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Boom Supersonic's engine reveal not enough to get skeptics all on board



Blake Scholl, Boom Supersonic's founder and CEO, talks about the Symphony engine project at a press conference at Piedmont Triad International Airport in Greensboro on Tuesday. Boom has projected having at least 1,761 jobs at its planned PTI "superfactory" by 2030.

Richard Craver – Dec 16, 2022

GREENSBORO — Credibility has been a central challenge for Boom Supersonic and its planned \$500 million "superfactory" at Piedmont Triad International Airport.

The Denver-based manufacturer appeared to have answered some overshadowing questions during Tuesday's announcement that it had secured three additional suppliers and developers for the Symphony supersonic engine on its Overture aircraft.

Those are engine developer Florida Turbine Technologies — a division of Kratos Defense & Security Solutions — 3-D parts manufacturer General Electric division GE Additive and engine maintenance vendor StandardAero.

FTT is better known for making small engines focused on drones and cruise missiles.

GE Additive is providing additive technology design consulting, foremost engineering consultancy services focused on the design, materials and processes used in industrial 3D printing.

Boom founder and chief executive Blake Scholl describes Symphony as a “Boom-led development program with a team of world-class, best-of-breed companies.”

Yet, even with the acknowledgement of a start-from-scratch engine design and production approach, there remains a level of we’ll-believe-it-when-we-see-it perspective on Boom.

For example, Chris Combs, an assistant engineering professor at University of Texas-San Antonio, tweeted after the announcement “Welp, Boom Supersonic has decided they are going to try to build a custom turbine engine called Symphony.”

“It’s an interesting group of collaborators, but when you’re basically starting from scratch on the engine their current timeline seems ... challenging.”

Ben Schlappig, with aircraft-focused website OneMileAtaTime.com, said that since the Boom Overture is a supersonic jet, “I suppose partnering with a non-commercial jet engine producer isn’t a bad idea.”

“Then again, it’s pretty telling to me that none of the major commercial engine manufacturers have been willing to pursue this concept.”

Schlappig said that Boom not having an engine partner prior to last week “has obviously been a major concern when it comes to the viability of this jet.”

“Boom would have lost a lot of credibility if there wasn’t an announcement before the end of the year.”

The challenge

There was significant aviation-industry buzz when Rolls Royce ended its engine-development partnership with Boom after two-plus years on Sept. 8.

Since that announcement, the other Big Three aircraft engine manufacturers — GE, Pratt & Whitney and Safran — have either expressed limited or no interest in developing a supersonic engine apparatus.

Even with the engine development component now in place, Boom won’t begin production until 2024 and test flights until 2026 from PTI.

Boom has projected having at least 1,761 jobs at PTI at full production capacity in 2030, and potentially as many as 2,400 by 2032. The average annual wage is estimated at about \$68,000.

Hiring is projected to begin in 2023. The facility will feature manufacturing, assembly, testing and distribution operations.

Scholl has acknowledged concerns that Boom has set an ambitious development, testing and production timeline.

“We believe that aggressive schedules are the best ones, and we actually believe we will be able to deliver on this timeline, thanks to the great team we have put together with proven technology and suppliers,” Scholl said.

‘Taking a fresh look’

Scholl stressed that Boom’s reassessment of its engine plans post-redesign — “taking a fresh look” — made it clear that trying to convert a subsonic engine to supersonic capabilities was going to be costly in initial production and after-market maintenance and spare parts.

“We could have taken a subsonic engine and adapted it, and taken a subsonic business model and adapted it. That works,” Scholl said.

“But, that’s not nearly as good for our customers and our passengers because it brings the baggage of designs that were never optimized for supersonic flight, and at significantly increased operating and maintenance costs.”

Developing a supersonic engine specifically for Overture “offers by far the best value proposition for our customers,” Scholl said.

“Through the Symphony program, we can provide our customers with an economically and environmentally sustainable supersonic airplane — a combination unattainable with the current constraints of derivative engines and industry norms.”

Scholl said the current design and production plans are the best approach “to be able to deliver on reliable and economical supersonic flight ... with proven technology and known materials and design techniques with a great certification pedigree for every component of the engine ... optimized for Symphony’s mission.”

FTT has supersonic engine-design expertise, including key engineers who were among the team responsible for the design of the F-119 and F-135 supersonic engines that power the F-22 and F-35 U.S. fighter jets.

Scholl touted the 3-D additive parts production process as being able to reduce parts count, be easier to assemble, increased engine efficiency while reducing weight.

“It allows us to rapidly prototype and rapidly build engines, while delivering on all our sustainability initiatives,” Scholl said.

Scholl stressed that “there significant financial advantages to doing it this way” even though Boom has not disclosed projected financial expenditures related specifically to Symphony.

According to Reuters, Boom had raised \$319 million as of October 2021 and was valued at \$1.2 billion by PitchBook Data.

“We always assumed Boom will be funding a significant portion of engine development,” he said.

“Doing it this way allows us to be more capittally efficient working much more closely with the supply chain that we would have in a traditional approach.”

Henry Harteveltdt, travel analyst and president of Atmosphere Research Group, told BusinessInsider.com in September that “it will be a big challenge” for Boom to build its own engine.

“But, if it is successful in building the jet and the engine, then they get their aircraft and have very unique intellectual property and a business advantage because they will not rely on a third-party engine maker.”

Why climb on board?

Overture is expected to be the first large commercial aircraft to be net-zero carbon from Day One, running on 100% sustainable aviation fuel.

Symphony is described by Boom as “a medium-bypass turbofan engine with the same basic engine architecture that currently powers all modern commercial aircraft.

Unlike subsonic turbofans, this new propulsion system will include a Boom-designed axisymmetric supersonic intake, a variable-geometry low-noise exhaust nozzle, and a passively cooled high-pressure turbine.”

“The team at FTT has a decades-long history of developing innovative, high-performance propulsion solutions,” said Stacey Rock, FTT’s president. “We are proud to team with Boom and its Symphony partners and look forward to developing the first bespoke engine for sustainable, economical supersonic flight.”

Alex Trapp, with StandardAero, said the start-from-scratch approach with the Symphony engine “is very exciting for us to ensure it is designed for maintainability, efficiency, reliability and environmental sustainability.”

“We’re pleased to be on the front end of developing what should be an industry-best service program.”

“Adding Symphony to our broad portfolio (that includes military supersonic aircraft) will be a major milestone for our company and something we take immensely seriously,” Trapp said.

Trapp said that already serving planned Boom commercial airline customers and the U.S. Air Force “has prepared us for Boom’s future requirements.”

See it to believe it

A primary analyst concern about Boom is whether there truly is a global market for supersonic flight in the age of Zoom calls and other online connectivity, particularly at a price most consumers can afford.

Schlappig said “it’s questionable how viable this concept really is.”

“While Boom has been suggesting that the plane will enter service by 2029, Boom completely overhauled the aircraft design earlier this year.”

Schlappig said that while Boom “has managed to raise an unbelievable amount of money, but personally I’m still skeptical about this being a viable concept.”

“Can Boom build a jet that can fly supersonic? Yes, I absolutely believe so.

“Can Boom build a plane that’s commercially viable, that gets support from regulators, and that could actually be carrying passengers within seven years? That I remain much more skeptical about.”

Even though Boom is six-plus years from its 2029 projection of commercial flight, the engine developments “add a new layer of confidence for the project to eventually become a reality,” wrote Joanna Bailey with SimplyFlying.com.

Bailey touted the three engine partners as pluses, even though they have much lower profiles than the Big Four aircraft engine manufacturers.

“These manufacturers are no Rolls-Royce or Pratt & Whitney, but they do have a strong track record in propulsion technologies,” Bailey wrote.

Bailey specifically cited the GE Additive element as a pivotal participant, and the decision to have four engines per Overture.

“Metal additive manufacturing is also known as metal 3D printing, using a heat source, such as a laser or electron beam, to heat metal in powder or wire form,” Bailey wrote. “The molten metal is then formed into an object.

“This sort of process offers exemplary design freedom with improved efficiency and, most importantly for Boom, to increase the speed to market or stronger and lighter parts.”

Bailey cited the reality that both Symphony and Overture need to be certified before either can enter into service, although she said Boom could begin flight testing with an uncertified engine as an experimental aircraft.

“Nevertheless, the road ahead is going to be long and expensive for Boom, despite (Tuesday’s) progress on its goals.”

Local reactions

Scholl said taking a start-from-scratch engine development approach will “absolutely enable a significant number of high-quality jobs on the engine, technical and assembly sides.”

“But, it’s too early to put a number on it,” as well as where and how engine assembly will take place.

Kevin Baker, PTI’s executive director, said that if/when Boom reaches its initial goal of 1,761 workers, it would boost the total airport campus workforce to more than 10,000 given its current level of about 8,600.

“Combined, we’re already the fifth-largest employer sector in the Triad,” Baker said.

The confirmation of the Symphony engine suppliers has led to an exhaling from Triad and North Carolina’s economic development leadership, said John H. Boyd, founder and principal with global site-selection firm The Boyd Co. of Boca Raton, Fla.

Boyd said the collaboration announcement “is huge” considering the Big Four aircraft engine manufacturers “showed no interest in supersonic.”

“These three new suppliers definitely add credibility not only to Boom, but also to the aerotropolis vision that PTI and Triad are working to achieve,” Boyd said.

“There will be significant opportunities for suppliers and downstream suppliers of Boom, HondaJet, HAECO, FedEx, along with other new industrial players like VinFast and Toyota, to generate new business to the benefit of the Triad region.”

“We see the industry continuing to invest heavily in North Carolina given the now-soaring global demand for new aircraft, such as Boeing announcing major new orders just in the past few days.”

Keith Debbage, a joint professor of Geography & Sustainable Tourism and Hospitality at UNC Greensboro, considered it a wise move that Boom secured the assistance of GE Additive and StandardAero.

“The collective history and experience of the Symphony collaborative makes sense, although it also makes it complex and the success of this deal will likely hinge on how well the different partners work together.”

Debbage said that choosing FTT as the engine developer come with risk given that “up to now has only built jet engines for cruise missiles and unmanned aerial systems.”

“It is a big leap forward to build engines for a supersonic passenger aircraft.

“I wish them well, but, as best I can tell, the company has no history of building the sorts of engines required by Boom.”