

# **Joby Aviation, Inc. (JOBY) Q2 2024 Earnings Call Transcript**

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**Body**

Joby Aviation, Inc. (JOBY)

Q2 2024 Earnings Conference Call

August 7, 2024, 05:00 PM ET

Company Participants

Teresa Thuruthiyil - Head of IR

JoeBen Bevirt - Founder and CEO

Didier Papadopoulos - President, Aircraft OEM

Matt Field - CFO

Paul Sciarra - Executive Chairman

Conference Call Participants

Andres Sheppard - Cantor Fitzgerald

Bill Peterson - JPMorgan

Austin Moeller - Canaccord Genuity

Savanthi Syth - Raymond James

David Zazula - Barclays

Presentation

Operator

Greetings, and welcome to Joby Aviation's Second Quarter 2024 Conference Call and Webcast. At this time, all participants are in a listen-only mode. [Operator Instructions] As a reminder, this conference is being recorded.

It is now my pleasure to introduce your host, Teresa Thuruthiyil, Joby's Head of Investor Relations.

Teresa Thuruthiyil

Thank you. Good afternoon and evening, everyone. Welcome to the Joby Aviation conference call to discuss the company's financial results for the second quarter of 2024. We announced our results earlier today. Both our Q2 2024 shareholder letter and a webcast of this call are available online at the Investor Relations page of our website at ir.jobyaviation.com.

Our discussion today will include statements regarding future events and financial performance, as well as statements of belief, expectation, and intent. These forward-looking statements are based on management's current expectations and involve risks and uncertainties that could cause actual results to differ materially from those expressed or implied.

For a more detailed discussion of these risks and uncertainties, please refer to our filings with the SEC and the safe harbor disclaimer contained in today's shareholder letter. The forward-looking statements included in this call are made only as of the date of this call, and the company does not assume any obligation to update or revise them. Please note that today's call will include results reported on a non-GAAP basis. Our Q2 2024 shareholder letter provides a reconciliation between GAAP and non-GAAP measures.

On the call today, we have JoeBen Bevirt, Founder and Chief Executive Officer; Didier Papadopoulos, President of Aircraft OEM; Matt Field, Chief Financial Officer; and joining us for Q&A we also Paul Sciarra, Executive Chairman. After management's prepared remarks, we will open the call for questions.

And with all of that said, I'll turn the call over to JoeBen.

JoeBen Bevirt

Thanks Teresa, and thank you all for joining us today.

I'm pleased to report that we've had another great quarter, making important progress across all three of our core focus areas, certification, manufacturing, and commercialization, while investing in Joby's long-term success. Didier is going to speak to the detail of this in a few moments, but I'd like to call out some of the headlines.

On certification, we saw a significant momentum during the quarter and we're now at 37% complete on the Joby side of Stage 4. On manufacturing, our second production prototype aircraft began flying during the quarter. Our third rolled off the pilot assembly line. Our fourth is in final assembly and the fuselage and tail for our fifth are already connected and undergoing proof load testing. That means we will soon be flying four aircraft as part of our test program.

On commercialization, we applied for certification in Australia and signed a memorandum of understanding with Mukamalah, a wholly owned subsidiary of Saudi Aramco and operator of the world's largest fleet of corporate aircraft. Together we'll be working to introduce Joby to the Kingdom of Saudi Arabia through the direct purchase of our aircraft.

As a reminder, the sale of aircraft to customers like Mukamalah or the U.S. government forms just one pillar of our commercialization strategy alongside the direct operation of our aircraft in core markets and partnered operations in other markets. We expect sales to be an important pillar of our commercialization strategy offering the opportunity to generate recurring revenue through the provision of training and maintenance services.

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Each of these achievements demonstrates Joby's leadership in our sector and I'm incredibly proud of the team that continues to deliver quarter-over-quarter. Before I hand it over to Didier, I would like to focus on two other areas that are critical to Joby's long-term success. Our preparation for commercial operations and our investment in future technologies.

On operations, we hosted a virtual briefing during the quarter where we introduced our pre-flight checklist, a list of the operational items required to successfully deliver an air taxi service, whether you are operating aircraft yourself or selling them to customers. If you haven't seen the briefing, I'd encourage you to watch it on our YouTube channel. And what I hope you'll takeaway is that certifying an aircraft is just one piece of the puzzle.

To commercialize successfully, you also need simulators, pilot training, maintenance, safety management systems, and much more. With our Part 135 and Part 145 certifications in place, we are making sector-leading progress towards being ready to start commercial operations. And during the quarter, we announced that we have also received FAA authorization to use our ElevateOS operating system.

ElevateOS is an airline operating system developed in-house that is designed to enable high-tempo on-demand air taxi operations. It includes pilot tools, schedule management software, a mobile-first rider app, and an intelligent matching engine. It's built on a software foundation developed by Uber that we brought across as part of our Uber Elevate acquisition in 2021.

Uber is the undisputed leader in ride-sharing technology. But the team that joined Joby from Uber also brought direct experience of deploying a multimodal ride-sharing product through UberCopter. We knew early on in our journey that to deliver the sort of efficient, even magical experiences our customers would expect, we would need to fundamentally rethink the aviation software stack. And that's exactly what we've done. We've built a remarkable set of tools that goes far beyond anything available today and is designed to connect seamlessly into the services of our partners like Uber and Delta. And we're already testing it in real life so that we'll be ready for day one of operations.

Looking beyond our initial service launch, the second area I'd like to focus on is our investment in future technologies. Our goal has always been to broaden access to flight as widely as possible while reducing the environmental impact of travel. Our battery electric aircraft is going to help us take the first step on that journey. But it is also going to act as a platform for us to take the next steps on that journey. Because the vast majority of the design, testing, and certification work we've completed on the aircraft will carry over into future aircraft or future integrations of the same aircraft.

In other words, we can build on the investments we've already made to open up new and adjacent markets. We're able to do that because of the vertically integrated way in which we've built our company and our record-breaking 561-mile hydrogen electric flight is a great example of that. This range would make it possible to connect Baltimore to Boston or San Francisco to San Diego, changing how people think about transportation between cities.

We converted our own battery electric aircraft to complete a hydrogen-electric flight in a matter of weeks with only a small team. Our Xwing acquisition tells the same story of small but important investments that leverage our existing technology to make a big difference. We believe autonomy has the potential to widen access to flight on the consumer side and enable a larger set of applications on the government side. And in Xwing, we've been able to bring on a team that has demonstrated true leadership in the field.

At the Farnborough Airshow back in July, the excitement around our work in automation and hydrogen took me back to 2017, the year we first flew our full-size battery electric prototype aircraft and demonstrated what eVTOL could be. Those flights played an incredibly important role in bringing this sector to life and catalyzing the regulatory work required to commercialize battery electric technology. My hope is that our hydrogen and autonomy work will do the same thing and help lay the groundwork for those technologies to enjoy the broad bipartisan and global support we're seeing for our battery electric aircraft today. It's an honor to be able to share our progress with you each quarter.

And I'd like to hand it over to Didier to look in more detail at our future technology and our core work on certifying and manufacturing our battery electric aircraft. Didier, over to you.

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Didier Papadopoulos

Thanks, JoeBen.

It was exhilarating to witness our team complete multiple 500-plus-mile eVTOL flights using our hydrogen-electric demonstrator aircraft. This was truly a landmark achievement, and I want to take a moment to explain how we were able to quickly and efficiently demonstrate in next-generation technology and why we did it.

Our battery electric pre-production prototype completed its mission as a test asset on May 2, and less than two months later, it demonstrated that regional emission-free flight is possible. Looking at the aircraft from the outside, you can tell that the vast majority of it is fundamentally the same aircraft as the battery electric prototype. It has the same six propellers driven by the same six electric propulsion units and the same airframe structure. The wiring and electronics inside the aircraft are nearly identical as well.

A small team at Joby worked with H2FLY, a wholly-owned subsidiary we acquired in 2021 for our pioneers in hydrogen-powered flight, to develop a hydrogen-electric powertrain that we were able to integrate into the aircraft and fly in a matter of weeks. This is the power of the vertical integration at Joby that we've been describing for the past three years. From composites to metallics, electronics to mechanical systems, hardware to software, the design, manufacturing, and testing of all of these, as well as the integrated systems testing that brings each of these elements together, we have all of this under one roof. In more than 20 years I spent at CAE and Garmin, I saw many products through the life cycle of development from drawings to technology demonstrators, through prototyping, and then finally into formal certification programs.

As we move through the cycle on future products and future upgrades, our vertically integrated approach allows us to invest efficiently in staying ahead of the competition. That in-house engine of technological development is what enables us to do incredible things on relatively short timelines, while leveraging existing resources for minimal incremental expense.

The investments we've made in people, technology, test assets, and certification of novel aircraft systems allows us to not only bring our revolutionary battery electric aircraft to market, but to make improvements to our core aircraft or develop entirely new products. These investments are the pillars of the future.

With a team that has already progressed through the development life cycle on novel flight control systems, propulsion, wiring, and energy storage, we know what types of challenges to expect, and we can use that knowledge to be even more efficient developing new technologies. As we continue to explore opportunities, including new manufacturing methods like thermoplastics, we believe that this will lead to products with a lower bill of material that are cheaper and easier to build and operate, and have additional capabilities that open up new markets.

Over the next year, as we move further into the final stages of certification, members of our core design and technology prototyping teams will be freed up to focus on future technologies, much like we did this quarter with our hydrogen electric demonstrator, supported by our contract with Agility Prime.

We plan to take similar steps on work with flight automation, supported by our acquisition of Xwing's Autonomy Division. Like H2FLY, the Xwing's team has pushed the boundaries of what is possible in aviation, completing more than 250 fully automated gate-to-gate flights using their Superpilot technology and a Cessna Caravan fitted with a suite of sensing and autonomy solutions that can be applied to a variety of aircraft types. We see the potential for this technology to both expand our government contracts and bring new safety capabilities to our civil products through block upgrades in an amended type certificate.

Turning now to the core focus of our business. The team continues to make great progress towards bringing our battery electric aircraft to market. Last week, we rolled our third production prototype of the manufacturing line in Marina, where it has already begun ground testing in preparation for flight later this month. By the time we speak next quarter, we expect to have four aircraft in active flight test, with additional aircraft being assembled behind them.

With each completed build cycle, we learned a tremendous amount that enables us to increase production speed, reduce costs, and move closer to receiving our production certificate shortly after TC. We remain on track to reach our previously stated goal of a production capacity equivalent to one aircraft per month by the end of this year, and to ramp beyond that through our expansions in Marina and Ohio. The team is continuing to increase the rate of production and at the same time, the amount of conforming hardware being built.

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Turning to certification, I have never been more confident than I am today about our program. As JoeBen mentioned, we first flew and transitioned a full-scale eVTOL aircraft in 2017, and we did it again with our pre-production prototype beginning in 2020, with those aircraft completing more than 33,000 miles of flight over four years.

During the proof-of-concept and prototyping stages of development, flying as much as possible is critical to demonstrating the viability of the overall program and to fully characterize the design. Now that we are deep in the certification process, the vast majority of the necessary work we have to do to get to the market is the less visible, behind-the-scenes work to develop conforming software and hardware, as well as building conforming test assets that will support the bulk of our certification activities in Stages 4 and 5.

This is our primary area of focus, combined with our work on submitting Stage 4 test plans. This quarter, we made more progress on both sides of Stage 4 of certification than any previous quarter, moving from 9% to 14% complete on the FAA side. Included in this were FAA acceptances for numerous test plans related to onboard equipment and structural materials and processes, as well as our Integrated Flight and Propulsion Control System Operational Test Plan, a key system-level test.

We also submitted a number of test plans for FAA review, covering system area and structures across the aircraft program. But I want to draw your attention to two in particular that demonstrate our leadership on certification. The first is a system-level test plan covering the endurance of our propulsion system. To step back for a moment, there are multi-billion-dollar aerospace companies dedicated to developing, certifying, and manufacturing propulsion systems alone. Electric motors are a core technology that will drive the next era of aviation, and we are trailblazers here, working closely with the FAA to develop certification standards that allow us to demonstrate the safety and performance of electric motors.

The second is our first human factors evaluation plan, which will see the FAA carry out certification tests in a Joby engineering simulator that conforms to our TC intent aircraft. These are huge steps forward, and we expect the pace of this progress to increase over the balance of the year.

Key to the progress we're making in Stage 4 are the regular technical discussions taking place between Joby and FAA staff. During the quarter, we hosted three teams from the FAA at our site across California. Staff from the FAA electrical and propulsion engineering team witnessed a battery safety thermal runaway test in our newly built battery test facility that was representative of the test we intend to conduct for FAA credit. The FAA flight test and human factors division completed a two-week visit that included an initial round of FAA pilot training, as well as human factors development testing and flight test techniques development using our simulator.

This visit marked an important step towards FAA pilots later carrying out for-credit flight testing on our aircraft and working to certify our pilot training program in advance of a commercial operation.

We also hosted a group from the FAA aircraft evaluation division, which is charged with ensuring the operational safety and readiness of our aircraft before it enters commercial service. These sessions included careful review of operational aspects that are required as part of our type certification, such as instructions for continued airworthiness and our planned maintenance program for the aircraft.

These technical engagements with the FAA are my favorite part of the certification process where we work together to hammer out all of the final details for the key tests that will bring our aircraft safely into commercial service. These conversations are progressing very well and we expect to conduct for-credit testing in many of our test assets including the Worley track, our battery test facility, and our integrated test lab.

As JoeBen said, we're now more than one-third complete with Stage 4 on the Joby side and expect progress to continue to accelerate in the back half of the year. As we take these strides forward, we believe the environment around us is the most supportive it has ever been for bringing our revolutionary technology to market.

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In May, Congress passed the FAA reauthorization bill highlighting the desire of U.S. lawmakers to make sure America is a global leader in advanced air mobility. The bill specifically calls on the FAA to prioritize work on the type certification of air taxis and to publish necessary rulemaking to enable commercial operations. With the FAA on track to finalize the powered lift as far which outlines the operational rules for our aircraft, we're extremely pleased with the support for our mission at the federal level.

The momentum we're seeing on our FAA certification work puts us in a great position for our international expansion plans. During the quarter, we were pleased to add Australia to the list of countries where we are pursuing bilateral validation where the U.S.-Australian Bilateral Aviation Safety Agreement already considers powered lift aircraft. Under these agreements, international regulators can leverage the work conducted under the FAA type certification effort, expediting our path to market in those countries.

Validation is already underway in Japan and the U.K. During the Farnborough International Airshow two weeks ago we had very productive conversations with the U.K. Civil Aviation Authority as well as a range of other policymakers, business partners, airport operators and the public. I'm excited about what lies ahead including our first overseas demonstrations later this year and continued progress in Dubai to deliver on our exclusive access to that market. With groundbreaking on the first vertiport expected this year and in-region flight testing to begin in 2025.

Matt, over to you.

Matt Field

Thanks Didier, and good afternoon everybody.

In addition to the progress highlighted by JoeBen and Didier, I'd like to share our recent accomplishments in two adjacent areas. First, in July, we published our 2023 Impact Report, which highlights our actions to make the world a better place for our communities, employees, and shareholders. It addresses enterprise-level safety management systems, expanding climate impact and waste reporting, workforce development, and more. This report represents our second year sharing information on these subjects, and it's another area where we lead the industry, with reporting that embodies good governance and showcases our progress in matters core to Joby, since our founding in 2009.

Another area of progress relates to our activities, to reduce our capital needs for the business, in this case, training programs, tax incentives, and loan opportunities. We are grateful to the FAA for a recently awarded grant to support the development of maintenance training programs. The application process was highly competitive, and it's a testament to the team and our commitment to our employees that Joby was awarded this grant. We also were granted another round of California tax incentives for manufacturing equipment, which builds on our first grant received in 2019.

Lastly, we submitted our Part II application for a Department of Energy Title 17 loan. This loan application represents significant effort across multiple teams and represents an opportunity to support a large portion of our capital needs through scaling. Substantial work remains ahead to evaluate our application, but getting this far is a sizable accomplishment. This application highlights our commitment to fund and build a business for the long-term, not just the next quarter.

Shifting to our quarterly financial results, we ended the second quarter of 2024 with cash and short-term investments totaling $825 million. Our use of cash totaled $99 million, lower than last quarter as we had one fewer pay period in the quarter, as well as higher contract deliverables. This spending also included about $8 million on property and equipment. We remain on track with our full year 2024 cash spending outlook of $440 to $470 million.

We incurred a Q2 net loss of $123 million, reflecting a loss from operations of about $144 million, partly offset by interest and other income of $21 million. Our net loss was $29 million higher, compared to the prior quarter, reflecting a lower favorable revaluation of our warrants and earn out shares.

Total operating expenses for the quarter were nearly $2 million lower than the first quarter, as our increased staffing and spending was more than offset, by increased government contract deliverables, which are recorded as a reduction of our expenses. These deliverables, which included our hydrogen-powered flight, reflect our ongoing prioritization of government contract resources across three elements. Work directly supporting our certification effort, R&D work that supports mutual areas of interest to Joby and our DoD partners, and on-base revenue-generating activities.

In the first half of this year, we prioritized the first two of these areas through things like HIRF and wind tunnel testing in Q1, and R&D projects like the hydrogen-powered demonstrator, which was important to our customer in Q2. As a reminder, these payments show up as a reduction of R&D expenses.

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We will continue to manage our engagements across these three elements of our government contracts, and we expect an increase in on-base government-directed operations late this year and next year. We expect to deliver our second aircraft to Edwards Air Force Base late this year, and two additional aircraft to MacDill Air Force Base in Tampa next year.

Adjusted EBITDA, a non-GAAP metric that we reconcile to our net income and our shareholder letter, was a loss of $107 million in the second quarter. This was about $3 million lower than the prior quarter, reflecting the increased contract deliverables mentioned earlier. Our adjusted EBITDA loss was $24 million higher than the same period last year, reflecting the growth in our organization.

As you heard from JoeBen at the top of the call, we continue to make sector-leading progress across all elements of our business, and I'm pleased to say that we do that with the strongest balance sheet in the sector. We have real momentum behind our certification workstream, reaching 37% on the Joby side of stage four.

We're about to have four aircraft in test flight. We're on track to reach our goal of having production capacity equivalent to one aircraft per month by the end of this year. We're on track to deliver demonstration flights overseas this year, and we continue to ensure we're well-positioned to deliver long-term growth by capitalizing on new technologies, through disciplined investments.

With that, I'd like to ask the operator to please instruct participants on how to ask questions.

Question-and-Answer Session

Operator

Thank you. [Operator Instructions] And our first question comes from the line of Andres Sheppard with Cantor Fitzgerald. Please proceed with your question.

Andres Sheppard

Hi, good morning, everyone. Thanks for taking our question and congratulations on the quarter. JoeBen, Didier and Teresa is also great seeing you at Farnborough a few weeks ago. JoeBen, question for you. I'm wondering if you could maybe help share with us your vision regarding commercialization. Now with the application into Australia, obviously the FAA, Korea, Japan, and the UAE, just wondering kind of how you envision that commercialization process taking place in the near term. Just curious to get your thoughts there? Thank you.

JoeBen Bevirt

Thank you, Andres. I think you did a fantastic job of summing it up with beginning next year. We're targeting the commercial launch in Dubai. We've seen fantastic lean in there from multiple dimensions of the government, including the RTA and the GCAA and as well as momentum on building out infrastructure. So you can expect us to announce the groundbreaking on the first infrastructure there later this year, as well as first flights in the first half of next year and commercialization towards the back after the year.

And then, you rightly pointed out the fantastic progress we're making in Japan, Korea, U.K., and the recent announcement of progress in Australia and leveraging in all of those markets, the bilateral relationships that the FAA has with the local regulators, where we're able to leverage all of the incredible work that the team is doing, on certification with the FAA across the world.

So, we do see tremendous international opportunities. And then the other element of course, is our operations here at home and our partnerships with Uber and Delta on the demand gen and the infrastructure side of the airports with Delta. We're really excited about the momentum we're seeing in New York and LA.

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Andres Sheppard

Got it. That's super helpful. I appreciate all that detail. And maybe just a quick follow-up, maybe a question more for Matt or Paul or Didier potentially, but just with the rollout of the third prototype aircraft and now the fourth one being in final assembly, I'm wondering what lessons have been learned that will help with the more significant ramp up in production once you are operating these, or selling these in those international markets? I'm just curious, what lessons have been learned and maybe more specifically on kind of from a cost perspective in the process, what are some things that maybe you've identified that you can automate or accelerate? Just curious kind of what that process has shown? Thank you.

Matt Field

Hi, Andres. It's Matt. I'll take part of that and then hand off to Didier to talk a bit about the manufacturing. So in terms of cost, we're really pleased with the progress. I know we've talked on a past call about seeing reductions kind of plane over plane as I like to think of it. And we continue to see those. We continue to incorporate lessons in our manufacturing plant operations kind of across the board.

Because our vertical integration allows us to look at every part of the plane and not just limit ourselves to, let's say, final assembly. Our partnership with Toyota continues to bring dividends there. And so really pleased with the progress on that. Lessons in terms of go-to-market, too early to say, but really pleased with how we bring up planes.

So we're learning as we have the plane roll off and bring that into operations. So incorporating that with each successive plane as well and seeing an increase in the pace and cadence there. I'll hand it off to Didier to talk a little bit about the manufacturing shop floor as well.

Didier Papadopoulos

Yes, thanks for the question, Andres. Good to see you at Farnborough, by the way. Very exciting show there. The past few months have been really exciting on the manufacturing. It gave us the opportunity through, those three airplanes to truly fine tune the value stream of manufacturing the airplane, right from receiving of the raw materials all the way to the work instructions leading to the integration at the end. And that helped us on multiple fronts. Optimizing the workflows, building some automation that we hadn't started with at the beginning, because we really wanted to understand the process.

And then on top of that, in terms of yields, we were from month-to-month, we're seeing two double-digit yield improvements on multiple side of the vertical integration on the manufacturing side. As we've mentioned also earlier, those yields and those efficiencies are helping us get closer-and-closer to our target, of producing one aircraft a month. In fact, on multiple fronts, we've exceeded that already here in barely past this year, the middle of this year. All of these translate into cost reductions and also quality improvements, which most importantly for me right now, helps us support a mature quality management system, which is a direct correlation to getting a production certificate right after TC.

Andres Sheppard

Wonderful. Super helpful. Appreciate all that color. Congrats again on the quarter. I'll pass it on.

Operator

Thank you. Our next question comes from the line of Bill Peterson with JPMorgan. Please proceed with your question.

Bill Peterson

Yes. Hi. Good afternoon and thanks for all the details thus far in the talk. But I want to elaborate, see if you can elaborate more on the mid to longer term vision for the hydrogen aircraft. So I guess, do you intend to develop a hydrogen version of the current, four seat model, or would this be envisioned for other models down the line? Can you elaborate a bit on what kind of modifications, you would need to do to accommodate payload as well as the hydrogen, fuel system? And then, I guess you alluded to it, but what is the current spend that, in terms of R&D that you have internally, I guess, meta proceeds? And how do you see that evolving in 2025 and beyond?

JoeBen Bevirt

Hi Bill, thanks. This is JoeBen and I'll take the first piece of that and then hand it to Matt on the spending side. So, we do see our hydrogen electric program as being a game changer from a technology standpoint that has the potential, to dramatically improve not just the sustainability, but the performance of aircraft writ large. When we began pulling the thread on this five years ago, it was much more nascent.

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But the more - we pull on it, the more confident we've become that this is a massively disruptive technology that, can really change the future of aviation writ large. In terms of this specific demonstration that we did, it was just a demonstration. We took our battery electric aircraft and we retrofitted it, with the hydrogen electric system. And as you saw, delivered substantially more range with it.

But the purpose of this was really to begin to get regulators, both here in the U.S. and around the world to lean in, and to work with us on putting the processes and the regulatory steps in place, for us to be able to certify a production version. As we mentioned in our prepared remarks, the amount of spend on this, was extremely small. The number of people we have working on this is quite small.

But the potential upside impact is incredibly exciting in that we can take a small amount of spend, and a small incremental amount of work on modifying a - contained number of systems on the aircraft, and give it outsized new capabilities that allow us to address adjacent large and adjacent TAMS, where instead of just being able to provide services across town.

We're now able to provide regional service from the same Vertiport investments the same software operating ElevateOS operating system the same pilot training et cetera. Now all of a sudden we've massively increased the value that we can provide to our customers, and then I'll hand the financial piece over to Paul oh sorry over to Matt.

Matt Field

That's all right. Hi Bill thanks for the question. So as you think about the R&D cost and you think about this program specifically. I think of R&D right now in, kind of three buckets, first of all is the engineering factory if you will or the certification factory which is a real muscle and as Didier likes to call it, it's the machine that makes the machine. And that, we'll expect that to taper off at this point in the going years.

But what that really means is that as we get this playing closer-and-closer to certification, there'll be resources that roll off onto other projects, block upgrades and so forth. And so, that's really the beauty of what's being built here around vertical integration, is you're creating an engineering base that can do amazing things time-and-time again. And so, some of those we block upgrades some of those eventually would be things like hydrogen or autonomous roadmaps or so forth.

So that's the first part of the factory. The second piece you see in our cost today, is the cost of building in the plant and the material we use to build prototypes, or to build test articles. What you'll see there, is you'll see continued growth as we build more units, and so we would expect that cost to increase. But it'll shift into a traditional kind of manufacturing cost of goods, or a different form factor if you will to support our ongoing operations.

So, you'll see a growth there over time, but really a migration into supporting commercialization and the growth of our production. And then the last piece is government contracts, that's going to be something we will always evaluate and pursue where there's opportunities and mutual benefit. But that will probably ebb and flow depending on how we see those evolve.

But the bigger two pieces which is the engineering factory and kind of the manufacturing piece of it will stabilize on the factory, and continue to grow on the manufacturing piece, but in support of production and commercialization.

Bill Peterson

Thanks Matt Thanks JoeBen here. Pivoting to certification and something we've discussed I think maybe around a year ago, but in light of the statement published by the FAA around harmonizing certification standards with EASA. What is your latest thinking around EASA validating FAA type certification, despite the former's higher safety standards? I guess how does this impact your outlook entering maybe the European market down the line I mean, you obviously have a lot of opportunities in the U.S., UAE, Japan, U.K. and Australia, but obviously Europe's a big market as well?

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Paul Sciarra

Yes thanks for the question Bill. So, we continue to work directly with EASA, but also with the FAA in order to be aligned on the path towards certification with EASA. Our focus is has been and continues to be the FAA, and working with the FAA to see how we can get closer-and-closer. And we've seen steps in the past few months where there's more and more alignment on some of the key points on that front.

We're continuing working through that, or continue expanding with U.K. CAA as well, once we get those complete. We expect to have a much closer path to EASA certification after that.

Bill Peterson

Thanks.

Operator

Thank you. Our next question comes from the line of Austin Moeller with Canaccord Genuity. Please proceed with your question.

Austin Moeller

Hi, good evening, and great to see everyone at Farnborough. Just my first question which is a follow-up on Bill's question, if you want to submit a hydrogen variant of your eVTOL aircraft in the FAA for certification presumably this would require a new SFAR and certification basis, to be established for a hydrogen propulsion system correct? And so that was kind of the objective of doing this flight testing?

Paul Sciarra

Yes, great question, so maybe upfront on the question. This doesn't necessarily require a new SFAR, SFAR is much more focused on the operational aspects in general and less so on the technologies that go into the certification of the aircraft, though there are some byproducts and implications. So, we expect to be able or at least the desire is to be able to leverage the path on that front.

In terms of the type certificate, I think one of the most exciting things about where we are today and introducing technologies like hydrogen, is that two fronts one we've built a platform which I'll call the aircraft right now where a lot of the certification basis on that aircraft is reusable and that's why we talk about introducing new technologies through amended TC's after this initial TC.

So the foundation of the aircraft platform is here and the introduction of the new technologies, will be focused on those changes only. The other big element that's really critical here in what Matt was talking about making the machine that makes the machine. We've built the infrastructure at Joby to where we're able to develop, and certify software we're able to develop and certify hardware components systems and airplanes.

That whole machine that sort of develops the plans and leads them to certification, is really what's really important for us. And we'll be able to reuse all of this as we introduce new technologies. What we did today like JoeBen said is demonstrator, and it's really important to think about that and understand what that means. In order to be able to certify something novel with the FAA first and foremost.

We have to demonstrate that we understand the technology and that we understand what the technology is capable of doing and not capable of doing that's step one and it was a success, we're really excited about that. Past that is where we start working with the FAA on the rules applicable to this technology only that may affect the certification basis, but that would be at a smaller scale - focused on those changes relating to hydrogen.

Austin Moeller

Great. That's helpful. And just my second question given stage four is of the FAA process is 37% complete. Can you go into detail on what you will be doing with the aircraft in the show and verified stage? What is the timeline look like on that given you're aiming to have a type certificate by late 2025?

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Paul Sciarra

So, I think - thanks for highlighting that we're really excited about the progress we've had on stage four, having more than a third complete at this point. It's been more progress this quarter than any other previous quarter. And we expect to be able to continue to accelerate in the latter part of this year. In addition to the percentage I think one thing that's really unique and trying to highlight in the prepared remark also.

Is the fact that we're now touching on multiple fronts of the FAA certification branches, and as well as on multiple systems. You want to see that breadth of exposure, whereas a year ago we were working for example on materials, or then moved on and made progress towards equipment qualifications. Now we're talking about more complex systems like flight control, propulsion, endurance testing, human factors and so on.

So, we're very excited to have a broader exposure on that front. Now if you think about the aircraft pyramid where you start with components systems and move all the way to the aircraft, you can naturally expect us to start moving into the aircraft progressing from there. So that's the direction you should expect us, to progress into here in the near future.

Austin Moeller

Excellent. Thanks for the color.

Operator

Thank you. Our next question comes from the line of Savanthi Syth with Raymond James. Please proceed with your question.

Savanthi Syth

Hi. Good afternoon, everyone. I was kind of curious if you could share what type of flying you've done with the production conforming aircraft. I know what you're doing is extremely challenging, but I was kind of curious if you've kind of gone through the trust born and transition flights yet, or where that where you are in that flight test process?

Paul Sciarra

Yes, thank you for the question. So with respect to flying I think it's really important to step back and remember we started flying a full scale aircraft in 2017, and then in 2020 we full scale pre-production prototype aircraft. And over the past few years we've consistently continued flying that airplane. In fact, we've been flying it even as recently as a few days ago here.

What's really important about that is, during the early stages of a program you want to fly as much as possible in order to gain confidence and mature your design as it relates to the aero structures, the flight controls the propulsion units all of those elements you really need to properly understand, you need to lock in the design and you also need to build a proper model around these, so you can evolve the design as need might be with high confidence.

All of this is behind us at this point. And so for us spending a lot of time flying is not necessarily the highest priority though it is something that is part of our plan. Most of the focus right now is where it should be, which is making progress in stage four across all of the pyramids. So the equipment the systems leading to the aircraft. Particularly three things we have been spending time on the past quarter and will continue to do so moving forward.

One, continuing to make progress on building certified software and hardware, so that's what builds the equipment. Number two, converting the development test assets into conforming test assets, because you need these to actually take credit for FAA. And number three, continuing to make progress on test plans submitting these to the FAA and getting acceptance on these.

So this is our strategy here, making sure we're continuing to be on pace and making progress on that and obviously excited about having gotten to 37% submitted on that front. You should expect us to continue in that direction and continue to make progress on those airplanes. And as we said earlier, we should start seeing all of the airplanes flying here in the next quarter, and in the not too distant future.

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Savanthi Syth

Just to clarify that on Didier, so I know these are full scale, but I think there are differences with the production version. So is there any kind of reason you haven't kind of gone through that or you just want to kind of have a lot more flying to have more productivity or some reason around how you do those test flights?

JoeBen Bevirt

Yes, there's no reason of we're really confident about the design here and this is part of sort of the evolution of going through the flight testing. We want to make sure that most importantly, Savanthi what we're working on is getting towards a conformity, because we want to make sure that every aspect, every energy we're spending here is something that goes directly towards FAA conformity and then FAA points as soon as the FAA is available.

That's why you see engagement from the FAA here on a regular basis. We want to see them with us seeing some of those test executions. So that we can get high confidence that when we submit these and invite them next time, it's for credit.

Savanthi Syth

And actually that ties in well with my kind of second question, which is I imagine building these aircraft are really expensive. So curious why can I continue to build production conforming aircraft versus kind of switching to certification conforming aircraft? It seems like the rule of thumb is to build six or seven of the conforming aircraft so that you have enough testing and flight hours and everything. Curious what the strategy there is?

Didier Papadopoulos

Yes, I'll start with this and pass it a bit on to Matt. I think it's important to remember that the airplanes we're building today have multiple purposes. And it's kind of a two axes. The first axes is really maturing our quality management system. We have to nail this down in terms of our product quality and getting a path towards PC. So that when it's time to scale, we're able to scale cost effectively, and we're able to scale quickly.

So you can learn on paper, but the best way to learn is to build airplanes. And this is how we're learning right now. On the other side of the axes, we're fortunate in that every one of these airplanes has a purpose, right. So some of these airplanes are used directly for the program in order to mature and do verification activities for engineering and PC purposes.

Others of these airplanes are intended like we mentioned earlier for DoD applications. And then the third group of these is intended for international demonstrations. So every one of these airplanes has dual purpose and we're fortunate that way it has an end goal utilization and then also it has a short-term use for us that's extremely important for TC and PC.

Matt Field

Yes, Savanthi, Didier just covered kind of what I would have said on that, but I just want to add, in a traditional aviation program, I think you're absolutely right. You probably only just build your conforming aircraft, because you don't need to show what these aircraft are capable of. With a new and novel aircraft, we have so much demand, whether that's engagements with the DoD or international areas where people want to explore what the art of the possible is, or how they might want these to operate in airspace that's traditionally been restricted to helicopters, and had very limited helicopter use, that we're in a fortunate position where people are asking us to bring the aircraft.

And so unlike the traditional kind of routine aviation program where you might only have four or five conforming aircraft, we're building more, one, for that manufacturing muscle that Didier talked about, two, to refine our processes so that we know they're scalable. And then three, because there's a great opportunity to bring those into service, get paid in many cases for doing so, and to kind of educate the public, which is going to be really important for us to be welcomed into communities.

Savanthi Syth

Helpful. Thank you.

Operator

Thank you. And our last question comes from the line of David Zazula with Barclays. Please proceed with your question.

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David Zazula

Hi, thanks for squeezing me in. For JoeBen, or Paul, maybe even, I think you guys have had a number of great opportunities to kind of expand the scope of Joby, thinking internationally, thinking hydrogen, thinking autonomy. I guess when I started covering you guys a couple of years ago, what struck me was an intense focus, singular focus on certifying the best possible aircraft with the FAA. So I'd just be interested in your assessment of the risk that you're straying from that focus. And to the extent you assess any risk or have considered that, what mitigation efforts you've put in kind of from a high level company-wide?

JoeBen Bevirt

Yes, thank you. I think we are very, as we said before, extremely focused on the, certification of the battery electric aircraft and making fantastic progress there. We do see incredible opportunities to build on the platform of the battery electric aircraft as we layer on these incremental technologies as Didier spoke about, and really substantially expand the opportunity before us. And so, we are extremely optimistic about our progression as we expand into a next generation aviation company.

David Zazula

Okay. Thanks. And then if I could just have one more. You used in a couple of releases recently the term core markets. I wonder if you could kind of define what you mean by core versus non-core markets and potentially even is there a possibility that a market within the U.S. be defined as a non-core market?

Paul Sciarra

I'm not sure which press releases. I'm sorry, this is Paul, David, you might be referring to. But I mean, at this point, all of the markets that we've talked about are potentially core. So you shouldn't read anything into that particular phrasing. JB mentioned on his prior answer, that we are sort of in full lean in mode across Dubai and the opportunity for commercialization there.

But we are also actively working on a potential service here in the U.S. in conjunction with Delta, in conjunction with Uber. And some of the work that we highlighted both this quarter and on previous calls, about activating the bilateral arrangements between U.S. FAA and other regulatory bodies around the world, whether that's U.K., Australia, , JCAB and Japan, that should allow us to continually expand from some of these early markets, to a broader set of markets over time. But long and short, I don't think there's any magic to core or not core. All of these markets of markets that we are very excited about.

David Zazula

Thanks very much. Appreciate the time.

Operator

Thank you. And we have reached the end of the question-and-answer session. And this also concludes today's teleconference. You may disconnect your line at this time. Thank you for your participation.

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