

EPISODE 189

[INTRODUCTION]

[00:00:07] IP: Hello and welcome to Episode 189 of AvTalk. I am a much more human sounding Ian Petchenik, here, as always with –

[00:00:15] JR: Jason Rabinowitz. And as promised today, we have a special guest with us, Jon Ostrower, Editor-in-chief of The Air Current. Welcome, Jon.

[00:00:24] JO: Oh, god. It's always so good to be with you guys. So much fun. Love it. Love it. Love it.

[00:00:28] IP: Jon, thanks so much for joining the program. We brought you on today to talk about not just what happened last week, but to kind of expand the conversation and talk about where Boeing sees itself on what they said during their investor day last week, which was their first in a few years, when they brought their vision of the future of the company, to the public and to their investors.

But to expand that conversation, to talk about kind of macro level, where does Boeing fit into the future of commercial aerospace and the airplane building business? So, thanks so much for joining us.

[00:01:04] JO: Yeah. Absolutely. Where do we begin? There was so much.

[00:01:09] IP: I think the biggest news to come out of the investor day, was kind of a fine point on where Boeing's commercial business is going, or not going for a number of years now. Which is to say that CEO, David Calhoun said, that Boeing is not going to build a new aircraft, before the next decade. They're not even going to start designing the new aircraft before the next decade. And I think they weren't really concerned about getting this plane out the door.

[00:01:40] JO: But they weren't not concerned with it. They had been talking about it for years and insinuating that they were going to do it, and the middle of the market aircraft was the next thing on their list, and now it's very much the list doesn't even exist.

[00:01:51] IP: Well, it's still on the list, but the list just has a bunch of blank spaces in it. So, Jon, fill us in on what Boeing's thinking is, at this point, as far as not even trying to build a new aircraft until the beginning of the next decade?

[00:02:08] JO: I have been actively covering the will they, won't they have new Boeing aircraft development, since probably 2009, or 2010. I mean that we've had this discussion several times, and they've various points broken off and said, "No, we're going to do a derivative. We're going to do a derivative." At each time. So, in 2011, it was the MAX decision over new single aisle in. Starting in, say 2014, after they got the 787 kind of stabilized in production, they like okay, we're going to start thinking about the middle the market, that sort of spot between the top end of the MAX and the bottom end of the 787. Anywhere between, say, let's call it 195, all the way through 280 seats-ish, depending on your configuration.

And they had this sort of like, constantly looking at the market evaluating the market, what's the market going to be? Is it a niche? Is it big enough? is small enough? And Boeing actually, in middle last, they came and said, "Well, look, the market is big enough for new airplane." And that was sort of a big moment where they're like, "Whoa." Okay, the most important requirements that they see, is there a big enough market to justify doing this, is that real? They said, "Yeah it is."

After they decided the market was real for this airplane, they said about actually building an engineering team. And through 17, 18 and 19, they actually put a thousand plus staff on the NMA program, and it may be new mid-market airplane. And the company was cruising for a launch. But there were certain signs that things were missing in the business case, just wasn't quite getting there. And the MAX crash has happened. First in October of 2018, and then in March of 2019, when the airplane was officially grounded, they go through that entire year, and that sort of on the backburner.

But NMA as a program is still progressing. They're growing number of engineers, growing number of resources being put toward it. Dennis Muhlenberg is fired in December of 2019, as CEO. David Calhoun, who's on the board at the time, longtime board member takes over as CEO. And then the next month after he officially takes the reins, one of his first acts was actually to kill the NMA program. He pretty much said, "Okay, we have bigger fish to fry, and we need to focus on getting the MAX back and service and that is the priority. And I need my executive leadership team focusing on that." So okay, I've now watched two major iterations of Boeing airplanes get shelved, whether it was the NSA back in 2011, when the MAX decision was made, and then, in 2020, when NMA was killed, and the focus was getting the airplane back in service, MAX.

So, there was sort of an expectation that Boeing would have to get through this process to the process being the return to service at the max and everything, to be able to start thinking about an airplane again. And there was sort of an expectation that that was going to happen. Comments by Calhoun to do, we understand what the next point design is going to be. We know what the enablers are. And there was always sort of there. But over the last, probably five or six months or so, rhetorically, he's been softening. And one thing I mentioned in our report, and all this from last week was that in recent weeks, late September to be specific, the whole sort of product development universe inside Boeing ground to a halt. And there was – what they were actually working on at the time was a 757-300 replacement.

So, a large single aisle, all new airplane, to replace sort of the workhorses of Delta and United's fleet, hugely influential customers when Boeing goes to make a decision. If you go without Delta and United, you shouldn't go at all. So, having them in the mix, that was going to be the guide here. And they've all both wanted 757-300, ultra-long, single aisle airplanes for their fleet. But that effort was shelved.

Here we go early November rather, and Calhoun makes it official. Nope. There will be no airplane, not only this decade, but not until the propulsion is ready to support a 20% to 30% improvement in efficiency. That is pretty startling.

[00:06:22] JR: That sounds like a huge number like 15% to 20% gain, like, can you put a finger on like what is the jump between the 777 and the 787? How big an efficiency gain was that? Because 15% to 20% to me sounds quite dramatic.

[00:06:36] JO: Yeah, the jump between the seven six, which was the kind of the comparable baseline, the 78 was 20%. And the MAX was about 14% versus the NG. 777 is sort of somewhere in between the two, and triple 777x is about 10-ish percent, 10% to 12% more than the 350. A lot of it is due to size, a lot of aerodynamics, a lot of engines, it depends how you measure it.

But ultimately, that's a really big leap. But I think it's really important to put this in historical context, and also sort of the bigger industry context. If you look at 27 years from the point that the 87 entered service, or are supposed to enter service in 2008 to 2035, that's 27 years. In a 27-year period during the 20th century, Boeing developed and deliver the 707, 273, 747, 757, 767 and 737 Classic.

[00:07:30] JR: Wow. When you put it that way.

[00:07:34] JO: So, the interpretation of, you know, Kelvin say, well, these developments happen roughly every 15 years. It's a huge misreading of history. But what we've seen is that every successive jump, this is actually a really important point. Why there's so much hesitation by Boeing to do this. Every time you make a jump in technology that next 15%. So, if you assume that the 767 was 15% to 20% better, it's called 20% in round numbers than the 707. So, 707 is 1, 767 is 80% of 1. The 787, that replaces the 767 is 80% of 80%. So, the absolute improvement is getting smaller.

Yes, you're getting more range, yes, you're getting a lot of other things out of the package, but the absolute improvement is getting smaller for the amount of money and time it takes to deliver a new airplane. To make a business case close, it is a huge, huge sum of money the way Boeing does it. So, they're ultimately pivoting to this idea of the capabilities, the building blocks around process and technology to get them there. But again, propulsion wise, not till next decade.

[00:08:44] IP: So, I guess the question is, why come out and say it now? And why be so clear cut on, we're not going to do it until everyone else has done the work for us. And one of our listeners wrote in and I thought this was a really interesting question. Because with the 20%, cut off with the – we're not going to do it until everything else is in place and then we'll design the airplane. It seems like they're not doing any of the homework that the rest of the class is working on. What is their plan to help that number become a reality? Or are they just counting on everyone else to – you're either counting on GE, or Rolls Royce, or Pratt and Whitney to make all of this.

[00:09:27] JO: Or Airbus to figure it out at this point.

[00:09:28] IP: Or Airbus, yeah, and then say, “Okay, we'll just use that.”

[00:09:33] JO: So, I think to be fair to Boeing and reading of this, I don't think they're letting everyone else do it themselves. I really don't. They want to mature their ability to design, use model-based systems engineering techniques, and that's sort of, it's a very boring way of saying a digital twin to approach to iterating the design and having it be mature when you go into production and design the production system in parallel, to allow you to understand how the airplane comes together. So, the next iteration of digital design, that they're doing over on the defense side of the business successfully.

They're looking at high rate composites. That's actually a really interesting piece here. Because the high rate composite, essentially building at 50, 60 a month of for a single aisle is very, very different from doing 12 or 14 a month for the 787 in composites. And composites, it's challenging to scale up and rate like that. So, what are those building blocks? NASA is going to be a big part of this equation. If I had to tell your listeners to focus on one piece of news in particular, over the next year, and probably next six months really, is what does the sustainable flight demonstrator look like? Okay, what is the sustainable flight demonstrator? You may ask.

NASA is developing a crude, crude as in piloted, ex plane, likely based on a very long and slender high aspect ratio, trust, braced wing, which means – think of the Cessna 172, but a jetliner, but really long and slender wings. And that's been Boeing's proposal for that ex plane for a long time and Boeing if they win the contract, which everyone largely believes they will,

because it is designed to pioneer future single aisle technologies, that will be a major pathfinding operation for aerodynamics required for this next big leap, potentially, the systems and the propulsion and the high rate composite technology that go into it.

I actually described it in my piece as Boeing is entering the homework years for getting there. So, it's not like they're letting everyone else do the work. I don't think that's fair to them, because there's a lot of investment going on where they see this is going to be happening. The problem is, and there are two big problems, with taking this approach is number one, 27 years between service entries for commercial aircraft means a lot of people who knew how to design, manufacture, certify, deliver and support a brand-new aircraft in service are going to retire. And from a demographic perspective, that's a huge problem. A lot of the gray beards, or gray hairs, so to speak, aren't going to be there, when they're ready. They might be available as consultants. But look, if we're talking about 13 years from now, think about where you were 13 years ago, and we're going to be 13 years from now. That's a big open question in terms of the institutional knowledge.

To kind of connect the points here, we talked about model-based systems engineering, and a lot of that is about capturing knowledge and allowing the design, safe to say, make one design change in x part of the airplane, how does it affect, you know, A, B, C and D, in an integrated fashion. A lot of that, the subtext of that is well you don't – is if you've captured that in a computer simulation, there's less of a need for the gray-haired folks who know how to make this work.

I don't believe that that's sort of a utopian view of this. There's a very healthy debate about whether or not that can actually happen. But that's ultimately how Boeing is thinking about it. But are the people going to be there? I don't know. Just the really quick second part of it is, airplanes don't just pull themselves out of a hat, and Boeing has gotten themselves into a lot of trouble when they've tried to wait a long time to do a new airplane, happened with the 787, between the triple seven, and the irony of all these tools is that they're designed to be iterative and mature over time. And the way that Calhoun is kind of talking about it is that there will be a moment in time where you believe that yes, everything will pencil out and give you the answer you want. That's kind of not how airplane development works.

[00:13:39] IP: So, to your point about not being fair to them, they are working on this. They are the TTBW which looks I mean interesting to me. But on the other hand, they've also been saying, and we talked about this not five minutes ago, for a number of years now. Okay, NMA, it's next. We're ready to go. We're going to launch this, we're talking to customers, we're having conversations, we're finding the sweet spot, we're going to make sure that we can carry cargo in it. We're doing all of these things. And then coming to the decision that okay, no, never mind, we're not going to do that.

I mean, at some point, you have to take the decision to either say, "Okay, we're going to build an airplane, or we're not going to build an airplane." And it doesn't seem to me like they've actually made the decision that they're going to build another airplane.

[00:14:26] JO: They have not. Absolutely. So, a lot of the capability building that they're going to do over the next 10 years, 10 years is a long time in this business. It's a long time in any business, but it's especially a long time and in aerospace. When you think about the impact of that, and I kind of reemphasize the point is that they're going to lose the institutional knowledge to allow them to do this in a really concrete way when they believe they will eventually be ready. A message that was just sent to a lot of the engineering corps, and if you're a 20 something year old engineer, even a 30, 35-year-old, 40-year-old mid-career engineer, and you go, "Look, okay, it's going to be another 10 years before we even start on a new airplane." Is that a way to attract and keep those people?

I think Boeing thinks it is because of things like Wisk their eVTOL effort, things going on the defense business, all of that. But I think it's a fair question to ask if they're going to have the know how that comes along with that. And preserving that is not easy to do. And you lose that muscle memory. Look, the 737 MAX, 737 NG assembly line in let's call it early 2018, was humming along with somewhere between 42 and 47 airplanes per month. Just absolutely clockwork, just stamping them out. And Wall Street loved it. The stock was heading for \$500 At that point. And because of the amount of cash he was generating, and it was doing exactly what they wanted it to do, and then things shut down for 20 months or so, in terms of the production system. And then getting that back going again, just getting to 31 has been an incredibly challenging slog because of a lot of the people they lost who knew how to do it.

[00:16:13] JR: It's almost kind of like foreshadowing for the rest of the entire industry during COVID, where so much institutional knowledge exited the industry. They retired or they took buyouts and didn't come back, and those who replaced them didn't have that same knowledge. And then we just can't get over that maybe last 15% capacity from 2019. It's almost like the entire industry is now feeling exactly what Boeing has, after 2019, with the max production.

[00:16:42] JO: Exactly, exactly. And that institutional knowledge, and that's that supply of people to know what they're doing, and have done it before and have made it run like clockwork, by the way an ecosystem of suppliers to go along with it is also incredibly important and essential to that process. That is kind of a small microcosm for what I think is going to likely happen when they try to design a new airplane again, in 2035, or for 2035, after not having done it for over two decades.

[00:17:11] IP: And I mean, we haven't even touched on the fact that the industry is, if not decided upon a new set of propulsion technologies. But moving quickly there. I mean, Boeing has Wisk and it's eVTOL, kind of set up, though, some of the reporting this week from The Air Current gave a little less weight to Boeing support of Wisk. So, I don't know how much to read into that at this point. But I mean, if you look at Airbus' vision for what's next, I think at this point, it doesn't matter whether or not they're right or wrong, or somewhere in the middle. I think at this point, what matters is that they have a public vision. Whereas Boeing's vision for kind of whatever airplane they're going to build next that isn't a kerosene powered aircraft, is very much at last we heard, sustainable aviation fuel is what we're going to do to bridge us to get to whatever's next. But we don't know what's next, so we're not going to worry about it. I mean, have they said anything about that either in the investor day or anywhere else that they've revised their thinking or refined it?

[00:18:24] JO: One of the most interesting things to watch about Boeing and Airbus is how their individual messages is ultimately received by folks in our world and the broader public. Because it's really interesting. They actually had an entire presentation on how they're viewing sustainability and what their head of sustainability, Chris Raymond, kind of talking about the various techniques and tools and plans and concepts that they were looking at. Airbus also has had a very similar conversation in terms of zero E, in terms of their potential for a hydrogen powered aircraft and sort of the building blocks for that.

So, there is this kind of dueling conversation that is taking place, but Airbus has absolutely broken through better in terms of that messaging. And I think it's not just the message. I think there's also a lot of actions behind it that have not accompanied what Boeing is doing relative to, okay, so what Airbus is going to test fly the CFM Rise engine, the A380 later in the decade, and they're going to fly a GE passport engine on hydrogen, on also on another A380 later in the decade.

So, there are these sorts of indications of, you know, making these technology investments and actually going and showing that yeah, look at the building blocks from a technology perspective. It's far less firm when you think about how Boeing is moving forward. eVTOL is part of how they're thinking, but ultimately, what they've also said about Wisk, they being Boeing, and their \$450 million investment in Wisk is really – okay, eVTOL is a part of it, but it's more like can you do it, but even more importantly, the autonomous model, fully autonomous model of operations that they see for Wisk when it is ready. And that ultimately translating to the jetliner business. And by the way, when you take the part 25, which is the FAA rules for civil aircraft that Boeing builds, and part 121 that govern airlines, that's very different than what they're looking at for Wisk how to get the FAA comfortable with a bridge between the two is one of the key questions here.

Again, it sort of again, it's that where you invest to do your homework over the next 10 years. I think the difference also, and this is just straight up cold, hard math, is that when it comes to the intense focus on single aisle, where the volumes and of the business are, the weight is heavily tilted towards Airbus on the single aisle, heading to 75 per month, in the middle of the decade, if the supply chain will let them, that's a totally different discussion. Where Boeing is on 31 per month, today, and Airbus at the 60 range right now. So, when you match those two side by side, does the guy who has the larger single aisle market share need to replace or do something in their single aisle portfolio to get ahead? No, because they're already in first place. And I think that's why there's so much discussion about how does Boeing build back to parity, which by the way, it's not even clear, they want to do that, based on again, comments from Calhoun about being like, “You know what, we're not going to chase market share, we're not going to get there, we're not going to go down the ranks and make some really bad decisions.” But I think Airbus

doesn't have to do this, principally, because they do have the larger share, and they can guide a lot of the conversation here by just doing what they're doing.

[00:21:44] IP: So, let's talk about Boeing's single aisle, issues at the moment. We've talked a lot about what they're going to do when the next decade comes, let's talk about what they're going to do until they get to the next decade, and one of the most pressing concerns at the moment is really, we've got two airplanes that need to get certified and not a real clear path to actually get those two customers at this point.

[00:22:10] JO: The craziest part of all this is that we have this conversation where we're like, banging the drum that Boeing needs to do an all new airplane. When we say Boeing needs to do an all new airplane, a lot of that conversation is focused around, somewhere on the 220 to 260 seat, 280 seat size, which is again, that airplane that we're working on just before Calhoun killed it recently.

I'll have the challenge psychologically, it's like a good problem to have, but I think it puts a yoke around your neck to some extent, is that the MAX backlog is so big, about 3,000, 4000 airplanes that how do you maneuver forward without putting that at risk? Because look, it is a big thing. They do have a major, a huge tremendous share in a duopoly and that's the product that they're that they're betting on, and one that they've already sold in one, there's a tremendous franchise as a result of its connection to the existing fleet, the existing 737 NG, which brings us to, of course, where they are today on development.

So, they have the MAX 8 in service, they have the MAX 9 in service, they have the MAX 8-200 and service, which is the high density, nearly 200 seat version, that's –

[00:23:21] JR: The Super Switch.

[00:23:22] JO: And within that they have sort of the core of their offering and overall majority of deliveries are from MAX 8s right now. The two remaining variants, the 737 MAX 7, which first flew in 2018 is principally an airplane for Southwest. It's sort of Southwest future regional jet so to speak at 150 something seats, and that has been in testing for a long time and it was actually used as the testbed for getting a lot of the MAX technologies ready back in service, revised

flight control, all that. But it's been kind of held up through a lot of paperwork design processing by FAA and Boeing around the new certification law which is extremely relevant relative to what I'm about to tell you, which is that one of the provisions in the new certification bill that that came out of the MAX grounding, crashes and grounding and return to service required the flight deck to have what's called EICAS. I'm going to mess up the acronym, but it's the Engine Indicating and Crew Alerting System. It's EICAS. I'm messing with it.

But effectively it's a display in the flight deck which prioritizes all the alerts for aircraft systems, tells you if the doors are open, tells you if the if the fuel pump is off, tells you if something has failed, and it prioritizes it in a nice color coded hierarchical way.

[00:24:46] IP: That's supposed to what on a 737 project?

[00:24:50] JO: I know one 737 Captain who calls it his Apollo capsule indication were you, on the glare shield, right in front of the pilot, you get a series of lights that flash and they tell you which panel, overhead panel to look at, if there's an issue. And then you go to that panel and you diagnose the lights that are that are up above. That is a very old way of doing crew alerting. Generally, it's been successful for the 737. There are absolutely documented instances where the way that crew alerting has worked on the 737 has not been successful, to make sure the crew is aware of issues when they need to be, which is a totally different discussion in its own right. But an important one very, very, very important one that probably requires its own episode.

But that requirement to have an EICAS system is now part of any airplane that would be certified by the FAA, after two years of following passage of the original bill, and by our calendar, that is the end of December of 2022. So, if the MAX 7 and the MAX 10, yet to be certified, slip into 2023, they are now required to have the system that has not ever been on a 737. Notably every single Boeing airplane, since the 757, and 67 have had this. So, 57, 67, 747-400, 777, 747-8, 87 have all had EICAS as a built-in system. Because you know something, it's a better system for telling pilots what's wrong with the airplane, it just is. It's been phenomenally well received by the pilot community. And it's also a regulatory requirement now.

So, when they did the MAX, they did not include it in there, because of effectively breaking the continuity of what they have always maintained was a consistent alerting philosophy from the

737 NG through the MAX, and would've, from Boeing's argument, would've cost considerable sums to incorporate in the airplane, as well as revising how training is done. And it's generally a dollars and cents argument for why not to do it in terms of EICAS. But now Boeing is making the argument that you don't want to have the MAX 7 and 10 have EICAS, but the 8 and the 9 not, and that would ultimately separate it on a type certificate where you had one group of pilots that could fly the 7 and 10 but couldn't fly the 8 and 9, and never the two shall meet.

[00:27:24] IP: With the EICAS installation on the MAX have triggered Southwest's contractual million dollar in airplane clause? When Southwest basically said, "You pay us a million dollars in airplane if we have to go into the SIM on this one."

[00:27:38] JO: Yeah, if they have to go into the SIM. That's the question. I don't know the answer to that. I would assume, yes. I don't know that that necessarily was the driver. But I don't think it's necessarily – Southwest gets sort of – this gets pinned on Southwest a lot that they were the sort of the driver for the cockpit. And there are certainly indications that that was true, but wasn't. But largely these decisions came down to Boeing and how they look at keeping the continuity within the NG, a fleet to the MAX.

So, if all of a sudden you have a 7 and a 10 that are required to have EICAS, assuming Boeing doesn't get action by Congress to change the law, which by the way, there has been action around that, hasn't gotten there yet. But there has been a move to move it to 2024 for that requirement. If it does go with EICAS, the pilots at American said, "Well, we want this, despite not having the MAX 7 and 10 on order." But the pilots at Southwest are like, "No, we don't want this", because fundamentally, pilots deal on standardization and we don't want our pilots going back and forth and having nonstandard, or a different standard for crew alerting on both airplanes, including the MAX 8.

So, it is a very serious and real threat to the 737 as a franchise, if they don't get these airplanes certified with EICAS. That being said, should EICAS be there? Yeah. And realistically, probably the whole 737 Max fleet should have EICAS. There's a reason it has been included in Boeing's other designs. By the way, designs from Airbus and Embraer and ATR as well. It's a better way to do crew alerting.

[00:29:25] IP: I mean, I don't think Boeing has ever come out and said it's a bad thing. They've never argued against the utility of it. They're just saying, well, we shouldn't do it for this, because we need to make sure everything stays the same.

[00:29:36] JR: It wasn't a bad thing to do is a bad thing from a business point of view from their point of view.

[00:29:41] JO: Right. I mean, look, the cold hard reality is incorporating EICAS into the MAX does likely break the type certificate between the 7 and the 10 and the rest of the fleet. And that has a cost in terms of development. It has a cost in terms of time. It has a cost in terms of training. So yes, that's part of it. The question ultimately is, does that matter relative to making, whether it's in the argument of the APA, the safest possible airplane, given that it is a safer system? Or on the other hand, having a different type of alerting system for the same fleet? Is that a good idea? I would love to see from the outside looking in here, FAA, and also weigh in on the human factors question here and they have not. And largely, I think, until, and frankly, FAA, has been left to solve this themselves, or at least, loves to do to enforce the law, which is that if after December, this airplane doesn't have EICAS, it does have to have EICAS. And if it's not certified, so it's been a political creation by Congress, in terms of ultimately moving the ball down the line and say, "Okay, you guys need to do this, but we're left to implement it."

So, it's a bit of a political mess as well. The question is, I think, in all the conversations I've had with wind pilots, and folks at both Southwest and American Unions who differ on this is that they both would like to see some level of analysis that answers the question one way or another, because you don't want to be cost driven. You don't want to be scheduled driven. You want to be human factors, data driven. That's the goal here. What is ultimately the safest outcome for the airplane, and those who fly on it? That would seem to be the most logical way of coming at this. Frankly, I think that would probably go a long way to compelling Congress act, and also explaining to those of us who follow this closely, and who are closely read and followed by the aviation ecosystem, to explain why they're making the decision that they are. And, look, I think this industry has always run best when it's data driven.

[00:31:54] IP: Jon, that all makes perfect sense. But setting all of that very reasoned, learned, impassioned, argument aside, are we going to see Congress move? I feel like none of that

matters if you can get a Senator to feel the amendment again. Wickers already put it in once. It didn't get in the defense bill, this time around. It could get into something else, especially in the lame-duck Congress, where it says, okay, Boeing now has another two years.

[00:32:25] JO: So, we're recording this on the afternoon of November 9. The US election was yesterday. We do as of right now do not know who controls either house of Congress going into the next year. January 3rd is when they all go back to work, that will decide priorities in terms of who runs many chairmanships and all that. A lot of this, look, members of Congress have a lot of different reasons for doing the things they do. I think it's important that when you think about giving them the best information up or down, it goes back to that data driven question, and how do they make the best decision.

I think Maria Cantwell who is currently chairman of the Senate Commerce Committee, which has oversight of the FAA, and in turn Boeing, where this would ultimately progressed, she's sort of looked to the FAA, for the answer. FAA is like, "Whoa, we didn't we didn't create this. Don't look at us for the cover here." So, the question, is there a human factors study that's going to be done by somebody, to say up or down, "Forget the dollars and cents of it. Forget the training impact of it. Forget what it does to for type ratings." I think it would make sense that there would be some level of regulatory study that comes along with a question like this, not just, "Well, you didn't mean to put it in there." Well, it's in there for a reason.

[00:33:49] IP: John, I think you are far more optimistic than I am, that there will be a safety based technological study done to determine whether or not this should be included in the best course forward.

[00:34:04] JO: That's what should happen. What's probably going to happen is, you know, dot, dot, dot. I don't like to be cynical about this process. But look, if they're excluded from China, and they've got Delta, Southwest, United, WestJet over the border, ultimately saying, "Hey, what's at stake is American jobs and American industry and the future of American aerospace, because would have to cut production or lay people off." Members of Congress, have constituencies and they're accountable to those constituencies, for better or worse, for the reasons that they have. Government relations folks act to advocate a position based on a lot of

different factors. So, does it end that way? I don't know. But members of Congress being members of Congress tend to have priorities.

[00:34:04] JR: So, we've talked about what Boeing isn't going to do for another decade. We've talked about what they're doing now in the single asset. Let's talk about what they're doing now on the widebody side. The 787 was grounded for nearly two years or not grounded for nearly two years, deliveries were halted for nearly two years. Well, Boeing figured out quality and production issues. Those issues have since been, if not resolved entirely, then figured out enough so that Boeing can rework the aircraft.

The interesting thing that and we mentioned this on last week's show is that they talked about how long it takes to rework each one of these airplanes, both the 737 MAX to get those that were previously built into service and delivered and then the 787s which needed reworking. Boeing said, it takes us as much time to rework the aircraft as it did to build it in the first place. So, what is the health and welfare of the 787 program at the moment?

[00:35:49] JO: Well, I think one of the things to keep an eye on since they started deliveries is what is the ramp up of new aircraft going to look like because they have this backlog of about 115 airplanes that they have to clear to get out the door for existing customers? So, it comes back to the question we talked earlier about the muscle memory of our production system.

Going into the pandemic, Boeing was actually on the way down in 787s, because they built so aggressively as an Airbus on the on the twin outside, there were a ton of airplanes that are out there. And so, there was a glut in the market. And they were already really heading down toward, if I remember, correctly, I think was seven per month, sometime right around now, before the pandemic hit, and deliveries halted and all that glut into a halt. I'm very curious, the 87 had only gone in one direction from 2008 through 2019. So, that 11-year period was effectively straight up to 10, 12, 14 airplanes per month. I'm really curious to see how the chain itself bounces back on the production side. And whether or not the muscle memory is going to be there in the same way, as they've seen troubles on the 737.

One of the big demand questions is this upcoming order decision from United, and United has a huge fleet of 787s now, and we're looking at 100 plus potential 787s or 350s, for the airline, that

is going to be a huge, huge, huge shot in the arm for Boeing, if, in fact, it is the way United goes. Given the incumbency, I think, ultimately, it's Boeing's to lose. But I think within that, again, what it's going to take to get them back to that tempo, and the supply chain back to that tempo. Coming off of the investor day, a lot of the Investment Committee was like, okay, they have this free cash flow goal of \$10 billion, by the middle of the decade. I think one of the things that they're looking at is, can you execute on that, and that's going to be the thing to watch. And, frankly, I think, what Calhoun has done is cleared out any other focus for the commercial aircraft business in the interim. It's deliver Max's, to get 787s back up, finish the 7 and the 10, get the 777X out the door by 2025. And then you can start thinking about whatever.

But Boeing is capable of walking and chewing gum, comes back to the new airplane question, and when you really start that in earnest again. But fundamentally, the wide body side is going to be driven by a lot of different factors. But again, that industrial chain has never slowed down before to this extent. So, I'm very, very curious to see how it, how it comes back up and whether or not it can come back up in the same way, as it was before it.

By the way, the original 787 ramp up was not a cakewalk. It was incredibly, incredibly costly, incredibly challenging to reach 10 a month, and they're saying by mid-decade, they want to be back at 10 a month. So, they certainly already have the infrastructure in place for it. Just having the infrastructure is obviously not going to be enough in terms of labor and all the factors that go into a ramp up. So, can be very interesting to watch. But look, the 87 has been a phenomenally successful product that has given Boeing an edge on the twin aisle airplanes, and I think that's going to be a big one to watch whether or not that that advantage can be maintained around deliveries. And Airbus went down to about five A350s a month, and now Boeing is sort of just getting back toward a slow tempo of building again and delivering. So, it's going to be interesting to kind of watch how that plays out.

[00:39:27] IP: And technically Boeing is working on a new aircraft. I think in all of this, we've really forgot the 777X exists.

[00:39:34] JO: It's been pushed out. Yeah, I mean, look, the 777X, I think it's an absolute beast of an airplane. It is a super twin in the truest sense. And come 2025, the assumption is that China will We will be back online in terms of international traffic, that the world will be have

moved past the sort of pandemic collapse and rebound and more into a steady state. And that that's when you bring an airplane to market – that's a market question, set aside the certification question for a second, but that's the market question. Yeah. I mean, that's going to be a big deal come mid-decade. Again, the here to there is sort of exactly what the investment community is wondering about.

[00:40:12] IP: So, what I'm wondering about, and you mentioned that Boeing can walk and chew gum at the same time. Is this a lack of confidence by Boeing's management in Boeing's engineering core? Is this something where they're saying, "Okay, we don't think you can walk and chew gum at the same time?" Because it seems to me if you put the Boeing engineer court to the test and said, "Guess what, we're going to start building a new airplane now, and we're going to fix all of these problems." If you post it as a challenge, it would be something that historically, Boeing could handle.

[00:40:49] JO: Boeing's engineering corps can handle it. Look, they are – you don't become a Boeing engineer without having significant expertise and capability that does not exist elsewhere. It is a world class engineering organization anyway you fold it. And world class engineering organizations like these, you can count on one hand in this world. And so yes, they can absolutely design a new airplane, no doubt. That would be tremendously expensive. I think that's an important piece of this, when you match it up against, they want to be back at three and a half billion worth of research and development spend by mid-decade. They're at about two annually, right now. A new airplane would significantly increase that. I think there is a question of how you allocate that free cash. There's a question about from the investor community, is that go to a new airplane? Would that be welcome if it went to a new airplane?

I do wonder, can Boeing walk and chew gum? Of course, they can. Of course, they can. The question is, does the leadership think about its ability to deliver a significantly better 757, 767 replacement that is significantly better and make a business case close? This is what I come back to about the pulling a rabbit out of a hat that – and this is something that I'm personally really curious about as someone who's watched this company so closely for a long time, thinking about the decision making, and what is the magic number for a Boeing leadership to say, "Yes, it's time to pull that rabbit out of a hat." And is that number arbitrary fundamentally?

And how do you get to that number? And what do you lose along the way, waiting so long to get to that number?

Richard **[inaudible 00:42:41]** makes the point that sometimes just got to get on with it. And I think, given the skill, and the incredible talent of Boeing's engineering leadership, yeah, they're absolutely capable of doing it, they just have to be given the opportunity to do it.

[00:42:56] IP: It seems to me that looking at the two MAX, the 7 and the 10, that either need to receive special dispensation with the United States Congress, which isn't an assured thing, or go back to the drawing board to add an EICAS. The 787, which is, I guess, a production issue at this point, rather than anything else. The 777X which is almost a production issue, but not quite yet, figuring out how to get 20% on a new airplane, before you even start designing it. It seems to me that everything has to go right for Boeing, from this point on, or the really becomes a question does Boeing Commercial Airplanes continue to exist?

[00:43:36] JR: Oh, you're just asking the hard question here. I was waiting for that moment. But somebody needed to ask it. Is there a future where Boeing exits the commercial airline space?

[00:43:47] JO: So, it's really interesting. So, looking at the history of Boeing, there have been very clear indications that there has been a desire to exit, and to still have products is one thing. To actually have an enterprise, be structured for and geared toward being the supertanker that a commercial aircraft company is, whether or not they actually want to participate in that and that was the 87 business model. Look, it was the famous, we're going to make a ton of money on this because the amount of the return on net assets Rona, as a metric they were using, the assets would be really small, but what you sell it for would be really big, because you'd have it all outsourced. That was a form of market exit, and ultimately Boeing's role as a systems integrator.

[00:44:35] IP: And that worked very well.

[00:44:35] JO: It was absolutely a complete disaster, complete disaster. Does Boeing, Boeing, the top-level entity want to be in the commercial airplane business? Certainly, it seems that way. But I think that might be a short-term question. And I think, beginning to pull the onion back or

open the purple the curtain back or whatever analogy you want to use, on new product development has to begin to illustrate that this is not a company, which they swear they're not, living off of derivatives are us, through the rest of the decade, and then launching a new airplane will be the next CEOs problem, or the CEO after that, depending on how long you wait.

So, the body language matters. And right now, the body language says, get MAX'S delivered, get 87s delivered, get the financial performance of the company, go and get the quality and the stability of the supply chain back where it needs to be, and that's the short-term goal. The question is, but this is ultimately a long cycle business and how do you get there and the dot, dot, dot profit is not clear right now, bridging into the back end of this decade and into the next.

[00:45:48] IP: It really feels like everything has to go, like whatever they're saying is going to happen, has to happen in order for this to keep going along. Because if there's kind of one more trip up, I feel like you get to the point where like, "Okay, there's just no coming back from this."

[00:46:04] JO: You have to assume that there will be. The reason I say is not because I think that it's assured, that something will happen. But look, something always happens in this business. And the exogenous shock, whether it is you know, COVID or 9/11, or SARS or whatever, always comes along, always comes along as an external shock. And what that does to your ability to weather that shock internally is really how you run enterprise.

It's funny, back in the 2015 investor conference, Dennis Muhlenberg was asked, so how do you plan for that big external shock that you all know is coming? And he said, "Well, we don't. We know what's coming. But I'm not going to sit here and over rotate on trying to plan for it." Well, that's probably the wrong way to run an enterprise of this size and desired stability. And here we are, right? So, the question then becomes, is it the shock, internal or external? And right now, the external hits have been coming pretty consistently, every 7, 10, 12 years. How do you weather that?

[00:47:11] IP: The internal shocks alone, I feel like the past couple years, and maybe this isn't the entirely correct analogy, but I feel like Boeing has shot itself in the foot, look down, taking a step forward and said, "Okay, let's do that again." And then been able to somehow figure itself out. But I mean, again, sticking with the pulling rabbits out of a hat, you said, this is not the way

to run an airplane business. I feel like they've been banking on pulling as many rabbits as humanly possible.

[00:47:42] JO: After the 87 happened, one of the big sort of rhetorical moments came from former CEO Jim McNerney, who himself as a former GE executive, said, “We're not doing moonshots anymore for a new commercial aircraft.” And so, what that did is it caused Dennis Muhlenberg when he was kind of planning out the NMA and the NMA strategy within Boeing Commercial Airplanes was, this is not a technology pushing airplane, we're going to take what we know, take this existing systems, shape of an airplane, we're just going to craft it differently to deliver a different type of performance and capability for customers. Okay, well, that's definitely not a moonshot, that's sort of an existing evolution. And then Calhoun comes along, and says, “Well, no, because it's not a big enough leap from what you had, and the market may not be big enough, and we're not going to do that. We have other priorities.”

[00:48:28] IP: We need to shoot for somewhere between the Earth and the Moon. Some point we're doing space station shots.

[00:48:32] JO: But the irony is that now, when he says, pull a rabbit out of a hat, that's a freaking moonshot. We're back to that. And it's like, and there is sort of an inherent contradiction, cognitive dissonance around we're not doing expensive moonshots for technology and propulsion, which by the way, is exactly what he's –he said we're not going to do that now. But we're going to do it eventually, is just going to cause that cost to ballooning even more the longer the wait.

So, there is this real kind of contradiction in terms that exists within how they're thinking about product development in the future of their presence in this marketplace. I understand completely, the focus on getting the 737 supply chain reconstituted and stable and 87s delivering and all the final tools they have now. The problem is then again, returning to this moonshot mentality, that's how you're going to get there and that just makes it more expensive.

[00:49:27] IP: I get that you need to get your house in order. But I keep coming back to, you also need to have what's next.

[00:49:34] JR: In the meantime, they've had nothing to show off either. I think one thing that stuck out to me from the investor day or week, whatever it was, that what Boeing was showing off to their investors and their partners was the sky interior. And hey, our windows on the 78 are larger than the A330. That's what you're showing off to investors and people who buy airplanes? What have you done for me in literally the last decade. They or have anything to show.

[00:50:03] JO: I think one of the things that they wanted to show was the triple 777X, 777x interior. I think from a passenger perspective, I think because of that individual point, that's obviously, now we've kicked down to 25. But I think, there has been – the airplane portfolio has remained unchanged, since the 777X. But with a notable exception of the 777-9, 8F, the freighter that was launched earlier this year. This has been the lineup since 2017, when the MAX 10 was launched.

So, moving forward on that, yeah, I think that don't fight the last war. I think thinking about what comes next, and a lot of the things that they think they really want to show are happening on the defense business, which by the way, has been a real historical template for Boeing where, whether it was composites on the on the B1, or the digital tools on the X32, Joint Strike Fighter offering in the early 2000s, lead a lot of the foundation for 787. The last moonshot, right? And we heard a lot of that message again, which was we're going to let these technologies mature in our defense business, and then when they're ready, we're going to bring it over to the commercial business. And I think that's going to be very interesting how those are ultimately reconciled. But again, it's a lot of a return to the old template that has caused them problems.

[00:51:19] IP: Well, as we keep following along with whatever Boeing is going to do, I think this is a very in depth primer for where Boeing's by the past couple years and where they see themselves going, and kind of where folks on the outside see them going. So, I want to thank Jon Ostrower, who is the Editor-in-chief of The Air Current for joining us, for what has been a very enlightening episode and very thorough episode. And so, Jon, thank you, as always, for coming on the show. We really appreciate it.

[00:51:46] JO: Always a pleasure. Thanks, guys.

[00:51:47] JR: Thanks, John.

[END]