Engineers at Boeing in Seattle in 1949.

IMAGES COURTESY OF BOEING EXCEPT WHERE NOTED

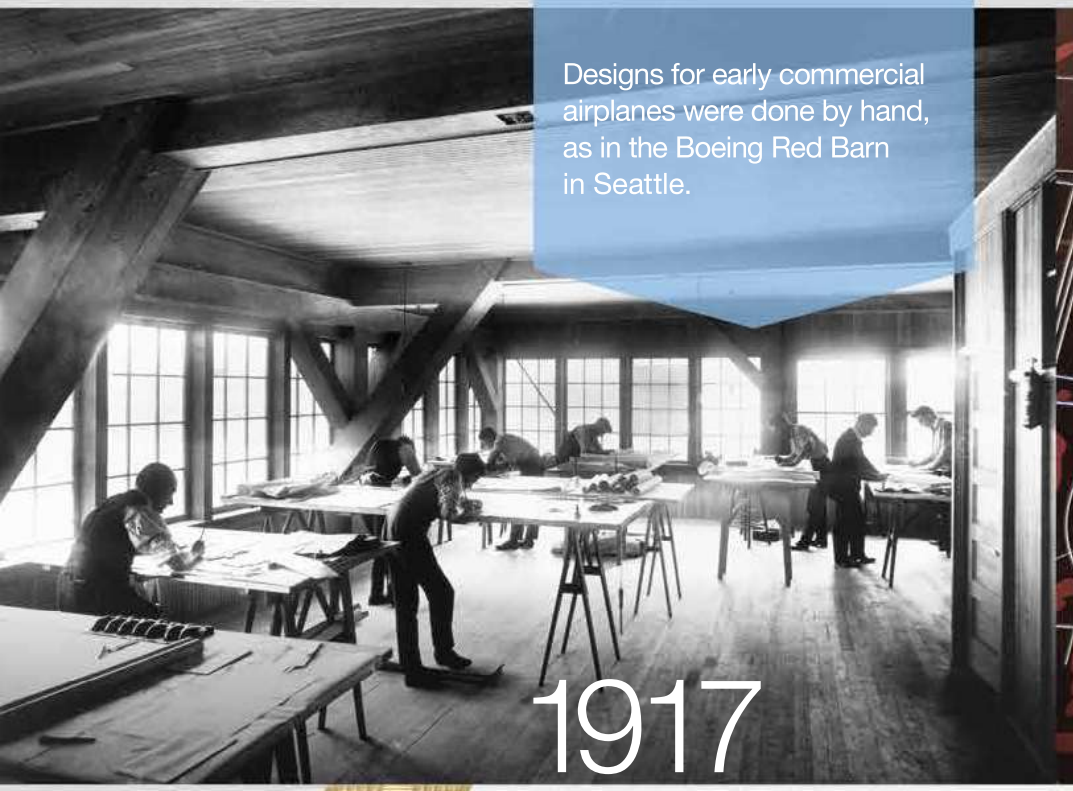
Drawings to digital

PHOTO: GETTY

EVOLUTION OF ENGINEERING: PENCILS WERE STILL A THING JUST 40 YEARS AGO

BY LESLIE HAZZARD, BOEING HISTORICAL SERVICES

Before there were wings and wheels, flight decks and fuselages, there was a pencil. In the early days of aerospace, the first step in design was to find something to write with. And that didn't change until relatively recently.



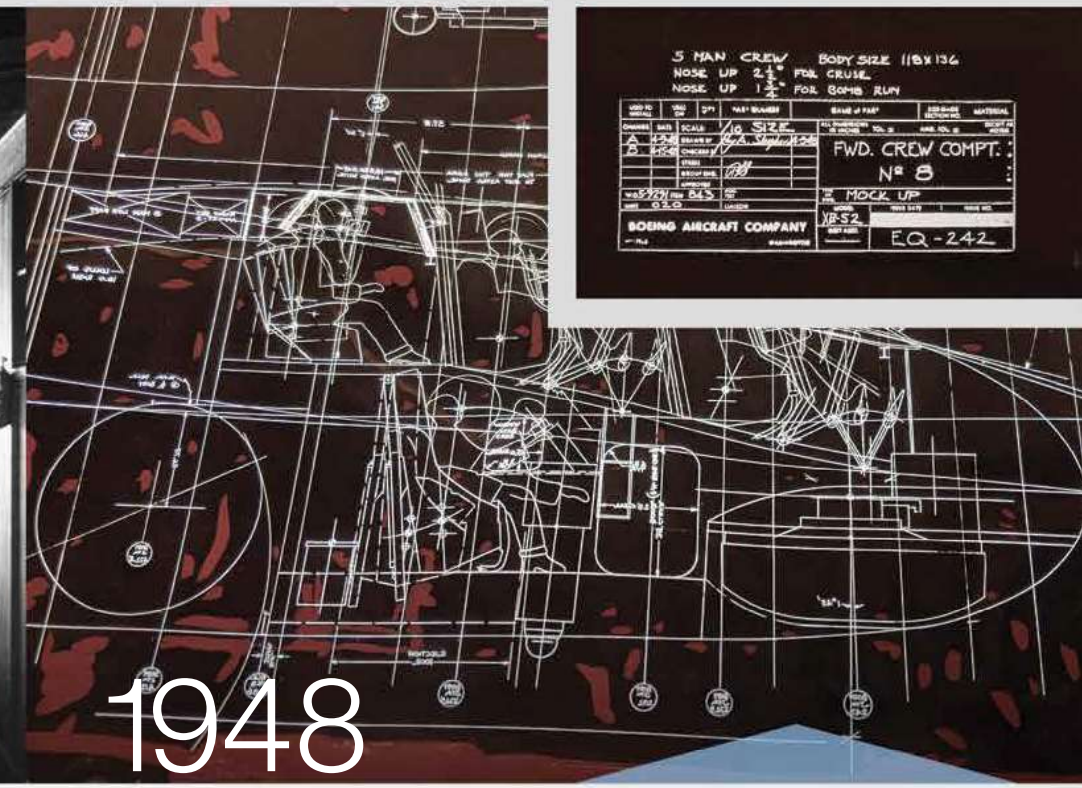
Designs for early commercial airplanes were done by hand, as in the Boeing Red Barn in Seattle.

1917

PENCIL POWER

The media for airplane design remained surprisingly static from the start of the 20th century until the 1980s, when the physical drawings began the shift to digital files.

Pencil or pen and paper were the currency of engineers in the Red Barn, Boeing Airplane Co.'s first building. Standing at large drafting tables to create early flying machines such as the B & W seaplane, designers shared the building with seamstresses who sewed the airplane's wood-and-linen wings.



1948

TRANSITION TIME

Later programs such as the McDonnell Douglas F-15 Eagle and the Boeing XB-52 Stratofortress transitioned to ink on polyester film to illustrate geometry.

INSET: STRATOFORTRESS STATS
Used for the XB-52 prototype, this identification block is for the forward crew compartment.

On the back side of polyester film, red paint was used to block out any pinholes or errors that let light through.

FORM AND FUNCTION
For many decades, drawings for commercial, defense and space products — such as this illustration of the Mercury space capsule — were painstakingly handcrafted by talented drafters and artists.

1953

DUCKS IN A ROW

The design process continued to rely on physical drawings for several more decades, with some hand-drawn lettering and drawings so stylized that teammates could tell which designer had created them. Signed or unsigned, they were often works of art.

At Boeing in Seattle, engineers hold the spline (a flexible curve) in place with weights known as “ducks” because of their shape.

1960s

TOOLS OF THE TRADE

Even in the 1960s on both commercial and defense programs such as the McDonnell F-4 Phantom II fighter jet, drawings were created on vinyl film. A pointed instrument known as a scribe removed material from the film to depict product geometry, and flexible paint was used to erase drawing content for design changes.

The red and gray tools on the right were used for drawings on vinyl film. The ink pens and black electric eraser applied or removed ink on polyester film.

1980s

NO MORE PENCILS

Over the last four decades, electronic technology replaced drawings as the basic means of conveying design. The transformation began with the advent of computer-aided design, or CAD. Related advancements included CATIA, the computer-aided three-dimensional interactive software used to create the 777 widebody airplane — the first all-digital design of a commercial jetliner.

Early computer-aided design steadily began to replace handmade drawings.

Supercomputers generated so much heat while processing data that they required their own temperature-controlled rooms to operate properly.

1990s

MAKE ROOM

The evolution has continued steadily, with a marked transition from early supercomputers that filled a room to modern programs that allow engineers to design airplanes using special software on their laptops.

And if you long for the good old days, you'll be pleased to know those laptops often come with what looks a lot like a digital pencil. IQ