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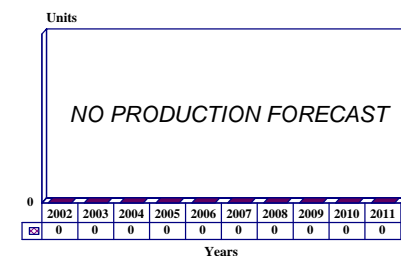
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Fokker 70/100 - Archived 3/2003

Outlook

- Fokker 70/100 production ceased in 1997
- A number of companies have shown interest in restarting production

10 Year Unit Production Forecast
2002 - 2011



Orientation

Description. Twin turbofan-powered, narrowbody, short-range commercial jet transport aircraft.

Sponsor. Development and production of the Fokker 70/100 series was privately sponsored by Fokker.

Contractors. The Fokker 70/100 series was produced by NV Koninklijke Nederlandse Vliegtuigenfabriek Fokker, Amsterdam-Zuidoost, the Netherlands. Production occurred at Schiphol-Oost Works, Amsterdam.

Status. Fokker 70 production was terminated in 1997. Fokker 100 production was terminated in 1996.

Total Produced. Fokker produced 47 Fokker 70s. The company also produced 278 Fokker 100s.

Application. Short-range scheduled passenger transportation including high-density regional/commuter operations.

Price Range. Fokker 100, \$25-\$30 million; Fokker 70, \$20-\$25 million; both in 1997 US dollars.

Technical Data

(Fokker 100/70)^(a)

Design Features. Circular section semi-monocoque fuselage with hydraulically operated airbrakes at tail end. Cantilever low-wing monoplane with swept leading and trailing edges. Irreversible hydraulically operated ailerons, double-slotted fowler flaps, five-

panel lift dumpers in front of flaps. Cantilever T-tail with variable-incidence tailplane. Tricycle-type landing gear with twin wheels on each unit. Main units retract inward; nose unit retracts forward. Multiple-disc carbon brakes with anti-skid system.

	<u>Metric</u>	<u>US</u>
Dimensions		
Length overall	35.53/30.91 m	116.57/101.41 ft
Fuselage length	32.50/27.88 m	106.63/91.47 ft
Fuselage diameter	3.30 m	10.83 ft
Height overall	8.51 m	27.92 ft
Wingspan	28.08 m	92.13 ft

	<u>Metric</u>	<u>US</u>
Tail span	10.04 m	32.94 ft
Cabin internal width	3.10 m	10.17 ft
Cabin height	2.01 m	6.59 ft
Cabin length ^(b)	21.19/16.57 m	69.52/54.36 ft
Weight		
Operating weight empty	24,747/22,784 kg	54,558/50,230 lb
Maximum take-off weight	45,810/36,740 kg	101,000/81,000 lb
Maximum landing weight	39,915/34,020 kg	88,000/75,000 lb
Maximum payload (weight-limited)	11,993/9,190 kg	26,442/20,260 lb
Capacities		
Standard fuel	13,365/9,640 liters	3,531/2,548 gal
Performance		
Maximum range ^(c)	3,111/1,981 km	1,680/1,070 nm
Maximum speed	Mach 0.77	Mach 0.77
Maximum operating speed at 25,500 ft, ISA	856 km/h	462 kt
Service ceiling	10,670 m	35,000 ft
Propulsion		
Fokker 100	(2)	Rolls-Royce Tay Mk 620 turbofans rated 61.6 kN (13,850 lbst) each or
	(2)	Tay Mk 650 turbofans rated 67.2 kN (15,100 lbst) each.
Fokker 70	(2)	Tay Mk 620 turbofans rated 61.6 kN (13,850 lbst) each.

Seating

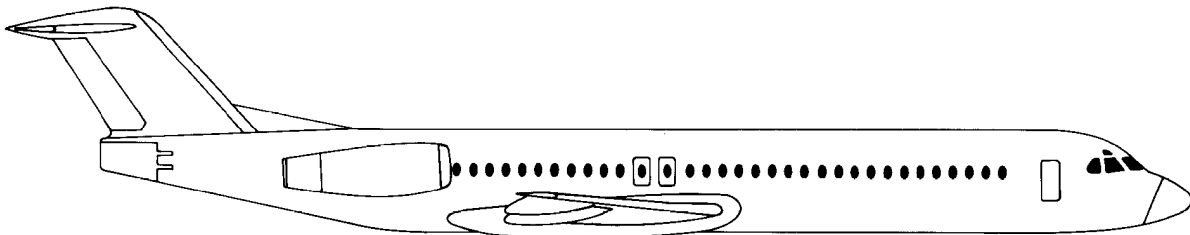
Fokker 100: 107 passengers in standard layout (five abreast, 32-inch pitch); 122 passengers in all-tourist class configuration. Crew of two.

Fokker 70: Standard layout for 79 passengers (five abreast, 31/32-inch pitch). Crew of two.

^(a)Fokker 100 High Gross Weight with Tay 650; Fokker 70 at standard weights and fuel capacity.

^(b)Not including flight deck.

^(c)Fokker 100 with 107 passengers and baggage; Fokker 70 with 79 passengers and baggage.



FOKKER 100

Source: Forecast International

Variants/Upgrades

Fokker 70. The first Fokker 100 derivative, the Fokker 70, was launched in mid-1993 on the strength of 15 firm orders and 10 options from two Indonesian airlines: Sempati Air (10 firm orders and five options) and Pelita Air Service (five firm orders and five options). The Fokker 70 was based on a shortened

Fokker 100 fuselage. It has a wing almost identical to that of the Fokker 100, and Rolls-Royce Tay Mk 620 turbofan engines rated 13,850 lbst each. The Fokker 70 was also available in an Executive Jet VIP/corporate shuttle configuration, as well as an extended-range version.

Fokker 100. Announced in November 1983, this 107- to 122-passenger aircraft was based in part on Fokker's F.28, but with significant equipment and design improvements. First flight occurred in November 1986, with commercial introduction taking place in February 1988. As with the Fokker 70, the Fokker 100 was available in Executive Jet and extended-range versions. The Fokker 100QC was a quick-change version featuring a 3.4 meter x 1.9 meter cargo door on the port side. The 100QC was built as a standard Fokker 100 and then modified by a subcontractor. Maximum payload of the 100QC is 11,500 kilograms (25,353 lb).

Fokker 130. Fokker had considered a stretched version of the Fokker 100 called the Fokker 130. This variant would have accommodated 128 to 137 passengers. The Fokker 100 fuselage would have been stretched about 6.3 meters (20.7 ft). The powerplant would have been an advanced high-bypass-ratio turbofan engine in the nominal 66.7-88.95 kN (15,000-20,000 lbf) class. Standard maximum take-off weight would have been an estimated 55,340 kilograms (122,000 lb).

Program Review

Background. The Fokker 100 jetliner replaced the Fokker F.28 Mk 4000 twin-turbofan transport in the Fokker commercial aircraft line. The Mk 4000 was the final F.28 variant produced, the last rolled off the production line in 1986. Fokker's target for the 100 was the major airlines' requirement to replace the 55- to 100-seat Douglas DC-9, BAC 1-11, and Boeing 737-100 aircraft, as well as Fokker's own F.28. However, over time, the Fokker 100 moved into segments previously flown by much smaller turboprop equipment. In the US, both USAir and American have used Fokker 100 transports on commuter/regional routes using commuter slots approved by the US Federal Aviation Administration (FAA).

F.28. The initial F.28 production version was the Mk 1000, seating up to 65 in an all-passenger configuration. Development began in 1961, the prototype flew in 1967, and certification was granted in 1969 by the Netherlands, West Germany, and the United States. This version was also available in a mixed passenger/cargo variant. The Mk 2000 was introduced in 1971 and featured a stretched fuselage and seating for 79. Ninety-seven Mk 1000s and 10 Mk 2000s were sold.

Mk 3000. The Mk 3000 was similar to the Mk 4000, but with a shorter fuselage and seating for up to 65 passengers. It was also available in a 15-passenger VIP version. Twenty-two aircraft were produced.

Mk 4000. The Mk 4000 combined the stretched fuselage of the Mk 2000 and the updated engines of the Mk 3000. Up to 85 passengers could be carried. The last of 112 units was produced in 1986.

Fokker 100 Announced. Fokker announced the 107-passenger Fokker 100 program in November 1983, hoping to capitalize on rapidly expanding airline travel and the aging DC-9, 737-100, BAC 1-11, and F.28 fleets. Compared to the F.28 series, the Fokker 100 had a fuselage lengthened by 18.8 feet, and a wingspan

increased by 9.9 feet. The Fokker 100 was powered by 13,850 lbf Rolls-Royce Tay Mk 620 turbofans, with the 15,100 lbf Mk 650 variant becoming available as an option in 1988. A prototype flew in November 1986 and initial deliveries, having slipped several times for a total lag of nine months, began in February 1988.

International Participation. The Fokker 100 had a great deal of international content. DASA was a major participant, responsible for more than 27 percent of the program, producing center and aft fuselage sections and the entire tail. Bombardier's Short Brothers unit built the aircraft's wings. Northrop Grumman supplied the composite nacelles and thrust reversers, while Dowty produced all landing gear for Fokker 100s built through the end of 1993. In late 1991, Menasco of Canada received a four-year production contract from Fokker to supply a new steel landing gear for the aircraft. The Menasco undercarriage was used on Fokker 100s built from 1994. IPTN signed on to the Fokker 100 program in 1988 and built various machined components, some of which were in tail and wing sections.

Order Progression. The order book grew slowly in the first few years of marketing. In July 1984, Swissair became the first Fokker 100 customer, placing orders and options for eight and six aircraft, respectively. Its first aircraft was delivered in February 1988. Swissair's Fokker 100s were outfitted in a three-class configuration, reducing the passenger capacity to 84. The first class section had two rows of seats arranged four abreast. The 53 business class and 23 economy class seats were five abreast. The largest order came in 1989 from American Airlines, which ordered 75 aircraft and optioned another 75.

Advanced Cockpit. One of the most notable features to be found on the Fokker 100 is its advanced cockpit avionics suite. Building on technology introduced on the Boeing 757/767 and the Airbus A310, the Fokker 100 includes Rockwell Collins ARINC Series 700 avionics and a Honeywell flight management

system. In building the Fokker 100, Fokker adopted the dark cockpit philosophy (no indication lights are on during normal operations, thus preventing pilots from being unnecessarily distracted from flying the aircraft). The aircraft also has a Rockwell Collins automatic flight control and augmentation system and an advanced flight warning system. Available options included Category IIIB autoland capability, a windshear detection and guidance system, and a Traffic Alert and Collision Avoidance System.

DASA Acquisition. In 1993, the German company DASA acquired majority control of Fokker. DASA established a subsidiary, Fokker Holding, which owned a 51 percent share of Fokker.

The Fokker Jetline. In the late 1980s, as North American and European air transportation systems became more congested, operators began to use the Fokker 100 on traditional commuter routes. In the United States, USAir and American were granted exemptions from the Department of Transportation's commuter slot rule, which limited the size of jet equipment to 68 seats. USAir's petition came in 1989, and American's was submitted in 1990. Another American request affected O'Hare commuter slots, restricted to 56-seat jet equipment. An FAA two-year trial exemption, allowing 110-seat commuter jet operations on 25 percent of American's Chicago slots, was granted in 1992.

Fokker sought to further meet airline demand by introducing the Jetline, a family of aircraft including the Fokker 100 and the 79-seat Fokker 70. In late 1992, Fokker started work on a Fokker 70 prototype, prior to receiving a single firm order for the version. But launch orders were received a few months later, in June 1993, from two Indonesian airlines: Sempati Air and Pelita Air Service. The two carriers placed a combined total of 15 firm orders and 10 options.

First flight of the Fokker 70 prototype occurred in April 1993. This prototype was a modified Fokker 100. First flight of the initial production Fokker 70 occurred in July 1994. Certification from both the US Federal Aviation Administration and the Dutch civil aviation authority RLD was awarded in October 1994. Later that same month, the initial production Fokker 70 was delivered to Ford Motor Company for use as a 48-seat corporate shuttle.

Bankruptcy. DASA halted financial support to Fokker in January 1996, after negotiations with the Dutch government concerning a rescue plan failed. DASA said that it would fulfill only obligations that it guaranteed or that Fokker assumed with its authorization.

A Dutch bankruptcy court subsequently granted Fokker a 30-day suspension of payments to creditors. Also, in late January 1996, the Dutch government granted a 365 million guilder (\$237 million) rescue package to Fokker that enabled it to temporarily continue operations while it searched for possible solutions.

One potential solution would have been the purchase of Fokker by an outside company. Companies in Asia, Europe, and North America had shown some interest in saving Fokker. In all, approximately 30 interested parties approached Fokker, but only six or seven of these were interested in purchasing the entire company or a majority of it. Among the parties interested in purchasing at least part of Fokker included Samsung of South Korea and the (now defunct) British-French-Italian consortium Aero International (Regional), or AI(R). The Dutch industrial conglomerate Stork said that it might participate in a rescue of Fokker Aircraft but did not want to become a leading aircraft producer itself.

In March 1996, unable to find a purchaser, Fokker declared bankruptcy. A number of Fokker subsidiaries, though not the aircraft manufacturing unit, continued to operate under the name Fokker Aviation. In mid-1996, Stork acquired Fokker Aviation, which will continue to provide maintenance and repair for all existing Fokker aircraft. Meanwhile, the separate aircraft manufacturing portion of Fokker continued to build a small number of aircraft.

When Fokker declared bankruptcy in March 1996, it had 15 aircraft under assembly, including seven jets. The company asked 350 employees to keep working for three months in order to complete the 15 aircraft. Plans called for production of Fokker aircraft to then cease. However, Fokker subsequently decided to produce an additional 15 aircraft (including nine jets), which extended production until mid-1997.

In December 1996, Fokker's bankruptcy trustees ended negotiations with Samsung regarding a possible takeover of the aircraft manufacturer. The trustees concluded that it was no longer feasible to continue aircraft production beyond May 1997 since Short Brothers and other component suppliers were not prepared to continue to produce parts for Fokker aircraft.

In early 1997, a deal to rescue Fokker Aircraft collapsed. The deal would have involved Stork and Khazanah Nasional Berhad, the investment arm of the Malaysian government.

Funding

The government of the Netherlands provided a revolving loan facility to help finance working capital. It was repaid with royalties from the sale of Fokker aircraft.

The development cost of the Fokker 70 was 350 million guilders (\$181 million).

Timetable

<u>Month</u>	<u>Year</u>	<u>Major Development</u>
Apr	1962	F.28 program announced
May	1967	Prototype first flight
	1969	F.28 certificated in West Germany, the Netherlands, and the US
	1969	F.28 entered airline service
	1976	Mks 3000/4000 entered production
Nov	1983	Fokker 100 program announced
Jul	1984	Swissair placed order for Fokker 100
Nov	1986	Fokker 100 first flight
Mid-	1987	Final F.28 deliveries
Nov	1987	Fokker 100 obtained Dutch certification
Feb	1988	First Fokker 100 deliveries
Jun	1988	First Tay 650-powered aircraft flown
May	1989	Fokker 100 received FAA type certification
Late	1992	Work on Fokker 70 prototype began
Apr	1993	DASA acquisition of Fokker majority share concluded
Apr	1993	First flight of Fokker 70
Oct	1994	Initial delivery of Fokker 70

Worldwide Distribution

See the “World Airline Inventories, Orders and Options” appendix.

Forecast Rationale

Fokker's problems stemmed from a number of factors. These included a decline in demand for aircraft (which resulted in expensive overcapacity at Fokker), a decrease in achievable aircraft prices due to market conditions of low demand and high supply, and high finance charges resulting from previous reorganizations of the company. Added to these factors was a 25 percent drop in the value of the US dollar compared to the Dutch guilder. Since Fokker fuselages were produced in Germany, the strength of the Deutsche mark against the dollar had also been a factor. The company was thus caught in a squeeze – often its aircraft had been sold in weaker dollars while its production costs had been covered by stronger currencies.

The basic inability to sell its aircraft at an economic price led to Fokker's problems. Fokker's financial

difficulties had not been due to any technical deficiencies in its aircraft nor to a lack of sales. On the contrary, both Fokker jets were impressive aircraft and each garnered a significant number of orders. At the end of 1995, total orders for the Fokker 70 had numbered 71. At that time, the Fokker Jetline series had a healthy backlog of 60 aircraft: 44 Fokker 70s and 16 Fokker 100s.

The termination of production of the Fokker Jetline was unfortunate. Already off to a good start with the Fokker 100, the Jetline had excellent long-term potential. Following its launch in mid-1993, the Fokker 70 appeared to be solidly on its way to gaining a

sizable share of the regional aircraft market. Indeed, the Fokker 70 could have become one of the ways in which major airlines reduced operating costs on routes now flown by much larger jets. In addition, corporate sales could have been a small but important component of any future success of the Jetline.

Attempts by the Dutch company Rekkof Aircraft (formerly known as Rekkof Restart) to revive production of the Fokker 70/100 have come to naught, apparently due to a failure to find financing.

In late 2000, another Dutch company, RDM Holding Inc, also proposed resuming production of the Fokker 70/100. Production would occur in an Asian country, possibly the People's Republic of China (PRC). RDM is the parent company of light helicopter manufacturer MD Helicopters. Hutchison Whampoa

has indicated interest in financing RDM's Fokker jet program.

Meanwhile, a third Dutch company, Forward Aircraft, is attempting to restart production of the Fokker 60 turboprop. The company's managing director, Wichard de Waard, has also indicated interest in restarting production of the Fokker jets.

Despite the interest that has been shown by these companies in resuming Fokker 70/100 production, it is possible that the 70-85 and 90-110 passenger sub-segments may already have too many competitors, and there may not be enough of a market for additional ones.

Currently, a restart of Fokker 70/100 production is not forecast. Further developments are awaited.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR PRODUCTION

Aircraft	(Engine)	High Confidence Level				Good Confidence Level				Speculative			Total 02-11
		thru 01	02	03	04	05	06	07	08	09	10	11	
FOKKER													
FOKKER 100	TAY 620	130	0	0	0	0	0	0	0	0	0	0	0
FOKKER 100	TAY 650	148	0	0	0	0	0	0	0	0	0	0	0
FOKKER 70	TAY 620	47	0	0	0	0	0	0	0	0	0	0	0
Total Production		325	0	0	0	0	0	0	0	0	0	0	0