

Starting their armament program as late as 1942, they could only arm in "width"; that is, accept their equipment and material base as given and expand munitions production on the basis of available capacity.

But, to ask the next question, was Germany able to make full use of her existing capacity? It will be shown below that she was not. While the German economy was approaching its basic limitations in mid-1944, it never attained its full war potential. Production capacity, except in a few special cases, of which oil was the most notable, was never really short; machinery capacity was never fully utilized. Manpower—particularly woman power—was never mobilized. Raw material stocks of the most important categories, such as steel, were rising up to mid-1944. The output of civilian consumption goods, after the restriction of the first two years of the war (which still left the civilian standard of living at a fairly comfortable level and above that of the depression years in the early thirties), was maintained virtually stable until the second quarter of 1944.

Yet, at least from the end of 1942 onwards, the Germans were arming as fast as they could. If they did not reach their full war potential before the end of the war, this was due to limitations on the speed with which they were able to convert and expand. Expansion was held up by temporary shortages of components and parts and by the introduction of new types of armaments. Air raids and the dispersal of industry also played their part in slowing down expansion.

Some of the impediments to the expansion of German war production might have been removed by better coordinated planning. Speer's work was more the result of brilliant improvisations than the execution of a single well thought-out plan. His main achievement, the exploitation of mass production techniques, was not done in any prearranged and systematic manner over industry as a whole, but in a piecemeal fashion, as urgent military needs called for the achievement of high output levels now in tanks, now in aircraft, now in guns or ammunition. Better coordination and overall planning might have speeded up the rate of expansion somewhat; but it is doubtful if a significant improvement could have been obtained.

GERMANY'S PRODUCTIVE RESOURCES

To assess the effects of strategic bombing on the German economy, one must analyze the extent to which Germany utilized her resources, and the extent to which she could afford losing industrial capacity or divert resources to the restoration of destroyed capacity. The basic resources of an economy are the capital equipment of its industries, its industrial manpower, and its supply of raw materials. Of these three, capital equipment alone is directly vulnerable by aerial attack; and the strategic bomber offensive mounted against Germany aimed primarily at lowering military industries, in the industries supplying basic materials and components, and in the transportation system. The supply of raw materials can only be affected indirectly by bombing, through the destruction of equipment in the raw material extracting and manufacturing industries. Similarly, in the bombing of Germany, industrial manpower could only be affected indirectly by strategic bombing, insofar as it affects morale, causes absenteeism, and diverts labor to anti-aircraft defense and to debris clearance and reconstruction.

CAPITAL EQUIPMENT

The German economy does not appear to have suffered from shortages of machine tools, general machinery, or plant facilities—except temporarily in a few isolated cases. On the contrary, machine tool and machinery capacity was generally in excess of needs. Detailed inventories of industrial equipment are not available, but the total inventory of machine tools suggests that on the whole, machine tool capacity was more than sufficient. This view is also confirmed by the fact that apart from the aero-engine industry and a few other exceptions, the German armament industries worked only a single shift throughout the war, and the great capacity reserve that would have been available from double or triple shift operations was largely unutilized. Furthermore, the German machine tool industry hardly expanded during the war, worked on a single shift basis throughout, and converted almost 30 percent of its capacity to direct munitions production.

Germany's easy machine tool position is in striking contrast with the experience of the United States and Great Britain, where machine tools were kept working 24 hours a day seven days a week, and the machine tool industry was very much expanded and strained to the utmost to supply requirements. One reason for Germany's

strong position was her large machine tool industry which, being an important exporter, had a capacity greatly in excess of Germany's domestic peace time requirements. Secondly, Germany started the war well stocked with machine tools which, unlike the American inventory, consisted mainly of universal machines and could therefore easily be converted to war production. In any case, Germany's war production was not limited by her machinery equipment. The important exceptions to rule occurred in the synthetic oil and chemical industries, in the electric power system, and in the manufacture of high grade steel. Germany had ample capacity also in plant facilities. Statistics of factory floor space are lacking; but it appears that new factory construction was moderate during the war, while the large industrial dispersal programs occasioned by the Allied air offensive were carried out without being handicapped by a shortage of factory space.

MANPOWER

Germany's experience was fundamentally different from that of the Anglo-American Allies also as far as the manpower problem is concerned. While England and America both entered the war with substantial unemployment, Germany's labor force was fully employed already in 1939. Total employment increased by 8 million, or 30 percent, between 1933 and 1939. Industrial employment nearly doubled, with most of the increase concentrated on the heavy goods industries.

The absence of unemployment does not mean, however, that Germany was fully mobilized for war in 1939. The percentage of workers in her nonagricultural population of working age was hardly greater than it was in Great Britain at the time; and what manpower she utilized was not concentrated unduly on war production. According to German statistics, civilian consumption in 1939 was above the 1929 level and had only fallen slightly by 1941. This shows that Germany entered the war with a "guns and butter" philosophy which was continued well after the initial defeats in Russia.

With the progress of the war, the mobilization of manpower increased both in Great Britain and in the United States; but not so in Germany, where the total employment of Germans (including those called up for the Wehrmacht and not deducting casualties) remained practically unchanged throughout the war and reductions in the civilian labor force due to military draft