

# TESTIMONY

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## Advances Underway in China's Defense Industries

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**The RAND Corporation**

**Before the U.S.-China Economic and Security Review Commission**

**March 16, 2006**

Mr. Chairman: Thank you for inviting me to participate in today's hearing on this important topic. I should begin by pointing out that the findings I present today are based not just on my own work but on the results of a collaborative effort between me and my RAND colleague Evan Medeiros. Evan was the lead author of a recently published RAND study called *A New Direction for China's Defense Industry* to which I was the other major contributor. Evan could not be here today so my testimony will draw on both my work and his, although he should not be held responsible for anything I say as he has not had a chance to review it.

For the first two decades after the launch of China's economic reform program in the late 1970s, China's defense industries were best and often described as moribund. With a few notable exceptions such as ballistic and anti-ship cruise missiles, much of their output consisted of systems based on Soviet technology and designs from the 1950s. Since the late 1990s, however, China's defense industries have begun turning out an increasing number of recognizably modern weapon systems. Although the capabilities of these weapons fall short of the most advanced systems now entering the U.S. inventory, they are comparable in capability to the systems we fielded in the 1970s and 1980s that still make up the bulk of our forces. If the United States is to keep its qualitative military advantage over China, therefore, we will need to continue to develop and field systems that are significantly more advanced than the types currently in our inventory and that China is now in the process of developing and fielding.

**Background and Recent Changes in China's Defense Industries**

China's defense industries were originally established with Soviet assistance during the 1950s and organized according to the Soviet model as government ministries. This structure persisted well into China's economic reform era which began in the late-1970s, except for the 6<sup>th</sup> Machine Building Industry which was converted into a state-owned company, the China State Shipbuilding Corporation, in 1982. China's other defense industries remained government

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<sup>1</sup> The opinions and conclusions expressed in this testimony are the author's alone and should not be interpreted as representing those of RAND or any of the sponsors of its research. This product is part of the RAND Corporation testimony series. RAND testimonies record testimony presented by RAND associates to federal, state, or local legislative committees; government-appointed commissions and panels; and private review and oversight bodies. The RAND Corporation is a nonprofit research organization providing objective analysis and effective solutions that address the challenges facing the public and private sectors around the world. RAND's publications do not necessarily reflect the opinions of its research clients and sponsors.

ministries, in some cases combined together with purely civilian industries. In 1993, however, most of the defense industries that remained under the control of government ministries were also converted into three more state-owned corporations with sometimes somewhat misleading names, especially in English: Aviation Industries of China; China Aerospace Corporation, which developed and produced missiles and space systems; Northern Chinese Industries Corporation, which developed and produced weapons for ground forces, and China National Nuclear Corporation, which produced civilian and military nuclear power systems. The only defense sectors that remained under direct government control were China's nuclear weapons complex, which remained under the control of the government's Commission on Science, Technology, and Industry for National Defense (COSTIND) and the People's Liberation Army (PLA), and China's defense electronics complex, which remained under the control of the Ministry of Electronics Industry.

In 1999 Aviation Industries of China, China Aerospace Corporation, Northern Chinese Industries Corporation, China National Nuclear Corporation, and China State Shipbuilding Corporation were each divided into two nominally independent companies, and in 2002 China's defense electronics complex was converted into a state-owned corporation, the China Electronic Technology Corporation. Thus, China's defense industry now consists primarily of eleven state-owned corporations, plus the nuclear weapons complex.<sup>2</sup>

In addition to bifurcating its state-owned defense companies, China made a number of other changes in its defense industrial sector in the late 1990s. First, until 1998 COSTIND was a joint military-civilian body responsible both for running China's defense industries and for overseeing the procurement of equipment by China's military. In 1998, however, the old COSTIND was abolished and replaced by a purely civilian body with the same name. The new COSTIND's role is to regulate China's defense manufacturers and to facilitate coordination between them and China's military. COSTIND also oversees a number of defense-related universities and colleges as well as the Southwest Institute of Engineering Physics, which develops nuclear weapons.

At the same time as COSTIND was abolished and recreated, a new general department of China's military was created, the General Armaments Department.<sup>3</sup> The General Armaments Department's role is to oversee the acquisition and maintenance of the PLA's weapon systems. By removing the acquisition function from COSTIND and creating the General Armaments Department, China has created within the PLA an advocate for the PLA's interests in the

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<sup>2</sup> China's military also employs communications and information processing equipment produced by firms outside of the official defense industrial complex.

<sup>3</sup> The other general departments are the General Staff Department, the General Political Department, and the General Logistics Department.

development and procurement of weapon systems that is independent of the interests of China's defense industries. On paper at least, this is a very significant move as, by giving the military control over which systems it acquires, it should force China's defense industries to be much more responsive to the needs of the Chinese military than they were in the past. In practice, of course, both the General Armaments Department and COSTIND remain embedded in China's larger government bureaucracy and thus the General Armaments Department is not a truly independent, autonomous actor. This weakens the incentives for China's defense industries to improve the quality and prices of their products.

China's government has also taken steps over the past few years to rationalize and streamline its defense companies. Significant numbers of workers have been laid off or reduced through attrition, and some money-losing enterprises have been shut down. China's eleven defense companies are actually holding companies containing dozens of subordinate enterprises and many of these enterprises are now responsible for their own finances.

China's defense industries have also undoubtedly benefited from the rapidly increasing technological capabilities in China's broader economy and improved knowledge of China's scientists, engineers, and managers. China's growing integration into the world economy has resulted in an increasing number of enterprises in China, both foreign-invested and wholly Chinese-owned, that possess state-of-the-art production equipment and know-how and employ modern production management and quality control techniques. Although the technologies these firms employ are not necessarily defense-related, they form part of the overall economic environment in which China's defense industries are embedded and represent a source of technical know-how and management expertise that China's defense industries can draw on. Similarly, the improvement and growing exposure to Western teaching and scientific methods of China's universities and technical schools means that they are turning out increasingly well-trained and independent-thinking scientists, engineers, and technicians. And as salaries and working conditions in China's defense industries improve, they are increasingly able to attract high-quality university and technical school graduates as well as employees of high-tech civilian enterprises and Chinese nationals who have been studying or working abroad.

Perhaps the most significant change in China's defense industries in recent years, however, has been a dramatic increase in the amount of resources flowing to them. As is well known, China's defense budgets have been increasing rapidly in the past decade, but within those budgets spending on procurement has been increasing even more rapidly. Between 2000 and 2003, for example, while the official Chinese defense budget increased at an average annual rate of over 16 percent, the amount the PLA spent on weapons procurement increased at an average annual

rate of over 18 percent. These increased financial flows enable defense enterprises to purchase advanced production equipment and to attract highly capable employees from colleges, other enterprises, or abroad.

### **Improvements in the Output of China's Defense Industries**

It is difficult to determine which of the changes described above has been the most crucial, but their net effect has been a qualitative improvement in the output of China's defense industries in recent years. China's defense companies are now producing systems that, while not cutting edge, are comparable to those that dominate the inventories of the United States and other advanced militaries. The Type 98 tank, for example, is assessed to be comparable in capability to the main battle tanks of other Western countries, although so far it has been produced in small numbers. Similarly, China has launched two classes of destroyers expected to have air defense capabilities comparable to those of U.S. Aegis-class cruisers and destroyers. China is currently producing two classes of modern diesel-electric submarines and is building a new class of nuclear submarine expected to be comparable to the Los Angeles-class ships that comprise the bulk of the U.S. attack submarine force. The C-802 anti-ship missile carried by China's naval combatants is comparable in capability to early versions of the Harpoon missile that still equips U.S. naval combatants.

Since the 1990s the Shenyang Aircraft Corporation has been co-producing, with Russian assistance, Su-27 air superiority fighters, which are roughly comparable to the U.S. F-15. More recently, an indigenously built light fighter, the J-10, which is comparable in performance to an F-16, has reached initial operational capability. China's PL-9 infrared-homing air-to-air missile is comparable in capability to the U.S. AIM-9M "Sidewinder," which was in production until the end of 2004, and China is developing an active radar guided missile, the PL-12, which is expected to be comparable in capability to the U.S. AIM-120 "AMRAAM." China is also believed to have developed and be testing an airborne early warning and control aircraft comparable to the U.S. AWACS.

Other systems under development in China include a surface-to-air missile system that is expected to be comparable in capability to the Russian SA-10 system or early versions of the U.S. Patriot, a cruise missile expected to be comparable to the U.S. Tomahawk system, and a high-speed anti-radiation missile.

Perhaps China's best-known weapon systems are its short-range conventionally-armed ballistic missiles. These systems provide China with a unique capability possessed by virtually no other

country and one that is extremely difficult to counter. The missiles are solid fuel and carried on road-mobile launchers, meaning that it is extremely difficult to locate and attack them before they are launched, and the latest models are believed to have accuracies of less than 50 meters.

Although the output of China's defense industries has advanced rapidly in recent years, it is not clear how much of this is the result of significant technological innovation in China. All of the classes of systems described above were first developed in other countries, in most cases decades before China began producing them. China has also received considerable technical assistance from Russia and Israel, and much of the equipment used to produce these weapons is imported. Certain technologies may have been acquired through espionage. In the case of China's short-range ballistic missiles, although China has the most capable force of this type in the world, this is not because other countries are incapable of fielding such systems. In particular, the United States and Russia are prohibited under the terms of the 1987 Intermediate Nuclear Forces Treaty from fielding land-based missiles with ranges between 500 km and 5,500 km and instead rely on aircraft or sea-launched cruise missiles to deliver conventional ordnance over distances greater than 500 km.

The lack of weapons capabilities unique to China should not necessarily be viewed as evidence of weakness on the part of China's defense industries, however. In a situation in which technologies and designs have already been developed elsewhere, it is generally much more cost-efficient to acquire those technologies and designs from countries and companies that already possess them than to reinvent them oneself. To the extent to which technical assistance has been available from Russia, Israel, and other countries, it probably has not made sense for China to attempt to develop completely new types of weapons.

Moreover, although China has yet to develop a type of weapon that was not first developed elsewhere, clearly significant innovation is going on in China's defense industries. Although China has received significant technical assistance from Russia and Israel, much technological progress has been the result of indigenous efforts. By all accounts, for example, China's ballistic missile programs have received little or no direct external assistance. China is also reported to be attempting to develop a ballistic missile capable of hitting a moving ship at sea, an effort which, if successful, would provide China with a unique and unprecedented military capability.

The real test of the innovative capacity of China's defense industries will occur as China closes the technological gap between itself and the most advanced militaries of the world. The closer China approaches the world state-of-the-art, the less readily technology will be available to it from abroad. Countries and companies that possess state of the art technology will be less

willing to share it with China due to concerns about giving away their military advantage, in the case of countries, and concerns about giving away their competitive advantage, in the case of companies.

### **Prospects for Future Advancements in China's Defense Industries**

Although the quality of the output of China's defense industries has improved significantly in recent years, a number of shortcomings remain. For example, China has yet to develop a dedicated attack helicopter; its anti-submarine warfare technology is weak; it appears to be nowhere close to fielding any kind of stealth aircraft; it does not have a super-agile IR-guided air-to-air missile like those produced by the United States, Russia, and Israel; and it has nothing like the range of precision air-to-ground munitions employed by U.S. air forces. For China to be able to challenge the United States for military dominance in East Asia it will need to solve these and other shortcomings. Moreover, as implied above, although catching up to the state of the art may require fewer resources than were originally required to advance the state of the art, as China begins to approach the state of the art, further narrowing that gap will become increasingly costly. And in another RAND study we estimated that, prior to 2025, China is unlikely to have available to it defense resources comparable to those currently available to the United States.

In addition, China's defense industries continue to suffer from a number of structural problems that, if not resolved, will inhibit their efficiency and ability to innovate. Of these structural problems I think two are particularly important. First, despite the subdivision of most of China's defense industrial corporations in 1999, there is still relatively little direct competition in China's defense sector. All twin-engine fighters are still produced by the Shenyang Aircraft Corporation. All single-engine fighters are produced by the Chengdu Aircraft Industry Group. Almost all air-to-air missiles are produced by the China Air-to-Air Missile Research Institute. All anti-ship cruise missiles are produced by the Third Academy of the China Aerospace Science and Industry Corporation. And so on. As we have discovered in a certain (non-defense) sectors in the United States, without competitive pressures the pace of innovation is much slower than it is in a situation in which there is intense competition.

The second ongoing structural problem in China's defense industries is that they are state-owned. As with a lack of competition, the lack of private owners demanding a return on their capital investment significantly dampens pressures to innovate and improve efficiency. The deleterious effects of being state-owned are probably particularly acute for China's defense companies due to their history of having been government bureaucracies in the past, which has probably bequeathed on them an institutional ethos distinctly different from that of a dynamic



private sector firm that the ongoing lack of competition and their status as state-owned corporations has likely done little to dispel. Many of China's defense companies have transferred portions of their holdings to joint-stock companies, but these invariably consist only of enterprises that produce only of civilian goods. Up until now the Chinese government has been unwilling to relinquish its direct control of the producers of actual weapon systems.

Unless China allows full, direct competition for weapons development and production contracts and privatizes its defense companies, therefore, China may further close the technological gap between itself and the advanced militaries of the world. As long as the products of U.S. defense industry continue to advance, however, it seems unlikely that China's defense industries will acquire the capability to produce systems that directly challenge the technological dominance of the U.S. defense industry.

### **Strategic Significance**

The potential strategic significance of advances in the production capabilities of China's defense industries is huge. Although I just stated that as long as the products of U.S. defense industry continue to advance, it is unlikely that China's defense industries will acquire the capability to produce systems that directly challenge the technological dominance of the U.S. defense industry, if the U.S. military does *not* continue to upgrade its technological capabilities, it is possible that by the end of next decade China will be able to field a military capable of challenging the United States for military dominance in East Asia. As I said earlier, prior to 2025 China is unlikely to have available to it defense resources comparable to those currently available to the United States. However, if China focuses on developing its capabilities for military operations within East Asia, and avoids investing in expensive long-range power projection assets such as aircraft carriers, heavy bombers, strategic transports, and amphibious assault ships, then by 2020 China will be capable of fielding forces that, while not equal to those currently fielded by the United States, will at least be in the same order of magnitude. (Assuming that on average it is no more expensive to produce a weapon system in China than it is in the United States, which would seem to be a defensible assumption.) And China will have the advantage that its home territory is within the region, whereas East Asia is nearly halfway around the globe from the United States. Whether or not we will still hold our current military advantage over China, therefore, will depend on whether we have replaced our current generation of military systems with a new generation that are as qualitatively superior to the modern systems that China is now fielding as today's systems are to the outdated systems that currently still make up the bulk of China's military. China's defense industries are advancing increasingly rapidly, and striving to close the technological gap with the United States.