Technology Transfer from Germany to Japan in the Machine Tool Industry before the Second World War

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1 PREFACE

The development of Japanese sewing machines, cameras, motorcycles, ships, automobiles, electric machines and machine tools symbolizes the economic development of Japan in the post-war period. All of the above items were first imported from Europe and the USA and then gradually replaced by Japanese-made products which were finally exported to the world market. These sectors all belong to the assembly industry which shares a common process of metalworking, and this machinery is characterized by being produced mostly in advanced countries. Thus Nathan Rosenberg once pointed out the importance of the machine tool industry as ‘technological convergence’.¹
This study analyses a process vital to economic development, namely technology transfer, especially from the viewpoint of German-Japanese relations. While detailed research exists on the technology transfer in the iron industry, electronics and chemicals from Germany to Japan, research on technology transfer in the machine tool industry has fallen far behind. Within this industry, there was no colossus like General Motors or Ford; instead it was comprised of numerous small- to medium-sized companies.

It is true that the Japanese machine tool industry could not catch up with Western technology until the Second World War, but Japanese entrepreneurs and engineers kept making efforts to improve quality. These efforts laid the foundations for the success of the post-Second World War Japanese machine tool industry. What kind of role did the German machine tool industry play in this process? How did Japanese engineers regard the German machine tool industry? What were the results of German-Japanese technology transfer in this industry?

There are some research models on the technology transfer from developed countries to developing countries. Here, by using Uchida Hoshimi’s model of technology transfer as a base of reference, I will analyse how transfers played a role in the machine tool industry, focusing on materials, people and information, keeping a view of the transition of world machine tool production. Unfortunately there are relatively few original materials remaining in machine tool companies in either country, because the companies were too small to keep company archives. Although this lack of historical materials hinders research, I will analyse the problem by using company archives, journals and other materials.

2 BEGINNING OF MACHINE TOOL PRODUCTION IN JAPAN

First, let us look briefly at the history of the world machine tool industry to see when the Japanese met machine tools for the first time. Modern machine tools were invented at the end of the eighteenth century, when new machines were built to work metal parts of steam engines and textile machines. Great Britain was the leader in machine tool production until the 1860s. At that time Manchester was famous not only for its cotton industry but also for its machine tool industry, which would face increasing competition from the USA in the 1870s.

US manufacturers rapidly came to dominate the world market in the new type of machine tools, such as turret lathes and automatic lathes, which enabled the so-called ‘American system of manufacturing’ using interchangeable parts. It was then Germany that followed the USA in producing these new machine tools. Thus the USA and Germany led the world in machine tool production after 1900. Japan started production at the end of the 1870s at a time when the change of leadership was taking place in world tool production. How was Japan able to acquire machine tool production know-how in this situation?