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China's Space Industry in 2009: A Year in Review

Kevin Pollpeter

Summary

China's space industry is a strategic sector that the country's leaders point out "constitutes an important force in safeguarding national security, driving scientific and technological advancement, enhancing national comprehensive power, and boosting international competitiveness." Indeed, since 2000 China has made impressive gains in space power, expanding its human spaceflight program, and launching its first lunar orbiter and an increasingly diverse number of satellites.

However, 2009 was a year of setbacks for China Aerospace Science and Technology Corporation (CASC), one of the space sector's two dominant conglomerates, as it faced increasingly complex challenges brought on by a new dual mandate. It is unclear at this point whether CASC can successfully serve both the economic and national security interests now required of it or how steep the learning curve will be as the corporation prepares to compete at the next level.

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A NEW MANDATE FOR CASC

Under the dual mandate to serve the country's national security interests and the needs of a large economy, CASC is creating a "new system" in which it will continue to innovate in the manufacture of satellites and launchers, but also expand its product line to include commercial space products and services, spin-off technologies from space research and development, and services unrelated to space technologies. CASC is now focused equally on the domestic and international markets and aims to capture a larger share of the global space economy. However, this plan is as much, if not more, about leveraging CASC's expertise in space technologies to manufacture civil-use products.

CASC began a major push in 2009 to establish numerous corporations in eight regional space industry bases. Their main emphasis will be to strengthen regional economies through the development and manufacture of civilian products such as solar panels, integrated circuits, and agricultural products rather than the innovation of space technologies.

CASC's major theme is thus not about technology or innovation. It is about structural reorganization to meet the needs of the political economy. Such reorganization will dramatically increase the size of CASC. It has necessitated changing CASC's goal from becoming a world-class aerospace corporation to becoming a large world-class aerospace corporation by 2015 with projected total revenue of 250 billion yuan.

Indeed, CASC posted strong performance in 2008 and 2009, with increases in total assets of more than 9 percent and 13 percent, respectively. In addition, CASC has posted strong revenue earnings and has maintained a profit margin of more than 20 percent for the past three years. But if CASC is to reach its goal of 250 billion yuan in total assets by 2015 it must continue its aggressive growth. With total assets of around 157 billion yuan in 2009, CASC must grow by more than 9.4 percent annually to meet this goal, a rate higher than China's annual GDP growth since 2000.

TROUBLES IN 2009

While 2009 was a year for CASC to position itself for market expansion, it was also a year of setbacks in CASC's core business and China's space program. The year 2009 has been described as a year that was "out of the ordinary," in which CASC faced many "strenuous, complex, and formidable difficulties in research and development, production, testing, and flight." CASC launched less than half the satellites than were planned, experienced its first launch failure since 1996, delayed the planned 2010 launch of the Tiangong-1 space station to 2011, and lost two Beidou satellites due to control problems. These difficulties have been attributed to problems encountered in leap-frog development. CASC management states that even though these are new problems, the fact that they were not identified more quickly indicates that CASC's knowledge management system still needs to be strengthened.

The dilemma for CASC is that while it has established a solid technological basis for its satellites and launchers, each successive generation of technology brings with it new challenges that may require more know-how than CASC's relatively young workforce of technicians and scientists can muster. In effect, as China's space technology gets closer to international levels, there is a disproportionate increase in technological difficulty and a concomitant steepening of the learning curve. If this is the case, CASC may go through a prolonged period of technical setbacks before it can be truly competitive internationally.

THE RISKS INHERENT IN CASC'S NEW SYSTEM

The difficulties faced in 2009 may be a harbinger of the challenges CASC must confront as it transforms to its new system. Indeed, it may not be coincidental that in the first year of its implementation of the new system, CASC experienced so much trouble.

First, CASC may be trying to do too much too soon. As China's leading space industrial organization, CASC is concurrently working on human spaceflight, lunar exploration, and precision Earth surveying programs. Each of these have subprograms involving new, highly complex technologies, most of them unprecedented in China's technological history.

The human spaceflight program, for example, involves the development of a space station;

docking technologies; simultaneous production of Shenzhou capsules; and a new Long March series of launch vehicles that feature a new propulsion system, China's largest rocket to date, and a human-rated launch vehicle. The lunar program involves a lunar orbiter, a lander, and a return vehicle. The precision Earth surveying program involves the development of global navigation technologies, including critical atomic clock technologies, and a diverse range of optical, radar, and microwave sensors. Under this scenario, CASC may experience the same types of quality problems that other companies have faced during times of rapid expansion.

A second risk is distraction. CASC's new role as a major player in China's political economy, with its emphasis on developing regional economies, and its headlong rush to establish companies across China to manufacture civil-use products may divert CASC from the core functions of building satellites and launchers. Diversification carries risk: even companies that have successfully diversified in their core competencies have discovered that more is not always better.

Indeed, the downsizing and rationalization of the 1990s and 2000s that were seen as imperative for the health of the defense industry appear to have been reversed. While it is not evident that the aerospace industry has had to fill its ranks with redundant personnel, the horizontal expansion that has been forced upon CASC suggests it is taking on many new organizations that it will be forced to retain, regardless of performance. In fact, CASC may be challenged by having tasks that are at cross purposes to each other, namely, remaining innovative and profitable while serving the Party requirements of job creation and retention. In other words, CASC must respond to government directives to expand in ways that it might not have done otherwise, but is still required to function as a "real" business.

This is not to say that CASC's new business plan is inherently flawed. U.S. aerospace giants Lockheed Martin, Northrop Grumman, and Boeing have also expanded beyond their core functions into other defense-related technologies and services such as C4ISR, information systems, systems integration, and shipbuilding. These companies, however, have retained their core defense and commercial aviation clientele and have not moved into other markets. Moreover, these companies expanded into these sectors only after being well-established as aerospace corporations. CASC must undergo its expansion at the same time it is having difficulties manufacturing internationally competitive products.

CASC's move into non-defense sectors may be based on limited opportunities for expansion into other defense sectors. Whereas its U.S. counterparts have been able to develop or acquire product lines to expand their defense business, CASC appears to be blocked from doing so since it would involve merging with another defense industrial group. To become more like a U.S. aerospace company, for example, CASC would have to merge with the Aviation Industry Corporation of China (AVIC) so that the new company could offer both aviation and space technologies. A merger with China Aerospace Science and Industry Corporation (CASIC) would appear to make more sense. CASC already is responsible for the bulk of the aerospace sector and there appears to be little competition between the two corporations. Such a move would also not be unprecedented, since AVIC I and AVIC II were merged in 2008.

IMPLICATIONS FOR THE UNITED STATES

China's desire to forge a large and economically powerful space industry reflects its intention to compete with the United States in space. While China has repeatedly stated that it is not in a space race, its actions demonstrate that it regards space as an area of competition. China's rise in this arena and its ambition to become a major space power on a par with the United States indicate that as it becomes more capable, China's space industry could have deleterious effects for U.S. national and economic security.

CASC's bid to become a large world-class aerospace corporation is supported by more aggressive international marketing. For example, China increased its satellite exports in 2009 following its launch of the Nigerian satellite Nigcomsat in 2007 and the Venezuelan satellite Venesat-1 in 2008. These include contracts to build satellites for Bolivia, Laos, and Pakistan as well

as to launch a satellite for Nigeria to replace one that failed in 2007 due to an anomaly with its solar arrays. There is also speculation that China is in talks with Bangladesh, Ecuador, Myanmar, Vietnam, and several African countries for the export of satellites.

Improvements in China's space industry have military implications as well. While China's 2007 ASAT test and its 2010 direct ascent missile interception test received much greater attention, China is also expanding its space-based C4ISR system with two new series of remote sensing satellites, the Huanjing and Yaogan. The Yaogan satellites, in particular, have both optical and synthetic aperture radar payloads and are intended to form an eight-satellite constellation that could be used to extend China's power projection capabilities.

CONCLUSIONS

The first 20 years of this century are described as a period of "historic opportunity" for CASC. In fact, it is also a period of historic challenges. As China's leading space industry organization, CASC is now tasked with executing more technologically sophisticated programs than at any other time in its history.

CASC has also entered an era in which the reforms of the 1990s and much of the 2000s have been reversed. It is now expected to be fully involved in addressing some of the societal problems associated with China's economic reforms. In response to the Party's efforts, CASC has undertaken the major task of increasing its role in the service of China's economic interests. It is unclear at this point whether CASC can successfully balance its requirement to promote job creation with its requirement to serve national security interests. Certainly risks to innovation in the field of space technology are inherent in this approach, as is China's goal to be a strong space power. The central government, however, gives a high level of attention and support to China's space program. CASC's goal of making China into a strong space power is also a goal of the Communist Party and it is likely that failure to show progress in this area will result in corrective action being taken by the Party.

What is apparent from the trends of 2009 is that Communist Party ideology matters. It is easy to dismiss Communist Party writings as vacuous, turgid, and inscrutable. CASC's response to the Communist Party's goal of creating a more equitable society that evens out the economic disparity among different regions demonstrates that government organizations cannot just pay lip service to political ideology. They are also required to act on it.

Kevin POLLPETER is China program manager at Defense Group Inc. (DGI). Pollpeter's research focuses on China military and Chinese military-related research and development and science and technology issues. In particular, Pollpeter focuses on the Chinese space program.