

Machine Tools

Machine tools are a wide range of machinery employed for cutting, removing or forming metals to produce components for assembly into a single machine. Termed as strategic sector for any country, they are essential for reproducing technologies and adopting advanced manufacturing processes.

The manufacture of machine tools is widely accepted as a significant component of any industrialisation. Without exception industrialised nations manufacture, or have manufactured, machine tools. Those that have reduced their machine tool manufacturing capabilities are finding themselves more dependant on imported manufactured product while those nations that are developing industrially are moving upward in the list of machine tool suppliers.

The significance of the industry is reflected in the fact that 29 countries produced machine tools in the year 2006 worth \$65.30 billion. Japan with machine tools valuing \$13.50 billion dollars ranked number one, followed by Germany, Italy and China, in that order.

The subject of which comes first - the chicken or the egg, or the dynamics of industrialisation, is well studied but seems not that well understood. We do not claim to understand it better than others but we do make several historically based, or perhaps intuitive, assumptions in structuring this project.

The conventional western machine tool industry is facing a change which it has perhaps not yet recognised - or at least not yet accepted as a threat. The last decade of development in the area of the Personal Computer and Software, will have a significant impact on the CNC machine tool industry - akin to the effect the PC itself had on the Mainframe Computer market.

The subject of "Technology Lock" is covered elsewhere in this site but is as relevant to the machine tool industry as it is to the motor vehicle and petrochemical industries - and as it was to the computer mainframe industry. As it was with the Mainframe business there will remain a niche for the super precision sub-micron machining centres - but the vast majority of work presently handled by expensive precision machines will be able to be done adequately and cheaply on low cost machines. Basic machine tools with moderately precise leadscrews plugged into a PC with a Software suite costing a hundred or so dollars.

The high capital cost of what are now considered conventional CNC machines has had a destructive influence on developing countries in the last decades - any transfer of such technology has been generally limited by the high capital cost to that done by the wealthier multinational companies looking for cheap labour - and that does not normally result in technology "spinoff".

Machine tool industries do not develop in isolation as a precursor to industrialisation - they develop hand in hand with industrialisation - but it would be reasonable to claim the *availability* of machine tools is a precursor to industrialisation. One theory explaining the western "Industrial Revolution" claims the machine tools and knowledge developed by the clockmakers to the courts of Europe became available to the textile producers of England after the political changes in Europe left the clockmakers unemployed.

Innovation and invention have also played a significant role in the demand for and development of machine tools. How much is supplier and how much is user driven is beyond this discussion - as is the subject of how much of the development finance is private capital and how much is a result of state funding.

What we do have is a situation where the last decades of shift to CNC equipment has left available, at low cost, many older machine tools in the west. We also have a situation where a simple PC and suitable software can upgrade those tools to a very effective standard for the easily "affordable" manufacture of engineering product in developing countries. The high capital cost of CNC equipment has further created a market in the West for low cost machinery to suit the smaller businesses that could use, but not afford, and finally the availability of low cost CNC machinery opens up a western hobby market.

The demand for Biofuels opens up an opportunity for some industrialisation in Africa to supply suitable machines and process equipment needed - the nature of the Biofuel business then gives Africa the source of low cost fuel for rural electrification which in turn opens up opportunity for machinery to

manufacture generating equipment. This then creates the opportunity for enough industrial development to redress the imbalance in the African textile industry and so on.

The IFAF projects offer the "innovation" component needed in such development in the form of equipment designs and knowledge support. Two spectacular advantages Africa has are the availability of the needed raw materials for both the machinery and the Biofuel - and the opportunity to make any manufacturing and any energy production totally sustainable and in harmony with the environment.

The question then becomes whether or not the African entrepreneurial spirit is up to it - we believe it is.