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Future Vertical Lift Could Be Shot in the Arm for Industry

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SB-1 Defiant concept

The Army's forthcoming future vertical lift program — which would replace thousands of aging helicopters — will rejuvenate the United States' stagnant military helicopter market, experts and executives said.

The service wants a new vertical take-off and landing aircraft that will have light, medium, heavy and ultra-sized variants with commonality in components such as drive train and avionics. The medium aircraft will also be split into two versions — a utility and attack aircraft.

The FVL program — which is being led by the Army and could replace aircraft across all four services — is being preceded by what is known as the joint multi-role technology demonstrator. Last year, the Army downselected from four vendors to two — a Boeing-Sikorsky team offering the SB-1 Defiant and Bell Helicopter offering the V-280 Valor.

The JMR demonstrator will be required to fly at least 230 knots and is to be designed as the medium-variant of the FVL aircraft. Flight tests are slated for 2017.

Dan Bailey, the program manager for JMR, said the demonstrator is a way for industry to get its feet wet after years of producing the same traditional helicopters.

"We have not in the vertical lift arena put a newly designed aircraft on the street in four decades," he said. "From an industry perspective and the government side as well, the competencies and the tools that are required to design a new aircraft had atrophied

significantly."

"Not only have we bolstered that back up for executing a future vertical lift family of systems program in the future, we've done it in a way that I think is really unprecedented," he said. "Taking aircraft from a paper design to a flight test in three years is a big deal."

Because the JMR program is meant to only produce a demonstrator, there will be no contract award at the end. However, the technology will greatly influence the design and requirements of future rotorcraft, said Rich Kretzschmar, acting project manager for the Army's FVL program.

"When we develop the requirements for FVL, the fact that Dan's program has flown those technologies certainly reduces the risk of us getting from what is now state of the art to what we want to buy," he said. "We can more deliberately, more accurately say, 'We want it to go this fast. We want it to carry this much. We want it to have this much endurance,' and know with much more certainty that those requirements can be met with reasonable risk, schedule and cost."

Raymond Jaworowski, a senior aerospace analyst at Forecast International, a Connecticut-based market consulting firm, said FVL would be one of the most important programs for the U.S. military aviation industry.

"It's a very big program. It's a very important program … because it will potentially be the first all new rotorcraft the Pentagon will be procuring in quite some time," he said.

FVL will encompass four or five missions, he noted. The main variant, the medium-lift craft, will replace Apaches and Black Hawks for attack and utility missions. The light variant will be used in a scout role. The heavy-lift version will either complement or replace the Chinook. The ultra-large variant could be as large as a C-130, Jaworowski added.

The program would be a shot in the arm for companies and give competitors "an opportunity to inject innovation back into the U.S. industry," he said.

Jaworowski said that he and other industry watchers had been concerned for years that the European aviation industry was outshining the United States'.

"There has been a sense and a concern including on my part over the years that the … European helicopter manufacturers, Airbus Helicopters, … Eurocopter and AugstaWestland kind of had a leg up on the U.S. industry when it came to innovation and new designs," he said. "If you look at the new designed military helicopters that have emerged over the years they've primarily been European designs."

V-280 Valor concept

This lack of innovation isn't the fault of U.S. aviation companies, but rather the Pentagon for not buying clean sheet helicopters, Jaworowski said. Besides the V-22 Osprey tilt-rotor aircraft, "they were simply buying an improved version of helicopters already in their fleets — an improved Apache version, an improved Black Hawk model, an improved Chinook model."

With JMR, industry has a chance to throw out new ideas and come up with inventive platforms, he said. And if one competitor presents something truly novel, that could bode well for them when the FVL program formally starts.

“If one substantially outshines the other it could certainly be considered the front runner for the FVL contest, even though technically it is a separate procurement effort,” he said.

Originally, the Army stated it wanted the same platform for each variant but now the service has signaled that it could purchase different platforms from different companies, Jaworowski said. There would still be commonality in the cockpit, the avionics, the drive train and other components.

“You might have different platforms. You might have, for instance, a tilt-rotor for one requirement; a compound helicopter for another requirement,” he said.

That has the potential to bring more players into the mix, Jaworowski said.

Kretzschmar said there have not been requirement changes in what the Army wants, but rather a refinement.

“When you look at the efforts that have been going on in the initiative, they have a very structured approach to the maturation of the requirements,” he said. “There have been some maturation of those requirements and the Army is getting a better look at exactly what they want to buy by maturing those requirements along the way.”

Since last year’s downselect, both industry teams have been preparing for flight trials that are scheduled for 2017.

Keith Flail, program director of the V-280 Valor at Bell Helicopter, said the JMR program offers the company a way to bring new ideas to the forefront.

“We’ve brought an incredible amount of innovation with our design for manufacturing, our design for affordability [and] our design for maintainability,” he said.

Over the last year, Bell — which manufacturers the V-22 Osprey — has completed all subsystem critical design reviews for components such as the wing, fuselage and gearboxes, he said. In July, the company completed its air vehicle critical design review. A final design and risk review was held in August, he added.

“We’re moving from a design-centric to a build-centric effort. We are now heavily into parts fabrication, our long-lead components, and we’ve actually begun aircraft assembly,” he said.

The wing is currently being assembled and the fuselage will be delivered in October, he said.

The V-280 will be able to fly 280 knots, has a combat range of 500 to 800 nautical miles and can carry four crewmembers and 14 passengers. Additionally, it has a useful load of more than 12,000 pounds.

Doug Shidler, Sikorsky’s JMR program director, said since last year the company has been in a preliminary design phase and is now moving into detailed design of the Defiant, which is expected to fly at a cruise speed of 250 knots.

The aircraft — which is based on Sikorsky's X-2 aircraft, a compound helicopter with coaxial rotors — will have its critical design review later this year, he added, with final assembly beginning next year.

Pat Donnelly, Boeing's JMR program director, said working on the program gives the Army the opportunity to see what capabilities are out there.

"They're trying to understand that given their emerging set of requirements, what's the art of the possible," he said. "What transitions into future vertical lift is really up to us and how we influence and shape that requirement."

Besides manufacturing a new aircraft, JMR will give the Boeing-Sikorsky team greater insight into how to make the Army's legacy fleet more advanced, Donnelly said.

"We are certainly very aware of the legacy fleet," he said. "Our expectation is that we're going to transfer any lessons learned, any advanced technologies to the greatest extent practical to our existing fleet. So it's a good investment from our part because it postures us for the future, but it also helps keep our current fleet going."

Sikorsky is the manufacturer of the Black Hawk.

Despite the work that has been done with JMR, Richard Aboulafia, vice president of analysis at the Teal Group, a Virginia-based defense and aerospace market analysis firm, said he was doubtful FVL would ever take off.

It comes down to economics, he said. While the Army may want a significant improvement in speed over traditional helicopters, it is unlikely the service will pay for that premium, he said.

"What this all presupposes is that they find a way to get a marginal increase in costs for a hundred extra knots or more," he said. "I just don't know how that happens."

He expected that the Valor and Defiant would end up in what he called "rotorcraft heaven," where other aircraft have gone after they were canceled. "It's been the fate of a lot of technology demonstrators over the decades," he said.

In the end, the Army will likely buy new versions of its proven helicopters, he added.

Despite his doubts that either of the technology demonstrators would transition into a program of record, he said such programs are useful to industry.

"JMR is great. We need more JMRs — the experimentation, the new architecture, the new technologies, keeping design teams in place. The more JMRs, the better," he said. "But the actual decision to buy thousands of something, usually that's predicated on economics and cost effectiveness — the best bang for the buck."

Photo Credit: Boeing, Bell Helicopter

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