The Other Wright Airplane Company; Dayton-Wright Airplanes

by Hayden Hamilton

The Dayton-Wright Plant 1 in Moraine, Ohio, in 1918. (Photo courtesy of Special Collections and Archives, Wright State University, MS152-193)

Wilbur and Orville Wright and the Wright Airplane Co. are well known to most of us. What has garnered much less attention, however, is the other very successful airplane company that Orville was directly involved in. A company that in a short five-year span manufactured more than 3,500 aircraft while establishing a number of first for U.S. aircraft manufacturers. This company created one of the first cabin-class aircraft manufactured in the U.S. They created the first retractable gear aircraft built here. The first "guided missile" was developed by this company. The company's management would go on to play significant roles in the development of the U.S. aircraft industry and military aviation services. This company was the Dayton-Wright Airplane Company.

Background

At the turn of the century, Dayton had become a leading industrial city in the United States. It hosted not only the earliest developments of aviation in the form of the Wright brothers' activities but companies like the Thresher Company, National Cash Register (NCR), Dayton Electrical Laboratories (Delco) and Dayton Metal Works among others. Edward Deeds and Charles Kettering had either played significant management roles and/or helped found all of these companies. Deeds was also an early aviation pioneer.

With the passing of Wilbur Wright in May 1912, Orville was left with managing the Wright Airplane Co. along with his inventor/designer responsibilities. Orville realized that managing a company was not something he was motivated to do, so in October 1915 he sold his interests in the Wright Airplane Co. Recognize, too, that for most of the period between 1912 and 1915, he had been embroiled in a bitter patent dispute with Glen Curtiss and the Smithsonian, which is sure to have influenced his decision to liquidate his holdings in the Wright Airplane Co. Orville sold his entire interest in the company and the patents to a group of seven eastern capitalists to form the Wright Company. This venture struggled financially and eventually merged in 1916 with the Glenn L. Martin Co. in Calif., and the Simplex Automobile Co. of N.J., to form the Wright-Martin Co.[1]

An important aspect of the sale of the Wright Aircraft Co. is that most of the work relating to manufacturing was eventually transferred out of the Dayton, Ohio, area. In March 1917, the engine manufacturing headed east to New Jersey where it would go on to become a successful manufacturer of aircraft engines. Martin departed the relationship in 1917 and in 1919 Wright-Martin would be reorganized and renamed the Wright Aeronautical Co. This move left a large pool of skilled aircraft engineers and craftsmen in the Dayton area that were reluctant to move to New Jersey and left with little prospect for work. This readily available pool of skilled workers was one of the motivations that led Deeds and Kettering to form the Dayton Airplane Co. Both were already involved to some extent in aviation and were committed to keeping Dayton as the center of the aviation industry.

Edward A. Deeds

Edward Andrew Deeds was a successful engineer, inventor and prominent industrialist in the Dayton, Ohio, area. Born in Granville, Ohio, March 12, 1874, he was the valedictorian of his class at Denison University. He then studied electrical engineering at Cornell University before joining the Thresher Co. in Dayton where he designed and installed electrical motors. Within 18 months he had been named superintendent and chief engineer.

In 1899 Fredrick Patterson invited Deeds to join the National Cash Register (NCR) Co. to strengthen its engineering team. Deeds oversaw the electrification of the NCR factories and built its first electric generating station. In 1901, Deeds was lured away by Henry Perky to build a factory for the Perky's Shredded Wheat factory in Niagara Falls, New York. This innovative factory was white-tiled, air-conditioned, well lit and equipped with showers, lunchrooms and auditoriums for the employees and became known as the "Palace of Light." The factory operated until 1954 being owned by Nabisco who acquired the rights to Perky's shredded wheat in 1928.

Deeds returned to NCR in 1903 as chief of development and construction where he developed prototype electrical motors capable of being used in cash registers. He hired Charles F. Kettering to improve the design and within three years Kettering had a working production model that revolutionized the cash register business. This propelled NCR into the position as the dominant manufacturer in this area and Deeds oversaw an international expansion that included factories in England, France, Italy, Germany and Canada.

The Deeds-Kettering relationship established at NCR would become a life-long professional relationship and friendship. Deeds provided space in one of his barns for Kettering to work on an electric automobile starter that would be patented in 1909. With an order for 5,000 units from Cadillac, Deeds and Kettering formed the Dayton Engineering Laboratories Company (Delco). This company was later sold to United Motors Co. that was later acquired by General Motors. Deeds became a member of the board of United Motors. The research laboratories of Delco became the foundation for the General Motors Research Corporation.

In 1917, Deeds, Kettering, along with H.E. Talbott (Jr. & Sr.) formed the Dayton Airplane Company, which was quickly reincorporated to the Dayton-Wright Airplane Co. with Orville Wright lending his name and serving as a consultant.

Almost simultaneously, Deeds enlisted in the U.S. Army with the rank of colonel and was put in charge of procurement for the Aircraft Production Board. Deeds divested himself of his holdings in Dayton-Wright, but went on to assign two major contracts to the company. In his role as procurement officer, he assembled the engineering team that designed the "Liberty" engine in a matter of days.

Following WWI, Deeds returned to Delco. In 1922 he was instrumental in reorganizing over 100 Cuban sugar companies into General Sugar Co., which he served as chairman until 1946. In 1931, Deeds returned to NCR to restore shareholder confidence shaken by the Depression, serving as president until 1940 and honorary chairman until his retirement in 1957.

Among his other notable accomplishments are cofounding of the Engineers Club of Dayton in 1914 (still operating today) with Charles Kettering, a founding member of the Dayton Astronomical Society (DAS) in 1918, the construction of his home, Moraine Farm, which was the first home in the United States to have a private airstrip. Along with his wife Edith Walton Deeds, he built the Deeds Carillon in Carillon Historical Park, which with its 57 bells is the largest in Ohio.

Deeds died at Moraine Farm in 1960.

The Dayton Airplane Co. was formed in early 1917, with Deeds, Kettering and the father-son team of H.E. Talbott Sr. and Jr.[2] forming the initial board. The Talbotts were local financiers and had previous relationships with Deeds and Kettering in conjunction with Delco, Dayton Metal Works and the Domestic Engineering Co. This team quickly reorganized the company as the Dayton-Wright Airplane Co. on April 9, 1917, and added Orville Wright as both a consultant and board member. While this reorganization had already been in the works, it inauspiciously came to fruition three days after the U.S. declared war on Germany taking the country into WWI.

With their worldwide background and connections, it is likely that both Deeds and Kettering recognized that the U.S. would eventually be drawn into the conflict and that aviation would play an important role in determining the outcome of the war. Both would have been familiar with advances in aviation in Europe as a result of the war and familiar with the ever increasing influence it was having on the conduct of the war. These connections would have come, in part, through the relationships established while they were building NCR into a global organization with operations in Great Britain, Germany, France and Italy during the early 1900s.

Deeds would almost immediately resign in order to enlist in the U.S. Army at the rank of colonel and be put in charge of the Aircraft Procurement Board. In order to avoid any conflict of interest, he divested himself of any financial interest in Dayton-Wright. One of Deed's initial assignments was to evaluate foreign training and fighter aircraft designs for manufacture under license by the U.S. Both France and Britain were the primary contenders with the British winning out on

Charles F. Kettering

Charles F. Kettering, 1918

Born in 1876 in Loudonville, Ohio, Charles Kettering would develop into one of the leading industrialists and inventors in the United States. Many of his inventions represent not only the "first of their kind" but served as a basis for implementing fundamental changes to the products they impacted. Industries that he had a significant influence on included the automotive, aviation, railroad and chemical industries. During the course of his career, Kettering would receive 140 patents.

Kettering attended the University of Wooster and received an electrical engineering degree from the University of Ohio. He was hired almost immediately after graduation by Edward Deeds at National Cash Register Co. (NCR) to "electrify" the mechanical cash register. The success of this project launched a successful career and a life-long business, professional and personal relationship with Deeds. Many of the ventures they would initiate are still successful organizations today.

In 1909 Kettering and Deeds founded the Dayton Engineering Laboratories Company (now known as Delco) that was focused on automotive applications. Out of this venture would come Kettering's development of the all-electric starter for automobiles; first applied to the 1912 Cadillac. They eventually sold this company to United Motors (acquired shortly thereafter by General Motors). It would become the General Motors Research Corporation and Delco Electronics. The Deeds and Kettering team also formed Domestic Engineering and Dayton Metal Works, both of which would play important roles in the Dayton-Wright story.

Deeds and Kettering recognized that Dayton was among the leading industrial cities in the U.S. with a large number of skilled engineers and technicians. He founded the Engineers Club of Dayton (1914) with Deeds and the Foreman's Club of Dayton (1922), which later on became the National Management Association. Both are strong organizations today.

In 1920, Kettering returned to GM heading up the General Motors Research Corporation where he would remain for the rest of his professional career, retiring in 1947. Research developments there led to the development of light-weight diesel engines including the Detroit Diesel Series 71 and diesel-electric locomotives, a 600-hp version that powered the "Pioneer Zephyr" for the Chicago, Burlington and Quincy Railroad and would eventually lead to the formation of the GM Electro-Motive Division. He would remain a director and research advisor at GM until his death in November 1958.

Among his more notable accomplishments not already mentioned were the creation of "ethyl" (leaded) gasoline; "Duco" paint, a fast-drying longer-lasting finish for automobiles; the first "cruise missile," the Kettering Bug; a compact electrical generation system for rural farms; the refrigerant (cooling agent) "Freon"; and an incubator for premature infants and he was a pioneer in the application of magnetism to medical diagnostic techniques.

His name and work continue today in the form of the Charles F. Kettering Foundation (founded in 1927) and the Sloan-Kettering Institute for Cancer Research (founded with GM chairman Alfred P. Sloan Jr. in 1945).

both manufacturing and licensing agreement costs.

It was important for the U.S. to quickly ramp up both production and training to a war level, having allowed its services to languish in the preceding years. In the period between 1910 and 1916, the U.S. Army Signal Corps had purchased a total of 59 aircraft. In 1916, they had ordered an additional 366 planes of which only 83 had been delivered at the time war was declared on April 6, 1917. Needless to say, the U.S. was totally unprepared to respond to an urgent cable from French Premier Alexander Ribot on May 26, 1917, requesting 16,500 aircraft, 5,000 trained pilots and 50,000 mechanics and support personnel as the U.S.'s contribution to the first six months of the 1918 Allied campaign.

On May 19, 1917, Orville Wright responded to a query from Glenn L. Martin concerning the Dayton-Wright Co. In this letter Wright states:

> I was glad to receive your letter asking for some particulars of the Dayton-Wright Airplane Company. The company was organized by Messrs. Deeds and Kettering and H.E. Talbott, Senior and Junior. These men are extraordinary good businessmen with lots of financial backing. They are going to try and carry out some of my ideas in creating a sport in aeronautics.
>
> Since the war has started, they are considering undertaking the building of a number of school planes for the government. Of course, they would have to put up a plant for this, but I do not know anyone who could undertake a job of that kind and put it through more successfully than those men could.

Dayton-Wright FS-1 "First Shot" at South Field shortly after rollout in 1917. (Photo from the Robert Casari collection)

First Aircraft

The Dayton Airplane Co. was not a "paper" company, began hiring and designing their first aircraft. They erected five buildings (designated D1 thru D5) south of Dayton on land owned by Deeds. This field would become South Field and the base for Dayton-Wright's flight testing. These buildings were equipped for manufacturing aircraft on an experimental basis and work began almost immediately on trainer design intended to be used at a flight school run by the Wright Field Co. in Dayton. The Dayton field would be designated North Field and would later become McCook Field after the U.S. Army took it over during WWI. Louis C. Luneke was the design engineer, in consultation with Orville Wright, and the layouts are thought to have been prepared in an office of the City National Bank Building owned by the Talbotts. Parts for two aircraft were fabricated in the woodworking shop in building D4 and assembled in D3 under the direction of Harvey Geyer, Jim Jacobs and Charles Nellis, all former employees of the old Wright Company.

Only eight weeks were required between the initiation of design and the completion of the first aircraft, which was rolled out in the late spring of 1917. Harold Talbott Jr., now president of the Dayton-Wright Airplane Co., designated this "first shot" of the company the "FS," with the first machine being called the FS-1. The design was never intended to be mass produced, but more of a special purpose machine that also served to help organize the company. It would soon be joined by its sister ship, the FS-2, and both were used for flight training at North Field where Howard Rhinehart and Archie Freeman were instructing students for the Wright Field Co. The aircraft would remain there until they were forced out when the Army took over the field in late 1917. Both ships appear to have been returned to South Field at that time and used as test beds for engineering development until Dayton-Wright could substitute DH-4s and J-1s for this purpose. One was eventually sold to a private individual named Hinkley. The records on the disposition of the other one have been lost.

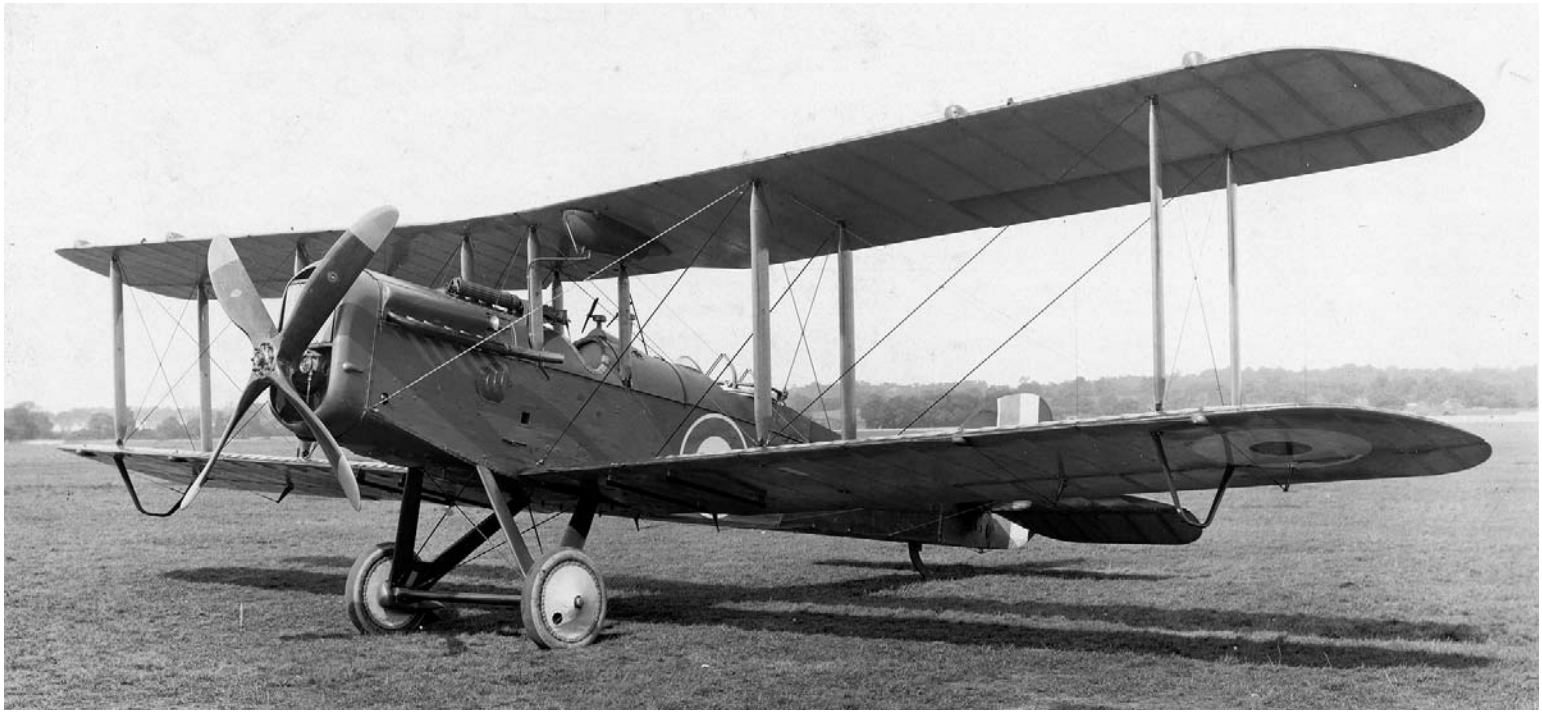
Gearing up for War

Deeds would be reassigned from the Aircraft Procurement Board in August 1917, being appointed Acting Chief of the newly created Equipment Division of the Signal Corps, a position that became permanent on August 24. The primary mission of the Equipment Division was to oversee the production of the thousands of aircraft and engines required for the war effort, and to see them supplied as quickly as possible. He had an initial budget of $350 million to accomplish this objective. In this capacity, Deeds was able to direct the award contracts. His selection of newly established Dayton-Wright sizeable contracts over other existing aircraft manufacturers would cause hard feelings and eventually lead to a congressional investigation. In retrospect, when one examines what was accomplished in so short a period of time by Dayton-Wright, one comes to the conclusion that Deeds had unusual foresight in his selection because it is doubtful that any of the existing airframe manufacturers would have had the talent, resources and connections to gear up as quickly.

Dayton-Wright received their first government contract on August 1, 1917, to build Standard J-1 training planes. This contract was superseded on September 7, which expanded it to include 400 Standard J-1 planes, 1,500 Martinsyde planes and 2,000 de Havilland DH.9s. This second contract was quickly replaced by a contract that eliminated the Martinsyde planes and replaced the DH.9s with DH-4s, ultimately resulting in an award to produce the 400 J-1s and 4,000 DH-4s.

Dayton-Wright needed larger manufacturing facilities in order to fulfill these orders, much more than their existing experimental shops located at South Field. Deeds and Kettering arranged the acquisition of a new manufacturing plant owned

The Standard J-1 production line at Dayton-Wright's Plant 1 in Moraine, Ohio. (Photo courtesy of Special Collections and Archives, Wright State University, MS152-193)



The DH-4 was based on a de Havilland design, modified to access a heavier, more powerful Liberty engine. Dayton-Wright would build over 80 percent of all the 3,800-plus DH-4s that were built during WWI. (USAAC photo from the author's collection)

by the Domestic Engineering Co. located about a mile from South Field in Moraine, Ohio. The plant had been constructed to build the Delco Light generation units developed by Kettering as a reliable, low-cost electrical generator for farms and organizations that were "off the grid." With the war effort now underway, there was no pressing need for this product and they were able to quickly convert the facilities over to aircraft production. Initially, the building measured 1350 feet in length and 270 feet wide. This would become Plant 1 of the Dayton-Wright Co.

War Production

In August 1917, de Havilland delivered to Dayton-Wright a DH-4 as a sample plane along with engineering drawings required for production. Because the U.S.-built DH-4s would be powered by the heavier "Liberty" engine,[3] it was necessary to modify the original design including lengthening the fuselage. Orville Wright was a consultant in this activity and, according to him, he spent most of his time trying to prevent changes that diverged from the original design. Less than three months later, on October 29, 1917, the first Dayton-Wright DH-4 was completed and flown. This plane was painted yellow and retained by Dayton-Wright as test aircraft, becoming known as the "Canary."

As manufacturing rates grew, the need for more space matched pace, sometimes not quite as fast as was needed as photographic evidence suggests. Plant 1 was expanded and additional warehouses and specialized facilities (wood drying operations for example) were constructed at the site. Two additional factory sites were acquired to meet production requirements. One was 100,000 square feet in Miamisburg, Ohio, (about eight miles from Plant 1) and designated Plant 2. This factory was used for manufacturing propellers, wires, landing gear and rear fuselages. Plant 3 was created with the acquisition of the former Wright Co. factory on West Third Street in Dayton where metal fittings were produced and all emergency work was performed.

NCR, Delco and Dayton Metal Works were involved as suppliers to Dayton-Wright. Carl Beust who was head of NCR's Patent Department during the life of the Dayton-Wright Co. recalled:

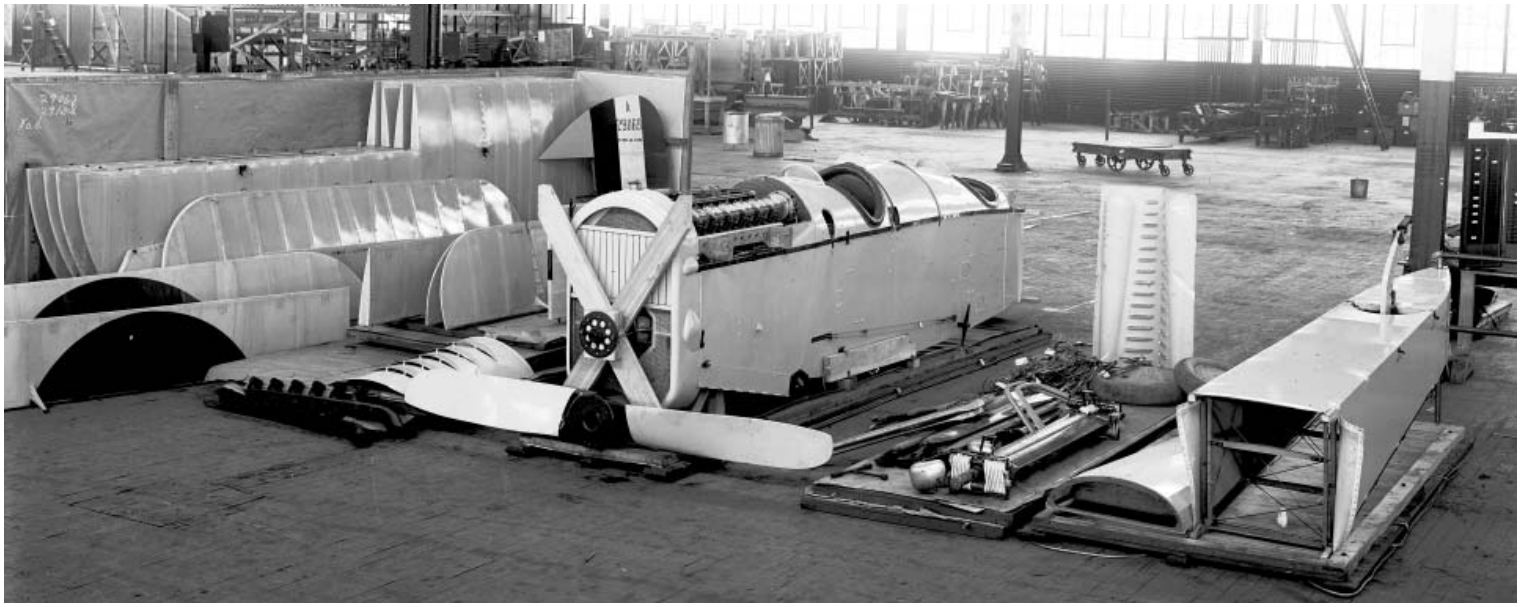
> "NCR made metal fittings on those planes," Mr. Beust said. "In addition, it made ailerons, rudders and elevators for the *Jennies*."
>
> He recalled that NCR needed aluminum to make 200 airspeed indicators, but couldn't get raw materials. Undaunted, NCR bought aluminum pie plates and, on a roller specially designed by NCR for the job, rolled the material to the thickness specified for hands on the indicator dials.
>
> "The military wanted the instruments right away, "Mr. Beust noted. "We scoured the country to find a watchmaker who could make them. Found him in Hartford, Conn., working in his home."

At its peak, Dayton-Wright employed over 8,000 workers.[4] They were an equal opportunity employer with women making up many of the departments associated with fabric coverings – the WWI equivalent to "Rosie the Riveter."

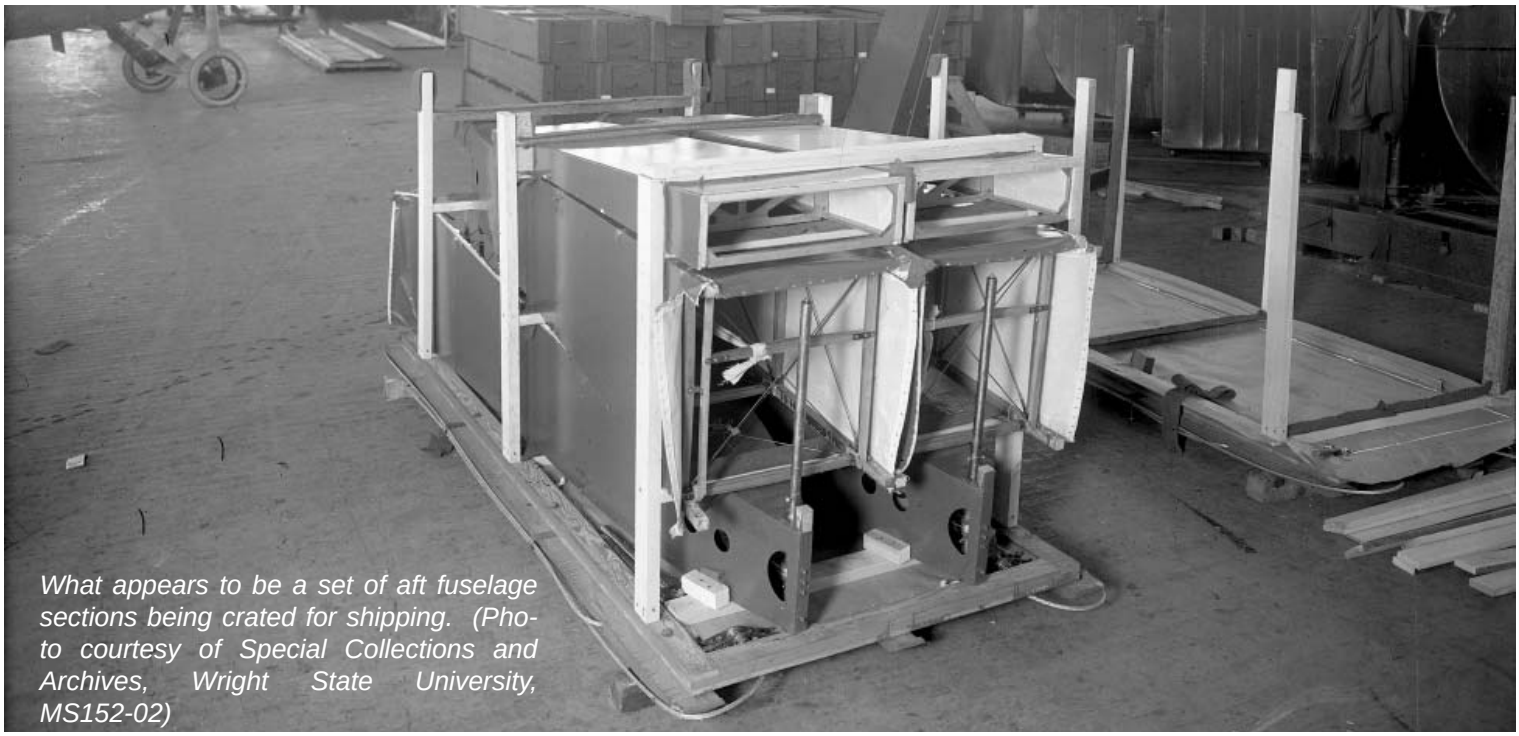
South Field had two separate areas with runways and hangars about a quarter mile apart. These areas were designated the experimental and production areas. The experimental area was originally part of Deeds' property and personal airstrip.

Above*: Dayton-Wright was consuming so much aircraft grade lumber that they built their own dry kiln for processing it. This reduced cost and assured a ready supply of material.* **Upper Right:** *As manufacturing geared up, it often out-paced the facilities construction as seen here with the DH-4 line being gradually covered.* **Upper Middle:** *Dayton-Wright employed a large number of women on their production lines performing duties not only fabric related, but slicing control cables and even working as mechanics. (While difficult to tell in this picture, careful examination of an enlargement shows that these are all women) With production rates of over 30 aircraft a day, the engine department was constantly receiving, preparing and moving Liberty engines to the production line. Here we see about two dozen Liberty engines being prepared for installation.* **Lower Middle:** *Women working on fabric covering of wing panels for the DH-4.* **Lower Right:** *Dayton-Wright was trying to plan ahead. Here we see a number of model builders in the design engineering department working on various concepts including the FP-2, RB-1, OW-1 and two unidentified models.* **Lower Left:** *Female employees attaching fabric to the skeleton of an aircraft wing. (All photos courtesy of Special Collections and Archives, Wright State University, in order MS152-009, -155, -124, -101, -187, -107)*

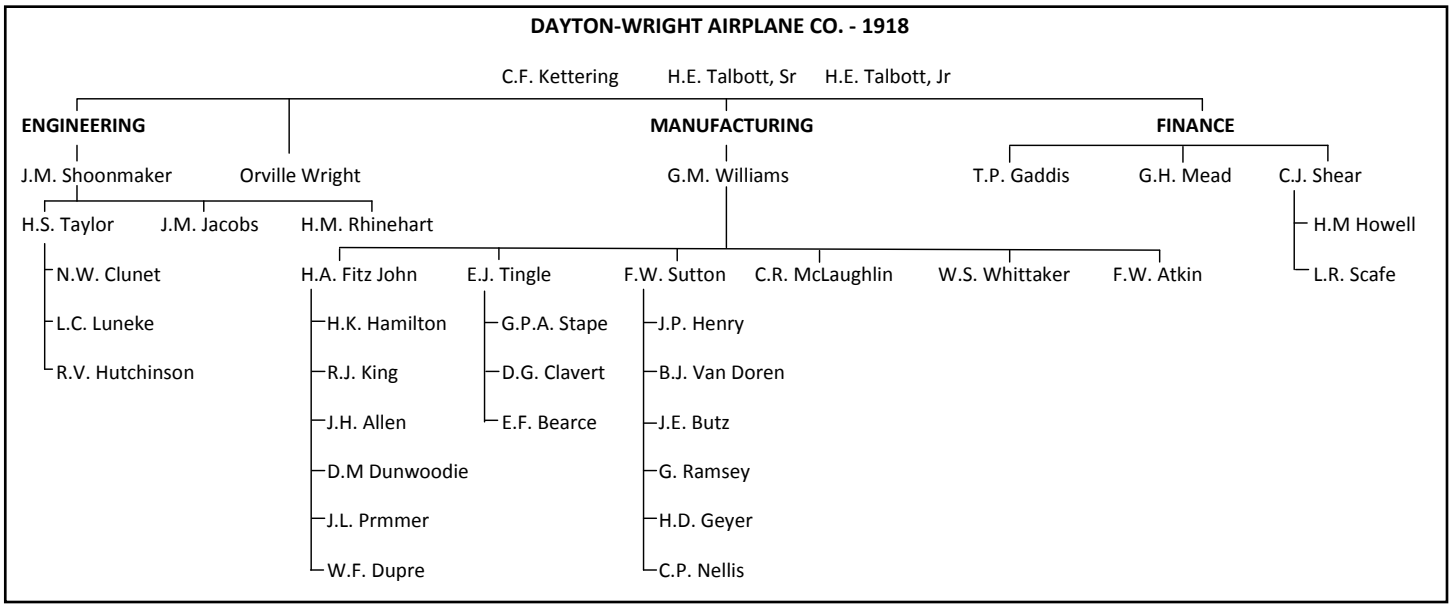
Approximately 150 completed DH-4 fuselages arranged on South Field. At the height of production, this represents about five days of production by Dayton-Wright. (Photo courtesy of Special Collections and Archives, Wright State University, MS152-53)



A DH-4 laid out on skids for final crating for shipping. (Photo courtesy of Special Collections and Archives, Wright State University, MS152-97)



What appears to be a set of aft fuselage sections being crated for shipping. (Photo courtesy of Special Collections and Archives, Wright State University, MS152-02)



The planes were built on the production (west side), military equipment such as the machine guns were installed and "bore-sighted" in a target area in the rear of the plant. Howard Rhinehart and a small crew of mechanics took care of the experimental work, and Archie Freeman and Bernard L. Whelan handled the production testing. Mechanical defects and poor workmanship, in which case the ship had to be rebuilt, or at least the defective part corrected, were reported back to production engineering.

The initial 200 aircraft were each flight tested, but with production rates of over 20 aircraft a day, there was neither enough time nor pilots to test every aircraft before they were crated for shipment to Europe. The Army agreed to a schedule by which about eight out of 20 aircraft were tested to ensure good workmanship. The Army contracting officers oversaw the selection of the test ships to assure a random sampling and were responsible for overseeing the disassembly of these ships after testing – all as part of the quality control process.

Production testing was not without its hazards with the reliability of the Liberty engines being one of the prime concerns. The engines had a propensity to stall or lose power on takeoff forcing an abortive landing back on the field when possible. On June 27, 1918, Archie Freeman was killed in a crash on the third flight of a ship that was losing power at about 50 feet of altitude. He twice successfully performed a 180-degree turn to land back on the field. After the mechanics checked the aircraft over for the third time he made another attempt that ended with catching a wing in the turn and slamming into the ground after losing power. Freeman died of injuries suffered when his head struck the instrument panel. Post-crash examination determined that the engine stalling had been caused by the carburetor jets being plugged by bits of rubber. The fuel had come from Air Service's stores and was subsequently treated with suspicion.

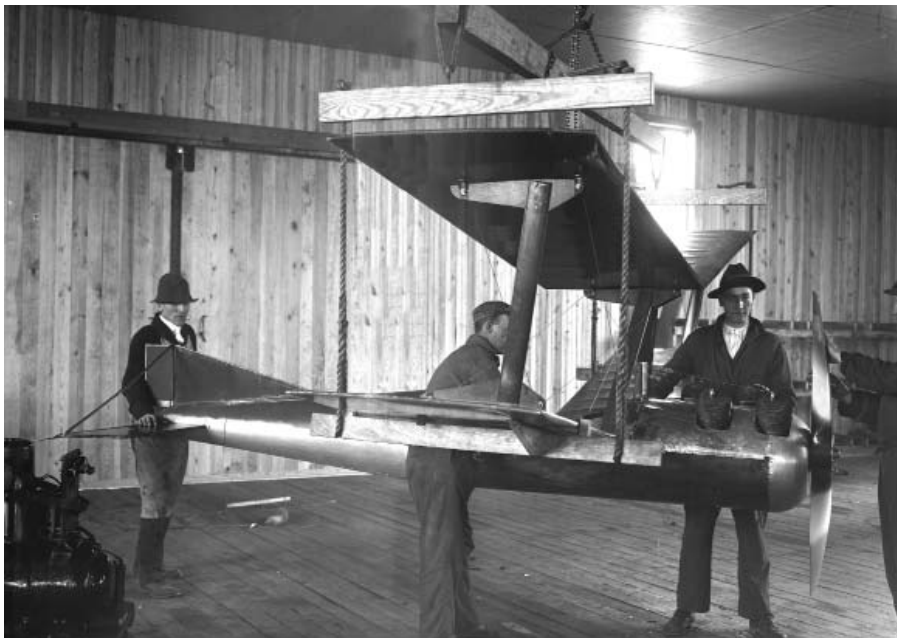
Dayton-Wright began to crank out the aircraft. The 1,000th DH-4 rolled out of the factory in early July 1918, less than 10 months after the first. By then, production rates were approaching 40 planes a day. A total of 3,846 DH-4s would be produced by Boeing Airplane Co., Dayton-Wright Airplane, the Fisher Body Corp. and the Standard Aircraft Corp. by the end of the war, with 1,885 being delivered to France. With the signing of the armistice the War Department ordered Dayton-Wright to cease production at 3,500 aircraft. All total, Dayton-Wright would produce 400 Standard J-1s and 3,106 DH-4s – or 80 percent of all DH-4s produced.

Other Wartime Aircraft

Dayton-Wright maintained an active experimental design during the war that was involved not only with modifications to the license-built designs, but with original new designs. None of these would have a significant impact on either the war effort or lead to postwar opportunities.

The most famous of these, a Dayton-Wright first, was the development of the Liberty Eagle, better known as the Kettering "Bug." This design was intended to be a low-cost, long-range aerial bombardment weapon designated an "aerial torpedo." The military cannons of the day had a maximum range of about 20 miles. The Bug was targeted to deliver about 200 lbs of

The 1,000th DH-4 rolled out of the factory less than 10 months after the first one. (Photo courtesy of Special Collections and Archives, Wright State University, MS152-139)



Workers moving a fully assembled Kettering "Bug." (Photo courtesy of Special Collections and Archives, Wright State University, MS152-139)

high explosives at a range of 75 miles and at a cost equivalent to firing one eight-inch artillery shell – about $400.

An initial order for 25 set the development in motion. The design consisted of a fuselage made from wood laminates and paper mache while the wings were cardboard. Power was supplied by a 4-cylinder 40-hp De Palma engine built by Ford for about $40. The system was designed to fly a specified distance determined by counting engine revolutions. At a predetermined number, the engine was cut, wing attachment bolts were slipped separating the wings and the fuselage/bomb would make a ballistic dive to the "target."

The first attempted flight was made on October 2, 1918, and is described by Roland V. Hutchinson, a Dayton-Wright engineer in his unpublished remembrances, "Skylarking." He recounts the occasion as follows:

> "A small "doghouse" had been erected, open on two sides, in the northeast corner of South Field. This shielded the "Bug" from the eyes of the profane and the *hoi polloi*. South-southwest from it stretched the track. Inside the doghouse, on the launching car, sat No.1. The Delco Light chugged away. The gyro whined increasing loud. The fuel tank was filled plumb full but no simulated payload was carried. A short hop, inside the field, was intended, the air log set for l/2 mile range only. The time - about 5:15 p.m. on a fine summer evening. Everything checked. In the light breeze the air log idled over. It was of the first type and had no locked out of action. So, realizing the short flight contemplated might be unduly curtailed, one of the mechanics, Maxwell, tied the log up to the interplane strut with his handkerchief, to temporarily halt its rotation.
>
> The gyro was up to speed and the prop snapped over, the engine took and ran up without undue balking and was warmed up.
>
> The moment arrived!
>
> The brake was off and away down the track she started . . . . with the air log still tied up tight. Flying speed was attained, she lifted from the carriage and started to climb. The carriage stopped per schedule.
>
> Score? Goldberg 100% so far!
>
> But - she climbed steeply to 125 or 150 feet, whip stalled and dove for the ground. The big dihedral seemingly prevented a spin. Some feet from destruction, she pulled out sharply, clearing the ground some five or six feet and climbed not so steeply, stalled again and nosed over gently to about 25 feet and then went into a gentle climbing turn. All these things occurred in a matter of seconds. The distance covered by all less than 400 yards. A stable flight condition had been attained and nothing new could be done but wait and see what happened. After 30 minutes she was still going strong, had described three big circles a few miles in diameter and was disappearing behind a patch of clouds estimated at 10,000 feet or so up, and somewhat northeast of the starting point, evidently over the southeast corner of Wilbur Wright Field.
>
> Noticing its drift in this general direction, we called Wilbur Wright Operations to keep an eye on our baby, and they reported her drifting in big circles toward Xenia, Ohio, though by now she was out of sight to us. A search party started by car, given the lead furnished by Wilbur Wright Field. At last a farmer was found who saw the job crash in a field alongside the road along that he was driving his wagon home. The wings fluttered down some hundreds of yards away.
>
> The farmer sought the pilot and found none. Jim Jacobs told him the pilot had parachuted out, hurt his ankle and was in the hospital.
>
> The parts were brought in for examination and so ended the first flight. As a memento of the occasion, Mrs. Schoonmaker was presented with a walking stick made from the broken propeller of this sample."

While innovative, the Kettering Bug suffered from inadequate technology associated with aerodynamics, autopilots, and guidance systems. Of 24 attempted flights, only eight could be considered successful. It is unclear that any of these flights actually terminated anywhere near the intended target. Due to the problems associated with launch and targeting, the Army wisely decided to not deploy any Bugs to the front lines. They did continue investigating unmanned aerial weapons and a version of the Bug would be resurrected in the early stages of WWII.

There seems to be some confusion regarding whether or not Dayton-Wright ever created a manned version of the "Bug," as well as the real intent behind the development of the "Messenger." Considering the design of the "Bug" and its relatively inexpensive cost and construction, it is unlikely that the company would have risked putting a human into the

The Dayton-Wright T-4 Messenger was developed as an engine-test platform, though it was given a cover story that persists to this day. (Photo courtesy of Special Collections and Archives, Wright State University, MS152-131)

craft for flight testing. Add to that the project was secret and having a strange looking craft tooling around the skies would have raised questions that no one really wanted to have to explain. They were, however, faced with a dilemma of how to adequately test the powerplant. With a lack of recording instrumentation there was a need to flight test the engine under conditions that provided feedback regarding various settings.

The solution was for the team to cobble together the "Messenger" as an engine test-bed. The cover story, which has helped create the confusion, was that the craft was intended as a light observation plane and could also fulfill a role similar to the motorbike equipped messengers that operated between the front lines and command sites. According to sources, the plane had marginal structural integrity and was equipped with a cheap two-cycle engine that had a design life of three to four hours maximum.

The cover story worked perfectly – persisting even until today.

Dayton-Wright engineers also performed a number of modifications to the DH-4 basic airframe to serve specific purposes. Ambulance version for the U.S. Navy with an extended turtle-deck that was capable of transporting a stretcher case; a day plane for the U.S. Post Office in which the front passenger area was converted to a cargo area (similar to the later Boeing DH-4M of the mid-1920s), and a two-passenger enclosed cockpit version nicknamed the "Honeymoon Express" are all examples of this type of modification.

Dayton-Wright was proud of its organizations and capabilities. Among their achievements during the war were:

- The first American-built battle plane was turned out by this company.
- The first planes this country sent to France were made in and shipped from their factory in Dayton.
- They shipped over 80% of all the American-built battle planes that ever reached the Front.
- The Dayton-Wright Airplane Co. produced more planes per day than any other plant in the world!

Postwar Period

Deeds, Kettering and the Talbotts were hoping to capitalize on a postwar aviation boom, but as shrewd business people they recognized that there was not an established market demand for aircraft. They wisely sold their interest in Dayton-Wright to General Motors (GM), purportedly for $100,000 in GM stock. Kettering would transfer over to the General Motors Research Corp., which he headed until his retirement in 1947. Talbott Jr. remained as president of Dayton-Wright, and Deeds moved on to new ventures.

All government contracts were immediately cancelled with the end of the war, leaving many aircraft manufacturers scrambling for business to remain open. There was no existing public demand for personal aircraft and war surplus planes ate quickly into what demand there was. Most of the established airframe manufacturers realized that commercial transport was the most opportune area to exploit and began designing aircraft to meet this need. Dayton-Wright headed in this direction as well. By 1920 they were offering three designs, two of which were early cabin-class aircraft. The KT Cabin Cruiser was based on the DH-4 design with a widened fuselage allowing for side-by-side seating of four in an enclosed cabin and was offered at the bargain price of $5,500. The OW-1 was a new cabin-class design with seating for four. This aircraft was designed by Orville Wright and represents his last aircraft design, thus the OW designation. Bernard Whelan would pilot this plane to an altitude record of 19,710 feet while carrying three passengers in 1920. The last design has been identified a "Nine-Hour Cruiser," which was open cockpit and had greater speed. This model may have been the "Bull Head" of which little technically is known.

The company set up a flight school on South Field to assist buyers in learning to fly their new purchases. With the field's proximity to the factory, students were afforded the opportunity of learning how the aircraft were built as well as flying them. Lessons consisted of a combination of ground instruction and training flights. The basic course fee was $450, and for students supplying their own plane the fee was reduced to $250. Those buying a plane from the company were provided free instruction.

Dayton-Wright also engaged in government contracting during the period immediately following the war. The Engineering Division at McCook Field contracted with them to build a modified Bristol F2.B, that was designated the XB-1A. Primary modifications included construction of a lighter all-wood monocoque fuselage and installing a 330-hp Wright-Hisso H engine. Dayton-Wright would build a total of 40, of which two were delivered to the U.S. Navy for testing. They also built 11 Douglas DT-2s under contract for the Army in 1922, and later modified another three that had been built by L-W-F. These planes carried the factory designation of SDW-1.

In the specialty design area, Dayton-Wright built a number of unique aircraft. Possibly the most notable and significant was the RB-1. Dayton-Wright built this unique racer to

Left and Above: *The KT Cabin Cruiser was a DH-4 derivative seating four in an enclosed cabin. (Photos courtesy of Special Collections and Archives, Wright State University, MS152-209, MS152-211)*

Dayton-Wright modified at least one DH-4 into a three place ship - two passengers, one pilot. The passengers rode in a cozy enclosed cabin and the plane became known as "The Honeymoon Express" as a result. (Photo courtesy of Special Collections and Archives, Wright State University, MS152-145)

The OW-1 Aerial Coupe was the last aircraft designed by Orville Wright. Featuring an enclosed cabin, this four-place design set an altitude record of 19,710 feet on May 22, 1921, with D-W test pilot Bernard L. Whelan at the controls and three passengers on board. Seen here during construction with Bernard Whelan sitting in the pilot's seat and two unidentified people in the passenger seats. (Photo courtesy of Special Collections and Archives, Wright State University, MS152-208)

The RB-1 was revolutionary in design featuring retractable landing gear, a fully cantilevered solid-core variable-camber wing and full monocoque enclosed fuselage - features that would not regularly be incorporated in designs for another 10 years. Though it failed in the only race it was entered in, the plane still "caught the eyes" of many in the industry. It survives today on display at the Henry Ford Museum in Dearborn, Michigan. (Photo courtesy of Special Collections and Archives, Wright State University, MS152-207)

compete in the 1920 Gordon Bennett Race. The unique features about this aircraft were its retractable landing gear (first to fly in the U.S.), a completely enclosed cockpit, one of the first fully cantilevered wing designs and one of the first aircraft to have variable camber wings. Orville Wright developed the cambering wing design while the overall design was handled by Milton Bauman and Charles Grant. Powered by a 250-hp Hall-Scott L-6, this plane was capable of speeds approaching 200 mph. Howard Rhinehart was the pilot, but was forced to drop out of the competition due to a mechanical failure. This ship caught the eyes of the Army's Engineering Division that ordered three XPS-1s (Pursuit-Special Alert) that were based on the RB-1. Unfortunately, while different engines were tried, the design had poor performance due to being underpowered and nothing further came from it.

Another specialty aircraft, and the only twin-engine design built by Dayton-Wright, was the FP-2 (Forest Patrol, twin-engine). This four-place cabin biplane was acquired for Canadian operations. It was powered by two 420-hp Liberty 12 pusher configured engines. The upper and lower wing panels were interchangeable. Only a single unit was produced.

Dayton-Wright's "Chummy," a two-seat side-by-side cockpit design, was developed initially for the civilian training market. Only two were built and the company was unable to generate interest, but the design did serve as a basis for a series of design variation as possible replacement to the Army's Curtiss JN-4Ds. These became the TA-3 (13 planes), TA-5 (one plane) and TW-3 (3 prototypes by D-W and 20 built by Consolidated). The TA-5 was modified at McCook Field to evaluate operating with a single main landing gear. This design also became the basis for the Consolidated PT-1 series based on the TA-3/TW-3.

Dissolution

By 1923 General Motors had lost interest in the aviation business. They decided to close Dayton-Wright and liquidate the assets to re-coop some of their investment. Howard Rhinehart

Another photo of the RB-1 undergoing a negative 12-G (guys) stress test. The men standing on the wings are listed from right to left: Howard M. Rinehart, James M. Jacobs, J. P. Henry, Harvey D. Geyer, Bernard L. Whelan, Wallace S. Whittaker, Thomas Midgley Jr., J. H. Hunt, Milton Clement Baumann (chief designer), Harold E. Talbott, G. M. Williams, and Charles F. Kettering. The RB-1 was also known as the Dayton-Wright Racer. (Photo courtesy of Special Collections and Archives, Wright State University, MS152-217)

The side-view of the fuselage of the Dayton-Wright XB-1A at the Dayton-Wright Airplane Company in late 1921. The fuselage has the front cockpit installed and the engine with propeller. A fixed machine gun is attached by the pilots cockpit and it has an Aldis gun sight. Another machine gun is attached to the Scarff ring of the second cockpit. The fuselage is in a small room enclosed by opaque glass walls. (Photo courtesy of Special Collections and Archives, Wright State University, MS152-206)

An XB-1A at McCook Field. (Photo from the author's collection)

and Bernard Whelan acquired the rights to the Chummy, KT Cabin Cruiser and OW-1 that were marketed for a time under the Rhinehart-Whelan name. Ruben Fleet acquired the right to the TA-3/TW-3 family developing a successful trainer that would supplant the Curtiss JN-4Ds and allow him to build Consolidated Aircraft from this basis. Thomas Morse would also acquire some of the Dayton-Wright assets, but the specifics of these remain undefined.

An attempt was made to interest the Engineering Division at McCook to take over the Dayton-Wright facilities at South Field (Plant 1). The government had already sizable capital improvements invested in both the plant and field, and was looking for a replacement for the cramped and restricted space at McCook. This was not to be, with Wright Field east of Dayton eventually winning this selection.

With the dissolution of the company by GM, Dayton-Wright Airplane Co. passed into history.

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Endnotes

1 Martin would divest his interest in the company by the end of 1916. The engine manufacturing group would become the Wright Engine Co. that would be eventually acquired by Glenn Curtiss, forming Curtiss-Wright. This must have seemed somewhat ironic to Orville Wright after his long and bitter patent battles with Curtiss.

2 Harold E. Talbott Jr. involvement with aviation started with the Wright Brothers and remained throughout his career. In the early 1930s Talbott served as chairman of North American Aviation and was a director of TWA. At the time North American held shares in Douglas Aircraft Co. that was building military aircraft. Talbott prevailed on Donald Douglas to enter the commercial market by building the DC-1 and DC-2 aircraft to TWA's specifications. In 1953, he became the third Secretary of the Air Force where he was instrumental in the selection of Colorado Springs, Colo., as the site of the Air Force Academy and enhancing the living conditions and pay for Air Force personnel, thus improving retention rates.

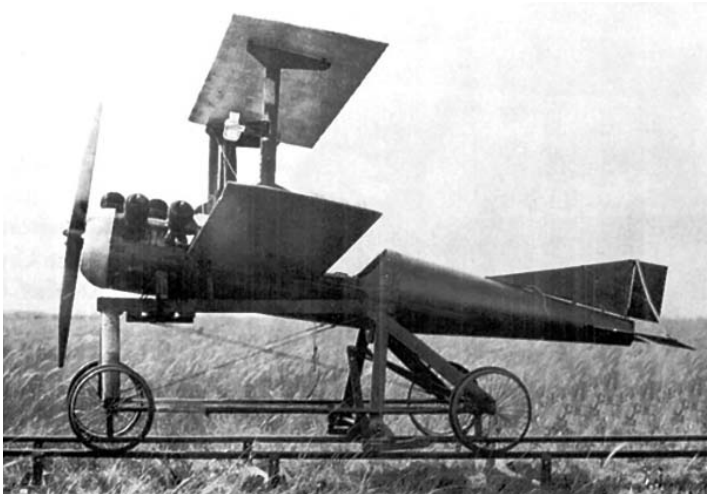
3 Edward Deeds, in his capacity as head of the Aircraft Production Board, called Jesse Vincent (Packard Motor Car Co.) and E.J. Hall (Hall-Scott) together on May 29, 1917, at his suite in the Willard Hotel in Washington. He asked the two to stay until they produced a set of basic drawings. After just five days, Vincent and Hall left the Willard with a completed design for the new engine.

4 Some sources state a figure as high as 12,000 employees for the peak number.

Dayton-Wright Aircraft Specifications

XB-1A: British Bristol F.2b redesigned with a lighter, all-wood monocoque fuselage under contract from USAAS' Engineering Division at McCook Field. Year of Manufacture (YOM) – 1920. Design: 2-place, open cockpit, biplane. Population 40.

Length:	25 ft 5 in
Span:	39 ft 4 in
Gross Weight:	3,791 lb
Power:	330-hp Wright-Hisso H
Vmax:	121 mph
Vcruise:	101 mph
Vstall:	? mph
Range:	495 miles



Bug: The Kettering Aerial Torpedo YOM – 1917. Population: 25.

Length:	15 ft 0 in
Span:	12 ft 0 in
Useful Load:	180 lb warhead
Power:	37-hp De Palma V-4
Vmax:	? mph
Vcruise:	?
Vstall:	? mph
Range:	75 miles

Bull Head: A Hisso-powered aircraft about which little is currently known. Design: 2-place, open cockpit, biplane. YOM – ca.1918. Population: 1.

Length:	?
Span:	?
Useful Load:	?
Power:	100-hp Hall Scott A-7
Vmax:	68 mph
Vcruise:	?
Vstall:	38 mph
Range:	?

Chummy: Trainer design developed to replace the Curtiss JN-4D, and evolved into the TA-3, TA-5, TW-3. Design: 2-place, open cockpit, biplane. Population: 2.

Length:	21 ft 11 in
Span:	31 ft 0 in
Useful Load:	604 lb
Power:	80-hp LeRhone rotary
Vmax:	84 mph
Vcruise:	?
Vstall:	?
Range:	210 miles

DH-4: Licensed production of the British DH-4 with Liberty engines in place of Rolls-Royce for civilian and military use. DH-4B-5 (or -4K) with supercharged Liberty was nicknamed the "Honeymoon Express" for its cozy cabin for two. YOM - 1917. Design: 2-place, open cockpit, biplane. Population: 3,106.

Length:	38 ft 8 in
Span:	43 ft 4 in
Gross Weight:	3,472 lb
Power:	400-hp Liberty 12
Vmax:	143 mph
Vcruise:	?
Vstall:	?
Range:	470 miles

DT-2, SDW-1: Douglas DT-2s built under contract. YOM – 1922. Design: 2-place, open cockpit, biplane on floats. Population: 11.

DWH-4 Blue Bird: A trainer based on the DH-4 with enlarged fuel tanks and produced in small numbers for the Army. YOM – 1920. Design: 2-place, open cockpit, biplane. Population: 2.

FP-2: Built for forestry patrol in Canada, with a triple tail and interchangeable upper and lower wings. YOM – 1921. Design: twin-engine, 4-place, cabin, biplane on floats. Population: 1.

Length:	36 ft 10 in
Span:	51 ft 5 in
Useful Load:	1862 lb
Power:	2 x 400-hp Hall-Scott L-6; latter 2x 420-hp Liberty 12 pushers
Vmax:	120 mph
Vcruise:	?
Vstall:	63 mph
Range:	325 miles

FS-1, -2: "First Shot," both nearly identical and targeted at civilian flight training market. YOM – 1917. Design: 2-place, open cockpit, biplane. Population: 1 each.

Length:	?
Span:	?
Useful Load:	?
Power:	100-hp Hall Scott A-7
Vmax:	68 mph
Vcruise:	?
Vstall:	38 mph
Range:	?

J-1, -2: Standard J-1 produced under license for wartime production. YOM – 1917. Population: 400.

Length:	26 ft 2 in
Span:	43 ft 10 in
Gross Weight:	2,025
Power:	100-hp Hall Scott A-7
Vmax:	68 mph
Vcruise:	64 mph
Vstall:	38 mph
Range:	350 miles

KT Cabin Cruiser (Limousine): A modification of the DH-4 airframe to create an enclosed cabin for four people. YOM – 1921. Design: 4-place, cabin, biplane. Population: 4.

Length:	30 ft 2 in
Span:	43 ft 8 in
Gross Weight:	4,128 lb
Power:	400-hp Liberty 12
Vmax:	120 mph
Vcruise:	100 mph
Vstall:	55 mph
Range:	700 miles

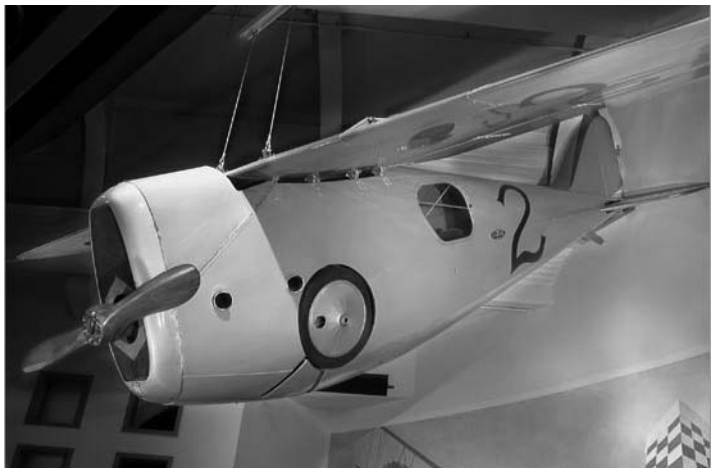
OW-1 Aerial Coupe: "First Shot," both nearly identical and targeted at civilian flight training market. YOM – 1919. Design: 4-place, cabin, biplane. Population: 1.

Length:	29 ft 9 in
Span:	48 ft 0 in
Gross Weight:	2,492 lb
Power:	150-hp Wright-Hisso A or Packard 8
Vmax:	85 mph
Vcruise:	?
Vstall:	40 mph
Range:	500 miles

OW-1 Aerial Coupe

PS (XPS-1): Fighter designated as a Pursuit-Special Alert was the military's first retractable gear aircraft. Design was based on the RB-1. YOM – 1922. Design: 1-place, open cockpit, high-wing monoplane. Population: 3.

Length:	19 ft 2 in
Span:	30 ft 0 in
Gross Weight:	1,175 lb
Power:	200-hp Lawrance J-1, last two with 200-hp Wright E-4
Vmax:	145 mph
Vcruise:	?
Vstall:	?
Range:	275 miles



RB-1 Dayton-Wright Racer: Specially designed Gordon Bennett racer featuring retractable landing gear, variable-camber cantilever wing and plywood-clad monocoque fuselage. YOM – 1921. Design: 1-place, cabin, high-wing monoplane. Population: 1 (currently in the Henry Ford Museum, Dearborn, Mich.).

Length:	22 ft 8 in
Span:	21 ft 2 in
Useful Load:	450 lb
Power:	250-hp Hall-Scott L-6
Vmax:	190 mph
Vcruise:	178 mph
Vstall:	64 mph
Range:	275 miles

T-4 Messenger: Developed as an engine test-bed for the Kettering "Bug." YOM – 1918. Design: 1-place, open cockpit, biplane. Population: 1.

Length:	17ft 6 in
Span:	19 ft 3 in
Gross Weight:	636 lb
Power:	37-hp De Palma V-4
Vmax:	85 mph
Vcruise:	? mph
Vstall:	35 mph
Range:	200 miles

TA-3: Trainer based on the Chummy with side-by-side seating. YOM – 1923. Design: 2-place, open cockpit, biplane. Population: 13.

Length:	22 ft 7 in
Span:	30 ft 11 in
Useful Load:	? lb
Power:	80-hp LeRhone (later 100-hp)
Vmax:	83 mph
Vcruise:	? mph
Vstall:	? mph
Range:	? miles

TA-5: Slightly larger TA-3 with larger engine modified for Engineering Division tests of single-wheel landing gear. YOM – 1923. Design: 2-place, open cockpit, biplane. Population: 1.

Length:	25 ft 8 in
Span:	34 ft 9 in
Useful Load:	?
Power:	220-hp Lawrance J-1
Vmax:	104 mph
Vcruise:	? mph
Vstall:	? mph
Range:	? miles

TW-3: Side-by-side cockpit design based on the Chummy that became the Consolidated TW-3/PT-3. YOM – 1923. Design: 2-place, open cockpit, biplane. Population: 3 prototypes by D-W and 20 by Consolidated, built by the Gallaudet factory in Rhode Island.

Length:	26 ft 9 in
Span:	34 ft 9 in
Useful Load:	707 lb
Power:	180-hp Wright-Hisso 1
Vmax:	103 mph
Vcruise:	?
Vstall:	?
Range:	300 miles

WA-1: YOM – 1922. Design: 2-place, open cockpit, biplane on floats built for the U.S. Navy. Population: 1.

Length:	34 ft 5 in
Span:	40 ft 9 in
Useful Load:	?
Power:	200-hp Wright E-4
Vmax:	110 mph
Vcruise:	?
Vstall:	?
Range:	?

WS-1: YOM – 1922. Design: 2-place, open cockpit, biplane on a single float built for the U.S. Navy. Population: 1.

Length:	34 ft 5 in
Span:	40 ft 9 in
Useful Load:	?
Power:	325-hp Wright H-3
Vmax:	110 mph
Vcruise:	?
Vstall:	?
Range:	?

XO-3: Unknown D-W with some confusion about this aircraft. May have been initially designed by D-W but was built by Wright Aeronautical after GM dissolved the company in 1923. YOM – 1924. Design: 2-place, open cockpit, biplane. Population: 1.