CHAPTER EIGHT

COUNTDOWN

Mass production takes time to get started.
—William S. Knudsen to FDR, 1941

AT NIGHT KNUDSEN sat with his yellow legal pad and did the numbers.

Despite the strikes, production was going up. A year before, no tanks
were being manufactured in the United States except those hand-made
in government arsenals. Now, Baldwin Locomotive had a backlog
order, Chrysler was coming through with its plant, while American Car
Foundry and American Locomotive were ready to turn out tanks on
their assembly lines.¹

“Babe” Meigs (a nickname owing to the fact he was six foot four)
had reported that total plane production was up to 1,450 a month; the
good was 2,600 by October. Knudsen estimated they would hit 3,000
to 3,500 a month before 1942 was out.² “Powder” Johnson had per-
formed miracles with the help of DuPont as well as companies with
names out of Greek mythology—Hercules, Atlas, and Trojan Powder—in
getting new American gunpowder and TNT plants up and operating
at sites ranging from Radford, Virginia, to Sandusky, Ohio. Meanwhile—
the brightest spot on the horizon—small-arms production at places
like Saginaw Steering Gear and the Winchester Company was actually
running ahead of schedule. Saginaw was supposed to supply the gov-
ernment with 280 machine guns by March 1942. When that date came,
they would ship 28,728 guns.³

As for raw materials, when Knudsen had come to Washington, the
country’s aluminum production was barely 25 million tons. Now it was
40 million, and headed to 70 by the end of the year. Steel was showing
similar numbers.⁴ If imported materials like tungsten, chrome, and rub-
er were still in critical short supply, once Henry Kaiser’s yards began
turning out ships ready to go fetch them, that would change.

At the top of the page, however, Knudsen scrawled two large num-
erals: 1 and 8. That was the magic number: eighteen months. That’s
how long Knudsen estimated it would take for American business and
industry to make the arsenal of democracy a reality. One year to build
new plants and retool the old ones, six months for conversion.

Everywhere he looked, that number held true. A year for tooling for
airplane engines, maybe ten months with overtime. A year to tool for
tanks of thirty to thirty-one tons. Nine to eleven months for a TNT
plant.⁵ Then another six months before everyone would see full pro-
duction—enough guns, tanks, planes, and bombs to sweep Germany
and its Axis allies into oblivion.

“Everyone knows that America is the greatest mass producer in the
world,” Knudsen kept telling Roosevelt. “Not everyone knows that
mass production takes time to get started.” But “once you get going,
the momentum takes you a long way”—all the way to victory.⁶

Why so long to get started? Because American assembly lines could
not get moving until they had the machine tools for the job. Machine
tools are the heart of the industrial process. They can drill; they can
bore; they can turn steel like table legs on a lathe or slice slabs of iron
like a wood plane. They take steel, cast iron, brass, and aluminum and
mill, grind, shear, and press them into parts for household or industrial
goods. Their design depends on the amount of force needed behind the grinding, cutting edge.\textsuperscript{7}

This means some machine tools are not much bigger than a bread box; others are the size of a house. In 1940 eighty-seven were necessary to make the average propeller shaft, from lathes to cut the shaft metal to machines to bore it and grinders to finish the job. The men, and later women, who ran the machine tools were the grunts, the unsung but essential foot soldiers of the modern industrial process. The machine tool makers were its elite, its master sergeants—except that they were aloof from the processes they set in motion. One admirer dubbed them the “master builders of the Industrial Revolution”—except that what they brought into being weren’t soaring cathedrals of stone but sprawling factories of iron and steel.\textsuperscript{8}

In 1940 almost every machine tool in America came from two hundred firms. Most had barely one hundred employees; some, fewer than fifty. Most of the best firms were concentrated in New England, and three of the biggest were in Vermont, in the Black River Valley, where their origins reached back to the American Revolution.\textsuperscript{9} Their hands smeared with oil and aprons with grease, generation by generation they labored to create the machines that made every product from cars to refrigerators and industrial fans.

The Depression years had been hard on the machine tool makers. In 1929 total American sales were $185 million; in 1932 they were hardly over $22 million. Companies like Jones and Lamson of Springfield, Vermont, and Cincinnati Milling Machine had filled the gap with foreign orders—ironically, one of their best customers was imperial Japan, whose Mitsubishi and Kawasaki aircraft factories hummed to the tune of American machine tools.\textsuperscript{9} When the war buildup started, Jones and Lamson’s president, Ralph Flanders, warned Knudsen and the NDAC that the need for machine tools would be “infinite” and that they were going to find themselves up against the wall in getting enough grinders, borer, and stamping and milling machines.\textsuperscript{10} Roosevelt had put a

halt to exports of machine tools, even to Great Britain. Then machine tool makers could only send new tools to those companies on the defense priorities list. Even so, dealing with the problem had been largely put off until now.

The first part of Knudsen’s plan had been under way since the previous June. New plant construction had been booming for almost a year, with Jesse Jones putting up more than $33 million for new facility construction for War Department orders.\textsuperscript{11} Some 784 new factories had been started and more than half were finished.\textsuperscript{12} Thanks to miracle workers like Albert Kahn, the work went even faster than many thought possible. K. T. Keller came to Kahn on a Wednesday looking to build Chrysler a new machine shop five hundred feet wide and two-thirds of a mile long. Kahn had the plans ready by Friday morning, and ninety days later the building was going up.\textsuperscript{13}

April, May, and June 1941 were the next critical months, when retooling around the country would kick in. To make sure that happened, Knudsen went to find Fred Geier.

Geier was president of Cincinnati Milling Machine and president of the Machine Tool Builders’ Association. Over time, as America’s manufacturing spread over the Old Northwest and across the Mississippi, two firms rose up to challenge the mighty New England machine tool empire. One was Cleveland Machine Tool; the other, Cincinnati Milling Machine. Fred had inherited the latter company from his father, a German immigrant’s son who sold Henry Ford his first machine tool before passing the firm over to his extraordinary son.\textsuperscript{14}

Fred Geier did not fit the image of the hard-charging American businessman. He was soft-spoken and formally dressed (he often appeared on the golf course in a three-piece suit) and had been educated at exclusive Williams College. He could read Latin and Greek with ease and didn’t drink or smoke.\textsuperscript{15}

Beginning in 1932–33, he had made several trips to Germany, which was still the Olympus of machine tool makers, and was shocked by what he saw: the persecution of Jews, the dogmatic militarism, the frantic arms buildup. It convinced Fred Geier that war was coming and that his business had better get ready for it. In 1938 he began doubling the size of his plant and put in a new foundry and a new office building—

\textsuperscript{*} Another was Stalin’s Russia. In 1938 almost one-quarter of all foreign sales were to the Soviet Union, and in 1934 Bryant Chucking Grinder saw more than half of its total sales going to the Workers’ Paradise.
all out of his own profits (Geier despised debt as much as he hated liquor).  

In the spring of 1941, Fred Geier was president of the Machine Tool Builders’ Association, and Bill Knudsen caught up with him at the association’s annual meeting at the Hotel Cleveland on May 5 and 6. Though Geier’s prediction of war had been borne out by events, he was still amazed when Bill Knudsen told him he wanted production of machine tools in America to double, redouble, and redouble again—all inside a year.  

“You’re crazy,” Geier said good-naturedly, “but then so are we. When do you want them?”  

“Right away,” Knudsen answered with a straight face, “and in the ratio I mentioned.” Geier knew Knudsen well enough to know he meant it.  

Geier and his colleagues did as the Great Dane asked. Over the next months, they and their factories would labor round the clock to produce a bewildering range of machine tools. In 1940 they had produced some 110,000. In what was left of 1941, they nearly doubled that number, to 185,000.  

By 1942, Geier’s Cincinnati Milling Machine was making a new machine tool every seventeen minutes, seven days a week, around the clock.  

One of the biggest and most important was a giant machine for boring giant naval guns. Geier had seen one in action in Germany in the thirties, and secretly bought one in defiance of Nazi export rules. He managed to smuggle it out of the Third Reich, piece by piece, through Switzerland and Italy and then reassembled it in Cincinnati. It was this mammoth machine, the pride of Geier’s factories, that would bore the great sixteen-inch guns for battleships like the Iowa, New Jersey, and Missouri.  

Knudsen and Geier did not stop there. In late June they launched a nationwide survey to track down every machine tool made in America in the past ten years, especially twenty-one types that were considered critical to the defense industry. Knudsen put OPM’s tool man, Mason Britton, on the scent of “idle” tools, so that used tools could be mobilized as well as new ones.  

The amazing machine tool production numbers fell off in 1943 and slid back to normal by 1944. But by then the necessary machines were in the factories and doing their job. The critical fuse for the great explosion of productivity in America’s defense industry after Pearl Harbor had been laid, thanks to Knudsen and the tough-minded teetotaler from Cincinnati Milling.  

Still, the criticisms did not stop. One of the first, and in many ways the most perceptive, came in the pages of Fortune magazine in April. It charged that Washington had underestimated “the size of the effort necessary to build an armament economy without turning the civil economy inside out.” The fact is, it read, “national defense is in pretty bad shape, and everyone in and out of Washington has seen the defense program drift and stumble.”  

Time had been wasted putting Bill Knudsen in charge of policy and contracts, for example, when he should have been put in charge of directing production. Fortune’s editors blasted Stettinius for accepting the Army’s estimates of how much steel would be needed, with shortages now predicted for the rest of 1941 and into 1942. It damned the administration for failing to impose stricter price controls when armaments orders piled on top of a growing civilian demand meant prices would inevitably skyrocket.  

 Barely 10 percent of the country’s factories had converted to war production. America, it seemed, needed a Dunkirk in order to get serious about defense. “The job is plain: Tool up now so that we can deliver later”—which was exactly what Knudsen was doing, although no one at Fortune took notice.  

Instead, many blamed Knudsen for the delays. “Knudsen is simply not delivering the goods,” Harold Ickes complained in his diary. “Big business is having too much say.” Columnist Walter Lippmann accused Knudsen of organizing the entire war effort “as a kind of annex and superstructure to an immense boom in private business.” Stimson himself was getting worried. “I’m afraid that Knudsen is too soft and too slow,” he wrote on May 29, “because of his connection with the auto industry.” All asked the same question: When would he finally put defense ahead of business as usual?
The person who really needed to answer that question was the president, who had been so passive all spring. Finally something happened to snap Roosevelt out of his lethargy. On May 21 an American freighter, the SS Robin Moor, was sunk by a German U-boat inside the security zone. The Germans had allowed the crew and passengers to load into lifeboats before a torpedo sent the Robin Moor to the bottom, but it was two weeks before a passing steamer picked up the wretched survivors.

The president decided it was time to act. On May 27 he declared a state of national emergency, saying that “if we were to yield on this, we would inevitably submit to world domination” by Hitler. American naval forces extended the security zone as far as Iceland and occupied that barren island country. On June 9, Roosevelt ordered federal troops in to end the strike at the North American plant. Many predicted a violent backlash. Instead, when troops arrived, workers unveiled an American flag and marched with them back into the factory.

That was the one bright patch on an increasingly dismal labor front. On June 22, Hitler attacked the Soviet Union. Some hoped this would move the Communist Party firmly into the Allies’ camp, especially the CIO. Instead, Big Labor came up with another issue to fight about, unionization of all defense contractors. It found a firm new ally in the National Defense Mediation Board, whose members consistently backed every effort to enforce unionization, including walkouts by labor. Overall, 1941 was a near-record year of strikes and disputes, with more than 3,500 of them, costing 23 million man-days of labor—enough to build 124 Fletcher-class destroyers.

That second week in August, the strikes came with a dizzying flurry. On August 6, 16,000 CIO shipyard workers walked away from their jobs at Federal Shipbuilding in Kearny, New Jersey. The issue was not pay or conditions, but a contract with the Navy that allowed an open shop. Three tankers, two freighters, six destroyers, and a cruiser sat unfinished and useless as union stewards and management wrangled.

That was Wednesday. On Saturday fifteen hundred workers walked away from the Curtiss-Wright propeller plant in Caldwell, New Jersey, which made propellers for eight types of warplanes. That same day, carpenters struck at the Philadelphia Navy Yard, where they had been building a new dry dock. Their demand was for overtime pay on Saturdays. By the time the strike was settled, almost two weeks of crucial work were gone.

Knudsen watched, helpless to stop the crumbling production effort. Roosevelt was sending conflicting signals on the seriousness of the defense effort, while the American people themselves were sharply divided. Gallup polls showed that almost two-thirds of the country opposed getting involved in the war in Europe, but almost the same number expected the country to be at war in the next year. It was not a formula for boosting morale. New York Times reporter Frank Kluckhohn toured the American heartland—Ohio, Minnesota, Illinois, Missouri—and of the hundreds of businessmen and working people he spoke to, only three or four actually supported entering the war. “I would do everything short of going to Leavenworth to sabotage the war if we entered,” one young lawyer declared.

A Time reporter visited the Army’s new training depots to interview eager young draftees, except that few of them were very eager. At one Mississippi camp, soldiers booed newsreel pictures of President Roosevelt and General Marshall, while excerpts from a speech by isolationist Senator Hiram Johnson drew a loud ovation. Certainly it was hard to expect American business to go full out for the war effort when the country itself was so conflicted.

The battle over raw materials bottlenecks brought all the caterwauling in Washington to a fevered pitch. Don Nelson had to report to Knudsen and the rest of OPM that his priorities system for raw materials was breaking down. As many as five thousand factories might have to close because they couldn’t get adequate supplies of aluminum, copper, nickel, alloy steels, zinc, tin, and tungsten. Somewhere between one and two million workers might find themselves out of work.

Clearly something had to give. What gave was the Knudsen formula for steadily growing military orders on the backs of civilian production, and letting suppliers find new ways to increase production. Instead on August 28 the president announced the creation of yet another new agency, the Supplies, Priorities, and Allocation Board, to split up available supplies of materials between military and civilian needs. “Don’t worry, Bill,” Roosevelt said with his engaging grin, “it’ll make your job easier.”
Knudsen knew better. The New Dealers had won. The membership of the new SPAB told the story. They included Leon Henderson, now head of the Office of Price Administration and Civilian Supply, who wanted deep cuts in civilian production (it puzzled Knudsen and his stalwarts that the man in charge of protecting civilian consumers from the impact of war preparation was always looking for ways Americans could do with less). Harry Hopkins sat at the table in his capacity as head of the Lend-Lease program. So did Roosevelt’s vice president, Henry Wallace, the former agriculture secretary and New Deal ideologue who, like Hopkins, saw the defense buildup as a way to deepen and extend the powers of the federal government—in the words of one cynical, “as a version of WPA that Republicans will have to support.”

If Knudsen was the big loser, the winner was Donald Nelson as SPAB’s executive director. The creation of SPAB involved a larger personnel shake-up. Ed Stettinius was appointed to replace Harry Hopkins in running Lend-Lease. Knudsen’s right-hand man, John Biggers, was moved to London to oversee that end of the Lend-Lease knot. At the same time, the first round of curtailment of civilian production had begun.

First came the auto industry, with a drastic cut by more than half. Then in October nonessential construction was ordered halted, to divert materials to defense plant construction. On October 21 manufacturers had to stop using copper in almost all civilian products, followed by sharp cuts in refrigerators, vacuum cleaners, metal office furniture, and similar durable goods.

Yet in the end, SPAB did no better than its predecessors. The Army and Navy would fight it tooth and nail over what it saw as misplaced priorities in the allocation of materials, as they would its successor agency, the War Production Board. Don Nelson’s efforts to tell them they could not have everything they wanted, exactly when they wanted it, and that a military buildup without a strong civilian sector (one with enough lumber, for example, to build houses for war plant workers or enough heavy equipment to repair roads and bridges) was impossible, would make him the most hated man on Constitution Avenue. As for SPAB, it became another lump in Washington’s administrative alphabet soup until it was washed away by Pearl Harbor.

Still, Knudsen could look down at his own schedule with some satisfaction. Things were on track. The critical period of retooling was almost over. Although the increase in the output of machine tools was not yet visible, by year’s end the value of machine tools put out by the industry would be nearly double that of 1940—just as Fred Geier had promised. Likewise, the nation’s munitions output would double in the second half of 1941.

No one who read the newspapers knew it yet, but the tap was about to be turned on. In January 1941 defense spending rose to triple what it had been during the previous six months. By July it quintupled, and December it jumped another twelvefold. America, the isolationist nation still at peace, was fast approaching Nazi Germany in its defense output. In 1942 it would roar past it.

Every month of the second half of 1941, $2 billion of munitions were being stamped, milled, riveted, punched, or rolled out. While Walter Lippmann and others bayed about unreadiness and the need to move forward, and while agency heads in Washington were panicking across the country the war production curve was moving steeply upward. America was poised to produce arms in quantities no one had ever thought possible. The explosive rate of growth Knudsen and his colleagues triggered from mid-1940 to the end of 1941 eased after 1942, although the numbers of planes, ships, tanks, and weapons would continue to explode (see Appendix A). As historian Geoffrey Perret later put it, “Without the accomplishment of those eighteen months who can doubt that the war would have lasted substantially longer than it did and taken more lives than it did?”
Now it was up to America’s military to get ready to use it—and that moment was coming faster than anyone realized.

On a cold blustery Thursday evening in late 1941, Knudsen attended a dinner in the North Lounge of the Carleton Hotel. Vice President Henry Wallace of SPAB was there. So was SPAB’s executive director, Donald Nelson, Lend-Lease’s Ed Stettinius, and Frank Knox, the secretary of the Navy.

After dinner Knox gave a speech to the assembled distinguished guests.

“I feel I can speak very frankly, within these four walls,” Knox said. “We are very close to war. War may begin in the Pacific at any moment.”

It was true. In June, Roosevelt had imposed an oil embargo on imperial Japan, and in July he had frozen Japan’s assets in America—a virtual casus belli if ever there was one for the resource-starved island nation. In October some two thousand Japanese Americans were ordered evacuated from the West Coast. American naval intelligence had discovered that the Japanese were gathering troop transports in their harbors in Indochina—possibly for a strike against British Malaya and Singapore, or the oil-rich Dutch East Indies, or possibly even farther out. On Monday the new Japanese premier, General Hideki Tojo, formally rejected an appeal from Secretary of State Hull for settling America and Japan’s differences amicably.

“But I want you to know,” Knox continued, striking his fist into his palm, “that no matter what happens, the United States Navy is ready! Every man is at his post, every ship is at its station. The Navy is ready. Whatever happens, the Navy is not going to be caught napping.”

Knudsen’s driver picked him up and took him back to his Rock Creek Park home. It was the evening of Thursday, December 4, 1941.

Three days later, in far-off Hawaii, the roof caved in on Knox’s prediction.

America was about to begin the test of total war.