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Good day and welcome to the BofA Securities Airworthiness Directives: A deep-dive with GE. Today's call is being recorded. I'd now like to turn the call over to Andrew Obin. Please go ahead sir.

Andrew Obin: Yeah, good morning everybody. Thanks so much for joining us. For those of you who don't know me, I'm Andrew Obin. I'm still the GE coverage analyst, but there's been a lot of inquiries about recent headlines on specifically Airworthiness Directives, and I think the goal of this call is to dispel, is to provide some insights to investors as to what these are, and to dispel some misconceptions as to what's really going on. And we have Ron Epstein, Dr. Ron Epstein, BofA's aerospace and defence analyst joining us who will be hosting this call co-hosting this call with me, and GE made available Dr. Mohamed Ali, who is VP and General Manager of Engineering for GE to take a deep-dive into the Airworthiness Directives.

Before we start, a couple of things, we have roughly 40, 45 minutes to talk. If you have questions, feel free to id Ron Epstein if you have any questions that you can incorporate into the dialogue. And I would remiss if I did not mention that it's Steve Whittaker's birthday, so I think we should all wish Steve a happy, happy, happy birthday.

He's on mute, but I absolutely wanted to make sure everybody knows that Steve is on, and the birthday boy is working today. And with that, I'll turn over the call to rocket Ron, Dr. Ron Epstein. Thank you.

Dr. Ron Epstein: Hey, thanks Andrew. Yeah, thanks everybody for dialing in, and going into this long weekend. Given everything that's been going on out there with regard to there's been Airworthiness Directives or potential ones on the engines and airframes and all kinds of things, this was a really timely offer from the folks at GE.

So Mohamed, I know there's a lot to talk about recently. I was just wondering if before we go there, if you could maybe put this in context of the overall safety and quality culture and processes at GE, and kind of in that framework also within the industry, right, how safety is really tends to be generally right, priority number one for the entire industry for the FAA, all the regulators and so on and so forth?

Dr. Mohamed Ali: Sounds perfect, Ron, good morning. First of all, thank you very much for the opportunity to talk about something that we in GE, and I think I would say the whole speaking probably for the whole industry if I could, that the whole industry would care deeply about regarding safety. But and I -- you want to really think when you think about the industry and also about GE from a safety and quality culture and the processes, there are really three pillars to that.

Number one is Safety, is always the number one priority for our business, for the industry, and it's not something we compete on. As a matter of fact, we cooperate as an industry to promote safety, and advance safety. That culture is what led to successive improvement from one generation to the other in the whole industry on safety, making it the safest method of transportation. And we are here in GE, exceptionally proud of that.

We always repeat our purpose statement. We invent the future of flight, lift people up, and bring them home safely. The second pillar, when we think particularly about GE, and when I first joined GE Aerospace in particular, you can see that permeating the entire culture. Maybe a little bit of background, I started in GE in 1997.

I worked at the GE Global Research Center, not very far perhaps from most few are in Upstate New York. And then later, I joined GE Aerospace, attracted by this, the pinnacle of engineering in the company, and perhaps in the world. But one of the things you can keenly observe in the company here is the Sioux City tragedy in 1989. This was an important cultural milestone, and led us all here to think about safety quality processes in a very deep manner.

And many of the safety processes and tools that came as a result of Sioux City is the culture we live in right now. And there is something we always say to each other whenever we are discussing a safety issue matter, is this a Sioux City moment, and what do we need to do? And that becomes the cultural alert and trigger that makes us all keen on. We are going to detect it early. We're going to solve it early because safety is number one for us.

The third pillar I think when you think about GE as well as also the entire industry is what we call the Safety Management System. And we proactively in GE implemented what we call the Safety Management System. Acronyms are SMS, and I apologize this, we are all particularly -- probably a lot of acronyms around here. But we implemented that in 2013 proactively, and it incorporated all the safety processes that we learned as a result of Sioux City and since 1989, up to that point in 2013.

Then the FAA established a voluntary program for OEMs, and GE became the first one to be accepted by the FAA in December of 2017, and to have a Safety Management System. So we're very proud of that, of being the first in

the world, and also the first one to be accepted by GE. And this month, we're actually celebrating ten years since the implementation of SMS in GE.

And there are just maybe quickly four pillars to the Safety Management System that we advocate for, and the regulators do as well. It's having a safety policy, which reflects the commitment of the senior management team to understanding and continually improve safety across the entire company.

The second one is Safety Assurance, meaning you are going to be continuously surveying what's happening out there in the manufacturing processes, in the design processes, and the operating processes. Think about it as a safety surveillance to assure safety moving forward.

The third one is a Safety Risk Management is when you do change management process, are you understanding the safety risk implications of that, and how we factor that in moving forward. And the fourth pillar of Safety Management System is what we call the Safety Promotion, which is continuously, educate everybody within your four walls and outside your four walls. And here I'm not talking about only engineering. I'm talking about everybody about the importance of safety, and the cultural impact of that.

We have safety month, we actually start every meeting with a safety moment. You probably have seen some of that in our investors meeting when we started all the investors meeting with a safety moment. This is all part of an architecture and a culture in GE, and an entire industry that puts safety of the flying public first.

Dr. Ron Epstein: If you could just for maybe some of the generalists on the call, maybe just take 30 seconds and remind folks what happened in Sioux City because it was a long time ago, and there's probably folks on the call who don't know what really happened there.

Dr. Mohamed Ali: I was -- I think I was in high school perhaps at that time. What happened in Sioux City is a fan disk that had a defect, and that resulted in an uncontained failure of that fan disk. A disk is a high energy rotating part that is when it fails because of its high energy, it's hazardous to significantly hazardous to the aircraft. The pilot in this case, they lost authority over control authority over the aircraft because the fragments of the disk, they shear the control surfaces or the control levers that are part of the aircraft, so lost control of the control surfaces.

Think of wing flaps and tail components, and the heroics of those pilot they were able to actually actuate using the thrust lever, differential thrust levers between the two remaining engines to maintain authority over the directional authority over the aircraft. They were able to control it. They actually managed to land in Sioux City, however, they came short of the runway, and that resulted in the loss of life of 111 people.

That's really just shortly what happened in Sioux City that led to a whole cascade of obviously process improvement, early detection. This was a titanium disk led to the formation of committees across the industry, so that we are all collaborating and sharing information about how to manage at what -- at that time were new titanium alloys. And since then, all of these processes led to significant improvement in the safety, and the safety culture, and the safety processes across the entire industry, not just GE.

Dr. Ron Epstein: Yeah, that's amazing. Has it changed much in recent years?

Dr. Mohamed Ali: Improvements, I think and you see that like the outcome, you see it it's in the -- I mean our goal is that, and we know that that's the case today is when the flying public is getting on an aircraft. My mom, your mom or families, when they're getting on an aircraft, they're not thinking twice about is this safe or not? And that's really a testimony to the strides that happen in the industry, and we continue to do that.

But several things have changed. Number one is, I want to start with the lean prioritization. You heard us talking about lean, safety, quality delivery cost in that order. That was an important cultural reinforcement for the entire company here. And as I mentioned, you have seen that during investor events that we start with a safety moment.

We have in the past few years launched what we call Proactive Enhanced Inspection of safety critical parts in the field. This is really on the premise that these systems are designed and manufactured and operated by humans. Therefore, there's always a probability, even though it's very rare and very remote, there's always a probability of something to be caught, and we would rather find it early.

And while the part is with us rather than the issue finding us that was the premise of adding more proactive enhanced inspection. And in the past decade or so, inspection technologies, learning also from the healthcare industry have made quite a bit of stride. And our goal is don't leave any rock unturned that we would use the most advanced inspection technologies available.

The third element, which I'm really excited by is the On-Wing and Module Level inspections and even interventions. And I just actually was at our GE Global Research Center where I started, I worked there for ten years, I mentioned that to you. And I'm really excited by the development going on for On-Wing Inspection capabilities and even Intervention.

We talk about snake robots that will go inside the engine in ways that think about the non-invasive surgery. And that not only would help us to uncover issues and detect them early, but also minimize the disruption in our customer in the unlikely event or improbable event that we actually have an issue.

Quite honestly, we have in GE this is in GE in particular. We have more products than in the past. So there's now more focus on how we do the read across between all of these different products. So if we discover an issue in one product line, we make it part of our standard work, how we migrate that discovery and understand it, and assess it for all the other potentially impacted product line.

And quite honestly, finally, supply collaboration. We launched a program. We call it Partnership for Safety and Quality. This is important because we recognize that we cannot only look within our walls, and the idea is to make the data flow directly from them to us, in a collaboration I frequently go and visit some of those critical rotating parts and raw material suppliers.

We work together on what we call Process F-Failure Modes and Effect Analysis. Look for every possibility with our eyes and with the data, every possibility that there can be an escape, and how we continuously reinforce our defences. And last, quite honestly, the usage of data, operational data. We get a tonne of operational data. We have algorithms continuously watching, and that gives us an early indication about what potentially can happen in the field.

And as I mentioned, early detection followed by early intervention is actually the best way to handle it to a) obviously improve the safety, but also minimize the impact and disruption to our customers.

Dr. Ron Epstein: Man, that makes a tonne of sense. So if we kind of move back towards Airworthiness Directives, can you put them in context for the generalists who are on the call so folks that just don't specialize in a) aerospace and defence? Why do we have them? How many do we have? What are the issues? What are the different types? What do they mean? Are they something to be afraid of or not? If you could put that in context.

Dr. Mohamed Ali: Ron, that's a big question, but let me try. And first, I'd like to, I think it's important for the generalists to maybe set the table a bit about roles and responsibilities in the industry because it is an intricate system that works really well. And as I said, the outcomes are the safest method of transportation, but it's also an intricate and a complex system because we're also dealing with complex machines here.

And the roles and responsibilities here become really critical. So let me start with the airline or the owner and operator. They are responsible for the airworthiness of the products they operate. They are responsible for following the product maintenance instructions and operational instructions, which are created by the original equipment manufacturer with us being one of them, which these instructions for continued air worthiness, they are overseen by the regulator.

We develop them, but they are instructions for how to operate, and how to maintain, and how to repair the product or the asset that we are talking about. But the responsibility for that airworthiness and continued airworthiness from the time they take custody of the asset is with the airline and owner and operators. Then after that, let me talk about the original equipment manufacturer responsibility.

They have a responsibility because they are authorized to design a product that the public can fly on. Comes with that, a responsibility for constantly monitoring the performance of the fleet, and the manufacturing processes. And I think I talked about data enhanced inspection, operation data, operational data from the engine and the aircraft. That's where a lot of progress has happened in the past, call it decade or so.

The OEM has the responsibility to recommend additional or updated instructions based on learnings, and do that as fast as possible, and we then share it with a customer officially through what we call a service bulletin. So the service bulletin can have an updated instruction for either the way to operate or the way to maintain or the way to repair the asset.

The service bulletin, when we issue it, and as we are developing it, that process is overseen by the regulator. As OEM, we publish those service bulletins. We have an ongoing dialog with the customers. And but what we issue as a service bulletin is a recommendation. As I said, the airworthiness responsibility is with the airline owner and operator.

They can include -- these recommendations would include details of approved modifications to the engine, how to do such modifications, repair, ongoing inspection details, how to do that inspection. But the execution of that service bulletin is at the discretion of the owner and the operator because they are the ultimate owner and responsible for the air worthiness of the asset.

Then that's when the regulator would come. They use this info that I just talked about, which we have a responsibility to continuously transparently share with the regulator, but they use this information and their own monitoring and capabilities to independently assess, and define the action needed, and they can deem certain actions to be mandatory in order to maintain safety of flight.

And that's when the Airworthiness Directive would come in play here. It's one of the tools, it's a notification to the operators, which outline to them mandatory action or limitations. It's part of the law to maintain that safety.

And the civil aviation authorities, they are responsible for issuing that Airworthiness Directives in the United States as obviously is the FAA. And the Airworthiness Directive is a public document. In the United States, it's published

in the federal register, which I know that at least some of you have seen how those Airworthiness Directives are structured, and are written.

I think that was very important to really first understand the roles and responsibilities, and how this entire system has worked to continuously improve the safety. You should view it as its one of the tools to improve safety of the flight public, and it's a regulatory process, and it's a regulatory action that they do, and we play a role, we have a responsibility, but at the end, it's a regulatory process executed by the regulators to perform those Airworthiness Directives.

Dr. Ron Epstein: Now there's different types, right?

Dr. Mohamed Ali: Yeah, there are, and there are three types. The first is called NPRM. We always refer to them as NPRM, but they stand for Notice of Proposed Rulemaking, which ends up being followed by the final rules Airworthiness Directive. This is the standard process. This is most of the vast majority is majority of the Airworthiness Directive will be in this category. It's a regulation making process. The public can comment, and then the final rule is issued. This takes multiple months typically for that process to take place.

Second category or type, it's called IAR, Immediate Adopted Rule or Immediate Adoption Rule. This occurs much less frequently. It's used when the condition requires action quicker than the NPRM, so typically weeks or small number of months. The final rule is issued here and it's effective immediately. The public commentary is still required. The regulator can incorporate these public comments later.

The third type is what we call Emergency Airworthiness Directive. This occurs very infrequently. It's very short-term action. And if a very short-term action is required by an operator, and typically we talk about days and no more than weeks, there's no public commentary involved. And obviously, you can see that that's when the regulator deems that a quick action is more important than a public commentary process. So these are the different types of the Airworthiness Directives.

Dr. Ron Epstein: I mean, you kind of talked about it a little bit, but I mean, what would catalyze one of these being issued [inaudible]?

Dr. Mohamed Ali: Yeah. Obviously, the goal is to maintain the safety of a product, and usually three aspects here to think about when the regulator would deem that that's important issue and an Airworthiness Directive. It's either they want to impose a new requirement or limitation based on a new learning.

For example, a product design learning or a manufacturing process learning, and they deem that that needs to be imposed to maintain the safety of a product. Second is addressing a condition, which was incorrectly fielded. For example, a quality escape, discover quality escape in the process, it wasn't supposed to be fielded, and the regulator think that to maintain the safety of a product, this needs condition that was inadequately incorrectly fielded needs to be addressed.

The third aspect, or the third tool or goal, really is reinforcing an existing requirement, which are not being followed consistently. So some are following, some are not following, and the regulator will deem it that it's important for the maintenance of safety of a product that it becomes compulsive to follow that already existing requirement. So these are really the three different maybe sub-goals from maintaining safety that the regulator will deem that it needs to be issued.

Dr. Ron Epstein: Got it. And then what are the key elements of an AD when one is issued?

Dr. Mohamed Ali: Sure. Yeah. And AD is they will have a preamble. It'll describe, and if you have one in front of you, you can easily follow me here because that's standard work. A preamble, it describes the condition to be corrected, it summarizes the rules. It will say what the product impact it is, the date, the timeline for implementation of the corrective action, the economic burden.

If it's a final terminating action or not, if it's an interim action, and it'll also list a previous AD that this one potentially would be superseding. And while you are thinking, and perhaps this is the crux of the discussion here. As you are reading the AD, you're really -- one thing I want you to leave today with is not all ADs are created equals.

And there are four key components that while you are reading the AD, you really should be looking for those because in trying to assess the impact or the disruption, which I think is what you are kind of thinking about or the investor committee would potentially be thinking about as they're assessing an AD. And I think there are four key components to think about here.

Number one is the impacted population. Are we talking about one engine, five or a thousand or the entire fleet, that obviously, the scale of impact here varies widely on that. And there are ADs for a handful of engines then there are ADs for thousands of engines.

Number two is the compliance timeline. Is the compliance timeline within days, which you can imagine more disruptive than if the compliance timeline is at the next regularly scheduled shop visit. And we have cases in which the AD is a visual inspection at the next of a component at the next shop visit, next regularly scheduled shop visit.

That's obviously very different than the compliance timeline is to do an action or perform an action within days or cycles or before the next cycle, which as you can imagine, that would be the most disruptive.

The third component to look for is what's exactly the required action? Is the required action to remove the engine or is the required action to perform an On-Wing Inspection or is the required action to do a repair in a certain way at the next regularly scheduled shop visit? And that's a huge scale in terms of the disruption to the customer, and therefore, the cost as you can imagine.

And then the fourth aspect, which is also in the AD is the type of the AD itself. I think we talked about three types of the AD, NPRM, immediately adopted rule and emergency AD, the type of that action, the type of the AD itself is the fourth component that you can assess. But that I think gives you an idea about that it's -- not all ADs are created equal in terms of the disruption nor regarding the cost in the end.

Dr. Ron Epstein: And typically, how frequently do these things come out? I mean, what's kind of "normal"?

Dr. Mohamed Ali: There is no, and trust me, we studied this a lot here, but there's no typical frequency or rhythm of how often the authorities would issue an Airworthiness Directive. And they are issued when the regulator determines that to maintain safety of the product and action or a limitation must be mandated.

When we look at it, you would see that it actually is a big function. Maybe the biggest factor that we have seen is the size of the fleet and how much the fleet is flying. And that actually is about the only trend we can see. It means really that as the fleet is big, and as being used, there are more opportunities for learning and more opportunities for service bulletins learning, and therefore, and some of them will become an Airworthiness Directive.

I wouldn't look for a typical frequency, but maybe just to calibrate you, so far this year, between GE and CFM, we had about eight Airworthiness Directive. We went all the way back for many, many, many years, and we have seen on average about 14 per year.

Dr. Ron Epstein: Got it. And there are differences between say a mature engine and a new product introduction or a widebody engine and a narrowbody engine?

Dr. Mohamed Ali: No, we could not. We -- again, as I mentioned, we studied this quite a bit. There is no observable correlation to any of that. The most, the only observable correlation of AD is to the size of the operating fleet and the hours and cycles are being accumulated in that operating fleet. That's the most recognizable trend that we can see.

And as I mentioned, the more we exercise the product, the greater the opportunity to have learnings. And I want to say that that's part of the whole process. It's one of the tools of the whole process to continuously improve the safety for the flying public.

Dr. Ron Epstein: Got it. And then I mean, you alluded to this a bit before, but maybe if you could be a little more specific. In the AD process, what is the manufacturer's role?

Dr. Mohamed Ali: Yeah, so I want to reinforce one thing first because I think this is really important about roles and responsibilities. The AD process is that regulatory process executed by the regulator. Our responsibility in having approval of our design to be fielded, and used by the flying public, and the operator is identify and correct potential unsafe conditions in the product, including making design or manufacturing changes to the product.

And those actions are all executed with the oversight of the regulator. And this is really important actually with transparency, from identification of the issue all the way to the recommendations being made, and for the actions to be taken by the owner and the operator. And I'll tell you, honestly, the best day I have is when our Airworthiness team, who is our primary interface with the regulators, would come to me and say the feedback from the FAA is they are thankful that we have been sharing the data transparently, and we have been sharing it early, and we're dealing it with urgency.

That's a key component. It's unwritten component, but it's a key component of our responsibility, that transparency with our regulation[?].

Dr. Ron Epstein: Right. And then how do you -- how does one determine the impacted population, the actions needed, the estimated costs? And I guess more importantly, does the cost always fall on GE or the OE or does it sometimes fall on the operator to actually pay for the resolution?

Dr. Mohamed Ali: Ron, let me try to unpack that. First of all, we use a rigorous process for how to investigate a safety concern, and actually a rigorous process for problem resolution in general. And actually, this is the first training that any engineer would join the company.

The first thing they do is the first thing I did, is get trained in the problem resolution process, and then later on the safety concern investigation process. And it starts with root cause, understand the root cause. You can't fix something that you don't really understand the root cause of so.

And I think you remember maybe me talking about turn on, turn off. So root cause then talk about the corrective action. And this is where the engineering team is focused, and we have multiple step process in order to achieve that. And I think, I mentioned with the enhanced inspections that we do, and the data that we get from the fleet, that helps us a lot in making the detection to be early, and honestly in making the arrival at the root cause, and therefore, the corrective action to be earlier, and maybe a little bit more background here about how it works.

We get that data and about the issue, how it's being operated, the operational data enhanced inspection data, and we try to determine the root cause. Sometimes there's testing involved that we have to do in-house etc., or in collaboration with the supplier, in case, the supplier plays a role in there. And then after that, and when we arrive at what the corrective action could be, there can be a whole range of corrective action that we're looking at.

And that's when we try to assess what's the best corrective action we can take. And that's when technologies like On-Wing Inspection can play a big role in developing that. And quite honestly, especially recently in the past decade with all the data coming, we are able to segment and stratify the affected population. So even though it might be a single issue, but it doesn't affect all engines in exact same way because they might be operating differently in the -- being operated differently in the field, but also because the magnitude of the issue also varies.

And that's when data plays a big role. And then we try to tailor the action to even the subpopulation as much as we can. And perhaps if you look at our Airworthiness Directives or our Services Bulletin, you would see some of that is we break it into multiple subpopulation, and tailor the corrective action to each one of them. Granted, that can result in a large number of service bulletin, but in the end, it's a more, it's actually a better solution for the safety of the public.

It makes us understand the root cause better, which means also that we arrive at a better corrective action. And actually, that's why that the multiple service bulletins, each one of them dealing with a subpopulation, and therefore the potentially multiple Airworthiness Directives could be resulting from that gives you another indication for why the number of the Airworthiness Directives alone without factoring some of the nuances I mentioned to you, doesn't tell you enough without understanding the substance and the context of what we are talking about here.

So I hope that gives you an idea about the process we go through. And during that process, it becomes really important for us from the early identification all the way to the corrective action, to transparently talk to the regulators and transparently talk to our customers. Working with our customers, even though it might be a complex root cause investigation, it's important that they know what's going on so they also understand and help them in their planning process for their fleet planning and schedule planning process.

And obviously, I can't emphasize more the importance of that transparency with the regulator because a well-informed regulator that is as competent or even more competent than us is actually a very important, and that's informed about the details, and how to think about these complex machines is very important for the entire safety architecture in the whole industry. Now talk about cost, which I'm sure is very important for you.

And the answer directly is it depends, Ron. Once we understand the corrective action, now we are able to estimate the cost and the financials and who bears that cost is it depends. There are situations when customers would bear the cost. There are situations not. It's really a function of the commercial arrangement with a customer and the level of the disruption that's being impacted, and what's in the contract.

And quite honestly, what is the arrangement you want to have with a customer? There are maintenance assumptions that are being made and does this fall into the maintenance assumption for that fleet contractually negotiated with the customer or not? Short answer is it depends. And it's not necessarily true that the OEM would bear the cost all the time. That is not true.

Dr. Ron Epstein: Maybe this is a good time actually too. Can you give an example or two of maybe a GE AD that was less significant, maybe one that was more significant just to give folks a feel for how to think about it?

Dr. Mohamed Ali: Let me try. Actually, we went in preparation for this. We went back about more than 20 years, and we could not find an AD for GE or CFM affecting a very large portion of the fleet for immediate grounding for example. We couldn't find any.

In the last decade, we had about six emergency ADs. Again, if you recall, this is one of the three types of ADs that require short-term action. One example, several years ago, we had a high pressure turbine failure in GE90, and resulted in ejected takeoff. And within days, we issued a service bulletin, and it became an emergency AD to remove fuel[?] suspect engines.

At that time, we had not yet confirmed the root cause, but we did this action out of abundance of caution. And as I mentioned, affected fuel[?] suspect engine. With more data coming, being able to analyze the manufacturing data and the way the engine is being operated within month, we identified the root cause, and we issued an additional service bulletin, and then we worked with our customers.

And this is something I'm personally very proud of. I was leading that team at that time, and we worked on an alternative method. We call an alternative method of compliance in which we developed an On-Wing Inspection to reduce the burden on our customers for doing that.

We obviously never wished this for us or for anybody in the industry. But as I said, these are machines designed by human, made by human and operated by humans. But what shows you here is the speed of the action, the intensity of the action. You do certain things out of abundance of caution while you're developing the root cause. And then that's when technology will come in play.

Also about minimizing, getting the data early so we do the early detection, so the affected fleet is not big, and also use the On-Wing Inspection technologies that we have been developing for at least the past decade in order to reduce the burden in our customer and collaborating with them about it.

Dr. Ron Epstein: Yeah, that makes sense. Without commenting on Pratt specifically, which I know you probably wouldn't do. Could you talk about the specific history with powdered metals and contaminant issues? What has been kind of the GE process impact? That's one area where there's been a lot of questions just broadly on the industry.

Dr. Mohamed Ali: I think, Ron, you got it exactly right. I will not comment on anybody else. So a few years ago through our and maybe talk about our experience, we had powdered metals for[?]us. We have it on GE90, GEnx, LEAP, several other engines. And a few years ago through our enhanced inspection, we identified contamination source.

And there is, I'm not going to add a whole lot here to what we said by the way before about it. We found the root cause. We corrected it. We issued the service bulletins with oversight from the regulators and working with customers. And all of that is factored I think in our financials that we talked about before.

And some of these service bulletins are now Airworthiness Directives. But the one part that's really important and I want -- as we reflect on this, there were few key enablers to highlight. Aircraft engines are awesome machines. They are complex, high speeds, tiny clearances with unmatched safety record. It's the safest method of transportation. However, designed by humans, made by humans, operated by humans. And as we improve the technology and push the boundaries or envelop of technology, there will be learnings.

That's a normal part of the process that we go here. But the key enablers, and I think that's what we expect of ourselves. That's what our customers and the regulators and the flying public would expect from us is number one. The design system of these critical rotating parts that are probably the most critical for safety because of their high energy and high speed.

We design them so that they are damage-tolerant, knowing that there is a potential for an error to be made, and no process is a 100% perfect. That's number one. Number two, we analyze a lot of data from suppliers, customers,

how the asset is being operated, and how it's being manufactured through the enhanced inspection I mentioned about, and we constantly expand the enhanced inspection capability and the fleet monitoring capability, and we use that data, and we have been expanding that significantly actually since 2019.

This allows us to detect issues early. Technology or inspection, and all what you hear about big data, this results in early detection. And as I mentioned, the earlier, the better. And three, and this one, I cannot talk enough about. A culture of transparency do not coexist with problems. This is what I keep telling the engineering team. Keep telling the supply chain team.

You saw that we were the oldest adopter of SMS in the company. The transparency culture leads to speed of tackling the issue. The fourth pillar that we reflect on powder or any other technology is continuous improvement. You have to realize that it's not a perfect system. And what your goal is, have you done everything you possibly know how to have you realized that it's not perfect.

If you assume everything is perfect, it's not, and the issue is going to come to find you. That is an important realization. I think that's also in the spirit of lean, that when Larry came, that was a big reinforcer to that culture of continuous improvement. So that's really, as we reflected on powder or any other technologies, these were really the four pillars that I think were the key ingredients for us tackling that issue or any other issue.

Dr. Ron Epstein: And maybe just one last one as we were coming up rapidly running out of time. Is there any final points, you'd want investors to understand here just to kind of reiterate to the A&D investment community when they think about this stuff?

Dr. Mohamed Ali: Absolutely. I mean, number one, goal is safety. Minimize unsafe conditions in the industry and continue to make strides and meaningful investments to improve that safety. Talked about technology, the data, the inspection capability. That's the goal is safety.

We do not compete on safety. We prioritize communication and the industry committees to our competitors, and I believe they do the same thing too. So we continuously raise the level of safety, and the industry is unlikely, completely free of unexpected conditions. It's a complex design, manufacturing process, maintenance of a product.

When needed instructions, we communicate that proactively with the service bulletins, technical data and symposia with our customer engagement. And we communicate frequently with the regulators, and the Airworthiness Directives are one of the tools and part of that continuous improvement of safety system. So it's important for you not to view it as won't ever happen or should never happen.

In fact, we encourage the regulators to issue Airworthiness Directives, mandated recommendation service bulletins, even though most of the time actually our airline customers would comply with the service bulletin. This is one of the tools to maintain safety. There is no set timing, frequency or standard impact.

I think I talked about the four things you want to look for when you are leading an AD, trying to decipher the disruption or the cost. Impacted population, compliance timeline, required action and type of the AD itself, don't take a pure count as indicative because it's not, and don't assume that all the cost would be burdened by the OEM. That's also not true.

I want to finish by saying it's the safest method of transportation, and as a leading manufacturer of aircraft engines, and we are a thought leader in the industry too, and we're proud of that. Our commitment is to improve that further while we are expanding the boundaries of technology.

Our goal is to make the current generations of engines safer and safer, and the next generation of engines to be even more safe for the flying public. That's our number one goal for us as well as for the entire industry, and how it works together here.

Dr. Ron Epstein: Well, Mohamed, thank you so much for spending the time with us today. We're out of time now, but that was a great conversation, I think really useful for everybody to try to get their heads around Airworthiness Directives that have been kind of more in the news lately. So thank you for that, and thank you for taking the time. I know you're busy with everything going on, so thanks for spending your time with us.

Dr. Mohamed Ali: Thank you for having me. I appreciate it.

Andrew Obin: Thank you very much.

Dr. Mohamed Ali: Thank you. You enjoy a long weekend.

Andrew Obin: Yeah, Ron, Mohamed, thank you very much, Doctor, Doctor, birthday boy, thank you all for joining us.

Speaker: Thanks, bye.

Operator: And this concludes today's conference. We thank you for your participation. You may now disconnect.