

02-Nov-2022

The Boeing Co. (BA)

Investor Day

CORPORATE PARTICIPANTS

Matt Welch

Vice President-Investor Relations, The Boeing Co.

David L. Calhoun

President, Chief Executive Officer & Director, The Boeing Co.

Stanley A. Deal

Executive Vice President, President & Chief Executive Officer-Boeing Commercial Airplanes, The Boeing Co.

Theodore Colbert

Executive Vice President, President & Chief Executive Officer-Boeing Defense, Space & Security, The Boeing Co.

Stephanie F. Pope

Executive Vice President, President and Chief Executive Officer of Boeing Global Services, The Boeing Co.

Gregory L. Hyslop

Chief Engineer & Executive Vice President-Engineering, Test & Technology, The Boeing Co.

Christopher D. Raymond

Chief Sustainability Officer & Senior Vice President, Global Enterprise Sustainability, The Boeing Co.

Brian J. West

Chief Financial Officer & Executive Vice President-Finance, The Boeing Co.

OTHER PARTICIPANTS

Peter J. Arment

Analyst, Robert W. Baird & Co., Inc.

Sheila Kahyaoglu

Analyst, Jefferies LLC

Myles Walton

Analyst, Wolfe Research LLC

Seth M. Seifman

Analyst, JPMorgan Securities LLC

Noah Poponak

Analyst, Goldman Sachs & Co. LLC

Kristine Tan Liwag

Analyst, Morgan Stanley & Co. LLC

Robert Spingarn

Analyst, Melius Research LLC

Robert Stallard

Analyst, Vertical Research Partners LLC

David Strauss

Analyst, Barclays Capital, Inc.

Ken Herbert

Analyst, RBC Capital Markets LLC

Cai von Rumohr

Analyst, Cowen Inc.

Matthew Akers

Analyst, Wells Fargo Securities LLC

Charles Armitage

Analyst, Citigroup Global Markets Ltd.

Gregory L. Hyslop

Chief Engineer & Executive Vice President-Engineering, Test & Technology, The Boeing Co.

Good morning. It's good to see many of you again. The engineering culture at Boeing has always been strong. It's what produced these beautiful airplanes behind you. But the MAX accidents taught us, showed us what we had to do to strengthen that culture. We'll never forget October 29. We'll never forget March 10. And that's what we've been about for the last three years. So when you talk about changing the engineering culture, strengthening the engineering culture in a global company with 58,000 engineers, that's a big job. But the scale of the task didn't make us blink. We committed ourselves to it, and we've made significant progress.

Our values state right up front that we start with engineering excellence, and that's what I'm going to talk about on the next chart, how we do that. We established these four priorities three years ago to set the course for the changes in engineering and really the changes across the company. The tagline for our safety management system or SMS is SMS is how we work, and it has become the heartbeat of our company. Every week, we have schedule – we have safety reviews in each of the business units chaired by me, Stephanie, Ted and Stan.

In those reviews, we look at trends in the data. We celebrate success. We learn from mistakes. We review the input that comes in from our employee speak up portal. The reviews are characterized by transparency. The FAA attends every week at the BCA safety review. And these reviews have enabled us to identify risks more quickly and get them elevated today to Dave and our board of directors. Dave mentioned we established our aerospace safety committee of our board.

We created a Chief Aerospace Safety Officer position. We stood up a product and services safety organization, outside of the business units, housed within engineering and we've also hired over 60 experienced pilots and deployed them around the world to consult with and work with our customers on any issues that might be coming up.

We realigned our engineering team, so we took 58,000 engineers. So now every engineer in The Boeing Company works for another engineer, all the way up to me. My title changed. I was the CTO. Now, I'm Chief Engineer. I was asked about that when that change went in, how I felt about that. I said, at Boeing, it's actually a higher calling because the technology always serves the engineering at our company. And now our CTO and the business unit chief engineers are all direct reports to me. Howard McKenzie, our Chief Engineer for Boeing Commercial Airplanes, is here today.

When we talk about our design practices, Dave mentioned the demographic shift that's underway. And so how do we make sure that incoming engineers get off to a good start? With our design practices, this provides the foundation that they can build their careers on the knowledge of all those who have gone before. Again, when you

look at our company and you look at the diversity, look at Ted's chart on the portfolio of products, and you look at that and literally that we need expertise in every engineering discipline, that is a big job.

But again, we didn't let use that as an excuse. We got after it. We've written over 2,000 design practices so far. We're using our top 1,500 engineers that comprise our technical fellowship to curate and apply that knowledge across the company. And more importantly, to approve any exception to a design product that is requested by an engineer in the course of their work.

When we talk about engineering across the value stream, we want our engineers to be curious, curious about what it takes to build the product in the factory and to operate it and maintain it in the field. This is where our work around model-based engineering and the digital factory comes in which I'll talk about later. But it also means we need our design engineers on the factory floor, which we've done and it's making a big difference. It also means we need to strengthen industrial engineering in our company, which we've been about and we're making good progress there.

And finally, we want our engineers to be empowered to make decisions. While our work is very exacting, as Dave mentioned earlier, judgment's still required. The design practices provide the foundation from which engineers can be creative, but it also gives you the guardrails so you can make judgment calls. While our focus has been on strengthening engineering and the issues within our own programs and production systems, we are thinking about the capabilities we need for the future and we group those capabilities in these four areas: producibility, digital transformation, autonomy and sustainability.

Our work in producibility is built on the foundation of our work in carbon fiber composites, which now goes back almost 50 years. It started in our defense programs and has now been scaled up to what you see out here with the 787 and that beautiful wing on that 777X. The 787 alone represents over 80 million pounds of composite parts that we've got in service today.

And I always bristle a little bit once people talk about Boeing and, well, are you really innovating? When you see that wing on that 777X, that's innovation. When you see the size of those composite parts and the precision with which that wing comes together and the performance it gives and you watch that wing tip fold and after it comes down, you don't see a seam. That's where technology and innovation is happening. That's the foundation we're going to build upon for our producibility effort.

And that pattern of starting in our defense programs and scaling it up to commercial continues, as Ted mentioned on the T-7, with the advanced assembly technique of Full-Size Determinant Assembly. That has great promise in terms of ergonomics and quality, a fuselage joined on a tactical fire that used to take days is now measured in minutes. The issues we're working through on T-7 are normal for any new airplane going through development and our issues with these Full-Size Determinant Assembly and some of the other advanced producibility is how it gets deployed throughout the supply chain and the process discipline required for them to do that. And that's where you have our engineers working with the suppliers so they can do that and have that process stability.

But also on T-7 is where we talk about digital factory and model-based engineering. What do we mean by that? We want to design a production system with the same system engineering rigor that we design the airplane. We want to be able to connect models of the production system and a model of the airplane through an authoritative engineering database because a good program manager, what do they do, they manage change. We want to see what the effective change in one does to the other and we want to have models that predict the performance of both of them.

The learning curve goes back to the 1930s and we want to flatten that learning curve and create that new paradigm by being able to build the first several airplanes in a simulation. The T-7 program has done that and they see the benefit of it. They see the benefit of having the data coming out of that database straight to the mechanics on the floor with what they need to do their task. So that is achievable. Now, our job is we're going to scale it up for our commercial airplane program.

Our work in autonomy is really motivated by safety. If you can think about a certified software agent working alongside a human operator and the software can respond more quickly to the unknown and the unforeseen, you're going to make a safe product safer. Our work on Wisk, as Dave said, is to push autonomy through that certification process. There will be a lot of learning that comes from that. And that will set the standard then for the programs that will follow.

Wisk is also where, as you saw, it's an all-electric airplane, vertical take-off and landing and it's a key part of our strategy on sustainability, which Chris will talk about after me. So, sounds great. Do you have the people that can do it? The answer is yes. We've hired 9,000 engineers this year. We have very aggressive goals, and in this labor market, frankly, we were wondering would we be able to do it? We actually achieved that goal sooner than we thought. That includes 1,100 interns we had.

And I'll say this because I spend a lot of time on college campuses and I talk to students. Our brand is still strong. It is still strong. And it also extends to and I say our university partnerships have extended to how we build those capabilities. We are invested with the University of Washington on their iterative disciplinary engineering building that's going to house their AI Institute.

We invested in the Innovation Campus at Virginia Tech in Arlington. And we just now – we're the only aerospace company that opened an office on the campus of MIT with our Boeing Aerospace & Autonomy Center in Kendall Square. But we've also been able to attract experienced talent into the company. Jinnah Hosein is here. Jinnah is our Vice President for Software Engineering and he did his graduate work at SpaceX and Google before he came to Boeing. But Jinnah has been a great add to our team.

So when talent comes in, how do we nurture them? How do we grow them? Our intern program, as I mentioned, we had 1,100 interns this summer. And we were proud to be announced as the number one internship program by WayUp and Yello this year. In our interns, I talked to a lot of them, they have access to me. They have access to Howard, all of our senior engineering leaders. They all had a great experience because they were doing real work on real programs and it changed them.

And then finally, for engineers at the high end of their career, I mentioned our technical fellowship. We did something a few years ago, because our technical fellowship went up to the executive level, but we expanded it. And we said you could have a technical career at Boeing and go to the Senior Director and to the Vice President level. Dr. Jill Seebergh is here. She is the Chair of our fellowship, Ph.D. in Chemical Engineering from the University of Washington.

So, all of these changes, I hope you can tell, are having a deep and lasting impact on our company. It's a huge job that we've been about, but the scale of it, we have – is not something we shy away from and we don't blink at. And our commitment to those changes, as Dave said, will never be done with these things, we're only going to get better. But our commitment is unwavering to all of these things.