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The Army's rugged helo is creeping toward retirement, and Bell Helicopter wants to replace it with a scaled-down version of the Osprey.



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Bell Helicopter

By Eric Tegler May 4, 2016

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The Army's Black Hawk helicopters lead a hard life. Over the next decade or so the Pentagon will need to begin replacing the ubiquitous UH-60 medium-lift helos, and when it does, it will require vertical lift with similar cargo carrying capability to what it has now. And beyond that, what the Army really wants is speed.

So what's fast and can takeoff and land like a helicopter? A tiltrotor. Bell Helicopter is building a tiltrotor aircraft called the V-280 Valor for the Army's Joint Multi-Role Technology Demonstrator project, hoping to win the contract for the Black Hawk's successor. Bell will pit the Valor tiltrotor against the Sikorsky/Boeing-built SB-1 Defiant coaxial rigid-rotor helicopter that features two rotors, one placed atop the other.

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When you think of a tiltrotor aircraft, you probably picture the Osprey. The Bell V-22 Osprey tiltrotor can cruise at 270 knots (310 mph) and has been in service with the Marines, Navy, and Air Force since 2000. But the Osprey is significantly larger and more costly than a medium-lift helicopter. Bell's Valor is considerably smaller than an Osprey with a simplified design aimed at reducing cost and weight.



V-280 Valor

Bell

The V-280 name speaks to the Army's desire for velocity. Where the UH-60 cruises at 150 knots (170 mph), Bell says the Valor will do 280 knots (322 mph), and with a range of 500 nautical miles.

"It carries the same payload twice as fast and has twice the range," says Vince Tobin, vice president for advanced tiltrotor systems at Bell. "If you put the same payload on a Black Hawk, you have to stop at half the distance, and while the Black Hawk was stopping for fuel, the V-280 would be landing at its destination."

The Valor achieves that speed and range via a tiltrotor design that departs from the V-22 most notably at the wing. Instead of the complex, forward-swept dihedral wing found on the Osprey, the Valor will use a straight wing without dihedral. As with the Osprey, the wing is made of carbon fiber but rather than being constructed using a time-consuming carbon-fiber tape-strip layup, the Valor's wing is made using swaths of carbon fiber. Vince Tobin says the difference is akin to having a tailor made suit starting with thread only versus starting with bolts of cloth.

"We've had 30 years to figure out what we did with the V-22 and how we would do things differently to get cost down," he says.

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Doing things differently extends to the Valor's proprotors. On the V-22, the entire engine/gearbox/rotor assembly at the end of the wing rotates 90 degrees in-flight to transition the aircraft from vertical takeoff and landing to airplane-like forward cruise. On the Valor, the turbofan engines remain fixed, parallel to the fuselage. The proprotors and gearboxes are hinged, tilting up or down through 90 degrees via a hydraulic jackscrew mechanism.



V-280 Valor production

Bell

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The design pays dividends in simplicity. The Osprey had a mid-wing gearbox to transfer power to both proprotors in the event of an engine-out scenario, but the Valor has a straight shaft through the wing to transfer power. Rather than requiring necessary elements like wiring, hydraulics, and bleed-air to pass through a rotating joint as on the V-22, they simply pass straight through the wing on the V-280. The result is lighter weight and less cost.

Bell envisions a real production version of the Valor having an aerial refueling capability, but has given the plane the ability to carry fuel bladders in its fuselage, extending its range to more than 2100 nautical miles—good enough to fly from California to Hawaii, the longest deployment leg U.S. aircraft fly. Like the Black Hawk, the Valor will be unpressurized, typically operating up to altitudes of 10,000 feet in cruise. The aircrew will be the same as present medium-lift Army crews: pilot/co-pilot, and two crew-chief/gunners. The tiltrotor will accommodate the same defensive countermeasures systems as a UH-60 and the same weapons. The latter are more difficult to fire forward in airplane mode because the proprotors take up large area, but Bell is confident there's enough area between the cabin rotor disks to make it possible.



V-280 Valor night vision concept

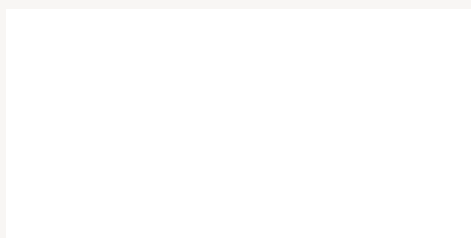
Bell

Tobin, a former Army AH-64 Apache aviator, says the Valor will be able to sustain the same kind of battle damage as a Black Hawk. The V-280 is scheduled for first flight in September of 2017 and thereafter will be evaluated against the Sikorsky/Boeing SB-1, which claims a 250-knot top speed.

Either way, the Army is speeding into the future. "When you find yourself with an unexpected threat, being able to get away from it quickly is a good thing," Tobin says.

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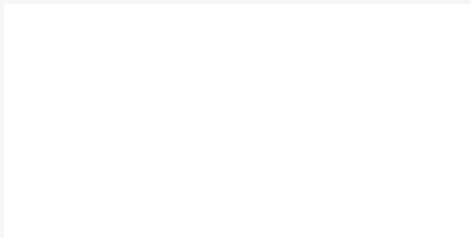
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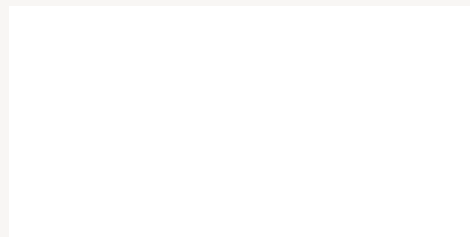
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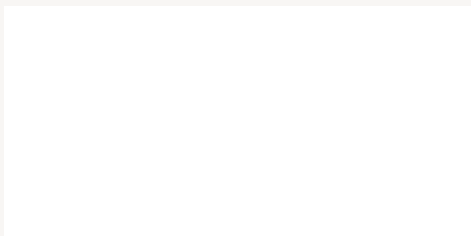
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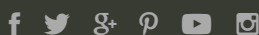
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