1. Introduction

Machine tools are power driven metal working machines which work metal either by cutting, forming or physico-chemical processing or a combination of these techniques. Metal cutting has tended to dominate forming in terms of machine production. A major technological breakthrough took place in the 1950's with the advent in 1952 of the first numerically controlled machine. By the 1980's it has become synonymous with computer numerical control. With the application of these control technologies to handling and management of production there have been further applications of NC technology in the shape of flexible manufacturing systems (FMS) and computer integrated manufacture (CIM).

The industry is small in relation to the rest of the economy, in both output and employment terms, but is of major strategic significance in the contribution it makes to industrial efficiency. It achieves this by virtue of its role in both developing new production techniques to meet the needs of its customer base (primarily engineering and metal working trades) and by acting as a transmission centre for the diffusion of new techniques. In fact, despite the growth in intra-industry-trade, the existence of a strong link is still claimed between a highly competitive domestic MT industry and a successful engineering industry (Jones, 1983). A view to the contrary is that a strong engineering sector derives from the better use of standard tools rather than the use of better tools ie performance is more determined by skill levels. Given the relative ease with which technology is diffused within the global industry, the argument that the industry is of strategic importance is undermined (Carlsson, 1990).

The UK machine tool industry achieved a dominant position in the world from its inception in the late 18th century with most of the machine tool production sold to the heavy capital good industries of the Industrial Revolution. The UK maintained this position until the second half of the 19th century when directly challenged by firstly the emergence of the US industry and then the German industry . The US industry succeeded on the basis of standard machines suitable for mass production of consumer goods, a market which the UK industry chose to neglect for two reasons. First, at that time it was cheaper to employ skilled workers than to buy highly specialised machine tools. Second, consumer products that make mass manufacture on special purpose machines possible were not yet very developed in the UK (Sciberras and Payne, 1985). The German growth was achieved rather through the development of more sophisticated machine tools in which they were able to build a technological lead, partly thanks to a comprehensive system of technical education (Harrop, 1985). By the beginning of the First World War, the UK share of world production had fallen to 12% at level at which it held roughly constant until the 1960's (Jones, 1983; Committee on Industry and Trade, 1928).

More recently, the UK industry has suffered badly in the two recessions of the 1970's and 1980's. The industry shrank during in the depths of the 1979-81 recession to between one third and one half of its size in 1970. Since that trough there has been a steady recovery but employment levels remained depressed. In 1990, employment was in the region of 24,000 as compared to a level of 74,000 in 1963 (Figure 1.1). In the early 1980's the downturn coincided with the second oil price rise and the resulting global recession. In addition Government policies aimed at restraining inflation depressed demand further