



ANALYSIS
November 8, 2016

Interview with Lei Fanpei

For this issue's analysis, we provide a translation of an interview with China Aerospace Science and Technology Corporation Chairman Lei Fanpei. The interview with *People's Daily* was given a few weeks before the launch of the Long March 5 rocket and provides key insight into where China sees itself in the context of its own aerospace development and in the context of international competition. Perhaps most revealing is Lei's assessment that China currently has matched leading international space standards in one-third of its technologies but needs to double that before it will consider itself a "strong space power."

Translator's Notes

Lei Fanpei was appointed chairman of the board and secretary of the Leading Party Members' Group at China Aerospace Science and Technology Corporation (CASC) in May 2014. He previously served as vice president of CASC and in other management positions in CASC. He currently also serves as the vice president of the China National Defense Science and Technology Industrial Enterprise Management Association, vice chairman of the board of the Chinese Society of Astronautics, and chairman of the board of APT Satellite Holdings Ltd. A rocket engine technology researcher, Lei helped develop Long March booster rocket engines and major model posture controlled engines.

CASC was established in 1998, but traces its roots back to 1956. It is China's sole entity performing development, production, and launch testing of launch vehicles, manned spacecraft, space station, deep space exploration spacecraft, and strategic missiles, and is also heavily engaged in satellites and tactical missiles. It is China's only domestic service provider for broadcast communication satellite operations.

CASC Chairman: Become a Strong Space Power by About 2025

航天科技集团董事长：2025 年左右建成航天强国

Original Link: <http://scitech.people.com.cn/n1/2016/1008/c1007-28758727.html>

October 8, 2016

People's Daily Science and Technology

Author: Zhao Zhuqing

Translated by: Eric Anderson

On October 8, 1956, the Fifth Academy of the Ministry of Defense was established, marking the official birth of China's aerospace industry. After 60 years of development, Chinese aerospace has grown from small to large and is now a veritable space major power (航天大国), advancing with strides towards its goal of becoming a space strong power (航天强国). On the eve of the 60th anniversary of the founding of China's space industry, People's Daily interviewed China Aerospace Science and Technology Corporation (CASC) chairman and party secretary Lei Fanpei.

CASC is a leading force in China's aerospace science and technology industry, with primary responsibility for China's Long March series of launch vehicles, manned spacecraft, deep space probes, strategic and tactical missile weapons, and various applications of satellite development, production, launch and operational services.

Pressing Forward from a Space Major Power to a Space Strong Power

People's Daily Science and Technology: Hello Chairman Lei, General Secretary Xi on Space Day put forth that China's aerospace industry created the brilliant achievements of "two bombs, one satellite," manned spaceflight, and lunar exploration, all the while following a development path of self-reliance and indigenous innovation and accumulating a deep and broad "spirit of spaceflight." How do you understand this "spirit of spaceflight"?

Lei Fanpei: Chinese aerospace has three major spirits: "two bombs, one satellite," traditional space, and manned spaceflight. These are summed up as: self-reliance, hard work, selfless dedication, painstaking research, and climbing high peaks. Put simply, the majority of space S&T workers follow this path of self-reliance and indigenous innovation. These "three major spirits" sum up the "spirit of spaceflight" that has been created over the past 60 years of aerospace industry development.

People's Daily: Compared with international space powers, where does China's current aerospace level stand?

Lei Fanpei: China's aerospace industry has grown from small to large through this sixty-year period. Under strong attention and leadership from the party and state, it has built a complete aerospace industrial system with supporting systems. There are 17 models of launch vehicles, and satellites cover communication, navigation, marine, meteorological, and remote sensing. In terms of the technological level of achievements and products, we have already entered the ranks of space major powers but still do not count as a strong space power. Therefore, we still need a period of time through 2025 in order to achieve the goal of becoming a strong space power.

People's Daily: What meaning does the launch of the Long March 5 in the second half of the year have for China's establishment as a space strong power?

Lei Fanpei: The Long March 5 launch vehicle will be launched in the beginning of November [2016] and is an important marker for China becoming a strong space power. Its carrying capacity is greatly improved over our current capability: 25 tons in near-Earth orbit; 14 tons in geosynchronous transfer orbit. It also carries the weight of China's follow-up megaprojects, since it will be the rocket used in the Chang'e 5, the launch of the space station's core module, and a Mars exploration mission. The Chang'e 5 is significant toward China's completion of the follow-up megaprojects and also lays the foundation for China's rocket carrying capacity to reach globally advanced levels. Following the successful launch of the Long March 5, China's rocket carrying capacity will be first in Asia, third in the world, and will have reached internationally advanced levels.

People's Daily: Speaking of strong space powers, what is the definition of becoming a strong space power? How do we become a strong power?

Lei Fanpei: Through comparative study, we have put forward 100 technical indexes and 27 economic indexes as reference standards. We have done benchmarking, and currently there is still a large gap, with only about one-third of the indicators reaching internationally advanced levels. We believe that increasing it another one-third to exceed 60 percent or higher will allow us to truly reach a strong space power.

Additionally, the tasks we are currently implementing-manned engineering, lunar exploration, Mars exploration, Beidou navigation, a new generation of launch vehicles-all will push towards these indicators. For example, the Long March 5 is an important marker toward us becoming a strong space power. In other words, following the successful launch of the Long March 5, in terms of carrying capacity, our country will already be a strong space power, having reached strong space power markers in low Earth orbit and synchronous orbit carrying capacity.

Space Development Injects "Fresh Lifeblood"

People's Daily: Over the past two years, research and development produced new generations of the launch vehicles Long March 6, Long March 7, and Long March 5, which are still to be followed by Long March 8 and a heavy-lift rocket. What will be the future mission plans for the new generations of launch vehicles? And what will be their relationship to current rockets?

Lei Fanpei: Long March 7 was developed specifically for the Tianzhou cargo spacecraft. The Tianzhou spacecraft will soon rendezvous and dock with the space station. Near-Earth orbit carrying capacity needed to reach 13.5 tons, whereas rockets preceding the Long March 7 had near-Earth orbit carrying capacities of around 9 tons. It was therefore necessary to develop a launch vehicle specifically for Tianzhou.

The space station's core module weighs 23 tons, so a larger thrust rocket must be used to send it into orbit. That is the Long March 5 launch vehicle.

The Long March 6 launch vehicle is used for emergency launches. Once it reaches the launch range, less than a week is needed to prepare and launch a satellite.

With the development of China's new generation space transportation system in full swing, existing rockets will gradually be replaced by a new generation of launch vehicles with non-toxic, pollution-free propellants. With the Long March 5 as representative, it broke through a new engine and a series of other key technologies, which has driven the development of the Long March 6, Long March 7, and Long March 8 series and significantly enhanced our ability to enter space. Following this year's maiden flight of the Long March 5, the next steps to look forward to are the Long March 8 and heavy-lift launch vehicle. We

are striving by 2020 to have a new generation of launch vehicle systems basically completed, with the Long March 8 having completed development and taken its maiden flight, and having a breakthrough in the key technology for the heavy-lift rocket project.

People's Daily: What are the characteristics of the new generation of space talent?

Lei Fanpei: First, space is the country's; the excellent talent that comes here all have a sense of national mission and patriotism. This is very valuable.

Second, they have experience with major projects. This major project not only shows the individual's wisdom but also reflects the wisdom of the group. If you want to do good research, you cannot only have a proven personal standard, but you have to also cooperate with everyone else. For an individual, tempering and honing is a very good environment.

Third, they have a sense of honor. Through their own research and through making major breakthroughs, they have a sense of comfort and happiness that is not found in other industries.

Holding to Indigenous Innovation; Promoting Space Development

People's Daily: If China's aerospace industry is summed according to economic accounts, is there any advantage over the input-output ratio of foreign countries?

Lei Fanpei: Compared with foreign countries, there are still gaps in our commercial applications. Our input-output ratio is about 1:7; foreign countries are perhaps a bit higher. From this perspective, we need to further increase promotion and applications. For example, promotion of applications of Beidou and satellites in new fields.

People's Daily: What rate of localization is CASC's core components and equipment currently able to achieve?

Lei Fanpei: Rockets are basically completely localized. Satellites are not there yet, as there are still very few components that need to be imported. This is being researched. Our goal is during the 13th Five-Year period is to complete one hundred percent localization.

People's Daily: Can you please introduce again the situation in international cooperation?

Lei Fanpei: CASC has carried out 54 satellite launches or piggyback services for 20 countries and exported 11 satellites to 9 countries.

The primary service of international cooperation is whole satellite exports. Our country has signed more than 100 space cooperation agreements with more than 30 countries. Last year, aerospace contracts amounted to \$1.12 billion, of which Africa and Algeria accounted for a larger share.

People's Daily: Standing at 60 years of aerospace, looking back 60 years, and looking forward to the future, what are your thoughts on China's aerospace industry?

Lei Fanpei: After 60 years of aerospace, it should be said that under the party and state's strong attention and support, there have been many achievements. These 60 years of aerospace have laid an excellent foundation for our future development. We believe that by 2020, we can build a world-class, large-scale aerospace enterprise group, boost the establishment of a strong space power, and be the vanguard of

scientific and technological innovation. In scale, we want to enter the top 300 of the world's top 500-this goal should be quickly achievable. Within some technological innovations, we should be able to be at the world's forefront, some keeping pace with the world's powers, and some shortening the gap. This is our strategic goal, which has already been included in our group's 13th Five-Year Plan. Concurrently, we will also implement Made in China 2025, and in 2025, China aerospace will enter the ranks of strong space powers.

Under the interest and support of the party and state, we ushered in the important opportunity of aerospace development in the 13th Five-Year period. In these five years, the amount of missions will be increased 70-80 percent from the foundation of the 12th Five-Year period. We also have confidence to lead, to carry forward the spirit of spaceflight, to establish CASC, and to develop the space industry.

Concurrently, as a frontline leader, we need to recognize our shortcomings and that, measured against a strong space power and advanced technology, we still have a gap. Therefore, we must lead our workers to carry forward the spirit of spaceflight and make persistent efforts to continually broaden innovation and push forward the development of our space industry on the foundation and spirit laid by the former generation of aerospace workers.