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China sends world's first methane rocket into orbit

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China successfully flight-tested a methane-propelled carrier rocket on Wednesday morning at a launch facility in its northwestern Gobi Desert, marking the first orbital mission of any methane-fueled rocket in the world.

The rocket, named ZQ 2 or Rosefinch 2, blasted off at 9 am from the Juquan Satellite Launch Center in the Inner Mongolia autonomous region and transported an experimental pay-

load into Earth's orbit, said LandSpace, a Beijing-headquartered private enterprise that designed and built the rocket.

The successful mission also made ZQ 2 the largest and most powerful private rocket in China.

According to LandSpace, the ZQ 2 is 49.5 meters tall and has a diameter of 3.35 meters — the same diameter as most of China's Long March-series rockets. It has a liftoff weight of 219 metric tons and a launch thrust of 268 tons.

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The ZQ 2 carrier rocket blasts off on Wednesday from the Juquan Satellite Launch Center, Inner Mongolia autonomous region.

WANG JIANGBO / FOR CHINA DAILY

Rocket: Methane engines are reusable, more eco-friendly

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The vehicle is capable of placing a 4-ton satellite into a typical sun-synchronous orbit about 500 kilometers above the Earth, or a 6-ton satellite into a low-Earth orbit with an altitude of 200 km.

The rocket's main propulsion system — the TQ 12 — is the first methane engine in China. Before LandSpace, only a handful of companies in the United States had developed such engines.

Compared with traditional types of rocket engines that can function only once, a methane engine is reusable and more environmentally friendly.

The maiden flight of the ZQ 2 model happened in December at the Juquan center. The rocket successfully crossed the Karman Line, the globally recognized boundary between Earth's atmosphere and the edge of space, but malfunc-

tioned in its second stage and failed to reach orbit. That was the world's first attempt to achieve orbit with a methane-fueled rocket.

The Chinese model had been in a close race with Relativity Space's Terran 1 and SpaceX's Starship to be the first methane-fueled rocket in orbit.

LandSpace is making the ZQ 2 and its engines at its plant in Huzhou, Zhejiang province, the first privately owned carrier rocket factory in China and the largest of its kind in Asia.

Zhang Changwu, founder and CEO of LandSpace, said after Wednesday's launch mission that the ZQ 2's success means China now owns key technologies needed to build methane-propelled rockets.

Zhang said his company plans to launch the third ZQ 2 rocket in the near future to complete the type's technical verification phase, after

which the model can enter commercial operation.

"Starting next year, we will launch the ZQ 2's initial commercial operation. We plan to perform three to four launches in 2024, and hope to launch another eight of these rockets in 2025," he said, adding that LandSpace engineers will continue to improve the model's carrying capacity.

According to Zhang, the company has also started designing a reusable rocket and the experience gained during ZQ 2's research and development will help advance the reusable type's design work.

Yang Yuguang, a senior space industry observer and vice-chair of the International Astronautical Federation's Space Transportation Committee, said the ZQ 2 has set a new milestone in the global space industry.

"This is the first time a rocket fueled by methane and liquid oxygen has entered Earth's orbit. Meth-

ane-liquid oxygen engines are widely recognized as the most suitable propulsion system for reusable rockets," he said.

Rocket engineers around the world have been striving to develop reusable engines for many years and those built previously needed a lot of money and time to undergo maintenance before they could be reused, according to Yang.

"By contrast, methane-liquid oxygen engines promise the most convenient checks and maintenance for reuse, saving a considerable amount of time and money," he said.

Yang's remarks were echoed by Yao Weixin, a retired professor of Peking University's School of Earth and Space Sciences and a renowned blogger on space technology.

"Methane-propelled engines boast many advantages such as lower cost of fuel consumption, easier maintenance and more eco-friendliness," he said.

Nation unveils plan on crewed moon mission

Long March 10 rockets to carry astronauts, landing module to lunar orbit before 2030

By ZHAO LEI in Wuhan
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China made public on Wednesday specific designs for its manned lunar mission, which is scheduled to be achieved before the end of this decade.

Speaking at a space industry forum in Wuhan, Hubei province, Zhang Hailian, deputy chief planner at the China Manned Space Agency, said the plan is to launch two Long March 10 carrier rockets from the Wenchang Space Launch Center in Hainan province to transport a lunar landing module and a manned spacecraft to lunar orbit.

After reaching their preset orbital positions, the landing module and the spacecraft carry astronauts will rendezvous and dock with each other. The crew will enter the landing module, which will then undock and descend toward the lunar surface for an engine-assisted soft landing.

On the moon, the astronauts will drive a rover to carry out scientific tasks and collect samples. Upon the completion of their assignments, they will return to the landing module, which will fly them back to lunar orbit and dock with their spacecraft.

In the final stage, the astronauts will carry the samples into their spacecraft, which will then undock and carry the crew back to Earth.

"To achieve this goal, designers and engineers are developing the Long March 10 rocket. The model will have three-and-a-half stages and a liftoff weight of about 2,200 metric tons, capable of sending a 27-ton spacecraft into the lunar transfer orbit," Zhang said.

The manned spacecraft for the mission is in the middle of its research and development stage, according to Zhang.

"It will have an overall weight of 26 tons and will consist of three components — an escape tower, a reentry capsule and a service section," he said, adding that the new spacecraft will feature reusability and modular designs that suit both near-Earth and deep-space explorations.

According to the space agency, the landing module will have two parts — a landing section and a propulsion section — and will weigh nearly 26 tons. It will accommodate two astronauts. The four-wheeled moon rover will weigh 200 kilograms and carry a host of scientific equipment.

In the long term, China intends to construct a lunar scientific outpost to conduct extended explorations and technology demonstration operations, Zhang said.

"The moon is the nearest extraterrestrial body that humans can reach based on current technologies. Manned missions to the moon will be a realistic and practical step — to start with (in order) to expand our exploration endeavors in deep space.

"Meanwhile, it is scientifically meaningful for us to continue to explore the moon because it will help scientists better understand the origin and the evolution of the solar system as well as the composition of planets," Zhang said.

The massive project will welcome international cooperation and the participation of private enterprises, he added.

Lin Xiqiang, deputy director of the space agency, said in May that in order to achieve the goal of a manned moon landing before 2030, scientists and engineers would develop a computing system and short-term stay system for crew members, and would work out human-robot integrated testing and other key technologies.