

# ATR Invests In Digital Mockups To Streamline Aircraft MRO

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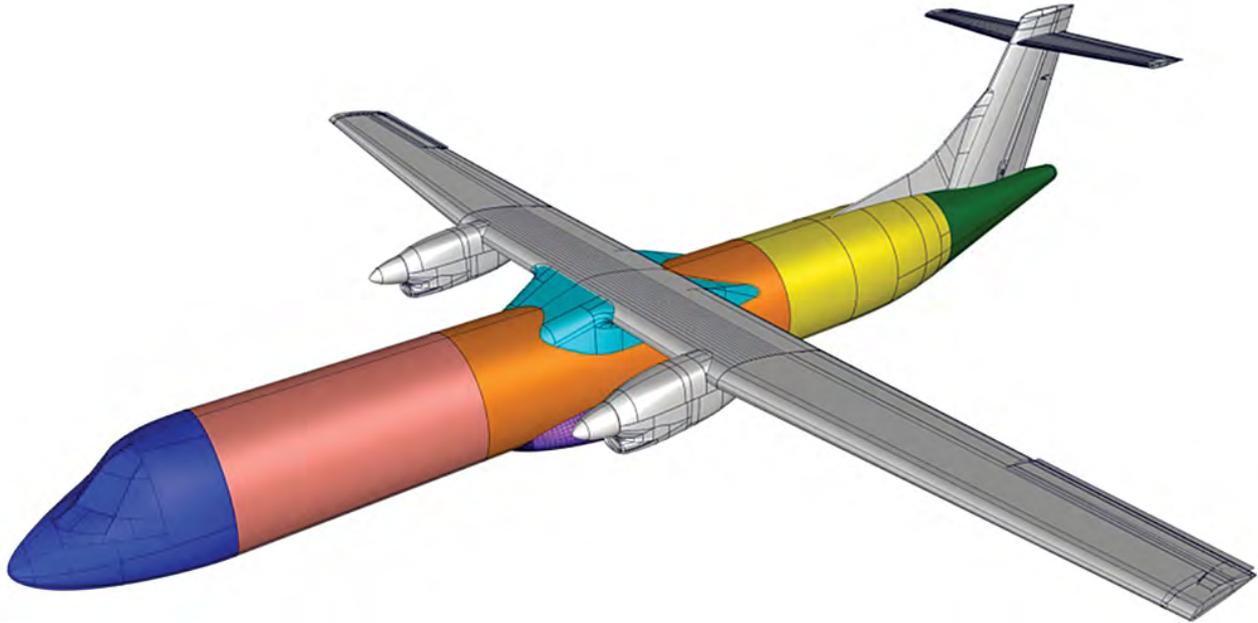
**ATR** is digitizing the design drawings for the ATR 72 regional turboprop, a four-year endeavor that shows how 3-D digital mockups have become all-important, even for an aircraft in service for three decades.

The need the Toulouse-based manufacturer identified is different than what manufacturers usually emphasize when using the latest in computer-aided design (CAD). For example, in 2002, when Dassault Aviation praised the benefits of designing its Falcon 7X with Dassault Systemes' Catia software, it highlighted the better integration between design and production. In ATR's case, the idea is to streamline repair and modification processes.

When a customer asks for guidelines to perform a new repair, ATR engineers must refer to paper drawings and 20-30-year-old software. The technique is relatively slow, and some computing tools are becoming or are already obsolete. Because many young engineers are familiar only with CAD tools, ATR has had to instruct them on drawing-board use. The company determined that four years spent digitizing drawings would be worthwhile, given that an ATR aircraft's service life is 30 years or more.

"We will save time when devising each repair drawing; we will thus be faster in answering our customers' requests," Vladimir Camuzard, head of structures support engineering, tells *Aviation Week*. Customers include airlines and maintenance, repair and overhaul service providers.

Another anticipated improvement is the readability of design drawings. "When a customer has to replace a part, their maintenance technicians have to use the drawings we send them," but they lose time in trying to decipher them, Camuzard explains. Customers had therefore suggested that ATR use a virtual mockup, which would give them a better understanding of the aircraft's design and help them train their employees.



***ATR is creating a digital mockup for the ATR 72's fuselage, and partner Stelia Aerospace is doing the same with the wing. Credit: ATR***

The work began in September 2015. Approximately 10,000 parts have to be modeled. In fact, rather than a generic digital mockup, ATR is creating one for each manufacturer serial number (MSN). The first is for a Bangkok Airways ATR 72-600. Once complete, this virtual mockup will be the basis for much-faster creation of the other MSNs' 3-D digital models. Developing one for an ATR 42 will be about as fast, Camuzard adds.

The initial work is limited to the fuselage, as it is the area that sustains the most damage from impacts. So far it only encompasses the airframe, although systems will eventually be included.

Airbus-owned aerostructures supplier Stelia Aerospace is performing parallel work on the wing, which it manufactures. The digital mockup is complete for the ATR 72's wing and "well underway" for the ATR 42's, a Stelia spokesperson says. In addition to the structure, the 4,000-part digital mockup includes mechanical and electrical systems. Such a 3-D digital model is needed for improvements on the wing and its future evolution, the spokesperson emphasizes.

ATR is considering adding the empennage later at an undisclosed time. Combining all these works, the company hopes to build an exhaustive digital mockup model of its aircraft.

Will the company encourage its suppliers to digitize their old drawings? "It is rather working the other way round—when an equipment manufacturer develops a new system with a virtual mockup, its design engineers ask about details on the interface," says Camuzard. Thus far, ATR has found it difficult to answer promptly.

The digitization task involves a long and tiresome data input process. "We start with scanned paper drawings that pose legibility problems; we have to go and see an aircraft on the

assembly line to answer some questions," says Camuzard. ATR is not resorting to retired design engineers. Rather, it turns to repair technicians, whose experience helps decipher original drawings.

So far only a few ATR personnel are assigned to the digitization effort. One is dedicated to the task full time, others contribute some hours per week, along with their primary jobs resulting in an estimated total equivalent of two full-time employees. But the airframer has contracted an unnamed engineering company, which has allotted 15 full-time engineers and technicians.

The software program is Catia v5, the same version Airbus (and its subsidiary, Stelia) uses. ATR's parent companies, Airbus and Leonardo, do not use the same software programs, Camuzard notes. "Airbus is accustomed to managing these differences, and there will be a solution to any problem," he says. Heterogeneous software was one of the causes of the huge delay in the early production phase of the A380, 10 years ago.

Another Dassault tool being used for the project is Enovia Virtual Project Management, which sorts aircraft configurations efficiently and allows several people to work concurrently.

In addition to answering the need for streamlined repair and modification processes, having a 3-D model "opens other doors," Camuzard says. For example, approving a slight discrepancy between the definition phase and an in-production aircraft is expected to become a smoother process. Communications among engineers will be based on clearer representations, Camuzard explains.

The cabin interior department is already working with a digital mockup. Airframe and cabin interior engineers commented on how much easier it was to work together when they reviewed an airframe-lavatory interface recently.