

# ARCHIVED REPORT

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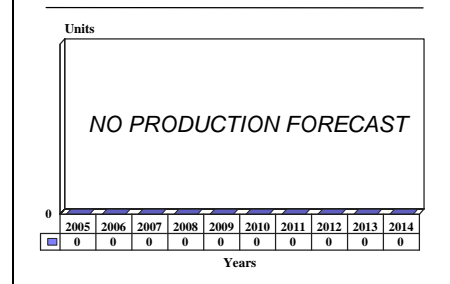
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## IAe N-250 - Archived 7/2006

### Outlook

- The N-250 program is shelved
- Resumption of the program cannot be entirely ruled out

10 Year Unit Production Forecast  
2005 - 2014



### Orientation

**Description.** Pressurized, high-speed, regional/commuter twin-turboprop transport aircraft. Three versions were planned: the 54-passenger N-250-50, the 60-68 passenger N-250-100, and the 70-76 passenger N-270.

**Sponsor.** The N-250 was sponsored by Indonesian Aerospace (IAe).

**Status.** The N-250 program is shelved.

**Total Produced.** The initial N-250 prototype was rolled out in November 1994. First flight occurred in August 1995. A second prototype made its initial flight in December 1996.

**Application.** Short-haul, commercial and military passenger/cargo transportation. Additional applications included maritime patrol, search-and-rescue, and anti-submarine warfare.

**Price Range.** N-250-100: \$14.5 million in 2002 U.S. dollars.

### Contractors

PT. Dirgantara Indonesia (Indonesian Aerospace - IAe), <http://www.indonesian-aerospace.com>, Jalan Pajajaran 154, Bandung, 40174 Indonesia, Tel: + 62 22 6034562, Fax: + 62 22 6019538, Email: [infosales@indonesian-aerospace.com](mailto:infosales@indonesian-aerospace.com), Prime

Rolls-Royce Corporation, <http://www.rolls-royce.com/northamerica>, PO Box 420, 2001 South Tibbs Ave, Indianapolis, IN 46206-0420 United States, Tel: + 1 (317) 230-2000, Fax: + 1 (317) 230-6763 (AE 2100 Turboprop Engine)

Rockwell Collins Inc, <http://www.rockwellcollins.com>, 400 Collins Rd NE, Cedar Rapids, IA 52498-0001 United States, Tel: + 1 (319) 295-1000, Fax: + 1 (319) 295-5429, Email: [collins@rockwellcollins.com](mailto:collins@rockwellcollins.com) (Pro Line 4 Avionics System)

Goodrich Power Systems, Pitstone Green Business Park, Westfield Road, Pitstone Green, LU7 9GT Buckinghamshire, United Kingdom, Tel: + 44 1296 663000, Fax: + 44 1296 663300 (Three-Axis FBW Flight Control System)

Liebherr-Aero-Technik GmbH, Pfaenderstr 50/52, Postfach 1363, Lindenberg, Germany (Three-Axis FBW Flight Control System)

Auxiliary Power International Corp, <http://www.hs-powersystems.com>, 4400 Ruffin Road, PO Box 85757, San Diego, CA 92186-5757 United States, Tel: + 1 (858) 627-6527, Fax: + 1 (858) 636-3535 (APS-1000 APU)

Dowty Propellers, <http://www.smiths-aerospace.com>, Anson Business Park, Cheltenham Road East, Gloucester, GL2 9QN United Kingdom, Tel: + 44 1452 716000, Fax: + 44 1452 716001 (Propeller)

Flight Refuelling Ltd, <http://www.flight-refuelling.com>, Brook Rd, Wimborne, BH21 2BJ Dorset, United Kingdom, Tel: + 44 1202 882121, Fax: + 44 1202 880096, Email: [businessdevelopment@flight-refuelling.com](mailto:businessdevelopment@flight-refuelling.com) (Fuel Management System)

Hamilton Sundstrand, <http://www.hamiltonsundstrand.com>, One Hamilton Rd, Windsor Locks, CT 06096-1010 United States, Tel: + 1 (860) 654-6000, Fax: + 1 (860) 654-2621, Email: [hs.general@hsd.utc.com](mailto:hs.general@hsd.utc.com) (Environmental Control System)

## Technical Data

### (N-250-100)

**Design Features.** Cantilever high-wing monoplane. The airframe was fabricated from aircraft light alloys and titanium with a significant portion of nonstructural components of composite materials. The fuselage was derived from that of the CN-235, although it was wider and taller. The wing, tail, and engine nacelles were all-new designs. The wing included double-slotted fixed vane flaps and wing spoilers for STOL enhancement. Standard avionics equipment included the Rockwell Collins Pro Line 4 avionics system. This system featured five large CRT displays that provide primary flight, navigation, engine, and aircraft status information. A sixth display was optional. Dassault Aviation assisted IAe with CAD/CAM systems implementation. Fly-by-wire technology was used for the primary and secondary flight control systems.

Lucas (since absorbed into Goodrich) and Liebherr were selected to provide the FBW control system in June 1992.

Subcontractors included Rolls-Royce for the propulsion system; Dowty for the six-blade propellers; Messier-Dowty for the landing gear; Goodrich for the Full Authority Digital Engine Control; APIC for the auxiliary power unit; Intertechnique for the EROS oxygen system; Flight Refuelling for the fuel management system; Hamilton Sundstrand for the environmental control system; Abex GmbH Aerohydraul for the hydraulic power generation system; and GKN Aerospace Transparency Systems for windshields, cabin windows, and the windshield heating control system.

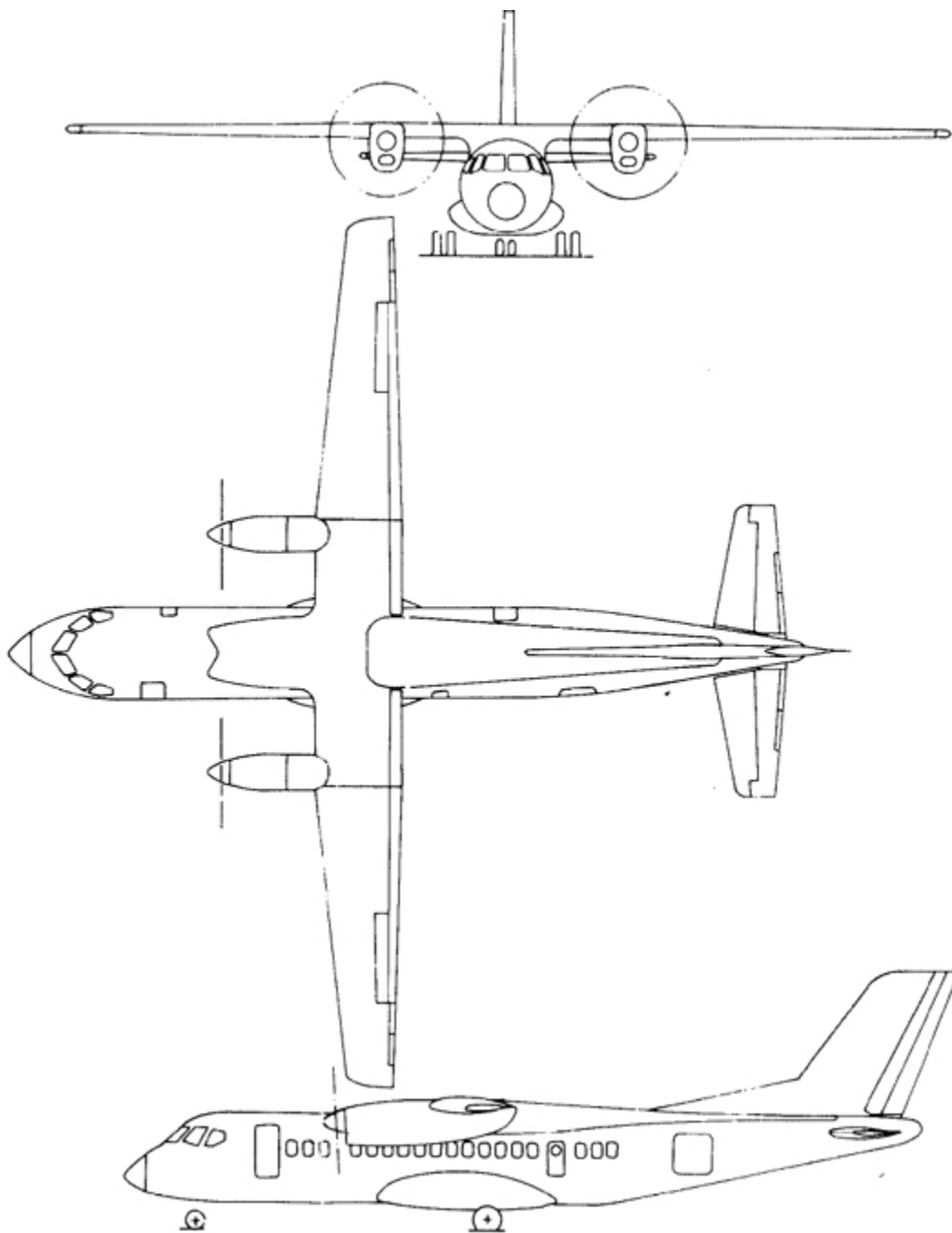
	<u>Metric</u>	<u>U.S.</u>
<b>Dimensions</b>		
Wingspan	28.0 m	91.86 ft
Overall length	28.15 m	92.36 ft
Overall height	8.78 m	28.81 ft
Fuselage length	26.77 m	87.83 ft
<b>Weight</b>		
Max TOW	24,800 kg	54,675 lb
Max landing weight	24,600 kg	54,234 lb
Max fuel weight	4,200 kg	9,259 lb
Max payload	6,200 kg	13,669 lb
<b>Performance</b>		
Max cruise speed at 20,000 ft, ISA	616 km/h	330 kt
Takeoff field length	1,219 m	4,000 ft
Landing field length	1,219 m	4,000 ft
Max range with 64 passengers, ISA	1,481 km	800 nm

### **Propulsion**

N-250-100/-50 (2) Rolls-Royce AE 2100C axial-flow, free turbine turboprop engines rated 2,439 kW (3,271 shp) each. Engines turned Dowty six-blade, low-noise, high-efficiency, composite propellers.

### **Seating**

Crew of two. Four passenger configurations were available for the N-250-100: 62 or 64 passengers at 32-inch pitch, 68 passengers at 30-inch pitch, and 60 passengers at 32-inch pitch with optional increased cargo. All-cargo and combi versions were also to be available.



N-250

Source: IPTN

### Variants/Upgrades

N-250-100. Stretched N-250 version that carried 60-68 passengers. Originally called the N-270. The -100 had a 0.5-meter fuselage plug in front of the wing and a one-meter plug aft of the wing.

N-250-50. Fifty-four passenger version. Based on the initial N-250 prototype.

N-270. IAe had planned a further stretched version of the N-250. This version, which assumed the N-270

designation, was to have seated 70 passengers four abreast at 31-inch pitch and have a cargo area in the forward cabin. Compared to the N-250-100, the N-270 was 3.05 meters (10.0 feet) longer. Maximum take-off weight was 28,300 kilograms (62,400 lb). Maximum payload was 8,200 kilograms (18,078 lb).

The N-270 was to be powered by uprated AE 2100C turboprops, rated 2,983 kW (4,000 shp) each. Range

with 70 passengers was estimated at 1,481 kilometers (800 nm).

IAe had suspended N-270 development until certification had been received for the N-250.

N-250-200/-300. Proposed stretched versions of the N-250. The -200 was to have been capable of carrying 76 passengers.

## Program Review

**Background.** Industri Pesawat Terbang Nusantara (IPTN), as IAe was then called, launched the N-250 at the 38th Paris Air Show in 1989, following a market evaluation that began in 1987. That study resulted in a decision in 1989 to proceed with development of the N-50. The first metal for the initial prototype was cut in August 1992.

Development Program. First flight of the initial N-250 prototype was originally scheduled to take place in 1994. However, the prototype made its initial flight in August 1995.

It was originally announced that engine selection would probably be made by the end of 1989. In early 1990, however, the selection was scheduled to be made in April of that year. Candidates included the Allison GMA 2100 (later known as the AE 2100), the General Electric GLC38, and the Pratt & Whitney Canada PW130. In July 1990, IPTN finally announced that the GMA 2100 would power the new transport. This engine received its U.S. Federal Aviation Administration (FAA) certification in December 1993. Allison (since merged into Rolls-Royce) delivered two engines to IPTN in 1994 for installation on the N-250.

The N-250 was FADEC-equipped. IPTN also incorporated fly-by-wire technology into the N-250. The aircraft had fly-by-wire technology applied to flap, aileron, spoiler, elevator, and rudder circuits, with a backup system for the ailerons and elevators. In July 1992, IPTN selected a team of Lucas Aerospace (since absorbed into Goodrich) and Liebherr-Aero-Technik to develop and supply the entire three-axis fly-by-wire flight control system for the N-250.

The 50-seat N-250 experienced a problem with weight growth. In early 1993, an analysis of the aircraft's airframe showed that the basic N-250 would likely be five to 10 percent overweight. Such an increase would translate into a weight gain of approximately 1,000 kilograms. Engineers began working on a new target weight for the aircraft design. IPTN began looking to save weight through increasing the use of composites in secondary structures and by reducing the wiring harness.

IPTN had planned to introduce a stretched variant after building 50 units of the basic 50-seat version. However, in June 1993, IPTN announced that, in response to market requirements for additional passenger capacity, the stretched N-250 variant (to be called the N-250-100) would be the production version right from the start of the program.

Beginning in mid-1994, the Indonesian government diverted \$185 million from the country's reforestation budget to the N-250 development program. IPTN had apparently found itself short of funds to continue the program. The funding diversion sparked protests by several environmental groups, which went to court to block the diversion. However, in late 1994, an Indonesian court ruled in favor of the government.

As mentioned above, the first flight of the initial prototype, a 50-seater, occurred in August 1995. At that time, then-IPTN chairman Bacharuddin Habibie announced that IPTN would now manufacture the N-250 in two versions: a 50-seat aircraft and the larger N-250-100 version. The decision to market the 50-seat aircraft was prompted by a desire to provide an entire family of aircraft, from the 30-40 passenger CN-235 to the proposed 130-passenger N2130 regional jet. The smaller N-250 version, which would carry 54 passengers, later became known as the N-250-50.

A second N-250 prototype made its initial flight in December 1996. It was built in the stretched N-250-100 configuration.

In January 1998, as part of a \$43 billion bailout of the Indonesian economy, the International Monetary Fund (IMF) ordered the Indonesian government to cease financing IPTN. This had a serious impact on the N-250 program.

Some previous delays in the N-250 program had occurred due to problems in achieving FAA certification of the aircraft. The U.S. agency expressed dissatisfaction with the component documentation of the second prototype. In addition, no bilateral airworthiness agreement covering aircraft certification was in effect between Indonesia and the U.S. Without such an

agreement, the FAA could not certify the aircraft for operation in the U.S.

Subsequently, IPTN decided to target European Joint Aviation Authorities (JAA) certification. In the fall of 1997, the JAA reached an agreement on working with the Directorate General of Air Communications (DGAC), the Indonesian air certification authority, to validate airworthiness certification of the N-250.

Meanwhile, by early 1998 the N-250 program was claimed to be completely in compliance with FAA requirements. Also, Boeing agreed to help in gaining FAA certification for the N-250.

Airbus had earlier signed a Memorandum of Understanding (MoU) with IPTN to assist in the N-250 flight test and certification process.

IAe intended to certify the -100 first. An amended type certificate for the -50 was to have then followed.

N-270. IAe's plans to open a facility in the U.S. for final assembly of the N-250-100 and the N-270 were

put on hold due to concerns over the size of the U.S. market. This plant, which was to have been located in Mobile, Alabama, was to have supplied aircraft for the U.S., Canada, and South America. Mobile was selected in June 1995 over another site in Macon, Georgia. Major subassemblies were to have been fabricated in Bandung and shipped to Mobile for assembly as well as engine and avionics systems installation.

The Mobile facility was to have been operated by American Regional Aircraft Industries Inc (AMRAI). IAe held a 40 percent stake in AMRAI, and General Electric had a 10 percent share. Boeing was approached to participate in the effort.

AMRAI was to have marketed and assembled the 70-76 passenger N-270, which was targeted at the North American market. However, N-270 development was shelved until the N-250 was certified. The N-270 had been designed and priced to compete with the Bombardier Q400.

## Funding

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Development costs had been estimated at \$528 million.

## Recent Contracts

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None

## Timetable

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<u>Month</u>	<u>Year</u>	<u>Major Development</u>
Jan	1987	IPTN begins studies of new regional transports
Jun	1989	N-250 launched at 38th Paris Air Show
Jul	1990	GMA 2100 selected to power N-250
Aug	1992	First metal cut
Jun	1993	N-250-100 announced as production version
Nov	1994	Rollout of initial N-250 prototype
Aug	1995	First flight of initial N-250 prototype; Announcement that N-250 would be built in two versions
Dec	1996	First flight of second prototype

## Worldwide Distribution

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Not applicable.

## Forecast Rationale

The N-250 program is currently shelved. IAe had hoped to find an investor (or investors) to contribute the \$90 million needed to complete certification of the aircraft, and had discussions with several potential foreign investors over securing this funding. However,

at this writing, no suitable investors have committed to the program.

In early 2004, the Indonesian government conducted a study on the possibility of reviving the N-250 program.

The N-250 effort is currently in limbo. Two prototypes have been completed. Construction of a third prototype was started, and remains incomplete.

IAe teamed with Composite Research Technology Malaysia (CTRM) in 2004 to investigate the possible joint development of a new 50-passenger STOL turbo-prop aircraft using materials from the N-250 program.

Resumption of the N-250 project cannot be completely ruled out, though it appears unlikely. If the project is revived, the N-250 would face a number of competitors for sales. The market for 60-75 passenger regional aircraft is crowded and includes turboprop aircraft such as the ATR 72 and the Bombardier Q400, as well as regional jets such as the Bombardier CRJ 700 and the Embraer 170.

## Ten-Year Outlook

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No forecast.

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