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General Electric Co Aerospace: Paris Air Show Presentation

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PRESENTATION

Steven Eric Winoker General Electric Company - VP of IR, GE Aerospace VP of IR

Good morning. Welcome to the first Investor Meeting at the Paris Air Show since 2019. Last time I was here as well. It's great to see so many familiar faces with that, as well as our March investor meeting. Slightly more intimate, smaller facility. So I appreciate everybody who's been able to make it here as well.

When I see that video, I couldn't be more excited on behalf of the team, and we're all so excited for the future of GE Aerospace as a publicly traded independent company that's going to launch sometime early in '24.

Many of you have had the opportunity to see and will today our innovation and technology as well as our commitment to customers on display at the innovation showcase as well as through the air show. And hopefully, you had that opportunity or will.

Before we start, though, a few familiar reminders. First, the materials for today are on our website. Second, as usual, some statements we're making are forward-looking and based on our best view of the world and our businesses as we see them today. As described in our SEC filings and on our website, those elements can change as the world changes.

Now remember, at GE, with all our meetings, we start with SQDC in our framework, right? Safety, Quality, Delivery, Cost. Safety, number one. So with that in mind, let's begin with how our team on the ground from our ACSC business, Aerospace Component Services Center in Ohio, developed a pretty unique solution through lean practices to eliminate ergonomic risks.

(presentation)

Steven Eric Winoker General Electric Company - VP of IR, GE Aerospace VP of IR

So just a great example of using lean to reduce injuries, not just throwing money at capital and equipment before you get the process right, but using the process to help design equipment that actually improves the process along the way. I love seeing that.

So GE Aerospace overall is a safety-critical business. In that light -- an important reminder. For those in person here today, in the event of fire or other emergency, please exit the building through the doors closest to you and proceed to the gravel area that's outside the room where we just had breakfast.

So excited to be here today joined by Chairman and CEO, Larry Culp; as well as CEO of GE, as well as CEO of GE Aerospace. Many of the same leaders you heard from in March are here, Russell, Mohamed. We've got Amy, Rahul, and we have 2 new leaders -- not new



leaders, but new to you, maybe on stage. One of them is Mike Kauffman, who runs and leads our supply chain with our supply chains around the world. Fabulous to get him on stage here. Riccardo Procacci, who runs Avio Aero based in Italy as well.

The agenda, as always, is packed. We tried to make -- fit in as much content as we could in a small amount of time. So presentations, Q&A sessions that will follow. And then, of course, our innovation showcase after all of that.

So with that, I'd like to welcome Larry to the stage.

H. Lawrence Culp General Electric Company - Chairman & CEO, GE Aerospace CEO

Thank you, Steve. And as Steve indicated, what we try to do with that safety moment is just start every session off with a reminder as to why safety is so important. Just keep it front and center. And as you saw on the video, also try to leave everybody with a little bit of knowledge, a little bit of perspective on how to improve safety. Hopefully, you took that away. I think most of our colleagues do when we start our meetings like this when we're back in the office. Welcome. We really appreciate you coming in to this admittedly frigid environment that Steve has created for us this morning. That's small humor. Everybody got it, will digest that as the morning goes on.

But as Steve indicated, we've got a lot to walk through. We are genuinely excited not only about our time together this morning, but frankly, everything happening here at the Paris Air Show. There's a lot. If you've been out to Bourget to see, but I think what you don't see in the Chalets and elsewhere, there's a lot of business being conducted very much in sync with the tone at the show this year in terms of the dual ramps that are underway, just a bear not to be seen here, and we're very excited about the position we have with that backdrop.

And we come here today, obviously, it is a near \$30 billion business. So we occupy a lot of real estate. But more importantly, we believe we are the company shaping the future of flight. If we look at our purpose statement, you see it on the slide here, you've heard us talk about this. Those of you who were with us in March, heard us reference how we invent the future of flight, how we lift people up and bring them home safely. Those aren't just words. That really is a purpose that inspires the entire GE Aerospace team, the world over. Number of statistics capture our position in the marketplace and how active we are with the flying public. But to think at this very moment, 2/3 of 1 million people are aloft with GE technology under wing, right? That technology effectively define gravity. That's something we're very proud of, but it's also a responsibility we take incredibly seriously.

If I were to summarize the session this morning, for those of you who want to take a quick exit, it's really simple. And it hasn't changed much from March. Simply put, we know we're in a unique position of global industry leadership at just the perfect moment with respect to where the industry is today, not only, vis-a-vis, the post-pandemic recovery, but relative to the longer-term challenges of not only economic growth but also sustainability. As we approach things strategically, we really are breaking our business down into 3 phases. We've got a lot to do today. You'll see that in the course of the presentations in addition to getting ready for tomorrow. And tomorrow is, in fact, for many of us Wednesday. But at GE Aerospace, we're also thinking about the future. And given the long cycle nature of this business, the future isn't Friday, right? It isn't even 2024. There are technology bets that we're making today that will inform aviation in the 2030s and the 2040s. We take that responsibility seriously as well.

And all of this is happening against a backdrop, as everyone in the room knows, with GE, the parent going through a dramatic transformation that's going to have us sometime early next year spin-off GE Vernova. We're excited about that for a lot of the obvious reasons. But then when the dust settles and HealthCare and Vernova are doing their thing, we'll have GE Aerospace as a standalone public company, and we're really, really keen to get to that place.

Just to level set everybody for the morning, we'll get into a lot of detail. This slide may be familiar to some of you. But we come here today again, \$26 billion in revenue off of last year, moving quickly toward \$30 billion. You'll see us talk and report in the future basically in 2 segments: commercial, engines and services, and defense and systems. Obviously, our commercial propulsion business is the core of CES, where we've got a better part of \$19 billion of revenue, 41,000 engines flying in our installed base today, really an unparalleled position, vis-a-vis, the installed base. And we know that we lead with technology. We lead with reliability. We lead with safety and frankly, trust. And you hear that, I think as you wander around Bourget and talk to the airframers, talk to the airlines that are here.

On the Defense & Systems side, similarly, a business that is, I think, well positioned for the demand drivers that are out there today,



different but not unrelated to what we see in commercial aero. The world is a different place. We see readiness top of literally every government's agenda. We can play a very important part -- do play a very important part in that regard, coming in on \$8 billion of revenue and installed base of over 26,000 engines. And again, both of these businesses are very well positioned. And those installed bases not only represent past success in winning new business, new platforms with the airframers, business with the airlines but in turn, really set the stage for us to stay close to our customers through our service business. And it's really our services business that captures the bulk of what we do. You see this with the animation.

I was really pleased that Steve was able to work that in and then it worked. But importantly, I don't want to be cute about this. 70% of our revenue, 70% of our revenue comes in the aftermarkets. 70% on the CES side, 60% in Defense & Systems. And we really like that. We like that for a lot of reasons. First and foremost, it keeps us close to our customers. Every meeting I was with are in yesterday with a customer was focused on how do we continue to keep planes in the air, right? And those daily conversations that we have at the ground level, those top-to-top dialogues really, I think, creates a customer intimacy, not only about what we're doing today but builds that confidence and trust for tomorrow that has served this business very well, frankly, over decades.

I think we also are proud of the fact that that's not a captive network. You'll hear more from Russell a little bit later about our open MRO network. That allows us not only to build capacity to service our customers as new platforms come online and those installed bases grow, but it also gives us an opportunity to shape the customer offering. They've got latitude to mix and match what they want to do through a product life cycle, and they do. And at each step of the way, whether it be early on or perhaps a platform's last flight, GE is there to support our customers. And in turn, we really think that is part of the core of our value proposition. It certainly yields some of the attractive economics that are obviously of interest to shareholders.

I won't belabor this slide. Everybody at Bourget, everybody here at the Paris Air Show knows that this is a unique moment. It's a special moment for the industry. The tailwinds continue to build. They've only gotten stronger since we were with many of you back at CTEC in March. Some of the recent IATA information is captured here on the left. We're seeing the same thing in our GE departures. And we've talked in the past about how we look at departures platform by platform, region by region, 6 a.m. every morning. And we can see continued strong growth in North America, not quite double digit, but close. And then really everywhere else in the world, particularly in the Pacific, especially with the China recovery, if I may, almost raging. And again, with that installed base, really well positioned to tap into that. We're excited about that.

And at the same time, not captured on the slide. Again, we see budgets continuing to grow in support of our aspirations in defense and systems in an uncertain world. We know and we're having conversations on a daily basis that we want to continue to not only support our customers, vis-a-vis, their readiness today, but their preparedness for tomorrow. So with all of that, we know we've got tremendous demand at our back, and that's a good place to be. We go to the next slide, and we talk a lot about the ramp here relative to the airlines today. Those installed bases of 41,000 engines, 26,000 in defense. But you'll continue to see big orders coming as we've captured here. We talked earlier in the year about the record-breaking deal at Air India, both narrow-body and wide-body. We're really honored to get the nod there. In turn, just a couple of weeks ago, we were celebrating with Michael O'Leary and the Ryanair team. The big MAX order they've laid in just yesterday at Jet2, another new order there almost up to 71 A320s and 321s.

And even on the military side, right, a big order nearly \$700 million for the Sikorsky King Stallions. You just see this drumbeat right alongside the demand on the airlines today. So we're excited about what we're doing to build the installed bases going forward. If we go to the next slide, but we share that with you just as a matter of fact. And we do that with due humility, right? This is a team. And I can assure you, having been closer to the action over the last year, which has been a blast, by the way. We've talked about that maybe at the break. This is a hungry team. It's a team that is aware of all that has been left to us by those that have come before, but also our obligation to continue to manage and drive this franchise forward.

It always starts with the team. Those of you who've known me for a little bit. Now that is front and center. And I really like the work this team is today and the way we're continuing to involve tremendous domain expertise, right? There's no substitute for experience when you think about the high sciences that come together to put together an aircraft engine. And at the same time, we're mixing GE people, with people from the outside to create the best possible team to move these businesses forward. Steve talked about lean. You'll hear a lot, I think, today about how we're deploying lean to help us drive our operations better. Steve got the simple mantra right, SQDC. Those are



the priorities. But it also in my experience, is a wonderful way to transform the culture. And I think we're seeing many green shoots across our company in that regard.

And in addition to lean, we talk a lot about decentralization because we want to make sure that we're really running the company, not from Evendale top down, but from the P&Ls that are dealing with customers day in, day out on up. And we've made some moves recently. We took our systems business, for example, for discrete P&Ls and say we're not going to run it as one. It's 4, so let's run it as 4. Amy took 2 of those, Power and Avionics. Riccardo took the other 2, Unison and Daudi. Time won't permit us to get into those businesses today, but just another proof point as to how we're decentralizing GE Aerospace to drive results for you and for our customers over time.

So you've got a team today and plenty of us who won't make the stage or will be at the perception later. It's a keenly focused team on what we need to do. This is the framework you've seen this slide before. Russ will come up and talk through the commercial side, both today and tomorrow with the airlines and the airframers. Amy and Riccardo will do the same in Defense and Systems. We'll bring up Mike Kauffman to really help underscore all that's happening in the supply chain that he leads to support those efforts. Mohamed will then talk to the future relative to technologies that are under development, progressing with an eye towards our sustainability mandate. And then Rahul will come up and put a bow on all of this with a detailed look at the financials.

So by quick opener. Again, we appreciate you being here with us today. And I think what we'll do here is get things started off with a quick video from our friends at Air Asia talking about our partnership. Thank you.

(presentation)

Russell T. Stokes General Electric Company - President and CEO of Commercial Engines & Services - GE Aerospace

A big thank you to Tony Fernandes. Just an amazing partner, a great customer. And we couldn't be more proud to really be able to support him and his team at AirAsia. Good morning. Thank you for being with us. I'm Russell Stokes, and I wanted to start off by really helping you understand what differentiates GE Aerospace on the commercial side of the business. There's 3 things that we tend to talk about. First, it is the breadth of our product portfolio: narrow-bodies, wide-bodies, regionals and business applications with 70% of the revenues of those businesses coming from the services side of the house. Second, technology. We deliver products that are reliable, efficient, durable, and it's reason that customers continue to make sure that we're the partner of choice.

Third, and we'll talk about this quite a bit. You've heard us reference it before, is that we operate what we call an open network, giving our customers true flexibility and maximum choice for where they want to be able to get their work done. You saw Larry lay out the framework in the previous section. And so let's just kind of talk about what this means in our group. This is something that we and CES spend a lot of time on in terms of communicating to the teams what's important where we are today and where we want to go as we head towards the future. Today, pretty simple. We want to make sure that we keep the value proposition for our installed fleets where it needs to be so that customers continue to operate them and that they continue to fly. We are working with our customers and make sure that we continue to have the right reliability so that they can trust these assets and to be able to do that with the right cost of ownership as well.

Tomorrow, we want to make sure that we're growing that installed base and that we're further optimizing the performance of NPI programs, like our LEAP engine and the GE9X that we're working with Boeing right now to certify that we'll launch in 2025. You heard the reference to SQDC. And we're making sure that we focus on that as well as we bring new products to life, making sure that they are safe as our previous generations that the quality, the durability and the reliability is there where the customers would want it to be. That we're delivering and navigating through those ramps. And that we have the right cost of ownership but operating in a way that we're generating real efficiency with the way that we perform and are able to operate the business.

Last but clearly not least, is the future. And it's there that we're really focusing on developing, certifying and scaling next-generation technologies, component technologies that will ultimately be part of entire new platforms. And I really hope that if you haven't had a chance that you do get a chance to come out to our chalet and see the model of the open fan engine in the chalet to be able to see it live. It is majestical when you get the chance just to see what it represents and the ingenuity of our engineering teams each and every day.



So maybe let's just start with where are we right now? We're operating in an attractive market with real tailwinds. Those tailwinds are driving new equipment deliveries and new equipment orders in pretty significant levels. We are growing mid-20 CAGRs and are seeing record backlogs from all of the airframers. The last 12 months, we've seen tremendous demand with 2,000 engines that were ordered, and you can see the list of companies that put their faith and trust in us to be able to procure what you see here. As you heard Larry say, it's on the back of that great technology, but also trusted relationships that our customers continue to bet on the GE or CFM solutions. I just want to thank all of them. I know they're not necessarily here today for the ability to be able to serve them and their teams and their respective missions.

It is through those wins that you see in the center and more that we build on the 12,000 engines that are still yet to be delivered. And you can see what that means on the right side of the page, as we continue to grow the installed base mid-single-digit CAGRs through 2030 across a number of our platforms. And obviously, as all those planes continue to fly, we will continue to consume cycles, which will continue to support that services revenue stream that you saw earlier on the screen.

Now all of this is supported by a robust recovery of the market. Right now, we see narrow-bodies back in the high 90s, about 98% to 2019 levels. Wide-bodies are quickly recovering. We're in the upper 80s, low 90s, but we expect to have that back at the end of 2023, early '24. Those increased departures, as you think about our model, means that customers are consuming cycles, which means that eventually, we're going to be doing more and more shop visits. And as you see on the upper right, we are seeing growing demand and are projecting growth in shop visits across our platforms at a mid-teens CAGR. All of this contributes -- once again, I keep coming back to that healthy, resilient services revenue stream, being able to manage that through the cycles at 50% of those revenues being tied to our narrow-body business, but 40% of those revenues being tied to wide-body.

So let's get into this a little bit more. Let's start with the narrow-body. As you've heard us say before, we'll say again, it is the largest and youngest fleet in the industry. We have held a sole-source position on some of the most amazing narrow-body platforms that this industry has seen in its history. And we've sustained that position on the MAX.

We have a strong position on the A320. 55% of the NEOs have LEAP-1A engines under wing. And on the C-19, it's a LEAP-1C. Now as you look across this product life cycle, I would hope that you can appreciate, as we've been doing this for 40 years, we have managed through product transitions before. And we've done it rather well, I would say. And humbly, I'll also say we don't expect for that to stop now.

As you look at this screen here, you get a feel for our narrow-body fleet and CFM56, what it will continue to represent for us for years to come. You can see we see CFM56 continuing to grow through the middle of the decade, but it's also important to note that it does not drop off as we continue towards the back end of the decade. This is part of a partnership with us and Safran, a joint venture of which we'll celebrate a 50th anniversary next year, and we're looking forward to continuing that partnership with our partners.

It's a long tail of revenue and both shop visits, once again, as I said, that we'll continue to see as we work through the narrow-body product transition. Remembering that 50%, close to 50% of those engines have not seen their first shop visit yet. And so we're working with our customers to make sure that we keep them flying at the right cost of ownership and the right value proposition for them.

Now on the right side, as the LEAP continues to fly and it ramps into service, eventually, it too is going to need shop visit and maintenance support. You can see we'll do some here in 2023, and we'll see those levels increase in 2024 and 2025. We think about being focused on kind of a 3-pronged approach. We want to first make sure that the product is durable. We want to second make sure that we have the right maintenance and overhaul network for them to be able to get the work done when they need it. And then we want to also make sure that we are improving and performing the program in such a way that it is as profitable and as successful as programs that we've done before.

So to ensure the success of this program, as I said just a moment ago, durability has to be our absolute #1 focus. For all that we love about CFM56, and I hear so many people talk about the time on wing performance of just an amazing engine and what we've been able to achieve. I think it's important for everybody to realize that the LEAP-1A engine is actually outperforming CFM56 at the exact same point in time post entry into service.



Now I want to make sure that you don't believe that, that means that we are satisfied with where we are or where that engine sits today nor are our customers. And so we're continuing to work in very targeted ways to make sure that we are working on a select number of components that we are actively getting after working with our customers to be able to ensure that, that engine stays underwing as often and as long as possible.

We've been working extensive testing of performance upgrades. We've completed the shroud, the radio drive shaft, and the teams have been working on the package around our fuel nozzle, not to mention also bringing forward a new HPT blade, both of which will go into service in 2024.

The teams have made great progress around the development of those applications, and you'll hear Mohamed come up in a little bit and share some more detail about what it is we've been doing there. All of these actions and activities, we believe lead us to a place where we see OE breakeven and program profitability by the middle of the decade.

Again, we talk about our open network, but it really is important to the way that we run the business in a capital-light way. And this really is one of the differentiators. This means that GB, our CBSAs and external MROs are all investing and competing to be able to do LEAP shop visits. We are working as you look at the right side, to do a couple of things. We want to make sure that across those partners that we have enough capacity to be able to do up to 2,000 shop visits.

On CBSAs, the last time we were together, we had announced 3 actual operator MROs in Delta TechOps, Air France, KLM and Lufthansa Technik. At MRO Americas, just a couple of months ago, we announced 2 independents with StandardAero and ST Engineering all out there actively starting to get bidding activity at our customers. We want to make sure that us and them are doing that in a productive way.

So we continue to look at new repair capability and innovative inspection techniques, which I'll talk about here in a little bit as we go forward. And then we want to make sure that when the engine does have to come off wing that we are doing everything we can to get it back under wing as quickly as possible, and that's tied to something we call turnaround times in our shops. And we're using all lean practices and principles, value stream maps, 3P exercises, standardization, relocating repairs into the back shops to be able to make sure that we could do that as efficiently and as effectively as possible.

Now it is not lost on us that our customers operate at times more than just LEAP engines. And so this idea of making sure in today's environment that we can keep them flying as much as possible is critically important to us as much as it is to them. And so I want to assure you, we're looking at this dynamic across all of our different product lines and all of our different shops.

You can see that I think all of you are more than aware, given the current environment around supply chain and some of the challenges that we're seeing and the things that you're hearing, some of the labor challenges that are happening in the market, our current turnaround times are at a level that is actually above where we were in 2019. But you can see the goals we're setting for ourselves, and we want to even be able to get beyond those as we continue to move forward. Now it's easy to say that. But one of the big principles we have around lean here, Larry talked about our operating reviews and cadences, is get me to the action plan. What are you going to do? What is it we need to do this week? What is it we need to do this month? What is it we need to do this quarter to make sure that this isn't just something on a sheet of paper, that this is something we're all committed we're going to go execute?

And so you can see some of the things that we have up there that we're working on to be able to get after that 30 to 50-day improvement. Advanced inspection. As much as possible, we'd like to be able to keep those engines on wing just a little bit longer to be able to give the customer an ability to be able to generate more revenue before we need to take them off. We're working in advanced robotics to be able to do greater inspection and some amount of actual repair at work while the engine is still on wing.

When it does come off, we want to make sure we're optimizing capacity, and that's through lean. So we always start with looking at how can you squeeze out more capability? How can you squeeze out the ability to do more in the footprint that you have before we start talking about investing and spending capital on additional sites?



And then repair. To the extent that we do run into challenges in the supply base being able to get new material, we do have the ability to be able to use repair. And we have been industrializing greater than 2,000 repairs per year to be able to support our customers and support those fleets. And I'll share with you, if you look over on the right, an example of how we are doing that, but also combining it with lean to really be able to improve overall turnaround time. This is an example of something we did with line replaceable units, 72 days down to 60 days, and the team is going to continue to keep working that to drive it down lower.

Important to note, 80% reduction in the need for new material when we're able to execute something like this. And not only that, to be able to do it faster is just another benefit for our customers. We are feeling impact like this across a number of our sites: Wales, Malaysia, Strother, Celma. I had the opportunity last week to be able to be at our Wales site. I spent an entire week there a year ago in a Shingi event working side by side with the teams on the floor. There's nothing like being able to work with some of our technicians to tell you the real truth around the things that you need to be focused on, the things they want management to understand because they want to win for customers just as much as management does. But unless we're out there on the floor going again, but investing in that time, we're not going to really be able to get to hear how we can all jointly create value.

But I thought maybe one of the best ways for you to appreciate that, not being able maybe to go with me around the globe to see all these sites, but to be able to hear from a video from some of our employees that will help you understand some of the work that we did at our shop at Celma and how they then hand off parts to our shop in Singapore and just the collaboration that it takes to be able to get those engines back underwing as quickly as possible. So let's roll the video.

(presentation)

Russell T. Stokes General Electric Company - President and CEO of Commercial Engines & Services - GE Aerospace

So I hope that you actually had an opportunity to at least appreciate what it is that we're trying to accomplish with our teams. I really love the video because it shows you the collaboration between our sites and how we really try to work with our teams to make sure a lot of times when we're doing this event at one site, we're inviting people from other sites to be able to come to realize how collaboration can help make us all better.

Now we've talked a lot and we tend to talk a lot about narrow-body. But I really want to take a little bit of time to talk about our wide-body fleet because it, too, is a key differentiator and a growth generator for GE Aerospace. We here as well have a broad product portfolio with the mature products that go all the way across there, as you could, CF6, over 50 years in operation, all the way to GE9X and the 777X as once again, they were working to certify and entering the service in 2025.

6,600 GE engines are powering some of the world's wide-body platforms. Why is that the case? On mature wide-bodies, we deliver a 99.96% dispatch reliability. And that is one of the key reasons that our customers continue to make sure that these wide-body assets are products of choice.

Let's talk about them just a little bit one by one. GE90. We're exceeding pre-COVID utilization levels. We're sole sourced on the 777, and 50% of this fleet is under 10 years of age. CF6, a very large installed base, greater than 8,500 assets. It powers 80% of the 767s and 747-4 freighters. The GP7200. The A380 is flying once again. And we're actually having customers like Emirates that have announced investments of up to \$2 billion to be able to retrofit a number of their assets that have the GPs under wing. And you can see what that contributes in terms of the shop visit forecast through 2025. And I'd say these mature engines have a lot of life left in them. Then there's the GEnx. 65% of the 787s are powered by the GEnx today, and we predict that the GEnx fleet is going to nearly double by 2030 with a near 80% win rate currently.

And you ask yourself, why? Why is that the case? Well, it's a winning formula, a 1.4% fuel burn advantage, saving customers almost \$300,000 per aircraft per year. That's 2 million pounds of less CO2 per year per aircraft. And then there's time on wing. 4x better than the competition. We expect to see this grow greater than 20% through the middle of the decade with significant growth there and beyond.

So we've talked today, we've talked tomorrow, maybe just a bit of a preview into where we're going in the future. As we invest in the



future of flight, our teams are working actively on the building blocks to be able to demonstrate that this is, in fact, real, to be able to put out proof points each and every day as we march towards being able to launch these game-changing products.

Starting with SAF. All of our engines today can operate on 100% SAF. Hybrid electric. We're actively doing demonstrations to be able to demonstrate the power of what it is going to represent on next-generation platforms, including RISE. We're creating advanced architectures and materials, leveraging things that we've learned on the XA100, also looking at advanced cooling capability and CMC technologies for weight.

And we're developing compact core capability that's going to be more efficient and consume less fuel than previous platforms. All of this ultimately then feeds into a product like the open fan that we believe generates 20% greater fuel efficiency than the current LEAP technology.

So we thought it might be helpful for you to be able to see some of these components and some of these technologies in a little bit more detail. And so I'd like to share one more video with you.

(presentation)

Russell T. Stokes General Electric Company - President and CEO of Commercial Engines & Services - GE Aerospace

I hope you can appreciate why this really excites me about the opportunity for us to continue to march towards inventing the future of flight.

So to wrap, I just wanted to share with you, I hope you can appreciate this morning, and thank you for your time, why I just absolutely love this business, and why I couldn't be more proud to be amongst this team that gets to do this each and every day.

And thought I would just close with a couple of closing comments, a couple of summary items here. We truly are dealing in an environment with a very attractive business with significant tailwinds, looking at a world or a business and an environment that's going to grow 1.5 to 2x GDP.

I want to make sure you appreciate the diversification of our portfolio across narrow-body and wide-body assets and what we do to make sure that those assets are safe, reliable and that they deliver the performance our customers are looking for. And lastly, that we strive each and every day to be better than we were the day before. And we do that through lean and additionally through technology investments and capabilities today, tomorrow and in the future.

Thank you once again for your time and your attention. And I'd now like to hand it to Mohamed.

Mohamed Ali General Electric Company - VP of Engineering -- GE Aerospace

Thank you, Russell. Good morning. You hear me okay? All right. Great. So here is my plan for today. I'd like to cover 3 things with you. First is a quick recap from the last time we had the dialogue back in March back in Cincinnati, Ohio. I'll give you LEAP updates about the durability improvements and the progress we have made. We have made quite a bit of progress, actually, since we last talked in March, and I'll give you some more color about that.

Second, I will do a deep dive in why we are confident that LEAP is going to achieve its intended durability and time on wing outcomes. And I'll talk more also about maybe behind the scenes, what makes a good engine, what makes it work, what makes a durable engine and also how long it takes to achieve those milestones.

And finally, I'll wrap with a discussion, give you some more color about some of the announcements and the dialogues that you have seen here in Paris at the Paris Air Show. Makes sense? Good? Okay.

I always get this question from you. And when I say it, you're going to absolutely recognize it, which is for the LEAP engines that you are shipping today, what is the expected time on wing of those engines? I assume you've heard that question, and you have said it to me



before. I actually have a better answer than that. And I'm going to see -- I'm going to show you real data about it. First, a neutral environment. LEAP, the fleet leader, is achieving 10,000 cycles, precisely 9,882 cycles and still counting. And that is without a single shop visit, without ever seeing a shop and still counting. And CFM56 in the same environment roughly achieves in the neighborhood of 17,000 cycles. As you can tell, what we are shipping today is only equal to or better than that, real data. And as you can tell also, we are well on our way to achieving CFM56-like durability and time on wing. We're not there yet, but well on our way and pretty close.

Harsh environment. Today, LEAP fleet leaders achieve about 4,800 and some cycles, close to 5,000 cycles. That's compared to CFM56 achieving in a similar environment somewhere in the neighborhood of 7,000 to 8,000 cycles. As we said, this is better than CFM56 at the same point in time since EIS. Humbly, not exactly where we want to be, but well on our way to achieve that.

And these numbers are a significant reason why we are feeling confident about LEAP achieving its intended durability on time on wing. Not only that, there's another important reason. In the beginning, at EIS, at entry into service, on average, LEAP, at that configuration then was achieving 2,800 and some cycles. Since then, with some improvements and design fixes, it improved their time on wing, as you can tell and from the numbers I just told you, somewhere between 2x and 5x improvement.

This is not a forecast. This is not wishful thinking. These fixes are working. Another reason we are confident it's only a handful of parts that are today limiting LEAP time-on-wing from achieving the CFM56-like durability that our customers are expecting. Only a handful of parts, and I think I mentioned that to you back in March. And since we talked in March, we actually made quite a bit of progress. Number one, on the fuel nozzles, as you know, we have experienced fuel nozzle coking.

We have been flying for the better part on flight testing for the better part of 2022 with a fix. We have been through our own internal testing and in flight testing been able to turn on the problem of fuel nozzle coking and turn it off with the design fix. And since March, we finished all of the certification testing for the fuel nozzle coking test fix, all of the certification testing. And actually, we are in the process of submitting the certification reports to the agencies. And we actually submitted most of these certification reports, and we feel quite confident about certification and EIS by the end of the year, as we told you that before.

HPT, high-pressure turbine blade. I told you before, we feel pretty confident about the design fix. I will talk more about that. But since we last talked, we actually put a fourth durability engine test on test. It's actually running right now. We actually have 2 of those engines, 1 here in France and 1 in the United States running with the intention of continuing to validate the design fix for the high-pressure turbine blade, and that fix is doing extremely well.

That progress since March is another reason we are very confident about LEAP being able to achieve its time on wing. Humbly, we have a lot of work ahead of us. But these numbers, and quite honestly, that performance I just spoke about, that is in a league of its own compared to anything that has ever been achieved in the industry, including CFM56 at the same point in its history.

Now there is another big reason we feel very confident about LEAP achieving its intended time on wing. And I'm going to share this data for the first time in public. And it's not just a reason to feel confident. It is a major milestone in the LEAP program.

People talk a lot about we have tested an engine for so many cycles or so many hours. As an engineer, quite honestly, that can be meaningless. The real question is in your internal testing, have you been able to replicate the same failure mode that you see in the field or not. That's what we call turn on. And when you introduce the design fix, in your own internal testing, did the design fix, fix the problem in your own internal testing or not, and that's what we call turnoff. In GE engineering language, we say, did you turn on the problem and turn off the problem. And without that, you're shooting in the dark. With that, you have confidence in the intended fixes that you have.

The harsh environment, what we call hot and harsh environment, add more nuance to that. Harsh environment, it's hot. Therefore, the engine is running hotter. Therefore, you create more stress in the materials. At the same time, when you are operating in a harsh environment, dusty, in particular, the dust would block some of those cooling holes. Therefore, you get less cooling, less cooling effectiveness. Therefore, the engine is also continuing to run hotter. It's sort of the acid test for a jet engine.

And here is the data about that. This is a high-pressure turbine blade of LEAP. The picture that you see right next to it, which is the first --



the second picture from the left. That is a picture of the same blade from a return engine from our -- one of our customers operating in the hot and harsh environment in the Middle East.

The crack that you see in that blade, in that location is actually what is limiting the time on wing of LEAP today. You can also see the dust accumulation around it. That's happening in the Middle East. Look at the picture in the middle. What do you see? It's the same blade, same location, same crack, same failure mode. It's in our own internal testing at the same number of cycles for what happened in the field. We kind of nailed it. It's the same exact failure mode. That is what we call turn on the problem.

What do you see on the far right? It's the new blade with a design fix. The failure mode is gone, the crack is gone, and it has been running at even a lot more cycles. That is what we call turn off. That is what makes us very confident about the introduction of that LEAP blade fixing the time on wing issue in the Middle East.

We have done that in GE90 and saw the same turn on, turn off. We have done that in GEnx and saw the same turn on turn off. And here it is in LEAP, we're doing it and seeing the same turn on, turn off. That's why it's not just feeling confident. That's why it's a major milestone in this program.

In addition to that, we actually are using our advanced computational fluid dynamics to shape the cooling passages, the passages that provide the cooling air into the blade, so they inherently separate the dust. So we get better results above and beyond what I'm showing you in here.

Now another question when I share this with some of our customers, and some of you may have that question is, well, dust in an engine and you just run it hotter, what's big deal about that?

So let me take you behind the scenes about what's a big deal about that. It took us 14 iterations in the span of 10 years to actually dial in the recipe for how to test those engines, 14 iterations, 10 years. It's not -- it's very easy to go up and down in cycles. You push the thrust, lever, go up and down in cycles. That will never achieve anything. It's how you test it, and there is a recipe for that so that you simulate the takeoff condition, climb condition, crews, descend, landing in a hot and harsh environment.

And by the way, it's not any dust. You cannot actually and trust me, we tried that 15 years ago when we started, collect dust from the ground in the Middle East, take that, inject that in the inlet to the engine. That never replicated the failure mode. It's the dust in certain altitudes that actually would cause that with also certain chemical composition. It's not just physics. There is chemistry to it.

And honestly and transparently, that's part of the secret sauce. And we call it the GE blend, and it's numbered. And I have that in my office, and it's in locks. And that's the blend that actually enabled us to turn on the problem and demonstrate that we can turn off the problem. In addition to that, we actually collect data from every airport around the world. And that's informed really by the large installed base that we have all around the world and also in the Middle East of GE90 and GEnx, and that gives us the experience that would inform our analytics about how we do the testing.

Now to drive that point home. Look at the chart on the right. LEAP is our third high-pressure ratio engine, GE90, GEnx, LEAP. Every one of them is successively building on the experience of the previous, one with a stable architecture. And X came with better time on wing at EIS that entered into service compared to GE90, and LEAP is coming with a better time on wing at EIS than GEnx, and we continue to improve that, as I talked to you about.

And to calibrate you, these learnings are in the span of 20 years. Here's what I'm going to say. It's going to be nearly impossible for anybody to come from behind without that experience and without these hundreds of millions of cycles of experience in GE90 and GEnx and develop a high-pressure ratio machine that will work with a high time on wing and high durability in the hot and harsh environment. But this is beyond the blade.

An engine has 4,844 parts, not that I am counting them. And nobody gets a price for designing a single part really well. Details matter here, and every part of 4,844 parts is one or more opportunity to limit the time on wing. And that's what we do as engineers, is pay



attention to all of those details. And that's how in the span of those 20 years of experience with high-pressure ratio machines developed validating, testing and analysis methodology. And you cannot invent that from scratch because they are going to have to be informed by real field data, informed by hundreds of millions of cycles of experience on GE90 and GEnx to calibrate those models so they can predict the outcomes accurately. And the outcome of that, we are on the third generation of a composite fan blade.

The second generation of lean or low emissions combustor. It took us 20-plus years to feel -- ceramic matrix composite parts feel confident of a ton of testing and feel confident about their durability and reliability. We are on the third high-pressure ratio engine.

And all of that gives me the confidence to stand in front of you here and say it's only a handful of parts that need tweaking in order to achieve that time on wing. And by the way, some details cannot really be fixed. Like if you don't get those details right from the beginning, they're just not going to be easy to fix because they have become part of the architecture. That's not what we have.

So for example, if your combustor is half and short, it's impossible or nearly impossible to fix that. It takes major surgery to achieve that because you don't have space in the engine to be able to do that. And that's not what we have. We only have a handful of parts that we need to go tweak in order to achieve that intended time on wing. That's why I stand here and be able to tell you I feel confident about it.

Now shifting gears to future flight. And as I said, my intention is to give you some more color about some of the announcements we talked about. You saw the hybrid electric. We talk also about sustainable aviation fuel, everybody does. Talked also about hydrogen. Some people do, including us. But there are also 2 revolutions that are happening that, quite honestly, we don't talk enough about them and you do not talk enough about them.

And the first one is supercomputing. And you have seen some of the announcements about that. But I really want to drive that point home because I actually feel very proud about it, and it's a big deal. So we are one of the largest users of supercomputing capabilities in the world, and we just announced with the Department of Energy that we are the first and so far the only nongovernment entity using the world's fastest supercomputer and the world's most powerful supercomputer.

Just to calibrate you, it has 37,000 GPUs, 37,000. That's multiple times more than your leading brand of artificial intelligence capability that's serving the entire planet. We are using multiple times more than that to design that fan of RISE that you're seeing in the beginning of a picture here. And it's allowing us to actually design and model at the molecular levels.

What's big deal about that? Everybody says open fan has noise challenge. That's a true statement. You don't have an SL. Therefore, you're not suppressing the noise. And the testing we have done way back in the '80s, absent those supercomputers, it was loud, very loud as a matter of fact. But with these new designs that we have developed, we actually took those designs and tested them in Airbus noise testing facility in Hamburg, and I had the privilege of actually being there during that test.

And we showed that these designs of that fan, they achieved lower noise than today's LEAP, lower noise than today's LEAP. That is the power of those supercomputers. And then we took that same capability, and we apply this to high-pressure turbine blades. You might as well. And we actually apply it to so many other parts of the engine.

And the results are just nothing short of phenomenal in both durability and fuel burn. And we created those new designs. But those designs and those geometries are useless unless you actually can make them. And that's when I think the second revolution comes in play, which is advanced manufacturing and material capability.

And as you know, we are the only company today with ceramic parts and additive parts certified and flying the only company. And chances are, many of you have flown with those parts already. We took those new geometries of high-pressure turbine blades and air foils and we made them using ceramics and additive, and they are actually on test as we speak on an F110 engine back in Evendale. It's huge progress that we're making with those capabilities.

These are the 2 revolutions that are happening that we are ushering. We are pioneering them for the whole world. That is how the future is being invented. That's what we do. That's the virtual cycle of continuous improvement that we create. We leverage the learnings from



our installed base with deep history. We work with customers to take that and deliver value to them, and we pioneer the future and humbly that what makes me proud, humbly proud to be standing in front of you, representing that team. Thank you very much. And with that, I give it to Mike Kauffman.

Mike Kauffman General Electric Company - VP of Supply Chain -- GE Aerospace

Mohamed, thank you so much. Mike Kauffman, the Vice President of Supply Chain. And I know we don't usually dedicate or it is unusual to dedicate time to supply chain and these type of events, but I've come to find out that it's a topic of some importance on everybody's mind.

So we thought we would carve out some time today to talk to you about what it is we're doing right now as we fight through the challenges of this as we really partner and go to gain but a problem solve.

I'm then going to shift, and I'm going to talk to you about the transformation we're under, it's underway within GE Aerospace, our lean transformation, and then what that means to our ultimate journey to getting on full pull. I'll explain more about that later.

So let's start with the overall GE Aerospace supply chain environment. It is a globally complex supply chain environment. And for context, that supply chain supports 53 engine models, some of which were designed back in the 1980s and manufactured back then as well. And I share that to highlight that while we're quite focused right now on LEAP ramp, 9x readiness, GEnx ramp headed into next year. We still have to be concerned with supporting those fleets in those engines that are still out there, which adds a level of complexity as we think about lifting the entire supply chain.

So the supply chain is made up of more than 450 direct suppliers, 30 internal OEM sites, 16 sites in our MRO network and more than 50,000 unique part numbers. So that's a lot of complexity. In a time of supply chain constraint, complexity is not your friend. That makes focus in early morning all that more important.

So if I can, I'd like to highlight the LEAP as an example of that. So for each model, about 2,500 parts of that GE provides per engine for a total of 5,000 parts with only 11% overlap. That's a lot of part numbers to ramp at once. And if you're focused on 5,000 parts, that becomes a mind-numbing endless task.

I'll talk a little bit later about how we're focusing on that. But we've employed some tools that allow us to skinny 5,000 to really 80, 8-0, that we're really focused on right now to ramp LEAP. 80 is still a lot, but it's not 5,000, and that's what focus brings you.

So because I know we're going to ask, let's talk about what the key challenges are in the supply chain. We still see -- and when you pull the thread through almost everything, it almost invariably ends with labor, the ability to attract it, retain it, train it in time. We're still being hampered by quality deviations inside, not safety of flight, but things that are caught inside as we begin to ramp that, which cause us to pause or in some cases, go backwards. There are still material constraints, and we still have the complexity issue that I described. But what I'd really like to do is spend more of my time talking about what we're doing about that. As we partner with our customers, suppliers, and our internal teams inside of GE to address that.

So about a year ago, we carved out and invested in a 200-person team in our procurement organization to focus solely on supplier recovery and supplier readiness. That team is fully in place and operational with standard work in tools. But more than that group, it's our manufacturing engineering team. It's our design engineers that are partnering with us. Again, I said our customers are partnering with us. We're going to where the action is. We're going to Gemba with our suppliers, our internal shops. We're identifying those constraints, those problems, manpower, machine, methods. We're focused on those, and we're problem-solving at that point of impact.

It's having an impact. We'll talk a little bit about that in a minute. The other thing which has been a breakthrough is an investment in our tools. Our ability to see WIP inside of the supply base, our ability to see their order book health. Our ability through PFEP, which I'm going to talk to you more about later, really to bring focus because in a world where there's so many things to go work on, you have to make sure that you're seeing the most critical at this point right now to deal with that, and we've got tools to do that.



That's what informs the 5,000 to 80 on the LEAP engine. And then finally, we've worked very hard on our internal management systems. We are quite focused on product line alignment and seeing constraint relief solving constraint through the lens of the customer and the product line. It's brought great clarity and great focus.

So with that, let me share with you some of the results we're seeing from that. And we start with because you need parts to service engines and to build complete engines. We start with what's been the material receipt trend. We see that trend growing. And just as a -- from a comparison on a year-over-year basis, we see growth of about 14% to 15% on an annualized basis as we begin to step up from a component standpoint. That's translating into engine output.

So -- and I'm showing first half results so we can have a comparative analysis. But on an annualized basis, similar around mid-teens in terms of year-over-year growth, we actually see that accelerating through the back half of the year to be in the high teens on a unit production. But particularly as we compare where we expect to finish, and we're nearly there, the first half of this year in comparison to last year, it's a 30% unit increase year-over-year, first half to first half.

Now look, so it's progress. And that's what I would leave you with from this where we are. It is progress. But in all humility, it is -- our customers expect more, our customers need more, right? So we take that with all humility that while we're making progress, we are still in supply chain in a daily grind.

Here's what I'd leave you with. You've got -- I represent thousands of people on our team that are capable and committed to that daily grind, waking up every day to solve the next problem in front of us, to release more material, to release more units.

So with that, I'd like to shift to what we're doing internally around our lean transformation because there will be a day where we won't talk about the post-pandemic supply chain recovery, and we're focused on that right now. So some of you may have seen in our Greenville event, our model line in the Greenville plant, our turbine blade line. We call that a model line, and let me describe what a model line is.

A model line is a production unit or a cell within a plant under the direction and coaching of a master lean leader to implement the standards of lean, starting with a value stream map constructing the cell, establishing the pole loops, establishing your takt time, your cadence, establishing your target OEE and your standards, coaching that involving the team and then beginning to operate and run that team.

We started with that one model line. This is the year where we spread the model line to each of the plants beyond Greenville. We're right now at 11 model lines, and that is our deployment strategy, and I'll come back to that here shortly. Those model lines are spreading rapidly we are at 11 now, will be at 15 by the end of the year as we begin to deploy that. The model line starts and is the standard for that plant as we begin to deploy that throughout each of the cells. And you saw earlier in Russell's video, each cell now if you're not a model line has a production standard for daily management, daily visual management, problems -- at point problem solving. It is -- so if you're not a model line, you're still operating under our standard.

But next year, 2024 is the year where we move from model lines and plants to model plants. So why are we doing this? The results we're seeing in these model lines are nothing, and I've been in the supply chain for nearly 29 years. The difference we're seeing in the model lines is staggering in terms of our ability to drive lead time, lead times down, drive the working capital down, the cost improvements, the improvement in the quality through app point problem solving.

It's staggering some of the improvements we're seeing. We are so excited, and we are seeing these green shoots popping up all around the supply chain in these sites. But the real reason we do it, and it is the first principle for lean, is a respect for people. We do it because we want people to come in and not waste their time to create value for our customers. That is why we do it.

So I'd love to be able to take you to Greenville because the best way to see improvement is not through hearing it from me and not through looking at pictures on the screen, but to see it with your eyes where the value is created. Fortunately, or unfortunately, we're here in Paris, and we don't have time to go to Greenville. So what I'd like to do is bring Greenville here and take you to Gemba.



(presentation)

Mike Kauffman General Electric Company - VP of Supply Chain -- GE Aerospace

Wow. If that is not awesome, if that doesn't bring back my point of -- the reason why we do this is for the respect for people, the passion in their -- and frankly, the satisfaction is palpable that they get. And we see that at each of these lines. So proud of what they're doing. And again, with all humility, early days, but we are learning fast and we have great coaches. So I'd like to bring us to PFEP, which I had referenced before. It's planned for every part. And it is a tool that we have implemented throughout GE Aerospace and into our supply base to drive focus.

Simply put, what it is, is it's an inventory target. It's a min target and a max target that is based on our forward consumption informed by our customer demand, our prior supply instability, our prior demand instability and then balanced with a percent stock out level that we'd like to be able to achieve.

What it's doing is it says at the individual part level, here's where we should be focused right now in problem solving on based on releasing at the engine level or in the MRO level where we should be putting our problem-solving activity. It's improving delivery performance at the part level. It's improving delivery management and delivering productivity. On the right is an example of our Bromont shop in Canada that makes compressor airfoils that is fully adopted down to the cell level, operating with the principles of PFEP.

You can see the improvements they're getting in their inventory as they focus on the things that are needed to release the over-max inventory and allow that flow to come, and we're seeing it with their efforts, 60% reduction in that inventory levels as well as improving the availability of the parts by 20%. PFEP, and as I referenced before, is the precursor to as we go on pull. Pull is one-for-one. Pull at the pace of the customer, which is where we're transforming as part of our lean journey as well.

So with that, I'd like to finish with -- we've talked about what we're doing right now to overcome the challenges. We talked about the transformation we're undergoing from a lean standpoint. I'll end with we're focused on the future as well. Mohamed and Russell both talked about the future of flight. We are focused on building our internal capabilities to protect our IP and manage our costs in the future. We're investing in manufacturing, engineering to have the right capable process at the right time, and we're relooking and thinking about our supply base to rationalize that and derisk that as we seek out the partners of the future to help us invent the future of flight.

I thank you for your time and attention, and I invite Steve up for Q&A.

QUESTIONS AND ANSWERS

Steven Eric Winoker General Electric Company - VP of IR, GE Aerospace VP of IR

Thanks, Mike. If I could just ask Larry, Mohamed, Russell up on stage. Mike, come back. So we have a little bit of time for a break. So let's start with some questions. Andrew, open. And I would just -- before I even go to you, Andrew. Reminder, we have a second session later with Rahul on the financials. So would love for you all to keep your questions to what you've heard so far this morning. Andrew?

Andrew Burris Obin BofA Securities, Research Division - MD

I'm not going to ask a time on wing question.

Steven Eric Winoker General Electric Company - VP of IR, GE Aerospace VP of IR

But wait for the mic.

Andrew Burris Obin BofA Securities, Research Division - MD

Yes, I'm not going to ask a time on wing question because I'm sure others will. But I will ask a question. Speaking about your turnaround times, because I think it does go toward a lot you talk today. If you were to benchmark the 2019 turnaround times, right, how would you compare like what you guys have internally to the best-in-class operators, right? And how much room is there to improve for your sort of beyond your targets that you have provided? .



Russell T. Stokes General Electric Company - President and CEO of Commercial Engines & Services - GE Aerospace

I mean it's something that we focus on each and every day. The turnaround times are really aligned to what our customers are looking for tied to the contractual commitments that we have with them. So you saw kind of where we are relative to the 2019 levels. Clearly, where we are right now. We showed a target. And if you notice those targets are all below where we would have been in 2019. It's something that each and every day, I would argue that the teams aren't quite sure what exactly is the possible, which is why we do Kaizen event after Kaizen event after event to be able to see where we need to go. I don't have a hard and fast percent, I could tell you. But I'm confident that as we get to the targets I showed you, we're going to keep pushing to get past those.

Andrew Burris Obin BofA Securities, Research Division - MD

And just a follow-up question. You sort of talked about the open network. What lessons have you learned from CFM56, how to enhance the network for LEAP and how sort of to improve your internal moat?

Russell T. Stokes General Electric Company - President and CEO of Commercial Engines & Services - GE Aerospace

Yes. So CFM56 of the network, so let's go all the way back. CFM56 launched in 1982. So we didn't have CSAs back then, and which is part of why it operates in a network that's up to 40 MROs that take care of the CFM56 engine. So there's a smaller proportion, say, in the 30-ish or so percent range that we actually do inside of the GE shops versus it being done outside of external partners.

What we've found is that over time, when you're in that type of a network, everybody is trying to make sure all of those MROs. They're competing to try to be able to fill their respective volume. So they're going to invest in repair. They're going to invest in labor productivity. They've got to figure out how to deliver turnaround times, which is ultimately best for the customer because it gives the customers options on the things that they want to do and the choices that they want to be able to have and where to get there as it's serviced.

So over time, when you saw kind of that historic kind of chart, if you will, over time, we fully expect that we're going to be moving through different phases of different offerings. And that's why you heard me talk about making sure we have the right material solutions for CFM56 at this point in time, which might be a little different than where LEAP is. But I expect some day, 20, 30 years from now, we'll be having that discussion on LEAP engine.

Steven Eric Winoker General Electric Company - VP of IR, GE Aerospace VP of IR

Yes. Julian?

Julian C.H. Mitchell Barclays Bank PLC, Research Division - Research Analyst

Maybe just a question around the profitability of the LEAP program. So I think yesterday, we heard from your competitor about a sort of teens margin on their products aftermarket in 2025 on the GTF. Just wondered how we should think about the LEAP's aftermarket profitability in the next few years.

You have some dynamics around the early visits and maybe not particularly economic for GE. How quickly does that mix turn around? And how kind of rich should the margins be on LEAP aftermarket? And also, I suppose it does look like competitively, the durability is far ahead on the LEAP versus its main competitor now, that's becoming sort of more and more apparent. How should we think about the implication on sort of pricing and market share of the program from here?

Steven Eric Winoker General Electric Company - VP of IR, GE Aerospace VP of IR

Russell, do you want to start? And then, Rahul, I know you're in the audience, but if you want to add anything you can, after that.

Russell T. Stokes General Electric Company - President and CEO of Commercial Engines & Services - GE Aerospace

So at the end of the day, where we are on the LEAP engine is that we're performing those maintenance events that we were referencing. It's really done under warranty. So they're net cost events at this point in time. So that's really kind of where we are at this point in '23.

We'll start to see that transition to more profitable shop visits. You saw on that one chart, it starts to step up in '23, really ramps in '24, '25, and those will be profitable shop visits. So take that inclusive of what we're doing on coming down the learning curve on the overall program. The overall program will be profitable mid-decade as well just in terms of total LEAP.



In regards to it compared to anything else, we have full expectations that we're going to make the investments that we've made over time to get lead to where CFM56 is. To your point, that will take some time, but that's our commitment and that's our focus.

Steven Eric Winoker General Electric Company - VP of IR, GE Aerospace VP of IR

And implications for kind of our growth and share effectively.

Russell T. Stokes General Electric Company - President and CEO of Commercial Engines & Services - GE Aerospace

Yes. So from a share standpoint, the way I look at this is, at the end of the day, humbly, we try to make sure that we're delivering the value proposition our customers are looking for. We believe if they get to fly more cycles every day, they're making more money every day, which goes to the durability things that you heard us talk about.

If we're focused on turnaround times, their engines don't sit in our shops or in parking lots outside of our shops. We get them in. We get them out. We get them back on a wing, and they're making money. And then we'll let the market dictate through different campaigns which engine somebody wants to ultimately choose. It's kind of easier in one where we know that it's more of a airframe competition. And then in others, it's an engine competition. But we feel pretty confident. So no specific number I quote, but game on.

Steven Eric Winoker General Electric Company - VP of IR, GE Aerospace VP of IR

Rahul, do you want to add anything?

Rahul Ghai General Electric Company - CFO, GE Aerospace CFO

(inaudible) getting to this a little bit later in my section. We'll talk LEAP profitability, but I think Russell touched upon it. I think we expect LEAP service to be profitable next year, overall program to be profitable kind of mid-decade.

I think the only thing I'll add to the second part of your question is, right now, what Airbus is shipping, we're kind of in the 55% to 60% range over the last couple of years. And I think on our win ratio, going back all the way to '21, I think we are in the 70% wins or the awards, I should say, since what's been decided since '21 to mid-2023.

Steven Eric Winoker General Electric Company - VP of IR, GE Aerospace VP of IR

Great. Next question. Nigel?

Nigel Edward Coe Wolfe Research, LLC - MD & Senior Research Analyst

So going to the time on wing that Andrew left to me. So the -- on the fuel nozzle and the blade upgrades, it feels like the blade is the kind of the game changer for time on wing and durability. Is that -- number one, is that correct? And then once you have this into service, production and service, does that bridge the bulk of the gap between the LEAP and the CFM56 performance? I've got a follow-on question.

Mohamed Ali General Electric Company - VP of Engineering -- GE Aerospace

Yes. A fuel nozzle coking is not affecting time on wing. It's a maintenance burden to our customers, which we care quite a bit about. So this is the biggest contributor to their maintenance burden. It doesn't result in a removal. The replacement of fuel nozzles is not a removal. It can be done on wing, has been done many times on wing, but we are improving that maintenance burden in a significant way. It is correct that the blade is the hurdle to achieving that CFM56 capabilities.

H. Lawrence Culp General Electric Company - Chairman & CEO, GE Aerospace CEO

Okay. And as, if I can just add to that. We talk about turnaround time. We're talking about time on wing to quantify, talk about those road maps. But when we talk about 70% of revenues coming from services, we love the economics, right, but it's that proximity to the customer. That conversation, I can remember vividly with a particular carrier around this coking issue is a maintenance issue, it's a turnaround issue for them. right? Might not a flash on any of our screens, but because we're having that type of conversation, we're on it. And there's just no substitute. No market survey, right, is going to be a substitute for that sort of operational intimacy day in, day out.



Mohamed Ali General Electric Company - VP of Engineering -- GE Aerospace

The other thing I would add also is as we have always done, we will -- there will be continuous improvement. So it's not like you go CFM56, okay, done, that's it. Customers operate differently. Well, even today with CFM56 and many of our other platforms, we just continue to provide improvements with our customers. That's actually one of the hallmarks of this company.

Kenneth George Herbert RBC Capital Markets, Research Division - Analyst

Ken Herbert with RBC. So when you look at your CBSA agreements and the network you're building, are you comfortable with the level of investments your partners are making? And are you concerned that in the next 3 to 5 years, there could be capacity constraints on your network, just considering how quickly the engine is ramping and moving into service. I mean, obviously, your CFM network has got 40 suppliers today, so there's clearly a ramp. But how comfortable are you with that now?

Mohamed Ali General Electric Company - VP of Engineering -- GE Aerospace

So for them to become CBSA partners, there's commitments that they're making, financial commitments that they're making that they're going to be looking for a return on. And so they're going to be out bidding to be able to get that volume and thus need to make sure that they're making the investments.

Tom Levin, who is over here, runs CFM programs for us. So he's out talking with those partners, and he's the one that facilitates the signing of those deals. And so we're always working with them to make sure that they are doing everything they need to do to be able to add the capacity. So to answer your question shortly, I'm confident that we'll continue to add the capacity that we need. Remember that there's also going to be people that are doing at this point in time, more quick turns and looking for ways to be able to do shop visits, they just may not be at the same point to be able to offer the same type of product offerings that a CBSA partner is going to be, but the network is going to be even more broad than what you might have -- then kind of maybe the way we talked about it tied to CBSA specifically.

Kenneth George Herbert RBC Capital Markets, Research Division - Analyst

So, you're not concerned about capacity down the road on the LEAP in particular?

Russell T. Stokes General Electric Company - President and CEO of Commercial Engines & Services - GE Aerospace

It is going to be a constant review and discussion with our partners to make sure that they're adding the capacity that they need to be able to stay up with the rates and the respective ramps as we continue to win the orders that you see there in the installed base.

H. Lawrence Culp General Electric Company - Chairman & CEO, GE Aerospace CEO

And it's a good business for them. So, right?

Russell T. Stokes General Electric Company - President and CEO of Commercial Engines & Services - GE Aerospace

Yes, it is.

H. Lawrence Culp General Electric Company - Chairman & CEO, GE Aerospace CEO

All right. You all need to be there.

Steven Eric Winoker General Electric Company - VP of IR, GE Aerospace VP of IR

I see your hand up Blair, if you want to just get the turn.

Gautam J. Khanna TD Cowen, Research Division - MD & Senior Analyst

Gautam Khanna of TD Cowen. Mike, you talked about supply chain. You're chasing a higher rate. We saw a number of demand charts on the shop visits and the like. I'm wondering if you could talk about when you anticipate your suppliers' capacity to be at a point in which they're on time kind of 95%, 98% of the time like they were pre-COVID, so that you can actually execute on the demand that will be there?



Mike Kauffman General Electric Company - VP of Supply Chain -- GE Aerospace

Yes. I think that's still an open question, to be honest, as we survey what the constraints are. I mean everybody wants to know when is it going to be over? When we're going to be out of this? I think we're going to be in it well through 2024.

As we spoke earlier, a lot of it comes down to solving the labor. And if you can't solve the labor in that location, how do you go to a place or a location that has labor. We'll know better when we see the end -- the quantity of issues that we're dealing with begin to decrease to a manageable level. But we're going to be in this certainly throughout this year and well into next year as we continue to try to ramp. And as we discussed before, we are ramping, but the demand is also ramping. So the ability to close a recover in a ramp is quite the challenge.

H. Lawrence Culp General Electric Company - Chairman & CEO, GE Aerospace CEO

And keep in mind, I mean, Mike is not only chasing a moving target as is the supply base but because of what we're doing with PFEP, right, we're trying to shrink batch quantities, trying to drive more flow and reduce cycle time. So we're solving for a number of different things. So on-time delivery, obviously, one of the best metrics of all time. However, we're playing a bit of multidimensional chess in addition to that moving target being out there.

Steven Eric Winoker General Electric Company - VP of IR, GE Aerospace VP of IR

We'll squeeze in one more question before the break, Kristine, Jerry, can you just hand -- Kristine Liwag from Morgan Stanley, the question?

Kristine Tan Liwag Morgan Stanley, Research Division - Equity Analyst

Yes, Kristine Liwag, Morgan Stanley. So you guys talked about the initiatives for the time on wing for the LEAP. And looking at your chart before for this 56, it's kind of -- it took 9 years for the time on wing to get to the customer expectation at maturity. So you guys are running, it looks like about a year ahead for the LEAP versus where you were for the CFM56. Does that mean that it's going to take another 5 years before you get to that expected time on wing at maturity? And then also, from where you are today until you get to that point, should we expect to see a higher spares pool proportion so that customers are happier in that transition period? .

H. Lawrence Culp General Electric Company - Chairman & CEO, GE Aerospace CEO

You want to take the first half? .

Mohamed Ali General Electric Company - VP of Engineering -- GE Aerospace

I can take that. No, it's -- I mean, that chart, obviously, there's smoothing here. But what you're going to be seeing is with the introduction of the blades that we talked about, you'll see a step function. And as I mentioned before in my previous answer, that's actually, as we know, the last hurdle to achieve that CFM56 level of durability. So no, there is no 5 years. And we are on plan to introduce these fixes in '24 and '25, 1A and 1B.

Russell T. Stokes General Electric Company - President and CEO of Commercial Engines & Services - GE Aerospace

And then we work collaboratively with the airframers to make sure that there is spares to be able to support the customers. Right now, if you were to look at kind of where the spares ratio is, it's a little elevated versus where we expected to see, but it's a timing dynamic just given the rate at which engines are going into the field, that will start to come back down to normalized levels that we tend to see across programs.

Steven Eric Winoker General Electric Company - VP of IR, GE Aerospace VP of IR

Thanks, everybody. We're going to take a short 10-minute break right now. So feel free to go to the other room. And then come back, we'll kick it off in 10 minutes. Thanks so much.

(Break)

PRESENTATION



Steven Eric Winoker General Electric Company - VP of IR, GE Aerospace VP of IR

If I could ask everybody to take your seats. We're going to get started here just in a moment. So anybody, if you can hear my voice in the other room, great to have you here. Glad there's a lot of excitement and conversation, but we need to get going into our second half of the presentation now. So everybody, please come in, grab a seat.

Okay. We're going to call that. Why don't we get started now. And we have a brief video, and then Larry will come up.

(presentation)

H. Lawrence Culp General Electric Company - Chairman & CEO, GE Aerospace CEO

Well, I got a sense from the break that folks enjoyed the presentations of Russell, Mohamed and Mike took you through, obviously, a lot going on, a lot that we're excited about, a lot that we're optimistic about with respect to the commercial engines and services side of the business. What we want to do now is show you why you should be equally excited about what's happening on the defense and systems side of our business.

Very much a similar play, again, different demand drivers. However, right, demand driver is unique to defense and systems give us, I think, a great growth trajectory as we think about today, tomorrow and into the future. So we're going to have Amy kick us off. She'll take you through what's happening in the defense space. And then Riccardo, who runs our propulsion and additive technology group, will give you a little bit of a detailed look at our Avio business. And you'll see some similar themes that cut across both Amy and Riccardo's presentations with what you've heard already.

But you also see hopefully that decentralization thrust in play as well as we're running each P&L one by one from the bottoms up to make sure they're tuned to the customers and the market opportunities that they each enjoy.

So we'll go through that, and then Rahul will come up and wrap it with financials, then we'll go to our second Q&A. So with that, Amy? The stage is yours.

Amy L. Gowder General Electric Company - President & CEO of Military Systems Operation - GE Aerospace

Thank you, Larry. So Riccardo and I are excited to elaborate on our defense business. The defense sector is a resilient one. And we saw during -- in the U.S. during the debt ceiling debates a strong bipartisan support to defense spending. And as we looked at the GE Aerospace programs such as F-15Ex or the CH-53K, the heavy-lift helicopter, we were well funded through the President's budget. We continue to see good marks coming out of the house, and we'll watch the budget bills coming out here shortly.

As we look at Europe and NATO, also a committed to -- commitment to increased spending across all of the NATO countries, but also across all the world with Japan. And here, it gives us the opportunity for U.S. exports. We have the electric power management and battery system on the F-35. We have the T700 powers Apaches. We've seen that recently in Poland, and many other U.S. exports give us opportunity. We're also seeing strong support in these international countries for indigenous platforms. And we've been fortunate to be selected as the engine provider of choice.

KF-21 in Korea is a good example, and Riccardo is going to highlight the Eurozone. So we're well positioned to take advantage of these businesses -- of these growing markets in our business.

And so let me remind you of our strategy we have to ensure we capitalize on that growth. So the strategy is really quite simple, yet very comprehensive. It enables us to be positioned for short term as well as long-term growth. Each and every day, we're using lean to improve the performance of our shops, as Mike highlighted, as well as connect with our supply base to deliver that output on the strong demand we have in our backlog.

We also are positioning ourselves for the readiness growth that's coming in our services market and the international opportunities I just spoke of, as well as we're focused on new product introduction to market, namely in the rotary wing space with our T901 engine, which I'll highlight a little bit later.

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And then, of course, in the future, our technology investments, our innovation breakthroughs are really focused on where our U.S. troops as well as allies need a capability step function improvement. And that remains in range, power, speed, thrust as well as fuel efficiency to counter the near-peer threats and the pacing environment.

So now I'll go and show you some applications of this strategy that's enabling our business success. So Mike highlighted several great examples, so did Russell in the commercial. The defense portion of our business is exactly the same. We're implementing plan for every part. And what that means for us, we took our top 3 programs, and we reduced excess inventory by 39%. Obviously, that's great from a working capital perspective. However, what was really important is it freed up the internal capacity to focus on our constraining parts to improve the output in our shops as well as focusing our suppliers on the constraining parts we need to get the output.

We also launched close to 18 months ago a quality transformation improvement called Part to Print. And you see on the right-hand side some proof points of the results. In the last 6 to 12 months, we've seen significant reductions where we engage the supply base to reduce the defects, improve the yield as well as internally in our own shops, we've seen that same yield improvement.

And what that means is, obviously, less risk for our customers, but more importantly, improved flow. It really reduces those disruptions. We're seeing that quarter-over-quarter in our internal shops. And I personally have seen leveraging our lean operating system, I'm seeing the alignment in our shops. I'm seeing the better communication with our customer -- with our suppliers and with our customers to ensure the flow is seamless.

And just as a proof point, as I looked at the number of part constraints the team dealt with in Q2, it was 10% less than what they dealt with in Q1. And as we look -- and the team is looking further and further into the future to resolve issues before they come and hit our factories. So we really are seeing this improve our output quarter-over-quarter, which meets the demands for our customers.

Then as I look at the growth, I shared with you in March, we have a very strong backlog, over \$1 billion. I've continued to see orders flow in this year. Quarter-to-date, we've had \$1 billion of new engine orders just year-to-date. Some key selections, the T408 I mentioned, we're now on contract for Lots 6 through 8. We reached agreement with Boeing on T-7A for the U.S. trainer. For Lot 1 through 3.

We've seen some international PAE7 as well as our shipbuilds come in. We're seeing about roughly 60% domestic engine orders, 40% international. And then our Services business remains very strong. Year-to-date, we've seen \$1.2 billion in orders for all of our Aftermarket and Services business. As I shift to T901, our new program that replaces our T700, T700 is a workhorse. We have over 12,000 of those in the field, 100 million hours of flight.

But what's really important about T901 is it's 50% more power than the T700 and 25% better fuel efficiency. So it's really critical for the retrofit of the Apaches and the Black Hawks. But even more importantly, it's part of future vertical lift and the FARA or a Future Attack Reconnaissance program. Those 2 engines, I go to the 2 primes, balance Sikorsky. They are fully assembled and the first one is in the test cell. So we're clearly driving to our commitment to deliver those engines to the prime for that program this fall.

And then as I shift to international, we remain the engine of choice on light fighter as well as trainer market. Our 404 powers, the -- not only the T7, but also powers the indigenous training aircraft in Turkey as well as the Korea T50. And then in India, their combat, we were selected as the 414 engine and then we are on the KF-21 powering their combat aircraft.

So continuing to see strong demand for indigenous selecting our engines. And then I always have to highlight the F110 engine. It is the leading time on wing engine, 8.5 million flight hours, compliant hot harsh environments in the last 5 years, 21 competitions, and we were selected 20 out of 21 F-16, F-15, it is the engine of choice for the large combat aircraft. So we have great backlog, continuing to see the demand flow in, continuing to see with the increase in defense spending more opportunities to deliver on that growth.

Now I'm going to take the long view. So our adaptive engines. They are truly revolutionary. It is the next-generation in large combat engine architecture. And we're very proud of our XA100 engine. It is in the test cell running just last week. We added 15% more testing hours to prove out the capability. And what is demonstrating to us and to the Air Force is we can deliver 30% more range, twice the



cooling and 25% fuel efficiency. As we look at the pacing threat, we look at Indo-Pacific, that range is definitely going to be needed for the future of combat. So we're very excited to be partnering with a customer on that.

We're also partnering with Congress because they have recognized this capability is needed for the future of combat. And we were very happy to see in the House Arm Services marks that this program was continuing to be funded. And this funding matures for technology that needs for us to be able to compete for the next-generation adaptive propulsion program. So this technology is for the future, both fifth and sixth generation aircraft. And that's not all Edison works on, they have a great technology opportunities ahead of them.

So they are positioned for the future of combat in several different technology spaces. And we've had recent wins that allowed us to achieve a 20% CAGR based on the recent wins between now and 2025. So we continue to see growth in all these areas. We are pushing the boundaries in hypersonics. We're investing in low-cost technology for future unmanned aircraft applications. We invest a lot in material solutions. An example of our material investment in silicon carbide is critical to the hybrid electric technology market. And we see hybrid electric in Army applications from ground to rotary wing as well as advanced mobility applications or contested logistics environments.

And that silicon carbide has allowed us to have high voltage, high density, low power options. And then I'll highlight specifically in hypersonics, the scramjet/ramjet domain, where we made an inorganic investment in a company called Innoveering. And Innoveering brings inlets and exhaustics for Ts. GE brings the high mach turbine as well as high-temperature material solutions. We believe together, we're putting forward innovative solutions, unique solutions for the hypersonic market. So we're very proud of that.

And frankly, Edison Works has a long history of fielding, innovation and applications to the war fighter. They have a history of partnering with the customer and then the deep engineering expertise is really what's setting us up to be very competitive in all of these next-generation programs where we need to shape the future of combat. So our future is bright. We have a very resilient market that we're in. We're well positioned to capitalize on that growth. We've made step-function changes in delivering for performance today. We're expanding that international as well as U.S. customer base for growth for tomorrow.

And then Edison Works is truly shaping the future combat with all of their investments in technology, enabling us to compete and share back with the commercial, some of these great technologies. So we have a diverse portfolio, and we're well positioned for accretive growth. Now I'd like to welcome to stage my colleague, Riccardo Procacci. Riccardo is the President of Propulsion and Adapt and Additive Technologies. I love adaptive. And he's going to highlight for you some more opportunities we have in the European defense market.

Riccardo Procacci General Electric Company - CEO of Avio Aero and VP & CEO of GE Additive -- GE Aerospace

Thank you, Amy, and thank you for your nice introduction. It's been a long morning already. But if you stay with me for 10 more minutes, I will tell you about one of the great company I managed with Avio Aero and how Avio Aero is helping GE Aerospace to play in the European defense market, but also how from Europe, Avio Aero is helping GE Aerospace towards its commitment to sustainability for our industry. Avio Aero is a solid presence in Europe that we have developed with over 110 years of operations started from Italy and now expanding in several countries and in Europe. We serve GE as an internal supplier, but also we serve external customers.

Interesting to note, the fact that over the last 10 years after GE acquisition, we have been able to grow our external part of the business, this to testify how strong our relationship with these customers. You follow me towards the center of the page, you'll see a portfolio product that ranges from complete engines to engine components and to services. With this product portfolio, we serve both the defense industry business and the commercial aviation with a balanced portfolio that helped us a lot to sale to the difficult time of the COVID crisis.

Another very important thing to note is that our portfolio of technology is composed by technologies that we codevelop with Mohamed and the GE Aerospace team, but also with technology that is developed -- the indigenous to Europe developed by us and completely fighter world from what Mohamed and team does. And we use this technology to serve our defense industry, but also some of our external customers. So all in all, a balanced portfolio of customers, product and technology. We all know how the instability has pushed up the defense budget for most countries in Europe. This has created 3 consequences.

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First, the existing military fleets are operating more and therefore, they require more service. Second, new acquisitions campaigns are starting all over Europe for our existing platforms. And third, a new wave of strategic investment started in Europe to give Europe more capabilities, but also more technology independence versus what we were -- used to have in the past. You easily understand how Avio Aero is very well positioned to take advantage for -- in the name of GE Aerospace for the 3 dynamics that have been developing.

Now as I'm talking about the Europe desire for more technological independence, at the same time, transatlantic ties are strong and never been this strong. And so once again, Avio Aero is uniquely positioned to be on one side, a key player in the development of a more independent from the technology standpoint in Europe. On the other side, a unique conduit to make some of the great technology that Amy is developing and bring it to Europe. So when you look at how we play today, you can recognize the familiar shape of the Eurofighter, the Eurojet engine is propelling the Eurofighter.

We make 25% of that engine. We service it and we support with our production the rest of the partner niches, totally indigenous technology. But you also see NH90 helicopter propelled by a T700 engine that Avio Aero builds and designs that builds about 50% of that engine, we do 100% of the assembly, testing, certification and services. When you look at how we add the platforms, they will fly in the coming years, you recognize in AW249, the new attack helicopter that Leonardo is developing initially at least for the Italian army, but we have very good prospects for export as well.

That helicopter will be propelled by another version of the T700 engine that Avio Aero has indigenized for the application. Next to it, you see the Euro drone, Amy mentioned it. The large remotely piloted aircraft, Airbus is developing it, 2 of our turboprop engines catalysts will be powering the drone. The catalyst engine has been entirely developed and produced here in Europe by 5 world technologies. Then we look at the future. The future, we really hope that we'll have an opportunity to indigenize and we're already working and thinking around that line, for example, the T901 that now to make it as successful at the T700 family has been in Europe.

But also in here as an engineers where I'm getting really excited, the fact that Italy, U.K. and Japan, just start the development of the sixth generation fighter so-called GCAP. This program will give us the opportunity to develop the technologies that, on one side, will make Europe more independent. But on the other side, we'll define our portfolio of technologies for the next 30 years and that eventually will flow down into our Commercial business, really, really a great story.

Now Avio Aero is not only and not all about military. We are also deeply committed to sustainability. EU has committed \$4 billion in funding for us -- for Europe to develop disruptive technologies on sustainability. These \$4 billion are deployed to a private public joint undertaking called Clean Aviation. Avio Aero is a funding member of Clean Aviation. And on a competitive basis, has just been awarded 3 key programs that will help us exploring the 3 key streams of technologies for sustainability.

New architecture, hybrid electric and nitrogen. What is interesting to note is that though we will get \$81 million of funding from EU, our partners, the partner that will work with us so that we will coordinate, altogether, we will get \$200 million -- over \$200 million of funding. But more than that, this investment will be matched by some of our money as well. And all these programs are 100% ingrained and coordinated with the future of aviation that Mohamed is leading. So the positive effect of the dividends of these programs will be much higher, both for GE Aerospace and for Europe, something that we are really proud of.

Now we can keep dreaming our future, about our future, making it real. But if we don't deliver to our customers today, not innovate accounts. So Avio Aero as well started a Lean journey a few years back, but it's only probably a couple of years ago that we started a true Lean transformation when we are making a Lean part of how we run the company in all -- from all angles. So we use Lean when we deal with our suppliers to help them solve some of the process issue, but also some of the key suppliers to help them taking better control of their own supply chain that is becoming critical to us.

We use Lean to improve our -- the stability of our manufacturing flow, improving the control we have on our input material inventory, but also trying to bring the point of deduction of quality issues as close as possible to the point of generation because that allows us to act faster and more effectively towards better quality. And finally, we are using Lean to create more capacity by eliminating waste. That gives us the opportunity to apply the precious capital that we have only to these assets that will give us a real competitive advantage versus

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our competitors.

As a proof point, I can show what we have done for our defense customers with really dramatic improvements, both on turnaround time and on-time delivery. So if you've been able to stay with me, now you know something about Avio and Avio Aero, I hope you like it.

And just so that it sticks in your mind, Avio Aero will be a key player in Europe from the defense standpoint, wants to be, at the same time, more anonymous, and with tighter links to the U.S. Avio Aero is committed as GE Aerospace is to sustainability, and we are able and very successful to access funding from the EU because they like what we do and because we deliver. And third, overall, we see it on a balanced portfolio of customers and products and technology. We deliver quite solid execution. And the 2 things together set us up for growth and success in the future. And with this, I would just thank you and introduce my good friend, Rahul Ghai.

Rahul Ghai General Electric Company - CFO, GE Aerospace CFO

Thank you, Riccardo. Good morning, everyone. I'm Rahul. So, those of you who have not had the pleasure of meeting yet. And what I want to do over the next 10 minutes or so is take in the step forward in the journey that we started back at Investor Day in March and go deeper into the business and discuss the impact of the profitability and free cash flow of our service contracts and also talk about the transition from CFM56 to LEAP. But before I do that, let me quickly talk about where we are for 2023 and to a recap of the outlook that we had provided for '25.

So with that, let's talk about 2023. We are on track to meet the guidance that we have provided back in April, the first quarter earnings release. The air traffic growth is still continuing. And in fact, it's a couple of points better than what we thought back in April, primarily due to the stronger-than-expected recovery in China, where the air traffic is back to 2019 levels much sooner than we had expected. This, combined with the strong start to the year that we've had, keeps us on track to achieve the mid- to high teens growth that we've outlined with our commercial new equipment business up approximately 20%, defense up high single digits and commercial services up high teens to 20%. Within services, we had discussed that our spare parts business will be up called mid-teens, which is what we expected the departures to be at that point.

Now with the stronger-than-expected recovery of air traffic, we think our spare part sales would grow slightly higher than mid-teens because of that quicker return of departure growth from last year. But this will be offset with slower-than-expected growth on shop visits because the material challenges that Russell and Mike spoke about earlier, with the overall services growth staying in that high teens to 20% range. And we'll talk more about this as we discuss our second quarter results and provide guidance for the back half of the year in July.

About \$700 million of profit growth, up mid-teens year-over-year, another strong year, primarily driven by volume coming from commercial services. Now as we discussed the first half, second half dynamic, we do expect the first half to be stronger than second half. And this is because of 2 reasons. One, if you look at last year, our Commercial Services business grew 35% between first quarter of '22 to fourth quarter of 2022. So strong sequential recovery in '22, which is making the comparisons in the back half of this year, very difficult. The second thing I would say is on the commercial new equipment side, our spare engine and install engine mix overall for the year is consistent with what we did back in '22, but it is favorable for the first half and unfavorable for the second half, which makes margin growth challenges a little bit harder in the second half of the year.

But overall, still a really good year, \$700 million of profit growth on top of the \$2 billion not of the profit growth that we did last year. Free cash flow continues to be tracking well to the guide that we provided. It should be up for the year, higher than net income coming from higher earnings' growth and lower working capital as we reduce our days sales outstanding and increase our service billings, which continue to outpace utilization. This more than offsets about the net AD&A headwind of about \$0.5 billion that we are expecting for the year. So it should be a really good year as we will talk more about that in July.

So now let's talk about the outlook for the medium term. We are confident about the trajectory that we are on and in the medium-term outlook for the business. The pandemic is fully behind us. The air traffic is still recovering. The defense spending as Amy and Riccardo spoke about is resilient, and our backlog is at record levels. So this framework supports the low double digit to mid-teens revenue growth with commercial up mid-teens and defense up mid-single digits to high single digits coming from the strength of the classified programs



and the continued backlog and growth that we are seeing on our core platforms.

On the commercial side, growth will be led by new equipment as LEAP deliveries continue to increase, but services growth should stay strong with shop visit growth of about high single digits between 2023 and 2025. More than \$2 billion of profit growth during this period, coming both from revenue increase, but also from margin improvement as margins trend back to 20% levels by 2025. So it should be a good year coming -- should be a good profit growth coming from volume, but also we are making progress on productivity. We are expecting 2 to 3 points of gross productivity every year between now and 2025, coming from all the lean work that we're doing in our factories. And as the lean principles go deeper in the organization, as we build those capabilities, we expect higher gross productivity.

And also the projects that we are starting this year will have carryover benefits for '24 and '25. Free cash flow conversion should remain strong. We are expecting to reduce our inventory, which we spoke about back in March. Our inventory levels are high as the throughput improves as we drive Lean into the organization, inventory levels come down, but also the AD&A headwinds abate by the time we get to 2025. So both those things should keep our cash flow above net income, and we should see strong growth in our free cash flow.

So now let me switch gears and talk about our service contracts, which we call customized service contracts or CSAs for short. Some people call them powered-by-the-hour contracts in the industry. So I want to point out a couple of things on the left. First, if you look at the left-hand side of the page, our newer platforms have a higher portion of their fleet covered by CSAs than the older platforms, be it narrow-body, be it widebody. The second thing I want to point out is that if you look at our platforms like GE90 or GEnx, even with a high portion of their fleet under CSAs, the profitability levels of -- the service profitability levels for these programs are higher than our overall services business.

And Larry touched on it this morning that these service agreements keep us close to our customer, right? And they allow us to control work scope and also drive a favorable cash profile. And I'll come back to free cash flow in a second. But if priced right, these contracts can create a lot of value for both our customers and for our investors. But having said all of that, we are committed to an open network, as Russell spoke about this morning because this open network creates competition, drives costs lower and creates options for our customers. So that's what we're trying to do.

Now as we look at the services growth, before I get there, I want to talk -- I want to spend a minute on LEAP and how LEAP is impacting our service profitability. Today, LEAP service margins are below our overall services business. This is partially because of where we are in the life cycle of the program. We are not yet at a stage where we are benefiting from the full scope shop visits. But also as we are encountering issues like the radial drive shaft or the shroud that both Russell and Mohamed spoke about, we are stepping up our standard warranty reserves and creating a separate warranty reserve.

In addition, we are creating separate provisions for the higher-than-expected shop visits in the hot and harsh environments. We set up these reserves in the quarter where we established the need to have that reserve and charge that to the P&L. About 2/3 of the reserves that we have on our books today are for these unanticipated, unexpected events that we've encountered since we launched LEAP. So when we have costs, again, that go against fixing these things, we charge those costs to these reserves, protecting our P&L and the contract profitability. So now as we look forward and talk about the growth of the services business between now until the end of the decade, LEAP will drive a big portion of that growth.

Now as we discussed, LEAP margins today are below that of our overall services business. But as we discussed in the Q&A, we do expect LEAP to turn -- LEAP services to turn profitable in '24, overall LEAP program to turn profitable kind of mid-decade. And then we expect future improvement in LEAP margins beyond 2025, similar to what we've achieved in other platforms, which you can see on the right, if you look at GEnx, the margins are 4x from where they were 10 years ago. And that's happened from all the things that we kind of list at the bottom of the chart on the right. This has happened as we've improved product durability. This has happened as we've done contract restructurings. This has happened as we've driven productivity and repair industrialization, which has reduced the hours it takes to complete a shop visit.

We are following the exact same playbook on LEAP, and there's absolutely no reason for us to sit here and believe that we will not achieve similar results. So we're confident about the future of LEAP and the benefit it will create for us and our investors. So now as we



look forward and talk about cash for a second. There's been a lot of discussions about the impact these service contracts will have on our free cash flow. These service contracts should be a net positive contributor to our free cash flow between now and '25. And this will happen because of 2 reasons. One, if you look to the left-hand side of the page, most of the billings on these service contracts have not yet taken place. So if you look at LEAP, 99% of the billings on these service contracts are to go.

And then if you look to the right-hand side of the page, as the installed base grows and as the air traffic improves, these billings will continue to grow. And these billings will outpace the cost that we need to expand to complete the shop visits that happen during this time period. So you put all that together, that basically means that net contract asset increases between now and 2025, reducing our working capital and improving our free cash flow.

So to summarize here, it's a great business, right? It's on solid, operational and financial fundamentals. Growth will be driven by macro trends and best-in-class people, technology and products. Price and productivity drive margin expansion and as we continue to offset the typical headwinds that are caused by introduction of new products. This is what gives us confidence of driving strong performance over the next couple of years and then driving mid-single-digit to high single-digit growth beyond that with margin expansion and strong free cash flow. With that, Steve, I'll hand it to you to get us very quick Q&A.

Steven Eric Winoker General Electric Company - VP of IR, GE Aerospace VP of IR

Great. So I know we have a short amount of time. So Gautam, I think I see here the first question then Sheila afterwards.

Gautam J. Khanna TD Cowen, Research Division - MD & Senior Analyst

Gautam Khanna, TD Cowen. I had a quick question on the CFM aftermarket. One of your slides shows that shop visits, it looks like peak in '25 and then start to decline through '28. And I presume, it's more profitable, like you mentioned, than the LEAP. Could you just help frame that profit transition on the single-aisle aftermarket, 2025 and beyond?

Rahul Ghai General Electric Company - CFO, GE Aerospace CFO

So you're right, Gautam, it is -- if you look at CFM56, as it was on the chart, we have -- our service contract mix and that platform is low, so less than 20%, right? So the margin profitability is higher, right, just because we're shipping a lot of spare parts, right? But the overall profitability on the CFM per kind of per shop visit is slightly lower than what we do on the widebodies. Widebodies, the absolute dollar profitability is a little bit higher, right?

So as CFM, you're right, as CFM kind of starts coming down, but the overall revenue for CFM, as Russell showed on his chart, is not that much of a difference between '25 and '28 because you have price increase and other things that go in to cover for the drop in shop visits. So not a huge drop in revenue on CFM56. So that's one thing that should protect us. And the second thing that will protect us is the improvement in LEAP service margins, right? Keep in mind that we are kind of incurring losses on LEAP service right now. We get to profitability in '25, gets better in '25 and then keeps going from there. So I think between the 2, we should be okay. And that's where we kind of said we'll continue to expand margins beyond '25.

Steven Eric Winoker General Electric Company - VP of IR, GE Aerospace VP of IR

Sheila?

Sheila Karin Kahyaoglu Jefferies LLC, Research Division - Equity Analyst

I'm Sheila Kahyaoglu from Jefferies. How do we think about the cadence Rahul, of CSAs on LEAP for shop visits 1, 2 and 3, whether it's margin profile or free cash flow profile? And does free cash flow continue to grow if production rates stabilize?

Rahul Ghai General Electric Company - CFO, GE Aerospace CFO

I just want to make sure I understand the question, Sheila. So let me try and see if I don't answer it, ask again. So our CSA are -- as we think about the number of shop visits, when we do our shop visits as part of our CSAs, the margin -- the dollar profitability -- or I should say, the margin profitability does not change, right? Because we're recognizing the same margin because it's part of the CSA. Now as I think Russell had a chart at Investor Day and jump in Russell, here the dollar per shop visit is higher for shop visit 2, then it's for shop visit 1, right?



So as we get into second shop visit that dollar profitability should go up, but the margins -- margin percentage should remain the same. And I think with the installed base, that obviously, that's going to impact -- it's not going to have a near-term impact because everything that we're doing now is not going to really enter into service too much later then. Russell, anything to add?

Russell T. Stokes General Electric Company - President and CEO of Commercial Engines & Services - GE Aerospace

No, I think you said it perfectly. The contracts are underwritten to a levelized margin rate. So that's kind of a what Rahul means that they don't fluctuate other than to the extent that we continue to improve productivity in the contract around turnaround time, time on weighing, those other elements that raise the margin rate for the contract over its side. So more cost that comes in, more revenue that comes in at a higher margin rate...

Steven Eric Winoker General Electric Company - VP of IR, GE Aerospace VP of IR

And Russell, just like also work scope and dollars as opposed to rate over that time, it might see a difference.

Russell T. Stokes General Electric Company - President and CEO of Commercial Engines & Services - GE Aerospace

And it comes down to operating parameters. So it depends on by contract, what way the customer is utilizing the engine, what thrust they're using the engines on. So there's a little bit of mix in that, but that the way we all said it is correct.

Rahul Ghai General Electric Company - CFO, GE Aerospace CFO

Good to pass the test.

Steven Eric Winoker General Electric Company - VP of IR, GE Aerospace VP of IR

Julian?

Julian C.H. Mitchell Barclays Bank PLC, Research Division - Research Analyst

So yes, this one shouldn't be very testing. You've got the sort of \$700 million profit increase guide this year. The guide for '25 implies it's about \$700 million per year for the 3 years, right, the \$2 billion increase...

Rahul Ghai General Electric Company - CFO, GE Aerospace CFO

Over 2 years, Julian, more than \$1 billion.

Julian C.H. Mitchell Barclays Bank PLC, Research Division - Research Analyst

Right. Sorry. So you've got a step up. Maybe just help us understand sort of that delta of the LEAP improving? And then what's sort of coming the other way, if you're thinking about the headwinds offsetting that LEAP program improvement and then the second one would more be around maybe within Defense & Systems, just some understanding of sort of broad profit pools within that. Just so from the outside, we can kind of understand the moving pieces a little bit better and how you feel about the defense improvements in output that you'd mentioned? Maybe any more color on that, please?

Rahul Ghai General Electric Company - CFO, GE Aerospace CFO

Yes. So let me start on the bridge from \$700 million to \$1 billion, Julian, if I understood your question right. I think if you look at '24, LEAP profitability is maybe half of that and then as we get into '25, obviously, that gets a bigger portion. But keep in mind that gets -- what's going the other way and this goes back to Russell chart where he showed the increase in deliveries on the OE side, right? So that obviously is a negative impact, right? So that's kind of -- so if LEAP profitability goes up, we do see a drop off in the headwind a little bit in the OE deliveries.

But net-net, if you go back to the earnings bridge that we showed back at Investor Day, volume mix was a net positive, right? So that's a positive. Then the other thing that's coming our way is the productivity that I spoke about, the 2 to 3 points of gross productivity that we are driving, right? Prices are positive and then gets partially offset by inflation and gets offset by the investments that we are making to -- for RISE, for LEAP durability. So that's kind of the walk between \$700 million to \$1 billion. Amy or Riccardo for Defense.



Amy L. Gowder General Electric Company - President & CEO of Military Systems Operation - GE Aerospace

Sure. So I'll start with output and then maybe do the profit pools and feel free to jump in. So we've seen nice improvement quarter-over-quarter where 150 units quarter-to-date much more than last year. It's an improvement year-over-year. So we're seeing that incremental improvement in the supply chain, both suppliers and internal to hit the high single-digit growth we're expecting. So we see that incrementally improving proof point F110 engine, we're going to deliver roughly 30 engines. That's more than we delivered in the last 3 years in 1 quarter. So it's nice.

Profit pools are very similar in defense. You can think about development contracts are single digits in the early stages of technology development. We have nice production portfolio though. And production portfolios definitely get the higher margins, especially when they're international. As I showed to you, we have a lot of international opportunities. And then our services also have double-digit margins.

Riccardo Procacci General Electric Company - CEO of Avio Aero and VP & CEO of GE Additive -- GE Aerospace

Yes. Probably on my side, I can only add that what I was mentioning of more utilization of (inaudible) assets require the industry has to be more reactive, more productive, they need more availability from these assets. This requires us to be more efficient in how we service our military forces. And in the moment we become more efficient, we become also more profitable. We need to eliminate waste in the way we serve our customers. And so it's really a win-win situation for what we -- how we serve them and how we accept value from that.

Jason Michael Gursky Citigroup Inc., Research Division - Research Analyst

Jason Gursky from Citi. Rahul, sticking with you on this \$2 billion of profit improvement. There's also a bullet there that says does not include stand-alone impact. So I'm wondering if you can size that for us all.

Rahul Ghai General Electric Company - CFO, GE Aerospace CFO

Yes, a little early to size that, Jason. I think if you think about what we are expecting now, I think -- and Steve jump in here. I think the corporate guide is about \$600 million of Corporate costs this year, which includes some corporate costs, and I'm talking at the GE level, right, which includes the corporate cost and also some of the EH&S expenses that we will have going forward, right? Now Corporate is going to wind down that \$600 million a little bit as we get towards the end of the year so that we don't have a lot of stranded cost but we will have our own kind of stand-up public company cost. But I think we sized it in the \$150 million to \$200 million range, right?

Hopefully, at the lower end of the range, but the range is between \$150 million to \$200 million, right, to stand up a public company cost. Then we're going to get a portion of the EH&S liabilities that we'll get from corporate, right? So because these costs are not going away, how that gets exactly gets split, I think that will decide that over time. That is not finally decided. So think about that, the \$150 million to \$200 million of corporate costs to stand up a public company, plus the EH&S costs that are between that \$300 million to \$400 million range for the year, that will come to GE Aerospace. So I'll think about that about, call it, \$0.5 billion or so that will hit us on the P&L.

Steven Eric Winoker General Electric Company - VP of IR, GE Aerospace VP of IR

Yes. So \$600 million goes down to \$400 million. That's somehow split between Vernova and Aerospace and then \$150 million to [\$200 million] for each of the 2 entities.

Jason Michael Gursky Citigroup Inc., Research Division - Research Analyst

Right. And then just a quick follow-up for Larry and Amy on the defense side of things. Just want to get your sense of how committed you all are to avoiding firm fixed-price development programs?

Amy L. Gowder General Electric Company - President & CEO of Military Systems Operation - GE Aerospace

Certainly. We agree with a lot of our peers in the industry that the cost plus is a better way to go during the development period. And we've been fortunate working with our customers that, that's generally what we're on, like the T901 is a cost-plus contract during development. And it really has the right risk-reward balance as requirements change the cost-plus nature. So we're in line with the rest of industry.



Steven Eric Winoker General Electric Company - VP of IR, GE Aerospace VP of IR

Nigel. And then we'll finish up with George and be out of time.

Nigel Edward Coe Wolfe Research, LLC - MD & Senior Research Analyst

So I've got a question that's probably more the housekeeping type of category, but the '25 profit range for Aviation was \$8.5 billion to \$9 billion. Back in March, we're now seeing \$2 billion of growth more or less the same, but is that an intentional shift or nothing changed?

Rahul Ghai General Electric Company - CFO, GE Aerospace CFO

It's exactly the same number, Nigel. I think we said \$2 billion plus back in March. If I said \$2 billion, that's an error on my part. I meant \$2 billion plus so it's exactly the same number. No change in our outlook for '25 at all.

Nigel Edward Coe Wolfe Research, LLC - MD & Senior Research Analyst

And then on the CSA mix for the LEAP and the GEnx, obviously, very high today. As that installed base grows by 2030, is there an ideal mix between CSAs in terms of term material? Is that 50%, 55%, 45%? Is there an ideal mix between the 2?

Rahul Ghai General Electric Company - CFO, GE Aerospace CFO

So are you -- the question, Nigel, is specifically on widebodies or on LEAP?

Nigel Edward Coe Wolfe Research, LLC - MD & Senior Research Analyst

Both GEnx and LEAP. And really, you mentioned you're committed to keeping an open network to drive on those costs. I'm just wondering if there's a sweet spot between the 2?

Russell T. Stokes General Electric Company - President and CEO of Commercial Engines & Services - GE Aerospace

So as you saw in the chart there, so we've been very focused on improving the profitability of the GEnx engine and what's under contract in those. And so we'll expect over time that just given kind of the network will ramp that down a bit, working with customers or continue to focus on the profitability of the program. On the LEAP engine, I do expect it to be lower than the 60% that you saw. That's kind of where we are at this point in time. I don't have an actual specific glide path for you, but we will be bringing that down over time, probably something closer to the thing you saw on one of those sand charts that look more like 50/50, will kind of be probably more directionally where we at.

Steven Eric Winoker General Electric Company - VP of IR, GE Aerospace VP of IR

Let's take the last question from George.

George Zhao Bernstein Ag - VP & Research Analyst

George Zhao from Bernstein. When you sign new LEAP CSA contracts today, are you getting better prices relative to the older contracts to account for the higher cost? And if so, are you able to apply those benefits to prior existing contracts as well?

Rahul Ghai General Electric Company - CFO, GE Aerospace CFO

So I can start while Russell is getting the -- the answer to that contract, the answer is yes, right? We are definitely getting better pricing. The launch pricing days are behind us. So we're getting definitely better pricing.

Russell T. Stokes General Electric Company - President and CEO of Commercial Engines & Services - GE Aerospace

We've been clear that the launch pricing element, we're no longer doing. And so there definitely has been better pricing that's come along on those contracts. And then there's clearly things we've learned about those contracts since we underwrote them way back at the launch of the product, and we'll continue to apply those learnings to continue to make those better and more profitable programs as we go forward.

Steven Eric Winoker General Electric Company - VP of IR, GE Aerospace VP of IR

Thanks, George. So with that, Larry, do you want any -- have any time for some final comments?



H. Lawrence Culp General Electric Company - Chairman & CEO, GE Aerospace CEO

Yes. I appreciate everybody staying with us. I would just basically wrap up where we started. I think you've seen over the last several hours, the evidence that we have an enviable position of market leadership centered on propulsion at just the perfect time relative to this industry. That said, I think in every presentation that you saw, a keen focus to make sure we're delivering today, we're preparing for tomorrow while investing for the future. We know we have a lot in front of us, not only this year, but certainly next year in anticipation of the spin.

So everything that we can do with our Lean initiatives, with our decentralization work to best position ourselves not only to take full advantage of this opportunity in terms of the future of flight, but also with respect to our status as a stand-alone company. So again, I appreciate the time this morning. We're going to get back to work straightaway and look forward to getting together before too long for another update. Thank you.

Steven Eric Winoker General Electric Company - VP of IR, GE Aerospace VP of IR

Thank you. So now that we've concluded the formal presentation. We have a reception in back around the innovation showcase and then transportation to the Air Show for everybody at noon, okay? So please come join us. We have a number of managers in the business and appreciating those of you who have stuck through and not go back to the Air Show already.

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