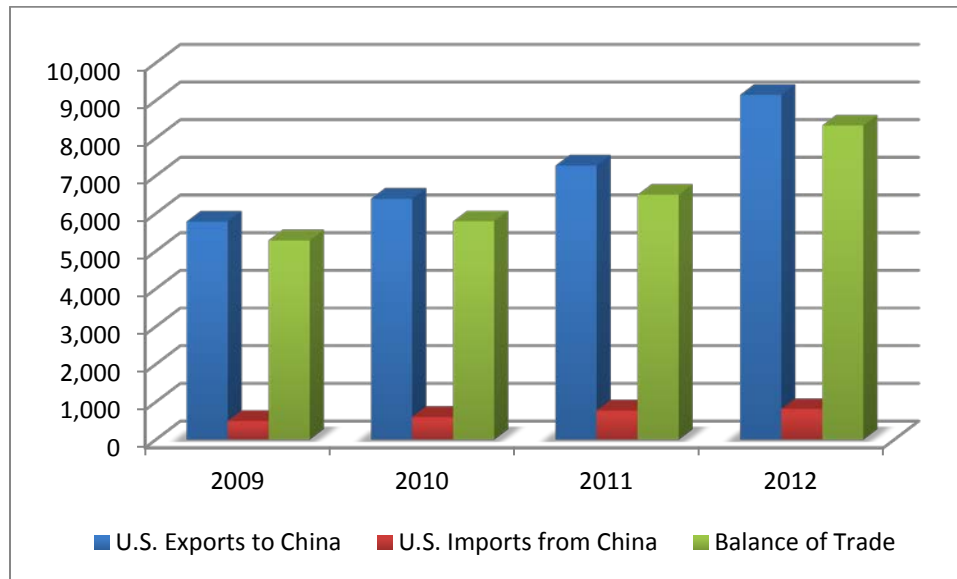


## Country Studies: China



*U.S. aerospace trade with China in millions of dollars*

The People's Republic of China is investing significant resources to become a competitor in the civil aircraft industry. With its regional jet program in the flight testing phase, the Chinese are embarking on a new program to develop a 150-seat narrow-body aircraft that would compete with aircraft currently sold by Boeing and Airbus. The effort to create a competitive civil aircraft production program in China is in part motivated by growth in domestic demand for air transportation, which should lead to orders for over 4,330 new aircraft by 2029.<sup>1</sup> Attempts to capitalize on this demand have led established manufacturers to engage Chinese suppliers in various joint ventures while simultaneously eyeing the Chinese as future competitors.

In 2008, China undertook a major reorganization of its aerospace manufacturing enterprises. In May 2008, China established the Commercial Aircraft Corporation of China (COMAC) to oversee the development and production of a large civil aircraft now called the C919. COMAC was given responsibility for most of China's commercial aircraft programs, including the ARJ21 regional jet. In October 2008, the central government merged China's two large aerospace entities, Aviation Industry Corporations (AVIC) I and II, creating one business unit with ten aerospace subsidiary companies.<sup>2</sup> The new company, which took the name AVIC, was formed from various pieces of the former AVIC family. AVIC is a partial shareholder of COMAC. Since late 2008, enterprises dedicated to aircraft engines, helicopters, composites, and general aviation have been announced or rumored. A strategic agreement on specialized steel for large

<sup>1</sup> Boeing Current Market Outlook 2010. Viewed April 14, 2011. Available on the web at: <http://www.boeing.com/commercial/cmo/china.html>

<sup>2</sup> enAvBuyer.com. "China's new aviation giant targets 1 trln yuan revenues by 2017 – official." November 13, 2008. Available on the web at: <http://www.avbuyer.com.cn/e/2008/30511.html>.

civil aircraft was signed between Baosteel, China's largest steel producer and COMAC shareholder, and COMAC in January 2009. By early 2011, most of the major suppliers had been selected. As with the ARJ21 regional jet, most of the airframe will be produced by Chinese firms, while the subsystems will be made in conjunction with foreign suppliers. U.S. suppliers on the project include General Electric, Honeywell, Rockwell Collins, Eaton, Parker Aerospace, Crane, Kidde, DDC-I, Hamilton Sundstrand, and Nexcelle (GE nacelle joint venture with SAFRAN).<sup>3</sup> Many of these companies are also suppliers to the ARJ21.

The C919 was first mentioned in China's 11<sup>th</sup> 5-Year plan, released in March 2006. Initially, the goal was to produce the plane for military and civil purposes by 2015, with entry into commercial service in 2020.<sup>4</sup> China later moved up the date for commercial entry to 2016. The aircraft will be assembled in Shanghai and, as noted above, will have parts sourced globally. However, COMAC early on the selection process indicated that foreign suppliers would be required to participate in the project through joint ventures with Chinese manufacturers and to conduct a significant amount of the manufacturing in country. So far, that assertion has been reflected in most of the major systems procurements. One exception, at least for now, is the engine—the only C919 engine so far is the CFM LEAP-X1C engine, and it has not yet been determined if that engine will be assembled in China. COMAC has said that it intends to develop a domestic option.

While Chinese attention has turned to the C919, the ARJ21 regional jet has struggled. The original entry into service date for the ARJ21 was supposed to be 2007. Instead, the first ARJ21 rolled off of the assembly line in December 2007, and flight-testing was delayed until November 2008. The entry into service date has been pushed back several times due to regulatory issues and general manufacturing inexperience. Currently, the ARJ21 is expected to receive certification in late 2014 before being delivered to launch customer Chengdu Airlines<sup>5</sup>. Total orders for the ARJ21 stand at 252, mostly from Chinese airlines.

Technological advancement of China's aviation industry has been directly related to cooperation and investment from international firms. On the one hand, western companies have sourced parts from China for several decades. Most major aerospace manufacturers outsource limited volumes of metalwork to Chinese machine tooling shops, due not only to lower labor rates but also to the wide availability of the latest tooling technology.

On the other hand, non-Chinese firms have played a significant historical role in the development of aircraft by Chinese firms, up to and including the C919. Many of China's early aircraft were based on Russian designs, though that cooperation stalled with the downturn of

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<sup>3</sup> COMAC C919. [http://www.airframer.com/aircraft\\_detail.html?model=C919](http://www.airframer.com/aircraft_detail.html?model=C919)

<sup>4</sup> Peder Andersen. U.S. International Trade Commission. "China's Growing Market for Large Civil Aircraft." p. 12. [http://www.usitc.gov/ind\\_econ\\_ana/research\\_ana/research\\_work\\_papers/documents/ChinaLCA2-14-2008final.pdf](http://www.usitc.gov/ind_econ_ana/research_ana/research_work_papers/documents/ChinaLCA2-14-2008final.pdf).

<sup>5</sup> Flightglobal. "Long-delayed ARJ21 certification set to slip again." May 23, 2013

Russia's aviation industry. Later, U.S. and other western companies partnered with Chinese companies to incorporate western engines and components on Chinese aircraft. For example, starting in the late 1980s and into the early 1990s, Pratt & Whitney established joint ventures with Chinese firms to manufacture turboprop engines for several of China's Y-series transport aircraft. More recently, at least 19 U.S. and European aerospace companies have supplied major components on the ARJ21, including the engines (GE), avionics (Rockwell Collins), flight control systems (Honeywell, Parker Aerospace), and the landing gear (Lieberherr Aerospace).<sup>6</sup> As noted above, a similar pattern is holding with the C919.

Western companies have also partnered with Chinese manufacturers to co-produce aircraft in China, though these programs have had mixed results. One of the most extensive U.S.–Chinese civil manufacturing partnerships was a program started in 1985 with McDonnell Douglas to assemble MD-82 aircraft in China. Thirty-five of these aircraft were produced, five of which were sold in the U.S. market.<sup>7</sup> In 1994, McDonnell Douglas finalized an agreement to coproduce MD-90s in China, but only three of the planned 40 aircraft were assembled before the project was cancelled in 1998.<sup>8</sup> Plans by Chinese and Airbus officials to jointly build a 100-seat “Asian Express” aircraft that would be added to the Airbus product line never came to fruition.<sup>9</sup> Despite this history, in October 2006, Airbus signed a “Framework Agreement” with a Chinese consortium to assemble A320 aircraft in Tianjin, China, with production intended to serve the Chinese market. Since the first aircraft was delivered in 2009, a total of nearly 100 aircraft have been delivered to 11 Chinese operators. China has placed orders for more than 550 A320 aircraft since the agreement was signed.<sup>10</sup>

Since 2002, AVIC has had a partnership with Embraer which originally began with the manufacture, assembly, sale, and support for the ERJ 135/140/145 family of aircraft in Harbin, China. However, this production ceased in May 2011 in favor of a June 2012 deal to produce the Legacy 600/650 executive jets.<sup>11</sup> Using the same infrastructure and financial resources at the Harbin facility, the first aircraft is set to be delivered at the end of 2013. Embraer China expects to initially produce six jets a year with eventual maximum capacity for 20.<sup>12</sup> The Legacy is derived from the ERJ 135.

China's growing relationship with Canada's Bombardier deserves special mention. In 2006, Bombardier announced that it would start outsourcing significant airframe elements to AVIC

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<sup>6</sup> Andersen. p.11.

<sup>7</sup> *The Changing Structure of the Global Large Civil Aircraft Industry and Market: Implications for the Competitiveness of the U.S. Industry*, ITC Publication 3143, Investigation No 332-384, November 1998.

<sup>8</sup> Andersen. p. 8.

<sup>9</sup> Diane Brady and Charles Goldsmith. “Airbus is Set to Help China Build Jetliner.” *The Wall Street Journal*. November 20, 1996.

<sup>10</sup> Airbus Press Release. August 31, 2012. <http://www.airbus.com/presscentre/pressreleases/press-release-detail/detail/assembly-line-in-china-completes-the-100th-a320-family-aircraft/>

<sup>11</sup> Chad Trautvetter. AIN Online. March 26, 2012. <http://www.ainonline.com/aviation-news/abace-convention-news/2012-03-26/embraer-gets-closer-building-legacy-china>

<sup>12</sup> Firdaus Hashim. Flightglobal. “Embraer-AVIC JV to initially produce six Legacy 650s a year.” July 19, 2012.

subsidiary Shenyang Aircraft Corporation; today, it outsources fuselage sections and the empennage for the Q400 turboprop to SAC. In addition, Bombardier and China announced that they would work together to develop aircraft in the 90 to 149-seat range. In practical terms, this meant that Bombardier would help the Chinese stretch the ARJ21 to 90+ seats and that Shenyang would invest in the development of the C-Series. The fuselage and doors for the C-Series will be made by SAC. In March 2011, Bombardier and Comac signed a framework agreement for long-term, strategic cooperation, representing the first step in developing synergies between the two.<sup>13</sup>

More recently, the collaboration was extended to also include the C919. In March 2012, a new agreement was signed to cooperate on four areas of “commonality” between the C-Series and the C919. Commonality is attractive to airlines because it adds efficiency—commonality in the cockpit, for example, creates flexibility in pilot choice and commonality in components makes it cheaper to stock spare parts. Creating commonality will allow Bombardier and COMAC to market both aircraft as a family, meaning that they could help each other attract customers. The specific areas in which commonality will be sought are human-machine cockpit interfaces, the electrical system, the development of aluminum-lithium alloy standards, and customer services.

China’s transition to a competitive producer of commercial jet aircraft and engines will be aided by its large and growing domestic aviation market, providing a ready market for new indigenous aircraft. China has the world’s fastest growing domestic aviation industry, with passenger traffic increasing at a rate of 7 percent per year.<sup>14</sup> Given that there are only about 1,910<sup>15</sup> commercial jets operating in China (compared to roughly 7,000 in the United States), industry analysts predict that Chinese airlines will need to add over 5,260<sup>16</sup> large- and medium-sized aircraft to their fleets over the next two decades to meet this demand. Not surprisingly, Boeing and Airbus have identified China as the single most important market for sales over the next 20 years, and both companies are working hard to win orders from Chinese airlines.

Business opportunities in China are not limited to sales of large aircraft. Fleet expansion has been accompanied by infrastructure improvements, with 33 new airports added and 33 airports upgraded between 2005 and 2010, valued at 250 billion yuan.<sup>17</sup> CAAC expects the number of airports serving scheduled flights to increase to 220 by 2015 (this seems to surpass earlier estimates, which estimated that there would be 244 commercial airports 2020<sup>18</sup>). General aviation may eventually prove to be a significant market; for now, however, sales are limited by airspace, infrastructure, and tax restrictions. So far, rather than developing general aviation aircraft domestically, China has been acquiring general aviation capabilities through foreign

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<sup>13</sup> Bill Carey. AIN Online. “Bombardier, China’s Comac to Cooperate on ‘Commonalities’”. March 26, 2012

<sup>14</sup> Boeing Current Market Outlook 2013.

<sup>15</sup> Boeing Current Market Outlook 2013.

<sup>16</sup> Boeing Current Market Outlook 2013.

<sup>17</sup> “China to Build 56 New Airports in 5 Years.” April 7, 2011. [http://www.chinadaily.com.cn/china/2011-04/07/content\\_12288202.htm](http://www.chinadaily.com.cn/china/2011-04/07/content_12288202.htm)

<sup>18</sup> “CAAC to spend 1.5tr yuan to expand airports and fleets.” *South China Morning Post*. March 28, 2012. <http://www.scmp.com/article/739174/caac-spend-15tr-yuan-expand-airports-and-fleets>.

direct investment. Over the past several years, Chinese companies have purchased several U.S. aerospace firms including Teledyne Continental, Epic Aircraft, and Cirrus (still pending).

In the end, future export prospects may be dampened if Chinese companies are able to satisfy some of China's growing demand with indigenously produced aircraft and other equipment. Western companies also may face new competition outside of China as Chinese manufacturers seek to expand their share of the global aircraft market. For now, aerospace companies are exercising cautious optimism while pursuing business opportunities in China.