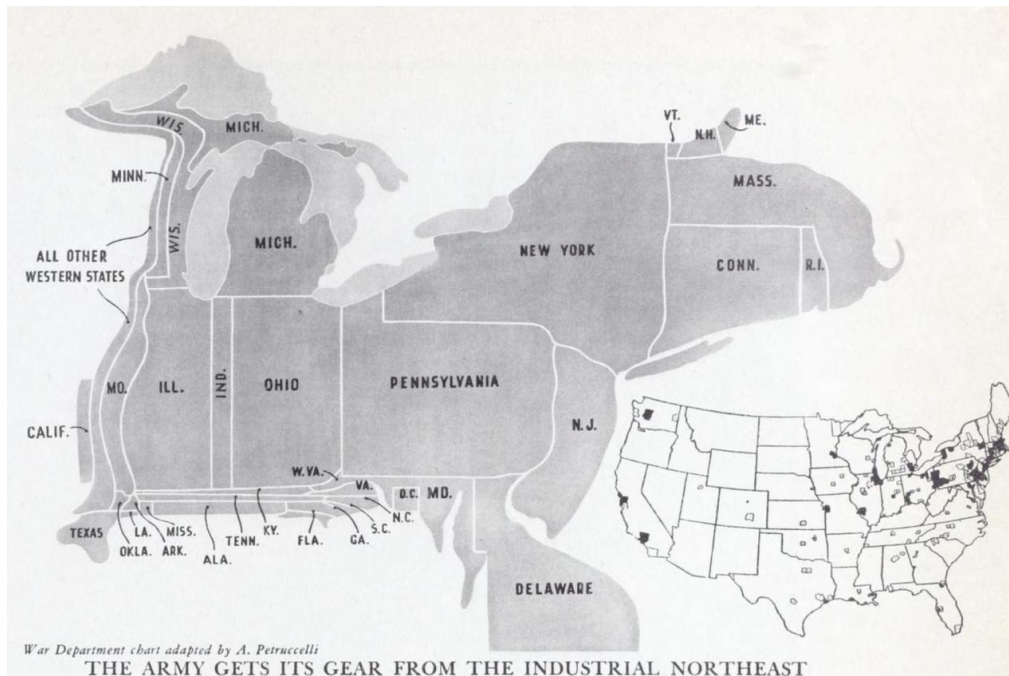




Controlling the Skies: Connecticut's Aviation Contributions in World War Two

After a few monthly articles exploring other facets of Connecticut history, this article will return to our usual *Connecticut Industry During Times of War* series. We've covered the growth, success, and meaningful contributions of Connecticut's vast industry through the Revolutionary War, Civil War, and the Great War. We will now turn our attention to the period where Connecticut's industrial might was arguably at its zenith: The Second World War (1939-1945). During the 1940s, manufacturing jobs would make up half of all employment in Connecticut. This placed Connecticut among the national leaders in industrial employment percentage per state (Srivastava; Ruggles et al.). The accompanying image exemplifies this statement, showing each state's size according to their relative importance to the government as centers of military manufacturing in 1940. Companies and industries that were mentioned in past wartime articles were once again called upon to produce for the war effort, that is, if they had survived the severe economic downturn of the Great Depression. A particular industry that rose among its peers and became a major part of what Connecticut was "known for" in the Second World War was the aviation industry. The products and contributions of Pratt & Whitney, Hamilton Standard, and Sikorsky would set the stage for America's airpower. My recent trip to the New England Air Museum provided many of the details for this article, unless otherwise stated.



How The War Department Sees The Country. WWII production output cartogram. Fortune Magazine (1940).

The story of today's well known aerospace company, Pratt & Whitney, begins with a great technical mind, a hefty financial investment, and a dash of nepotism. The original Pratt & Whitney Company was started in 1860 and made machinery and precision tools. This original company still exists today as Pratt & Whitney Measurement Systems. However, it would be overshadowed soon after a man named Frederick B. Rentschler approached his brother Gordon and family friend James Cullen, both members of the board of Niles-Bement-Pond, a massive machine tool corporation to which Pratt & Whitney was a subsidiary (United Aircraft Corp. 15-19). In 1925, the U.S. Navy was in search of an engine capable of 400-horsepower while weighing just 650 pounds. Rentschler believed he could make such an engine using an air-cooled radial design rather than the somewhat common liquid-cooled design of the period. Rentschler's proposal to his connections on the Niles-Bement-Pond board was to ask for financial assistance and tooling in order to create his engine design with the support of fellow engineer George Mead (TIME). The board quickly decided that their subsidiary in Hartford, Pratt & Whitney, should lend the funding that Rentschler requested, along with a manufacturing facility, and the Pratt & Whitney name. With this, The Pratt & Whitney Aircraft Company was founded in 1925 in Hartford, Connecticut. They would relocate and expand to East Hartford a few years later. The first model of their engine, named the "Wasp", was completed by the end of the year and met all of the Navy's requirements. It was this Wasp design that would revolutionize aviation in the United States (United Aircraft Corp. 45).

The first Wasp design, designated as the R-1340, broke records and changed the standards of aviation within the first few years of its existence. The engine proved to be incredibly reliable and planes using it showed remarkable speed and rate of climb. This single engine alone does not account for the reverence given to the Pratt & Whitney company during the period. Rather, it was the company's ability to make simple incremental improvements to the Wasp that allowed it to have such a long service career. This concept of continuous improvement is the same idea that led Toyota to dominate the vehicle market in the 1980s with their "Kaizen" model. Improvements in casting quality, design, and materials resulted in even greater reliability for the rugged aircraft engine. Little changes to cooling fins inside the engine, perhaps altering their pitch or making the fins deeper, allowed the engine to dissipate more heat, therefore allowing the engine to reach higher speeds without failing (White). The Wasp series of engines that started in 1925 would be continuously improved up to and during the Second World War, eventually culminating in the legendary 18-cylinder R-2800 Double Wasp engine. The Double Wasp would earn the reputation of being "indestructible" by many in reference to its ability to continue operating even after sustaining considerable battle damage. Even when taking survivorship bias into consideration, it is notable that US pilots would return from missions after taking damage to their engine but reported that their cockpit gauges indicated very little changes to the functioning of the aircraft



Pratt & Whitney Double Wasp R-2800. On display at the New England Air Museum. Author's Photo.

and that the ride back from the mission was relatively smooth. After inspecting the engine afterwards, it was revealed that the engine had internal damage, sometimes a completely blown off cylinder head, laying in the bottom of the engine (Cassiday; Wilkinson).

Pratt & Whitney engines would power an impressive array of America's most famous



Magneto driving gears for Pratt & Whitney engines are tested for hardness (1942). Source: Library of Congress.

planes used during and after the war. The R-2800 Double Wasp powered the F4U Corsair fighter aircraft, the P-47 Thunderbolt fighter aircraft, Grumman F6F Hellcat fighter aircraft, the B-26 Marauder bomber, and the Douglas A-26 Invader attack aircraft. Of this list, the P-47 Thunderbolt is considered to be one of the most recognizable planes of the war, serving in all theaters of the conflict. It was the United States' most produced fighter aircraft on top of being the largest, heaviest, and most destructive single engine aircraft used during World War Two. By the end of the war, Pratt & Whitney, with its licensees, had produced over 363,000 engines totaling nearly 609,000,000 horsepower, roughly half the air power used by the United States (Pomichter). Pratt & Whitney brought in thousands of new employees, many of them women, to build engines as quickly as possible. Factory employment numbers skyrocketed from 3,000 pre-war employees to 40,000 by 1943. Due to Pratt & Whitney's contribution to the war effort, East Hartford was named Connecticut's WWII Heritage City in 2022 (Leavenworth).

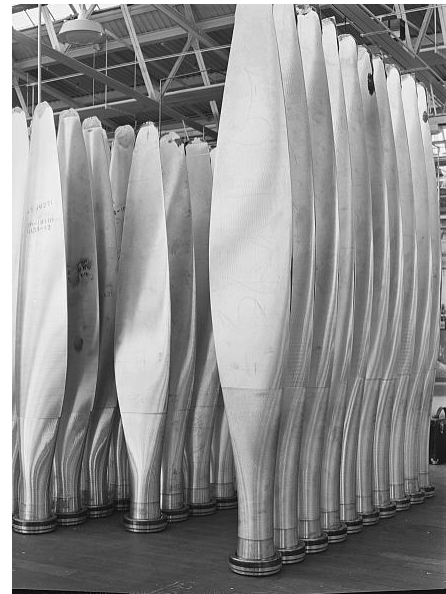
Along with Pratt & Whitney, the companies of Hamilton Standard and Sikorsky contributed immensely to the Allied air forces. Hamilton Standard as a Connecticut company began in 1929 when Frederick Rentschler, of Pratt & Whitney, started an expansive aviation firm with William Boeing and bought two smaller companies to form Hamilton Standard. After a short period of operation, their United Aircraft and Transportation Corporation would be broken up as a result of new antitrust laws. Nevertheless, the newly acquired Hamilton Standard would find itself under Rentschler's United Aircraft Corporation and have its manufacturing building positioned right next to Pratt & Whitney in East Hartford (Hitchens). Hamilton Standard's specialty was aircraft propellers. In the 1930s, the company developed a controllable-pitch propeller that used hydraulic pressure to change the angle of the propeller blades while in flight. This helped planes reach higher speeds and fly more effectively at high altitudes (TIME). This propeller design was one of the most advanced of its time and it proved decidedly popular, making Hamilton Standard the largest manufacturer of propellers in the world (Hitchens). As the war developed, Hamilton Standard increased production



The P-47 Thunderbolt. Chino Airshow (2014). Source: Wikimedia Commons, under the Attribution-Share Alike 2.0 Generic License.

to even greater levels and began to license out their various propeller designs in order to supply the US Navy, US Army, and British Royal Air Force. From 4-engine bombers like the B-17 Flying Fortress, to the famous P-51 Mustang fighter, and a plethora of bombers, fighters, and transport aircraft in between, all would use Hamilton Standard hydromatic propellers (National Air & Space Museum).

Most readers are familiar with the company Sikorsky today and its location in Stratford, Connecticut. Sikorsky is a leading helicopter manufacturer that got its start in 1923 when it was established by a pioneer in aviation design, Igor Sikorsky. Sikorsky's first commercial successes were not in helicopters, however, but in amphibious aircraft or flying boats; Planes that were capable of landing on water. In fact, a few of Sikorsky's JRS-1 amphibious seaplanes were at Pearl Harbor on December 7th, 1941. Immediately following the attack, these unarmed utility planes were sent out to search for the Japanese fleet and to take aerial photographs of the aftermath at Pearl Harbor (National Air & Space Museum). Sikorsky assisted with production of other fixed wing aircraft during the war as well, most notably the Vought F4U Corsair. The aforementioned Corsair would eventually be declared Connecticut's Official Aircraft in 2005 due to its airframe being built by Sikorsky, its engine by Pratt & Whitney, and its propeller by Hamilton Standard (Wynbrandt).



Propellers in the rough at the Hamilton Standard Propeller Corporation, East Hartford CT (1940). Source: Library of Congress.



A Vought-Sikorsky F4U Corsair (2000). Source: Wikimedia Commons, Mike Freer collection under GNU Free Documentation.

Sikorsky's most significant contribution was his R-4 helicopter. After designing and testing helicopters since 1909, he developed the VS-300 in 1939: The first successful practical helicopter to use a single lifting rotor and tail rotor in the United States. The design showed promise. With more experimentation and tweaking, Sikorsky unveiled the R-4 two seat helicopter which had its first flight in 1942. The R-4 would be the world's first production helicopter and the first used by



Sikorsky R-4 Helicopter (circa 1946). Source: Library of Congress.

the United States military (Devine). The application of helicopters in a wartime setting was not entirely figured out during the Second World War. They would come into their own during the Korean War, the image of medevac choppers coming over the hills made iconic by television's M*A*S*H for later generations, and reach their full effective application during the Vietnam War. The R-4 and other Sikorsky prototypes would see minimal combat use during the Second World War but they would

play an important part in a limited role. A Sikorsky helicopter would be the first to be used for a combat rescue mission. The theater of Burma, now called Myanmar in South-East Asia, is a land of very difficult terrain. Swamps, jungles, and rice paddies made landing rescue aircraft an impossible task in some cases. A downed American pilot and three British soldiers were trapped and unable to be retrieved in the dense terrain of Burma near Japanese positions. A helicopter flown by pilot Carter Harman was able to land and rescue all four personnel, one by one, exemplifying the use of the helicopter as a special operations tool (Dorr).

When World War Two finally ended in 1945, jet engines and helicopters were new but proven concepts. Pratt & Whitney, Hamilton Standard, and Sikorsky had each solidified a position in America's aviation history and its future. Connecticut aerospace firms participated in the large bounds of aviation advancement during the war and positioned themselves for commercial market growth afterwards. Still ringing true today, Aerospace and Transportation Equipment is the top manufacturing sector of Connecticut and the State's largest export (National Association of Manufacturers).

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The Gardiner Hall Jr Museum is open to the public Saturdays from 10:00am to 12:00pm. For more information, please call 518-791-9474.

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