



Source: Sikorsky Aircraft Corporation. | GAO-22-105230

CH-53K Heavy Replacement Helicopter (CH-53K)

The Marine Corps' CH-53K heavy-lift helicopter is intended to transport armored vehicles, equipment, and personnel to support operations deep inland from a sea-based center of operations. The CH-53K is expected to replace the legacy CH-53E helicopter and provide increased range and payload, survivability and force protection, reliability and maintainability, and coordination with other assets, while reducing total ownership costs.



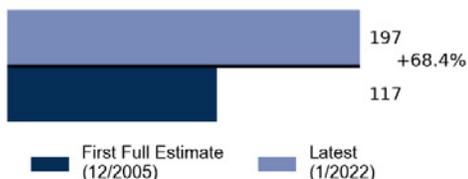
Program Essentials

Milestone decision authority: Navy
Program office: Patuxent River, MD
Prime contractor: Sikorsky Aircraft; General Electric Aviation
Contract type: CPIF (development), FPIF/FFP (procurement)

Program Performance (fiscal year 2022 dollars in millions)

	First full estimate (12/2005)	Latest (7/2020)	Percentage change
Development	\$5,182.47	\$9,043.36	+74.5%
Procurement	\$14,413.21	\$23,366.64	+62.1%
Unit cost	\$125.61	\$162.12	+29.1%
Total quantities	156	200	+28.2%

Acquisition Cycle Time (in months)



Total quantities comprise four development quantities and 196 procurement quantities. Current cost and quantity data were not available because out-year funding estimates were not updated during the fiscal year 2022 budget cycle.

Software Development (as of January 2022)

Approach: Waterfall

Average time of software deliveries (months)



Software percentage of total program cost



Software type

- 0 percent Off-the-shelf
- 0 percent Modified off-the-shelf
- 100 percent Custom software

Attainment of Product Knowledge (as of January 2022)

	Status at Development Start	Current Status
Resources and requirements match		
Demonstrate all critical technologies are very close to final form, fit, and function within a relevant environment	○	●
Demonstrate all critical technologies in form, fit, and function within a realistic environment	○	●
Complete a system-level preliminary design review	○	●
Product design is stable		
Release at least 90 percent of design drawings	○	●
Test a system-level integrated prototype	○	●
Manufacturing processes are mature		
Demonstrate Manufacturing Readiness Level of at least 9, or critical processes are in statistical control	○	○
Demonstrate critical processes on a pilot production line	●	●
Test a production-representative prototype in its intended environment	●	●

● Knowledge attained ... Information not available
 ○ Knowledge not attained NA Not applicable

CH-53K Program

Technology Maturity, Design Stability, and Production Readiness

Over the past year, new and continued technical and production risks raised questions about the CH-53K's ability to perform as expected and meet production goals. Last year, we reported that the program office identified 126 technical issues to be completed before the end of development. According to the program, 119 of the 126 issues have designs completed for potential solutions. Sikorsky delivered the first low-rate aircraft in October 2021; as of November 2021, the second was on schedule for delivery in January 2022.

Despite closing the above-mentioned technical issues, within the last year, the program continued to identify new technical challenges. For example, it discovered that while the aircraft is hovering, the compressor ingests too much sand and dirt, potentially resulting in an engine stall. While it temporarily limited aircraft landing over dirt and sand, the program is looking into a long-term solution that will likely require a redesign of the engine intakes. But, program officials state that this is not an uncommon problem in helicopters and therefore there is no perfect solution to this problem. Until fixed, this issue may limit how the CH-53K can be used in combat.

Other ongoing technical problems, such as with the rotor main damper and the intermediate gear box, are expected to affect future sustainability costs. Both parts have a much shorter life span than predicted, but the program is testing solutions to extend the parts' life cycle. Until these efforts are complete, the program is at risk of costly and time-intensive rework to aircraft already in production, and it places a greater maintenance burden on the warfighter.

The program decreased the planned amount of operational testing before its November 2022 full-rate production decision, which may lessen the information available about production maturity. Operational testing started in late July 2021 using aircraft purchased prior to production start and is planned to finish in February 2022. While the program planned three phases of operational testing, program officials stated that it was decided that two phases was sufficient to provide the information needed to make an informed-full rate production decision. The program now plans to complete the third phase of testing—which consists of using a production-configured aircraft—during follow-on testing in late fiscal year 2022.

Several supplier concerns are affecting the program. First, DOD reported that the supplier that produces the main gear box has not been able to produce enough parts or meet quality specifications for years. In order to mitigate this problem, the program is certifying two new suppliers to produce these parts. Second, DOD stated that the supplier for the fuel cell bags has had

issues meeting required specifications, resulting in several fuel cell bags needing to be returned to the supplier for fixes. The program made capital investments to help improve the supplier's tooling, which the program expects will help improve the parts' quality and recover some of the production time that was lost. Finally, the supplier for the data concentrator units (DCU) told the program office that it would no longer be able to support production of the DCU after low-rate lot 4. The program office is already attempting to replace this supplier, which it states should benefit the program in the long run. However, until that happens, program officials stated that to avoid a delay in production, they are pursuing an undefinitized contract action with a new supplier.

Software and Cybersecurity

Last year, we reported that the program delayed a contract award that would improve the program's cybersecurity because of funding constraints and the need to develop a statement of work. Since that time, the program awarded a contract in January 2021 for a cybersecurity assessment and a plan to implement security measures. This contract supports the efforts needed for meeting flight clearance requirements.

Program Office Comments

We provided a draft of this assessment to the program office for review and comment. The program office provided technical comments, which we incorporated where appropriate. According to the program office, continued progress over the past year has provided stakeholders with assurances of the CH-53K's ability to perform as expected and meet production goals. In addition, the program office stated that identification of new technical challenges was within the expected range during developmental testing and that solutions for these challenges, including the dust ingestion, are in progress. The program office added that both the main rotor damper and intermediate gear box technical issues are rated low risk for potential impact to program requirements and execution. Finally, the program office noted that all aircraft being used in operational testing have been modified to production configuration, making the two-phase test plan adequate to determine operational effectiveness and suitability. After our review period ended, program officials reported that CH-53K achieved initial operational capability in April 2022.