They had crazy names: the Traveling Circus, the Sky Scorpions, the Flying Eightballs, Helton’s Hellcats, Van’s Valiants. These were the heavy bombers of the Eighth Air Force, the principal force of the U.S. Army Air Force (USAAF), the precursor of the modern U.S. Air Force (USAF), which was tasked with invading “Fortress Europe” during World War II.

While the pilots and crews faced unimaginable dangers as they conducted hundreds of bombing raids against the Nazi Axis, it was American engineers and builders who literally laid the foundation for the Allied victory on the western front—helping, along with the British, build 67 airfields in a few years, making all the difference in establishing Allied air power across German-controlled Europe.

The airfield construction program was one of the biggest civil engineering projects ever undertaken in the United Kingdom. Estimates vary, but during the war, more than 400 new airfields were built. According to Johnny Bryant, a retired Air Force master sergeant who has traveled to many of the fields, the United States flew missions from 120 of them.
When America entered the war in 1941, strategic planners knew that a heavy bomber force based in the United Kingdom would be responsible for the “strategic bombardment” of Nazi Germany, with a mix of low-flying bombers with medium-sized bomb loads as well as heavy bombers such as the B-17 Flying Fortress and B-24 Liberator, according to longtime Eighth Air Force chronicler Roger A. Freeman, in his book, *Airfields of the Eighth: Then and Now* (London: Battle of Britain Prints International Ltd., 1978).

The USAAF operated two air forces from the United Kingdom. The Ninth Air Force comprised mostly transport planes, medium bombers, fighters, and disposable gliders that could be towed behind planes to insert soldiers into Europe. The larger Eighth Air Force consisted of fighter planes and, most important, heavy bombers. In total, the Eighth Air Force utilized 67 airfields: 42 for the B-17s and B-24s, 15 for the fighters, and one for use as a reconnaissance base. (The remaining airfields were used temporarily by the Eighth Air Force until more permanent fields were built.) Planes stationed at the recon base would take aerial photographs to assess the damage of targets after they had been bombed.

According to Bryant, about 18 of those fields already existed; the rest were built from scratch, starting in 1941. Many of the bases were built by some of Britain’s leading civil engineering firms. Anticipating the possibility of war, the Royal Air Force (RAF) had already surveyed possible locations for new airfields as early as 1938. Starting in 1942, the U.S. Army Engineer battalions built another 14 bases from scratch and assisted in outfitting the barracks and living quarters of virtually all the new bases.

According to *Army Air Force Stations*, a report written by USAF Capt. Barry J. Anderson of the Air Force’s Historical Research Center in 1985, the British agreed to supply the facilities needed for the USAAF to operate. “But labor shortages in Britain and the need to get airfields built as quickly as possible led to the use of U.S. aviation engineers,” wrote Anderson. “In fact, American engineers became a vital element in a severely stretched British construction program.”

“It was during this time that some of the most prodigious construction feats were performed,” wrote Wilf Nicoll in a preface to Freeman’s book. “Operational aerodromes seemed to spring up overnight where before had been only land under pasture or agriculture.” Between airfields built by and for the United Kingdom and those built by the Americans, a new airfield was started, on average, every three days in 1942, the peak year for construction. Among the many American engineering battalions was one comprising African American engineers, the 847th.

Several bases originally laid down for RAF bombers were enlarged to meet the needs of an American heavy bomber group. “The facilities at former RAF fields ranged from excellent to primitive,” Anderson wrote. While some had barracks, hangars, machine shops, and supply areas, he continued, most were little more than concrete runways. “None of the newly acquired airfields could be considered spacious by U.S. standards of the day,” Anderson wrote.

The heavy bombers and escorts of the Eighth Air Force were spread across a region of England known as East Anglia, on the east coast of the country 50 mi or so
northeast of London. So many bases were built across such a small area—roughly 800 sq mi—that even distinguishing them from the air was a challenge. In Anderson’s account, American pilots had their hands full simply knowing where they were. Unlike training under the “blue skies over Texas,” in England, the landscape “was (and still is) a patchwork of fields, towns, and villages, all looking remarkably similar from the air. And for aircrew members accustomed to using a single crossroads or country church as a landmark, accurate navigation became crucial.”

Anderson added that even on the ground, “crewmen travelling from place to place could find navigating difficult for in 1940, when a German invasion appeared imminent, the British had removed practically all the road signs and mile markers.”

According to Freeman, the majority of these bases featured similar layouts, designated “Class A-type.” These Class A bases utilized “three intersecting runways, the main being a minimum of 2,000 yds in length with the other two at least 1,400 yds each. The main runway—the instrument landing runway—was aligned to the prevailing wind where topographical features were suitable.”

The runways were 50 yds wide and were connected by a 50 ft wide perimeter taxiway that averaged 3 mi in length. Branching off from the perimeter track were hardstands for the bombers. To build all this required 500,000 sq yds of concrete, 400,000 cu yds of excavated soil, and the removal of 8 mi of hedgerow and 1,500 trees. Further, building the air bases required 20 mi of drainage, 10 mi of conduit, 6 mi of water mains, 4 mi of sewers, 10 mi of road, and 4.5 million bricks. According to Freeman, there was enough concrete used for 4,000 mi of three-lane highway.

Taxiways connected to concrete hardstands dispersed across the bases. These hardstands were where the bombers were parked, maintained, and armed for combat. In addition to the runways and hardstands, the aerodromes also required control towers. These towers were eventually standardized with a “concrete and brick boxlike structure with balconies,” according to Freeman, and large Nissen huts made of corrugated iron atop a concrete floor. The hangars were “rectangular, steel-framed buildings clad with corrugated steel sheet and sliding doors on both ends” that stood 130 ft by 240 ft by 39 ft.

On one side of the airfields were underground fuel and bomb depots. On the other were barracks and quarters for the roughly 3,000 personnel at each base. According to the website of the 390th Memorial Museum, which commemorates one of the Eighth Air Force bombing groups, the typical B-17 base would house 72 B-17s, 96 aircrows, 144,000 gallons of fuel, and 3,000 tons of bombs. Building each base “equated to building a small town in less than six months.”

One of the biggest challenges engineers faced was providing adequate runways. “American engineers put down a 6,000 ft PSP [pierced steel plank] runway on what had formerly been a grass flying field measuring some 2,000 by 1,600 yds,” Freeman wrote. “The heavy P-47s [Thunderbolts] were having difficulty in operating from the field in the very wet conditions that existed during the late autumn and early winter of 1944 and this damp nature of Duxford in winter led to the Americans calling it the ‘Duckpond.’”

The Allies’ air power depended on the development of PSPs, steel mats that could serve as temporary runways on soft soil. The British and French had developed their own mats by the late 1930s, but the Americans rejected them because they “disintegrated under heavy use and...neither could support large bombers,” wrote Michael C. Robinson in a chapter in a book about WWII engineers (Builders and Fighters: U.S. Army Engineers in World War II). Barry W. Fowle, ed. Fort Belvoir, Virginia: Office of History United States Army Corps of Engineers, 1992).

Americans began work in May 1940 on something better, mats that could serve as hard runways and standing areas for aircraft, fill-in for permanent runways that were under repair, and were, Robinson wrote, “easy to transport, repair, camouflage, and produce.”

Gerald G. Greulich of Carnegie-Illinois Steel Corp. developed the initial steel plank design. Each plank was 10 ft long, 15 in. wide, and 1/4 in. thick. The panels, Robinson wrote, were “joined together by a locking mechanism consisting of alternating rows of slots on one side and sliding, interlocking projections on the other. Spring clips kept the connectors in position.”

Testing at the U.S. Army Corps of Engineers’ Waterways Experiment Station in Vicksburg, Mississippi, led to many improvements. To reduce weight, holes were punched into the steel mat sections; this also served to improve airplane traction and water drainage. “Flanging the holes kept the mat durable by compensating for the strength lost by removing a portion of the metal,” Robinson wrote.
The PSP could support 60,000 lb of weight when laid on a “thick base course of sand or gravel.” During the war, according to Robinson, the U.S. produced 800 million sq ft of PSP.

Despite these achievements, danger was everywhere. During the war, 12,371 B-17s were built, and roughly 9,000 of them were in use in England. Of those, 8,300 were destroyed or damaged beyond repair. In the first year of use, bombers flew with no fighter escorts, and crews had to survive 25 missions in order to complete their tour of duty. Initially, only 27 percent of flight crews survived; on average crews completed eight missions before being shot down. Over time those numbers improved as first the P-38 Lightning and then the P-51 Mustang were used to escort heavy bombers ever deeper into German territory. Pilots who had crashed into the North Sea had only a 25 percent chance of being found during the first two years of combat operations. (This figure improved to 50 percent in the war's final year.) All told, more than 40,000 U.S. bomber and fighter pilots (26 percent) were killed, wounded, or captured in Europe.

But aircrews faced dangers just taking off and landing too. Freeman related several tragic accidents that happened on the airfields. At Duxford, a bomber crashed into a barracks building, killing 13 crew members and one man on the ground. At Podington, misty weather caused two planes to collide on the runway, killing 21 and devastating the runway when the bomb loads on the planes exploded. At Horsham St. Faith, Freeman wrote, “Another B-24 blew up with its load of bombs while on its hardstand after an accident in which a gunner in a neighboring aircraft had accidentally discharged his guns into the bomb bay of the aircraft that exploded.”

At Kimbolton, Eighth Air Force commander James Doolittle was almost killed when a wounded pilot, Fred Sommer, attempted to land a bomber with a dead engine. Freeman wrote that Sommer “attempted to put the Fortress on the runway but too close behind another B-17 just touching down. Dragon Lady hit the slipstream and, thrown out of control, careened straight for the control tower. Only by giving the Fortress full throttle was Sommer able to clear the tower, and... Doolittle, by a few feet.”

U.S. engineer battalions completed their first airfield, Andrews, in early 1943. The last airfield completed, Debach, was finished in April 1944. (All told, U.S. bombers flew missions from August 1942 through April 29, 1945, just nine days before the German surrender.) On average each airfield conducted anywhere from 220 to 345 missions, according to Bryant.

After the war was over, most of the airfields were decommissioned. Nicoll noted that “year by year, their runways, perimeter tracks and hardstandings are nibbled away by demolition contractors as man competes with nature to win back the land, and provide rubble for motorways.”

Land was sold back to its original owners—but it was up to those individuals, mostly farmers, to clear the runways and other concrete surfaces. Some bases were turned into film sets; Duxford was “attacked” in 1968 during the filming of a movie depicting the Battle of Britain. Some bases returned to their original lives as orchards or farms. Others became museums. Today, some airfields are used for gliding or for flying clubs, others for turkey farms, and still others for racetracks. Two bases are still in active use by the RAF, according to Bryant.

Bryant made a pilgrimage to all 67 Eighth Air Force bases, a trip that covered 15 days and took a year and a half to coordinate. He described the experience as thrilling.

The foreword to a book called Workin’ on Those Airdromes (by the 923rd U.S. Army Engineer Aviation Regiment, 1945) recounts the work of the 923rd, which built bases at Eye and Debach, among many others. (On D-day, June 6, 1944, the first flight of B-24 Liberators took off from Debach.)

The crews faced crushing deadlines and danger from above—there were German raids over Eye and Debach, and the perimeter track at Debach was bombed. “Our task did not require us to engage in actual combat with the enemy,” wrote the unidentified author, “but as we watched the heavy bombers rear off in the morning from the fields we had constructed in England, and in France as we watched the fighters return from their strafing missions over the front lines to the haven we had provided for them, we felt a oneness with the combat men of the Air Corps and had a realization of the fact that we were playing a part in paving the way to victory.” —T.R. Witcher

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