



## Get up to speed with Boeing's chief scientist of hypersonics

In a recent conversation, **Boeing Senior Technical Fellow and Chief Scientist of Hypersonics Dr. Kevin Bowcutt** covered hypersonics, scramjets, propulsion and why he's also known as the "Father of the X-51A WaveRider." Plus, Bowcutt explains why he's spent more than three decades at Boeing, creating the future of flight out of thin air.



#### MACH 5 READY

The X-51A WaveRider is mounted under the wing of a B-52H Stratofortress in preparation for a test flight.

PHOTO: PAUL PINNER/BOEING

**Hypersonic speed:** “There’s no crisp boundary for hypersonic. But it’s typically considered to be Mach 5 and faster. ... It’s really a thermal barrier. As you go faster and faster, the frictional heating of air on the surface makes the temperature go up. And when you go up to Mach 5, you’re above 1,000 degrees Fahrenheit, your surface temperatures. ... By the way, Mach 5 is 1 mile per second. ... That’s a way to think about it.”

**The X-51A WaveRider:** “The X-51 was one of the first two demonstrations of scramjet propulsion that took 50 years to develop, to perfect, to figure out how to design it and prove that it worked on the ground in wind tunnels. ... The X-51 was like the Spirit of St Louis, the Lindbergh flight, the one that proved that aviation was practical? The X-51 proved that the scramjet engine could be a practical propulsion system.”

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#### Recently recognized

Bowcutt was recently named a Hagler Institute Fellow. The Hagler Institute for Advanced Study at Texas A&M University selects its fellows from among top scholars who have distinguished themselves through outstanding professional accomplishments or significant recognition.

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### Riding the Wave

The X-51A WaveRider is the first air-breathing vehicle to fly at hypersonic speeds and verify the operation of a scramjet in flight, thanks in part to these Boeing teammates: Craig Christy, Todd Magee, Mark Nugent, Daniel Ortega, Noelle Saccoccio, Paul Seigman, Sergio Vazquez, Joseph Vogel and Ben Wong.

Many others contributed expertise, effort and time to make history happen.

“The X-51 program started a worldwide race to produce similar platforms that will change the future of not only advanced hypersonic weapons systems but the future of space exploration, as many firms and countries try to harness more cost-effective methods of space access,” said Vogel, senior manager in Boeing Research & Technology’s Hypersonic Demonstrator Office.

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Audio: Hear the entire hypersonic conversation.



### FAST COMPANY

A U.S. Air Force B-52H Stratofortress carries the X-51A WaveRider near Edwards Air Force Base, California, minutes before the X-51A’s historic flight.

PHOTO: U.S. AIR FORCE

**Engineering:** “It’s solving problems, taking known science and turning it into technology and things that help humankind. ... And that’s what Boeing does, right? That’s the core of what we do, is we envision the future of flight, whether it’s in space, in the air, and then we create that future out of our imaginations. And that’s pretty cool.”

**His three-plus decades at Boeing:** “I came to work in the industry because I wanted to ... be the designer of a new, unique flying machine. ... And where else can you come and have the technology, the manufacturing capability, the smart people across any field?” **IQ**