



STOP CALLING THEM FLYING CARS —

# Uber and Hyundai's plan to develop air taxis hinges on mass production

If this is to work, it will require economies of scale—and some breakthroughs.

ERIC TEGLER - 1/20/2020, 4:04 PM



The joint announcement at this year's Consumer Electronics Show (CES) by Uber Elevate and Hyundai Motor Company that the companies will partner to develop Uber Air air-taxis for a future aerial ride-share network is news, but just as importantly, it's corporate messaging. At the crux of the announcement is Hyundai's reputation as an automotive OEM with a perceived ability to leverage economies of scale. For an urban air mobility (UAM) market to emerge at any sort of scale, Uber and industry observers believe that hundreds of thousands of four-passenger electric vertical takeoff and landing (eVTOL) aircraft will have to be built.

Their numbers, along with theoretically cheap eVTOL operating costs, are the key to getting the cost per seat at or near the level of ground transportation. But passenger air vehicles aren't built in taxi-cab-like numbers. So the prospect of a car maker churning out air taxis like sedans is an attractive one.

"We believe Hyundai has the potential to build Uber Air vehicles at rates unseen in the current aerospace industry, producing high quality, reliable aircraft at high volumes to drive down passenger costs per trip," Eric Allison, head of Uber Elevate, said at CES.

Jaiwon Shin, executive vice president and head of Hyundai's Urban Air Mobility Division said, "Our vision of Urban Air Mobility will transform the concept of urban transportation."

That's what Uber Elevate hopes will happen—and happen relatively quickly.

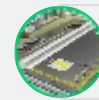
But how Hyundai—or any of the other seven companies which are building eVTOL air taxis for Uber Air—will cost-effectively manufacture hundreds of thousands of piloted and eventually autonomous aircraft to airworthiness/certification standards set by the FAA and other regulators is one among many open questions.

## Fundamentally different manufacturing

Uber Elevate has boldly staked its reputation on operating commercial urban air taxis by 2023, promising Uber Air service in Dallas, Los Angeles, and Melbourne, Australia. At CES, Uber's head of aviation product, Nikhil Goel, reiterated that massive numbers of air taxis operating globally will be the foundation of Uber Air's business. "Electric aircraft manufacturing needs to be fundamentally different from how aircraft are manufactured today," Goel said.

If Uber does commercially operate eVTOL air taxis in 2023, they will likely be few in number and very expensive. None of Uber's air vehicle partners have so far committed to a mass production timeline.

Ars spoke with Hyundai's UAM Division, and the answers we received could fairly be described as vague. With respect to a timeline, Hyundai says that it expects to "commercialize" its S-A1 air taxis (Hyundai and Uber call them **Personal Air Vehicles, or PAVs**) around 2028. It does not say it will be mass-producing PAVs by then.



### FURTHER READING

Uber hires NASA engineer to work on its flying car vision

The S-A1 is an eight-rotor/tilt rotor aircraft. As with air taxis in development by other Uber partners, it's initially envisioned as carrying four passengers plus a pilot with a cruising speed around 180mph (290km/h), an electric range of 60 miles (97km), and requiring only five to seven minutes to charge. Like other eVTOL craft, it will have to be certified for airworthiness by the FAA and other international organizations.

Jaiwon Shin is one of few people at Hyundai with aerospace experience. Hired last August, he comes to Hyundai from NASA, where he was associate administrator for aeronautics research. It will be his job to flesh out the design of S-A1 and usher it through international airworthiness certification. The company says it will seek US and Korean certification in parallel but offers no schedule. "This will be affected by when the regulations are made and relevant infrastructure matures," Shin told Ars.

At present, there is no UAM infrastructure—no vertiports, air traffic management, noise/environmental standards, security regulations, nothing.

The S-A1's design is a collaboration by Uber and Hyundai according to the former which offers a development model built on NASA data which it has shared with all its vehicle partners. Ars specifically asked Hyundai's UAM team if it has done its own S-A1 design work. The company would only say that "Hyundai has [an] in-house engineering environment which is capable of system design and optimization including electric powertrain, propulsion, aerodynamics and structure in order to satisfy Uber Elevate mission requirements."

Hyundai has scads of experience with mass production of cars, but an all-new aircraft design is another thing entirely.

With Nikhil Goel's admonition firmly in mind, Ars asked how Hyundai will manufacture S-A1s in a "fundamentally different" way. "Manufacturing UAM vehicles in large volume is like building tens of thousands of Formula 1 cars," the company told Ars. "Hyundai will make a breakthrough in volume production of aircraft with innovative methods."

So the plan is for Hyundai to "make a breakthrough." In quest of answers from a firm with real-world aviation experience, Ars put the same questions to helicopter manufacturer Bell, which is designing and building its own eVTOL air taxi for Uber—the Nexus E4X, an electric or hybrid tilt-rotor.

Bell could not provide us with a projected certification date for Nexus by our deadline. Nor would it explain how it will cost-effectively manufacture thousands of Nexuses (Nexi?). If a highly experienced aerospace firm like Bell has yet to work out such crucial questions, Hyundai surely has a mountain to climb.

## Substance or symbolism

If we're ever to see a UAM mass market, the manufacturing mountain will have to be scaled. But ubiquitous UAM won't happen in a vacuum. Aerial ridesharing will still have to compete with increasingly cost-efficient ground transportation. Most experts see a widespread UAM market by 2035-2040 at best. Until then, air taxis will likely be fashionable limousines for the rich, much like private

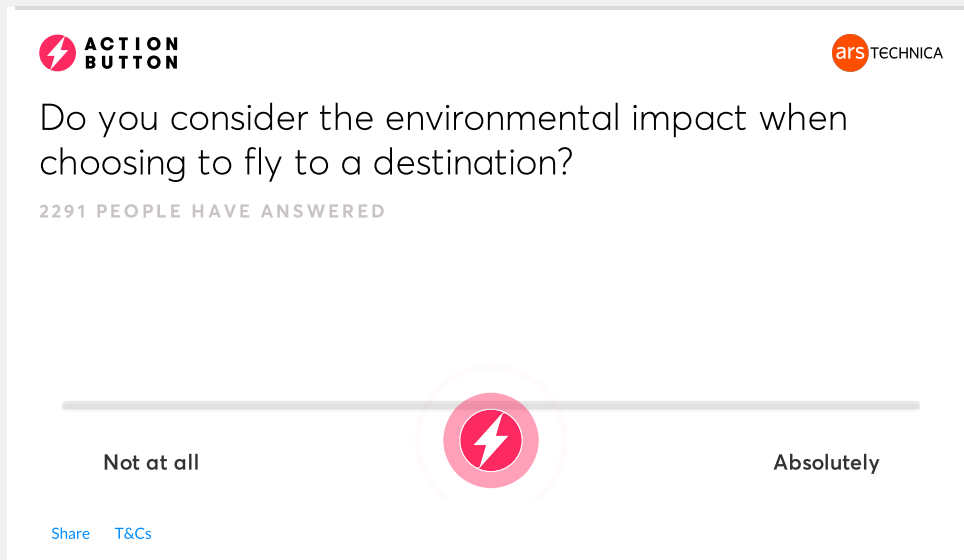
jets or helicopters today.

In that respect, the Uber Elevate-Hyundai announcement from CES is at least as much symbolism as substance.

Wyatt Smith, Uber Elevate's Head of Business Development, insists that the announcement is significant, telling Ars "the Hyundai relationship is a real step forward as it relates to bringing an experienced manufacturer of safe and reliable electric vehicles into the ecosystem."

Hyundai's team says it will work with Uber but that it will pursue other opportunities as well. Given the many unresolved questions about UAM we asked, does Hyundai consider the announcement with Uber Elevate to be an imminent business partnership or more of an aspirational joint statement? "Neither," Hyundai says. "The biggest goal of the recent partnership with Uber was to help accelerate the growth of UAM market... Hyundai will work toward developing PAV and Uber will prepare for related service."

Listing image by Hyundai/Uber



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**SixDegrees** / Ars Scholae Palatinae / *et Subscriptor*

**POPULAR** 6 HOURS AGO

Yeah, like I'm ever going to get into anything that flies made by Uber.

No. Just no. Taking "Move fast and break things" into the sky is a horrific idea.

↑ **+58** (+60 / -2) ↓

23486 posts | registered 2/4/2015

This is exactly what we need. Yet another way to waste huge amount of energy to transport a few rich shits. As if making it electric changes the energy demand or makes it somehow clean.

↑ +40 (+49 / -9) ↓

8675 posts | registered 1/30/2006

MailDeadDrop / Ars Scholae Palatinae

6 HOURS AGO

**Quote:**

The S-A1 is an eight-rotor/tilt rotor aircraft.

Eight rotors? The renders only seem to show four...

↑ +14 (+15 / -1) ↓

644 posts | registered 1/28/2016

whiteknav / Ars Scholae Palatinae

POPULAR

6 HOURS AGO

Uber should partner with Boeing.

↑ +28 (+30 / -2) ↓

1234 posts | registered 3/7/2012

SinclairZX81 / Ars Tribunus Militum

POPULAR

5 HOURS AGO

The problem here is that neither Hyundai nor Uber have any idea what they're getting into. The engineering hurdles are bad enough, and in areas in which they have no experience. But the regulatory hurdles are monumental, and if Uber thinks they can "play" the FAA the way they have city governments in the past, they're in for VERY rude shock.

↑ +52 (+52 / 0) ↓

2290 posts | registered 6/21/2011

S\_T\_R / Ars Tribunus Militum

5 HOURS AGO

Commercial electric aircraft are...well...nonsense. The weight and performance penalty is too much. Anyone pitching such a thing is to be treated with extreme scepticism, even if they aren't Uber.

↑ +3 (+12 / -9) ↓

2160 posts | registered 3/19/2012

maehara / Ars Scholae Palatinae

5 HOURS AGO

Came here ready to post a "Great, more ways for Uber to kill people" message. Not disappointed that others seem to be thinking on the same line...

↑ +8 (+10 / -2) ↓

909 posts | registered 2/6/2008

SixDegrees / Ars Scholae Palatinae / *et Subscriptor*

POPULAR

5 HOURS AGO

SinclairZX81 wrote:

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Uber's plan here is just to generate buzz to rope in investors, to shore up their ever-flagging revenue stream. Same approach they used for autonomous driving, with the similar intention of never actually producing anything.

Bicyclists beware.

↑ +43 (+43 / 0) ↓

23486 posts | registered 2/4/2015

CraigJ / Ars Tribunus Militum / *et Subscriptor*

5 HOURS AGO

LoL. No.

Sorry, I think that's the most appropriate response - hysterical laughter followed up by a "no fucking way this ever happens".

↑ +12 (+14 / -2) ↓

17565 posts | registered 3/7/2014

S\_T\_R / Ars Tribunus Militum

POPULAR

5 HOURS AGO



SixDegrees wrote:

SinclairZX81 wrote:

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Uber's plan here is just to generate buzz to rope in investors, to shore up their ever-flagging revenue stream.

This. They've burned through all that Saudi money and need more to stave off insolvency as they flail to find a market other than "taxis, but with an app".

↑ +26 (+26 / 0) ↓

2160 posts | registered 3/19/2012

SinclairZX81 / Ars Tribunus Militum

5 HOURS AGO



SixDegrees wrote:

SinclairZX81 wrote:

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Uber's plan here is just to generate buzz to rope in investors, to shore up their ever-flagging revenue stream. Same approach they used for autonomous driving, with the similar intention of never actually producing anything.

Agreed. This bears all the hallmarks of such a scheme.

↑ +15 (+15 / 0) ↓

2290 posts | registered 6/21/2011

tripodal / Ars Scholae Palatinae

5 HOURS AGO



S\_T\_R wrote:

Commercial electric aircraft are...well...nonsense. The weight and performance penalty is too much. Anyone pitching such a thing is to be treated with extreme scepticism, even if they aren't Uber.

A taxi ride should last 15 minutes at most in major urban areas. That's a sustainable amount of battery. Battery tech hasn't had the golden age we desperately need, but it had definitely seen incremental improvements year after year.

↑ -2 (+7 / -9) ↓

1409 posts | registered 1/29/2001

theramenman / Ars Scholae Palatinae

5 HOURS AGO



SinclairZX81 wrote:

But the regulatory hurdles are monumental, and if Uber thinks they can "play" the FAA the way they have city governments in the past, they're in for VERY rude shock.

They don't need to. I can almost guarantee this service is going to launch in the middle east first (if not exclusively). It'll be yet another vanity "high tech" thing they can flaunt, the same way the UAE is building a "hyperloop".

Last edited by [theramenman](#) on Mon Jan 20, 2020 10:29 am

↑ +13 (+14 / -1) ↓

1164 posts | registered 7/31/2015

CraigT / Ars Tribunus Militum / *et Subscriber*

5 HOURS AGO



SinclairZX81 wrote:

The problem here is that neither Hyundai nor Uber have any idea what they're getting into. The engineering hurdles are bad enough, and in areas in which they have no experience. But the regulatory hurdles are monumental, and if **Uber thinks they can "play" the FAA the way they have city governments in the past, they're in for VERY rude shock.**

Not 100% sure about this anymore. [https://www.newyorker.com/magazine/2019 ... nst-boeing](https://www.newyorker.com/magazine/2019...nst-boeing)

Edit:

I don't normally complain about downvotes, but I suspect the downvotes are knee-jerk reactions from people who are clueless about the transition of safety monitoring at manufacturers, etc.

Quote:

In 2005, embracing the deregulatory agenda promoted by the Bush Administration and the Republicans in Congress, the F.A.A. changed to a model called Organization Designation Authorization. **Manufacturers would now select and supervise the safety monitors.**

Whatever. Enjoy your ignorance - the FAA is not the organization if once was. See also 737 Max.

Last edited by [Craigl](#) on Mon Jan 20, 2020 12:20 pm

↑ +8 (+16 / -8) ↓

17565 posts | registered 3/7/2014

[yet\\_another\\_wumpus](#) / [Ars Praetorian](#)

5 HOURS AGO 

SinclairZX81 wrote:

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I'm guessing they will simply ignore US and EU markets and try Chinese, Arab, and similar markets (I suspect Hyundai can write their own laws in Korea). I'd also assume that the Chinese will jump into said markets whether or not Hyundai does (or whether they let Hyundai in).

Of course Uber doesn't follow laws at all, so getting them on such a plan might be tricky. But there's a great big world out there that doesn't always obey your laws.

↑ +6 (+8 / -2) ↓

543 posts | registered 5/14/2011

[peterford](#) / [Ars Scholae Palatinae](#) / [et Subscriptor](#)

5 HOURS AGO 

[tripodal](#) wrote:

[S\\_T\\_R](#) wrote:

Commercial electric aircraft are...well...nonsense. The weight and performance penalty is too much. Anyone pitching such a thing is to be treated with extreme scepticism, even if they aren't Uber.

A taxi ride should last 15 minutes at most in major urban areas. That's a sustainable amount of battery. Battery tech hasn't had the golden age we desperately need, but it had definitely seen incremental improvements year after year.

How long does the battery take to recharge / be replaced? If it then has to sit for 4 hours, that 15 minutes doesn't look good.

↑ -13 (+6 / -19) ↓

1264 posts | registered 3/25/2010

[caldepen](#) / [Ars Praefectus](#)

5 HOURS AGO 

Mass market!?

I can hear the public service warnings now:

*"Blood flows red on the parking lot... Grandma Smith didn't see the propellers until it was too late."*

Basically when you read "Mass market" understand that they are only referring to the very wealthy in this case. These aren't pop tarts.

↑ +3 (+6 / -3) ↓

8742 posts | registered 8/28/2013

Uber is pissing away money like cheap beer at a frat party. When the hell are investors going to realize what they're doing and let them rot?

↑ +22 (+22 / 0) ↓

2466 posts | registered 6/3/2012

TappedOut / Smack-Fu Master, in training / *et Subscriptor*

5 HOURS AGO 

So even if they build thousands of aircraft, and I assume hundreds of "Vertiports", get certification, and don't kill innocent bystanders along the way, they are still going to need thousands of pilots. Pilot licenses are a lot harder and more expensive to come by than driver licenses.

So yeah, no real business plan, just a publicity stunt.

↑ +19 (+20 / -1) ↓

30 posts | registered 7/13/2017

waryoldguy / Smack-Fu Master, in training

5 HOURS AGO 

The NTSB is going to be very busy.

↑ +8 (+8 / 0) ↓

34 posts | registered 3/28/2017

Andrewcw / Ars Legatus Legionis / *et Subscriptor*

5 HOURS AGO 

SinclairZX81 wrote:

The problem here is that neither Hyundai nor Uber have any idea what they're getting into.

Hyundai i think has a clue. They know the product won't work in the USA or any country with heavy litigation. But with the Hype money which Uber is excellent at getting comes to them. Hyundai gets infused with money with minimal effort. And in the end if it ends up being cargo planes for rural countries that use planes not certified by the FAA or other governing body and that country lets it go then so be it.

↑ +5 (+7 / -2) ↓

14783 posts | registered 6/6/2000

niwax / Ars Scholae Palatinae

5 HOURS AGO 

Uber and Hyundai's plan to develop air taxis hinges on [s]mass production[/s] Ubers ability to come up with something even more stupid to con the public out of their retirement money.

↑ +5 (+6 / -1) ↓

654 posts | registered 3/6/2014

arcite / Ars Legatus Legionis

5 HOURS AGO 

The Volocopter seems like a more viable design, with build-in redundancies. Testing already under way in Dubai and Singapore



↑ +1 (+3 / -2) ↓

18665 posts | registered 3/13/2004

**Deranged** / Ars Tribunus Militum

5 HOURS AGO

While I'm sure that Hyundai can handle the mass production aspect quite handily (it's an industrial conglomerate that makes everything from soap to supertankers), I'm quite sure the kicker is noise in urban areas. Even if it's electric, four (or eight?) huge fans will NOT be silent. Maybe such a scheme will fly in some Arabic countries, or parts of China, but it will for sure be more problematic in most of Europe.

As for pilots, I'd wager it's much easier to make an aircraft like they propose autonomous than it is to make an autonomous car, as disturbances are much less.

In short, the technical issues are solvable, it's getting them legally operational in a developed country.

↑ +5 (+9 / -4) ↓

2700 posts | registered 6/22/2002

**Nash Back** / Ars Legatus Legionis / *et Subscriptor*

5 HOURS AGO

**Andrewcw** wrote:

Hyundai i think has a clue. They know the product won't work in the USA or any country with heavy litigation. But with the Hype money which Uber is excellent at getting comes to them. Hyundai gets infused with money with minimal effort. And in the end if it ends up being cargo planes for rural countries that use planes not certified by the FAA or other governing body and that country lets it go then so be it.

Hyundai doesn't need Uber to help get money. Hyundai makes money. Hyundai just recently created an *enormous* venture fund all on their own.

↑ +9 (+9 / 0) ↓

12785 posts | registered 8/10/2000

**nom3ramy** / Ars Scholae Palatinae

5 HOURS AGO

**Quote:**

Uber Elevate has boldly **staked its reputation** on operating commercial urban air taxis by 2023

OK, so Uber is risking nothing of residual value at this point. From Uber's point of view, it is a lure for more gullible investors at little cost.

↑ +8 (+9 / -1) ↓

1268 posts | registered 11/19/2001

**wagnerrp** / Ars Tribunus Angusticlavius / *et Subscriptor*

5 HOURS AGO

**S\_T\_R** wrote:

Commercial electric aircraft are...well...nonsense. The weight and performance penalty is too much. Anyone pitching such a thing is to be treated with extreme scepticism, even if they aren't Uber.

This is supposed to be a metropolitan-area shuttle, with flight times no longer than 10-15 minutes. Basically, it would take you from one skyscraper to another, or to a local airport to connect to a longer range aircraft. It gets you out of the surface traffic. It's a task entirely



within the capability of current battery tech. Whether there's enough of a market to start a business around is another matter entirely.

↑ +18 (+18 / 0) ↓

7677 posts | registered 11/29/2009

Whiner42 / Ars Scholae Palatinae

5 HOURS AGO

Quote:

Aerial ridesharing ...

The term "ridesharing" needs to die, since it's lost whatever meaning it had. But alas - here it is in a new context ! And it still means nothing.

↑ +15 (+16 / -1) ↓

972 posts | registered 12/15/2014

mpfaff / Ars Praetorian / et Subscriptor

5 HOURS AGO

I feel like these sorts of things are just fodder for low info investors. It's a helicopter, needs the same amount of room to land, has the same issues. Big cities that could support this already have helicopters that do this, it's expensive but this thing will be too.

↑ +12 (+14 / -2) ↓

454 posts | registered 2/8/2013

wagnerrp / Ars Tribunus Angusticlavius / et Subscriptor

5 HOURS AGO

peterford wrote:

tripodal wrote:

S\_T\_R wrote:

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How long does the battery take to recharge / be replaced? If it then has to sit for 4 hours, that 15 minutes doesn't look good.

From the article...

Quote:

requiring only five to seven minutes to charge

↑ +1 (+6 / -5) ↓

7677 posts | registered 11/29/2009

commentaway / Smack-Fu Master, in training

5 HOURS AGO

MailDeadDrop wrote:

Quote:

The S-A1 is an eight-rotor/tilt rotor aircraft.

Eight rotors? The renders only seem to show four...

I see 4 propellers, and 4 sets of double rotors

↑ +2 (+2 / 0) ↓

12 posts | registered 2/15/2016

wagnerrp / Ars Tribunus Angusticlavius / et Subscriptor

5 HOURS AGO

arcite wrote:

The Volocopter seems like a more viable design, with build-in redundancies. Testing already under way in Dubai and Singapore

Spoiler: **show**

It's also far slower and less efficient, and there is zero possibility for recovery from a total loss of power. Provided enough speed and altitude, the Hyundai should be able to glide to a hard landing.

↑ +1 (+1 / 0) ↓

7677 posts | registered 11/29/2009

I am reminded of the Dilbert comic where part of the development plan is when aliens arrive to give us their technology.

↑ +11 (+11 / 0) ↓

4792 posts | registered 1/3/2007

herculepoirot18 / Smack-Fu Master, in training

4 HOURS AGO 

I can see how it might work in a big city for the uber-wealthy, going from work skyscraper to home skyscraper. But for me in the burbs, with power/telephone lines, lots of traffic, and only parking lots as having enough room for landing, this isn't a door to door solution. At best, it is a walk to the local baseball/playing field, get in, and get dropped off at a parking lot solution. Given that a regular Uber will take me door to door, that would probably be faster.

↑ +1 (+2 / -1) ↓

34 posts | registered 7/15/2018

readykilowatt / Ars Scholae Palatinae / *et Subscriptor*

4 HOURS AGO 

mpfaff wrote:

I feel like these sorts of things are just fodder for low info investors. It's a helicopter, needs the same amount of room to land, has the same issues. Big cities that could support this already have helicopters that do this, it's expensive but this thing will be too.

Operating cost would probably be less than a turbine engine helicopter. Electric motors and silicon are far more reliable and don't have anywhere near the maintenance requirements. The issue I see is the "creature comforts" that will be necessary for transporting humans will negate a lot of the efficiency of electric motors, assuming a battery breakthrough. Which brings up the real elephant in the room. Most of these plans depend on battery chemistry catching up with petroleum based fuels. Might happen, but that's quite the long shot, at least for the next 10 years.

↑ +2 (+3 / -1) ↓

1073 posts | registered 3/31/2010

Statistical / Ars Tribunus Angusticlavius

4 HOURS AGO 

SixDegrees wrote:

Yeah, like I'm ever going to get into anything that flies made by Uber.

No. Just no. Taking "Move fast and break things" into the sky is a horrific idea.

Yeah I know this is a longshot anyways but I think Hyundai underestimates how toxic Uber's brand is. You want me to get into an aircraft by the same Uber who optimized ride quality over not killing people? Seriously? How much are you paying me? I would love to fly in an air-taxi at least once but not if it is run by Uber.

Last edited by [Statistical](#) on Mon Jan 20, 2020 11:25 am

↑ +11 (+11 / 0) ↓

33730 posts | registered 9/27/2010

wagnerrp / Ars Tribunus Angusticlavius / *et Subscriptor*

4 HOURS AGO 

commentaway wrote:

MailDeadDrop wrote:

Quote:

The S-A1 is an eight-rotor/tilt rotor aircraft.

Eight rotors? The renders only seem to show four...

I see 4 propellers, and 4 sets of double rotors

I'm not seeing any "double rotors". Looks like just four typical single-rotor props.

↑ 0 (0 / 0) ↓

7677 posts | registered 11/29/2009

giddy-idiot / Smack-Fu Master, in training

4 HOURS AGO 

Will also require:  
Billions from suckers investors  
Magic

↑ +3 (+4 / -1) ↓

46 posts | registered 9/25/2017

**illhavesthsteak** / Wise, Aged Ars Veteran

4 HOURS AGO

wagnerrp wrote:

commentaway wrote:

MailDeadDrop wrote:

**Quote:**

The S-A1 is an eight-rotor/tilt rotor aircraft.

Eight rotors? The renders only seem to show four...

I see 4 propellers, and 4 sets of double rotors

I'm not seeing any "double rotors". Looks like just four typical single-rotor props.

Look at the second picture. There are 4 props, and then a set of horizontal rotors at the back of the forward nacelle, located just ahead of the rear set of props.

Edit: Yeah, Statistical's post on the next page shows it better than I explained it.

Last edited by **illhavesthsteak** on Mon Jan 20, 2020 11:34 am

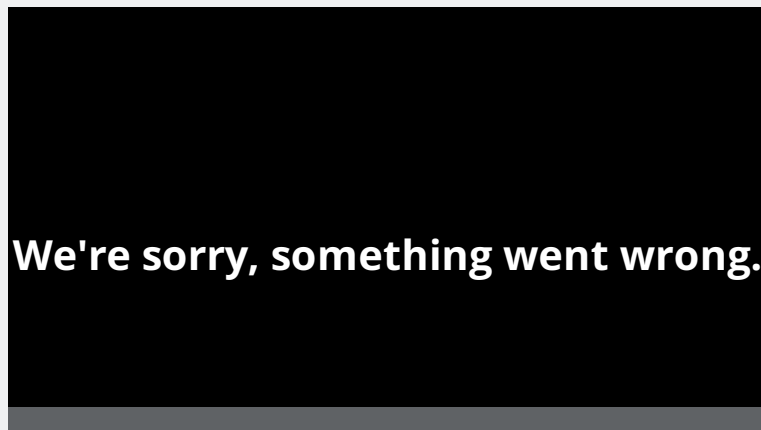
↑ +2 (+3 / -1) ↓

113 posts | registered 1/28/2014

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**The supercharged Ferrari 488 GTB | Ars Technica**



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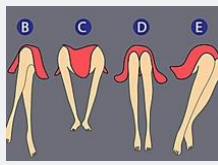
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Soolide



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