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Japan's Defense Industry, Science and Technology in the Northeast Asia Strategic Landscape

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SUMMARY

Despite its limited presence in the international arms market, great strides have been made in the Japanese defense industry over the last decade, including development of new transport aircraft, a ballistic missile defense system, and a new class of submarines. While these achievements are partly motivated by internal drivers and themselves have driven the capability areas prioritized in the 2010 National Defense Program Guidelines, the main driving force has been the geostrategic realities in East Asia, particularly China's A2/AD capabilities. Although Japan is making progress, missing capabilities have been brought to the forefront in the aftermath of the Great East Japan earthquake.

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ACHIEVEMENTS OF THE JAPANESE DEFENSE INDUSTRY OVER THE LAST DECADE

The Government of Japan maintains very strict constraints on arms exports. As a result, even though the Japanese defense industry manufactures highly sophisticated and advanced products, its presence in the global arms sales market is very limited. One cannot find “made in Japan” end-product weapons systems outside of Japan. For the most part, Japanese defense corporations do not participate in international arms development such as the Joint Strike Fighter project. One exception is ballistic missile defense cooperation with the United States.

This very limited presence in the international arms market, especially considering its performance in civilian technology, does not mean that the Japanese defense industry lacks technological potential. In reality, the Japanese defense industry made significant achievements this decade. It developed two different types of indigenous aircraft, a missile defense interceptor, and underwater warfare capabilities.

The Japanese aerospace industry made great efforts to develop the P-1 maritime patrol aircraft (MPA) and the C-2 transportation aircraft. The P-1 MPA, with four indigenous turbo-fan jet engines manufactured by Ishikawajima-Harima Heavy Industry, was developed as a successor to the P-3. Since Japan is surrounded by ocean, making airborne maritime surveillance assets indispensable, the Government of Japan decided to develop indigenously and did not participate in the P-8 development program. The C-2 transportation aircraft, with two engines manufactured by General Electric, was developed as a successor to the C-1 indigenous transportation aircraft. The C-2 was designed to fill a niche between the C-130 as an intra-theater transportation aircraft and the C-17 as an inter-theater transportation aircraft. As discussed later, Japan needs to cover a broad theater if it wants to counter China’s growing anti-access/area denial (A2/AD) capabilities. To do so, Japan requires transportation aircraft that can cover a broader theater than the C-130.

Development of both aircraft kicked off in 2000 as coordinated projects. The development phase of these two types of aircraft is almost complete, and the procurement process should begin in the coming five years. While these are not front-line combat aircraft, this speed of development is favorable when compared with similar aircraft

development programs such as the A-400M and P-8 in other Western countries. Computer-based model and simulation technology, and experience gleaned from working with F-2 fighter support aircraft contributed to the quick completion of this phase.

Development of a ballistic missile defense system is also an important achievement of the Japanese defense industry in this decade. Engagement by Japan’s defense industry in missile defense began in the 1980s during the SDI program. Since then, the Japanese defense industry has continuously paid strong attention to the missile defense projects of the United States. In December 1998, Japan made a decision to kick off joint technological research with the United States after North Korea’s Teapo-Dong long-range ballistic missile flew over Japanese territory that summer. In this joint cooperative technological research project, the Japanese defense industry participated in four components of the Aegis vessel-based maritime upper-tier missile defense system: nose cone, infra-red seeker, kinetic warhead, and second-stage rocket motor.

Increasing ballistic missile threats from North Korea led the Government of Japan to decide in 2003 to deploy a ballistic missile defense system, in addition to the research programs begun in 1998. The PAC-3 ground-based terminal phase missile defense interceptor and the SM-3 Block I Aegis-based interceptor were deployed through this decision. In December 2005, Tokyo decided to transit from its research programs to development of the SM-3 Block IIA interceptor, which can cover a broader area than the SM-3 Block I.

The success of the development phase of the SM-3 Block IIA led to discussions of a transition to the production phase. The U.S.–Japan Defense Consultative Committee, which consists of U.S. Defense and State Secretaries and Japanese Defense and Foreign Ministers, released a joint statement in June 2011 that refers to third country transfer of SM-3 Block IIA under certain conditions. This is a big breakthrough in the history of the Japanese defense industry, which lives with severe restrictions on arms exports. With these achievements in missile defense technology and with political support, the Japanese defense industry now has the opportunity to play a significant role to counter WMD proliferation.

Finally, one cannot ignore the Japanese defense industry’s technology for underwater warfare capability. After introduction of the Stirling

engine technology from Sweden, Japanese submarine builders developed the Soryu-class diesel submarine with air independent propulsion (AIP). Soryu-class SSs are the largest AIP SS in the world, with 4200 underwater replacement. Under the Japanese military's operational environment, the Maritime Self-Defense Force (MSDF) wants to develop larger, quieter diesel submarines: the Japanese defense industry could fulfill that expectation. As a result of this achievement, in the National Defense Program Guidelines released in 2010, Japan decided to increase its fleet of submarines from 16 to 22 vessels.

These achievements by the Japanese defense industry in this decade are the products of evolutionary efforts rather than revolutionary innovation. Without long-term efforts, such as experience with F-2s, continuous efforts to develop missile defense technology since SDI, and long-time experience in building submarines, these three achievements would not have been realized. In this sense, internal drivers play significant roles in such achievements. The P-1 and C-2 could not be completed without Japanese indigenous production orientation.

But such internal drivers cannot tell the whole story of Japan's defense industry in this decade. External drivers cannot be ignored in the cases of ballistic missile defense and submarines. North Korea's nuclear and missile development program has been a big driver of Japanese efforts in ballistic missile defense. And development of large AIP SSs cannot be separated from China's rapid modernization of maritime capabilities. Needless to say, deployment of a missile defense system will enhance base resiliency in Japan against Chinese medium-range ballistic missile forces. In this way, responses to regional geostrategic uncertainties became strategic forces driving the development of these weapon systems.

STRATEGIC IMPLICATIONS

Given current uncertainties in East Asia, such as the nuclear and missile development programs of North Korea, leadership succession in North Korea, and strategic challenges from a rising China, defense planning in the region is no easy task. Under this situation, the Government of Japan released its new National Defense Program Guidelines (NDPG) in December 2010. This document outlines Japanese threat perception; roles,

missions, and capabilities of the SDF; and force structure. The NDPG identifies some high-priority capability focus areas: irreplaceable capabilities, shaping favorable operational environments, and capabilities with asymmetric comparative advantage in the region.

This decision, as to which capability areas to prioritize, reinforces the Japanese defense industry's achievements in this decade. A missile defense system is an irreplaceable capability to counter against ballistic missiles. Aerial threats from transportation capability and anti-surface warfare (ASW) capability, reinforced by the C-2 and P-1 respectively, help to shape a favorable operational environment in defense operations in the Ryukyu island chain. And underwater warfare capability by AIP SSs will give Japan an asymmetrical comparative advantage over Chinese surface fleets, including aircraft carriers.

Defense industry achievements are partly motivated by internal factors of indigenous production orientation, but the main driving force has been the geostrategic realities in East Asia—countering Chinese A2/AD capabilities and developing Japan's own A2/AD capabilities against modernized Chinese air and maritime forces. These Japanese efforts to counter Chinese capabilities and to develop its own A2/AD capabilities could have significant implications for U.S.–China strategic competition. As is widely known, Chinese A2/AD capability is a serious concern for the United States. Military facilities of U.S. forces and the SDF in Japan are located within the Chinese A2/AD area. If they are vulnerable, these military assets can easily turn into liabilities. But with significant resiliency, these military bases can be used to neutralize China's A2/AD capability. To increase base resiliency, missile defense cooperation and Japanese efforts to develop its own A2/AD capabilities against China will have positive implications. With potential future arms exports, in addition to missile defense interceptors, Japan can play an even more important role in strategic competition in the Asia-Pacific.

FUTURE CHALLENGES: LESSONS FROM THE EAST JAPAN EARTHQUAKE

Even though the Japanese defense industry has a good track record for this decade, there are still some missing capabilities. One important area is in unmanned technology. Advanced robotics is

one of the comparative advantages of Japanese civil industry. However, as the Great East Japan earthquake and resultant nuclear incident at Fukushima showed, the SDF lacks unmanned ISR capabilities. In the initial phase of Fukushima, Japan had to depend on information from the Global Hawk unmanned aerial vehicle (UAV) before manned helicopters began to fly to gather information on the situation. Following efforts to cool down these nuclear reactors, Japan again had to depend on foreign-manufactured unmanned sensors and robots. Application of Japanese robotics to actual crisis management, including military use, could be a new challenge for the Japanese defense industry.

The “supply chain” problem after the East Japan earthquake points out another strategic importance of Japanese industrial potential, not just of the defense industry. With damage and black-outs caused by the earthquake, most production facilities in northern Japan shut down. The impact of these shut-downs was felt around the globe. For example, 30 percent of the world’s supply of semiconductors to control automobile driving systems and 50 percent of those used to control industrial manufacturing machinery are made in

Japan. These production facilities stalled after the earthquake because 60 percent of the super-purified hydrogen peroxide which is indispensable in the semiconductor manufacturing process, is produced in affected areas in Japan. In addition, 100 percent of the artificial quartz crystals used in computer manufacturing, are produced in Japan; their production was also stalled by the earthquake.

The earthquake pointed out the irreplaceable position of the Japanese industry in the global supply chain. However, to hedge risks from another earthquake and to maintain competitive power under the high-valued yen, many industries are now looking to suppliers located outside of Japan, including those in China. Under the current global supply chain structure, Japan can maintain its strategic advantage over China. But if these industries go abroad, Japan’s current strategic advantage will be lost, which may change future defense science and technology trends.

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