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Crew members of the Shenzhou XVI and Shenzhou XVII space missions pose for a group photo in the orbiting Tiangong space station on Thursday after the Shenzhou XVII spaceship docked with the front port of the Tianhe core module, the main body of Tiangong.
XU BU / FOR CHINA DAILY

Shenzhou XVII astronauts join peers in Tiangong

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Crew members of Shenzhou XVII — China's 12th manned spaceflight — arrived at the Tiangong space station on Thursday evening, joining their peers from the Shenzhou XVI mission who have been in orbit for five months.

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A Long March 2F rocket, carrying the spaceship with mission commander Senior Colonel Tang Hongbo, Lieutenant Colonel Tang Shengjie and Lieutenant Colonel Jiang Xinlin on board, lifted off at 11:14 am from the Jiuquan Satellite Launch Center in northwestern China's Gobi Desert.

After a six-and-a-half-hour flight, the Shenzhou XVII spaceship docked with the front port of the Tianhe core module, the main body of Tiangong.

The Shenzhou XVII crew members hail from the People's Liberation Army Astronaut Division. The mission is the first spaceflight of Tang Shengjie and Jiang, who are from China's third generation of astronauts.

The mission has also made Tang Hongbo, who belongs to the nation's second generation of astronauts, the first person to return to Tiangong. His first space journey was on board the three-month-long Shenzhou XII mission, the first manned flight to Tiangong, which concluded two years and one month ago.

Following the docking process, the Shenzhou XVII crew spent nearly two hours on preparatory work to enter the space station, which included changing into intravehicular work suits from their pressure suits.

The Shenzhou XVII spaceship lifts off on Thursday from the Jiuquan Satellite Launch Center in northwestern China. Perched atop a Long March 2F carrier rocket, the spaceship, with three Chinese astronauts on board, blasted off at 11:14 am. ZHU XINGXIN / CHINA DAILY

Meanwhile, the Shenzhou XVI crew — mission commander Major General Jing Haipeng, Colonel Zhu Yangzhu and Professor Gui Haichao — waited inside the connection cabin. After all preparations were done, Jing's team opened a hatch in the connection cabin at 7:34 pm to welcome the new team of astronauts.

The first to step out of the Shenzhou XVII spaceship was Tang Hongbo, followed by Tang Shengjie and Jiang, who were all greeted with hugs by Jing, Zhu and Gui. The astronauts then exchanged thoughts inside the Tianhe module.

Jing said he and his team were very happy and excited to see their "brothers from Shenzhou XVII". He pointed to a banner his team had placed inside the Tianhe module that read, "Welcome, our teammates".

"We have been in space for nearly five months and we missed you so much," Jing said. "We know that you trained very hard and made all-out efforts to prepare for your mission. ... Now, you have realized your dream of being in this space station and we want to extend our heartiest congratulations."

The meeting of the two teams is very meaningful because it marks the first space-based gathering of crew members from China's first, second and third generations of astronauts, said Jing, who is from China's first generation of astronauts. With the arrival of the Shenzhou XVII crew, 20 Chinese astronauts have made it to the Earth's orbit, he added.

Tang Hongbo thanked Jing and his team for the warm welcome, and said that returning to Tiangong "makes me feel I am at my space home again".

"Your outstanding performance during the past five months has set a very good example for us. We closely followed your work and learned a lot from you when we trained on the ground," said the Shenzhou XVII mission commander.

Jiang echoed Tang Hongbo and said they will continue to learn from the Shenzhou XVI astronauts during the space station handover process.

After their talks, the six astronauts took a group selfie amid cheers from ground controllers. The event was broadcast by China Central Television.

The handover process will take place over the next four days, and the Shenzhou XVI crew will return to Earth on Tuesday. The Shenzhou XVII crew will man the space station for about six months and return in April.

In addition to their routine tasks, the Shenzhou XVII crew members will perform experimental repair operations during spacewalks, according to the China Manned Space Agency.

Pang Zhihao, an expert on space exploration technology and a renowned spaceflight writer, said that repair capabilities and skills are crucial to any long-working spacecraft.

"Tiangong is set to operate in orbit for more than 10 years. It is understandable that any spacecraft designed to have such a long life span runs the risk of external impacts, particularly from space debris," Pang said.

"Our space station is in good condition so far, but we need to be well prepared for every possible scenario. It is very important for our astronauts to be able to fix broken parts or replace them with new ones," he added.

Yang Yuguang

Shenzhou XVII a step toward manned lunar mission

The launch of the Shenzhou XVII manned spaceship on Thursday was successful. The launch came just a few days after China celebrated the 20th anniversary of its first manned mission. On Oct 15, 2003, Yang Liwei, China's space hero, fulfilled the country's dream of accessing outer space.

In an interview with a major media outlet, Yang, currently deputy chief designer of China's manned space program, said all Chinese astronauts selected for the manned missions to the moon must have the experience of traveling to the Tiangong space station. This is an important criterion for the selection of "moon walkers". The Shenzhou XVII mission can therefore be described as an important stage of the preparation for China's manned lunar mission.

The Shenzhou XVII mission and its crew have many firsts. The crew is the youngest of all manned missions of China. It is also the first to have a combination of second-batch and third-batch astronauts. Tang Hongbo, a veteran astronaut who completed his first spaceflight about two years ago, is poised to be the first space traveler to revisit China's Tiangong space station.

The Shenzhou XVII crew is very young. Astronauts Jiang Xinlin and Tang Shenglie are two of China's third-generation astronauts, and were born in 1988 and 1989 respectively. As they are on their first space mission at such a young age, they will get plenty of opportunities to join more space missions.

In 2021, the program was still in the "technology demonstration and verification phase". A series of new technologies needs to be tested and mastered before being applied to space missions. For instance, during Shenzhou XII mission, China tested the regenerative environmental-control and life-support system. This system is much more complex than the non-regenerative systems used in all Shenzhou spaceships and the Tiangong-1 and Tiangong-2 space laboratories.

But mastering the technologies of regenerative environmental control and the life-support system is a prerequisite for operating a space station, otherwise many resources would be wasted in providing water, oxygen and other resupplies to the astronauts.

Since the major purpose of building the Tiangong Space Station is to conduct all scientific research, we need to reduce the amount of resupplies to the space station to the lowest possible level.

During the Shenzhou XII mission, Tang and his two colleagues tested the oxygen production system, water recovery system, urine processing system, hazardous gas removal system, carbon dioxide removal system, and CO_2 recovery system. These six sub-systems form the regenerative system, and the three-month operation of these systems during the Shenzhou XII mission gave China valuable experience and knowledge on how they work. Tang played an important role in accomplishing this task.

Since Tang is familiar with the regenerative environmental-control and life-support systems, and since the corresponding system in the Wentian laboratory module has the same specification and design as the Tianhe-1 core module, he can ensure the normal functioning of these important systems during the six-month stay at the Tiangong Space Station. More importantly, his experience will also be helpful for China's future manned lunar missions.

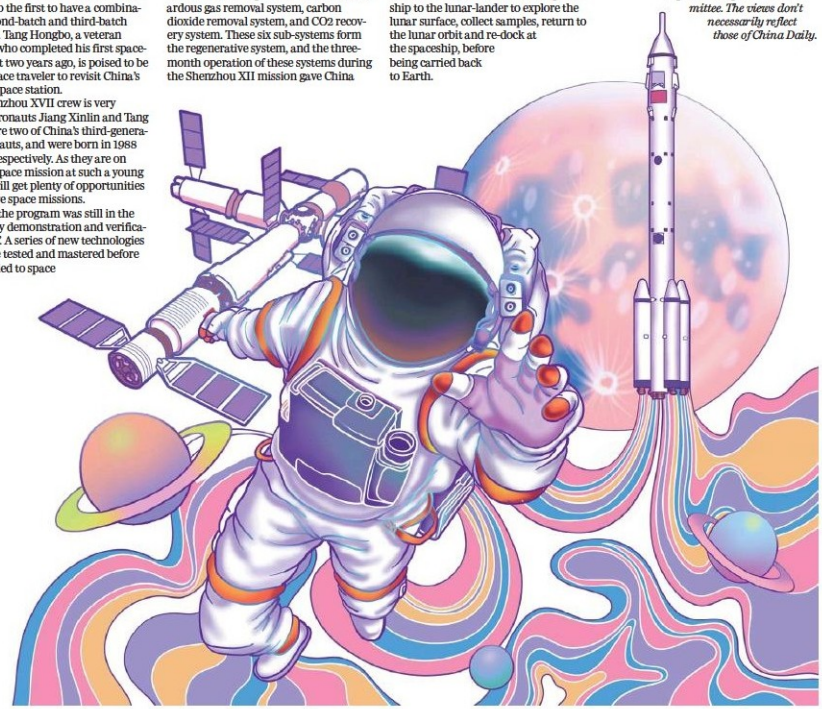
As Zhang Hailian, deputy chief designer of China's manned space program, said, China will use two Long March-10 heavy launch vehicles to launch a lunar-lander and spaceship to trans-lunar orbit respectively. The two spacecrafts will rendezvous and dock in circumlunar orbit, following which two of the three crew members will transfer from the spaceship to the lunar-lander to explore the lunar surface, collect samples, return to the lunar orbit and re-dock at the spaceship, before being carried back to Earth.

The "Lunar Orbit Rendezvous" is so complicated that even the smallest error could cause disaster. Thus the astronauts have to be doubly sure about everything they do. That's why their experience at the Tiangong Space Station is very important. All this can be described as a warm-up exercise for the lunar missions.

The young astronauts Tang Shenglie and Jiang Xinlin are in perfect physical condition and could handle abnormal situations. Being trained as pilot-astronauts, we hope these young people get the chance of leading space missions in the future.

Having its astronauts walk on the moon is part of China's space dream, and the Shenzhou XVII manned mission could be a very important step toward China realizing that dream.

The author is vice chair of the International Astronautical Federation Space Transportation Committee. The views don't necessarily reflect those of China Daily.



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