A weak turboprop market is damping enthusiasm for bigger ATR and Bombardier models, but new technology could boost regional jet producers including Embraer and Mitsubishi

JIM WINCHESTER LONDON

Low demand in the turboprop sector has seen more seats shoehorned into existing airframes rather than stretched or new developments. In Russia and China, the need for efficient regional aircraft becomes ever greater, while Western manufacturers face strong entry barriers.

The ATR 72-600 has been outselling the Bombardier Q400, not least because of its lower price, but overall demand remains low. Bombardier has increased Q400 seat capacity to 98 by some internal reorganisation and ATR has done likewise to squeeze 78 seats into some ATR 72s for the Asian market. Both manufacturers face strong entry barriers.

In the past year Bombardier has announced strong entry barriers.

Further delays with the Mitsubishi Regional Jet (MRJ) have allowed Embraer to steal a march on its Japanese rival. The E195-E2, the first of the updated E2 versions of Embraer’s E-jets, took flight ahead of schedule – then made its show debut at Farnborough in July.

MRJ MODIFICATIONS
The MRJ haltingly began its long-delayed test programme in November 2015 with the maiden flight of the MRJ90, followed by a brief grounding for modifications and a warning that there might be further structural changes needed. Things seem to have got back on track with the start of a test campaign in the USA and flight of the third MRJ in September.

China’s under-developed regional sector, hampered by taxes and landing costs on imported regional jets, is in dire need of a reliable local product. Comac’s ARJ21 limped into service in 2016 after a long gestation, but is probably not a long-term solution. Meanwhile, Embraer is closing its joint-venture with Kiev is unlikely and prospects for further confirmations of the Russian regional airline in 2016. Handover of the demonstrator to the Saudi partners is expected in the first quarter of 2017.

Antonov says there is no participation in the project by Russian companies, and numerous Western suppliers are on board, including Pratt & Whitney Canada, which will provide PW150A engines, and Dassault, with its R408 propellers. Aeronics will be supplied by Honeywell.

Holding pattern

A weak turboprop market is damping enthusiasm for bigger ATR and Bombardier models, but new technology could boost regional jet producers including Embraer and Mitsubishi

Antonov
An-140

Antonov’s An-140, a 52-seat, high-wing twin-turboprop, was first flown in September 1997 and has been built at three plants in these countries—albeit in tiny numbers. Six were completed by 2009 at the Kharkov State Aircraft Production Plant in Ukraine and seven AN-140s were built by HESA Iran Aircraft Corporation at Tehran between 2001 and 2010. The type was grounded pending the investigation into an August 2014 crash at Tehran which killed 39. In March, an accident investigation report concluded that a fault in engine control electronics was the cause.

Aviacor, in Samara, Russia, builds the Antonov-designed An-140-100; it has so far built a number for the civil market and eight for the Russian armed forces, but lost a lawsuit in 2016 over royalty payments to use the Antonov name. Aviacor delivered a third passenger-configured An-140 to the Russian navy in May, but development of a ramp-equipped An-140T version appears to have stopped.

Series production of the civil An-140 was one of the four options put to Russian President Vladimir Putin in May for the revitalisation of the Russian regional airline industry. Reorganisation of the Antonov Company, which is concentrating on the An-132, and continued tensions over eastern Ukraine suggest that further co-operation with Kiev is unlikely and prospects for further volume production are not good.

Antonov An-140 data check

Antonov An-140 spec check

Number of civil An-140s built across type’s 19-year history

with an estimated completion by the end of 2016. Handover of the demonstrator to the Saudi partners is expected in the first quarter of 2017.

Antonov says there is no participation in the project by Russian companies, and numerous Western suppliers are on board, including Pratt & Whitney Canada, which will provide PW150A engines, and Dassault, with its R408 propellers. Aeronics will be supplied by Honeywell.
**ATR 42/72**

An order slowdown has seen only one significant new sale for the ATR regional turboprop in the year to date. ATR was an immediate beneficiary of the lifting of some sanctions against Iran in January, following international agreement on uranium enrichment. Within two weeks, a firm order for 20 ATR 72-600s, with options on another 20, was announced in Tehran. Africa and the Middle East currently represent only 9% of ATR sales. In September, ATR began deliveries of a new ATR 42/72 variant, with increased fuel capacity and improved performance.

**Xian MA60**

With a less-than-stellar safety record and lack of Western certification, the 60-seat ATR Xian MA60, derived from the Antonov An-24 and powered by Pratt & Whitney Canada PW127J turboprops, has struggled to find sales outside of China, the Far East and Afghanistan.

The lack of certification has caused friction between New Zealand and Tonga, where airline Air Tonu has returned to service the one aircraft donated by China in 2013. New Zealand suspended some aid and issued a travel advisory over the issue. Grounded for a year, it flew again in August. A handful of improved MA60s featuring Rockwell Collins Pro Line 21 avionics have been built since 2008.

**AVIC Xian MA60 data check**

**First flight**

1994

**Net orders (all-time/2016)**

4710 1210 3660 33326

**Deliveries (total/2016)**

4710 1210 285 3660 31647

**Backlog**

0 0 0 21 275

**MTOW (t)**

18.6 18.6 22.5 23

**Seats (single-class)**

48 48 54 70.78

**RANGE (NM)**

720 720 780 880

**Improved MA600 has been sold to airlines in three nations**

**ATR 42/72 spec check**

**First flight**

22-28 November 2016

**Net orders (all-time/2016)**

140 -

**Deliveries (total/2016)**

0 0 0 0

**Backlog**

0 0 0 0

**MTOW (t)**

21.8 21.8 26.5 26.5

**Seats (single-class)**

80 80 68.6 68.6

**RANGE (NM)**

680 770 1140 1140

**Cebu unit Cebgo was first to take 78-seat example**

**ATR 72-600**

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Bombardier CRJ family

Following aerodynamic improvements that have achieved 5.5% better fuel efficiency, Bombardier is offering an improved cabin, as a retrofit to existing operators with increased bin space, larger toilets, mood lighting and electrical outlets. The new cabin could be delivered in a year from a first order and is first being offered on the CRJ900.

The first generation, 50-seat CRJ100 and 200, which entered service from 1992, sold 1,021 examples. Their stretched replacements have achieved 725 orders to date, with a backlog of 100 orders and options—equivalent to 37 months of production at the current 2.7 aircraft per month rate.

Current models are the CRJ700 NextGen, CRJ900 NextGen and the CRJ1100 NextGen, offering 70, 90 and 100 seats, respectively. The CRJ700 and CRJ900 were introduced in 1999, followed by their NextGen counterparts in 2008 and the CRJ1100 in 2010. All have 14,500lb-thrust (64.5kN) GE Aviation CF34-8C5 turbofan engines. The CRJ900 continues to be the top seller of the range, with no CRJ1000 orders since 2013.

Orders in 2016 have included 10 CRJ900s for Chorus Aviation, four for Trident Jet and 10 for an unidentified customer—revealed at Airshow China in Zhuhai to be China’s CSB Leasing.

Bombardier CRJ family data check

<table>
<thead>
<tr>
<th>Model</th>
<th>Seats (two-class)</th>
<th>Seats (single-class)</th>
<th>MTOW (t)</th>
<th>Range (nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRJ700</td>
<td>70/59</td>
<td>70</td>
<td>14.0</td>
<td>3,500</td>
</tr>
<tr>
<td>CRJ900</td>
<td>90/67</td>
<td>90</td>
<td>14.0</td>
<td>3,500</td>
</tr>
<tr>
<td>CRJ1100</td>
<td>100/67</td>
<td>100</td>
<td>14.0</td>
<td>3,500</td>
</tr>
</tbody>
</table>

5.5% CRJ fuel efficiency gains as a result of aerodynamic improvements

Bombardier Q400

In a weak turboprop market Bombardier hopes to revitalise sales by entering the 80- to 100-seat segment, which is otherwise unfilled by Western manufacturers. Bombardier will expand the Q400’s passenger capacity to 90 by adding 12-14 seats, equal to a 907kg (2,000lb) payload increase. This will be achieved by moving the rear bulkhead aft and reconfiguring the front right-hand door to accommodate an extra row of seats. For the time being, talk of a stretched variant has stopped while Bombardier concentrates on this niche, which the company describes as a “sweet spot”. No launch customer has yet been announced for the variant.

Orders in 2016 include two for Air Tanzania, three for All Nippon Airways, nine for WestJet, and a letter of intent for 12 from Philippine Airlines. Although ATR stole a march in Iran with a commitment following the end of some sanctions in January, Bombardier is hopeful of taking a share of this large country’s regional market. Deliveries of Q400 cargo-combi aircraft began as 2015 closed, with the first of five ordered by Ryukyu Air Commuter, a member of the Japan Airlines Group. The cargo-combi model was announced at the Farnborough air show in 2014 and offers several configurations from 50-68 passengers and up to 32.5m (1,090ft) of freight volume.

Although deliveries of first-generation Q-series turboprops remain in service and increasing numbers are undergoing freight conversion. Bombardier has begun work with Quebec-based Air Inuit to convert Q300s with a large cargo door. Inuit currently operates 12 Q-series turboprops.

Bombardier Q400 data check

<table>
<thead>
<tr>
<th>Model</th>
<th>First flight</th>
<th>Net orders (all-time/2016)</th>
<th>Deliveries (total/2016)</th>
<th>Backlog</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q400</td>
<td>25/12/1991</td>
<td>823/40</td>
<td>900/32</td>
<td>0</td>
</tr>
<tr>
<td>Q400/Q400NG</td>
<td>25/12/1991</td>
<td>823/40</td>
<td>900/32</td>
<td>0</td>
</tr>
</tbody>
</table>

Comac ARJ21

After one of the longest gestation periods in civil aviation history, Comac’s ARJ21 regional twinjet finally entered service in 2016, albeit in a limited way, in China’s relatively undeveloped civil aviation history. The first ARJ21 (MSN 106) was delivered to Chengdu Airlines on 29 November 2015 and entered service in June in an all-economy configuration on the Chengdu-Shanghai route. The second aircraft was not delivered until October, and was in a 78-seat, mixed-class layout.

Production certification is the next goal, but certain issues need to be addressed before the Civil Aviation Authority of China will grant it. Noise in the rear cabin is said to be so high that the last two seat rows have to be left unoccupied; there is no aircrew address and reporting system; cockpit warning systems need simplifying; and there is no door seal problems. Some reports say the type can fly only in fine weather.

At the Farnborough air show in July, Comac disclosed tentative commitments for 95 ARJ21s from two Chinese lessors. One deal will see 65 ARJ21-70Ds placed with an Indonesian airline owned by Hong Kong-based Friedman Pacific Asset Management. The unidentified airline is operating, according to Friedman Pacific, which hopes to take delivery from late 2017 or early 2018. Other non-Chinese customers include Lao Airlines and the Republic of Congo. It seems unlikely that Comac will seek Western certification.

Lead operator Chengdu Airlines has taken delivery of its first two twinjets

Comac ARJ21 data check

<table>
<thead>
<tr>
<th>Model</th>
<th>First flight</th>
<th>Net orders (all-time/2016)</th>
<th>Deliveries (total/2016)</th>
<th>Backlog</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARJ21-700</td>
<td>26/11/2008</td>
<td>1810</td>
<td>120</td>
<td>0</td>
</tr>
<tr>
<td>ARJ21-800</td>
<td>26/11/2008</td>
<td>1810</td>
<td>27</td>
<td>0</td>
</tr>
</tbody>
</table>

Comac ARJ21 spec check

<table>
<thead>
<tr>
<th>Model</th>
<th>MTOW (t)</th>
<th>Seats (single-class)</th>
<th>Seats (two-class)</th>
<th>Range (nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARJ21-700</td>
<td>40.5</td>
<td>78</td>
<td>86</td>
<td>74-90</td>
</tr>
<tr>
<td>ARJ21-800</td>
<td>40.5</td>
<td>78</td>
<td>86</td>
<td>74-90</td>
</tr>
</tbody>
</table>

ARJ21-700ER  ARJ21-800ER  ARJ21-900ER
### Embraer E-Jet family

Embraer’s second-generation medium-range E-Jet family continues to make good progress towards service entry in 2018. The first E190-E2 was rolled out in late February and flew on 23 May – three months ahead of schedule. Only 44 days after its first flight and with 59h logged, it flew from São José dos Campos, Brazil to Farnborough for a static appearance at the biennial air show.

The second E190-E2 flew on 8 July. These are the first of four E190-E2 prototypes, to be joined by two E195-E2s and three E175-E2s for the certification programme. Service entries for the types are scheduled for 2018, 2019 and 2020, respectively.

Embraer announced a 1.4m (4.6ft) wing-span extension for the 120-seat E195-E2 in February, allowing increased maximum take-off weight and better range for customers using high-altitude airports such as in Denver, Colorado. The model’s sea-level range is expected to increase to 2,450nm (4,537km) from 2,000nm, and take-off weight by 2t. All three new E2 models will now have individual wing designs. The design change is not expected to delay the projected service entries or increase the cost of the $7 billion programme cost.

The current generation E-Jets are still selling, with a significant order from Horizon Air for 30 E175s, plus 33 options announced in April, all to be flown for Alaska Airlines. Modest orders for the current versions and E2s were also announced during the Farnborough show.

LeaseAir Corp later placed five E-Jets with Turkey’s Borajet, the first such arrangement for the series, and China’s Colorful Guizhou Airlines signed for up to five E190s.

### Mitsubishi Aircraft MRJ

Embraer may boost the E-Jet production rate slightly in 2017, to 105 aircraft per year for the current versions and E2s, plus 33 options announced in April; all are expected to increase the overall $1.7 billion programme cost. The design change is not expected to delay the projected service entries or increase the cost of the $7 billion programme cost.

The current generation E-Jets are still selling, with a significant order from Horizon Air for 30 E175s, plus 33 options announced in April, all to be flown for Alaska Airlines. Modest orders for the current versions and E2s may also be expected during the Farnborough show.

Lessor AerCap later placed five E-Jets with Turkey’s Borajet, the first such arrangement for the series, and China’s Colorful Guizhou Airlines signed for up to five E190s.

**Embraer E-Jet family data check**

<table>
<thead>
<tr>
<th>Aircraft</th>
<th>E170</th>
<th>E175</th>
<th>E190</th>
<th>E195</th>
<th>E170-E2</th>
<th>E190-E2</th>
<th>E195-E2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Net orders (all-time/2016)</strong></td>
<td>580/0</td>
<td>170/0</td>
<td>343/0</td>
<td>560/0</td>
<td>106/0</td>
<td>0/0</td>
<td>8/0</td>
</tr>
<tr>
<td><strong>Deliveries (total/2016)</strong></td>
<td>89/0</td>
<td>199/0</td>
<td>403/2</td>
<td>532/9</td>
<td>15/25</td>
<td>0/0</td>
<td>0/0</td>
</tr>
<tr>
<td><strong>Backlog</strong></td>
<td>0/0</td>
<td>3/0</td>
<td>127/53</td>
<td>14/190</td>
<td>82/0</td>
<td>0/0</td>
<td></td>
</tr>
</tbody>
</table>

**Mitsubishi Aircraft MRJ**

**Embraer E-Jet family spec check**

<table>
<thead>
<tr>
<th>Aircraft</th>
<th>E170</th>
<th>E175</th>
<th>E190</th>
<th>E195</th>
<th>E170-E2</th>
<th>E190-E2</th>
<th>E195-E2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MTOW (t)</strong></td>
<td>38.6</td>
<td>40.4</td>
<td>51.8</td>
<td>52.5</td>
<td>44.6</td>
<td>56.2</td>
<td>56.7</td>
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<tr>
<td>Swaps (single-class)</td>
<td>72</td>
<td>78</td>
<td>100</td>
<td>116</td>
<td>68</td>
<td>106</td>
<td>132</td>
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<tr>
<td>Range (nm)</td>
<td>2,100</td>
<td>2,200</td>
<td>2,450</td>
<td>2,500</td>
<td>2,060</td>
<td>2,860</td>
<td>3,000</td>
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</tbody>
</table>

**Mitsubishi Aircraft MRJ**

**Embraer E-Jet data check**

**Ilyushin Il-114**

Ilyushin’s Il-114 twin-turbofan regional airliner was first flown in March 1990 with Kimov TV7-117S engines. The Il-114-100 version with Pratt & Whitney Canada PW127Hs followed in 1999, but was sold only to the now-defunct Volborg airline and to Uzbekistan Airways, which today operates a handful of the 20 built.

Another is used as a radar testbed. Backed by R50 billion ($789 million) of Russian government money, production is due to restart in 2018 using only Russian equipment, including retrofitting to the TV7-117SM engine. Russia is trying to revive regional aviation and the Il-114 has the advantage over alternatives, such as the Antonov An-140 or licence production of the Bombardier Q400, of not being subject to sanctions or other supply problems with Western components.

The cockpit will have a five-screen layout with avionics allowing landings in Category II weather conditions, and the structure will enable landings on unpaved airstrips. Range with maximum passenger load is stated at 1,030nm (1,900km).

Demand for the Il-114 is estimated at up to 23 aircraft by 2030, with production of up to 18 per year. The intent is to build the Il-114-300 at the Sokol aviation plant in Nizhny Novgorod. Production at the TAMO plant in Uzbekistan ended in 2012 and Ilyushin has been negotiating to buy structural parts stored there. Russia also reportedly offered industry production of the Il-114 in mid-2016.

**Mitsubishi MRJ data check**

**Il-114 production will restart in 2018**

### Mitsubishi Aircraft MRJ

Following the MRJ’s delayed first flight on 17 November 2015, second and third flights followed quickly, but then Mitsubishi Aircraft announced another shift in its delivery schedule, to mid-2018. This was put down to further testing on a strengthened wing design.

The first flight test aircraft (FTA-1) was grounded until February, and the second was flown at the end of May, pushing the beginning of the flight-test campaign in the USA from the first or second quarter of 2016 into the fourth. Structural changes, such as added to FTA-2, included strengthening the wing-fuselage joint with additional plates.

More positive news included the announce- ment of two new customers. The first leasing company came aboard the programme at the Singapore air show in February with the signing of a letter of intent (LoI) from Aerolease Aviation for 10 firm MRJ90s and 10 options, and this was followed up by another LoI for the same quantities signed by the Swedish lessor Roslin at Farnborough in July. Although the final place- ment of the leased aircraft is unknown, that deal may see the MRJ gain its first foothold in Europe. Although Aeroset converted its Lolol into an order as a result of the request for an order before November, there have been no further orders announced since Farnborough. Leasing the order books by 427, including 233 firm or- ders, 170 options and 24 purchase rights, as of October. All the orders so far are for the 92-seat MRJ90, which, like the 80-seat MRJ70, is pow- ered by Pratt & Whitney geared turbines.

FTA-3 flew on 25 September and FTA-1 was transferred to Mitsubishi’s newly opened flight test centre at Moses Lake, Washington, three days later, after two aborted attempts attrib- uted to air conditioning problems. These are the first flight test aircraft with MRJ will follow, operating at various loca- tions. Roswell, New Mexico for special runway tests; Gunnison, Colorado for high-altitude op- erations; and the McKinley Climatic Laboratory in Florida for extreme climate testing.

Japanese media reports in early October suggested that Mitsubishi was warning custom- ers of a “risk” of further delivery delays, but the company denies there are any plans “at present” to shift the schedule. The reports sug- gested that structural changes necessitated a “rebalancing” of the aircraft.

**1999**

Year the E-Jet family was launched, with more than 1,200 delivered to date

**Mitsubishi MRJ spec check**

<table>
<thead>
<tr>
<th>Aircraft</th>
<th>MRJ90</th>
<th>MRJ100</th>
<th>MRJ70</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First flight</strong></td>
<td>11/12/2011</td>
<td>11/12/2011</td>
<td>11/12/2011</td>
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<tr>
<td><strong>Net orders (all-time/2016)</strong></td>
<td>33/0</td>
<td>23/0</td>
<td>33/0</td>
</tr>
<tr>
<td><strong>Delay</strong></td>
<td>8/0</td>
<td>8/0</td>
<td>8/0</td>
</tr>
<tr>
<td><strong>Backlog</strong></td>
<td>233</td>
<td>233</td>
<td>233</td>
</tr>
</tbody>
</table>

**Russian government funding to restart Il-114 production using only local equipment**

**Il-114 data check**

<table>
<thead>
<tr>
<th>Aircraft</th>
<th>Il-114</th>
<th>Il-114-E2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Flight test centre</strong></td>
<td>Moses Lake, Washington</td>
<td></td>
</tr>
<tr>
<td><strong>First flight</strong></td>
<td>29/3/1990</td>
<td>28/2/1999</td>
</tr>
<tr>
<td><strong>Net orders (total/2016)</strong></td>
<td>160*</td>
<td>160*</td>
</tr>
<tr>
<td><strong>Delivered (total/2016)</strong></td>
<td>160*</td>
<td>160*</td>
</tr>
<tr>
<td><strong>Backlog</strong></td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

* lists all for low-cost variants

**All orders so far that are for the 92-seat MRJ90**

**Ilyushin Il-114 spec check**

<table>
<thead>
<tr>
<th>Aircraft</th>
<th>Il-114</th>
<th>Il-114-E2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Flight test centre</strong></td>
<td>Moses Lake, Washington</td>
<td></td>
</tr>
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</tr>
<tr>
<td><strong>Net orders (total/2016)</strong></td>
<td>160*</td>
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</tr>
<tr>
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<td>160*</td>
<td>160*</td>
</tr>
<tr>
<td><strong>Backlog</strong></td>
<td>0</td>
<td>0</td>
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</tbody>
</table>

* lists all for low-cost variants

**All orders so far that are for the 92-seat MRJ90**
**Sukhoi Superjet 100**

Sukhoi Civil Aircraft Company (SCAC) says a stretched derivative of the Superjet 100 with 120 seats and a new larger wing will be marketed from 2017, with a planned service entry in early 2020. The central fuselage will be stretched, but the tail surfaces and PowerJet SaM146 powerplants will remain the same. Sukhoi earlier launched two new models based on the 98-seat SSJ100, the Sukhoi BusinessJet and the SportJet, which claims to be the first aircraft dedicated to transporting professional sports teams. Its interior fit includes areas for in-flight training and a treatment couch for injury recovery or match preparation. Biomedical sensors in the seats measure each athlete’s condition. A cabin mock-up was displayed on the eve of the Olympic Games in Rio de Janeiro, and the company is offering deliveries from late 2017. The only significant recent order has been from Rossiya for 20 SSJ100s, acquired via VEB leasing. The first European operator is Dublin-based CityJet, which introduced the Superjet to service in late July, initially on its Cork-La Rochelle route, and hopes to have four in service by year-end. The Irish airline is to lease 15 SSJ700s and has a further 16 options, using them to replace its Avro RJ85s. Two aircraft were in service by October.

Sukhoi hopes to certificate the SSJ100 next year for steep approaches, as required at London City airport, although operations are unlikely before 2018. Windtunnel tests have been conducted in Russia on a winglet-equipped SSJ100LR model to this end, but no full-scale test example has yet appeared.

SCAC plans to open its first overseas office in China in late 2016. The Beijing office will specialise in marketing, promotion, certification and arrangements for financial support of SSJ100 sales. The company also plans a future maintenance depot in the country. Reported talks with Chinese operators have not yet resulted in orders.

In April, Mexican operator Interjet and SCAC announced a deal to open a service centre and a joint venture to promote sales across the Americas. Interjet was the first non-Russian SSJ100 operator and now has 22 aircraft in operation, of 30 ordered. The SSJ100 is marketed outside Russia by Venice-based SuperJet International (SJI), a 49:51 joint venture between Sukhoi and Leonardo. SJI is also responsible for sales and deliveries. Sukhoi has recently moved to acquire Leonardo’s 25% holding in SCAC and has received Russian regulatory approval to do so.

**TRJet 328/723**

Owned by the US-based Sierra Nevada Corporation, which has held the type certificate since 2015, TRJet plans to develop modernised versions of the Dornier 328 turboprop and the 328ET turbofan-powered regional airliner. Theses are to be known as the TRP328 and TRJ328, respectively, with each having 32 seats in passenger configuration. Cargo and special mission variants are also being offered.

The company has strong connections with Turkey and at the Farnborough air show in July TRJet signed a memorandum of understanding for its first order. This covers 50 units for use by various Turkish agencies, from the central government to the Istanbul Chamber of Commerce. Another five have been ordered by Sentinel Aerospace Group of Singapore for special mission use.

TRJet has now brought on board a number of suppliers, including Pratt & Whitney Canada for its PW127 turboprops for the TRJ328 and PW306B turbofans for the TRJ328, and Rockwell Collins for Pro Line Fusion avionics. TRJet plans to follow the 328 with the TRJ723 (formerly the TRJ328), which will be fully designed and built by Turkish engineers, according to the company, and could be a jet or a turboprop. TRJet hopes to fly the TRJ328 in 2019 and the 70-seat TRJ723 in 2023, the centenary of the modern Turkish state.

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**TRJet 328/723 spec check**

<table>
<thead>
<tr>
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<td>Seats (single-class)</td>
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<td>Range (nm)</td>
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