



新喷气式飞机： 更大、更快、更高效

The New Jet Aircraft Pipeline: Bigger, Faster and More Efficient

by Kirby J. Harrison

近二十四款商用和私用喷气式飞机目前正处在不同的开发阶段或刚投入市场。所有机型都比此前同类机型更大、更快、更高效。下面简单介绍几款比较有特色的机型。

如果您正在物色真正的宽体飞机，世界上最大的商用喷气式飞机制造商空中客车公司和波音公司就是您的不二之选。

空中客车 (Airbus) ACJ350 - 900 公务机 (又称 A350 XWB 宽体飞机) 目前正处于开发阶段，零售价格拟定为 2.68 亿美元。不带内饰的“绿色”飞机的卖价稍低，但最终标价 (final tab) 取决于客户要求如何整改机舱，以使之适用于商用或私人用途。客户需将飞机送往空中客车公司认可的舾装中心，以完成内饰设计、工程和机舱舾装。

空中客车公司预计 ACJ350 - 900 的最高飞行速度可达到 0.89 马赫 (1,090 公里/小时)，航程约 18,600 公里，这些参数可能因为内饰重量不同而有所变化。空中客车透露已收到“数份” ACJ350-900 商用机订单，但尚未透露订单详情，对首次交付日期也绝口不提。

如果您认为 ACJ350 不够大，您可以考虑 ACJ380。ACJ380 是空中客车巨型双层宽体公务机 A380 的行政版，机舱面积为 551 平方米 (比波音新一代加长型 747-8 机型约大 102 平方米)。A380 已被认定为客机。其最高飞行

Nearly two-dozen jet aircraft for business and personal use are in various stages of development or have just entered service. All are bigger, faster and more efficient than anything that has gone before in their class. Here is a look at some of the more prominent projects.

IF YOU'RE LOOKING FOR REALLY BIG, LOOK NO further than Airbus and Boeing, manufacturers of the largest business jets.

The ACJ350-900 from Airbus is well along in development as an airliner (under the name A350 XWB), with a listed price of \$268 million. A “green” airplane with no interior should cost somewhat less, with the final tab depending on what modifications the buyer requires to convert the cabin for business or private use. The owner would need to have the aircraft sent to an Airbus-approved completion center for interior design, engineering and cabin outfitting.

Airbus expects the ACJ350-900 to have a maximum operating speed of Mach 0.89 (1,090 km/h) and a range of approximately 18,600 km, although these figures may vary depending on the weight on the interior completion. Airbus claims “several” orders for the ACJ350-900 for business use but remains silent on details and a date for the first delivery.

速度为 0.89 马赫 (1,090公里/小时)，航程为 17,582公里，机舱配置成本为 3.75 亿美元。最新报告显示，已售出一架 ACJ380。

波音公司最近证实了其 787 梦想飞机 (Dreamliner) 的机舱配置。波音公司预计在 2012 年年初将首架商用或私用机型 (售价为 1.78138 亿美元) 交付给组装中心。波音 787-8 的机舱面积为 224 平方米，巡航速度为 0.85 马赫 (1,041公里/小时)，航程可达到 17,748 公里，“几乎可以连接地球上任何两点”。波音公司透露已接到 12架商用和私用喷气式飞机订单。

波音公司另一宽体商务喷气式飞机是747 - 8i，这是最新 747 系列的衍生机型。该机型售价为 2.0681亿美元，公司预计将于今年晚些时候将其交付使用，具体交付时间取决于飞行试验计划的结果。波音公司声称已接到 9 份 747 - 8i 四引擎喷气式飞机的订单，并宣称该机型的巡航速度将达到 0.855马赫 (1,047公里/小时)，航程为17,508公里。

庞巴迪公司 (Bombardier) 是世界上最大的商用飞机供应商之一，以其大型机舱飞机系列 (始于挑战者 (Challenger)) 最为出名。该加拿大制造商最近宣布了其迄今为止研发的最大的商用喷气式飞机，即 Global 7000 和 Global 8000。

Global 7000 配置了四区机舱、平甲板和可站立客舱，机舱空间将达到 75立方米，是同类机型中最大的机型，可承载 19 名乘客。其高速巡航速度将达到 0.90马赫 (1,102公里/小时)，在以最高效巡航速度 0.85马赫 (1,041公里/小时) 飞行时，可不间断飞行13,510 公里 (约 14 小时航程)。可从北京直飞华盛顿。

Global 8000 可以相同的高速巡航速度飞行，航程甚至会更长——若以 0.85马赫 (1,041公里/小时) 的速度飞行则航程可达 14,620 公里，使乘客可从香港直飞纽约市。

Global 7000售价为 6750 万美元，Global 8000 的售价为 6500万美元。与早期 Global 系列商用喷气式飞机相比，这两种机型的机窗增大了 80%，拥有乘务员休息区和



庞巴迪公司
Bombardier - Global 7000

If the ACJ350 isn't big enough for you, consider the ACJ380, an executive version of the giant, two-deck Airbus A380 airliner, with 551 square meters of floor space—approximately 102 square meters more than you'll find in Boeing's new 747-8. The A380 has already been certified as an airliner. It has a maximum operating speed of Mach 0.89 (1,090 km/h), a range of 17,582 kilometers and costs \$375 million in its airliner configuration. At last report, one ACJ380 has been sold.

Boeing has just certified its 787 in Dreamliner airline configuration. It expects to deliver the first business or private variant, priced at \$178.138 million, to a completion center in early 2012. The 787-8, which contains 224 square meters of cabin floor space, boasts a cruise speed of Mach 0.85 (1,041 km/h) and a range of 17,748 kilometers, “connecting virtually any two points on the globe.” Boeing claims orders for 12 aircraft to be finished as business or private jets.

Boeing's other big-body entrant in the business jet sweepstakes is the 747-8i, the latest follow-on in the 747 family. The company expects to begin deliveries of the \$206.81 million aircraft later this year, depending on the results of the flight test program. Boeing, which claims orders for nine 747-8i four-engine jets, reports that they will have a cruise speed of Mach 0.855 (1,047 km/h) and a range of 17,508 kilometers.

Bombardier is one of the world's largest providers of business aircraft and is perhaps best known for its line of large-cabin aircraft, starting with the Challenger. The Canadian manufacturer recently announced its biggest business jets to date, the *Global 7000* and *Global 8000*.

The 7000, with a four-zone, flat-floor, standup cabin, will have the largest interior in its class at 75 cubic meters, and can carry 19 passengers. It will have high-speed cruise of Mach 0.90 (1,102 km/h) and at its most efficient cruise of Mach 0.85 (1,041 km/h) will travel nonstop 13,510 kilometers—roughly 14 hours in the air. It will be able to fly nonstop between Beijing and Washington, D.C.

The Global 8000 will have the same high-speed capability and will fly even farther—14,620 kilometers at Mach 0.85 (1,041 km/h), taking passengers nonstop from Hong Kong to New York City.

The 7000 is priced at \$67.5 million and the 8000 at \$65 million. Both will have 80 percent larger windows than earlier Global business jets, a crew-rest area and a large baggage compartment that is accessible in flight. Bombardier expects the Global 7000 and 8000 to enter service in 2016 and 2017, respectively.

The in-production Global Express XRS will be equipped with the new Global Vision cockpit upgrade and rebranded the *Global 6000*. The 6000 has already been certified by Transport Canada and is expected to enter service in 2012, following U.S. Federal Aviation Administration certification.

The *Learjet 85*, the line's first super-midsize business jet, is an all-composite twinjet with a cabin one-third larger than that of the Learjet 60XR. Bombardier says it can bring it to market by 2012 with a \$17.2 million price tag. The company expects the 10-passenger airplane to have a high-speed cruise of Mach 0.82 (1,004 km/h) and a maximum range of approximately 5,552 kilometers.



赛斯纳飞机公司
Cessna - Citation Ten

一个大行李舱，乘客可在飞行中取行李。庞巴迪公司预计 Global 7000和 Global 8000 将分别在 2016 年和 2017 年投入市场。

正在生产的环球快车 XRS (Global Express XRS) 将配备最新的环球视界 (Global Vision) 驾驶舱升级系统，并更名为 Global 6000。Global 6000已通过加拿大交通部认证，预计将在通过美国联邦航空管理局 (FAA) 认证后，于 2012 年投入市场。

Learjet 85 是该系列机型的首款超中型公务机，是使用全复合材料制造的双射流喷气式飞机，机舱面积比 Learjet 60XR 大三分之一。庞巴迪公司宣布将在 2012 年之前将该款机型推出市场，售价为 1720 万美元。该款机型核载 10 人，庞巴迪公司预计其高速巡航速度将达到 0.82 马赫 (1,004公里/小时)，最长航程约 5,552公里。

赛斯纳飞机公司 (Cessna Aircraft) 将有三款飞机在 2013 年至 2015年之间投入市场。Citation Te 是经典机型 Citation X 的后继产品，其最高巡航速度将达到 0.925马赫 (1,133公里/小时)，速度比前代产品更快。在G650进入市场之前，Citation X 是世界上速度最快的商用喷气式飞机。其造价为 2149.5万美元，最长航程将达到 6,006公里，预计将在 2013 年开始交付。

最近，赛斯纳公司开了 Citation M2，这是 Citation CJ1+ 的升级版。Citation M2的最高巡航速度为 740公里/小时，航程将达到 2,406公里。其售价为 419.5万美元，Citation M2的机舱比 Citation CJ1+ 更大，可乘坐六名乘客。预计将在 2013 年底之前投入运营。

Citation 系列的最新机型是 Latitude，赛斯纳去年秋天宣布了这一机型，预计将在 2015 年下半年投入市场。Latitude 机舱的窗户比 Citation 系列前代产品的窗户更大，视野更开阔。平甲板和可站立客舱可容纳 9 位乘客。该喷气式飞机的售价为 1499.5 万美元，公司最初会提供 100 万美元的折扣。Latitude 的最高速度将达到 508 公里/小时，航程为 3,701公里。

西锐公司 (Cirrus Aircraft) (中国国企中国航空工业集团子公司中航工业通用飞机有限责任公司 (CAIGA/AVIC) 去年购买了西锐公司的大部分股份) 已投资重新启动项目，将把SF50 Vision 单引擎喷气式飞机引入市场。该机型可乘坐 5 位成人和 2 位儿童。售价为 172 万美元，采用威



庞巴迪公司
Bombardier - Learjet 85

Cessna Aircraft has three airplanes scheduled to begin service between 2013 and 2015. The *Citation Ten* is the follow-on to the iconic Citation X and at a maximum cruise speed of Mach 0.925 (1,133 km/h) will be even faster than its predecessor, which was the world's fastest business jet until the Gulfstream G650 enters service later this year. It costs \$21.495 million, will have a maximum range of 6,006 kilometers and is expected to be delivered starting in 2013.

More recently, Cessna unveiled the Citation M2, an upgrade of the Citation CJ1+. The M2's maximum cruise speed will be 740 km/h and it will have a range of 2,406 kilometers. Priced at \$4.195 million, the M2 will carry up to six passengers in a cabin larger than that in the CJ1+. Projected entry into service is late 2013.

The newest Citation is the *Latitude*, which Cessna announced last fall and expects will enter into service in the second half of 2015. The cabin will feature windows that are larger than in previous Citations, and better placed for viewing. The flat-floor, stand-up cabin will accommodate nine passengers. The jet is priced at \$14.995 million and the company was initially offering a \$1 million discount. The Latitude will have a maximum speed of 508 km/h and a range of 3,701 kilometers.

Cirrus Aircraft, in which China's state-owned Caiga/Avic bought a majority share last year, has invested to restart the program and bring the *SF50 Vision* single-engine jet to market. The airplane is designed to carry five adults and two children. Priced at \$1.72 million and powered by a Williams International FJ44-3A turbofan engine, it will offer a projected maximum speed of 555 km/h and a range of 1,265 kilometers.

The low-wing, V-tail, proof-of-concept aircraft has accumulated more than 600 flight-test hours. The company reports that buyers have reserved approximately 425 delivery positions. The airplane isn't expected to enter service before 2016.

At **Dassault Falcon**, the latest offering is the *Falcon 2000S*, a \$25 million variant of the 2000 series that is more favorably priced. The 6,200-kilometer range is less than the 7,403 kilometers offered by the 2000, but performance in terms of landing speeds and time-to-climb are much enhanced. With upgraded Pratt & Whitney Canada PW308C turbofan engines, emissions will be cut 40 percent and thanks to those engines plus winglets, the Falcon 2000S will burn 10 percent less fuel than aircraft that are 20

廉斯国际 (Williams International) FJ44 - 3A涡扇发动机, 预计最高时速将达到 555 公里, 航程为 1,265公里。

该低翼、V 型尾翼、概念验证机累计试飞时间已超过 600 小时。公司宣称客户已预约约 425 个交付场位。预计该机型在 2016 年之前尚不能投入使用。

达索猎鹰 (Dassault Falcon) 最新推出猎鹰 2000S (Falcon 2000S) 公务机, 猎鹰 2000S 是 2000 系列的一款机型, 价值为 2500 万美元, 价格更实惠。

猎鹰 2000S 的航程为 6,200 公里, 比2000 的航程稍短 (7,403公里), 但其着陆速度和爬升速度更高。公司声称猎鹰 2000S 采用普拉特·惠特尼加拿大公司 (Pratt & Whitney Canada) PW308C涡轮风扇发动机, 排放量将减少 40%。由于这些发动机和小翼, 猎鹰 2000S 的耗油量比那些体积小 20% 的飞机少 10%。

达索公司 (Dassault) 目前继续开发其双射流喷气式飞机, 虽然公司对大部分研发细节守口如瓶, 但公司的一位发言人说这将会是一款超中型 (SMS) 机型, 将配置电传飞行控制系统和最新版 EASy 飞行甲板系统。SMS 研发已进入细节设计阶段, 约 1500 名工程师参与研发该机型, 达索公司预计在 2016 年将其投入市场。

日蚀航宇 (Eclipse Aerospace) 原公司于 2008 年宣告破产。新日蚀航宇正在研发 Eclipse 550入门级机型, 这是最新的个人双射流喷气式飞机。预计在 2013 年投入市场。

同时, 重组后的公司正在购买原来的 Eclipse 双射流喷

percent smaller, the company claims.

Dassault continues to develop a new twinjet, and while most of the details remain tightly wrapped, a company spokesman said it will be in the super-midsize (SMS) category, will have fly-by-wire controls and incorporate the latest version of the EASy flight deck. The detail design phase for the SMS has begun and some 1,500 engineers are at work on the aircraft, which Dassault expects will enter into service in 2016.

The original **Eclipse Aerospace** declared bankruptcy in 2008. The new Eclipse Aerospace is bringing its *Eclipse 550* entry-level, personal twinjet up to speed. It is due to enter service in 2013.

Meanwhile, the restructured company is purchasing original Eclipse twinjets, upgrading them and selling them as the *Total Eclipse*. Among the improvements are updated avionics, new exterior paint, a new cabin interior and enrollment in an engine-maintenance program. The aircraft come with a full factory warranty and, according to the company, a limited number are available in 2012.

Pratt & Whitney Canada's PW610F turbofan engines power all Eclipse airplanes. They feature a maximum cruise speed of 431 km/h and a range of 2,082 kilometers. The Total Eclipse sells for \$2.25 million and the Eclipse 550 runs \$2.695 million.

Brazilian manufacturer **Embraer** continues on schedule in development of its fly-by-wire *Legacy 500* and *Legacy 450*. The 500 will have a cabin that is 1.8 meters longer than that of the 450, but



巴西航空工业公司
Embraer - Legacy 450



湾流
Gulfstream - G650



湾流
Gulfstream - G280

气式飞机，将其升级并冠名为 Total Eclipse 进行销售。这些改进包括在发动机维护方案中使用升级的航空电子设备、新型外部涂料、新机舱内饰和机舱维护项目。工厂承诺对该机型提供保修服务，公司宣布将在 2012 年发布限量版。

所有 Eclipse 机型均使用普拉特·惠特尼加拿大公司 (Pratt & Whitney Canada) 的 PW610F 涡扇发动机。最高巡航速度为 431 公里/小时，航程长达 2,082 公里。Total Eclipse 售价为 225 万美元，Eclipse 550 的售价为 269.5 万美元。

巴西制造商 **巴西航空工业公司 (Embraer)** 目前正按照原计划进度开发其 Legacy 500 和 Legacy 450，这两款机型均采用电传飞行控制系统。Legacy 500 的机舱比 Legacy 450 的机舱长 1.8 米，但两款机型都拥有 1.83 米高的站立头部空间、一间设备齐全的厨房和机尾厕所。Legacy 500 最多可乘坐 12 名乘客，Legacy 450 可乘坐 10 名乘客。

Legacy 500 价格为 1840 万美元，航程为 5,182 公里，巡航速度为 0.80 马赫 (980 公里/小时)。该飞机预定在 2014 年投入市场。Legacy 450 的价格为 1525 万美元，航程为 4,072 公里，巡航速度与 Legacy 500 相当。巴西航空工业公司预计 Legacy 500 将在 2013 年底或 2014 年初投放市场，Legacy 450 将在 2014 年进入市场。

湾流 (Gulfstream) 推出了两款引人注目的新飞机，即 G650 和 G280。G650 是该公司颇受欢迎的新机型。这是湾流到目前为止制造的最大的商用喷气式飞机，也是当今世界上速度最快的商用喷气式飞机，最高速度可达 0.925 马赫 (983 公里/小时)。若以 0.90 马赫 (956 公里/小时) 的速度飞行，航程可达到 9,260 公里。若以其最高效巡航速度 0.85 马赫 (904 公里/小时) 飞行，则可不间断飞行 12,964 公里，售价为 6450 万美元。

该喷气式飞机采用罗尔斯 - 罗伊斯 (Rolls-Royce) 新款发动机，与早期 G550 使用的发动机相比，可将噪声降低 33%，废气排放量也更低。其厕所安装了独立的通风系统；窗户比 G550 的窗户大 16%。由于安装了新的软件应用程序，乘客可以方便地控制所有客舱功能，包括遮光板和收听娱乐节目，可使用 iPod 或 iPads。

G280 机舱虽然小得多，但配有许多相同的客舱设施。该超中型喷气式飞机售价为 2400 万美元，是 G200 的衍生机型，最高速度可达 0.85 马赫 (904 公里/小时)，若以 0.80 马赫 (850 公里/小时) 的速度飞行，可直飞 6,667 公里。

最近，**豪客比奇 (Hawker Beechcraft)** Hawker 400XPR 轻型双射流喷气式飞机的 Pro Line 21 三显示屏升级版驾驶舱航空电子系统获得了美国认证。400XPR 是 Hawker 400A 系列的主要改进机型，改进措施包括采用威廉斯国际 (Williams International) FJ44 - 4A - 32 涡扇发动机代替普拉特·惠特尼加拿大公司 (Pratt & Whitney Canada) 引擎，增加翼梢小翼等。客户须将其 400A 送往豪客比奇服务中心进行升级。该款机型造价为 267 万美元，包括所有的增强功能。

本田 (Honda) 自 1986 年以来就一直精心研发其 HondaJet 项目。尽管重新设计引擎耽误了研发进度，但现在看来其入门级喷气式飞机可在 2013 年年中申请认证。本

both will have 1.83-meter standup headroom, a fully equipped galley and aft private lavatory. The 500 can be configured for up to 12 passengers and the 450 for 10.

The \$18.4 million Legacy 500 will have a 5,182-kilometer range and a cruise speed of Mach 0.80 (980 km/h). The aircraft is scheduled to enter service in 2014. The \$15.25 million Legacy 450 will have a range of 4,072 kilometers and similar cruise speed. Embraer expects the 500 to enter service in late 2013 or early 2014 and the 450 to enter service in 2014.

Gulfstream has two impressive new airplanes, the G650 and the G280. The G650 is the company's new star. It is the largest business jet ever built by the manufacturer and will be the world's fastest, with a maximum speed of Mach 0.925 (983 km/h). Range at Mach 0.90 (956 km/h) is 9,260 kilometers, and at its most efficient cruise speed of Mach 0.85 (904 km/h), the \$64.5 million airplane will travel 12,964 kilometers nonstop.

The jet's new Rolls-Royce engines are 33 percent quieter than those on the earlier G550 and have lower exhaust emissions. The lavatory has an independent venting system; the windows are 16 percent larger than those in the G550; and thanks to a new software application, passengers can control all cabin functions, from window shades to entertainment, with their iPods or iPads.

Though much smaller, the G280 boasts many of the same cabin amenities. The \$24 million super-midsize jet, a derivative of the G200, has a maximum speed of Mach 0.85 (904 km/h), but at an efficient Mach 0.80 (850 km/h) it will fly nonstop 6,667 kilometers. Certification by the FAA is imminent.

Hawker Beechcraft recently received U.S. certification of the three-display-panel Pro Line 21 cockpit avionics upgrade for its Hawker 400XPR light twinjet. The 400XPR represents a major improvement for the Hawker 400A line; other enhancements include replacing the Pratt & Whitney Canada engines with new Williams International FJ44-4A-32 turbofans and the addition of winglets. Customers are required to bring their 400A into a Hawker Beechcraft service center for the upgrade. The airplane costs \$2.67 million with all the enhancements.

Honda has been carefully nurturing its *HondaJet* program since 1986. Though an engine redesign put it behind schedule, it now appears the entry-level jet is on track for certification in mid-2013. Honda has already invested more than \$100 million



庞巴迪公司
Hawker 200



本田
HondaJet

田已经向其美国工厂投资 1 亿美元以制造和维护该机型。目前，有三架飞机正在执行认证试飞计划。

该双射流喷气式飞机发动机的位置非常独特，位于机翼上方。据报道，其巡航时速已经超过其预计最高巡航速度 (777 公里/小时) 近 10 公里。本田预计该售价 450 万美元飞机的航程将达到 2,591 公里，计划每年生产 70 至 100 架。公司去年十月宣布，最初两年的产量已经售罄。

Nextant Aerospace 的 Nextant 400XT 去年十月已经获得了美国联邦航空管理局 (FAA) 认证，已经开始交付其轻型双射流喷气式飞机。Nextant 400XT 实际上是豪客比奇 Hawker 400As 和 400XPs 的改装机型。改装的商务喷气式飞机售价为 390 万美元，配有 Williams International FJ33-3AP 发动机和 Rockwell Collins Pro Line 21 航空电子设备，使用了新油漆，并对机舱进行了重大升级。

400XT 的巡航速度为 851 公里/小时，航程为 3,710 公里。Nextant 预计在 2011 年出产十几架飞机，到 2014 年之前实现年产量 38 架的目标。Nextant 也从其姊妹公司分时产权运营商 Flight Options 接到了 40 400XTs 订单。

俄罗斯苏霍伊推出了苏霍伊公务喷气式飞机 **Sukhoi Business Jet (SBJ)**，这是公司 Superjet 100 区域性喷气式客机的衍生机型。瑞士 Comlux 公司是起始客户，最先两架行政版喷气式飞机将在 Comlux America 在美国的舾装中心进行舾装。Comlux 公司预计在 2015 年开始运营飞机。SBJ 的机舱空间约为 119 立方米，其航程为 14,727 公里，预计最高巡航速度将达到 0.81 马赫 (992 公里/小时)。

in manufacturing and maintenance at its U.S. facilities. Three aircraft are now involved in the certification test flight program.

The twinjet, with its unique over-the-wing engine position, has reportedly already exceeded the projected maximum cruise speed of 777 km/h by almost 10 km/h. Honda, which expects the \$4.5 million aircraft to have a range of 2,591 kilometers, plans to produce 70 to 100 aircraft a year. It announced last October that the first two years of production are already sold out.

Nextant Aerospace received FAA certification for its *Nextant 400XT* in October last year and has begun deliveries of the light twinjet. The airplane is actually a major makeover of Hawker Beechcraft's Hawker 400As and 400XPs. The resulting business jet sells for \$3.9 million, which includes Williams International FJ33-3AP engines, Rockwell Collins Pro Line 21 avionics, new paint and a major cabin upgrade.

The 400XT offers a cruise speed of 851 km/h and range of 3,710 kilometers. Nextant expects to reach an annual production rate of 38 airplanes a year by 2014. Nextant has an order for 40 400XTs from its sister company, fractional ownership operator Flight Options.

From Russia comes the **Sukhoi Business Jet (SBJ)**, a derivative of the company's Superjet 100 regional jet. Comlux of Switzerland is the launch customer and the first two executive jet versions will be outfitted at the Comlux America completion facilities in the U.S. Comlux expects to begin operating the airplanes in 2015. The SBJ contains some 119 cubic meters of cabin space. It offers 14,727-kilometer range and is expected to have a maximum cruise speed of Mach 0.81 (992 km/h).