

Jane's Defence Weekly

Aiming high: China's air ambitions

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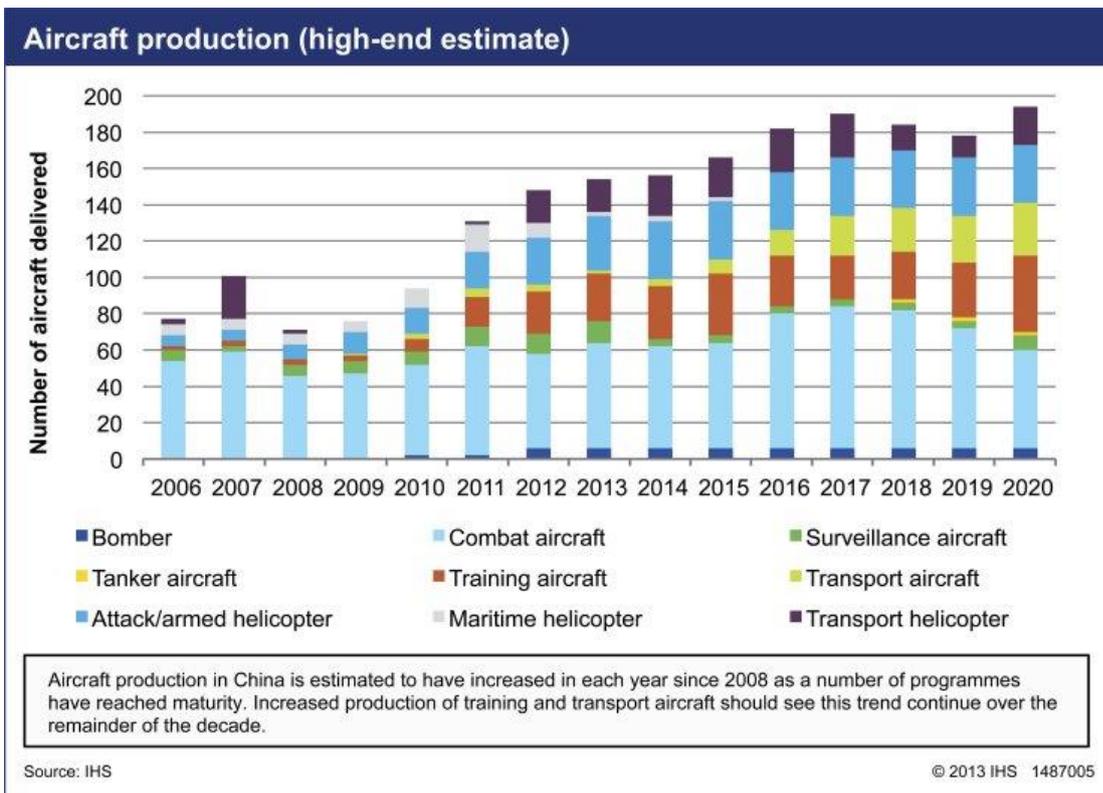
While gaps still remain in key areas, China's overall development and production of military aircraft is advancing rapidly. *Craig Caffrey* reports

Over the last 15 years China's domestic aerospace industry has made rapid progress in developing its capabilities to such an extent that it can now increasingly meet the requirements of the People's Liberation Army (PLA) in aircraft design and development.

While there are still some key areas of deficiency, both in terms of military and industrial capabilities, it is clear that efforts are being made to address these remaining gaps in order to create a domestic military aerospace sector that is truly self-reliant.

A number of high-profile events have made it difficult to ignore the development of Chinese aerospace capabilities over the last five years. Since 2011 seven new aircraft have made their maiden flights, including two fifth-generation combat aircraft designs.

The PLA's aviation arms have also achieved a rapid pace of inventory modernisation and enhancement, due in no small part to the existence of nine known military aircraft production programmes in China that produce aircraft for the Chinese armed forces. In 2012 up to 148 aircraft are thought to have been produced for the army, navy, and air force.



Aircraft production (high-end estimate) (IHS)

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Fifth-generation ambitions

The two highest-profile projects to come to light since 2011 are the Chengdu Aircraft Industrial Corporation (CAC) J-20 and Shenyang Aircraft Corporation (SAC) 'J-31' fifth-generation combat aircraft. While the emergence of the J-20 in 2011 had been widely anticipated following tacit acknowledgement of the programme by PLA officials, the emergence of a second design just 21 months later was a clear demonstration of the breadth of developmental work under way in China. At present there have been no indications of intent to acquire the J-31. However, the J-20 now looks set to become a future mainstay of the PLA Air Force's (PLAAF's) twin-engine fighter fleet.



Two prototypes of the J-20 are currently engaged in flight testing, with the aircraft expected to enter service from 2018 onwards. (Unknown authorship)

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Both designs incorporate features that are clearly aimed at radar cross-section (RCS) minimisation. However, judging the two aircraft's capabilities remains extremely challenging as systems and sensors are now more crucial to military aircraft performance than at any time in the past. Until more is known about the technology within the J-20 and J-31 it is impossible to accurately compare the two to other fifth-generation combat aircraft. In addition, the eventual production-standard aircraft may well differ in some respects from the prototypes now in flight test as new technologies are refined and developed.

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Strategic lift



The first flight of the Y-20 in January 2013 was a important milestone for the Chinese aerospace industry and will allow the PLAAF to expand its power projection capabilities when it enters service. (Xinhua)

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Arguably a more important milestone for both industry and the PLA, however, was the first flight of the Xian Aircraft Industries Group Y-20 strategic transport aircraft that took place in January 2013. The Y-20 represents the first example of a truly indigenous large aircraft, albeit with Russian-made Aviadvigatel D-30KP2 engines and apparent design input from Ukraine's Antonov, and demonstrates a further expansion of Chinese industrial capabilities. The emergence of the type also provides a potential opportunity to develop a genuine air-to-air refuelling platform in the future, thereby addressing two of the key weaknesses of the PLA's current aviation inventory.

Meanwhile, the Shaanxi Aircraft Industries Company Y-9 programme - a comprehensive modernisation of the company's Y-8 tactical transport aircraft featuring a redesigned wing, fully pressurised fuselage, and new six-bladed propellers - provides further evidence of the increased focus on airlift. Despite initial delays as a result of design changes, the first production aircraft in PLAAF colours was seen in the latter part of 2012 and the type is now expected to begin re-equipping the air force's transport regiments.

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Brand new trainers



In July 2013 the PLAAF's first production example of the JL-10 (formerly known as the L-15) made its maiden flight. More than 100 of the type are expected to enter service with the air force as replacements for the JJ-7. (Hongdu Aviation Industry Group)

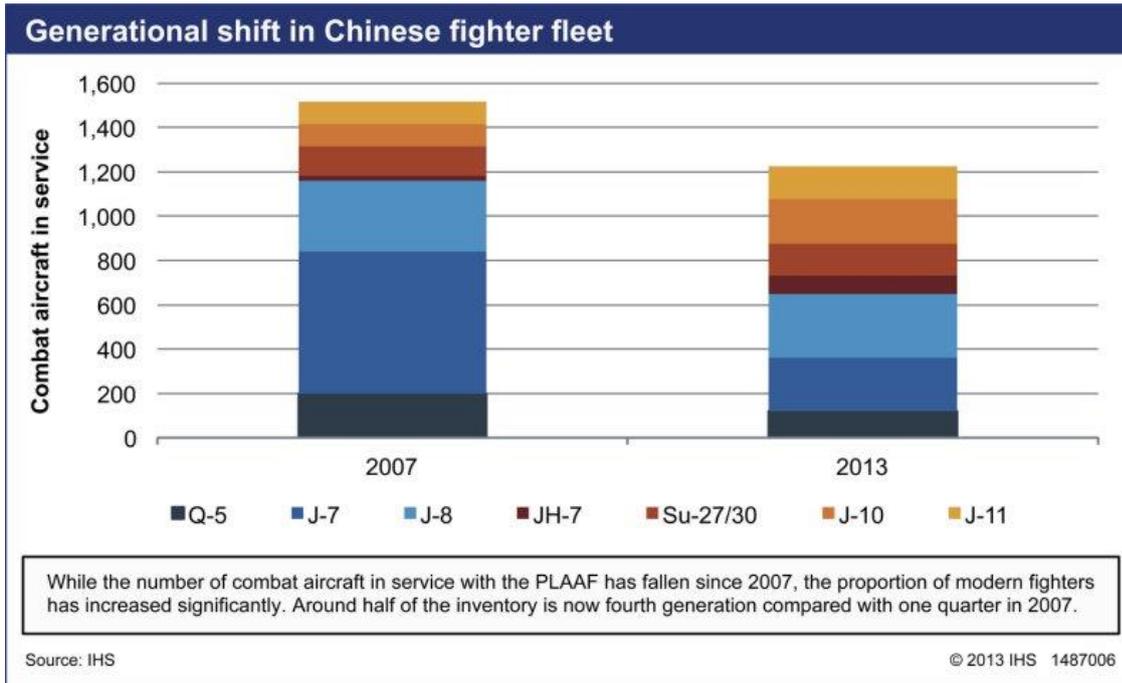
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The modernisation of the PLAAF and PLAN's advanced jet trainer fleets has now also begun in earnest with the Guizhou Aviation Industry Company JL-9 and Hongdu Aviation Industry Group JL-10 (formerly known by its manufacturer's designation of L-15) having both entered series production. On 1 July the initial JL-10 production aircraft for the PLAAF conducted its maiden flight. With 250 of the aircraft's Ukrainian Motor Sich AL222-24F afterburning turbofan engines placed under contract in 2011, it seems highly likely that at least 100 aircraft will enter service as replacements for the ageing CAC JJ-7 inventory. At present the PLAN appears to be focused on the less technologically advanced JL-9 design, with state media revealing the existence of a carrier-training variant in 2011.

The rotary-wing sector has seen more mixed progress. Local industry has yet to develop a suitable medium- or heavy-lift helicopter design despite pressing requirements for both from the PLA. The development of the Hafei Aviation Industry Company Z-9 (based on the Eurocopter AS 365 Dauphin) to fill a range of roles such as troop transport (Z-9B), anti-submarine warfare (Z-9C), anti-surface warfare (Z-9D), and close air support (Z-9WZ) has been in part due to the lack of a viable, indigenously produced alternative to meet these requirements.

Similarly, the Changhe Aircraft Industries Group Z-8 (based on the Aerospatiale SA 321 Super Frelon) has seen a number of incarnations in Chinese service as attempts continue to develop a true heavy-lift helicopter.

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Generational shift in Chinese fighter fleet (IHS)

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Combat aircraft developments

While the spectrum of activity in aircraft design and manufacturing has broadened over the last three years, combat aircraft remain the short-term focus of the aerospace industry. Of the nine production programmes known to be active in China in 2013, four - Xian Aircraft Industries Group's H-6K and JH-7A, the J-10A, and the J-11B - are producing aircraft for PLA fighter and bomber divisions. Similarly, five of the identified developmental efforts that are under way - the J-10B, J-15, SAC J-16, J-20, and J-31 - are multirole fighter designs.

The J-10 programme remains arguably the most important Chinese fighter project of the past two decades, representing a breakthrough moment for the domestic aerospace industry when it entered service in 2003. While deliveries of the J-10A have proceeded at pace over the intervening 10 years, production is now expected to draw to a close following completion of the development of the enhanced J-10B. There has been no official confirmation of PLAAF units being equipped with this new variant, although imagery from China suggests series production is now well under way, with the aircraft expected to enter service in the next few months after a lengthy flight programme. Ultimately, more than 600 J-10s are expected to enter service with the PLAAF as the remaining CAC J-7-equipped regiments are recapitalised.

The J-10B variant provides an excellent example of the incremental approach to the development of combat aircraft that has been a standard approach for Chinese manufacturers since the 1970s. Production of the initial variant has continued at pace alongside the development of the J-10B. The

aircraft appears to feature a scanned array radar - the first fitted to a Chinese fighter - a modified diverterless engine intake, and an enhanced range of sensors and electronic warfare capabilities.

Chinese officials have confirmed an increased use of composite materials and the creation of a "pulsation production line", demonstrating that manufacturing techniques are maturing alongside system and aircraft design capabilities.

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Strategic transformation

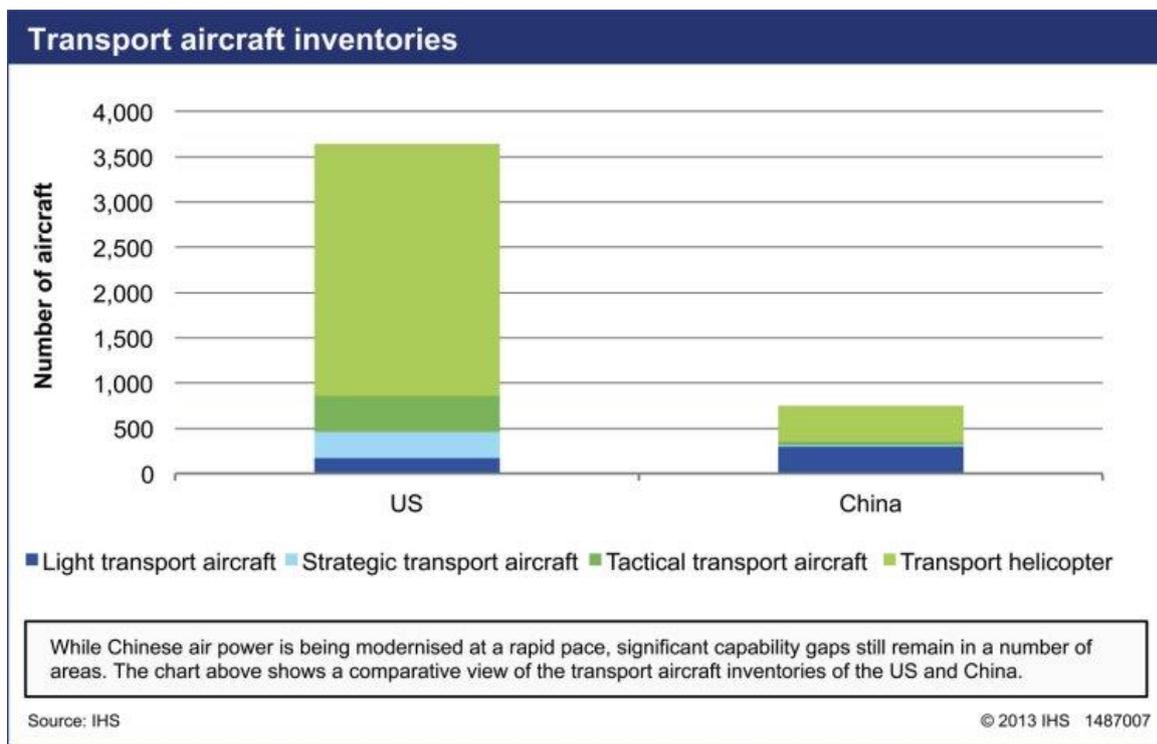


The J-20 is one of China's highest-profile projects to emerge since 2011. (CAC)

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A comparative analysis of army and air force aviation in the United States and China shows that mobility remains a key capability weakness for the PLA. China operates one transport helicopter for every seven US platforms; one C-130-sized tactical transport for every 13 in US service; and one strategic transport for every 14 operated by the US Air Force (USAF).

The USAF, meanwhile, operates around 570 aerial refuelling aircraft compared with just 10 possessed by the PLAAF. If training aircraft are excluded, then 42% of the USAF's inventory is dedicated to support tasks such as airlift, intelligence, surveillance and reconnaissance (ISR), and aerial refuelling. The PLAAF's own support aircraft constitute 26% of its inventory.



Transport aircraft inventories (IHS)

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It is therefore perhaps no surprise that one of the Chinese Ministry of National Defense's (MND's) stated priorities for the PLAAF is to "accelerate its transition from territorial air defence to both offensive and defensive operations, and increase its capabilities for carrying out reconnaissance and early warning ... and strategic projection, in an effort to build itself into a modernised strategic air force". As a result, while the PLAAF is expected to continue to modernise its combat aircraft fleet over the coming decade, it is likely to be the support elements of the inventory that see a quantitative expansion as Beijing looks to create a more balanced air force capability better suited to supporting the expanding ambitions of the PLA and the Chinese government.

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Importing capability

The government's growing emphasis on indigenous sources for its defence equipment has certainly placed pressure on the domestic industry to develop the technologies and platforms now required to fill the more expansive strategic goals of the PLA. Nevertheless, the Chinese aerospace sector remains unable to meet all PLA requirements, with the clearest indications of the more persistent gaps in industrial capability being provided by the contracts signed over recent years for foreign-manufactured aircraft and systems.

While imports of Russian Sukhoi combat aircraft concluded in 2005 and local production of the licence-produced J-11A (Su-27SK) was curtailed in 2004, a number of contracts have been finalised since that time in areas where local capacity is less robust.

In total, contracts for 138 aircraft and 1,423 engines have been finalised with foreign suppliers over the past decade and there have been few signs of a discernible downturn in the pace or size of orders.

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Investing in engines

While Beijing has been pragmatic in its decision to continue importing large numbers of engines from abroad, government and industry continue to invest in closing this key capability gap. In April 2011 AVIC announced plans to commit more than CNY10 billion (USD1.53 billion) to aero-engine R&D over the following five years: a commitment that represented AVIC's greatest independent investment during the period. The company also announced in 2012 that it would task LMAC - one of its major aero-engine subsidiaries - with the creation and implementation of a technology roadmap aimed at accelerating progress in this area.

There have, however, been indications of progress. The acceleration of J-11B deliveries is largely a result of the WS-10A turbofan being delivered in meaningful numbers. Furthermore, in early 2013 Chinese state media, citing officials at the PLAAF Command Institute, revealed that the Y-20 would also soon fly with an indigenous engine - thought to be the so-called WS-20 high-bypass turbofan - which would offer improved performance compared with the D-30KP2. While previous attempts at engine development suggest any such maiden flight would significantly pre-date series production of the powerplant, this would nevertheless represent progress in an area short on success.

At present the WS-10A remains the only indigenously developed engine in series production, with a number of other projects, notably the WS-13 - the intended replacement for the RD-93 - delayed. There have been numerous indications that the domestic aero-engine industry has begun work on a number of powerplants for the next generation of Chinese combat aircraft. However, it seems likely that progress will remain slow relative to wider aerospace manufacturing capabilities. The entry into series production of the J-20 may well be dictated more by the ability of AVIC to develop and manufacture a suitable and reliable powerplant than by the development of the airframe and systems of the aircraft.

Building robust capabilities in this area will also be crucial in expanding Chinese exports in the military aerospace market, with the lack of control over this key element of the supply chain acting as an impediment to independence. While Beijing has been keen to promote the JF-17 to potential foreign customers in recent years, the aircraft's Russian-made RD-93 engine ostensibly provides Moscow with a veto over potential sales of the aircraft, which in many markets is a competitor for Russian offerings. This awkward dynamic has arguably been a key reason behind the continued sales of the increasingly technologically obsolete F-7, with final deliveries of the most recent F-7BGI variant completed during 2013.

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Conclusion

While China has made great strides in aircraft development, aircraft systems, production techniques, composites, and - to a lesser extent - engine development and manufacture, these capabilities remain far from a fully mature state at this stage. Furthermore, in a number of these areas, in terms of the capabilities of both industry and the PLA, gaps remain. The challenge for China in the next decade will not be developing new indigenous combat aircraft, but in closing the gaps that still exist. Nevertheless, given the political will and vast investments being made in the aerospace sector, it certainly appears to be a matter of when, rather than if, this state of full maturity will be achieved.



The Shenyang Aircraft Corporation's new J-31 twin-engine, low-observable fighter made its first flight from SAC's airfield on 31 October 2012 accompanied by a twin-seat J-11BS chase aircraft. (Unknown authorship)

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