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## How American Industry Won World War II

By Mike Kubic  
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*In this article, Mike Kubic, a former correspondent of Newsweek, discusses the role of industry in the United States in World War II. The demands of participating in the second World War revitalized American industry and made the United States a global leader in production. The enhanced warships and aircrafts provided by the United States were crucial to securing victory for the Allied forces. As you read, take notes on the impact of the war and its demands on American life, in terms of both individuals and institutions.*

- [1] In Freedom's Forge, an in-depth account of the role American industry played in World War II, Arthur Herman tells a story that illustrates the abysmal<sup>1</sup> condition of the U.S. military at the onset of that global conflict. In the summer of 1939, mere weeks before Hitler's Wehrmacht<sup>2</sup> invaded Poland, Brigadier General George Patton—who would go on to become a legendary wartime commander—took charge of a unit with 325 tanks that needed certain nuts and bolts to keep them working. Patton tried, without success, to order the hardware from the Army quartermaster.<sup>3</sup> In the end, he ordered the nuts and bolts from a Sears catalogue and paid for them out of his own pocket.



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On the eve of the most cataclysmic<sup>4</sup> war in history, the American army was so short of equipment that it used borrowed Good Humor trucks as make-believe tanks in military maneuvers.

Yet by the end of the war, the U.S. produced two-thirds of the weapons and equipment used by the Allies (primarily the U.S., Great Britain, and the Soviet Union) to defeat the Axis of Germany, Japan and Italy. In 1945, Joseph Stalin, the dictator of the Soviet Union (who would become,

1. **Abysmal** (*adjective*) extremely bad; appalling
2. The unified armed forces of Nazi Germany from 1935 to 1946.
3. A military officer responsible for providing quarters, rations, clothing, and other supplies.
4. extremely bad or harmful

after the war, a major U.S. adversary)<sup>5</sup> publicly acknowledged that “Without American production, [the Allies] could never have won the war.”

This Herculean achievement<sup>6</sup> was made possible by the total mobilization of American industry, the country’s labor force of 54 million, and the genius of thousands of military and civilian engineers, scientists and executives. Many of the civilian volunteers were given military ranks and uniforms, and some, who were independently wealthy, toiled for Uncle Sam for \$1.00 a year.

- [5] During America’s four years of involvement in the war, these members of our “Greatest Generation” put 324,000 military aircrafts in the air, launched 6,771 large ships (including 349 destroyers), and supplied the Allied ground forces with 2.5 million tanks, trucks, and jeeps; 2.7 million machine guns; and 250,000 pieces of artillery. Three American products exemplified<sup>7</sup> the nation’s decisive contribution to the military triumph of the Allies:

## I. Liberty Ships

As an island nation, Britain required more than a million tons of imported material each week to survive and fight throughout the war. Hitler’s Germany, which had the world’s greatest fleet of modern submarines, attacked the convoys<sup>8</sup> of England-bound merchant ships ferociously and sank hundreds of them in an attempt to cut off the British lifeline.

Even before the U.S. entered the war in December 1941, President Franklin Delano Roosevelt came to Britain’s aid. In March, he and British Prime Minister Winston Churchill agreed on a lend-lease arrangement under which the U.S. would lend the Royal Navy 50 WWI destroyers to protect the convoys and the U.S. was given the use of British military bases in Bermuda, Newfoundland, and the West Indies. But the biggest help came when American ship builders set out to shore up Britain’s supply line by building replacements for the torpedoed<sup>9</sup> cargo ships.

Using a basic British design, American experts created a vessel that was oil-fired (rather than coal-fired), so that it could be refueled at sea; simplified its production by using welding<sup>10</sup>

5. World War II was followed by the Cold War, a period of political and military tension between the United States and the Soviet Union.
6. An accomplishment requiring great strength and effort.
7. **Exemplify** (*verb*) to be a typical or best example of
8. **Convoy** (*noun*) a group of ships traveling together, typically accompanied by armed warships or troops for protection
9. To attack or sink a ship with a torpedo, a self-propelled underwater missile.
10. **Weld** (*verb*) The process of joining together metal pieces by heating the surfaces to the point of melting by using a blowtorch and uniting them by pressing or hammering

instead of rivets;<sup>11</sup> and enlarged its cargo capacity so that it could carry ten thousand tons of material. Essentially a floating boxcar, each Liberty ship could deliver everything from tanks and bombers to wheat and corn. Most importantly, it could be mass-produced in record time and numbers, in 18 U.S. shipyards—mainly in Baltimore, Richmond, and Portland, Maine—where the keels<sup>12</sup> for the 2,710 Liberty ships were laid.

The Liberty ships were nothing to look at: President Roosevelt, who launched the first of them in September 1941, called them “dreadful looking.” But in England, similar ships took several months each to build while, in the U.S., each was completed on the average in less than six weeks. As many as 14 Liberty ships were launched each day, and they quickly became the beasts of burden<sup>13</sup> of American aid.

- [10] By the end of the war, they had transported a total of \$50.1 billion (equivalent to \$659 billion today) worth of arms and food supplies, \$31.4 billion of which went to Britain, \$11.3 billion to the Soviet Union, \$3.2 billion to France, \$1.6 billion to China, and the remaining \$2.6 billion to other Allies. Further, the Liberty ships stayed in service for a long time.

Although many were sunk by the German U-boats,<sup>14</sup> 2,400 survived the war, and hundreds of them were used to carry American GIs to the European bases of the North Atlantic Treaty Organization (NATO)<sup>15</sup>, and to bring wartime refugees to the U.S. By 1959, 16 of them were converted by the U.S. Navy into radar picket ships.

## II. B-29, the Flying Superfortress

Nazi Germany started WWII as well prepared for battle in the skies as it was on the seas. Hitler’s Luftwaffe<sup>16</sup> had tested its doctrines and aircraft in the Spanish Civil War, and by 1939, it had tens of thousands of the most sophisticated and technologically advanced military aircraft and well-trained and experienced pilots. In 1940, as part of its blitzkrieg,<sup>17</sup> Germany sent 1,380 heavy bombers to wreak ruin and destruction in England.

11. Short metal pins or bolts for holding together two pieces of metal.
12. A keel is a longitudinal structure along the centerline at the bottom of a vessel’s hull. It serves to increase the vessel’s stability.
13. The phrase “beasts of burden” literally refers to an animal, such as a mule or a donkey, that is used for carrying loads.
14. submarines
15. An alliance of countries from North America and Europe based on a commitment to collective defense.
16. Luftwaffe is the German term for air force.
17. Blitzkrieg is a type of military strategy widely used by the Nazis during World War II, in which they would use tanks and other motorized vehicles to swiftly attack their enemies.

By contrast, the U.S. Army Air Force (later renamed the U.S. Air Force) in 1940 had a total 1771 combat aircraft, only 46 of which were heavy bombers. But, spurred by the need to prepare for war and British orders for \$1.2 billion worth of warplanes, American airplane manufacturers developed a new system of mass production.

By adopting the assembly line<sup>18</sup> methods of the automobile industry, organizing in-time parts deliveries, and launching three shifts a day, American aviation rose from the 41st to the top-producing industry of the U.S. within two years.

- [15] In 1944, each American airplane factory worker more than doubled the output of his/her German counterpart and quadrupled the output of his/her Japanese counterpart, and American industry was moving a war plane on the runway every five minutes. By the end of 1941, the manufacturing of U.S. combat aircraft had shot up to 8,395; it nearly tripled a year later, to 24,669; and by the end of the war, America was producing 74,564 war planes a year—15,057 of which were heavy bombers.

Nothing, however, approached the feat of constructing the B-29, the most advanced, expensive, and devastating flying warplane of the war.

In design since 1938, the plane was described by Herman as “the most massive project in the history of aeronautics.”<sup>19</sup> Later known as the “Flying Superfortress,” the B-29 was the brainchild of Charles Lindbergh, the first pilot to fly solo from New York to Paris. It had five principal manufacturers (Boeing, North American, Bell Aircraft, Wright Aeronautics, and GM’s Fisher Body) and 1,400 subcontractors who manufactured the plane’s 40,000 parts and shipped them to plants in Kansas, Georgia, Nebraska, and Washington.

Assembled by 1,500 workers—including hundreds of women, known as “Rosies the Riveters”—on six separate assembly lines, the enormous plane was at first pronounced to have “more bugs than the Entomology<sup>20</sup> Department of the Smithsonian Museum.” But after 900 engineering changes it became the most formidable<sup>21</sup> and long-distance projection of America’s armed might.

Almost 100 feet long, weighing 58 tons, and powered by four engines, it climbed higher and faster than most fighter planes, and cruised for 5,330 miles—the distance from New York to San Francisco and back. Bristling with machine guns and capable of delivering 20,000 pounds of explosives, the Superfortress was primarily used for major air raids on very distant targets.

18. A series of workers and machines, who work together to mass produce a single product.
19. The science or practice of travel through air.
20. The branch of zoology concerned with the study of insects.
21. **Formidable** (*adjective*) causing fear or awe, often due to great size, power, or difficulty to overcome

- [20] One of these raids, carried out by 334 B-29s, took place in March 1945. It destroyed 16 square miles of Tokyo and killed 83,000 people. It was the most apocalyptic<sup>22</sup> air attack of the war until the B-29s dropped atomic bombs on Hiroshima and Nagasaki.

### III. The Manhattan Project

The A-bomb<sup>23</sup> development began modestly in 1939 as a U.S.-British top-secret project, but it grew to an effort involving hundreds of the world's best scientists and industrial leaders and more than 130,000 workers in the U.S., Britain, and Canada. The so-called "Manhattan Project" cost nearly \$26 billion in today's dollars.

Over 90 percent of the expenditures<sup>24</sup> went to the production of fission material<sup>25</sup> and to research and testing facilities at 30 sites in the U.S. (mainly Oak Ridge, Tenn., Los Alamos, N.M., Argonne, Ill. and Hanford, Wash.), Britain, and Canada. The actual cost of the development and production of the first two A-bombs was less than 10 percent of the total.

President Harry S. Truman authorized the use of the atomic weapons only three months after the German defeat in Europe, after Japan rejected the Allies' offer issued on July 26, 1945 at the Potsdam conference. The proclamation outlined the terms of surrender for the Empire of Japan and warned that, were it not accepted, Japan would face "prompt and utter destruction."

As Japan continued fighting and the U.S. faced the prospect of 150,000 GI casualties in the invasion of the Japanese islands, on August 6, a B-29 dropped an A-bomb on the industrial city of Hiroshima.

- [25] Sixteen hours later, President Truman called again for Japan's surrender and warned the Japanese that otherwise they had to "expect a rain of ruin from the air, the like of which has never been seen on this earth."

When the Japanese government still did not respond, on August 9, another B-29 dropped a second A-bomb on the city of Nagasaki.

The two bombings killed at least 129,000 people in total.

On September 2, less than a month after the Nagasaki bombing, Japan surrendered, effectively ending World War II.

22. **Apocalyptic** (*adjective*) Resembling the end of the world; catastrophic and highly dangerous
23. The atomic bomb, a nuclear weapon that uses nuclear fission as its source of energy.
24. Expenses
25. The substance capable of sustaining a nuclear fission chain reaction, the process which powers nuclear explosives.

As surprising as it may be, Freedom's Forge includes a statistic that puts the civilian contribution to the WWII victory in a rarely noted context: "The number of workers, male and female, who were killed or injured in the U.S. industries in 1942-43 exceeded the number of Americans killed or wounded in uniform, by a factor of twenty to one."

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