UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

FORM 8-K

CURRENT REPORT
Pursuant to Section 13 or 15(d)
of the Securities Exchange Act of 1934

Date of Report (Date of earliest event reported): April 25, 2023

Astra Space, Inc.
(Exact name of Registrant as Specified in Its Charter)

Delaware	**001-39426**	**85-1270303**
(State or Other Jurisdiction of Incorporation)	**(Commission File Number)**	**(IRS Employer Identification No.)**
1900 Skyhawk Street **Alameda, California**		**94501**
(Address of Principal Executive Offices)		**(Zip Code)**

Registrant's Telephone Number, Including Area Code: (866) 278-7217

Check the appropriate box below if the Form 8-K filing is intended to simultaneously satisfy the filing obligation of the registrant under any of the following provisions:

☐ Written communications pursuant to Rule 425 under the Securities Act (17 CFR 230.425)

☐ Soliciting material pursuant to Rule 14a-12 under the Exchange Act (17 CFR 240.14a-12)

☐ Pre-commencement communications pursuant to Rule 14d-2(b) under the Exchange Act (17 CFR 240.14d-2(b))

☐ Pre-commencement communications pursuant to Rule 13e-4(c) under the Exchange Act (17 CFR 240.13e-4(c))

Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
Class A common stock, par value $0.0001 per share	ASTR	NASDAQ Capital Market

Indicate by check mark whether the registrant is an emerging growth company as defined in Rule 405 of the Securities Act of 1933 (§ 230.405 of this chapter) or Rule 12b-2 of the Securities Exchange Act of 1934 (§ 240.12b-2 of this chapter).

Emerging growth company ☐

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act.

Item 8.01 Other Events.

On April 25, 2023, we held our second annual Astra SpaceTech Day at our headquarters. This event was livestreamed through our website, and we are furnishing the transcript of the livestream as Exhibit 99.1. This transcript should be read in conjunction with a viewing of the video of the livestream, which is available on our Twitter account (@astra), our LinkedIn account (linkedin/company/astraspace) and our website at www.astra.com.

This exhibit shall not be deemed filed for purposes of the Securities Exchange Act of 1934, as amended (the "Exchange Act") or incorporated by reference in any filing under the Securities Act of 1933, as amended, or Exchange Act, except as shall be expressly set forth by specific reference in such a filing.

Forward- Looking Statements

Certain statements made in the transcript included here as Exhibit 99.1 are "forward-looking statements". Forward-looking statements may be identified by the use of words such as "anticipate", "believe", "expect", "estimate", "plan", "outlook", and "project" and other similar expressions that predict or indicate future events or trends or that are not statements of historical matters. These forward-looking statements reflect the current analysis of existing information and are subject to various risks and uncertainties. As a result, caution must be exercised in relying on forward-looking statements. The following factors, among others, could cause actual results to differ materially from those described in these forward-looking statements: (i) our failure to meet projected development and delivery targets, including as a result of the decisions of governmental authorities or other third parties not within our control or delays associated with our move-in to our new production facility; (ii) changes in applicable laws or regulations; (iii) the ability of the Astra to meet its financial and strategic goals, due to, among other things, competition; (iv) the ability of Astra to pursue a growth strategy and manage growth profitability; (v) the possibility that Astra may be adversely affected by other economic, business, and/or competitive factors and (vi) other risks and uncertainties described discussed from time to time in other reports and other public filings with the Securities and Exchange Commission, including our registration statements, annual reports and quarterly reports.

Item 9.01 Financial Statements and Exhibits.

(d) Exhibits

Exhibit No.	Description
99.1	Transcript of livestream of Astra SpaceTech Day on April 25, 2023
104	Cover Page Interactive Data File (embedded with the Inline XBRL document)

SIGNATURES

Pursuant to the requirements of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned thereunto duly authorized.

Date: April 26, 2023

Astra Space, Inc.

By: /s/ Axel Martinez
Name: Axel Martinez
Title: Chief Financial Officer

Exhibit 99.1

April 25, 2023 — Spacetech Day livestream, transcript

Intro video:	04:34	Any organization and their success is based on the people. And it's also based on the culture that those people generate internal to that organization. The unique thing about what we're doing here at Astra is that we're not only designing and building and providing a thruster, we're building a whole entire propulsion system for our customers. Our capabilities that we're developing here at the facility allow us to not only test the thrusters, but the entire propulsion system as an integrated system.
	05:01	When Adam and I first met, we imagined the potential of space. We imagined the idea of dramatically increasing access of space. We might all go to space for other reasons, to settle other planets, to spread humanity into the solar system, but for Adam and I and for the whole team here at Astra, the mission is here on Earth.
	05:23	LV triple 09. It's on its way to space. Our next objective is MaxQ. Safety can confirm, opt and received. Option received. There is fairing separation.
	06:10	Stage separation. Stage separation. We have sep. The payloads have started to communicate with ground stations. Our customers are calling us and indicating that satellites are alive. They're talking, which means they've been successfully deployed.
	06:21	Red lead is go. FTS. FTS is go. Delphin. Delphin go. Ether. Ether is go. Odin. Odin is go. Nico. Nico is go.

	06:27	Ace. Ace is go. Launcher. Launcher is go. Corbin. Go. Booster. Booster is go. GNC. GNC is go. FDL. FDL is go. CDH. CDH is go. Tango. Tango is go. Safety. Safety is go. Flight is go.
	06:52	The opportunity to improve life on earth through these dimensions of a healthier planet and a more connected planet is truly something that has inspired all of the things that you'll see today.
	07:03	Six, five, four, three...
	07:08	There's really a significant shift, almost like an Astra 2.0 in terms of how we do design, how we do verification and then eventually how we conduct our mission and launches with a vehicle that is generated out of that new process.
	07:47	Four, three, two, one.
	08:07	To think that I get to touch in any small way a mission like this is It's ineffable. It is beyond articulation. Getting to work on anything related to improving life on Earth from space, I kind of have to pinch myself when I think about that and what a dream to work on this with all these amazing people, truly.
Margo de Naray:	08:45	Hello, everybody, and welcome. My name is Margo de Naray. I'm the vice president and general manager of our Astra Spacecraft Engine business. It is my great pleasure to welcome you to Astra's second annual Space Tech Day. But before we get started, our lawyers tell me that I need to cover this very important slide. So, I'll give you a moment to read it. It's our legal disclaimer and forward-looking statements.

09:11 Good. Okay. Great. Now that we've got that over with, it's my privilege and honor to introduce to you our, uh, founder, chairman and CEO of Astra, Chris Kemp. There you go.

Chris Kemp:

09:30 Thanks very much. Cool. Thank you, guys, so much for coming. It's an incredible day, uh, when we get to have the opportunity to pull everything together with you all. Spacetech Day 2023 is the second annual opportunity to bring our customers, our shareholders, analysts, uh, so many of our employees together, uh, to see what this team has been doing for the past year.

09:49 So, as we think about what happened over the last year in this industry, uh, we've seen new companies emerge, we've seen a number of companies go public. We've seen, uh, the war in Ukraine highlight the criticality of seeing what's happening in space, uh, and our team has been so inspired by all of these, uh, things that have been happening around the world and, uh, it's what drives us. Uh, if you look at, um, all of the things that have happened, it- it's been a year of building.

10:18 Um, when Adam and I first met, we knew that the only path, uh, to a, a vibrant and successful space economy, uh, was through space access and we started, uh, with a thesis that, uh, more infrastructure would be built in space, and in order to bring that infrastructure to space, we would need to make investments in, uh, scaled capability. We would need to make more rockets, or a bigger rocket. We had to choose a path, right? And being somewhere in the middle, as we, as we shared last year, was not where you wanna be. You either need to build the world's largest rocket and, and use it an infinite number of times, or you have to build a very large number of rockets and drive through economies of scale all of the costs out of manufacturing, out of the operation of the vehicle so that you can reach, uh, an inflection point where you have a, a product that can be in, in the marketplace.

11:08 So, throughout the year, uh, despite headwinds, uh, we made these investments. Uh, these investments started the day we took the company public. We, we remained committed to making the investments in the hardware, in the infrastructure, uh, that would drive costs down for our customers and create a lasting place for Astra in this market. And I'm so excited to have you all here today because this is not something I can do on Zoom, it's not something we can talk about in press releases. It's something you frankly have to come and see for yourselves. So, for those of you online, for those of you here in the audience, uh, you'll have the opportunity to walk the production line, uh, to see, uh, some of the things we've built.

11:47 When we bring our customers here, they see what we're doing. Uh, the Space Force has been working with us for the past 18 months on an opportunity to fly new national security payload missions on Rocket 4. They saw the commitment from our team. Uh, this is a high level of mission assurance, uh, that we wouldn't have been considered for, uh considered for a year or two ago. Our commitment to reliability, our commitment to learning from the launches that have been successful, unsuccessful is what allowed the Space Force to give us this opportunity to launch one of the first flights of Rocket 4, uh, a, a national security, high mission assurance payload. So we're incredibly grateful, uh, for the confidence that the Space Force had had uh, has in our team here at Astra to deliver this important mission.

12:32 Uh, NASA continued, uh, even after were unable to deliver their satellites last year, to renew that contract to give us opportunities to launch future NASA missions, uh, under that same contract. Uh, so the confidence that our customers have in this team is incredible.

12:49 Um, as we've seen, uh, over the last year, uh, more and more satellites are being launched. Uh, we're seeing the Amazon satellites come together. Uh, they'll They should be launched here in the next few months. Uh, SpaceX has launched a very, uh... the largest number of flights, I think, uh, ever have been launched in the last year. If you look at total global rocket launches. Uh, and it's because we're seeing a growing demand for satellites in low Earth orbit.

13:13 Uh, the forecast now is over 40,000 satellites will be placed in low Earth orbit, uh, this decade. That'll generate an opportunity for over a hundred billion dollars in launch market revenue. And the global space economy, uh, grew at its fastest rate, uh, in the last seven years, at a 9% CAGR last year. And this was in the backdrop of an economy, uh, which is struggling in other areas. So we're seeing a lot of signs that when Adam and I first met and we believed that the space economy would grow, we believed that small satellites would have a, a critical role in national security, uh, in our communications infrastructure, in our ability to manage our planet. Uh, this is evidence, uh, that there is scale in this industry and the investments that we're making, uh, are in the right areas.

13:58 So we've seen Apple roll out a new feature on the iPhone that's saving lives, uh, because of a phone can now talk to a satellite. We're seeing other carriers partner with other constellations to provide more bandwidth and more data. We're seeing more countries provide more broadband access. We're seeing, uh, incredible capabilities emerge with synthetic-aperture radars, with new imaging and hyperspectral imaging capabilities, uh, that simply just didn't exist five years ago. So this is a completely new platform that's being built. Uh, just like mobile phones and cell phone towers enabled a whole new wave of commerce, space and space infrastructure is enabling a whole new set of platforms.

14:38 So it was a difficult year for Astra, and there's, there's no way to sugarcoat that. Um, we were manufacturing one rocket per month in this factory before we built this out. And we had, uh, two launches within 33 days of each other. We demonstrated the ability to go to Cape Canaveral, conduct the first Part 450 license in under a week with a team of six people. Uh, these are incredible accomplishments. But we were unable to deliver a critical payload for NASA, and that set us back. And so we made a very difficult decision as a team that we needed to focus. And what that meant was all of our aspirations that would require more capital to go and work on satellites, and to go further expand some of our other businesses, would need to wait.

15:19 And so we focused all of our resources on these two areas of our business. Delivering a reliable launch system, launch service, and on what turned out to be an incredible, uh, surprise for us. Uh, we started selling spacecraft engines. And then we sold more spacecraft engines. And, uh, we're gonna hear from, uh, Margo, uh, about this incredible success that we've had. Um, and she's gonna tell you a lot more about what, what they're doing with these spacecraft engines and why they're so critical. But this has turned out to be a very important revenue stream for the company. As we start to shift these spacecraft engines, uh, it allows Astra to have two different, uh, pillars of growth. And the spacecraft engines give us visibility into the satellites that are coming out. And so, uh, these, these two businesses are very complimentary, and we're really excited about, about, um, the opportunity to serve customers both in space and also on the way to space.

16:12 The other thing that we're gonna bring to you today is reliability and scale. Uh, when we started working, uh, on the very first Rocket 1.0, Rocket 2.0, Rocket 3.0, uh, now Rocket 4.0, uh, it wasn't clear to us the investment that needed to be made to achieve these two things. And they are so intertwined. You cannot have reliability without scale. And you cannot have scale without reliability. If you have a flight that doesn't work, you're grounded for months or potentially longer. So, you need reliability to achieve scale.

16:45 And the engineering team that designs a system of this complexity has to design it so that other people can test it, other people can build it, and other people can operate it. So this product lifecycle is actually not an 18 to 24-month, 36-month lifecycle. It's probably a three to five-year lifecycle for a particular version of a... of a system of this complexity. And so, it was clear to us that we had to immediately

focus all of our energy, uh, on the new launch system. And not continue to have resources devoted to operating and, and upgrading a system that had the capacity, uh, that might have been relevant five years ago but isn't relevant today or five years from now.

17:23 And so, we made the decision to pull forward what we were calling Rocket 5 into Rocket 4, to upgrade our upper stage to have a turbo pump-fed engine, uh, and to partner with an incredible company that actually started before Astra called Ursa Major. And just yesterday we announced this partnership. Uh, the entire team at Ursa Major, uh, has devoted all of their capital, all their resources on one thing. Which is, the Hadley upper stage engine, or the Hadley engine that we're using in our upper stage. And so, um, we're really excited to announce that partnership because it allowed our team to focus all of its energy on the first stage engine and on the rest of, of this very complex system.

18:01 So, I wanted to highlight how important not just the rocket is. We all like to talk about rockets. But rockets are really just a small piece of the puzzle to achieving reliability and scale.

Today, you will see what we're calling the Rocket Production Line. Uh, it'll be a tour stop. I don't believe a machine like this has ever been created. Uh, this is a capability that we've been working on for several years. The final big machine dropped on the production line just a few weeks ago. Takes a coil of aluminum in one side of the building, and it processes it few various stages, and rocket stages come out the other side of this machine. Uh, I, I don't think another one of these exists in the world. And this will allow us to drive the cost of the primary structure of the vehicle down, like a gigafactory and presses drive the cost of vehicles down. We're literally pressing primary structures out of sheets of metal and taking rolls of metal and turning them into the tanks of the vehicle. And you're gonna see this, uh, on the tour here in a few minutes. I could not be more proud of the engineers that worked on designing these machines, the teams and the partners globally that we've had building these machines, and now, uh, putting these machines in operation.

19:11 Uh, so Rocket 4 will be made on this new rocket production line. And this rocket production line can produce, uh it's been designed to produce up to a rocket a day, which is an incredible amount of capacity. Uh, but when you think about a one ton class vehicle, you know, a single Starship is a hundred tons. And so, you know, if you if you're in the 500, that's somewhere between, you know, a hundred and 200, 500 kilogram to one ton class vehicle. So it's actually not that much if So if you believe in a market of one or two Starships worth of things going to LEO, you can certainly believe in daily space delivery of a vehicle of this size.

19:46 Uh, but there's more. We've doubled the capacity of our shop. Uh, this is a aerospace grade machine shop that can manufacture many of the components on our system. Uh, a quality control lab. Uh, Adam London, my co-founder, is gonna talk a lot more about reliability in a few minutes and how we're thinking about that.

20:04 We've built new test stands, uh, to test all of the different components. We're spending a lot more time before we get to the launchpad testing engines, testing valves, testing stages. And so this requires time and capital. And so, we've been very thoughtful about how much, uh, we're investing in the various stages of the development process so ultimately we do have the highest probability of a successful flight.

20:27 But it's not just a rocket. It's a new launcher. Uh, the tour will include, uh you'll see the new, uh, structure of our new launcher outside here in a few minutes. And, uh, this infrastructure is what allows us to move complexity off of the vehicle, on to the ground. And again, this is designed, uh, to support the fewest number of people in the field.

20:48 And I would be remiss not to include software. Um, a brand new mission control experience, uh, that's been designed to dramatically increase efficiency, productivity, and safety. A new data platform. Uh, every sensor on every vehicle, on every test stand is, is sucked into, uh, a platform that gives all of our engineers the ability to do analysis, uh, and compare, uh, different, uh,

components across time. Uh, it's, it's an incredible platform that's all built here at Astra. And a new launch system simulator, uh, that will increase our ability to simulate not just the rocket and the flight of the rocket, but everything that happens in the ground system as well.

21:24 So, people like to talk about rockets. Uh, but what this is – is an entire platform, uh, that teams of people are working incredibly hard on that all comes together. And what's exciting about today is we've been able to pull a lot of the pieces together to show you them for the first time.

21:40 So as you fly through our factory, uh, you'll see, uh, just past the inventory cage at the beginning of this new production line, where coils of aluminum are flattened, laser cut, rerolled, friction stir welded, circumferentially welded in one continuous production line. Uh, this is an incredibly capability. And, uh, you'll get to talk to the engineers that design this here in a few minutes, uh, for those of you on the tour. And when you think about the factory, what the factory really does is it allows us to increase scale. Uh, but the automation in the factory allows us to have consistency as we build the components of the system so we can actually increase quality as well and reliability.

22:19 Um, a hundred percent of our critical components, uh, which we've identified, uh, run through a brand-new quality control lab, uh, so we can know what parts are going on this rocket. Uh, we can now do next-day part production, so, uh, this gives us the ability to be very agile. Uh, we can take raw materials and turn them into the component so we're not sitting on expensive inventory. Drives down costs. Uh, and then we have the ability to test nearly everything on site. So, the vast majority of all the tests that are performed prior to a flight happen here on this campus.

And so, again, all of these things are very unique to Astra. And this vertically integrated strategy gives us the ability to do this without, you know, having people travel, having to rely on third-party, uh, suppliers. The launch system is mobile. And why this is becoming increasingly important is space is a strategic capability. You've seen the Space Force go from not existing, to having a budget, which is tens of billions of dollars, uh, just in the last two or three years. And this investment is for reason. It's because space is strategic. Um, if you have things happening and you can't see them, if you can't connect to them, or if you're relying on infrastructure, uh, that can't be reconstituted, uh, that's a problem. And the problem America has right now is this infrastructure is launched from two locations, Cape Canaveral and Vandenberg. And if anything happens to those locations, we can't reconstitute critical infrastructure. So we've designed the system so that we can place a launch system anywhere that we are licensed to operate. The lawyers wanted me to say that.

Audience: 23:54 (laughs)

Chris Kemp: 23:55 And conduct a launch with just five or six people. And this capability means, uh, we can place rockets and this infrastructure, which is all manufactured here, on trains, on container ships, on trucks.

We can place it and then we can start reconstituting infrastructure. This drives resiliency, and resiliency of critical national infrastructure becomes a national security priority. So really excited to be partnering, um, and demonstrating these capabilities, because as space becomes more strategic, so does this capability. And I believe that Astra is one of the only companies positioned to deliver with this level of agility and mobility, uh, today.

24:36 It's designed for small team operation, and it's designed for a one day turnaround capability from launch to launch. So we can launch a rocket and then we can reset the entire infrastructure so we can be prepared to launch again.

24:48 Software is one of the key enablers, so we're moving now to a two-person mission control experience. Um, when I was at NASA, uh, we liked to look at mission control as this incredible, you know, dozens of big screens and rocket

scientists looking over all their systems. That drives cost. Um, and it means that you need specialized talent at each of those consoles to be studying data to make decisions about whether the thing should work or not.

We've moved all of that into software and automation. And so this has been a journey we've been on since Rocket 1.0 where mission control went from, you know, 18 to 12 to 9 to 6, and the design for Rocket 4 and the new launch system 2, is a pilot and a copilot. Why should you be able to get on a transpacific flight with hundreds of passengers with a pilot and a copilot, uh, when an autonomous rocket flying with no people on it in the middle of nowhere, delivering a payload to space, shouldn't be operated by a pilot and copilot. Um, it's a software problem.

25:44 Um, we've been focused on the 24-hour CONOPS, both in mission control and in the field, and building simulation platforms so that we can actually do launches before there's ever a launch. And so what I'm really excited about is seeing our mission control be manned against just data that's simulating a launch. And we can start throwing scenarios at it. Um, months and months before launches actually occur, we're actually doing launches on actual hardware. Uh, this is This is very exciting.

26:12 Finally, uh, the team knows how critical is that we return to the pad and test this system. So we are working tirelessly, uh, to drive towards test flights at the end of the year, uh, because the more, uh, we're able to get this system pulled together and tested, uh, test again, the more we're gonna be able to return to flight with a reliable commercial service.

There's a really big change, uh, in Astra this year versus last year. Uh, I believe on this stage last year, uh, we had a gentleman from NASA talk about how, you know what? The mission that NASA had designed around TROPICS only needed six out of the nine satellites to be a successful mission. And while that was true, because our first flight didn't work, we lost the mission. And that wasn't acceptable. It wasn't acceptable to us. Uh, it hurt. Uh, it wasn't acceptable to our customer and it wasn't acceptable to our shareholders.

And so this time around, we are focused on success above schedule, right? And so we really placed a tremendous emphasis on the rigorous engineering processes, the testing, the failure mode analysis. And with that, uh, I'm gonna introduce my co-founder, Dr. Adam London. We've moved the mission assurance organization, which has been heavily invested in, under Adam. So it's independent from engineering, independent from launch operations, and has the independent ability to say, "no we're not ready."

27:36 And so we've made a number of changes across the company to prioritize success on our next flight, and I think that's a great segue to introduce Dr. Adam London, our co-founder and CTO.

Adam London: 27:55 Thanks, Chris. It's so exciting to have you all here at Astra today and I'm excited to spend a little time telling you about how we're thinking about reliability.

As Chris mentioned, as we're ramping up launch system 2 development and spacecraft engine production, we decided to move our mission assurance organization to report directly to me, independent of engineering, production, and operation. And this team and I, together with all of Astra, are working tirelessly towards these two goals. Successful first launch of Rocket 4, and the successful operation of every spacecraft engine on orbit.

Today I'm gonna talk mostly about the launch system, but our approach to reliability applies to our spacecraft engine as well. I gotta say, I'm really and continually impressed with the creativity the universe shows in different ways for rockets to fail. So the universe is throwing all kinds of potential failures at rockets. Design failures, process failures, random failures, often combinations of many of those. So our task to build a reliable launch system is to create three overlapping shields to catch all of these potential failures, ultimately enabling reliable and repeatable mission success for our customers.

29:13 The first is a reliable design. Designing reliability into our systems should be our first and our primary shield against failures. It's much easier and better to design reliability in a system than try to add it later.

29:27 Next is a dependable manufacturing process that ensures quality, and that the as-built rocket matches the design each and every time.

29:39 Lastly, we have a robust test and launch operation shield to confirm that the launch system is ready to fly, and to capture enough data during operations in flight to understand the system performance and anything that's off nominal in a flight to feed back into our, um, system and our reliability. So let's talk a bit about each of these.

30:06 Reliable design. Reliability, as I said, must be designed into the system from the beginning. It can't be an afterthought. And so And it's not just the design and the reliability of the rocket, but the design and the rest of the system has to be designed for reliability as well. The manufacturing system that produces it, the ground system that prepares it for launch, and all the software tools that we use both to fly the rocket and to automate our operations and our data analysis. All come together as an integrated system design that enables a reliable operation.

30:45 One of the most important things to build such a thing is experience, and the combined experience and the vast data from the dozen rockets that we've built and tested, and the nine that have flown, is a tremendously strong base that I'm proud to build upon.

31:03 So for Rocket 4 we've definitely turned up our development rigor. We formalize Astra's gated design review process for each system and subsystem as it goes from a conceptual design all the way through qualification, that creates consistency across the organization both for launch and for the spacecraft engine. We're doing detailed failure-mode analysis of each subsystem to identify opportunities to mitigate many more failure modes in the design itself, and all of of this has resulted in more robust design reviews, better systems engineering, and more robust requirement verifications both through test and analysis.

31:43 We've also staffed up our analysis capabilities, resulting in improved structural, thermal, and fluid analysis capability. We often pair this with additional testing to anchor and validate these analysis. Here's an example where the payload interface experiment didn't quite match the analysis, and those are the kinds of things that you want to catch as early as possible and understand in your design process.

32:09 So in addition to a lot of component-level analysis and design and development testing, we're also investing in a much more comprehensive launch system simulator. This will extend the hardware in the loop simulator that we had and was so critical for the Rocket 3 program to the ground system and to the launch control system, and let us conduct many, many more launches in the simulator, both for development and for practice, so that when we show up at the launch pad, we've already done a lot of launches, and we feel our system is well, well validated.

32:45 The final step in the overall design to qualification phase is qualification, and that's where we verify that our design meets all of its requirements. Here, we're further emphasizing the criticality of test like you fly. So now any exceptions from that test like you fly mantra must be justified and signed off by me personally, as well as several other Astra leaders. The qualification process will typically include environmental testing like thermal, vibration, or shock as shown here, as well as functional testing that demonstrates the system's functionality, and that it can operate throughout the expected flight environment, including margins. So you'll see that kind of thing in engine qualification campaigns, or components or things like that.

33:45 But once we've qualified a reliable design, it's time to manufacture it. And so the next shield in our process is the production process itself where reliability is embedded throughout. One example is our investment in the quality control lab, which helps ensure that all the parts that either we produce in-house or source meet their design intent before they go into manufacturing.

34:13 Another example is the new friction stir welder. You'll see that on the tour shortly. It validates the integrity of each weld as it occurs based on sensors that are embedded in the machine. So we incorporate diagnostics and validation directly into the process wherever possible.

We're also doing detailed process failure analysis on our most risky, hard-to-inspect or hard-to-validate manufacturing

processes, and using that to improve or adjust the processes accordingly. Once we've produced a rocket to its design, we have robust tests and operations. The final shield, and it's the final opportunity to catch potential failure modes, are the tests following assembly leading up to launch, as well as in the data from a flight itself. Our aspiration, of course, is not to catch anything at this phase, but we must always be vigilant.

35:17 So once a subsystem is fully assembled, it will go through acceptance testing to verify its functionality and workmanship. These tests start at the component level like a valve, or an avionics box, and they continue up to an engine or even a full stage, a rocket. As an example, here's a Hadley engine under test at our partner's facility in Colorado. And I stuck a spacecraft engine acceptance test in here because I think they're so cool.

35:50 At that point, we're ready to head to the launch site, and there's still a series of verifications that we do that will culminate in a short, static fire, as we did in Rocket 3. We've also improved and invested our post-launch data processing to further automate the analysis and review of flight data to make sure that we can feed any learnings back into improving our designs and operations, and I identify anything that might be the sign of an opportunity to further improve the system.

So, with all the energy, with all the investment and all the focus that we're putting on reliability, I'm pretty confident in the shields that we're building for our system. And I do believe that we're on track to deliver a reliable launch system for our customers. I can't wait to test it, about what the universe has in store for us, and see it fly.

36:49 As I mentioned, we also apply similar rigor to insuring to insuring the reliability of our Spacecraft Engines. And I'd love to invite Margo back to the stage to talk about this growing part of our business.

Margo de Naray: 37:05 Thank you, Adam. Hello, again. All right. Um, that was the wrong way. Okay, we're gonna go this way. Um, so thanks, Adam.

37:16 One of the things that I find myself doing often in my role is actually explaining what the Astra Spacecraft Engine is, um, and why it's such an important part of increasing access to space, as well as Astra's larger vision. The Astra Spacecraft Engine is one of the industry's leading flight-proven, um, uh, hall-effect propulsion system for satellites. That's a lot of words to get through.

37:39 So, if you're wondering, what does that actually mean? What do they do? Uh, for those of you who may not be aware, propulsion systems are one of the most essential parts of k- keeping satellites in orbit for LEO and GEO. Our engines enable satellites to maintain their positions, to continuously maneuver to avoid collisions, and very importantly, to safely de-orbit, um, to make space sustainable. Each one of our systems is delivered fully integrated and tested to reduce satellite development complexity, while improving on-orbit reliability.

38:12 Additionally, our design is flexible and can be configured with multiple thrusters, multiple PPUs, to meet a wide range of mission objectives. In addition, you can also operate it with both, Krypton and Xenon propellant, allowing customers to optimize around performance and cost. As of March 31st, I'm very happy to say that we have 278 cumulative orders of the Astra Spacecraft Engine. We're very happy to be powering critical applications, such as national security, Earth observation and communications, some of which are already operating successfully on-orbit. In fact, as of this month, we have nine Astra Spacecraft Engines on-orbit.

38:56 And while we're very excited that customers are continuing to choose Astra Spacecraft Engine for their propulsion needs, to meet this growing demand, we're, uh, continuing to ramp and scale air production at our new, uh, factory in Sunnyvale that was just commissioned last month. Our 60,000

		square foot facility is designed to produce upwards of 500 propulsion systems per year, with additional room to expand. It also includes our unique three-station chamber, um, which cuts test cycle time, which is a traditional manufacturing constraint, um, and it allows us to produce high volume manufacturing at scale.
	39:33	This is a picture of our test room, and you can see our three-station chamber there on the left. And here's some actual footage of thrusters firing in that chamber, that was taken, I think, just a couple weeks ago. I personally think it's beautiful. I'm biased. And here's a photo of our team that is assembling, um, testing, and delivering the first flight module out of that facility. So we're very excited to welcome some of you down to Sunnyvale later this afternoon to show you exactly what we're working on in person.
	40:09	So, finally, as mentioned, that Astra Spacecraft Engine provides complete propulsion modules to meet a wide variety of customer needs. We offer integrated configurations of key components, including the thruster, the PPU, the feed system and the tank. And now, we're excited to introduce something that we've been working on to address even more satellites than before, and that's the spacecraft propulsion kit. Thanks.
	40:39	The propulsion kit enables satellite manufacturers to take advantage of very short lead times, uh, to access key components of the propulsion system. We're adopting the way, uh, dev kits have transformed the software industry, and applying to hardware, and providing the support and tools to accelerate spacecraft development at scale. If you're interested, we have an example of our propulsion kit here on the table, so I invite anyone to take a look after our session today. And, in fact, we just sold five prop kits last night, so we're very excited.
	41:10	Um, so that's... I'm... Thank you for allowing me to share a little bit of what we're working on. Um, and now, I would like to hand it back over to Chris, for one more thing.
Chris Kemp:	41:18	Okay. Thank you.
Margo de Naray:	41:23	Yep.
Chris Kemp:	41:27	Cool. Thanks, Margo. And, um, kind of in the spirit of announcing new products and, um, we're excited to make it easier than ever to incorporate satellite propulsion systems into satellites, I wanted to, on behalf of everyone here at Astra, uh, announce Rocket 4.
	41:49	So what you're seeing is a combination of qualification and development hardware. Uh, all of our teams from across the company, uh, came together and started putting all the pieces together. This is the first time that we've done a fit check build for Rocket 4. The first stage assembly is actually the qualification article, which is the primary tank structure that will go into testing over the next weeks. Uh, the first stage engines, uh, will be used in Astra's engine qualification campaign for the engines. The upper stage engine is actually fully acceptance tested for flight. Uh, the upper stage tank was our first tank build for the upper stage.
	42:38	And, uh, the, uh, there's actually some things that you can't see that are actually on the rocket, such as, uh, our new upgraded thrust structure. Uh, we've cut holes in so you can actually see the upper stage engine, and there's a payload interface. And, um, there's so many teams that are working on things like software that you can't see when you just look at the rocket. Uh, so, on the tour, we're gonna show you the new launcher, uh, platform, uh, which is massive. Um, but mobile and- and- and still, um, can be constructed and, uh, transported.
	43:09	And, I'm just so proud of all of the work. I mean, imagine, last summer, uh, going into production, starting to launch rockets, and, uh, everybody's excited, and the having- having kind of, the- the wind knocked out of you. Uh, our team, uh, the resiliency of our time, the passion and the energy around our mission, they didn't stop. In fact, they started working harder, and started making even, um, more, uh, they're more committed than ever to the reliability and the quality of our products than ever.

43:40 And, this isn't easy. Um, as- as we've seen over the last few months, uh, this is a capability that has gotten a lot of attention and a lot of- a lot of teams are trying to succeed in this area. And, uh, Astra is a team that has been iterating and learning and, uh, reached space, uh, and reached orbit, and put satellite in orbit several times, faster than anyone. Uh, if there is a team that is gonna pull together, uh, capabilities, it's this team. And, uh, this factory, uh, was built in an economic environment, uh, where we could raise the capital to make the investments made to produce that machine at scale. And I think over the next few years, uh, that's gonna be challenging.

44:21 And so, I think Astra is in such a unique position, uh, given these two businesses that we've built around spacecraft engines, around launch services, where we've made the- we've made the investments, both in ourselves, the learning, the humility that comes from failing, uh, the- and the passion and energy that we're investing in reliability across all of these products. And we've made the investments in this factory, and that's why I'm so excited to stop talking, um, and, uh, this will be the first tour stop. Uh, and you'll get to go around from station to station and see, uh, all the different hardware we've built, that builds the hardware that's gonna ultimately drive scale, drive reliability, uh, and allow us to, uh, one day achieve our vision and our dream, when Adam and I first partnered, set out to, which was daily space delivery.

45:09 And, uh, we're so excited that, um, we bet on this market, um, and we bet on the- the abilities and capabilities on all the things that all of these incredible companies, um, and the- and the US Government and other governments are putting up in space. Uh, because, uh, we don't do this to do this, we do this because of the impact that infrastructure in space will have on community, on- on the- on humanity. It- it is the next platform. We've always believed that, um, and it's what inspires us every day, to improve life on Earth, from space.

45:38 So with that, I'm gonna hand it back over to Doug, uh, to go over ground rules for the tours. Uh, standing room here. Thank you all so much for coming today. We hope you all enjoy the tours, and we'll see you here next year. And hopefully we'll be talking about a successful test flight of Rocket 4 at Spacetech 2024. Thank you, all.