Missions for America
Semper vigilans
Semper volans!

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Issue 16.47 *14 December 2022*

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27 DEC-No Meeting
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Orville Wright, Age 9

"We were lucky enough to grow up in an environment where there was always much encouragement to children to pursue intellectual interests; to investigate whatever aroused curiosity."

SENIOR MEETING

14 December, 2022
submitted by 2d Lt Joanne Richards

Maj Farley briefed the squadron on assessing ice conditions for the ice patrol report to the U.S. Coast Guard.

He then joined with Capt Otrin and they described their recent tour of the USCG Sector Long Island Sound station in New Haven harbor. The station responsibilities were explained and a question and answer session followed

CADET MEETING

14 December, 2022
submitted by C/SrA Adam Balfour

Maj Roy Bourque presented an aerospace lesson in which he compared the Apollo rocket program with the ongoing Artemis missions. He used a model of the Saturn V launch vehicle to explain the use of the staged components and showed pictures of the Artemis rocket family.

C/2d Lt Aneleise Mazzulli explained the Mitchell and Eaker award to partially satisfy the requirements for promotion.

TRCS WINS COMMANDER'S CUP

The WinningThames River Team Cadets Nick Buchko, Mazzulli, Knets, and Stephen Buchko pose with Commodore Peter Jensen, USCGA. *(Credit: Maj Roy Bourque)*

The 15th CTWG Commander's Cup Rocket Competition was held at the Durham Fair Grounds on Saturday, December 10th. CATO, Connecticut's amateur rocket enthusiasts set up their launching equipment on a cold and rime ice coated field. Cadets prepared their rockets, passed a safety check and submitted them to judges for evaluation. Judging was done by Commodore Peter Jensen, USCG Auxiliary, former CTWG Commander and donator of The Cup in 2007 and George Planeta, retired lieutenant from the Meriden Fire Department and long time volunteer at CAP activities.

Squadron leaders were Lt Eric Testman from the 143rd, Lt Marc Delmonico from Stratford and Maj Roy Bouque, Lt Thornell and Mr. Knets from Thames River.

Entires were made in three categories, all of which counted towards the CAP Rocketry Badge requirements: A simple rocket decorated with a CAP theme, a more complex rocket bearing markings from actual military or civil rockets and multi-stage or load bearing rockets painted according to personal preference of the cadet.

Installing engines and parachutes and setting rockets on the launch platform. *(Credits: Maj Roy Bourque)*

A launching session followed during which not only our cadet rockets were fired but many sophisticated designs built by CATO members were launched.

An award ceremony followed. Cadets winners in each category were given prizes consisting of aerospace books or useful emergency services gear.

Roster of Winning Entries

Flight One

1st TIE
C/CMSgt Alexander Knets-TRCS
C/2dLt Aneleise Mazzulli-TRCS
2nd C/2dLt Matthew Fago-TRCS
3rd C/A1C Braydon Zalewski-143rd C.S.

Flight Two

1st C/CMSgt Nicholas Buchko-TRCS
2nd C/2dLt Srephen Buchko-TRCS
3rd C/SSgt Henry Silberger-Stratord

Flight Three

1st C/2dLt Matthew Fago-TRCS
2rd C/2dLtAnileise Mazzulli-TRCS
3rd C/SSgt Nicholas Scataglini-Stratford

Squadron Results

1st Thame River Composite Squadron
2nd Stratford Eagles Composite Squadron
3rd 143rd Composite Squadron

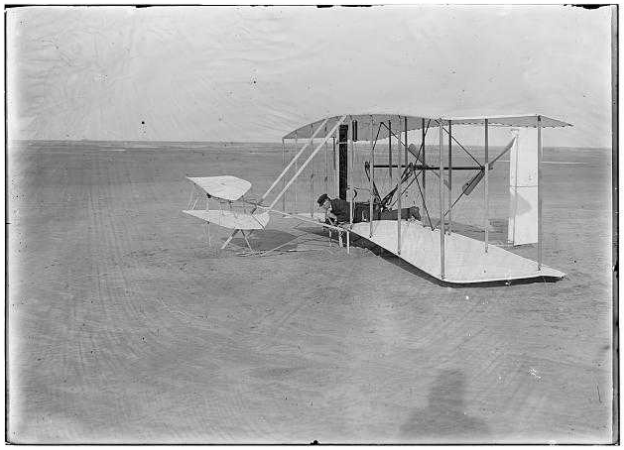
ACHIEVEMENTS AND TRAINING

Rocketry Badge Awarded

Lt Col Rocketto awarded C/2dLt Matthew Fago and C/2dLt Anelesise Mazzulli the brassard and badge emblematic of completing the CAP rocketry program.

AEROSPACE HISTORY

Dec. 14, 1903 – An impatient Wilbur Wright decides to eschew glider testing because they were behind schedule. The glider testing was planned to gain experience with the aircraft's handling and a decision was made to attempt powered flight. Wilbur underestimates the elevator sensitivity and pulls up, entering a stall three seconds after lift off and sliding to a stop 100 feet from the end of the launch rail. Minor repairs are necessary and the next flight attempt will occur on December 17th.



The end of Wilbur's very short hop. *(Credit: Smithsonian)*

Dec. 15, 1989 – KLM Flight 867, a Boeing 747-400 flying from Amsterdam to Anchorage flies through a cloud of volcanic debris from Mt Redoubt which had erupted a day earlier. The heat of the engine turns the ash into a glass-like substance which coats the inside of the engines, tripping the temperature indicators and causing an auto-shutdown of all four engines.

PH-BFC, on the ground. *(Credit: Alf van Beem)*

Captain Karl van der Elst and his crew succeeded in restarting the engines after losing 14,000 feet and made an emergency landing in Anchorage. After replacing the engines, windscreen, wing leading edges and electrical equipment, an 80 million dollar repair, the aircraft was returned to service.

Capt van der Elst and First Officers Imme Visscher and Walter Vurboorm (Credit: De Telegraaf)

Dec. 16, 1951 — Connecticut's own Kaman Aerospace flies the first helicopter, the Kaman K-225, powered by gas turbine engine, a Boeing 502. The aircraft was equipped with Charles Kaman's unique system of counter-rotating, intermeshing rotors which eliminate torque and he need for a tail rotor.

The aircraft was flown by William R. Murray, a former naval aviator who served as a Navy test pilot at NAS Patuxent River, and rose to the presidency of Kaman Aerospace.

Dec. 17, 2003 — Burt Rutan's "SpaceShipOne" becomes the first privately designed and manufactured manned aircraft to exceed the speed of sound. It was the 11th powered flight and flown by Brian Binnie.

A 15 second burn of the engine was used and all went well until landing when the left main gear collapsed causing minor damage.

Dec. 18, 1944 – Task Force 38 is operating in the Philippine Sea east of Luzon when Adm. William Halsey order it to turn into Typhoon Cobra. The 70 foot seas were whipped by 83 gusting to 93 knot winds. Three destroyers, *USS Monaghan, Spence* and *Hull* capsize, almost 800 men are killed and 146 aircraft are lost. Compare this aircraft loss with the 123 aircraft lost in the Battle of the Philippine Sea six months earlier.

USS Cowpens (CVL-25) rolling. (Credit: US Navy)

Task Force 38's combat effectiveness was seriously impaired. The bombardment operations of Luzon in preparation for the invasion were postponed and the fleet retired to Ulithi Atoll, the largest and busiest American naval base for repairs and rest.

A Court of Inquiry found that Halsey had made and "error in judgement committed under stress of war operations and stemming from a commendable desire to meet military requirements."

Dec. 19, 1928 – Harold Pitcairn flies a Cierva C.8W, the first autogiro flight in American at Willow Grove, Pennsylvania.The aircraft was purchased by Pitcairn for engineering studies preparatory to starting construction on his own line of autogiros.

C.8W [powered by a 225 hp Wright Whirlwind.
(Credit: National Air and Space Museum)

Dec. 20, 1928 – Australian explorer George Hubert Wilkins and Lieutenant Carl Eielson make the first sustained flight over Antarctica. They use a Lockheed Vega for the 10-hour flight. They flew from Deception Island in the South Shetlands across Graham land discovering several islands.

It was a busy year for the two high latitude adventurers and their Vega. In April, they had made the first flight over the Arctic Ocean, Point Barrow, Alaska to Norway's Svalbard Archipelago, a 2,200 mile, 20 hour jaunt.

Sadly, a year later, Eielson and his mechanic, Earl Borland were killed flying into terrain while trying to evacuate fur traders from their iced-in ship.
Wilkinson pioneered under ice submarine navigation in 1932 when he took the leased ex U.S. Navy submarine *O-12*, renamed *Nautilus* which became the first submarine to operate under the arctic ice. Wilkins died on November 30, 1958. On 17 March, 1959, the *USS Skate* became the first submarine to surface at the North Pole. Wilkins was memorialized and his ashes were scattered over the ice at the North Pole.

SPECIAL FEATURE

The Wright Bothers and the Craft of Engineering
by
Stephen M. Rocketto

Over 20 years ago, I got involved in a project tentatively titled "From Kites to the Wrights," a proposed interdisciplinary curriculum package for celebrating the centennial of flight in 2003. My involvement in this effort started in typical fashion. Gordon Schimmel, the Superintendent of Schools in Mansfield, CT called Ralph Yulo, Professor Emeritus of Education at Eastern Connecticut State University. He asked Ralph if he might recommend anyone and Ralph mentioned me.

I have always liked projects like this one. Even if they do not fulfill their expectations, enough good material can be garnered to make it all worthwhile. Besides, the collegiality and fellowship of the other participants buoys my spirit and brightens my dour disposition. But this project was a real bonus. My earliest memories are entwined with things aeronautical. Flying, model building, and studying the history of aviation has diverted me from the mundane, emptied my pockets, and enriched my soul. So I eagerly seized the

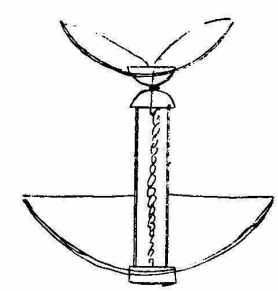
opportunity to minimize my sleep and complicate my life. Some people just cannot say "NO!"

One meeting led to another and the project has focused on developing a set of interdisciplinary modules centered on some sort of laboratory exercise or construction activity which is directly related to the experiences which Wilbur and Orville Wright underwent between 1895, when the first heard about the gliding experiments of Otto Lilienthal and 1905, when they produced the improved model of their 1903 Flyer.

Emulating the Wright Brothers, I entered into a bibliographical search of the literature which might assist me in producing one or two useful segments for the project. I was especially interested in the convergence of talents, social conditions, and technology which contributed to the Wright success in controlled, powered, manned, heavier than air flight; a goal which was eluding many notable scientists and experimenters.

Four books proved especially helpful. The first was Tom Crouch's biography of the brothers, *The Bishop's Boy's*. The second and third were Octave Chanute's *Progress in Flying Machines* and Orville Wright's *How We Invented the Airplane*. Both of these volumes were readily available in Dover Publications editions. The last book which I considered was Peter L. Jakab's *Visions of a Flying Machine* subtitled "The Wright Brother and the Process of Invention". This is another of the fine Smithsonian History of Aviation Series. The two historical reprints would serve as a "reality check" as I considered the theses offered by Crouch and Jakab.

Crouch develops a detailed and coherent narrative of the unusually close relationships among the Wrights, the father Milton, the sister Katharine, and especially, the youngest brothers, Wilbur and Orville. One of their favorite toys was a Penaud helicopter, a variation of the familiar rotor on a stick, which dances aloft when twirled by a sidewise motion of the hands or by the stored energy of a twisted rubber band. The 11 year old Wilbur tried, with little success to scale up this clever mechanism and exhibited a lifetime interest in building variations of this classic child's toy.



Orville's sketch of he Peanud helicopter.

The earliest business ventures of the brothers involved the construction and utilization of a series of printing presses and for a number of years, they were involved in the dual business of publishing and press manufacture. But in 1892, the bicycle craze swept into Dayton and they swiftly transitioned from riders to sellers, repairers, designers, and manufacturers of the safety bicycle. They outfitted a machine shop, designed their own gas operated power plant, and engaged in the production of high quality machines.

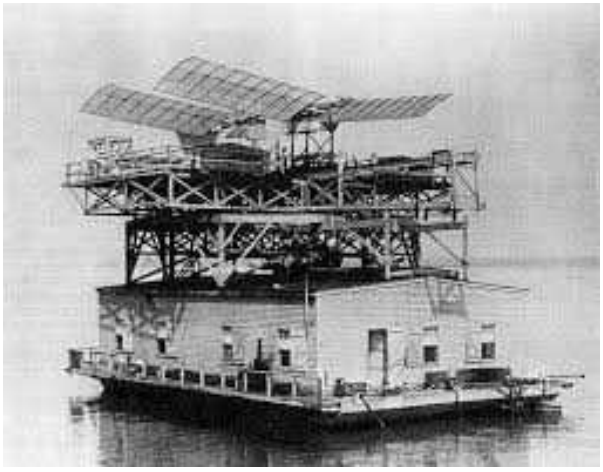
The original Wright Cycle Shop and one of their Van Cleve model bicycles.

As the last five years of the century played out, Wilbur started to exhibit an interest in heavier-than-air flying machines, initiated by reading about the experiments in gliding which Otto Lilienthal had been carrying out in Germany. Wilbur read Marey's *Animal Mechanisms* and started to consider the problems inherent in building a flying machine.

Lilienthal gliding from his artificial hill in 1896 (Credit: Robert W. Wood)

Both brothers were keen observers of animal flight and Orville stated that "If the bird's wing can sustain it in the air without the use of any muscular effort, we did not see why man could not be sustained by the same means." The use of the verb "sustain" indicates thinking beyond short glides, such as practiced by Lilienthal, to flights in which altitude is not constantly lost. They observed the wide variety of flying creatures and could not see any reason why, in principle, why many could not accomplish the same feat.

In 1899, the physicist Samuel Pierpont Langley was the leading experimenter in aerial enterprises in the United States. Langley, Secretary of the Smithsonian Institution and a scientist noted for his work in stellar astronomy had, in 1896, first flown a steam powered model and two years later, received a $50,000 grant from the U.S. Army for the development of a man-carrying version of what he called an "aerodrome."

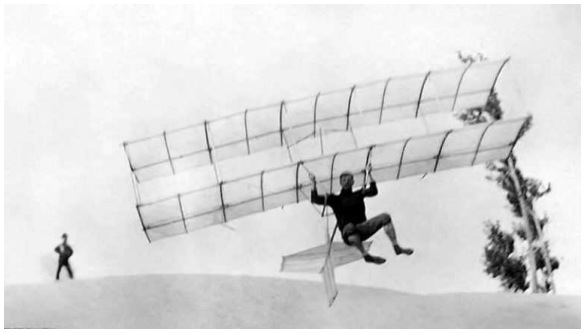


Langley Aerodrome on its launch barge on the Potomac River.On December 8th, a scant nine days before the Wright success at Kitty Hawk, Langley's final launch attempt failed and he withdrew from pursuing flight.

Wilbur wrote a letter to Richard Rathbun, Langley's assistant, requesting information on the current status of aeronautical science. Rathbun sent Wilbur a collection of pamphlets and a suggested reading list which included Octave Chanute's *Progress in Flying Machines*.

Chanute was a remarkable man with a national reputation as a surveyor of railroad lines, bridge builder and inventor. In 1888, Chanute retired and concentrated all of his attentions on a 30 year advocation, aeronautics. He compiled all of the experimental reports which he had collected during that time and published a series of articles which became the book *Progress in Flying Machines*. A perusal of this text reveals that he book is a comprehensive study of the research from Chinese kites and Leonardo da Vinci's ornithopter in 1500 to the 1890's trials of Hiram Maxim, Lawrence Hargrave, and Lilienthal.

But Chanute was not merely a researcher and archivist. He and his assistant, Augustus Herring, conducted over 2000 gliding experiments on the shores of Lake Michigan.



Chanute-Herring Biplane Glider

Research and experiment led Chanute to the conclusion that the development of a method for aircraft control was the key to practical flight. The Wright Brothers concurred. However, the eminent Langley and the inventive Maxim were convinced that the evolvement of a suitable power plant was the major problem to be solved. Furthermore, since most of the practitioners were doing their research with models, stability was a highly prized characteristic of any design.

The Wrights, taking their cue from Chanute and Lilienthal, eschewed stability in favor of controllability. This difference in design philosophy foreshadowed the arguments in the manned space flight program over automatic systems or pilot controlled vehicles. The U.S. astronaut corps forced the engineers away from the "spam in a can" model favored by our designers

and heavily utilized in the Soviet program.

The Wrights opened up a correspondence and a friendship with Chanute that was to continue until his death in 1910. Chanute personally visited their camp at Kill Devil Hills in 1901, 1902 and 1903 and served as their unofficial spokesman. Within several years, with Chanute's encouragement and assistance, the Wrights surpassed their mentor's achievements and Chanute saw the dream of practical flight achieved.

Kitty Hawk Camp-1901
L-R: Chanute, Orville, Edward C. Huffaker, Wilber *(Credit: Wright Bros. Collection)*

Orville's text, *How We Invented the Airplane*, is a succinct and profusely illustrated account of their adventure in invention. They were amateur photographers and carefully documented each step in the process of invention. The stark landscape of Kitty Hawk forms a dramatic backdrop. The poised figures at launch and the clean images of flight are a delight to the eye. Commentary is supplied by a Wright biographer, Fred C. Kelly. heir first personal account to the public, a 1908 article from Century Magazine is included as an appendix.

Wright's 1900 camp look south. *(Credit: Wilbur Wright/Library of Congress)*

This brings us back to the question of why the Wright Brothers were so successful when so many other people failed. After all, neither of them had completed high school, they were not part of the elite scientific establishment and they lived in the Midwestern backwater of Dayton, Ohio. Jakab's *Visions of a Flying Machine* successfully explains their achievement by examining how Wilbur and Orville were guided by their mechanical skills, scientific skepticism, "Yankee" pragmatism, and the technical spirit of the time in which they lived.

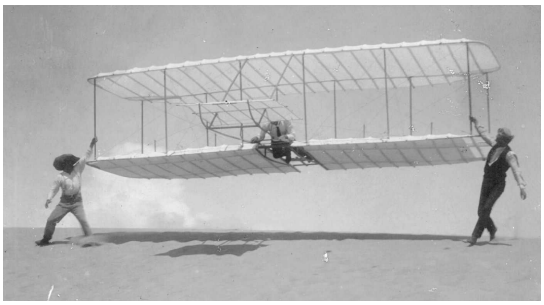
Whereas Crouch is somewhat diffident in analyzing their engineering aptitudes, Jakab's spares no ink in a close analysis of the technical issues which confronted them and how they mastered each of them in turn. As a result, Jakab's book is more a philosophy of engineering rather than a discursive history of the process by which Wilbur and Orville built their Flyer. One can understand the Brothers as prototypical engineers and in their career, mark those qualities which are the hallmarks of good engineering practice.

They could clearly define a problem. In the case of their aircraft, they quickly understood, from their experiences with kites and bicycles and their technical readings, that control was the key to success. In order to produce an airplane one had to experiment with models and manned craft and if the craft were to be manned, they had to be controllable. In a clear vision of priorities, unlike many competitors, they postponed considerations of engines until they resolved the more fundamental issues. Basically, controllability and airfoil optimization could only be done by flying. This realization led to a series of experiments, in 1900, with kites and gliders.

Operating at the remote site of Kitty Hawk, North Carolina, selected for its favorable winds, added logistical difficulties to their technical burdens. They developed the "wing-warping" technique for control but disagreements between the experimental values of lift measured and the theoretical values calculated from the standard tables of their precursors revealed that the traditional data regarding what we now call lift and drag were in error. They also encountered the

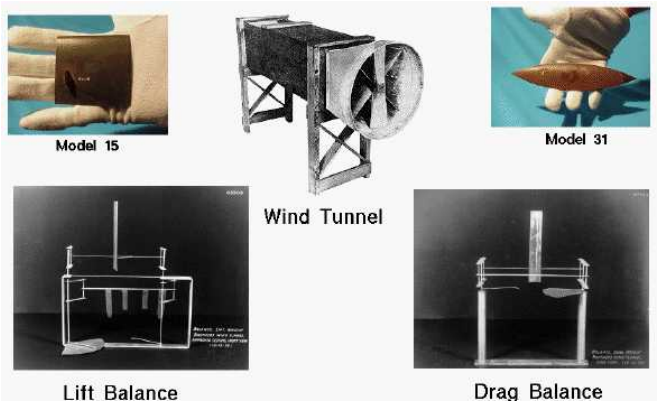
problem of adverse yaw, a phenomena which caused an aircraft when banked in one direction to point its nose in the opposite direction.

By 1901, they were somewhat discouraged but Chanute visited for several weeks and convinced them that, for all their difficulties, they were far in advance of the field. They did not quit and they modified their program to meet the difficulties which arose.



1901 glider launch. Wilbur is flying, Orville is on the left and Dan Tate, a fisherman who helped out occasionally.

Although the Wrights claim to have entered aviation as a sport, they "reluctantly entered upon the scientific side of it" and established a scientific program for investigating the myriad variations of fluid mechanics such as airfoil geometries and pressure distributions. They constructed simple devices for airfoil studies which culminated in their wind tunnel and by late 1901, had rectified the commonly accepted value for Smeaton's coefficient upon which the accuracy of lift and drag tables depended.and could find a rational relationship between the traditional theoretical values and their experimental values.

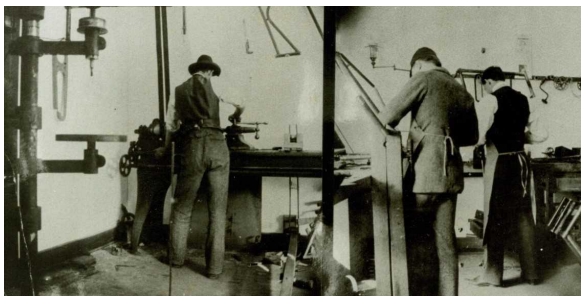


Some Wright experimental tools and models.
(Credit: Glenn Research Center)

Of paramount importance in their progress was their ability to visualize solutions. The "visions" in the title of Jakab's book refers not to some dream of a flying machine but to the specific mental constructs which allowed them to analogize between the abstract concepts of theory and the concrete products of the artisan's craft. It was once said of Kelly Johnson, the engineering genius of Lockheed's Skunk Works, that "he could see air."

Likewise, the Orville and Wilbur Wright could see, in their mind's eye, the relationships of forces and mechanisms. Jakab argues that a facility for nonverbal thought was a key element in the Wright's success and my experiences with first class engineers supports this conclusion.

Much of their equipment was made from off-the-shelf supplies as their facile imaginations saw new possibilities in old things. The addition of a rudder, whose movements could be coordinated with the warping of the wings, corrected the problem of adverse yaw. During this period another engineering asset, their skill with tools and their sensitivity for the materials of construction served them well since constant repairs were necessary to keep their delicate machines airworthy.



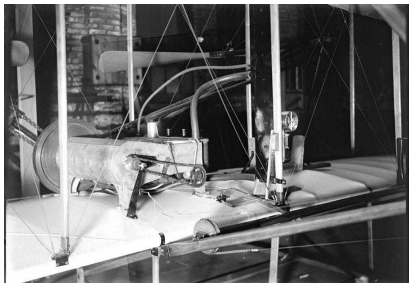
Charlie Taylor, Wright mechanic and the Brothers at work in the shop. *(Credit:FAA archives)*

Consequently, during the next year, they completed around 1000 glider flights and started to the acquire the aviator skills and experience which are needed to maintain the equilibrium of the aircraft in flight. Now they attacked the issue of motive power and did so in typical Wright fashion.

They calculated how much power they required and then designed and built, with the assistance of their mechanic, Charlie Taylor, a 12 horsepower engine. Their past work with airfoils, and the ability to visualize that an "airscrew" was just an airfoil which rotated and followed a helical path allowed them to design and construct the first practical propellers.

Charlie Taylor at work. *(Credit: U.S. Park Service)*

The 1903 horizontal 4-cylinder engine installed in the Wright Flyer generated 12 hp at 1,025 rpm.



And so, on December 17th, 1903, Orville made the initial takeoff, flying a distance of 120 feet in 12 seconds.

***J**ohn T. Daniels, a member of the Kill Devil Life Saving Station took the iconic photo*

Three more flights were made that day, the final one piloted by Wilbur logged 852 feet in 59 seconds and the age of aviation was launched.

The author at the stone marking the end of the longest flight. *(Credit: S.L. Carpenter)*

Within two years, they had perfected the original machine and, in 1908, Wilbur captivated Europe with his flying demonstrations and personality.

The period of time during which the Wrights grew up was a time of great technological and cultural change. The railroads opened up the west and telegraphy and telephony opened new possibilities in communication. Automobiles and bicycles gave people a new individual mobility. Everything seemed possible. High school educations were not common and neither of the brothers completed high school.

But they were voracious readers, deeply curious, and possessed finely honed intellects. The Wright Brothers Collection at Wright State University in Dayton and the list of books which they took to Kitty Hawk indicates wide reading in the mathematics and sciences including technical publications in French and German. Their biographers indicate that their readings extended into literature, history, and philosophy.

They were brought up to be confident and self reliant and lived in an age when such characteristics were prized. They entered into heated debates with each other over technical issues in which the give and take of the dialectic would lead to a solution to the problem under discussion. Yet their close personal relationship did not allow for the rancor which might have developed otherwise. These cultural and personal circumstances, melded to their methodical approach to problem solving contributed to their efficacy as engineers and makes them worth studying as a model of what engineering is all about.