No glorious weather marked one of the most auspicious moments in human history. The setting instead was a raw, late fall day at the turn of the 20th century, as two bicycle mechanics from Dayton, Ohio, set out to accomplish on the windswept sands of Kitty Hawk, North Carolina what no expert, innovator or dreamer before them ever had. At 10:35 on the morning of December 17, 1903, with a stiff breeze gusting to 27 miles an hour from the north, Orville Wright flew the Wright Flyer 120 feet into the air before coming to rest. In just 12 seconds the world was forever changed.

Three additional flights, each longer than the last, would follow. After the fourth had concluded, as the Wrights and several volunteers carried the gangly Flyer gingerly back nearly 900 feet to its launch spot, wind caught the fragile craft, rolling it backwards and damaging it beyond immediate repair. For this day, at least, the Wrights were done.
Later, pundits would marvel how it was that two high-
school dropouts, unknown and unheralded, could trump the
world’s leading aeronautical intellects and become the first to
fly a heavier-than-air machine.

Almost a century later, in a cavernous wind tunnel
where an enterprising builder could easily fit a small house —
say, two or three times the size of the modest research
shed the Wright brothers built on the Outer Banks — tests
are being conducted on meticulously recreated Wright Flyer
components. Eventually, an entire reproduction of the Flyer
will be mounted for testing in the Old Dominion-operated
Langley Full-Scale Tunnel (LFST).

In honor of the centennial of the Wrights’ first flight,
Ken Hyde, president of the Warrenton, Virginia company
The Wright Experience, has been commissioned by the
Experimental Aircraft Association in Oshkosh, Wisconsin to
build a duplicate of the original Flyer, using identical mate-
rials and the Wrights’ own design. If all goes as planned,
Hyde’s reproduction of the 21-foot-long, 600-pound Flyer,
with a 40-foot-plus wingspan, will fly in Kitty Hawk on or
near the anniversary date of the Wrights’ first flight.

“The test work at Old Dominion is absolutely essen-
tial,” Hyde says. “But this is not a stunt. We’re not in the
air-show business. The main purpose is to inspire a new
generation of engineers — and to demonstrate to the world
that the Wright brothers were scientists of the highest caliber.
They didn’t just luck into [the first flight]. They were sys-
tematic engineers who worked very, very hard.

“Genius may not be the right word. But they obvi-
ously had extraordinary ability. They had a lot of failures,
and yet they turned those failures into successes. In four
years they discovered the secret of powered flight, whereas
people before them had been working on the problem for
hundreds of years.”

Significant Contributions

As he describes the Wright Flyer project and the
University’s involvement in it, Robert Ash, Old
Dominion professor of aerospace engineering and
manager of the Flyer testing program, sits forward in an
office chair with a smile on his face. “For the very first time
we will document the actual technical achievements of the
Wright brothers — the power plant, the propulsion, the air-
foils,” he says. “What we’re really doing is aeronautical
archaeology, uncovering contributions that for nearly 100
years have been unknown or unrecognized. It’s one of the
most exciting things I’ve ever done.”

The “excavations” need to be done, Ash points out,
because although the brothers kept explicit accounts of their
work, not every pertinent technical detail was recorded. First
and foremost, the brothers were hard-nosed problem solvers
and therefore concentrated on the practical matters at hand,
without much effort expended on publishing their research
results. Because the Wrights always intended to profit from
their work, protection of their inventions was paramount;
the fewer specifics provided, at least in the early years, the
better their chances of defending against the inevitable law-
suits they foresaw as others attempted to infringe upon what
they had created.

“The Wrights were not acknowledged as having made
significant contributions to the aeronautical sciences. But
they did,” Ash says. “The brothers’ aeronautical theories
were as good, if not better, than those developed in British
and American national laboratories in the 10 years following
the first flight. The Wrights were not inclined to write books
or articles on what they knew. They were more concerned
about protecting their intellectual property. In the publish-
or-perish world in which we [academics] live, they would
have perished.”

The duplicate Flyer tests will be conducted in the
University’s Full-Scale Tunnel, operated by Old Dominion
under a memorandum of agreement with the tunnel’s owner,
NASA Langley Research Center in Hampton, Virginia. The
LFST remains one of the world’s four largest wind tunnels,
with a test section that is 30 feet high, 60 feet wide and 56
feet long. The tunnel’s closed-loop design allows for contin-
uous air flow at speeds ranging from 25 to 110 mph. The
building enclosing the test section, supporting equipment,
laboratory space, fabrication areas and offices puts 8 million
cubic feet — nearly 2.5 acres — under one roof.

That these latest investigations are being conducted in
a Virginia wind tunnel would have pleased at least one of the
Wright brothers. After the death from typhoid fever of elder
brother Wilbur in 1912, Orville Wright became an early and
enthusiastic supporter of NASA’s predecessor agency, the
National Advisory Committee for Aeronautics (NACA),
remaining on the committee for nearly 30 years. The
NACA’s first large-scale construction project was the con-
struction in 1917 of what would ultimately be called Langley
Research Center. In turn, Orville’s advocacy for and
Langley’s subsequent construction of the Full-Scale Tunnel in
1931 allowed for unprecedented analysis of new airplane
architectures.

No Piece Of Cake

Counted among the Wright innovations was a work-
able propeller design that took account of the fact
that planes navigate air and not water. Until the
brothers began their research, it was assumed that a water prop would suffice. The Wrights discovered that, on the contrary, airplane propellers are essentially wings in constant rotation. This key component couldn’t be adapted from aquatic use, but would have to be made from scratch, incorporating the brothers’ latest findings.

Such innovation, crucial to the Wrights’ success, can, however, frustrate even the most experienced modern expert. Although skilled in reproduction of classic airplanes, Ken Hyde says that building an exact Flyer duplicate hasn’t been easy, taxing his expertise and that of his associates. It’s not just figuring out how exactly to make a given part, which is difficult enough; rather, it’s putting the parts together in precisely the same way as the Wrights did.

“We know very little about the flight characteristics of the original Wright Flyer,” Hyde explains. “We’re going to reverse-engineer this. We’re going to get in the Wright Brothers’ minds. I thought this would be a piece of cake. Six months later I’m still trying to figure out how to begin sawing the first piece of wood.”

Data derived from the tunnel tests will be incorporated into a flight simulator for pilot training, so that whoever helms the reproduction will have an opportunity to practice and perfect the wing-warping techniques the Wrights used to control the Flyer. Initially, that simulation will run on a personal computer, with the user manipulating joysticks to direct flight. In the long run, probably after the anniversary flight, a full-scale simulator could be built for public use at regional and national aerospace museums and other appropriate venues.

Two Wright Flyer propellor tests are slated for the LFST, the first for a reproduction of the original propellor and the second for a later, improved version. Flyer stability and control tests have also been scheduled throughout 2001 and 2002, including evaluation of a duplicate of the original engine. Plans call for the complete Flyer duplicate to be tested in the LFST in February 2003, prior to a series of commemorative demonstration flights sponsored by the National Park Service that will occur at the original first-flight venue of Kitty Hawk.

“The Wright brothers were scientists of the highest caliber. They didn’t just luck into [the first flight]”

— Robert Ash