industry's leaders returned to marginal profitability in 1984, non-machine tool segments of their business often have been carrying machine tool operations. Cincinnati Milacron, for example, reported 1984 operating earnings of \$1.2 million on machine tool sales of \$312 million, while its plastics machinery business yielded earnings of \$25.9 million on sales of \$165 million and their specialty products lines returned \$9.6 million on sales of \$183 million. Smaller machine tool companies are in even worse situations. Despite a backlog of orders, many have had difficulty generating the working capital needed to sustain operations due to concerns about their long-term viability. (U)

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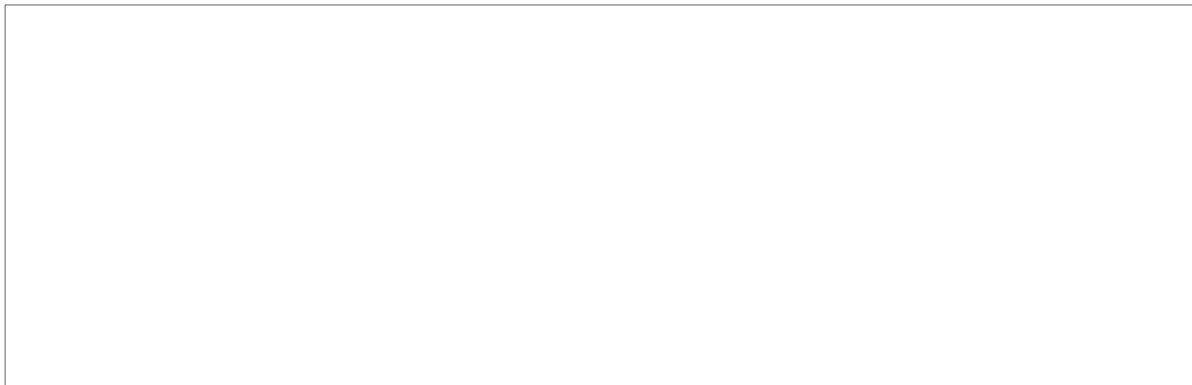
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Section 232 Supplementary Machine Tool Report

7

- o Not only have U.S. machine tool manufacturers been unprofitable, but many companies have gone out of the machine tool business altogether with more closings expected. DOC machine tool industry experts estimate that overall capacity has declined 25 percent since 1982. As a result, the U.S. has actually lost its ability to manufacture certain product lines. For example, in late 1984, the last U.S. producer of wire electrical discharge machines ceased production because of imports from Japan and Switzerland. (These high technology machines are computer controlled and cut extremely hard and exotic metals to fine tolerances in a single operation. They are many times more productive than other techniques and are used to produce dies, molds and jet turbine blades.) The U.S. is now totally dependent upon imports for advances in this technology. (U)

- o Further, some machine tool industry experts believe that the United States now risks the total loss of NC lathe and machining center production capacity due to high import levels. These technologies are the heart of flexible manufacturing systems. (U)



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- o Some analysts think this is particularly distressing due to the fact that, unlike raw materials such as copper, machine tool technology cannot be effectively stockpiled. Raw materials are extracted from the ground, are fungible, and have fixed specifications. On the other hand, machine tool technology reflects an evolving process that incorporates engineering, design and labor skills.(U)

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Section 232 Supplementary Machine Tool Report

8

- o Two factors in particular have dominated the machine tool industry's restructuring. First, foreign companies have been expanding their U.S. market share by buying into established U.S. firms, establishing new ventures and entering into marketing agreements with U.S. firms. Second, domestic builders have been moving their manufacturing operations offshore or sourcing components and machines offshore in efforts to cut costs and become more price competitive. By the end of 1985, it was estimated that one-half of the industry was importing either components or complete machines. The net effect of this trend will be a further reduction in domestic machine tool manufacturing peacetime and surge capacity. (U)

* * * * *

- o Some analysts believe that certain changes that are underway in the industry suggest that the preceding picture may be too bleak.
 - The critical element of new highly automated systems is not any particular tool but the computer hardware and software that links them. (U)
 - Large companies that have not in the past supplied machine tools, such as IBM and GE, are entering the market for automated systems. Sales of machine tools alone are not necessarily indicative of the health of the automated systems industry, particularly its high-tech component, since the computers linking machine tools are not included in machine tool sales. (U)
 - A high import share for particular machine tools does not necessarily impair U.S. ability to supply automated systems of machine tools. In fact, it may be enhanced if manufacturers of the hardware linking the various components can utilize the lowest priced components. In this way, the U.S. can best preserve the capability to supply entire systems at a competitive price. (U)

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SECRETSection 232 Supplementary Machine Tool Report

9

III. MOBILIZATION REQUIREMENTSStockpile Study Estimates of Requirements

The NSC Stockpile Study's Input/Output Report explicitly provides an estimate of total requirements for additional metal cutting and metal forming machine tools to be met by the domestic base during a mobilization year followed by a three year war. These requirements were generated after considering the effect of net imports (imports minus exports) on machine tool mobilization requirements.(U)

In order to compare the original DOC study's requirement estimates expressed in 1982 dollars with the Stockpile Study's estimates expressed in 1972 dollars, it was necessary to deflate the former using Bureau of Labor Statistics (BLS) price indices for the broad metal cutting and metal forming categories. Price indices of \$3.066 for metal cutting and \$3.230 for metal forming were used, indicating, for example, that in 1982 it would have taken \$32,300 to purchase the same amount of metal forming tools that \$10,000 could have purchased in 1972. The price indices used throughout this supplementary report to transform 1982 dollar requirements and other numbers into 1972 dollars compatible with the Stockpile Study can be found at Tab B. Table III-1 uses these BLS deflators to contrast Stockpile Study machine tool requirement estimates with the requirement estimates used in the original DOC machine tool investigation. (FOUO)

TABLE III-1
MACHINE TOOL REQUIREMENT ESTIMATES (FOUO)
(millions of 1972 dollars)

<u>Source</u>	<u>Mob Year</u>	<u>War Year 1</u>	<u>War Year 2</u>	<u>War Year 3</u>	<u>Total</u>
<u>Metal Cutting</u>					
Original DOC Study	\$4671	\$4394	\$2752	\$1439	\$13,256
Stockpile Study	\$2394	\$2833	\$4038	\$4430	\$13,695
<u>Metal Forming</u>					
Original DOC Study	\$1499	\$1258	\$ 603	\$ 303	\$ 3663
Stockpile Study	\$ 883	\$ 855	\$1140	\$1203	\$ 4081

Source: Original DOC machine tool study and Stockpile Study Input/Output report

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SECRET

Section 232 Supplementary Machine Tool Report

10

As shown, total Stockpile Study requirements estimates over the four year period are higher than requirements used in the original DOC machine tool study. However, Stockpile Study requirements reach their peak in the third war year. The machine tool requirements in the original DOC study were highest in the mobilization year. In a real situation, manufacture of capital goods such as machine tools must precede availability of the products to be produced on them. A description of how machine tool requirements estimates were derived by the NSC Stockpile Study is provided at Tab C. (U)

Table III-2 below presents Stockpile Study projections of exports and imports for metal-cutting and metal-forming tools for the mobilization and three war years. (U)

Table III-2

NSC Stockpile Study Exports and Imports
(millions of 1972 \$'s) (U)

<u>EXPORTS</u>	<u>Mob</u> <u>Year</u>	<u>War</u> <u>Year1</u>	<u>War</u> <u>Year2</u>	<u>War</u> <u>Year3</u>	<u>Total</u>
Metal-Cutting	233	161	147	134	675
Actual 1982	132				
Metal-Forming	148	102	93	85	428
Actual 1982	66				
<u>IMPORTS</u>					
Metal-Cutting	304	106	101	94	605
Actual 1982	345				
Metal-Forming	95	33	32	29	189
Actual 1982	61				

Source: FEMA I/O Analysis for NSC Stockpile Study

U.S. exports are larger than peacetime levels in all years. In contrast, imports are substantially less than peacetime levels in the war years. The NSC Study used relatively high assumptions for exports to allied nations and low assumptions for imports from them. This raised U.S. machine tool requirements significantly and constitutes a "safety margin." (U)

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SECRET

Section 232 Supplementary Machine Tool Report

11

Disaggregation of Requirements into 18 Categories

Beginning with the aggregated requirement estimates in Table III-1 above, the MTWG established a technical level task force to determine the best method to disaggregate these estimates into the 18 machine tool categories needed for individual product findings. Weighting factors were developed to determine what percentage of overall dollar requirements would be needed for each of the 18 categories for each of the years. Unit machine tool requirements for each of the 18 categories were next developed by dividing disaggregated dollar requirements by the average projected unit prices for each category. Average prices were calculated using value figures set forth in the DOC industry surveys. Within each category specifications (and prices) of individual machines will vary widely, and assumed "averages" are at best rough approximations. Table III-3 presents disaggregated unit requirements for each of the 18 categories for each of the four subject years. As specified by the Stockpile Study, this chart already incorporates the effect on requirements on net imports (imports minus exports). A more detailed discussion of the disaggregation process can be found at Tab D.(U)

Table III-3
Machine Tool Unit Requirements (FOUO)

<u>Metal Cutting</u>	Actual 1984				
	<u>U.S. Production</u>	<u>Mob Year</u>	<u>War 1</u>	<u>War 2</u>	<u>War 3</u>
Boring	472	2599	2404	3439	3771
Drilling	973	7189	8277	12026	13236
Gear Cutting	199	1029	1144	1608	1790
Grinding	8575	22982	26417	37182	40674
Hor. NC Lathes	1332	3825	4170	6037	6612
Ver. NC Lathes	165	401	468	689	760
Non-NC Lathes	2493	74565	80479	109413	118833
Milling	7531	27470	32169	42963	46582
Mach. Centers	1237	3731	4747	7159	7919
Station Type	599	1015	996	1439	1593
<u>Metal Forming</u>		<u>Mob Year</u>	<u>War 1</u>	<u>War 2</u>	<u>War 3</u>
NC Punching and Shearing	442	1298	1199	1578	1653
Non-NC Punching and Shearing	2722	14230	12986	17002	17827
NC Bending and Forming	218	624	600	818	865
Non-NC Bending and Forming	5954	15987	13812	18111	18983
Pressing Machines	2665	18583	18136	24721	26303
Forging Machines	198	1265	1197	1587	1672

Source: FEMA calculations based on Stockpile Study and DOC Calculations based on DOC survey of machine tool producers and importers

SECRET

Section 232 Supplementary Machine Tool Report

12

IV. MOBILIZATION CAPACITY

Once disaggregated machine tool mobilization requirements were established, it was essential to identify the best estimate of machine tool building capacity which would be available under emergency conditions. After considering several options, the MTWG agreed to use the capacity estimates developed for the DOC's original machine tool study. That study estimated capacity by surveying all identifiable domestic producers and importers. (U)

Although the interagency MTWG agreed to use the mobilization capacity projections set forth in the DOC industry survey, a number of qualifying factors must also be taken into consideration when using these estimates to reach national security policy decisions. Some industry experts believe that the DOC survey of 1982 industry capacity overstates current domestic capacity by about 25 percent. Other analysts note that although there have been changes in the industry since 1982, capacity is not likely to be significantly affected. These analysts believe that the DOC survey presents a conservative estimate of industry production capabilities. Tab E provides a more in-depth analysis of qualifying factors to be taken into account when using the DOC survey to estimate capacity. (U)

Substitutability of Machine Tool Production Capacity

The vast array of machine tools produced is indicative of the variety of knowledge, skills, physical capacities and materials required to produce them. Significant learning and experience would have to occur before a machine tool facility could be converted to manufacture a new and different machine tool product. The only short-term option available would be to convert excess capacity for a certain type of machine tool into a job shop operation for production of selected parts for another more critical type of machine tool. However, limited excess capacity could be used in this way, and it is likely that such a process would be inefficient. (U)

Due to considerable differences in the technology and skills needed to make different product lines, U.S. machine tool manufacturers tend to specialize in certain machine tools. For example, Landis makes grinders, Bridgeport makes milling machines and Hardinge makes lathes. Even the largest producers with the broadest product lines centralize production by type of machine. Cross and Trecker, for example, produces machining centers in Milwaukee and NC turning machines in Cleveland. In addition, before Houdaille put its machine tool facilities up for sale, it produced machining centers in Los Angeles and NC punching machines in New York. (U)

SECRET

SECRET

Section 232 Supplementary Machine Tool Report

13

Finally, fungibility of machine tool production capacity would be further limited by the industry's tight labor supply. Serious questions already exist about the availability of sufficient labor to support the industry's ambitious estimates of mobilization capacity growth. It is therefore unlikely that excess skilled labor will be available to be directed to the inefficient conversion of surplus production capacity.

In light of the above, the ability of machine tool manufacturers to shift from making one type of machine tool to a completely different product line would be limited, especially in the short term. Domestic producers, however, would be able to shift some fraction of surplus capacity to needed lower technology categories, especially under emergency conditions. (U)

Substitutability of Existing Machine Tools

It is important to note that the NSC Stockpile Study requirement projections for new tools already assume that there is complete intra-industry fungibility of existing machine tool stocks and no inter-industry fungibility. Although both assumptions are likely overstated, the Stockpile Study notes that "the two sources of error will tend to cancel, but the net effect is unknown." The degree to which these rough assumptions vary from future experience can have a major impact on requirements for new machines. (U)

Machine tools are complex mechanisms with applications generally fixed within a fairly narrow range. There are hundreds of types of relatively standard machine tools which fall within broad generic categories such as drilling, grinding or forging. In addition, there are literally thousands of specialized or customized machines such as cam contour grinders, stretch forming machines, multi-station in-line transfer machines-pallet type, rivet making machines, gear cutter sharpeners and gun drilling machines. (U)

All machine tools have limits to their applications due to physical characteristics and design specifications such as size, power, structural rigidity, spindle speed, travel distances, feed rates and ability to hold tolerances. The large number of machine tool varieties has been developed through time to meet unique industrial applications. Although machine tool technology has evolved and continues to evolve, this trend has not and will not obviate the need for a vast array of machine tool types. The current array of machine tools is the manifestation of numerous decisions made through the years by engineers and managers in all metalworking industries on the most efficient way to produce the vast number of metal parts needed by modern peacetime economies. (U)

SECRET

SECRET

Section 232 Supplementary Machine Tool Report

14

Some analysts believe that machine tools can be shifted among facilities. The NSC Study assumed civilian austerity, e.g., automobile plants will be operating far short of capacity. Some of the tools in these facilities may be able to be shifted to, e.g., the production of military vehicles. Alternatively, as in World War II, some automobile plants could be converted to produce these items. These analysts believe that as much as 25 percent of the idle machines could be shifted to the production of scarce commodities. (U)

Generally, there is no fungibility between the broad generic categories of machine tools. A drilling machine will never turn a part, and a boring machine will not produce a forging. It may be possible, or even desirable to drill a hole with a mill or to grind a part while on a lathe but these are operations ancillary to the basic function of the machine and would never be the efficient operation of choice. (U)

The hierarchy of machine tool controls offer some scope for fungibility. Numerically controlled (NC) lathes, for example, can do much of the work for non-NC lathes at much higher productivity. As a rough value, one NC tool is as productive as 5-10 non-NC tools. However, not all turning operations can be done on NC lathes. For some defense applications related to maintenance and repair, non-NC machines are essential. (U)

In some instances, fungibility is possible but not desirable. For example, a machining center can drill, mill, and bore but is designed to perform those operations in combination in a batch environment. It would never be efficient to use a machining center as a production mill, drilling machine or boring machine. Specialized and customized machines generally are designed for unique applications and are seldom fungible for other applications. (U)

Finally, some analysts believe that, under emergency conditions, the Defense Production Act will provide incentives for substitution among facilities, use of NC machines in place of non-NC machines, and conversion of domestic capacity from surplus categories to those machine tools with shortfalls. (U)

SECRET

SECRETSection 232 Supplementary Machine Tool Report

15

DOC Survey Capacity Estimates

Table IV-1 presents the unit capacity estimates per category per year derived from the machine tool producers' survey, as well as estimated mobilization year supply (capacity plus producer and importer inventories). In the original DOC study, all Defense Industrial Plant and Equipment Center (DIPEC) machines were added to total available supplies. However, for this supplementary study, the Department of Defense memorandum presented at Tab F caused us to determine that DIPEC machine tool stocks should not be included in mobilization year supply. Defense believes that the uncertain condition and usefulness of many DIPEC machines raise questions about their availability to meet emergency needs. Defense states that "(u)ntil the (DIPEC) General Reserve is in a ready for issue status, we would recommend that it not be included as an asset to help offset machine tool mobilization requirements in a 232 evaluation." However, some analysts suggest that, if needed, the tools could be refurbished during the mobilization and early war years. (U)

Table IV-1
MACHINE TOOL UNIT CAPACITY BY CATEGORY (FOUO)

Metal Cutting

	<u>Actual U.S. 1984 Prod.</u>	<u>Mob Yr Capacity</u>	<u>Mob Yr Supply*</u>	<u>War Yr 1 Capacity</u>	<u>War Yr 2 Capacity</u>	<u>War Yr 3 Capacity</u>
Boring	472	2132	3195	2526	3241	4238
Drilling	973	12386	14023	14677	18827	24623
Gear Cutting	199	1526	1746	1808	2320	3034
Grinding	8575	28066	33383	33258	42660	55795
Hor. NC Lathes	1332	4251	5781	5037	6462	8451
Ver. NC Lathes	165	632	813	749	961	1256
Non-NC Lathes	2493	36390	49764	43122	55313	72343
Milling	7531	23291	29097	27600	35402	46303
Mach. Centers	1237	3618	4813	4287	5499	7193
Station Type	599	1942	2161	2301	2952	3861

Metal Forming

	<u>Actual U.S. 1984 Prod.</u>	<u>Mob Yr Capacity</u>	<u>Mob Yr Supply*</u>	<u>War Yr 1 Capacity</u>	<u>War Yr 2 Capacity</u>	<u>War Yr 3 Capacity</u>
NC Punching and Shearing	442	2029	2207	2404	3084	4034
Non-NC Punching and Shearing	2722	5508	6769	6527	8372	10950
NC Bending and Forming	218	704	768	834	1070	1400
Non-NC Bending and Forming	5954	8825	12141	10458	13414	17544
Pressing Machines	2665	15143	16567	17950	23025	30114
Forging Machines	198	863	928	1023	1312	1716

*Equals Mobilization year capacity plus domestic and importer inventories. In practice inventories could not be drawn down to the zero levels assumed.

Source: DOC Survey of Machine Tool Producers and Importers

SECRET

SECRETSection 232 Supplementary Machine Tool Report

16

V. NATIONAL SECURITY ANALYSIS

Mobilization requirements were contrasted with mobilization machine building capacity to identify those machine tool categories where projected supply falls short of projected demand. Excess capacity in the mobilization or early war years was determined to be available for later year needs. In cases where shortfalls exist, we further evaluated whether shortfalls were due to exceedingly high import penetration of the domestic market. (U)

Administration policy is to rely on imports from our allies and reliable suppliers to meet wartime requirements. The recently completed NSC Stockpile Goals Study, from which the economic scenario underlying this investigation is taken, explicitly relied on our allies and other reliable nations for several critical materials in lieu of a stockpile. (U)

The NSC Stockpile Goals Study resulted in a decision to rely on members of NATO, as well as Japan, Taiwan and South Korea, since all are politically reliable nations for materials. The NSC Study of sealane attrition projected losses for civilian shipping averaging less than 1% per year. (S)

The NSC Study includes estimates of war damage for Western Europe, East Asia and OPEC. Only the first two areas are sources of machine tool imports. West German production is assumed to be completely unavailable for the first two war years, and 75% destroyed for the third war year. With West Germany currently the second largest producer of machine tools, this raises the question of which supplier will be available to compensate for the loss of West German capacity and to meet the wartime machine tool needs of our European and Asian allies. Remaining West European nations incur losses of 13.3% in the first year, 11.8% in the second and 7.5% in the third. For East Asia, losses are 6.7%, 6.3% and 5.0%. No losses in U.S. capacity are contemplated. (S)

Potential for Technology Loss and Transfer

There could be reasons other than the unreliability of wartime foreign suppliers to maintain a substantial domestic industry. Some analysts believe that U.S. technological competitiveness is the foundation of our national security edge and that we cannot afford to lose our lead in critical technologies to foreign manufacturers. It is important to note that the U.S. and its allies maintain COCOM export controls on high technology machine tools to deny access to Soviet Bloc countries. If these technologies are important enough to keep away from the Soviets, they should be important enough for us to maintain a domestic technological capability. (C)

SECRET

SECRET

Section 232 Supplementary Machine Tool Report

17

A healthy and technologically sophisticated machine tool industry is essential for our national security. This is true not only because these tools are used to manufacture virtually all military hardware, but also because technological developments in this industry have spin-off applications in other industrial and defense-related sectors. For example, technological advances in flexible manufacturing systems (FMS) are being applied to critical industries such as plastics and glass manufacturing. FMS technology is also critical to the development of aerospace components and the collaboration between machine tool and aircraft manufacturers has been essential in this process. (U)

In this regard, there are potential negative technology transfer implications associated with increasing foreign penetration of the U.S. machine tool market. Manufacturers of high-technology end-use items must often provide sensitive technical data to machine tool companies so that their tools conform to appropriate specifications. In this intimate synergistic process, we risk the possibility that U.S. advanced technical data will be transferred from U.S. manufacturers to foreign machine tool builders and then to foreign high-technology industries. Some analysts believe that this process can erode U.S. industrial competitiveness in high-technology applications and may even result in sensitive data leaking to Soviet Bloc countries. (C)

Other analysts believe that more detailed study is required of these issues before a definitive national security threat can be established. Since many of our most advanced technology weapons systems are exported (i.e., F-15, Aegis defense system, Patriot missile, etc.) to Allied and friendly countries, the transfer of weapon system specifications to reliable foreign country machine tool producers, in most cases, would not incur more risk of technology-transfer loss. (C)

Projected Shortfalls and Surpluses

Table V-1 identifies projected product-by-product machine tool surplus/shortfall estimates for those machine tool categories where supply (domestic capacity as determined by the Commerce survey combined with domestic and importers' inventories) cannot satisfy Stockpile Study disaggregated requirements. Such shortfalls were identified in the following categories: non-NC lathes, milling machines, machining centers, other metal cutting, non-NC punching and shearing machines, non-NC bending and forming machines, forging machines, presses and other metal forming. (FOUO)

SECRET

SECRET

Section 232 Supplementary Machine Tool Report

18

Although shortfalls were found in both the other metal cutting and other metal forming categories, it was determined that no systematic or reasonable means for disaggregating these categories into specific types of machine tools could be identified and used. For the seven additional categories in which supply shortfalls were determined to exist, the following individual product analyses were undertaken. (FOUO)

Table V-1
UNIT SHORTFALLS AND SURPLUSES (FOUO)

<u>Metal Cutting</u>	<u>Mob Year</u>	<u>War Yr 1</u>	<u>War Yr 2</u>	<u>War Yr 3</u>	<u>Cum. Total</u>
Boring Machines	596	122	-198	467	987
Drilling Machines	6834	6400	6801	11387	31422
Gear Cutting Machines	717	664	712	1244	3337
Grinding Machines	10401	6841	5478	15121	37841
Horizontal NC Lathes	1956	867	425	1839	5087
Vertical NC Lathes	412	281	272	496	1461
Non-NC Lathes	-24801	-37357	-54100	-46490	-162748
Milling Machines	1627	-4569	-7561	-279	-10782
Machining Centers	1082	-460	-1660	-726	-1764
Station Type Machines	1146	1305	1513	2268	6232
Other Metal Cutting	-3781	-6907	-12059	-7746	-30493
<u>Metal Forming</u>					
NC Punching and Shearing	909	1205	1506	2381	6001
Non-NC Punching and Shearing	-7461	-6459	-8630	-6877	-29427
NC Bending and Forming	144	234	252	535	1165
Non-NC Bending and Forming	-3846	-3354	-4697	-1439	-13336
Pressing Machines	-2016	-186	-1696	3811	-87
Forging Machines	-337	-174	-275	44	-742
Other Metal Forming	-3637	-2107	-3175	840	-8079

Source: DOC Calculations

SECRET

SECRET

Section 232 Supplementary Machine Tool Report

19

For each product where such a shortfall has been identified, two sets of discussions and conclusions appear in the text. The first set of discussions and conclusions (entitled Alternative A) is based on consideration of the following steps: (U)

Step A: Compare Stockpile Study disaggregated requirements with supply (domestic capacity as determined by the Commerce survey combined with domestic and importers' inventories). Requirements are already adjusted for net imports/exports as noted in the NSC study's Input/Output report. As the Stockpile Study provides, import levels are approximately one half the peacetime quantity while exports from the U.S. are increased. (U)

Step B: If a supply shortfall is calculated or if the U.S. production base is eroding in critical high-technology applications and imports represent more than one-third of the peacetime supply to the U.S., then it is determined that imports threaten the national security. (U)

The second set of discussions and conclusions (entitled Alternative B) is based on consideration of the following steps: (U)

Step A: Repeat Step A, as noted above. (U)

Step B: Consider the following other sources for machine tool supply:

- Substitution of NC tools for non-NC tools. (U)
- Adjusted imports from allies and other reliable countries. (U)
- Substitution of machines from idle facilities. (U)
- Conversion of surplus domestic machine tool producer capacity from surplus categories to the production of machine tools in short supply. (U)

Step C: If a shortfall exists in the mobilization year, consider the effects of the Defense Production Act's priority rating system which orders that defense items be prioritized over civilian goods production. Also consider increased substitution. (U)

Step D: Make a 232 finding in light of the above steps.(U)

SECRET

SECRETSection 232 Supplementary Machine Tool Report

20

Alternative A

Based on the analysis in the preceding sections, The Secretary of Commerce concludes that imports of boring machines, drilling machines, gear cutting machines, grinding and polishing machines, station type machines, other metal cutting machines, bending and forming machines, pressing machines, forging machines, and other metal forming machines do not threaten to impair the national security. The Secretary of Commerce also concludes that imports of lathes, milling machines, machining centers, and punching and shearing machines do pose a national security threat. Individual product category analysis based on post-1982 data would lead even more strongly to the conclusion that machine tool imports are posing a threat to our national security in the above product lines.(FOUO)

As the statute requires, we must consider "the requirements of growth of ... industries and such supplies and services including the investment, exploration, and development necessary to assure such growth." Continued investment and growth in NC lathes, NC punching and shearing machines, and other NC categories will be required for the U.S. to maintain its technological competitiveness in machine tools. At the same time, a technologically sophisticated machine tool industry is clearly essential to our national security. NC machine tools are a central element of flexible manufacturing systems, the forefront of advanced manufacturing technology.(U)

Given the fact that advanced technology cannot be stockpiled in the same way that one can stockpile raw materials, it is important for the United States to remain technologically competitive in advanced manufacturing processes. Furthermore, there are potential negative technology transfer implications to the loss of domestic NC capacity. We risk the possibility that U.S. advanced technical data will be transferred from U.S. manufacturers to foreign machine tool builders in the synergistic process of specification and design.(U)

As previously noted, the U.S. machine tool industry has faced severe economic difficulties that are largely attributable to import penetration. For the positive finding categories, U.S. shipments and domestic capacity have declined while imports have increased dramatically. Tab G presents a composite industry profile of activity in these categories for the 1981 to 1985 period.(U)

SECRET

SECRET

Section 232 Supplementary Machine Tool Report

21

The machine tool industry is one of the most critical elements of the U.S. defense industrial base. Even so, we may soon lose our ability to manufacture key product lines as increased imports drive U.S. companies offshore or out of business. As we consider this development, it is important to note that there are significant differences between import dependence (depending upon foreign suppliers to supplement domestic production) and import vulnerability (depending on foreign suppliers because we cannot make the products ourselves). We are facing import vulnerability in the machine tool industry with foreign suppliers capturing three-quarters of the U.S. market in some product lines. If no action is taken, we may soon lose our domestic capability to manufacture important machine tool product lines essential for weapon systems and related industrial production.(U)

This analysis accounts for reliable imports as specified in the NSC Stockpile Study.

The DOD recommended that old tools held in storage not be included in supply estimates. The Department of Commerce accepted the DOD recommendation.

This analysis is based on the NSC Stockpile Study assumption of complete intra-industry substitution of machine tools and no inter-industry substitution. Although both assumptions are likely overstated, the NSC Stockpile Study notes that errors in both directions would tend to cancel.

This analysis does not calculate additional available supplies from inter-industry substitution of existing tools and production facilities. Such substitution cannot be considered without a recalculation of intra-industry substitution potential that is incorporated in the NSC Stockpile Study model.

In any event, machine tool industry experts consider the potential for inter-industry substitution to be extremely limited due to physical, technological and labor constraints.

SECRET

SECRETSection 232 Supplementary Machine Tool Report

22

Non-NC Lathes

	<u>Mob Year</u>	<u>War 1</u>	<u>War 2</u>	<u>War 3</u>	<u>Cum. Shortfall</u>
Domestic Requirements	74565	80479	109413	118833	
Domestic Capacity	36390	43122	55313	72343	
Domestic Inventory	7703				
Importers Inventory	<u>5671</u>				
Total Supply	49764	43122	55313	72343	
Surplus/(Shortfall)	(24801)	(37357)	(54100)	(46490)	(162748)

Discussion:

There are major supply shortfalls during the mobilization year and all three war years. In the 1978-82 period, the DOC survey indicates that mobilization capacity declined. During this period, imports captured about half of the domestic market. By 1984, U.S. shipments declined to less than one-third of 1982 levels, and the import share of domestic consumption rose to 75 percent.

NC Lathes can be substituted for non-NC lathes with greater efficiency in some operations. However, there are applications critical to defense preparedness where NC turning machines cannot do the work of manual (non-NC) lathes. In general, this applies to maintenance and repair operations performed in many industrial facilities and all shipboard facilities. For example, in valve and pump repair, each item is unique and repair or modification of parts is often non-standard. Pump shafts and impellers require critical tolerances and finishes under manual control.

Furthermore, given the massive projected shortfalls, it can be expected that non-NC machines will be required on a widespread basis by many defense contractors. Machining capabilities must be available to the specific contractors who need them throughout the country. Furthermore, as fungible NC lathe capacity also continues to decline, it becomes less likely that surplus NC lathes will be available as substitutes for non-NC machines.

Conclusion:

Positive Finding: Given the massive projected shortfalls that will not be totally erased by fungible NC machines, the DOC finds that total available supplies will not meet national security requirements. Imports are capturing three-fourths of the U.S. market and impeding the industry's ability to meet national security requirements.

SECRET

SECRETSection 232 Supplementary Machine Tool Report

23

Horizontal NC Lathes

	<u>Mob Year</u>	<u>War 1</u>	<u>War 2</u>	<u>War 3</u>	<u>Cum. Surplus</u>
Domestic Requirements	3825	4170	6037	6612	
Domestic Capacity	4251	5037	6462	8451	
Domestic Inventory	368				
Importers Inventory	<u>1162</u>				
Total Supply	5781	<u>5037</u>	<u>6462</u>	<u>8451</u>	
Surplus/(Shortfall)	1956	867	425	1839	5087

Vertical NC Lathes

	<u>Mob Year</u>	<u>War 1</u>	<u>War 2</u>	<u>War 3</u>	<u>Cum. Surplus</u>
Domestic Requirements	401	468	689	760	
Domestic Capacity	632	749	961	1256	
Domestic Inventory	55				
Importers Inventory	<u>126</u>				
Total Supply	813	<u>749</u>	<u>961</u>	<u>1256</u>	
Surplus/(Shortfall)	412	281	272	496	1461

Discussion:

A technologically sophisticated machine tool industry is clearly essential to current military and associated industrial programs. As established in the body of the report, NC machine tools are a central element of flexible manufacturing systems -- the forefront of advanced manufacturing technology.

Furthermore, there are potential negative technology transfer implications to the loss of domestic NC capacity. We risk the possibility that U.S. advanced technical data will be transferred from U.S. manufacturers to foreign machine tool builders in the synergistic process of specification and design.

By 1984, domestic horizontal NC lathe shipments declined to less than 53 percent of 1980 levels. At the same time, import penetration in the horizontal NC lathe category rose from 49 percent in 1980 to 79 percent in the first half of 1985. U.S. 1984 vertical NC lathe shipments represented 46 percent of 1980 shipments. At the same time, import penetration in vertical NC lathes has gone from 72 percent in 1980 to 62 percent in 1981 back up to 76 percent in 1984.

SECRET

SECRET

Section 232 Supplementary Machine Tool Report

24

As noted previously, NC lathes can be substituted for non-NC lathes with greater efficiency in some operations. However, any dependence on excess NC lathe capacity to compensate for severe non-NC lathe shortages will become problematic as NC lathe capacity continues to decline and NC lathe import penetration levels continue to increase.

Conclusion:

Positive Finding: NC lathe technology is an essential element of flexible manufacturing systems and other advanced manufacturing technology. At the same time, imports are capturing three-fourths of the U.S. market and putting into question the very future existence of a domestic NC lathe industry.

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SECRETSection 232 Supplementary Machine Tool Report

25

Milling Machines

	<u>Mob Year</u>	<u>War 1</u>	<u>War 2</u>	<u>War 3</u>	<u>Cum. Shortfall</u>
Domestic Requirements	27470	32169	42963	46582	
Domestic Capacity	23291	27600	35402	46303	
Domestic Inventory	4029				
Importers Inventory	<u>1777</u>				
Total Supply	<u>29097</u>	27600	35402	46303	
Surplus/(Shortfall)	1627	(4569)	(7561)	(279)	(10782)

Discussion:

There are supply shortfalls for each year of the war. Imports as a percentage of domestic consumption have risen from 34 percent in 1979 to half the U.S. market in 1982. Even as apparent consumption increased through 1984, imports continued to capture half the domestic market.

Machining centers can be substituted for milling machines in some applications with greater efficiency. However, this is often not the case. For example, a machining center cannot do the work of a profiler or the work of certain high tolerance milling machines. In any event, it is anticipated that machining centers will be in short supply and not available to offset milling machine shortfalls.

Conclusion:

Positive Finding: Imports are impeding the industry's ability to meet national security requirements.

SECRET

SECRETSection 232 Supplementary Machine Tool Report

26

Machining Centers

	<u>Mob Year</u>	<u>War 1</u>	<u>War 2</u>	<u>War 3</u>	<u>Cum. Shortfall</u>
Domestic Requirements	3731	4747	7159	7919	
Domestic Capacity	3618	4287	5499	7193	
Domestic Inventory	620				
Importers Inventory	575				
Total Supply	<u>4813</u>	4287	5499	7193	
Surplus/(Shortfall)	1082	(460)	(1660)	(726)	(1764)

Discussion:

Machining centers are particularly important to the national security due to their key role in flexible manufacturing systems and other processes at the forefront of machine tool technology. Such systems are essential to improvement of both the quality and efficiency of weapons systems production.

Wartime shortfalls exist that cannot be met by total available supplies. Mobilization year supply is deemed adequate only due to the presence of large inventories. As previously noted, both domestic capacity and inventories have declined since the time that the survey was taken. Milling machines may be substituted for machining centers for some applications at significantly reduced efficiency. However, as previously noted, we anticipate shortages of milling machines.

During the 1978-84 period, imports as a percentage of domestic consumption rose from 22 percent to 72 percent. In the same period, domestic shipments as a percentage of domestic consumption declined from 92 percent to 31 percent.

Conclusion:

Positive finding: Shortfalls exist that cannot be met by anticipated total supplies. Imports are impeding the domestic industry's ability to meet national security requirements. The U.S. requires a rapidly increasing machining center production capacity due to this category's key role in flexible manufacturing systems and other of the most technologically advanced applications. The clear danger to the U.S. national security would be further exacerbated by any additional loss of capacity resulting from increased import penetration.

SECRET

SECRETSection 232 Supplementary Machine Tool Report

27

Non-NC Punching and Shearing

	<u>Mob Year</u>	<u>War 1</u>	<u>War 2</u>	<u>War 3</u>	<u>Cum. Shortfall</u>
Domestic Requirements	14230	12986	17002	17827	
Domestic Capacity	5508	6527	8372	10950	
Domestic Inventory	396				
Importers Inventory	865				
Total Supply	<u>6769</u>	6527	8372	10950	
Surplus/(Shortfall)	(7461)	(6459)	(8630)	(6877)	(29427)

Discussion:

Massive shortfalls exist for the mobilization year and all three war years. Imports of all punching and shearing machines increased from 19 percent to 36 percent during the 1978-82 period and to 43 percent by 1984.

Given the massive projected shortfalls, it can be expected that non-NC machines will be required on a widespread basis by many defense contractors. Machining capabilities must be available to the specific contractors who need them throughout the country. Furthermore, NC machines cannot substitute for non-NC machines in all applications. For prototypes and certain close tolerance parts manufacturing, non-NC machines are absolutely essential. In addition, most shearing operations are performed on manual machines.

Conclusion:

Positive Finding: Imports are impeding the ability of the industry to meet national security requirements.

SECRET

SECRETSection 232 Supplementary Machine Tool Report

28

NC Punching and Shearing

	<u>Mob Year</u>	<u>War 1</u>	<u>War 2</u>	<u>War 3</u>	<u>Cum. Surplus</u>
Domestic Requirements	1298	1199	1578	1653	
Domestic Capacity	2029	2404	3084	4034	
Domestic Inventory	63				
Importers Inventory	115				
Total Supply	<u>2207</u>	2404	3084	4034	
Surplus/(Shortfall)	909	1205	1506	2381	6001

Discussion:

Imports of all punching and shearing machines increased from 19 percent to 36 percent during the 1978-82 period and to 43 percent by 1984.

A technologically sophisticated machine tool industry is clearly essential to our national security. Furthermore, there are potential negative technology transfer implications to the loss of domestic NC capacity. We risk the possibility that U.S. advanced technical data will be transferred from U.S. manufacturers to foreign machine tool builders in the synergistic process of specification and design.

As noted previously, NC punching and shearing machines can be substituted for non-NC punching and shearing machines with greater efficiency in some operations. However, any dependence on excess NC punching and shearing machine capacity to make up non-NC shortages will become problematic as NC capacity continues to decline and NC import penetration levels continue to increase.

Conclusion:

Positive Finding: NC punching and shearing machine technology is an essential element of advanced manufacturing technology. Imports are capturing a rapidly increasing share of the U.S. market and putting into question the industry's ability to meet emergency mobilization requirements.

SECRET

SECRETSection 232 Supplementary Machine Tool Report

29

	<u>Non-NC Bending and Forming</u>				
	<u>Mob Year</u>	<u>War 1</u>	<u>War 2</u>	<u>War 3</u>	<u>Cum. Shortfall</u>
Domestic Requirements	15987	13812	18111	18983	
Domestic Capacity	8825	10458	13414	17544	
Domestic Inventory	1427				
Importers Inventory	1889				
Total Supply	<u>12141</u>	10458	13414	17544	
Surplus/(Shortfall)	(3846)	(3354)	(4697)	(1439)	(13336)

Discussion:

Shortfalls exist for the mobilization year and all three war years. Although NC machines can be substituted for non-NC machines with greater efficiency in many applications, this theoretical fungibility will not ensure that machining capabilities will be available to the specific contractors who need them throughout the country. Import penetration for all bending and forming machines increased from 10 percent in 1978 to 31 percent in 1984.

Conclusion:

Negative Finding: The U.S. must take steps to increase its ability to manufacture these machine tools. Import penetration of the U.S. market has increased significantly since 1978. However, at present, imports account for less than one-third of the U.S. market. At this juncture, we do not believe that there is an adequate basis to demonstrate that imports are eroding the capacity of the U.S. industry or impeding its growth. However, the trend in non-NC bending and forming machine imports should continue to be monitored.

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SECRET

Section 232 Supplementary Machine Tool Report

30

Forging Machines

	<u>Mob Year</u>	<u>War 1</u>	<u>War 2</u>	<u>War 3</u>	<u>Cum. Shortfall</u>
Domestic Requirements	1265	1197	1587	1672	
Domestic Capacity	863	1023	1312	1716	
Domestic Inventory	65				
Importers Inventory	0				
Total Supply	<u>928</u>	1023	1312	1716	
Surplus/(Shortfall)	(337)	(174)	(275)	44	(742)

Discussion:

There are shortfalls during the mobilization and war years. No other machine tool can be used to substitute for forging machines. Imports as a percentage of domestic consumption have increased from 35 percent in 1978 to 52 percent in 1982 to 83 percent in 1984. Although the U.S. industry has lost many of its export markets, exports continue to account for 57 percent of domestic apparent consumption, indicating that significant domestic capacity is still operating. Mobilization capacity declined by about half during the 1978-82 period, with no growth projected through 1985. Had the U.S. not lost this capacity, there would be no projected supply shortfalls.

Conclusion:

Negative Finding: Although imports substantially increased their share of the market and domestic shipments have rapidly declined, we believe that substantial capacity losses can be attributed to lost export markets.

SECRET

SECRET

Section 232 Supplementary Machine Tool Report

31

	<u>Presses</u>				
	<u>Mob Year</u>	<u>War 1</u>	<u>War 2</u>	<u>War 3</u>	<u>Cum. Shortfall</u>
Domestic Requirements	18583	18136	24721	26303	
Domestic Capacity	15143	17950	23025	30114	
Domestic Inventory	1272				
Importers Inventory	152				
Total Supply	<u>16567</u>	17950	23025	30114	
Surplus/(Shortfall)	(2016)	(186)	(1696)	3811	(87)

Discussion:

There are shortfalls in the mobilization and war years. No other machines can substitute for presses. Imports accounted for 19 percent of the domestic market in 1982, rising to 31 percent by 1984. Domestic capacity increased significantly during the 1978-82 period.

Conclusion:

Negative Finding: Imports account for less than one-third of the U.S. market. At this juncture, the Department does not believe that there is an adequate basis to demonstrate that shortfalls are related to excessive import penetration levels which either erode U.S. production capabilities or impede the growth of the industry.

SECRET

SECRET

Section 232 Supplementary Machine Tool Report

32

Alternative B

Alternative B concludes that imports do not represent a threat to national security, since there will be adequate supplies of machine tools from a variety of sources (domestic capacity, reliable imports, and substitution) to meet requirements. (U)

Definitions of Terms

The following summarizes the discussion of terms regarding requirements and supply incorporated in the following tables. (U)

- Requirements are from the NSC Stockpile Goals Study, appropriately disaggregated. (U)
- Initial supply is the total for domestic production and inventories (for producers and importers), as determined by Commerce surveys. (U)
- The initial surplus or shortfall is derived by comparing requirements and initial supply. If a shortfall is present, other available sources may be assessed and included as appropriate depending on one's assumptions. (U)
- Surplus NC machines can be used in place of non-NC machines to meet part of the requirements for non-NC lathes. Previous Commerce analyses estimate that one NC machine is equivalent to 5 to 10 non-NC machines; the below figures assume a ratio of 5. (U)
- There will be idle machines in, e.g., automobile plants, since the NSC Study included civilian austerity planning assumptions regarding nonessential goods. The figures in the table assume that no more than one-fourth of these machines are in fact transferred or, alternatively, used in their current locations to produce different commodities. (U)
- There exists considerable surplus domestic capacity for some metal cutting tools, e.g., drilling machines. The only other shortfalls for metal cutting tools (aside from the "other" category, which is not analyzed) are in milling machines and machining centers. As can be seen from the next two tables, imports and substitution of idle machines can alleviate most of their shortfalls. Most surplus capacity can be devoted to non-NC lathes; about 20% of this capacity is required. Non-NC lathes represent the simplest type of machine tool, and thus it should be relatively easy to convert some facilities. The Defense Production Act could be used to facilitate any conversions. (U)

SECRET

SECRETSection 232 Supplementary Machine Tool Report

33

- The pattern of wartime imports from reliable countries would shift towards those categories where shortfalls are present, relative to peacetime patterns. This line represents the difference between the level of imports expected on the basis of peacetime patterns and actual 1982 imports. The peacetime pattern of imports is already incorporated into the estimate of requirements, as derived from the NSC Stockpile Goals Study. Imports are projected to increase only for those tools where other sources, such as substitution, are not adequate; these increases would be matched by decreases in other tools (where surplus domestic capacity is projected) to maintain total wartime imports well below 1982, consistent with the NSC study. The low overall level of imports suggests that foreign producers should be able to concentrate production on those machine tools needed by the U.S., and thus achieve 1982 actual export levels for tools in short supply. (U)
- The cumulative surplus/(shortfall) is the result of the above steps. Government incentives available under the Defense Production Act could be used to ensure that surplus capacity in the early years is used to build up a stockpile for use in later years, when supply may not be adequate. (This line is only provided in subsequent tables in case there is a surplus in the early years, followed by a short fall). (U)

SECRET

SECRETSection 232 Supplementary Machine Tool Report

34

Non-NC Lathes

	<u>Mob Year</u>	<u>War Yr 1</u>	<u>War Yr 2</u>	<u>War Yr 3</u>	<u>Total</u>
Requirements	74,565	80,479	109,413	118,833	383,290
Supply					
Domestic Capacity	36,390	43,122	55,313	72,343	207,168
Domestic Inventory	7,703				
Importers Inventory	5,671				
Initial Supply	49,764	43,122	55,313	72,343	220,542
Initial Surplus/ (Shortfall)	(24,801)	(37,357)	(54,100)	(46,490)	(162,748)
<hr/>					
Use Surplus NC Machines	11,840	5,740	3,485	11,675	32,740
Wartime Imports	1,348	5,778	5,778	5,971	18,875
Substitute 25% of Idle Machines	5,178	14,925	11,614	10,492	42,209
Convert 20% of Surplus Capacity	30,624	13,983	5,624	37,750	87,981
Surplus/ (Shortfall)	24,189	3,069	(27,599)	19,398	19,057
Cumulative Surplus/ (Shortfall)	24,189	27,258	(341)	19,057	19,057

Discussion and ConclusionDiscussion:

Domestic capacity, substitution of idle machines, NC machines, and the conversion of surplus machine tool capacity, as well as a shift in the composition of imports, is adequate to meet both mobilization and war year requirements. Imports from reliable nations are projected to be available (up to 1982 actual levels) since the majority of imports come from Asian nations such as Japan and Taiwan. Production from West Germany, the only major supplier that suffers extensive war damage, would not be needed, since it accounts for less than 10% of current imports. Imports are needed for less than 10% of requirements; domestic sources can accommodate over 90%. (S)

SECRET

SECRET

Section 232 Supplementary Machine Tool Report

35

There are applications critical to defense preparedness where NC lathes cannot do the work of non-NC lathes, for example maintenance and repair operations performed in many industrial facilities and all shipboard facilities. In valve and pump repair each item is unique and repair or modification of parts is often non-standard. As can be seen from the table, surplus NC lathes are used to meet less than 10% of total requirements. Substitution of NC lathes for non-NC lathes would be concentrated in applications where NC lathes are most efficient. (U)

Conclusion

No shortfalls are projected; imports do not threaten national security.
(FOUO)

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SECRETSection 232 Supplementary Machine Tool Report

36

Milling Machines

	<u>Mob Year</u>	<u>War Yr 1</u>	<u>War Yr 2</u>	<u>War Yr 3</u>	<u>Total</u>
Requirements	27,470	32,169	42,963	46,582	149,184
Supply					
Domestic Capacity	23,291	27,600	35,402	46,303	132,596
Domestic Inventory	4,029				
Importers Inventory	1,777				
Initial Supply	29,097	27,600	35,402	46,303	138,402
Initial Surplus/ (Shortfall)	1,627	(4,569)	(7,561)	(279)	(10,782)
Wartime Imports	253	1,600	1,600	1,685	5,138
Substitute 2% of Idle Machines	716	2,359	1,790	1,537	6,402
Convert 2% of Surplus Capacity	1,536	700	282	1,892	4,410
Surplus/ (Shortfall)	4,132	90	(3,889)	4,835	5,168
Cumulative Surplus/ (Shortfall)	4,132	4,222	333	5,168	5,168

Discussion and ConclusionDiscussion:

Supplies from domestic capacity, substitution of idle machines, NC machines, and the conversion of surplus machine tool capacity (2%), as well as a shift in the composition of imports, are ample to meet projected requirements, including exports. Imports from reliable nations are projected to be available (up to 1982 actual levels) since imports are evenly split between Asian nations such as Japan and Taiwan, and Western European nations such as France and England. Production from West Germany, the only major supplier that suffers extensive war damage, would not be needed, since it accounts for less than 5% of current imports. Imports are needed for less than 10% of requirements; domestic sources can accommodate over 90%. (S)

Conclusion:

No shortages are projected; imports do not threaten national security.
(FOUO)

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SECRETSection 232 Supplementary Machine Tool Report

37

Machining Centers

	<u>Mob Year</u>	<u>War Yr 1</u>	<u>War Yr 2</u>	<u>War Yr 3</u>	<u>Total</u>
Requirements	3,731	4,747	7,159	7,919	23,556
Supply					
Domestic Capacity	3,618	4,287	5,499	7,193	20,597
Domestic Inventory	620				
Importers Inventory	575				
Initial Supply	4,813	4,287	5,499	7,193	21,792
Initial Surplus/ (Shortfall)	1,082	(460)	(1,660)	(726)	(1,764)
<hr/>					
Substitute 25% of Idle Machines	308	799	597	528	2,232
Surplus/ (Shortfall)	1,390	339	(1,063)	(198)	468
Cumulative Surplus/ (Shortfall)	1,390	1,729	666	468	468

Discussion and ConclusionDiscussion:

Domestic production and substitution of idle machines are sufficient to meet projected requirements. Given the peacetime pattern of imports (already implicit in requirements), less than 5% of requirements would be met with imports of machining centers. (S)

Conclusion:

No shortages are projected; imports do not threaten national security. (U)

SECRET

SECRETSection 232 Supplementary Machine Tool Report

38

Non-NC Punching and Shearing

	<u>Mob Year</u>	<u>War Yr 1</u>	<u>War Yr 2</u>	<u>War Yr 3</u>	<u>Total</u>
Requirements	14,230	12,986	17,002	17,827	62,045
Supply					
Domestic Capacity	5,508	6,527	8,372	10,950	31,357
Domestic Inventory	396				
Importers Inventory	865				
Initial Supply	6,769	6,527	8,372	10,950	32,618
Initial Surplus/ (Shortfall)	(7,461)	(6,459)	(8,630)	(6,877)	(29,427)
<hr/>					
Use Surplus					
NC Machines	4,545	6,025	7,530	11,905	30,005
Substitute 25% of Idle Machines	937	2,730	2,450	2,294	8,411
Surplus/ (Shortfall)	(1,979)	2,296	1,350	7,322	8,989

Discussion and ConclusionDiscussion:

Surplus NC machines and idle machines can eliminate the shortfall in all war years; one of about 15% of requirements remains in the mobilization year. A shift in the pattern of imports is not needed for the war years. (U)

Non-NC tools are relatively simple machines, and can thus be more easily transferred to other uses than, e.g., machining centers. Thus, the shortfall in the mobilization year could be easily accommodated with one or several of the following measures: (U)

- Substitution rates higher than 25% for idle machines. (U)
- Refurbished machines from the defense (DIPEC) stockpile of non-NC punching and shearing machines. (U)
- Through the Defense Production Act, prioritizing DOD procurement over civilian goods production. (U)

SECRET

SECRET

Section 232 Supplementary Machine Tool Report

39

Conclusion:

A shortfall of about 15% of requirements is anticipated in the mobilization year. This shortfall would be eliminated by giving priority to the production of defense and essential civilian requirements and/or through additional substitution. Imports do not threaten national security. (U)

SECRET

SECRETSection 232 Supplementary Machine Tool Report

40

Non-NC Bending and Forming

	<u>Mob Year</u>	<u>War Yr 1</u>	<u>War Yr 2</u>	<u>War Yr 3</u>	<u>Total</u>
Requirements	15,987	13,812	18,111	18,983	66,893
Supply					
Domestic Capacity	8,825	10,458	13,414	17,544	50,241
Domestic Inventory	1,427				
Importers Inventory	1,889				
Initial Supply	12,141	10,458	13,414	17,544	53,557
Initial Surplus/ (Shortfall)	(3,846)	(3,354)	(4,697)	(1,439)	(13,336)
Use Surplus NC Machines	720	1,170	1,260	2,675	5,825
Wartime Imports	---	1,330	1,390	1,340	4,060
Substitute 25% of Idle Machines	700	2,074	1,853	1,730	6,357
Surplus/ (Shortfall)	(2,426)	1,220	(194)	4,306	2,906

Discussion and ConclusionDiscussion:

A combination of surplus NC machines and idle machines, combined with a shift in the pattern of imports, can eliminate the shortfall in all war years (except for 1% of requirements in the second war year); one of about 15% of requirements remains in the mobilization year. (U)

Projected levels of imports will be available, and would be evenly divided between Asian nations such as Japan and Taiwan, and Western European nations such as France, Spain, and England. Imports from West Germany, the only major supplier that suffers extensive war damage, would not be needed, since they only account for about 20% of current imports. (S)

SECRET

SECRET

Section 232 Supplementary Machine Tool Report

41

Non-NC tools are relatively simple machines, and can thus be more easily transferred to other uses than, e.g., machining centers. Thus, the shortfall could be easily accommodated with the same measures proposed for non-NC punching and shearing machines: (U)

- Substitution rates higher than 25% for idle machines. (U)
- Refurbished machines from the defense (DIPEC) stockpile of non-NC bending and forming machines. (U)
- Through the Defense Production Act, prioritizing DOD procurement over civilian goods production. (C)

Conclusion:

A shortfall of about 15% of requirements is anticipated in the mobilization year. This shortfall would be eliminated by giving priority to the production of defense and essential civilian requirements and/or through additional substitution. Imports do not threaten national security. (U)

SECRET

SECRETSection 232 Supplementary Machine Tool Report

42

Forging Machines

	<u>Mob Year</u>	<u>War Yr 1</u>	<u>War Yr 2</u>	<u>War Yr 3</u>	<u>Total</u>
Requirements	1,265	1,197	1,587	1,672	5,721
Supply					
Domestic Capacity	863	1,023	1,312	1,716	4,914
Domestic Inventory	65				
Importers Inventory	0				
Initial Supply	928	1,023	1,312	1,716	4,979
Initial Surplus/ (Shortfall)	(337)	(174)	(275)	44	(742)
<hr/>					
Substitute 25% of Idle Machines	77	268	227	211	783
Surplus/ (Shortfall)	(260)	94	(48)	255	41

Discussion and ConclusionDiscussion:

Surplus idle machines can eliminate the shortfall in all war years, except for a small (3% of requirements) shortfall in the second war year; there is a shortfall (about 21% of capacity) in the mobilization year. (U)

The mobilization year shortfall could be alleviated in several ways. The NSC Study did not assume any civilian austerity in the mobilization year. The Defense Production Act provides that priority is given to the production of national security requirements, relative to nonessential civilian goods. In addition, substitution of more than 25% of the idle machines might be feasible. Forges, however, are more complex than non-NC tools, making additional substitution of idle machines less likely. Finally, West Germany supplies a large fraction of current imports of forging machines which would be lost during the war years. Shortages of certain specialized forges might develop. (S)

SECRET

SECRET

Section 232 Supplementary Machine Tool Report

43

Conclusion:

A shortfall of about 21% of requirements is anticipated in the mobilization year. Much of the shortfall could be eliminated by giving priority to the production of defense and essential civilian requirements. Since increased substitution may be less feasible, relative to non-NC punching and shearing and bending and forming machines, DOD should evaluate the need for additional machines in its stockpile of forges, considering especially the loss of West German imports. Imports do not threaten national security. (S)

SECRET

SECRETSection 232 Supplementary Machine Tool Report

44

Presses

	<u>Mob Year</u>	<u>War Yr 1</u>	<u>War Yr 2</u>	<u>War Yr 3</u>	<u>Total</u>
Requirements	18,583	18,136	24,721	26,303	87,823
Supply					
Domestic Capacity	15,143	17,950	23,025	30,114	86,232
Domestic Inventory	1,272				
Importers Inventory	152				
Initial Supply	16,567	17,950	23,025	30,114	87,656
Initial Surplus/ (Shortfall)	(2,016)	(186)	(1,696)	3,811	(87)
<hr/>					
Substitute 25% of Idle Machines	1,531	4,962	4,362	4,026	14,881
Surplus/ (Shortfall)	(485)	4,776	2,666	7,837	14,794

Discussion and ConclusionDiscussion:

Idle machines can eliminate the shortfall in all years, except for a minimal shortfall (about 3% of requirements) in the mobilization year, which could be accommodated with slightly higher rates of substitution or by giving priority to defense production. (U)

Conclusion:

The minimal shortfall in the mobilization year would be eliminated by giving priority to the production of defense and essential civilian requirements and/or through additional substitution. Imports do not threaten national security. (U)

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A

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WASHINGTON
March 3, 1984

TAB A

MEMORANDUM FOR THE HONORABLE MALCOLM BALDRIGE
The Secretary of Commerce

SUBJECT: Section 232 Case Concerning Machine Tools (U)

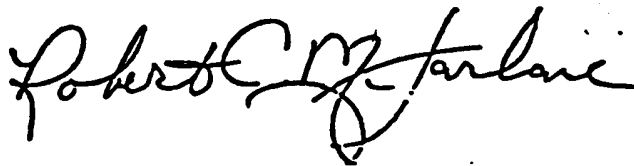
The Department of Commerce Section 232 investigation on machine tools has been raised with the President. The President has decided to defer his final decision in this case until the National Security Council (NSC) has completed its review of United States economic requirements in wartime, in order to promote a balanced and coordinated approach to mobilization preparedness. (S)

This is being done through the stockpile goals study begun by Judge Clark nearly eight months ago and now scheduled for completion and presentation to the President by the end of April. In the conduct of this ongoing study, the Secretary of Defense on February 15 forwarded updated defense expenditure patterns. The President has asked that the results of the stockpile goals study be incorporated, as appropriate, into the Section 232 report on machine tools. (S)

After this NSC study is complete, its findings should be integrated into the Section 232 machine tools report. (U)

The results of your Section 232 report should be kept classified until the President has ruled on your updated version. (U)

FOR THE PRESIDENT:



Robert C. McFarlane

Attachment
Tab A

Department of Commerce Section 232 Report on
on Machine Tools

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THE WHITE HOUSE

WASHINGTON

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July 14, 1984

- A 2 -

MEMORANDUM FOR THE HONORABLE MALCOLM BALDRIGE
The Secretary of Commerce

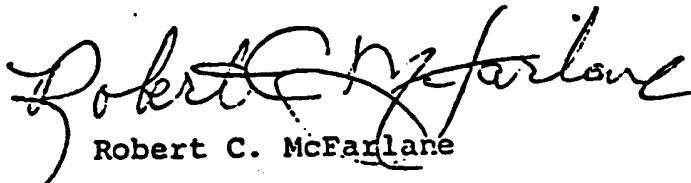
SUBJECT: Section 232 Report on Machine Tools (U)

The President has decided that the NSC Stockpile Study Working Group Reports presented in Robert Kimmitt's April 11 memorandum are to be used, as appropriate, for stockpile and industrial preparedness planning to include Section 232 investigations. These include:

- The full mobilization scenario.
- Expenditure patterns adopted by the President for the scenario.
- The wartime reliability assumptions for concerned countries.
- The international energy supply/demand price projections.
- The sealane attrition factors.
- Other related assumptions from the Stockpile Study. (C)

In order to ensure that the appropriate level of detail for the machine tools 232 report is drawn from these working group reports, a technical level interagency group to include State, DOD, NSC, OMB and CEA should be established to integrate the working group reports' findings into the machine tools report to the President. I would appreciate Commerce's taking the lead to establish this group. I hope that the updated machine tools report to the President could be submitted within five weeks' time. (C)

FOR THE PRESIDENT:



Robert C. McFarlane

cc: The Secretary of State
The Secretary of Defense
The Director, Office of Management and Budget
The Chairman, Council of Economic Advisers

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B

UNCLASSIFIED**TAB B****Machine Tool Price Indices used to transform
1982 dollars into 1972 dollars**

Table B-1 presents the price indices used throughout this supplementary report to transform 1982 dollar requirements and other 1982 dollar figures into 1972 dollars compatible with the NSC Stockpile Study. Numbers in the '1972' column represent the price indices for the various categories in 1972 relative to the 1967 base price for the all metal cutting, station type, all metal forming, and forging categories, and relative to the December 1971 base price for all other categories. Entries in the '1982' column represent the price indices in 1982 relative to the appropriate base period cited above. Entries in the 'INDEX' column represent the ratio of the entry in the 1982 column divided by the entry in the 1972 column: the appropriate index by which to divide to transform 1982 dollars into 1972 dollars.

**Table B-1
MACHINE TOOL PRICE INDICES(U)**

	<u>1972</u>	<u>1982</u>	<u>INDEX</u>
<u>Metal Cutting</u>			
All Metal Cutting*	120.2	368.5	3.066
Boring Machines**	102.8	283.7	2.760
Drilling Machines**	101.9	290.8	2.854
Gear Cutting Machines**	104.5	471.9	4.516
Grinding Machines**	102.3	318.0	3.109
NC Lathes**	101.7	229.5	2.257
All Lathes**	102.0	293.6	2.878
Milling Machines**	101.5	323.4	3.186
Machining Centers**	101.0	202.3	2.003
Station Type Machines* N/A	Used All Metal Cutting		3.066
Other Metal Cutting Machines**	102.2	280.6	2.746
<u>Metal Forming</u>			
All Metal Forming Machines:*	125.3	404.7	3.230
Punching Bending and Forming:**	102.1	296.1	2.900
Pressing Machines:**	101.2	345.4	3.413
Forging Machines:* N/A	Used All Metal Forming		3.230
Other Metal Forming Machines:**	102.3	326.2	3.189

* 1967=100

**Dec. 1971=100

Source: Bureau of Labor Statistics
Producer Prices and Price Indexes

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C



UNITED STATES DEPARTMENT OF COMMERCE
The Under Secretary for Economic Affairs
Washington, D.C. 20230

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February 21, 1985

MEMORANDUM FOR: Machine Tool Section 232 Working Group

From: David K. Henry, Regulatory and Legislative Analysis Division, Office of Business Analysis *David H.*

Subject: Machine Tool Requirements Methodology from the NSC Stockpile Review

The attachment is a summary of the methodology in the NSC chaired stockpile review to estimate the machine tool requirements. This summary is based on four reports issued in the stockpile review:

A. "National Defense Stockpile Review: Macroeconomic Scenario", March 7, 1984,

B. "Input/Output Report", June 27, 1984,

C. "Working Paper: Investment Sufficient to Meet the Industrial Output Requirements of the U.S. During an Emergency Period", 1984, and

D. "Final Report of the Working Group on International Supply/Demand Balances and National Defense Stockpile Goals", December 19, 1984.

This summary is a guide to the steps taken to estimate machine tool requirements once the overall economy estimate -GNP- was completed. The attachment includes revisions, where appropriate, to the draft summary issued on February 6, 1984 to the subworking group on requirements methodology.

Attachment

cc. R. Grant
W. Farb

Cover memo declassified when detached
from classified attachment.

CLASSIFIED BY: MULTIPLE SOURCES of Stockpile Review

DECLASSIFY ON: OADR

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SECRET**Attachment****Methodology Used In the
NSC Stockpile Review
to Estimate Machine Tool Requirements****Macro Economic Forecast**

o. The macroeconomic working group (of the NSC Stockpile Review), using the Wharton long term macroeconomic model, estimated a GNP path for 1983 through 1986 based on the modified EMPB 3A scenario, one year mobilization and a three year war. The major assumptions affecting achievable GNP during the scenario period were reduced imports and higher real prices of petroleum, higher real defense spending, and fiscal policies to finance the war. Austerity programs to reduce automotive production and housing construction also affected the composition of GNP.

o. Some of the other major assumptions that affected the overall composition of GNP and differed dramatically from the 1979 stockpile goals study included (1) sea lane attrition planning assumptions, (2) political reliability planning assumptions, (3) domestic mineral supplies, and (4) the resulting U.S. imports and international supply/demand balance.

o. The major components of GNP resulting from the mobilization assumptions and the macroeconomic model (Table 1) include Personal Consumption Expenditures (PCE), Gross Private Fixed Investment (GPI), Federal government defense and nondefense purchases, state and local government expenditures, and net exports.

**Table 1
GNP Assumptions (\$)
(Billions of 1972\$)**

	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
Gross National Product	1510	1592	1683	1744
PCE	958	940	966	1017
GPI	210	208	214	198
Net Exports	9	12	11	12
Government Purchases				
Federal defense	131	246	309	338
Federal nondefense	27	22	21	20
State and local	176	165	162	157

Source: Macroeconomic Working Group, March 7, 1984

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-2-

Military and Civilian Bills-of-Goods

o. Federal government purchases for defense were supplied by the Defense Department. They used bridge tables from their Defense Economic Impact Modeling System (DEIMS) to allocate their mobilization and war budget numbers among the supplying industries; i.e., to create a "bill-of-goods" for the direct requirements (final demands) of the defense effort.

o. The industrial composition (bills-of-goods) for each of the civilian components of GNP was estimated by FEMA's Demand Impact Transformation Tables (DITT). The DITT bridge tables are used in the same way as the DEIMS bridge tables; i.e., to estimate industrial final demands based on the allocation, in this case, of civilian components of GNP to direct industry purchases. (During the stockpile analysis, the need for using more updated bridge tables, rather than the DITT bridge tables, was recognized, but FEMA was unable to implement this recommendation.)

Indirect Output Requirements

o. Once the bills-of-goods for the direct industrial requirements of the military and civilian components of the economy were established, the indirect industrial requirements were calculated as follows: Indirect civilian requirements were estimated by FEMA using their 257 sector 1972 Input-Output matrix. DoD estimated indirect military output requirements by using their 403 sector 1972 based Input-Output matrix. A concordance between the 403 and 257 sector matrices was developed and civilian and military direct and indirect output requirements were summed to establish total required output from each industry (257 industry detail). The defense and civilian direct and indirect outputs added together by industry were then used to estimate the need for additional capacity.

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-3-

Investment Analysis

o. Seventy industries showed scenario output levels in excess of recent peak outputs. The output increase for 50 of these industries was determined to be well within the industries' ability to produce by increasing factor utilization. For the 20 industries that exceeded past output peaks by 50 percent or more (see end of attachment), investment requirements for structures and equipment, new and replacement, were estimated. In addition to these 20 industries, investment requirements were estimated for the petroleum and natural gas industries, utilities, and the strategic and critical minerals industries. An additional \$20 billion was distributed among industries to account for depreciation of existing capital stocks. These estimates of required investment in structures and equipment (Table 2), including machine tools, then replaced the macromodel's estimate of GPF (except for DoD-financed investment which remained in Federal government expenditures).

Table 2
Investment Requirements Estimates
NSC Stockpile Review
(billions of 1972\$)

	1983	1984	1985	1986
General Defense				
Private (1)	6.9	11.8	12.8	10.6
DoD Financed (2)	1.5	4.5	6.3	7.3
Energy (3)	18.9	19.4	18.5	13.7
Minerals (3)	2.0	3.5	3.7	2.4
Other (4)	129.4	20.0	20.0	20.0
TOTAL	158.7	59.2	61.3	58.0

Sources:

- (1) Office of Business Analysis (OBA), DOC
- (2) Program, Analysis, and Evaluation Div., DoD
- (3) Special Studies, OMB
- (4) The \$20 billion to offset depreciation was divided among industries (other than defense, energy and minerals) with proportionally larger amounts allotted to industries that produced at relatively high levels compared with past peak outputs.

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-4-

o. Input-output analysis used to derive required industrial output as described above does not allow for substitution away from products of those industries that are capacity constrained. This would result in the lowering of output requirements and therefore lowering of investment requirements. On the other hand, industries that are not capacity constrained and may have to provide the "substituted" product would possibly have higher estimates of required output and higher investment. The fixed relationship among industries unaffected by capacity constraints and price fluctuations should be kept in mind when using input-output analysis.

o. For the selected 20 industries, industry investment levels were estimated by relating maximum output estimates and net capital stocks for 1972 through 1981 and then applying the ten year average output to capital stocks ratio to the level of output determined necessary for the emergency. Net capital stocks rather than gross capital stocks were used to account for physical depreciation of the capital goods. Capital stocks estimates, derived from multiplying the average capital stocks to output ratio to the emergency output levels, were subtracted from the previous years' level to determine the new investment requirements. A separate analysis on the replacement investment provided for the value of assets discarded or subject to wear and tear during the 1983 through 1986 period for assets existing prior to the emergency.

o. Maximum estimated outputs for the selected industries for the years 1972 through 1981 were derived by dividing actual outputs by capacity utilization rates and taking a 95 percent use of the capacity estimate. This procedure was determined to be conservative since most capacity utilization rates (published by the Census) were based on a one-shift production rate. During an emergency, double or triple shifts could provide for increased output levels. Capital stocks data for the same time period on a three and four digit Standard Industrial Classification basis are maintained by the Office of Business Analysis in DOC. A ratio of capital stocks to maximum output was computed for each of the years for each industry. The average of ten (1972 to 1981) ratios relating capital stocks to output was used in the projected period to determine capital stocks requirements for each industry based on the levels of projected mobilization and war outputs.

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-5-

o. Investment in each industry was then broken down as to type of structure and type of equipment; e.g., cutting and forming machine tools. The distribution was done in two steps: (1) OBA's capital goods matrix for 1980 was used to break down the industry investment into 15 types of structures and 22 types of equipment, and (2) direct from BEA's capital flows matrix for 1972 was used to further break-down the structures and equipment estimates to the 4-digit SIC level of detail.

o. In the stockpile model, the Federal Government component of final demand from the DEIMS model includes estimates of producers' durable equipment required to make major defense systems such as missiles, aircraft, tanks, ships, and ammunition. Approximately 10 percent of overhead budgets on major procurement accounts are estimated to be capital investment. This translates to about 2-3 percent of outlays for most major weapon systems. To avoid double counting of producers' durable equipment in the GPMI component of final demand, the DoD purchases of producers' durable equipment were netted against the additional investment required derived by the procedures described above.

o. Separate investment analyses were performed for the petroleum and gas industries, utilities, and industries producing strategic and critical minerals. Estimates of investment for these industries were distributed as to type of structure and type of equipment and included in the GPMI estimate of final demands.

o. This alternative estimate of required new and replacement investment by industry, translated to a bill-of-goods, replaced the macro-model's estimate of GPMI. The investment bills-of-goods together with all other final demands, are used in estimating indirect requirements (including indirect requirements for machine tools.) The direct (final demand) and indirect output requirements are added together to estimate the machine tool output requirements.

Note: The 20 industries evaluated for investment included missiles (SIC 3761), tanks (SIC 3795), ammunition, small (SIC 3482), ammunition, large (SIC 3483), ordnance, nec (SIC 3489), chemicals (SIC 2892), primary metals (SIC 339), nonferrous forgings (SIC 3463), cutting machine tools (SIC 3541), forming machine tools (SIC 3542), metal machinery, nec (SIC 3544-9), electrical measuring devices (SIC 3825), radio & TV communications equipment (SIC 3662), electronic components (SIC 367), aircraft (SIC 3721), aircraft and missile engines and engine parts (SIC 3724,64), aircraft and missile parts (SIC 3728,68), ships (SIC 3721), and engineering instruments (SIC 3811)

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TAB D

**Description of the method used to disaggregate
machine tool requirements**

National security requirements for metal cutting and metal forming machine tools are set forth in the NSC Stockpile Study in 1972 dollar terms as part of a 257 industry input/output analysis of the U.S. economy. Requirements for these two broad categories of machine tools are specified for the mobilization and three war years. In order to adapt the NSC requirements into an appropriate format for this investigation, it was necessary to 1) disaggregate them into the 18 product lines under review, and 2) to convert them from 1972 dollars into units.

To disaggregate the Stockpile Study-generated machine tool requirements, the FEMA Capital Input/Output model was used first to calculate the specific machine tool inputs needed to manufacture the specified industrial output requirements. However, since the FEMA model divides the economy into 68 broad industry sectors, it was necessary to aggregate the 257 industry requirements provided by the Stockpile Study. The FEMA model results were used to determine the percentage that each product line's requirements represented of the broad metal cutting or metal forming categories. These percentages were then multiplied by the Stockpile Study requirements for each of the four years to generate 1972 dollar requirements for each of the 18 product lines.

To facilitate comparison with the capacity projections set forth in the DOC industry survey, these 1972 dollar requirements were next transformed into 1982 dollar requirements. The Bureau of Labor Statistics price indices for each category of machine tool presented in Tab B were used to accomplish this conversion. Table D-1 presents the disaggregated NSC Stockpile Study requirements for each product line in 1982 dollars.

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- D2 -

Table D-1

DISAGGREGATED SCENARIO REQUIREMENTS
(millions of 1982 \$)**Metal Cutting**

	<u>Mob Yr</u>	<u>War Yr 1</u>	<u>War Yr 2</u>	<u>War Yr 3</u>
Boring Machines	389.92	430.32	615.59	674.98
Drilling Machines	251.62	297.97	432.93	476.50
Gear Cutting Machines	205.85	242.63	340.94	379.41
Grinding Machines	896.31	1056.66	1487.29	1626.96
Horizontal NC Lathes	554.63	654.76	947.77	1038.04
Machining Centers	798.42	1077.58	1625.14	1797.57
Milling Machines	851.56	1061.57	1417.78	1537.20
Non-NC Lathes	1043.91	1207.18	1641.19	1782.49
Other Metal Cutting	536.62	623.86	873.82	958.26
Station Type Machines	998.55	994.30	1436.11	1589.76
Vertical NC Lathes	150.15	195.01	287.21	317.06

Metal Forming

	<u>Mob Yr</u>	<u>War Yr 1</u>	<u>War Yr 2</u>	<u>War Yr 3</u>
Forging Machines	206.20	190.36	252.39	265.86
NC Bending and Forming	43.07	40.81	55.61	58.82
NC Punching and Shearing	106.40	95.90	126.20	132.20
Non-NC Bending and Forming	415.66	400.56	525.23	550.50
Non-NC Punching and Shearing	498.04	480.50	629.06	659.61
Other Metal-Forming Machines	384.02	368.83	484.89	509.39
Pressing Machines	1133.57	1124.42	1532.72	1630.77

Source: DOC calculations based on FEMA Capital Input/Output Model

It was then necessary to convert the 1982 dollar requirements into the specific units that would be needed for national security purposes. To transform the dollar requirements into unit requirements comparable with available capacity information, the dollar requirement figures shown in Table D-1 were divided by the average prices per category per year shown on the next page in Table D-2.

Average prices for the mobilization year are based on both the survey of producers and the survey of importers as mobilization year supplies reflect domestic capacity, inventories held by importers, and inventories held by domestic producers. At the conclusion of the mobilization year, it is anticipated that domestic and import inventories will be exhausted. Therefore, the prices for all three war years reflect only data from the DOC survey of domestic manufacturers.

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- D3 -

Table D-2

AVERAGE MACHINE TOOL PRICES (\$000 OF 1982\$)

<u>Metal Cutting</u>	<u>Mob Year</u>	<u>War Years</u>
Boring Machines	150	179
Drilling Machines	35	36
Gear Cutting Machines	200	212
Grinding Machines	39	40
Horizontal NC Lathes	145	157
Vertical NC Lathes	374	417
Non-NC Lathes	14	15
Milling Machines	31	33
Machining Centers	214	227
Station Type Machines	984	998
Other Metal Cutting	23	23

<u>Metal Forming</u>	<u>Mob Year</u>	<u>War Years</u>
NC Punching and Shearing	82	80
Non-NC Punching and Shearing	35	37
NC Bending and Forming	69	68
Non-NC Bending and Forming	26	29
Pressing Machines	61	62
Forging Machines	163	159
Other Metal-Forming Machines	25	25

Source: DOC calculations based on DOC survey of machine tool producers and importers

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TAB E

Capacity Analysis

Although the inter-agency Machine Tool Working Group agreed to use the mobilization capacity projections set forth in the 1983 DOC industry survey of domestic manufacturers and importers, a number of qualifying factors must also be taken into consideration when using these estimates to reach national security policy decisions.

- o DOC machine tool industry experts estimate that overall US machine tool production capacity has declined since 1982. Weak domestic demand, increasing import penetration and stagnant exports have led to unprofitable operations and inadequate cash flow in the domestic machine tool industry. A list of some of the most significant capacity changes in the industry since 1982 can be found at the end of this Tab.

As a result of these factors, many companies are importing components and entire machines rather than manufacturing them. Others have gone out of the machine tool business, and others have shut down production capacity. Cincinnati Millacron, for example, has laid-off workers and increased its dependence on overseas operations; Brown and Sharpe has discontinued production of machining centers; Houdaille (previously one of the top ten producers) has announced plans to sell off all of its domestic manufacturing facilities, and Ex-Cell-O (previously one of the top five producers) has placed its machine tool and related businesses up for sale eliminating them as a domestic producer of machining centers, transfer lines, and flexible manufacturing systems.

- o The DOC survey did not provide for any lag time to reach mobilization capacity. In fact, there would likely be a substantial lag time to reach maximum production potential given the current low operating rates. When estimating capacity, surveyed domestic manufacturers were instructed to assume their best production mix for efficient operations and the immediate availability of labor and materials. In light of these assumptions, estimated mobilization year capacity represents 175% of the industry's 1979 production-its best year to date. By the third war year, survey respondents estimate that industry unit capacity will be 347% of the industry's 1979 production.

-E2

When asked about bottlenecks to reach such efficient operations, 76 percent of respondents indicated that skilled labor would be a constraint. Furthermore, in its contribution to the original machine tool study, the Department of Labor indicated that "the existing national pool of potentially available machinists, toolmakers and other similarly skilled workers does not appear to be adequate, absent extensive training, to meet the needs of restaffing an entire industry in an emergency. Efforts to recruit skilled workers from other industries could have an adverse impact on these industries, which may also be essential during a national emergency."

- o Inventories held by importers and domestic manufacturers are lower than they were at the time of the 1983 DOC survey. Nevertheless, in this report's shortfall analysis, survey inventory levels were added to available domestic supplies and were used to offset requirements. As the Department predicted in its original machine tool report, the liquidation of importers' inventories has in fact filled the demand for new U.S. machine tools as overall demand has increased. This has reduced the domestic industry's opportunity to increase production and capacity utilization.

Japan is the largest source of U.S. machine tool imports and, due to product lines and business practices, has also been the largest source of machine tools inventoried in the United States. In a May 1984, paper entitled "Exports of Japanese Machine Tools to the U.S. and the Recent Trend of the U.S. Market," Japan's Ministry of International Trade and Industry (MITI) presented the results of a 1983 survey of the U.S. inventory of Japanese-made numerically-controlled machine tools. This survey focused on NC lathes and machining centers, the largest dollar volume Japanese machine tool exported to the United States, and included machines in transit. MITI noted that "the inventory level at the end of the fourth quarter of 1983 was reduced 33 percent in the case of NC lathes and 18 percent in the case of machining centers as compared with the inventory level at the end of the first quarter of 1983." MITI also stated that "it is believed that the reduction of inventory reflects the recovery of demand in the U.S. market." It is quite likely that the level of inventory reduction was even greater in 1984 and 1985 than in the three quarters of 1983 covered by the MITI survey.

-E3

- o The requirements set forth in the NSC model are structured in such a manner so as to be unlikely to lead to the capacity expansions projected in the DOC survey. The survey anticipated that domestic producers will add capacity as quickly as possible. This was a reasonable assumption given the requirements for machine tools in the original DOC machine tool study. In that study, most of the requirements for new machine tools occur during the mobilization year and the first war year. However, the NSC Stockpile Study scenario projects that demand for machine tools will be lowest during the mobilization year and highest during the third war year. In the free market wartime economy envisioned by the Stockpile Study, it is therefore unlikely that domestic manufacturers will add capacity for orders they have not yet received. It is equally unlikely that orders will be placed three years in advance.

Significant Changes in Machine Tool Capacity Since 1982

Cincinnati Milacron - Traditional industry leader. Consolidated operations, layoffs of workers and management. Greater dependence on overseas operations. Has agreed to market NC lathes manufactured by Hitachi Seiki of Japan. Announced plans to import more parts and components - affects machining centers, NC turning, milling, grinding, etc. Since December 1985, consolidated manufacturing further discontinuing machining at Wilmington, OH plant (NC lathes) moving all production to main plant in Cincinnati.

Cross & Trecker - Consolidated operations, increasing dependence on offshore operations. Has acquired many machine tool companies and rationalized redundant capacity. Importing two lines of machining centers and NC lathes from Japan. May 1985 agreement to produce NC lathes in India. Ranks a close second to Cincinnati Milacron.

Houdaille Industries - Closed several plants. Placed entire machine tool group up for sale in May 1985. Announced in October 1985 it is selling or closing all of its machine tool operations. Machining centers, NC punching, etc. Houdaille was one of the top ten U.S. machine tool companies.

Jones & Lamson - Sold by Textron in May 1985. Undergoing restructuring: status unclear. NC lathes.

-E4

Bridgeport Machines - Offered for sale by parent (Textron) in May 1985. Sold to management in highly leveraged buy-out in October 1985. Has moved capacity offshore. Status unclear. Milling machines and small machining centers. Bridgeport and Jones & Lamson taken together, ranked as the seventh leading U.S. machine tool producer in 1982.

Bendix Corporation - Sold its entire machine tool group to Cross & Trecker after selling at auction the assets of its Turning Machine Division (formerly the Warner & Swasey Company). Bendix was the third leading U.S. machine tool producer in 1982.

Acme Cleveland - Sold its LaSalle Machine Tool Division to Cross & Trecker, reducing its machine tool capacity by half - eliminates participation in machining centers and systems. Acme Cleveland was eighth leading U.S. machine tool producer in 1982.

Ex-Cell-O - Has placed its Manufacturing Systems Division up for sale (July 1985). This effectively eliminates Ex-Cell-O as a domestic producer of machining centers, transfer lines, flexible manufacturing systems and other metal cutting machine tools. Ex-Cell-O has consistently ranked as one of the top five U.S. machine tool producers.

White Consolidated - Recently completed second major restructuring in two years. Significant reductions of capacity. They are "in a full retreat trying to salvage what they can of remaining product lines." Machining centers, NC lathes, VTL's. White Consolidated was the ninth leading U.S. machine tool producer in 1982.

Brown & Sharpe - Discontinued production of machining centers in 1984. Is leasing 20 percent of its production area as warehouse space. Brown & Sharpe ranked as the nineteenth leading U.S. producer in 1982.

Hurco - Importing castings for small machining centers from the People's Republic of China. Laid off 20 percent of its workforce in July 1985.

Monarch - Has begun importing small NC lathes.

Morey Machinery - Chapter 11 bankruptcy.

Conlon Corporation - Bankrupt. Assets up for auction.

-E5

New Britain Machine - Has begun importing NC lathes.

Gould & Eberhart - Chapter 11 bankruptcy.

Ekstrom Carlson - Moving out of machining centers and boring machines.

Hardinge Brothers - Announced a layoff in June 1985. NC lathes.

Boston Digital - Announced agreement to import Swiss machining centers.

Farrel Company - Offered for sale by parent (Emhart) in June 1985. Status unclear. Lathes, grinders.

Rank Engineering - Chapter 11 bankruptcy.

E & M Machine Tool - Out of business.

Charmilles - Discontinued U.S. production of travelling wire electrical discharge machines in 1984.

Milwaukee Press and Machine Company - Bankrupt. Assets up for auction.

Boyar-Schultz Corporation - Reduced capacity, moved into smaller facility. Produces NC grinding equipment.

Kysor Industrial Corporation - Divested machine tool operations. Some operations will continue under new ownership but at least one major product line will no longer be produced in the United States.

Fitchburg Engineering - Out of business

Fox Engineering - Out of business

HES Machine - Out of business

Ironcrafter - Dropped machine tool line

Famco - Out of business

Evans & Associates - Dropped machine tool line

F



RESEARCH AND
ENGINEERING

OFFICE OF THE UNDER SECRETARY OF DEFENSE
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FALLS CHURCH, VIRGINIA 22041-3466

19 MAR 1985

UNCLASSIFIED

MEMORANDUM FOR STEVE GOLDMAN, DIRECTOR, RESOURCES ASSESSMENT DIVISION

SUBJECT: Condition of Machine Tools in General Reserve

The Department of Commerce (DoC) asked the Department of Defense (DoD) to disaggregate and evaluate machine tools held in the General Reserve. We do not have disaggregated data available by the 18 classes specified in the Machine Tool 232 petition or a specific breakout by numerical controlled machines. There are a total of 13,644 metal working machine tools in the General Reserve as of 31 January, 1985. Approximately 5,000 of these will be disposed of during the next year. A breakout by 30 Federal Supply Classification classes is available and has been enclosed. This breakout shows the number of machine tools in each class.

Several years ago, an estimate was made that 80% of the items in the General Reserve required some repair prior to their being used. The actual condition (degree of repair) is not known. DIPEC also estimated that it would take 3-5 years to repair all of the equipment in the General Reserve. This estimate was based on a General Reserve that was 33% larger than the current structure. Defense Logistics Agency (DLA) is refining the requirements criteria for stocking machine tools in the General Reserve. After these criteria are finalized and the General Reserve is pared down, the DLA will address the problem of getting the machine tools into ready for issue condition. Because of the need for repair, very few of the machine tools could be placed into production in time to aid the mobilization effort.

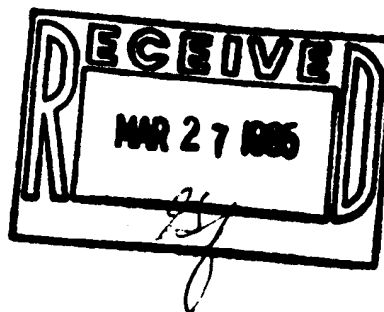
Until the General Reserve is in a ready for issue status, we would recommend that it not be included as an asset to help offset machine tool mobilization requirements in a 232 evaluation.

Please contact John King, 756-2310, if you require further information.

James H. Kordes
JAMES H. KORDES
Director

Enclosure

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31-34

Part 1 - Groups and Classes

types of equipment are excluded from this class and are to be classified in the same classes as their next higher assemblies. The FSC indexes and structure will govern the classification of those items permitted classification in a single class only.
Includes Shafts and Shafting; Collars; flexible Shafting.

GROUP 31**Bearings**

NOTE: All bearings, whether specially designed, specially lubricated, or specially selected, are classified in the appropriate classes of this group, unless specifically excluded, such as jewel bearings (FSC class 6695).

- 3110 Bearings, Antifriction, Unmounted
Includes Ball Bearings; Roller Bearings; Balls; Races.
Excludes Plain Bearings; Jewel Bearings.
- 3120 Bearings, Plain, Unmounted
Includes Sleeve Bearings; Split Bearings; Washer Type Bearings.
Excludes Antifriction Bearings.
- 3130 Bearings, Mounted
Includes Pillow Block Units; Cartridge Units; Flange Units; Takeup Units; Hanger Box Units; Flat Box Units; Step Box Units.

GROUP 32**Woodworking Machinery and Equipment**

- 3210 Sawmill and Planing Mill Machinery
- 3220 Woodworking Machines
Includes Mortisers; Tenoners; Veneer Lathes.
Excludes Hand Held Power Driven Tools; Hand Held Tools Operated by Flexible Shaft.
- 3230 Tools and Attachments for Woodworking Machinery
Includes Circular and Band Saw Blades; Cutter Heads; Jointer and Notcher Heads; Cutters.
Excludes Hand Turning Tools.

GROUP 34**Metalworking Machinery**

- 3405 Saws and Filing Machines **133**
Includes Cutoff Machines; Saw Blade Dressing Machines; Retooling Machines.
- 3408 Machining Centers and Way-Type Machines
188
NOTE: The following definitions apply to "machining centers" and "way-type machines".
a. "Machining Center", refers to a multipurpose numerically controlled machine tool for the complete and automatic machining of parts requiring multiple operations such as milling, drilling, tapping, boring, and reaming, having an integral tool storage device and an integral means for positioning various faces of the work piece. It must have facilities for automatic interchanging of varied cutting tools between successive operations. Excluded from this class are multipurpose numerically controlled machine tools, such as Boring-Drilling-Milling Machines, which require the use of an attachment or accessory for tool storage and/or to position the various faces of a work piece. These types of equipment are classified in other appropriate classes within group 34.
b. "Way-Type Machine", refers to a special machine tool of station type design consisting of individually mounted self-contained machining units and facilities for indexing the work piece to each station in a predetermined sequence. The machining unit(s) may be disassembled and rearranged to accommodate different work piece configurations. Machine is capable of performing single or multiple operations on the work piece simultaneously or in sequence to each station.
- 3410 Electrical and Ultrasonic Erosion Machines
Includes Electrical Discharge Machines; Electrolytic Grinding Machines. **56**
- 3411 Boring Machines **971**
- 3412 Broaching Machines **162**
- 3413 Drilling and Tapping Machines
Includes Multiple Spindle Drilling-Tapping Machines. **1024**
Excludes Way-Type Machines.
- 3414 Gear Cutting and Finishing Machines **432**
- 3415 Grinding Machines **2,192**
Excludes Electrolytic Grinding Machines.

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15

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Federal Supply Classification

- 34
- 3416 Lathes **3,280**
Includes Screw Machines.
Excludes Speed Lathes; Metal Spinning Lathes; Cartridge Case and Shell Lathes.
- 3417 Milling Machines **1718**
- 3418 Planers and Shapers **236**
Includes Combination Shaper-Planers.
Excludes Gear Shapers; Planer Type Milling Machines.
- 3419 Miscellaneous Machine Tools **203**
Includes Gun Rifling Machines; Speed Lathes.
- 3422 Rolling Mills and Drawing Machines **8**
- 3424 Metal Heat Treating and Non-Thermal Treating Equipment **380**
Includes Hardening, Annealing, Tempering, Normalizing, Cyaniding, and Carburizing Equipment; Furnaces, Flue Welding, Non-Thermal Stress Relieving Systems.
- 3426 Metal Finishing Equipment **19**
Includes Galvanizing, Tinning, Oiling, Pickling; Electroplating, and Anodizing Equipment.
- 3431 Electric Arc Welding Equipment **62**
Includes Gas Shielded Arc Welding Machines; Arc Bonding Machines; Semi-Automatic and Automatic Arc Welding Machines.
Excludes Welding Supplies, and Associated Equipment such as: Flux Recovery Machines; Flux Dispensers; Tacker Panels; Welding Panels.
- 3432 Electric Resistance Welding Equipment
Includes Electric Resistance Brazing Machines; Band Saw Brazers; Stored Energy Resistance Welding Machines.
Excludes Electric Induction Brazing and Soldering Machines. **236**
- 3433 Gas Welding, Heat Cutting, and Metalizing Equipment **13**
Includes Metal Spray Guns; Arc Cutting Machines; Torches and Tips; Gas Brazing Machines; Flame Cutting Machines; Vacuum Metalizers; Spark Discharge Metalizers.
Excludes Welding Supplies; Disintegrating Machines.
- 3436 Welding Positioners and Manipulators **72**
Includes Welding Tables.
- 3438 Miscellaneous Welding Equipment **30**
Includes Thermit Welding Equipment; Flux Recovery Machines; Flux Dispensers; Arc Converters; Welding Panels.
- 3439 Miscellaneous Welding, Soldering, and Brazing Supplies and Accessories
Includes Soldering Irons; Welding Electrodes and Rods; Brazing Fluxes; Soldering Fluxes; Solder.
- 3441 Bending and Forming Machines **303**
Excludes Wire and Metal Ribbon Forming Machines.
- 3442 Hydraulic and Pneumatic Presses, Power Driven **596**
Includes Metal Powder Compacting Presses.
- 3443 Mechanical Presses, Power Driven **902**
Includes Metal Powder Compacting Presses.
- 3444 Manual Presses
Includes Arbor, Straightening, Forcing, and Assembly Presses.
- 3445 Punching and Shearing Machines **115**
- 3446 Forging Machinery and Hammers **106**
Excludes Forging Presses.
- 3447 Wire and Metal Ribbon Forming Machines **24**
Excludes Roll Forming Machines.
- 3448 Riveting Machines **52**
Excludes Power Driven Hand Riveting Machines.
- 3449 Miscellaneous Secondary Metal Forming and Cutting Machines **57**
Includes Metal Spinning Lathes.
- 3450 Machine Tools, Portable **18**
Includes Portable Abrasive Cutting Machines; Portable Drilling Machines; Portable Slotters and Shapers.
Excludes Stationary Type Machine Tools mounted on portable devices such as wheel or leg type stands.
- 3455 Cutting Tools for Machine Tools
Includes Broaches; Files; Milling Cutters; Reamers; Saws.
Excludes Flame Cutting Tools.
- 3456 Cutting and Forming Tools for Secondary Metalworking Machinery

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Part 1 - Groups and Classes

34-36

3460 Machine Tool Accessories ⁴⁵
Excludes Abrasive Wheels, Cones, and other
 Abrasive Attachments for use only on Hand
 Held Power Tools.

GROUP 36**Special Industry Machinery**

3461 Accessories for Secondary Metalworking
 Machinery
Excludes Parts Feeders.

3605 Food Products Machinery and Equipment
Includes Industrial Food Products Equip-
 ment.
Excludes Kitchen and Galley Equipment.

3465 Production Jigs, Fixtures, and Templates
 NOTE: This class includes jigs, fixtures,
 and templates used in conjunction with the
 metalworking machinery classified in group
 34. Jigs, fixtures, and templates used in con-
 junction with maintenance and repair shop
 specialized equipment are classified in group
 49.

3610 Printing, Duplicating, and Bookbinding
 Equipment
Includes Offset Presses; Typesetting
 Machinery; Bookbinding Machinery; Pho-
 toengraving Machinery; Printing Type;
 Rules; Leads; Slugs; Line Gages; Quoins;
 Plate Hooks; Gelatine Process Machines;
 Spirit Process Machines; Stencil Process
 Machines; Offset Process Machines;
 Photostat Machines; Blueprint Printing and
 Developing Machines; Print Shop Furniture.
Excludes Microfilm Machines.

3470 Machine Shop Sets, Kits, and Outfits

GROUP 35**Service and Trade Equipment**

3510 Laundry and Dry Cleaning Equipment
Includes Washing Machines; Extractors; Wr-
 ingers; Drying Tumblers; Ironers; Presses;
 Starching Machines; Marking Equipment;
 Mobile Laundry and Dry Cleaning Units.

3611 Industrial Marking Machines
 NOTE: Marking machines which make per-
 manent indentations in metal are classified in
 group 34.
Excludes Marking Machines, Laundry; Prin-
 ting Machine, Label; Printing Press, Label;
 Embossing Machines, Office Type and Mark-
 ing Machines, Office Type.

3520 Shoe Repairing Equipment
Includes Shoe Sewing Machines; Mobile Shoe
 Repair Shops.

3615 Pulp and Paper Industries Machinery
Includes Chippers; Digestors; Beaters;
 Bleaching Equipment; Paperboard Manufac-
 turing Machinery.
Excludes Paperboard Box, Case and Tray
 Making Machines.

3530 Industrial Sewing Machines and Mobile Tex-
 tile Repair Shops
Excludes Shoe Sewing Machines.

3620 Rubber and Plastics Working Machinery
Includes Plasticators; Presses; Synthetic
 Rubber Working Machinery; Tread Ex-
 truding Machinery; Vulcanizing Machinery.
Excludes Protective Covering Laminating
 Presses; Tire Maintenance and Repair Equip-
 ment.

3540 Wrapping and Packaging Machinery
Includes Filling Machines; Container Capping
 Machines; Label Applying Machines; Package
 Sealing Machines; Paperboard Box, Case and
 Tray Making Machines; Strapping Machines;
 Stapling Machines, except Office Type.
Excludes Paperboard Manufacturing
 Machinery.

3625 Textile Industries Machinery
Includes Cotton Ginning Machinery; Looms;
 Button Covering Machines; Rope Laying
 Machines; Lace Machines.

3550 Vending and Coin Operated Machines
Includes Fare Recording Devices; Parking
 Meters; Turnstiles; Coin Operated
 Phonographs.
Excludes Coin and Currency Handling
 Machines; Coin Operated Scales.

3630 Clay and Concrete Products Industries
 Machinery
Includes Brickmaking Machinery.

3590 Miscellaneous Service and Trade Equipment
Includes Manicure Tables.

3635 Crystal and Glass Industries Machinery
Includes Optical Goods Manufacturing
 Machinery.

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TAB G

COMPOSITE INDUSTRY PROFILE FOR SELECTED MACHINE TOOLS*
1980 to 1985
(Millions of \$)

	1980		1981		1982		1983		1984		1985 (est.)	
	UNITS	VALUE	UNITS	VALUE	UNITS	VALUE	UNITS	VALUE	UNITS	VALUE	UNITS	VALUE
Consumption	58,561	\$2,217.0	56,255	\$2,480.4	34,553	\$1,779.7	25,256	\$1,101.8	34,320	\$1,396.2	39,893	\$1,590.8
U.S. Shipments	30,923	1,744.2	29,783	1,849.7	16,209	1,265.9	13,162	752.6	15,762	821.0	14,992	799.7
Imports	31,133	674.2	29,884	867.5	20,723	676.3	13,680	435.1	20,423	684.4	27,068	904.0
Imports Market Share	53.28	30.49	53.18	35.08	60.08	38.08	54.28	39.58	59.58	49.08	67.98	56.88
Capacity Change Per Year (Units)		\$1000		+2000		-1000		-2000		-7000		-3000
Industry-wide Profitability (Loss):												
on Sales	12.98		12.28		5.08		(9.68)		(3.28)		(1.08)	
on Assets	19.48		18.08		6.18		(8.78)		(3.48)		(1.08)	

* Covers machining centers, NC and non-NC lathes, milling machines, and punching and shearing machines valued over \$2500 each.

Source: U.S. Bureau of the Census, Barry E. Miller Company, ITA/Trade Development estimates by Tom Gallogly 1/29/86.