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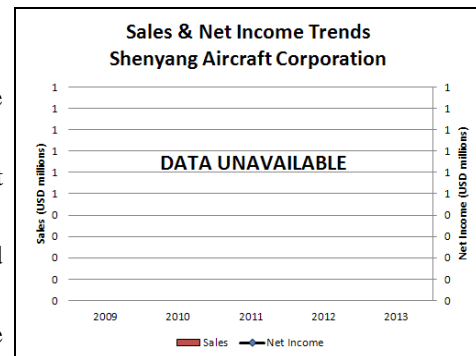
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Shenyang Aircraft Corporation (SAC)

Outlook

- Primarily a military aircraft manufacturer, SAC is part of the defense arm of its monolithic parent AVIC
- The company has also been expanding its commercial aircraft production
- SAC commercial operations are now a subsidiary called AVIC SAC Commercial Aircraft Co
- SAC was recently selected to build the empennage tips for the Boeing 777 vertical fin and horizontal stabilizer



Headquarters

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Founded in the early 1950s, Shenyang Aircraft Corporation is one of China's oldest and most renowned aircraft corporations. Shenyang signed an agreement with the USSR in November 1952 and began producing Yak-18s in large numbers by the mid-1950s. Between 1956 and 1959, some 750 J-5s (MiG-17Fs) were produced. Other Soviet license-produced aircraft included approximately 625 MiG-19s (J-6 series). Like many Chinese aircraft corporations, Shenyang produced many "copies" of Soviet MiG variations. Today, the company concentrates primarily on production of the

J-8. This aircraft is a derivative of the Soviet Mikoyan Ye-152A Flipper.

The company has also produced subcomponents for various aircraft, including the Boeing 757, Bombardier Dash-8, BAE ATP, and Airbus A320.

Following a restructuring of China's aviation industries in the late 1990s, SAC began functioning as a subsidiary of Aviation Industries of China (AVIC).

Although Shenyang is primarily known as an aircraft manufacturer, aerospace products account for only about 25 percent of its current business activities. SAC receives approximately 70 percent of its revenues from non-military products, including buses, light vehicles, and hospital and food-processing equipment. According to published reports, SAC employs approximately 20,000 workers.

Structure and Personnel

Pang Zhen
President
Chen Hongfeng
Senior Vice President
Yang Lei
Senior Vice President

Li Jisheng
Senior Vice President
Ma Weidong
Senior Vice President

Shenyang Aircraft Corporation (SAC)

Product Area

Shenyang Aircraft Corporation primarily manufactures military aircraft. Through its AVIC SAC Commercial Aircraft subsidiary, the company manufactures various

aircraft structures and components for Boeing, Bombardier, and Airbus.

Facilities

Shenyang Aircraft Corporation is located in Shenyang, Liaoning, China. SAC's manufacturing facilities occupy more than 1,900 acres. Although its facilities are not very technically advanced by Western standards, the company does have a computer center, which was established in 1985 with the help of IBM. In fact, its computer-aided design equipment is now being used extensively. In addition, Shenyang facilities include a six-floor training center with classroom space for training employees in new technology and equipment.

AVIC SAC Commercial Aircraft Co Ltd (SACC), 1 Lingbei St, Huanggu District, Shenyang City, Liaoning Province, China 110850. This operation was formed in 2007 when the commercial operations of SAC were spun off. Although it is aligned with AVIC's Transport Aircraft, it is still believed to function as a subsidiary of SAC. SACC produces commercial aircraft components for Boeing, Airbus, and Bombardier. The unit is also slated to manufacture the empennage, pylon, radio rack, power center, and wire harness for the entire ARJ21 aircraft.

Website: <http://www.sacc.com.cn/en/>

Aviation Industries Corporation of China, AVIC Plaza, No. 128 Jianguo Rd, PO Box 100022, Beijing, China 100022. Telephone: + 86 10 65 665 922. This grouping is responsible for the production in China of military and civil aircraft, engines, and airborne equipment.

Website: <http://www.avic.com/en/>

AVIC Aviation Techniques (AAT) Company Ltd, Beijing, China. Formerly AVIC Defense, this entity is mainly responsible for R&D, manufacture, sales, maintenance, and service of fighter, trainer, unmanned aerial vehicle, and missile products. It is also looking to diversify into the business jet market. AAT coordinates the activities of 10 subsidiaries: Chengdu Aircraft Industries Group, Hongdu Aviation Industry Group, Shenyang Aircraft Corporation, Shanghai Aero-Engine Company, Chengdu Aircraft Design and Research Institute, Shenyang Aircraft Design Institute, China Airborne Missile Academy, Jilin Aircraft Maintenance Company, Changsha No. 5712 Aircraft Industry Company, and Tianshui Aircraft Industry Company.

Corporate Overview

Currently, Shenyang focuses on production of military aircraft, such as the J-8 and J-11. The company has also been expanding its commercial aircraft production. Further, the firm has diversified its product line into non-defense areas, such as production of buses and light jeep-like vehicles.

New Products and Services

Divine Eagle. Shenyang Aircraft Corporation is working on a twin-fuselage, turbofan-powered, high-altitude, long-endurance (HALE) UAV under the designation Project 973 Shen Diao (Divine Eagle). This project first surfaced in 2012 (work began around 2010), with pictures appearing on the Internet in May 2015 (the first flight of this UAV took place the previous February).

J-31. The J-31 is a twin-engine, fifth-generation fighter under development by Shenyang Aircraft Corporation. The aircraft is designed as a joint strike aircraft similar in mission to the F-35. The J-31

technology demonstrator flew its first flight in October 2012. It made its first public appearance at the 2014 Zhuhai Air Show. While the aircraft will serve in China, an export variant, the FC-31 (also referred to as the F-60), is also being developed. The J-31 is forecast to enter service in 2022.

Boeing 777 Components. In November 2014, Boeing selected SACC to build the empennage tips for the 777 vertical fin and horizontal stabilizer. It builds on the contract Boeing signed with AVIC earlier in the year to produce vertical fin and horizontal stabilizer forward torque box panels. The two companies will also work together in establishing a Manufacturing Innovation Center (MIC) within the SACC facility to enhance the manufacturing and technological capabilities of SACC employees. Boeing and AVIC pioneered the MIC concept in 2012, establishing the first center in Beijing to provide classroom training for AVIC employees on Boeing's successful production methods.

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J-15 Flying Shark. This is a new carrier-based multirole fighter based loosely on the Sukhoi Su-33. According to reports, there will be three variants of the J-15: an advanced trainer for J-15 pilots, a multirole combat variant, and an electronic warfare variant. The aircraft will operate off China's refurbished former Soviet Kuznetsov class carrier *Liaoning*. The aircraft is believed to have first flown in August 2009. The J-15 was reportedly in full production as of late 2013/early 2014.

C919. In 2009, Commercial Aircraft Corporation of China (COMAC) signed a Memorandum of Understanding (MoU) with SACC and SAC for the supply of structural components for the C919 aircraft. SACC and SAC will jointly work on development of the fuselage, vertical fin, engine, and pylon components.

CSeries Components. In July 2008, Bombardier Aerospace signed a contract with SACC to supply the center fuselage on the newly launched Bombardier CSeries aircraft. Back in June 2007, the two companies announced an MoU for long-term strategic cooperation in the 90- to 149-seat commercial aircraft market. Both parties expected this collaboration to result in mutually beneficial cost reductions and increased production efficiencies for their respective aircraft programs.

Cessna Model 162 SkyCatcher. In November 2007, Cessna announced it would partner with Shenyang Aircraft Corporation to manufacture the new Model 162 SkyCatcher light sport aircraft. Cessna designed the aircraft and handled American Society for Testing and Materials compliance work, and provided on-site personnel to oversee manufacturing, quality assurance, and technical design. SAC was responsible for assembling the SkyCatcher. The first aircraft assembled by Shenyang Aircraft in China made its maiden flight in September 2009.

COMAC ARJ21. The ARJ21-700 regional jet is being developed by Commercial Aircraft Corporation of China. Based in Shanghai, COMAC (also called AVIC Commercial Aircraft Company) is a consortium of six companies and aerospace research institutes that have joined together to develop and manufacture the aircraft (see **Teaming/Competition/Joint Ventures** section). Begun in 2002, the first phase of the program was to develop a baseline passenger version with 70 to 80 seats. Development would then proceed to a stretched version (90 to 100 seats) and standard-range and extended-range versions, including all passenger, freight, and business jet variants. The first flight of the ARJ21 was completed in November 2008. After some delay, certification was finally achieved in December 2014. COMAC has taken 278 orders for the ARJ21-700, plus options and commitments for additional aircraft. These orders are likely provisional

only and not binding. Service entry with launch customer Chengdu has been delayed to sometime in 2016.

COMAC has proposed expanding this line to include an extended-range ARJ21-700ER, a 98- to 105-passenger ARJ21-900, an ARJ21F freighter variant, and a version in a 20-passenger business configuration. Only the ARJ21-900 has received serious consideration. Bombardier entered into an arrangement with AVIC under which the Chinese will contribute funds for the development of the Bombardier CSeries as a risk-sharing partner in exchange for technical and financial help in developing the -900.

Plant Expansion/Organization Update

AVIC Aircraft Corporation Formed. In early 2009, AVIC reportedly merged several businesses into AVIC Aircraft Corporation. The unit is composed of Xi'an Aircraft, Shaanxi Aircraft, AVIC Aircraft Design Research Institute, AVIC's landing gear unit, and other subsidiaries. The corporation will focus on large military transports and subcomponent production for China's commercial aircraft programs.

AVIC Restructuring Plans. Following the merger of AVIC I and II, the new firm is set to embark on an ambitious restructuring plan. Under the plan, AVIC will be restructured along the lines of Airbus, with regional entities dissolved and replaced with a specialized framework of manufacturers. Under this new structure, each unit would specialize in specific parts of the airframe, such as the wing, fuselage, or nose.

AVIC I and II Merged. In November 2008, China completed the merger of its two state aircraft makers, AVIC I and AVIC II, into a new entity, China Aviation Industry Corp (CAIC). The new company controls 10 aerospace- and defense-oriented business units composed of 21 firms.

According to a news report in the *Shanghai Securities Journal*, CAIC hopes to achieve 22.3 percent average annual sales growth, rising to CNY1 trillion (\$146.5 billion) by 2017 from roughly CNY150 billion. The new firm was hoping for a listing of the entire group's assets within five years.

In addition, CAIC holds a stake in Commercial Aircraft Corporation of China, which was established earlier in the year to build commercial jets and is developing China's first indigenously produced aircraft, the ARJ21 regional jet.

Commercial Aircraft Corporation Formed. In May 2008, Commercial Aircraft Corporation of China (aka China Commercial Aircraft) was established for

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the design and production of large passenger jets. Shareholders include the Chinese central government, the municipal government of Shanghai, and AVIC I and AVIC II.

AVIC I Commercial Spin-off. In August 2007, AVIC I separated the civilian and military work of its subsidiaries Shenyang Aircraft and Chengdu Aircraft. Two new units were created, Shenyang Commercial Aircraft (now known as AVIC SAC Commercial Aircraft Co Ltd) and Chengdu Commercial Aircraft, both of which now house the respective civil aviation assets of their parents and are led by independent management. Plans for such a separation began in November 2000, when AVIC I announced it would spin off its military aircraft business into a separate operation. The company said at the time that it was eventually planning to list some of its commercial companies on stock markets, with the government retaining control of the military business.

Mergers/Acquisitions/Divestitures

No mergers, acquisitions, or divestitures have been reported.

Teaming/Competition/Joint Ventures

SAC's involvement with other aerospace firms is limited to subcontracting relationships. It does not engage in true teaming or joint venture operations.

Airbus. SACC produces emergency exit hatches, interspar ribs, and the wing leading edge for Airbus A320 commercial transports. Forward and aft cargo doors are manufactured for the A330/A340.

AVIC Commercial Aircraft Co Ltd. The ARJ21 regional jet is being developed by the ACAC consortium, which was formed in 2002. ACAC members include the Shanghai Aircraft Research Institute and the Xi'an Aircraft Design & Research Institute. ARJ21 development also involves several other Chinese aerospace companies, including Chengdu Aircraft Industry Group, which is responsible for the construction of the nose; Shanghai Aircraft Company, which will carry out final assembly; Shenyang Aircraft Corporation, which is manufacturing the complete tail unit; and Xi'an Aircraft Company, which is responsible for manufacturing the aircraft wings and fuselage. This entity was absorbed into COMAC in 2008 (see entry regarding COMAC).

Boeing. Boeing and SACC are working together to establish a Manufacturing Innovation Center within the SACC facility to enhance the manufacturing and technological capabilities of SACC employees. Boeing and AVIC pioneered the MIC concept in 2012, establishing the first center in Beijing to provide classroom training for AVIC employees on Boeing's successful production methods. SACC is currently supplying components for the Boeing 787, 777, and 737 models.

Boeing/Spirit AeroSystems. SACC was contracted by Boeing to produce the tail section and cargo doors for the Boeing 757. In mid-2005, SAC was selected to build the 787 leading edge assembly for the vertical fin. The company also produces the rear fuselage, tail components, and Section 48 for the Boeing 737 – originally managed by Boeing Wichita, which has since become Spirit AeroSystems.

Cessna. In March 2012, Cessna, AVIC Aviation Techniques, and the Chengdu government entered into negotiations to establish a joint venture to produce mid-size Cessna business jet models, as well as a potential new product for the business jet market.

Commercial Aircraft Corporation of China Ltd. COMAC, based in Shanghai, was created to develop and build commercial airliners for the Chinese and international markets. It was formed in May 2008 by splitting off certain assets of the national aviation conglomerate AVIC, including AVIC's Commercial Aircraft Co (which is developing the ARJ21 regional jet) and Shanghai Aircraft Manufacturing Factory. The initial major owners of stock in the company include the Chinese government's Assets Supervision and Administration Commission, the city of Shanghai, AVIC, and Baosteel Group. COMAC's first aircraft will be the C919, a narrowbody commercial passenger transport aircraft.

Website: <http://english.comac.cc/>

HAI. In February 1997, SAC and Hellenic Aerospace Industry announced the formation of Shenyang Hellenic Aircraft Repair Company.

Stork. In November 2005, Shenyang Aircraft Corporation and Stork Aerospace signed a contract for the machining of components for Gulfstream aircraft.

Financial Results/Corporate Statistics

No information is available.

Shenyang Aircraft Corporation (SAC)

Strategic Outlook

Primarily a military aircraft manufacturer, Shenyang Aircraft Corporation is part of the defense arm of its parent company AVIC. While China's economy steams along, AVIC is expected to be a key component as the country seeks to efficiently develop indigenous military technologies and eventually compete with Boeing and Airbus in the civilian airline industry.

One of the first programs that will likely benefit from the reorganization is the indigenously designed ARJ21 regional jet. While significant in its own right, this program also marks a milestone as China's aerospace industry learns to develop a commercial aircraft to Western standards. With a commercial entity now clearly defined, China is hoping that such international partners as Honeywell, Rockwell Collins, Parker Hannifin, General Electric, and Bombardier will have a much easier time integrating their technology into the aircraft. This, in turn, should make it easier to certify the aircraft to U.S. Federal Aviation Administration standards, thus making it more appealing outside China's borders. However, with competition at a fever pitch, the ARJ21 will be at a disadvantage to newer, more fuel-efficient Western designs.

For SAC, not much is expected to change on the ground. In 2007, AVIC separated the civilian and military work of its subsidiaries Shenyang Aircraft and

Chengdu Aircraft, and created two new units centered on civilian business: Shenyang Commercial Aircraft (now known as AVIC SAC Commercial Aircraft Co Ltd) and Chengdu Commercial Aircraft. These firms will likely focus on the ARJ21 and C919.

A recent success for SAC's commercial operations came when Cessna tapped the firm to assemble its new SkyCatcher light sport aircraft. Although SAC's technical ability is adequate, its greatest attraction is its low labor costs. The low-cost structure at SAC will continue to make it an attractive subcontracting partner to major Western manufacturers, especially in these grim economic times. In late 2014, Boeing took advantage of this and selected the firm to build the empennage tips for the Boeing 777 vertical fin and horizontal stabilizer.

While commercial expansion is a focus, military production is the firm's foundation. China is seeking to modernize its forces and has selected SAC to lead in the military aircraft sector. The company was selected to build China's fifth-generation fighter, the J-31, which made its first public appearance at the Zhuhai Air Show in 2014. Programs such as these will no doubt receive strong governmental support. Further, the prospect of international sales will likely ensure that the J-31 reaches production, currently forecast for 2022.

Prime Award Summary

Unavailable.

Program Activity

Business Interests. The following are the business interests of Shenyang Aircraft Industry Group:

- Military aircraft
- Civil and military aircraft components

Aircraft Programs

Cessna 162 SkyCatcher

In March 2008, the Model 162 SkyCatcher made its first flight. This light sport aircraft, first announced in July 2007, is the first new control stick airplane designed by Cessna since the Model 188, introduced in 1965. Deliveries began in 2009. Shenyang Aircraft Corp currently manufactures the 162 SkyCatcher piston-powered light sport aircraft for Cessna.

F-8 II

This is a proposed export variant of SAC's J-8 fighter. SAC announced tentative rollout in February 1994. This variant includes a WP13B engine, a look-down radar, and digital avionics, and has a maximum speed of Mach 2.2. However, due to the aircraft's large size and heavy weight, sales to China's traditional customers appear unlikely. In May 1996, China announced the successful first flight of the improved F-8IIM fighter, which had been fitted with the Russian Phazotron Zhuk-8 II radar. The aircraft also features an indigenous head-up display and an INS/GPS.

J-6

The J-6 is a single-seat, clear-weather air-defense and close-support fighter that has been exported to Albania, Bangladesh, Cambodia, Egypt, Iran, Iraq, North Korea, Pakistan, Somalia, Sudan, Tanzania, and Zambia.

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Although the J-6 Farmer has seen action in many wars, notably in Vietnam, it is now out of production.

J-8

Development of the J-8 air superiority fighter began in 1964, and the first prototype flight took place on July 5, 1969. In 1981, an all-weather version of the J-8 (designated J-8I) emerged. Since 1981, more than 100 J-8 and J-8I aircraft have been produced. Some J-8s have been upgraded to the J-8I configuration.

J-8 II

In 1986, a model for a new J-8 version was displayed at the Farnborough Air Show. This new aircraft was designated J-8 II. The J-8 II first flew in public during a combined arms exercise in northern China in October 1987. This configuration allows room in the nose for a fire control radar and other avionics, and provides increased airflow for a more powerful engine.

Sukhoi Su-27/30/35 Series

In 1995, Russia sold a 15-year license for producing Su-27s to the People's Republic of China for over \$2 billion. As many as 200 Su-27s were to be built by Shenyang Aircraft Corp. The first two aircraft were assembled in December 1998 from KNAAPO-supplied kits. The aircraft manufactured by SAC are known as SAC J-11As. Prototypes of a Chinese-developed variant, the J-11B, were reportedly produced in late 2007. Development of the J-11B is believed to be ongoing.

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