

IAF MICROGRAVITY SCIENCES AND PROCESSES SYMPOSIUM (A2)
Interactive Presentations - IAF MICROGRAVITY SCIENCES AND PROCESSES SYMPOSIUM (IP)

Author: Dr. Ming Li

China Academy of Space Technology (CAST), China, liming_cast@sina.cn

Mr. Huang Zhen

China Academy of Space Technology (CAST), China, huangzhen_hz@yahoo.com.cn

Mr. Bin Guo

China Academy of Space Technology (CAST), China, robbin204@163.com

TIANZHOU'S REUSABLE CARGO SPACESHIP, A USEFUL AND POWERFUL PLATFORM FOR
MICROGRAVITY SCIENCE

Abstract

The Tianzhou-1 cargo spacecraft is China's first cargo spacecraft and was successfully launched on April 20, 2017. Tianzhou-1 is a fully-sealed cargo spaceship with a two-cabin configuration consisting of a cargo module and a propulsion module. The take-off mass was 12.91 tons, the transportation capacity was about 6.5 tons, and the propellant supplement capacity was about 2 tons, with the ability to fly independently for 3 months. Tianzhou-1 completed the tasks of rendezvous and docking with the Tiangong-2 space laboratory, implementing on-orbit resupply of propellants, conducting space science experiments and technical tests. After the completion of the planned mission, Tianzhou-1 was left the orbit and fell to the South Pacific. Waste and cargo ships were burned in the atmosphere.

Although Tianzhou-1 successfully completed its planned mission, Tianzhou-1 did not have recoverable ability, which severely restricted its application. To improve this issue, we have increased the reusable return capacity on the basis of the design of Tianzhou-1, with a downward capacity of 2.5 tons, which has greatly expanded the value of the Tianzhou follow-up cargo spacecraft. As the reentry capsule adopts the technology of repeated use, its cost to performance ratio has been greatly improved. Tianzhou's reusable cargo spaceship will use a competitive commercial model to cooperate with international customers, and the earliest time to use it is estimated around 2020.

In this article, the specific implementation of Tianzhou's reusable cargo spacecraft is introduced, and the customer's concern on the performance and cost is analyzed.