商务机制造商都有哪些货

What bizjet manufacturers have in store for you

预览最新设计的机型预计未来几年服役。

作者：*Mark Huber*

新机型分两种：全新设计；老机型升级。本文讨论的是前者。这类机型有很多，但大部分都是中型机或中大型机—反映了入门机型的持续疲软，同时也反映了大型机和商务机的持续增长。庞巴迪、赛斯纳、巴西航空全部都在开发针对中大型机市场的机型，这类机型对于分时拥有制计划及其他大客户最具有吸引力。大型机业务也在好转：庞巴迪、达索、湾流都有项目在进行中。

新中型飞机全部都注重乘客舒适度，座椅进行了改进、窗户增大、机舱采用平地板。此外，所有机型全部都在驾驶舱采用触屏式航空电子设备，使用的引擎燃油效率也更高，这样一来飞机的航程更远，爬升时间更短。小翼设计进行了调整，更呈现俯冲的形状。

制造商销售飞机的方式也在改变，现在更注重简化维护、降低生命周期成本以及改进小时维护计划，这些现在都涵盖进了飞机价格里。这将全面提升飞机的可靠性，而每英寸派遣率将提升近100%。高级项目的研发认证仍然滞后于拟定的时间表，一些公司的财务状况有困难，这些项目就成了受害者；将新技术整合进机身、航空电子设备、飞行控制装置遇到技术困难；预算及美国联邦航空管理局和欧洲航空安全局的其他限制造成认证放缓。

A look at the newly designed models set to enter service during the next few years.

by Mark Huber

New-jet programs come in two flavors: clean-sheet-of-paper designs and updates of existing models. This article deals strictly with the former. The category is well populated, but mostly with midsize and super-midsize jets—a reflection of continuing softness in the entry-level sector, but also of growing strength in the large-jet and bizliner field. Bombardier, Cessna and Embraer all have models under development in what can be called the greater middle market, the most attractive category for fractional programs and other fleet customers. The large-jet business is also seeing renewed action: projects are underway at Bombardier, Dassault and Gulfstream.

The new midsize aircraft all evidence a focus on passenger comfort, with improved seating, larger windows and flat-floor cabins. In addition, all categories are moving toward touchscreen avionics in the cockpit and more fuel-efficient engines, which translate into better range and time-to-climb numbers. Winglet design is being revised with more swooping shapes.

Manufacturers also are changing the way they sell aircraft, with greater focus on simplified maintenance and life-cycle costs and hourly maintenance programs that are wrapped into the purchase price. This should increase reliability across the board and inch dispatch rates up to near 100 percent. Development and certification schedules on select programs continue to fall behind, the victims of financial challenges at some companies; technical difficulties integrating new technologies into airframe, avionics and flight controls; and certification slowdowns attributable to budgetary and other constraints at both the U.S. Federal Aviation Administration and the European Aviation Safety Agency.

All that said, nearly all aircraft now under development have one thing in common: a near-perfect balance of versatility, performance, comfort and costs. The big differentiator will be customer service and support.


西锐视野 SF50 | Cirrus Vision SF50

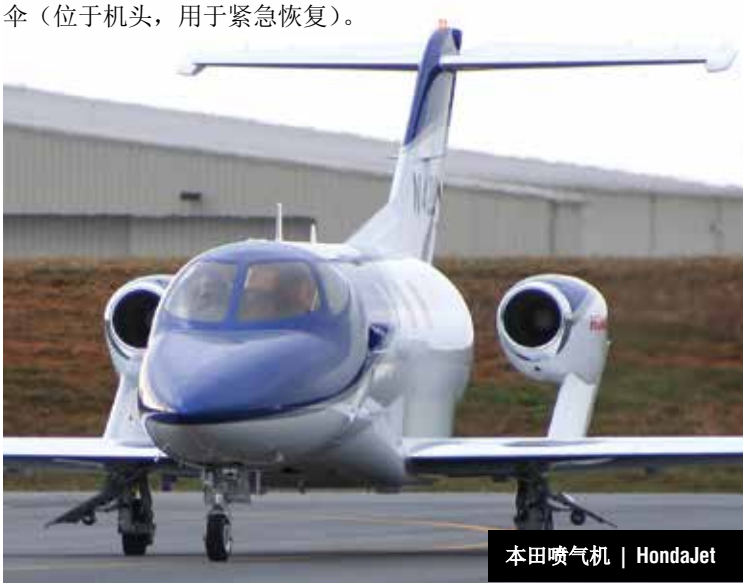
虽然存在上述问题，但是现在开发的几乎所有机型都有一个共同点：多功能、性能、舒适度、成本等各方面的平衡近乎完美。差别最大的就是客户服务和支持。

轻型单引擎

西锐视野 SF50：西锐SF50单引擎喷气机预计2015年晚些时候能够获得认证，该机型的开发进程严重滞后。2014年3月，该机型的首架合规性原型机试飞，去年11月和12月又有两架飞机进行了试飞。合规性试验机与2008年试飞的非合规性、概念验证原型机仅有少许不同：非合规性试验机的机头更长一点，机身阁楼更高一点。5+2式的座位格局得以保留，不过，西锐提供了其他一些选配项目，比如天气雷达、“救助站”、更好的皮革。

西锐已经在着手准备生产，目前针对这一全组合式飞机正在添置工业机器人以及机身修理模具。第一架投产的视野飞机预计今年下半年试飞。这款飞机价格196万美元，西锐已经收到了500多架飞机的订单定金，这款飞机配有西锐机身降落伞系统，可以在紧急情况下恢复整架飞机。

Flaris LAR 01：Flaris总部位于波兰，是航空业的新手，2013年在巴黎航展上发布了5座、单引擎轻型喷气机。这款引人注目的飞机主机舱配有后置铰链门，让人想起了60年代的林肯大陆轿车，还配有可拆卸机翼、可拆卸水平尾翼、机身油箱、电动除冰、整机弹道降落伞（位于机头，用于紧急恢复）。


本田喷气机 | HondaJet


Flaris LAR 01

LIGHT SINGLE ENGINE

Cirrus Vision SF50: Cirrus anticipates late 2015 certification for its long-delayed SF50 single-engine jet. It flew the first conforming prototype in March of 2014 and added two more to the flight-test program last November and December. The conforming test aircraft differ just a little from the non-conformal, proof-of-concept prototype the company has flown since 2008: they feature a slightly longer nose and higher fuselage loft than the model currently flying. The five-plus-two seating layout is retained but Cirrus has added options such as weather radar, a “relief station” and upgraded leathers.

The company already is beginning to gear up for production by adding factory robotics and a fuselage lay-up mold for the all-composite aircraft. The first production Vision is planned to take flight in the second half of this year. Cirrus has received deposits for more than 500 of the $1.96 million jets, which feature the Cirrus Airframe Parachute System for emergency recovery of the entire aircraft.

Flaris LAR 01: Poland-based aviation newcomer Flaris unveiled its five-seat, single-engine light jet at the Paris Air Show in 2013. The eye-catching model features rear-hinged main cabin doors reminiscent of 1960s Lincoln Continental cars, detachable wings and stabilizers, a fuselage fuel tank, electric deicing and an in-the-nose whole-aircraft ballistic parachute for emergency recovery.

LIGHT TWIN ENGINE

HondaJet: Honda Aircraft expects certification of its unique light twin in the first quarter of this year. Honda claims the jet has 15 to 20 percent greater fuel efficiency and higher speed than competing models. The five- to six-passenger model will be certified for single-pilot operation. The HondaJet mates a carbon-fiber composite fuselage to metal wings, and the positioning of the engines on over-the-wing pylons means larger cabin volume and generous passenger legroom as well as an enclosed and externally serviced lavatory. Top cruise speed is 778 km (420 knots) and range with four occupants is 2,185 km (1,180 nautical miles).

More than 1,000 employees are working at Honda’s massive 83-acre Greensboro, North Carolina campus, which has 55,742 square meters (600,000 square feet) under roof and should be able to turn out 70 to 100 aircraft per year when production is fully ramped up. The first two years of production are already sold out.

轻型双引擎

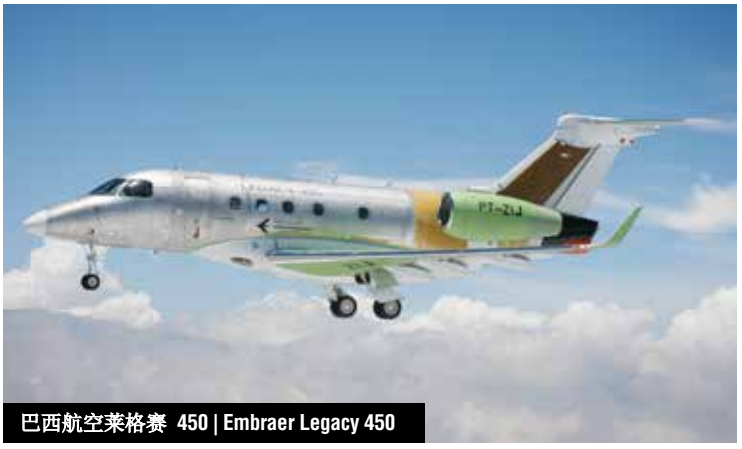
本田喷气机：本田飞机公司独特的轻型双引擎飞机预计今年第一季度可获得认证。本田声称比竞争机型的燃油效率高15-20%，速度也更快。5-6名乘客的机型将被认证用于单飞行员驾驶。本田喷气机将碳纤维组合式机身与金属翼结合，将引擎放置在机翼上方的挂架上，这样一来机舱体积增大，乘客放脚的空间也更大，另外还有封闭的外部服务式卫生间。最大巡航速度778公里（420节），4名乘客时最大航程2,185公里（1,180海里）。

本田在北卡罗莱纳Greensboro有83英亩大型园区，1,000余名员工在这里工作。该园区的建筑面积为55,742平方米（600，000平方英尺），满额生产时每年可制造70-100飞机。头两年生产的飞机已经售罄。

轻型中型机

赛斯纳奖状纬度：轻型中型机奖状纬度于2011年宣布，去年2月进行了首次试飞，预计今年第二季度开始服役。纬度是奖状系列中第一款平地板的机型（无下降过道），机舱8.38米长（27.5英尺），1.83米高（6英尺），约1.98米（6.5英尺）宽。座椅标配是，双座侧排长沙发椅一张，一组4张单人座，每两张面对面摆放，放脚空间更大，这之后是两张单人座。

纬度机型配备了Garmin G5000航空电子设备和赛斯纳无限光纤Clairity机舱管理系统。G5000有三个14英寸多功能LCD主显示屏，还有4个触屏控制面板。配有所有最新的安全设备，比如合成视觉、电子海图及Garmin安全的士机场图。Clairity系统可以实现完全无线控制机舱功能，并兼容个人设备。试飞中，赛斯纳能够增加纬度机型的航程，从 4,630 增加到 5,000 公里（2,500 到 2,700 海里），降低着陆距离，从 1,228 下降到 1,118 米（4,030 到 3,668 英尺）。



巴西航空莱格赛 450 | Embraer Legacy 450

赛斯纳奖状纬度 | Cessna Citation Latitude

LIGHT MIDSIZE

Cessna Citation Latitude: Announced in 2011, the light midsize Citation Latitude first flew last February and is slated to enter service in the second quarter of this year. The Latitude is the first Citation with a flat floor (no dropped aisle), and the cabin is 8.38 m (27.5 feet) long, 1.83 m (6 feet) tall and about 1.98 m (6.5 feet) wide. The standard seating arrangement accommodates passengers with a forward, dual-seat, side-facing divan, a club-four grouping of single seats with extra legroom and two more single seats aft of that.

The Latitude features Garmin G5000 avionics and Cessna's wireless fiber-optic Clairity cabin-management system. The G5000 has three 14-inch LCD primary and multifunction displays and four touchscreen control panels. It offers all the latest safety equipment, including synthetic vision, electronic charts and Garmin's Safe Taxi airport charts. The Clairity system allows completely wireless control of cabin functions, and it is compatible with personal devices. During the flight-test program, Cessna was able to increase the Latitude's range, from 4,630 to 5,000 km (2,500 to 2,700 nautical miles), and lower landing distance from 1,228 to 1,118 m (4,030 to 3,668 feet).

Embraer's Legacy 450: The Legacy 450 medium light twinjet made its first flight last December; certification is expected late next year. The shorter sibling of the Legacy 500 midsize, the 450 shares many of its systems and characteristics, including engines, avionics, fuselage diameter and fly-by-wire flight controls. The aircraft pressurization system keeps cabin altitude at 1,829 m (6,000 feet) at the 450's maximum cruising altitude of 13,716 m (45,000 feet).

The 19.2-cubic-meter (678-cubic-foot) cabin offers seating for seven to nine passengers. Cabin management and in-flight entertainment are courtesy of Honeywell's HD Ovation Select system, which allows for control of entertainment, communications, lights, temperature, window shades and more via drink-rail-mounted units, wireless handheld devices or a galley touchscreen. The system can interface with high-speed satellite communications and a variety of consumer electronics.

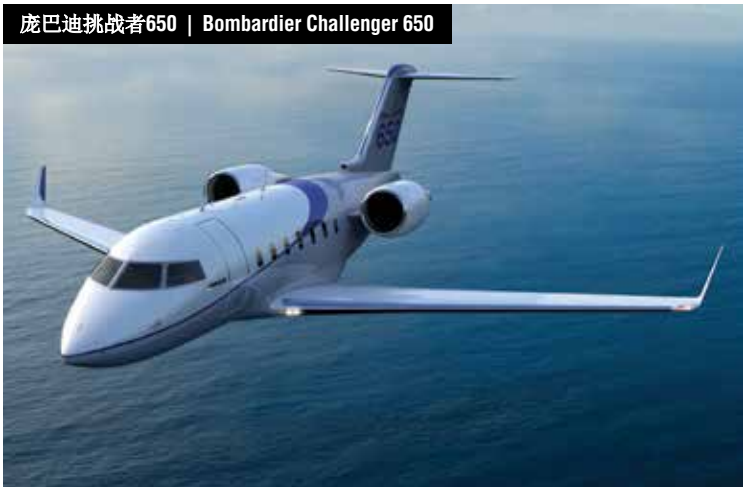
The cockpit offers Rockwell Collins Pro Line Fusion avionics. The four large active-matrix LCDs in the panel connect the pilots with synthetic and enhanced vision including an optional head-up display; electronic charts, maps, graphical weather depiction from an intuitive MultiScan weather radar system that "sees" up to 515 km (320 statute miles) out; and an airport surface-management system that minimizes the chances of ground mishaps.

巴西航空莱格赛 450：莱格赛450轻型中型双引擎飞机于去年12月首次试飞，预计明年晚些时候可以获得认证。莱格赛450相比兄弟机型莱格赛500要短一些，但450的很多系统和特性都和500类似，比如引擎、航空电子设备、机身直径、电传操纵飞行控制系统。在最大巡航海拔13,716米（45,000英尺），飞机增压系统将机舱海拔维持在1,829米（6,000英尺）。

19.2立方米（678立方英尺）的机舱可以容纳7-9名乘客。机舱管理和机上娱乐系统由霍尼韦尔友情提供，采用的是高分辨率Ovation Select系统，有了该系统，就可以通过安装在吧台内的设备、无线手持设备及厨房触摸屏控制娱乐、通讯、照明、温度、遮阳板。该系统可以衔接高速卫星通讯及一系列消费类电子产品。

驾驶舱配有Rockwell Collins公司的 Pro Line Fusion 航空电子设备。面板上四个有源矩阵LCD将飞行员与合成视觉和增强视觉连

庞巴迪挑战者650 | Bombardier Challenger 650



接，还可选配平视显示器；电子海图、地图、图绘天气（由直觉式MultiScan天气雷达系统提供，该系统可以观测到515公里（320法定英里）之外）；机场表面管理系统，可以将地面事故几率降到最低。

皮拉图斯PC24：皮拉图斯PC24既有轻型机在运营成本上的经济性优势，又有中大型机的功能和舒适，并且希望配备赛斯纳和巴西航空的传统项目。与该公司著名的PC-12单引擎涡轮螺旋桨飞机一样，PC-24保留了机尾货舱门，以及在短小、未铺砌、未改进的场地起飞的能力。新的Williams引擎具备独特的功能，比如自动推力反向、无源推力矢量喷管、地面电源采用静音电源模式（代替辅助电源组件）、预冷却器（可以控制引气，减少阻力损失）、防冻减噪引擎进气口。

最前方，定制航空电子设备组件PACE（皮拉图斯高级驾驶舱环境）以霍尼韦尔的Primus Apex and Epic 系统为基础，并具备所有最新的先进功能。宽敞的乘客舱比赛斯纳奖状XLS+和巴西航空飞鸿300的空间都大，并且地板是平的，过道净空更小。该机型有7种设

皮拉图斯PC24 | Pilatus PC24

Pilatus PC-24: Pilatus's PC-24 combines light-jet operating economics with super-midsize-jet capabilities and comfort and is aimed at more conventional offerings from Cessna and Embraer. Like the company's iconic PC-12 single-engine turboprop, the PC-24 retains an aft cargo door and the capability to operate from short, unpaved and unimproved fields. The new Williams engines have unique features, including automatic thrust reverse, passive thrust vectoring nozzles, quiet power mode in place of an auxiliary power unit to provide ground power, integral pre-cooler to condition bleed air and reduce drag losses and an anti-ice and noise-suppressing engine inlet.

Up front, the customized avionics suite dubbed Pace—Pilatus Advanced Cockpit Environment—is based on the Honeywell Primus Apex and Epic systems and features all the latest advances. The voluminous passenger cabin provides more overall space than either the Cessna Citation XLS+ or the Embraer Phenom 300 and has a flat floor, which means less headroom in the aisle. The aircraft will come with seven layout alternatives that include executive, commuter, combi and quick-change configurations as well as options for an externally serviced lavatory, either forward or aft, and galleys. Pilatus expects certification of the PC-24 in 2017.

MIDSIZE

Bombardier Challenger 650: Bombardier unveiled the Challenger 650 last October. The Montreal-headquartered airframer is refreshing its classic, 10-passenger 600-series Challenger with a redesigned cockpit and cabin and improved GE CF34-3B MTO turbofans that will provide more takeoff thrust to facilitate use of shorter runways, greater payloads and more range from challenging airports during high/hot operations. Planned maximum range of the new model is 7,408 km (4,000 nautical miles) with six passengers.

Deliveries of the $33.35 million Challenger 650 are targeted for this year's second quarter. Fractional-ownership provider NetJets is the launch customer with a firm order for 25 (and options on 50 more) to be completed to the Signature Series standard specified by NetJets.

Cessna Citation Longitude: The biggest Citation yet is a stretched and longer-legged variant of the Citation Latitude. Scheduled to enter service in 2017, it shares the Latitude's avionics, cabin-management system, seats, windows and fuselage cross-section but is 2.7 m (9 feet) longer and relies on Snecma's new Silvercrest engines for power. Cessna has selected the Garmin G5000 for the Longitude, employing the same three-screen "touch

计可选，比如：行政机、通勤机、复合设计、快速调换零件设计、外部服务式卫生间（可放置在机前或机后）、厨房。皮拉图斯PC-24预计2017年可以获得认证。

中型机

庞巴迪挑战者650：庞巴迪去年10月发布了挑战者650。庞巴迪总部位于蒙特利尔，该公司翻新了经典的10乘客挑战者600系列机型，比如重新设计了驾驶舱和机舱，改进了GE CF34-3B MTO涡轮风扇，改进之后起飞推力更大，更方便在短跑道上起飞，在高海拔/高温环境的机场起飞时可以载重更多、航程更远。预计这款新机型最大航程 7,408 公里（4,000 海里），乘客6名。

挑战者650售价3335万美元，预计今年下半年可以交付。分时拥有计划运营商NetJets是首位下订单的客户，已确认预订25架（可能一共订购50架以上），飞机需达到NetJets规定的Signature Series标准。

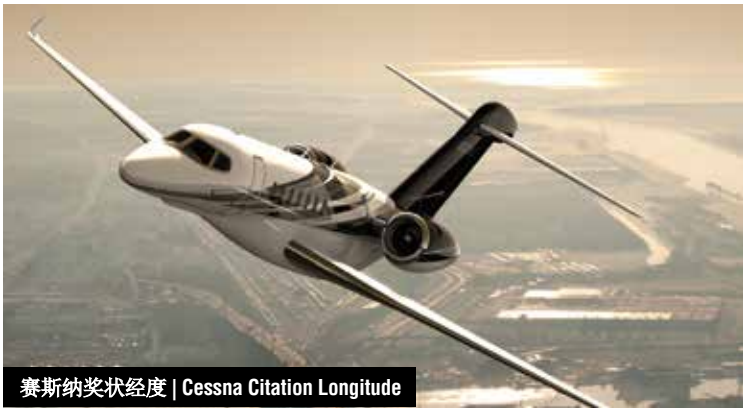
赛斯纳奖状经度：奖状经度是最大号的奖状飞机，相比奖状纬度更宽一点更长一点。奖状经度预计2017年服役，采用和纬度机型一样的航空电子设备、机舱管理系统、座椅、窗户、机身剖面，但是比纬度机型长2.7米（9英尺），引擎采用Snecma最新的Silvercrest引擎。经度机型选用Garmin G5000系统，采用和纬度机型一样的三屏“触屏控制”航空电子设备。机舱管理系统以赛斯纳Clairity设备为基础。

飞机机舱可以容纳8名乘客，机舱前方是厨房，后方是卫生间，带真空冲洗厕所。机舱前方还可设置机组人员卫生间以及第三个机组人员/乘务员座位。与纬度机型的内部剖面类似，经度机型的内部剖面是183厘米（72英寸）高，196厘米（77英寸）宽。机舱前方的4张一组的座椅设置很宽敞，单人的行政座椅可以完全展开成铺位。在机舱后方，正对娱乐中心（带大的平板显示器）还可设置另外一组4张座椅或是3座长沙发椅，起飞和降落时都可以设置已经获得认证。

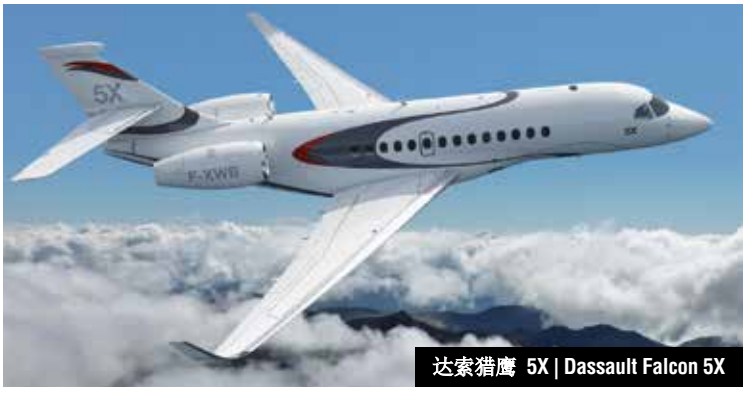
经度机型配置一定的计算机电传飞行控制功能，可以控制方向舵、扰流器、制动（电传操纵制动）。经度机型的30度后掠翼整合了先进的活动辅助翼、小翼、离心副翼，另外每侧各5个减速板/扰流板。所有这些使得经度机型在大部分载重情况下的短跑道起飞能力很好。

大型机

达索猎鹰 5X：达索2013年推出了大家翘首以盼的大型双引擎机，预计2017年服役。5X机型的机身拓宽了近2.7米（8.9英尺），这是猎鹰机型中最宽的，还配有电传飞行控制、新型Snecma Silvercrest引擎及先进的机翼飞行操纵面。该机型可以容纳8名乘客，航程9,630 公里 (5,200海里)。达索声称该机型相比现有的对比机型燃油效率高50%（飞行2,778 公里（1,500海里）。



赛斯纳奖状经度 | Cessna Citation Longitude



达索猎鹰 5X | Dassault Falcon 5X

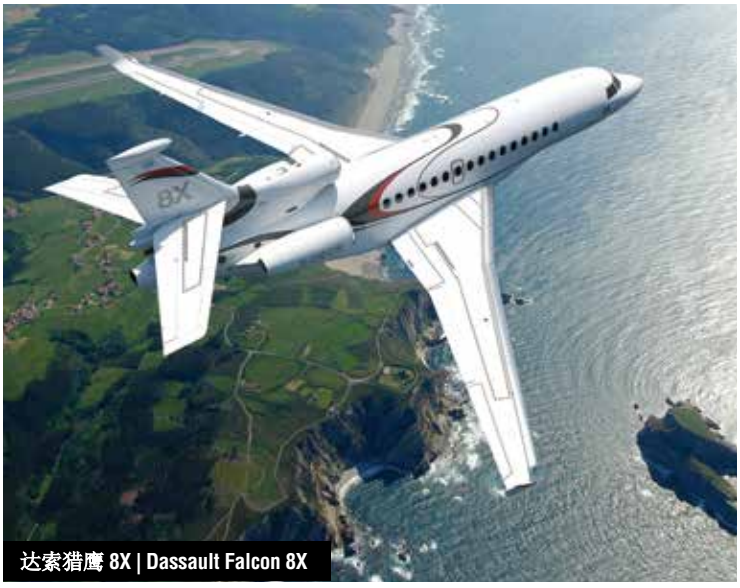
control” avionics architecture that the company is using on the Latitude. The cabin-management system will build on Cessna’s Clairity equipment.

The aircraft seats eight passengers in a cabin featuring a large forward galley and an aft lavatory with vacuum-flushing toilet. The forward cabin may include a crew lavatory as well as a third crew/flight-attendant seat. Like the Latitude’s interior cross-section, the Longitude’s is 183 cm (72 inches) tall and 196 cm (77 inches) wide. The forward club-four configuration is capacious and the single executive seats are full-berthing. There is room for another club-four in the aft cabin or a three-place divan, certified for takeoff and landing, opposite an entertainment center with a large flat-screen monitor.

The Longitude has limited, computerized fly-by-wire capabilities for controlling the rudder, spoilers and brakes (“brake-by-wire”). Its 30-degree swept wing incorporates leading-edge slats, winglets, centrifugal ailerons and five speed-brake/spoiler panels per side. All this combines to give the aircraft good short-field capabilities under most load conditions.

LARGE

Dassault Falcon 5X: Dassault launched its long-anticipated large twinjet in 2013 and expects it to enter service in 2017. The 5X features an expanded fuselage diameter of nearly 2.7 m (8.9 feet)—the widest ever for a Falcon—plus fly-by-wire controls, new Snecma Silvercrest engines and advanced flight-control surfaces on the wings. It has a range of 9,630 km (5,200 nautical miles) with eight passengers. Dassault claims that it is 50 percent more fuel efficient than current, comparable aircraft on a 2,778 km (1,500-nautical-mile) mission.



达索猎鹰 8X | Dassault Falcon 8X

达索猎鹰 8X：达索航空去年五月推出了猎鹰8X三引擎机，相比广受欢迎的7X有了很大提升。机身更长，布局选择更多，比如可以在机舱后方设置大型的带盥洗室的卫生间，在前方设置机组人员休息区，并在中间设置三张舒适的长沙发椅。8X的航程也更远—11,945公里(6,450 海里)。可以从洛杉矶直飞北京。从纽约起飞，8X可以直飞迪拜。预计今年早些时候首次试飞，预计2016年下半年交付。据说该机型的售价将比7X上浮10%，因此售价将达到5800万美元。直接运营成本预计为4,075美元一小时。

湾流G500/600：湾流航宇去年推出了G500和G600. 这两款机型预计分别于2018和2019年服役。两款机型相比G450和G550的机舱剖面更宽，但没有G650那么宽。这两款新机型介于G450, G550 和 G650之间，相比现有湾流机型组装部分更多。

G500和G600的正常巡航速度为0.90马赫，航程分别为7,038公里（3,800海里）和8,890公里(4,800海里)；如果巡航速度为0.85马赫，则航程分别为9,260公里（5,000海里）和11,482公里(6,200海里)。

这两款大机舱机型都将采用一对Pratt & Whitney Canada PW800涡轮风扇-G500采用推力6,869千克 (15,144磅)的PW814GA，G600采用推力7,112千克（15,680磅）的PW815GA。这两款机型采用电传操纵飞行控制，将是头两款装配有源侧杆控制的湾流机型。G500/G600飞行甲板，注册名称湾流Symmetry，是以霍尼韦尔的Primus Epic组件为基础的。

首次试飞已经在准备了，G500预计今年试飞；预计2017年获得认证，2018年服役。G500试飞之后12-18个月G600将试飞，G600预计2019年服役。针对第一批50架飞机，G500的售价为4350万美元，G600的售价为5450万美元。 BJT

本文中的报道由Thierry Dubois (tdubois@bjtonline.com)提供。

湾流G500 | Gulfstream G500

Dassault Falcon 8X: Dassault Aviation unveiled its Falcon 8X trijet last May, a significant step up from the popular 7X. A longer cabin offers more layout possibilities, including the option to install a large aft lavatory with a shower and a crew rest area in the front section and still have a comfortable three-lounge cabin in between. The 8X also offers greater range—11,945 km (6,450 nautical miles). From Los Angeles, Beijing is within reach. From New York, the 8X can travel nonstop to Dubai. The first flight is planned for early this year, with deliveries set to begin in the second half of 2016. The model will reportedly sell for about 10 percent more than the 7X, which would put the price in the neighborhood of $58 million. Direct operating costs are estimated at $4,075 per hour.

Gulfstream G500/G600: Gulfstream Aerospace unveiled its G500 and G600 last October. The jets are expected to enter service in 2018 and 2019, respectively. Both models have a wider cabin cross-section than the G450 and G550, but not quite as wide as that of the G650. The new jets—nestled between the G450, G550 and G650—will have more composite content than existing Gulfstreams.

At a normal cruise speed of Mach 0.90, the G500 and G600 will fly 7,038 and 8,890 km (3,800 and 4,800 nautical miles), respectively; at Mach 0.85, they will have a range of 9,260 and 11,482 km (5,000 and 6,200 nautical miles), respectively.

Each of the new large-cabin jets will be powered by a pair of Pratt & Whitney Canada PW800 turbofans—the 6,869-kg- (15,144-pound)-thrust PW814GA for the G500 and the 7,112-kg- (15,680-pound)-thrust PW815GA for the G600. The aircraft feature fly-by-wire flight control and will be the first Gulfstreams equipped with active sidestick controls. The G500/G600 flight deck, branded as Gulfstream Symmetry, is based on Honeywell's Primus Epic suite.

The first flight-test aircraft are under construction, and the G500 is slated to fly this year; certification is set for 2017 and service entry for 2018. The G600 will fly 12 to 18 months after the G500 and enter service in 2019. Pricing for the first 50 serial numbers has been set at $43.5 million for the G500 and $54.5 million for the G600. BJT

Thierry Dubois (tdubois@bjtonline.com), contributed reporting to this article.