

China's Reusable SpacePlane 'Shenlong'

China has been developing and testing a reusable SpacePlane known as the China Aerospace Corporation's (CASC) Chinese reusable experimental spacecraft (CSSHQ) within China's crewed spaceflight program, the Project 921. [1]

The spaceplane is part of China's efforts to develop reusable space technologies, which can potentially reduce the cost of space missions by allowing the reuse of certain components.



The file picture taken in April, 2010 shows X-37B Orbital Test Vehicle in the encapsulation cell at the Astrotech facility in Titusville. [6]



Possible configuration of China's experimental, reusable SpacePlane 'Shenlong' according to NASA Spaceflight (NSF). [7]

Spaceplane Development

China's SpacePlane is designed to be a reusable spacecraft that can take off and land horizontally, similar to an airplane. The reusable spacecraft, dubbed as *Shenlong*, or "Divine Dragon" in Chinese, coincides with an equally secretive program by the United States, an autonomous spaceplane known as the X-37B. [2]

Test Flights

1) September 4, 2020: China conducted the first uncrewed test flight of the Chinese experimental spaceplane. The spacecraft was launched atop a Long March 2F rocket, the same rocket series used to transport China's taikonauts into space, and later returned to Earth, landing horizontally after 2 days at the Lop Nur test site. The specific details of the mission and the technology involved were not disclosed.

2) August 4, 2022: Launched again uncrewed atop a Long March 2F rocket, landed after 276 days at Lop Nur after having performed orbital maneuvers successfully.

3) December 14, 2023: The uncrewed spacecraft was launched atop a Long March 2F rocket at the Jiuquan Satellite Launch Center in northwest China on Thursday December 14, 2023.

The spacecraft will operate in orbit for "a period of time" before returning to a "designated landing site" in China. During its flight, reusable technologies will be "verified" and space experiments conducted to provide technical "support for the peaceful use of space", state media reported, giving no other details. [3]

Just four days after being launched on its third mission, China's Shenlong robotic space plane seems to have placed six objects into Earth orbit. Amateur spacecraft trackers around the world have been following the objects closely for days and have recorded emissions coming from some of them. The six mystery objects have been designated OBJECT A, B, C, D, E and F. According to satellite tracker and amateur astronomer Scott Tilley, OBJECT A appears to be emitting signals reminiscent of those emitted by objects that China's space plane has released on previous missions. [4]

It also has been noted that the launch of the SpacePlane was scheduled coincidentally with a planned launch of the United States reusable robotic space plane, the Boeing-built X-37B. Similar to China's Shenlong space plane, little is known about the exact operations or capabilities of the X-37B. After several delays the U.S. Space Force launched the spacecraft atop a SpaceX Falcon Heavy rocket on December 28, 2023 from NASA's KSC in Florida into a higher than previously targeted orbit. The timing of the two reusable space plane launches isn't accidental: "These are two of the most watched objects on orbit while they're on orbit. It's probably no coincidence that they're trying to match us in timing and sequence of this," General Chance Saltzman, U.S. Space Force's Chief of Space Operations, said at a conference earlier in December 2023. [4]

At the time of publishing this article (January 1, 2023) the Shenlong mission is still ongoing.

Potential Military Applications:

While the primary focus of the spaceplane project is not publicly disclosed, there is speculation that it could have both civilian and military applications. Reusable spaceplanes can provide a quick turnaround between launches, which is advantageous for certain mission profiles. (chatGPT)

Limited Information

China has been relatively secretive about the details of its spaceplane program, and comprehensive information may be limited. Official statements and announcements from Chinese space authorities provide only partial insights into the development and objectives of the program. According to media reports, the Chinese reusable experimental spacecraft (CSSHQ) is launched into Earth orbit in a vertical configuration while enclosed within the payload fairings of a rocket like a traditional satellite or space capsule, but it returns to Earth via a runway landing like a conventional aircraft; the landing is conducted autonomously (unlike the Space Shuttle). In the absence of any official descriptions of the spacecraft or photographic depictions thereof, some observers have speculated that the CSSHQ may resemble the X-37B spaceplane of the United States in both form and function (see image above, left). [5]

References

- [1] Wikipedia_ https://en.wikipedia.org/wiki/China%27s_spaceplane_program
- [2] <https://www.reuters.com/technology/space/china-launches-experimental-spacecraft-into-orbit-third-time-since-2020-2023-12-15/>
- [3] <https://www.chinadaily.com.cn/a/202312/16/WS657c86aca31040ac301a8096.html>
- [4] <https://www.space.com/china-space-plane-depoyed-mystery-objects>
- [5] https://en.wikipedia.org/wiki/Chinese_reusable_experimental_spacecraft
- [6] Image X-37B: <https://www.dailymail.co.uk/sciencetech/article-8705765/China-quietly-lands-ultra-secret-experimental-spacecraft.html>
- [7] Image Artist's impression: <https://www.nasaspacelight.com/2020/09/china-launches-experimental-spaceplane/>