

The background of the slide is a vibrant red with a fine, dotted texture. On the left side, there is a vertical image of a space shuttle launching, with a bright yellow and white plume of fire and smoke. To the right of the shuttle, a satellite is shown in orbit, emitting a bright yellow beam of light. The main title is written in large, bold, yellow sans-serif font, and the subtitle is in a smaller, blue, italicized serif font.

China Manned Space Flight Program

—*its present and future*

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15-10-2009, Korea



Overview

- Brief Introduction
- Shenzhou-7 EVA Mission
- Development in Future



Brief Introduction of China Manned Space Flight Program

Brief Introduction

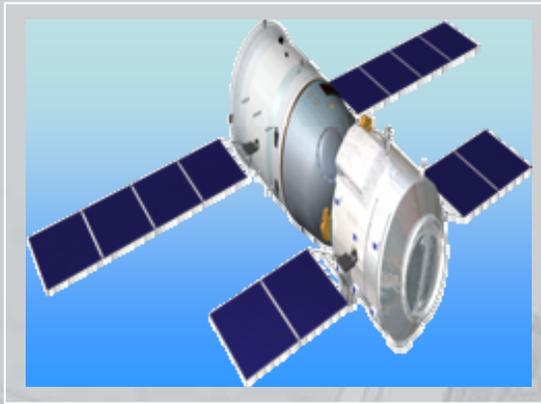
The background of the slide features a red header bar at the top. Below it, a semi-transparent image shows various components of a space shuttle or satellite in orbit. On the right side, a portion of a white and grey shuttle is visible. The central and lower-left areas are dominated by a large, semi-transparent, light-colored cylindrical component, possibly a payload bay or a large satellite, with various mechanical details and a circular hatch visible. The bottom edge of the image shows the curvature of the Earth with a thin atmosphere layer.

- **Development Strategy**
- **System Composition**
- **Previous Space Flight missions**

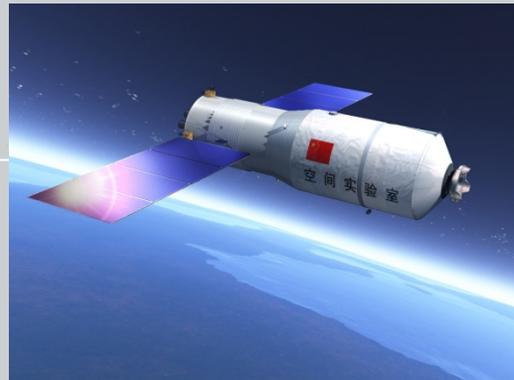
Development Strategy

On September 21st, 1992, Chinese government decided to implement the manned space flight program and approved a “3-step” development strategy.

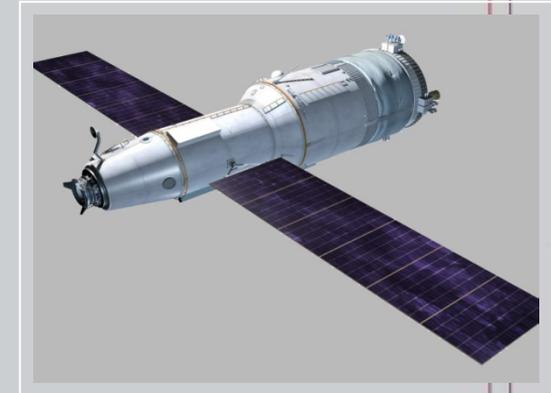
Step 1 : manned spaceship



Step 2 : space laboratory



Step 3 : space station



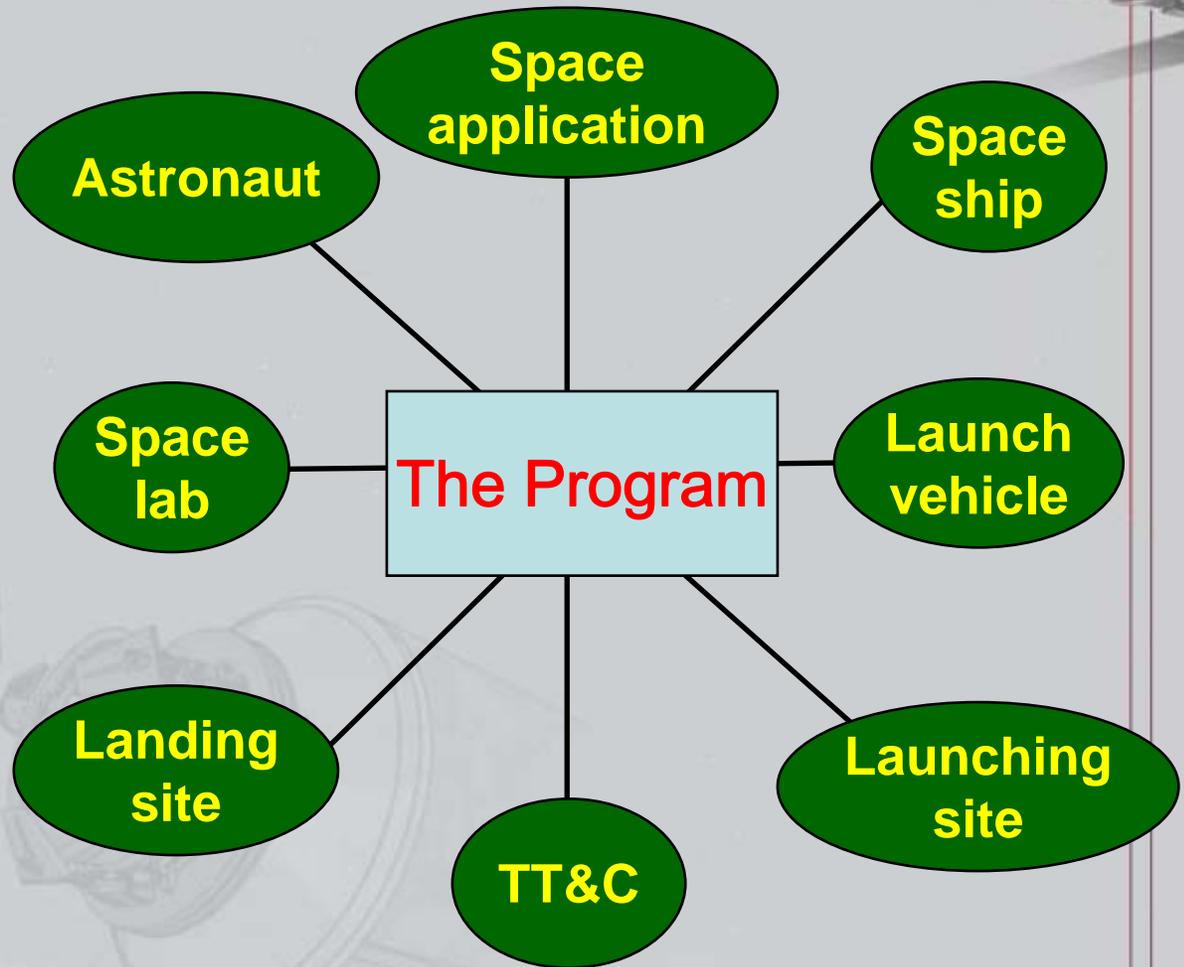
Completion of preliminary experimental manned spaceship and carrying out experiments for space application

Mastering the rendezvous and docking technology, launching a space laboratory, and carrying out scientific experiments on a certain scale with short-term human participation

Building space station and carrying out science experiments on a larger scale with long-term human participation

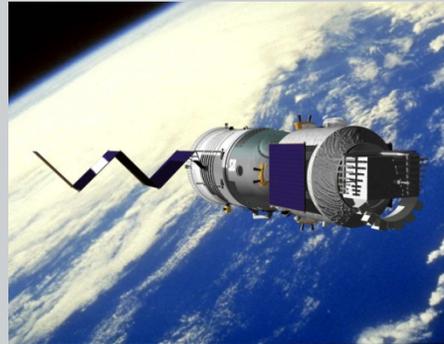
System Composition

China Manned Space Flight Program is a national key Project. It's also the largest space program of China. The Program is composed of 8 systems.

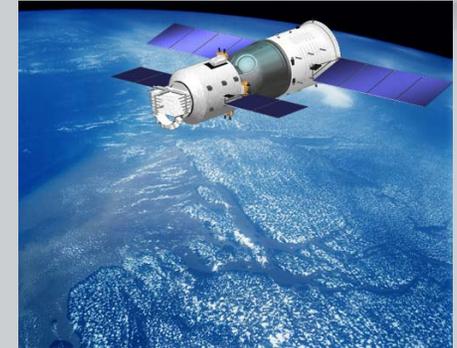


Previous Missions

The program started in 1992, In November 1999, the first un-manned space flight test was conducted. In January 2001, March 2002 and December 2002, China conducted another three un-manned flight tests successfully. These tests comprehensively checked the whole program and its various systems.



Shenzhou-1



Shenzhou-2



Shenzhou-3

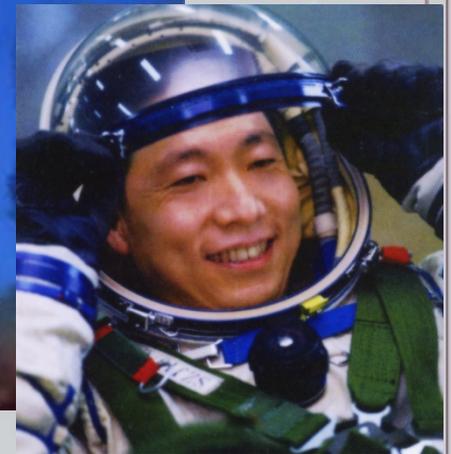


Shenzhou-4

Previous Missions

◆ SZ-5 mission: First Manned Space Flight

From Oct. 15th to 16th, 2003, China successfully accomplished the first manned spaceflight. Taikonaut Yang Liwei circled 15 times around the earth in Shenzhou 5 spaceship, and landed safely on the main landing site at Inner Mongolia.



Previous Missions

◆ multi-man and multi-day spaceflight:SZ-6 mission

From Oct. 12th to 17th, 2005, China successfully conducted her second manned spaceflight, the SZ-6 mission. It was China's first time for multi-man and multi-day spaceflight. Taikonauts Fei Junlong and Nie Haisheng entered the orbit module, operated and conducted scientific experiments. After 76 circles flight around the earth, they landed safely and healthily.





Shenzhou-7 EVA Mission

SZ-7 EVA Mission



From Sep. 25th to 28th, 2008, China successfully conducted Shenzhou 7 manned spaceflight. It was also the first flight of the second step for China's manned space engineering. It made China become the third nation with key technologies of EVA.

- **Main tasks**
- **Technology breakthrough**
- **Mission description**

Main Tasks



Shenzhou-7 manned spaceflight was the first flight of the second step for China's manned space engineering.

Main tasks : To conduct the first EVA, to master and make breakthrough on EVA technologies, to carry out space science and technology tests, such as accompanying satellite and data relay.



Technology Breakthrough

Compared with Shenzhou-5 and Shenzhou-6, the main technology breakthroughs of Shenzhou-7 mission are:

Feitian EVA spacesuit,

Airlock,

EVA training.



Technology Breakthrough : Feitian EVA Spacesuit

Since 1995 , China had began to R&D key technologies and components for EVA, such as water sublimator, freely movable joint and liquid cooling garment, etc. In 2004, the development of EVA spacesuit was fully started, and the design, prototype and flight type were gradually completed. We produced multi-sets of spacesuits for ground training and use in orbit.

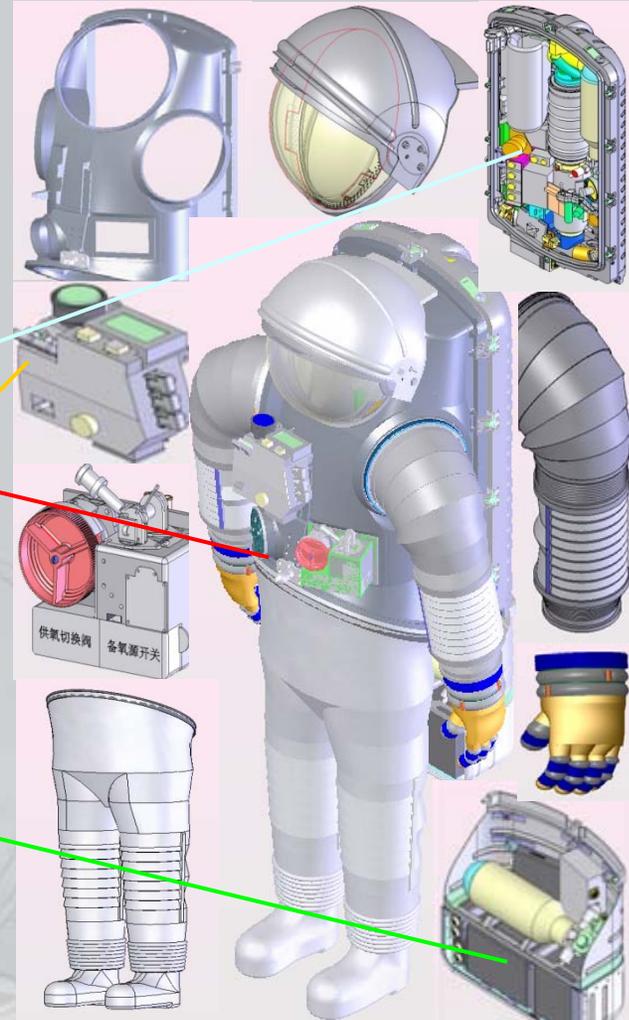


Technology Breakthrough : Feitian EVA Spacesuit

Spacesuit components:

4 subsystems

- **Body structure**
- **Environment control & life support**
- **Medical surveillance & remote measurement**
- **Control & display**



Technology Breakthrough : EVA Training

EVA Training has four factors, including human, extravehicular spacesuit, airlock module and space environment. The principle of training is to simulate real space environment as far as possible.



China developed and constructed many ground infrastructures for EVA training to simulate space environments such as thermal vacuum, microgravity and so on.

Technology Breakthrough : EVA Training



EVA Procedure Training

Technology Breakthrough : EVA Training



**Taikonauts carrying out low-pressure training
in extravehicular spacesuit test module**

Technology Breakthrough : EVA training

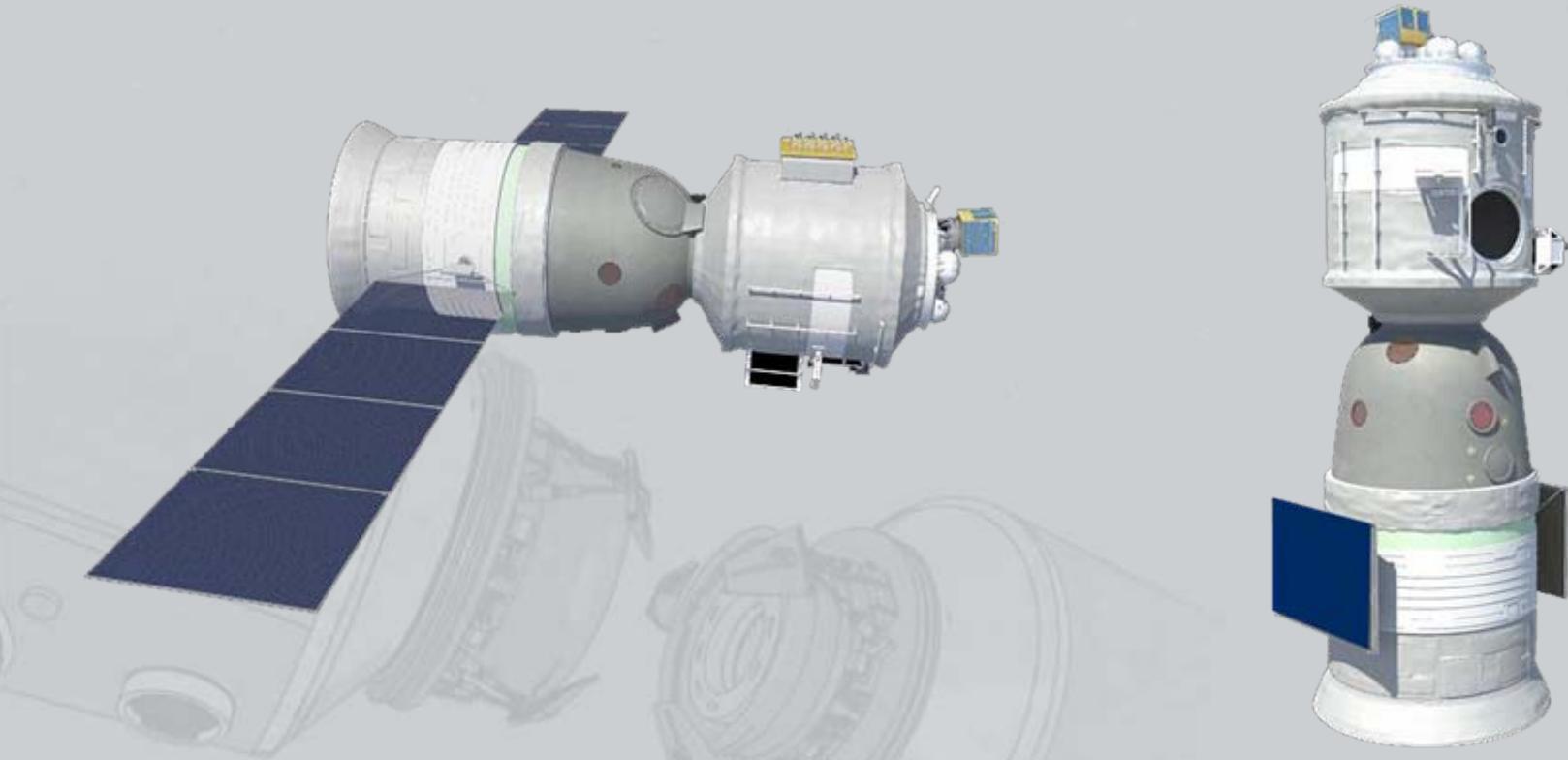


Chinese neutral buoyancy facility



Training in neutral buoyancy facility

Technology Breakthrough : Shenzhou Spaceship



The Shenzhou-7 manned spacecraft

Technology Breakthrough : Shenzhou Spaceship

**Propulsion
Module**



Propulsion Module is the power center of the spacecraft, in which solar panel and 28 engines are installed.

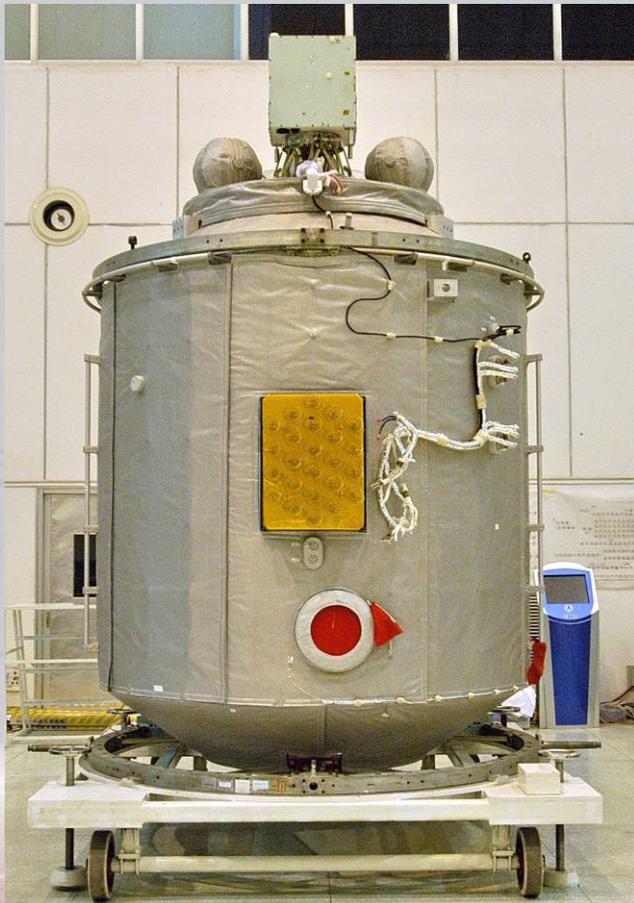
Descent Module



Descent Module is the control center of the spacecraft. Launch and Landing crews are Zhai Zhigang, Liu Boming and Jing Haipeng.

Technology Breakthrough : Shenzhou Spaceship

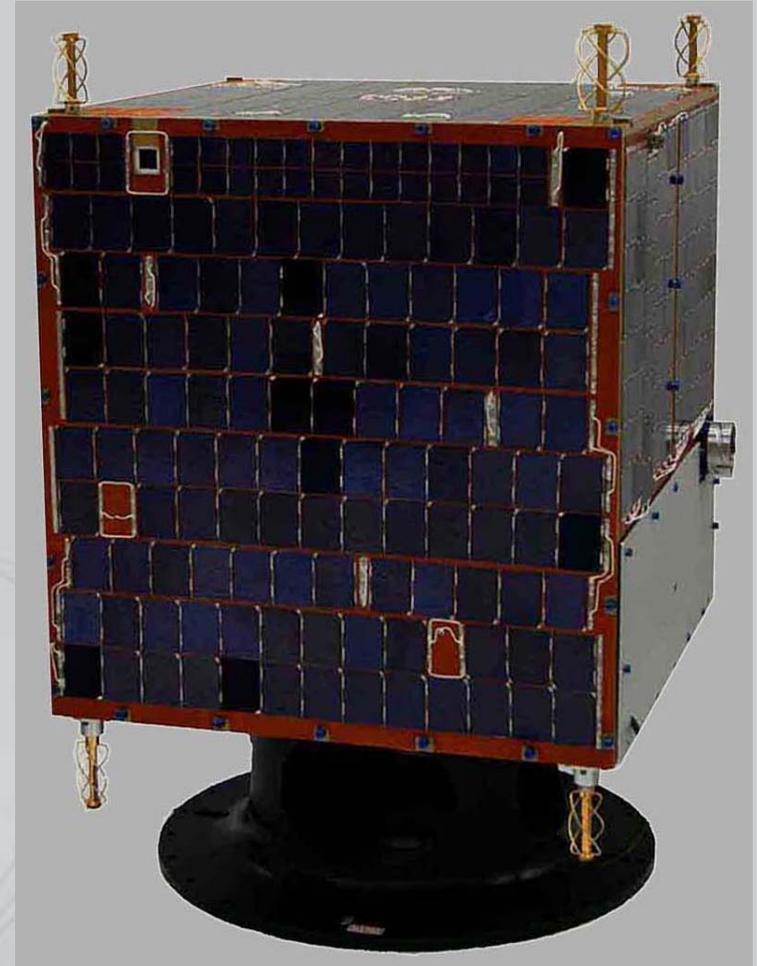
Orbital Module



The Orbital Module of Shenzhou-7 was not only the working and living module for Taikonauts. It also served as the airlock for EVA. The food, drinking water , sleeping bag and extravehicular spacesuit were all in the Orbital Module.

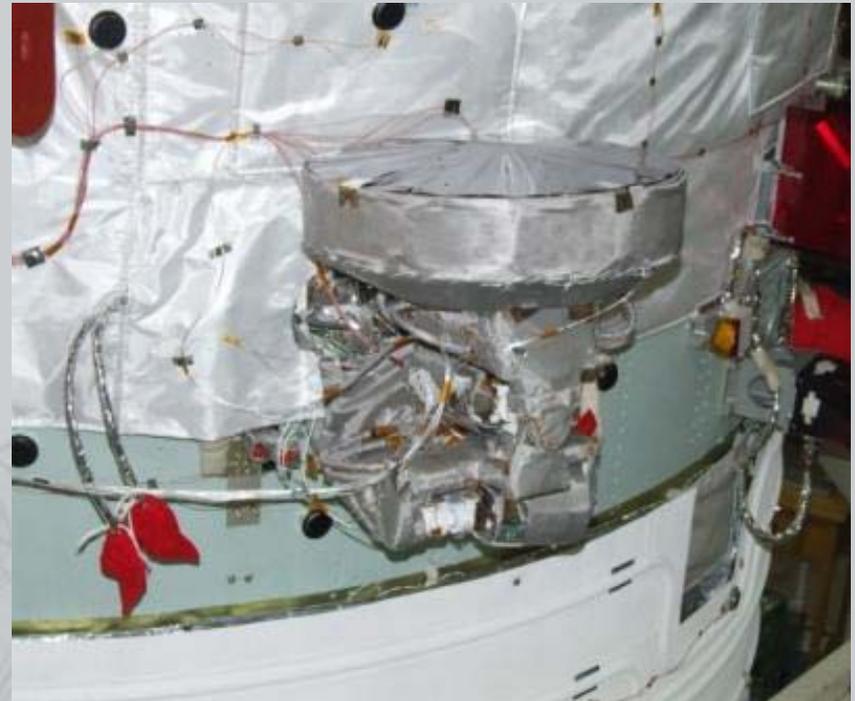
Technology Breakthrough : Accompanying Satellite

Accompanying satellite weighed 40kg, with the task of taking photos of the spaceship after being released and demonstrating fly around the Orbital Module after the spaceship's re-entry. Utilizing the accompanying fly test, we accumulated experiences in relative track, measure and control of two in-orbit spacecraft, and, as a result, we gained experiences in ground-based navigation for rendezvous.



Technology Breakthrough : Tracking and Data Relay Satellite Terminal

During the flight of Shenzhou-7 spaceship, the indigenous TL-1 data relay satellite was used to fulfill China's first data relay test in space and completely validate the concept of data relay satellite and data relay terminal, providing the basis of China's space-based TT&C network. The data relay satellite can extend TT&C coverage and provide better support for the ground-based TT&C of space rendezvous and docking. The data relay terminal was in the forehead of propulsion module, with the rotatable antenna automatically pointing to the data relay satellite.



Mission Description

At 16:34, 27th September, on the 29th circle, astronauts Zhai Zhigang and Liu Boming, wearing China-developed **Feitian** and Russia-imported **Orlan-M** EVA spacesuit respectively, performed Chinese first EVA. As scheduled, Zhai Zhigang retrieved the scientific experiment devices. At 17:00, the astronauts safely returned inside the module and closed the hatch. It marked the EVA was successfully accomplished.



Mission Description

At 17:37, 28th September, the Descent module of Shenzhou-7 spaceship landed safely and accurately in the scheduled landing site at Siziwang County of Inner Mongolia. Three astronauts came out of the module in good health. The Shenzhou-7 EVA mission achieved a complete success.





Development of China's Manned Space Flight Program in Future

Development in Future

The background of the slide features a red header at the top. Below it, a white horizontal band contains the title. The main body of the slide is light gray with a faint, semi-transparent image of a spacecraft or space station structure. The bottom portion of the slide shows a view of Earth from space, with the horizon and atmosphere visible.

Based on the existing space access technologies, China will continue to conduct the second phase of the second step and also the third step of the Manned Space Flight Program.

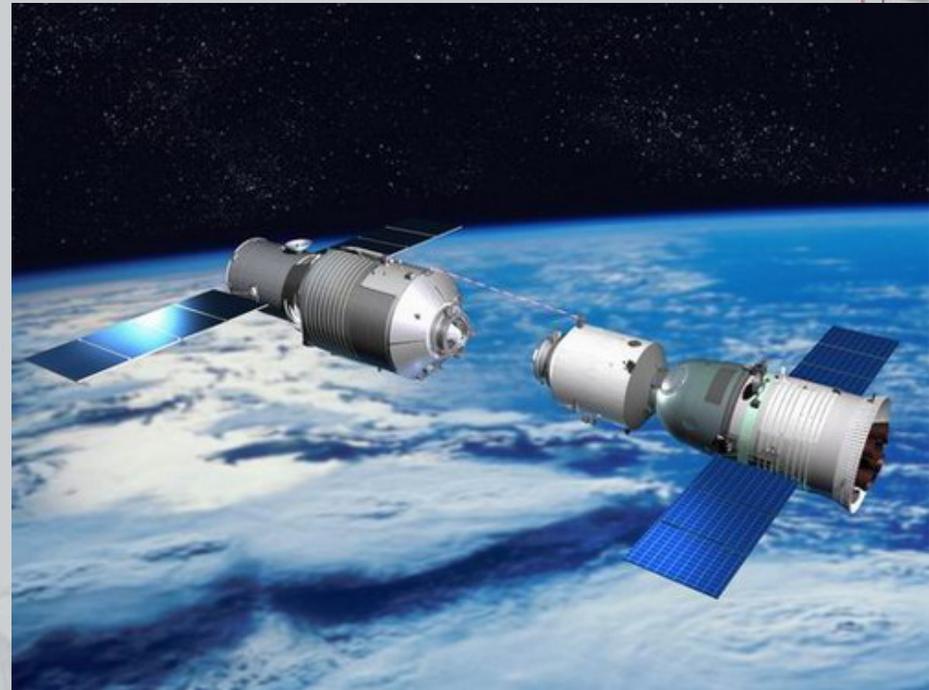
- Master and make breakthrough on rendezvous and docking technologies of spacecraft**
- Launch and operate Space Laboratory**
- Build and operate space station**
- Conduct manned lunar mission conception study**

Development in Future

Rendezvous and Docking

The next objective of the second step for China's Manned Space Engineering Program is to carry out space rendezvous and docking and master basic technologies for long-term manned space activities.

According to the plan, target spacecraft Tiangong 1 will be launched in 2011, and Shenzhou 8 will be launched for the first unmanned rendezvous and docking test. Then unmanned and manned rendezvous and docking will be conducted after the test.



Rendezvous and Docking for Tiangong 1 and Shenzhou 8

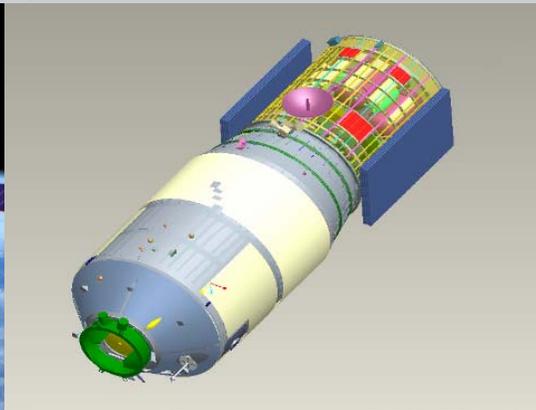
Development in Future

Space Laboratory

After accomplishing rendezvous and docking test, space laboratory and cargo spaceship will be launched around 2015. The space laboratory will provide the capability of Taikonauts ' medium-term stay in space. More science experiments will be carried out with the participation of Taikonauts. By operating the space laboratory, China will accumulate experiences in building, managing and operating the future space station .



Space Laboratory



Cargo Spaceship



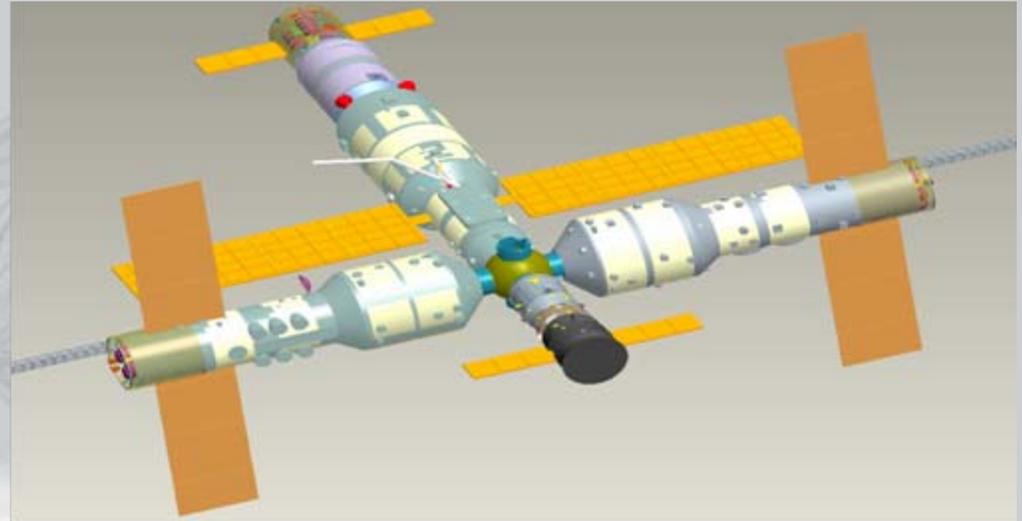
Manned Spaceship

Development in Future

Manned Space Station

Around 2020, China will launch and assemble a space station with the combination of 20-ton modules. By that time, China will master the technology of building and operating LEO space station.

- ◆ Development of space station's core module, experimental module I and experimental module II
- ◆ Orbit assembly of 60-ton manned space station



Development in Future

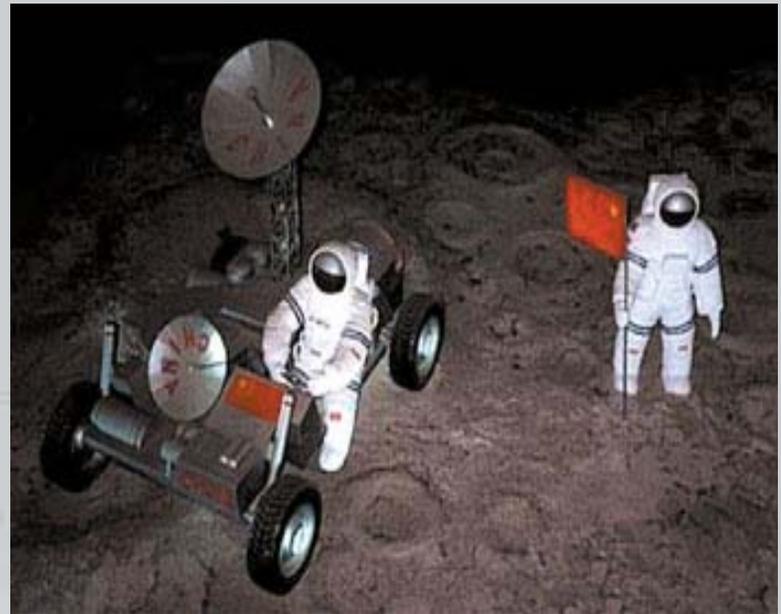
For the manned space station, the operation orbit is 400~450 km, the inclination is 42° ~ 43° , and the rated crew number is three. Astronauts will stay in space for a long duration and carry out large-scale space application and technological experiments. The lifetime of the space station is 10 years.



Development in Future

Manned Lunar Mission Conception Study

During the course of the third step of China Manned space flight program, we will conduct manned lunar mission conception study, validate the key technologies, and finally pave the way for manned lunar exploration mission.



Development in Future

Selecting and training new Taikonauts

Most recently, Chinese have selected 45 candidates, including 15 women, from the air force pilots. Finally, 5 men and 2 women will be selected as the new candidates of the next generation of Taikonauts. This is the first time for the Chinese to select and train women Taikonauts.

A close-up view of a white robotic arm, likely from the International Space Station, extending into space. The arm is composed of several cylindrical segments connected by joints. The background is a deep red with a fine, grid-like pattern, suggesting a digital or virtual environment.

Conclusions

The purpose for China to develop manned space flight program is to peacefully explore and use the outer space for the benefits of mankind.

We believe through our own efforts and the international cooperation, the purpose will be realized.



Thank You !