



中国商用飞机有限责任公司ARJ21机型计划于2012年年底完成认证，如届时被定义为商务喷气机，则将成为Bombardier's Global 5000在市场上的竞争对手。

Comac's ARJ21 is set to complete certification by the end of 2012 and, if reconfigured as a business jet, would compete in the same market segment as Bombardier's Global 5000.

中国新客机或可成为首架国产商用喷气机

撰稿人: Gregory Polek、Charles Alcock

在上海举办的亚洲商务航空会议和展览会上，有眼光的中国商务喷气机运营商能够选购到心仪的机型，不过在将来也许他们能够采购到国产商务机。

据报道，近几个月有至少一家西方飞机制造商正在与中国商用飞机有限责任公司洽谈有关联合开发生产的事宜。不过至该报道截稿，并未透漏任何确实的消息。

与此同时，巴西航空工业公司有意在中国北部的哈尔滨飞机制造厂生产其经典喷气机机型，该厂截至去年为止一直在生产其他支线机型。该项目是巴西航空工业公司与中国民航局下属的中国航空工业集团共同筹建的合资项目。

打造中国商用飞机有限责任公司下C919与ARJ-21这两款机型的VIP版本，这是中国迈入自主生产商务喷气机的显著起点。C919与空中客车以及波音公司的同类机型在尺寸上基本相当，ARJ-21则与Bombardier Global 5000的尺寸接近，这两款机型皆为高密度航空服务而打造，不过相应的VIP机型载客量要少得多，其航程也显著提高，尤其是加装副油箱之后。

中国民航局在二月份为ARJ21-700发放了机型检验许可，允许其进入最后的飞行测试。由于之前一系列的设计变动及飞行测试问题，载客量为85人的ARJ21的生产被推迟了四年，并有望在今年投产。有四架飞行测试飞机参与计划。

中国商用飞机有限责任公司对ARJ21的研发仅有部分所有权，这在计划执行上给了其合作伙伴成都航空公司相当的自由度。2009年，国有企业中国商用飞机有限责任公司与四川航空公司及成都投资公司达成协议，对坐落在成都的空中客车A320生产方鹰联航空公司进行重组，并向该厂订购了30架ARJ21型飞机。

该协议将该公司的资本由3亿元（4400万美元）提升至6.8亿元（1亿美元），中国商用飞机有限责任公司握有该公司48%的股份，四川航空和成都投资公司各占有公司改组后40.97%和11.03%的股份。目前中国商用飞机有限责任公司具体的ARJ21订购数量仍未可知。

该公司成立后，ARJ21部件供应商中

最为知名的，同时也是其发动机供应商，美国通用电气公司在俄亥俄州皮尔布斯测试基地完成了对该机16000磅推力的CF34-10A涡轮风扇发动机的地面测试，并于2010年7月获得了美国联邦航空管理局33号部件认证。通用公司同时负责供应该机型所需的推力反向器及发动机舱，已经交付了10个飞行测试用引擎以及另外8个在北卡罗来纳州北部达勒姆通用工厂生产的8个原厂引擎。

对中国商用飞机有限责任公司来说，不乐观的消息是ARJ21的延迟投产将影响C919改装型的研发，对支线机型的研发已经在相当长的时间内被停滞，而近期支线机型的需求增长势必造成C919改装型研发资源的紧张。即便如此，在去年12月9日通过了国家级初步设计审议后，载客量为168人的C919已经进入细节工程设计阶段。

在成都，去年12月19日进入了正式投产的第一阶段。今年，中国商用飞机有限责任公司计划全面铺开细节设计工作，发布设计图纸并开始进行“整体试投产”。该机型计划于2014年首飞，2016年正式服役。

C919的部件供应商还包括穆格飞机集团，该公司上个月签署了相关意向书，有意向C919供应高升力系统，包括襟翼及缝翼驱动系统、驾驶仪、电控系统、动力驱动装置、机翼端制动器、变速器、以及杂项组件。

来自德国的利勃海尔航空公司也于上月与中国商用飞机起落架生产集团签署了所谓总协议，有意向C919提供空气管理系统和起落架。2011年6月，利勃海尔与中国商用飞机起落架生产集团签署了相关意向书，共同研发及组装主前起落架以及配套的牵引和前轮转向系统。

在上月新加坡举办的航空站中，中国商用飞机有限责任公司与亚洲近来发展迅速的租赁商中银航空租赁公司（隶属中国银行）签署了20架飞机的启动客户协议，以此作为C919总的供货协议的铺垫。据中国商用飞机有限责任公司透漏，C919已经签订了235个零部件的供货协议，大部分供货商为中国国内的公司及租赁商。

New Chinese airliners could be first homegrown bizjets

by Gregory Polek & Charles Alcock

Prospective Chinese business jet owners have an excellent choice of Western-made products here at the ABACE show in Shanghai, but might they one day be able to buy a business aircraft built in their own country?

Reports have been brewing in recent months that at least one Western manufacturer is in talks with China's Comac aerospace group with a view to some sort of joint aircraft development. But, as of press time, nothing had been confirmed.

Meanwhile, Embraer is supposedly firming up plans to build its existing Legacy executive jet models at the Harbin factory in northern China, where until last year it was building some of its regional airliners. The facility is a joint venture with Comac subsidiary Avic.

The most obvious starting point for a truly indigenous Chinese business jet would be to develop VIP versions of the latest Chinese airliners, Comac's C919 and ARJ-21. The C919 is close in size to the Airbus Corporate Jetliner and Boeing Business Jet families of aircraft, while the ARJ-21 is roughly in the size category of a Bombardier Global 5000. Both are currently planned for high-density airline service, but carrying far fewer passengers in VIP mode their range profiles would grow considerably—especially if additional fuel tanks were an option.

The Civil Aviation Administration of China (CAAC) issued type inspection authorization for the ARJ21-700 in February, allowing it to begin the final process of flight-test certification. Hoping to gain type approval by the end of this year, Comac has seen the 85-seat ARJ21 suffer through four years' worth of delays thanks to a series of unspecified design changes and flight test "discoveries." Four flight-test

airplanes participate in the program.

Comac's part ownership in ARJ21 launch customer Chengdu Airlines has lent the manufacturer a certain amount of latitude to extend the program's development. In 2009, government-owned Comac reached an agreement with Sichuan Airlines and Chengdu Investment Company to restructure Chengdu-based Airbus A320 operator United Eagle Airlines, rename it Chengdu Airlines and place a firm order for 30 ARJ21s. The arrangement increases the airline's capital base from 300 million yuan (\$44 million) to 680 million yuan (\$100 million) and gives Comac a 48-percent share, while Sichuan Airlines and Chengdu Investment retain, respectively, 40.97 percent and 11.03 percent of the reorganized entity. It is unconfirmed how many total firm orders Comac holds for the ARJ21.

Since Chengdu's formation, the ARJ21's highest-profile Western supplier—engine maker GE—finished ground testing of the airplane's 16,000-pound-thrust CF34-10A turbofans at its Peebles, Ohio test facility and received U.S. Federal Aviation Administration Part 33 certification in July 2010. The U.S. company, which also supplies the thrust reversers and nacelles, has manufactured a total of 10 engines for the flight-test program, along with eight production engines built at the GE plant in Durham, North Carolina.

The delays to the ARJ21 could affect the timing of development of the newer C919 for Comac, whose engineering resources have become stretched due to the continuing need for their engagement on the regional jet, which has been under development for longer. Nevertheless, after

Continued on page 8 ►



中国商用飞机有限责任公司C919机型与空中客车以及波音公司的同类机型在尺寸上基本相当，不过在服役之前仍然有相当的工作要做。

Comac's C919 airliner is in the same size category as the Airbus Corporate Jetliner and the Boeing Business Jet, but it has some way to go before entering service in its air transport configuration.

SE Asia bizav set for expansion

Southeast Asia is increasingly being identified as the continent's next aviation hot spot, based on annual economic growth rates there of around 5 to 8 percent. That's what airliner manufacturers like Boeing are

seeing in fast-growing countries like Indonesia, and prospects for business aviation growth appear to be following suit.

In fact, Indonesia's President Susilo Bambang Yudhoyono has just received approval to

invest \$60 million in a pre-owned Boeing Business Jet. Meanwhile, Boeing Southeast Asia president Ralph Boyce recently identified Indonesia, along with neighbors Singapore, Thailand, Malaysia and Vietnam, as nations that will

lead the charge in fleet expansion, followed by other currently sluggish markets, such as Myanmar, Cambodia and Laos.

Doubtless, this is what has just prompted Hong Kong-based start-up/investor matchmaker Angel Investment Network to advertise an opportunity to get involved in a new business aviation company

based in Batam Indonesia. The group is looking for an initial investment of just \$1.3 million.

Judging by the growing numbers of business jets parked at Jakarta's Halim Perdanakusuma Airport, the Indonesian boom is already under way. The airport was the Indonesian capital's main airport until the 1985 opening of Soekarno-Hatta International Airport, and now has capacity for general aviation expansion.

For more information on Indonesia's business aviation prospects see Thursday's edition of **ABACE Convention News** on March 29. —L.M.

Chinese airliners homegrown bizjets

► Continued from page 6

passing the state-level preliminary design review on December 9, the 168-seat C919 entered its detailed design and engineering development phase.

Formal production of the first part began last December 19 in Chengdu. This year Comac plans to roll out detailed design work, release all production drawings and start "overall trial manufacture" ahead of first flight, scheduled for 2014, and entry into service, planned for 2016.

The C919's list of Western suppliers include Moog Aircraft Group, which signed a letter of intent last month to supply the airplane's high-lift system, including all flap and slat actuation, pilot interfaces, electronic controls, power drive units, wing-tip brakes, gearboxes and miscellaneous components.

Another Western supplier, Germany's Liebherr Aerospace, signed so-called master agreements last month to supply the C919's air management system and landing gear with China's AVIC Landing gear Advanced Manufacturing Corporation (LAMC). In June 2011, Liebherr signed a letter of intent to form a joint venture with LAMC to develop and assemble the main and front landing gear along with the associated extension and retraction system and nosewheel steering system.

Comac padded its orderbook for the C919 during last month's Singapore Airshow with a launch customer agreement for 20 of the aircraft with one of Asia's fast growing lessors, BOC Aviation, which is part of the Bank of China. The C919 has now drawn orders for 235 units, according to Comac, mainly from Chinese-owned airlines and lessors. □