

Puerto Rican engineers co-develop world's smallest and most fuel-efficient turbofan engine

Florida Turbine Technologies makes history by successfully demonstrating a 35% fuel consumption reduction for turbine engines in its size range

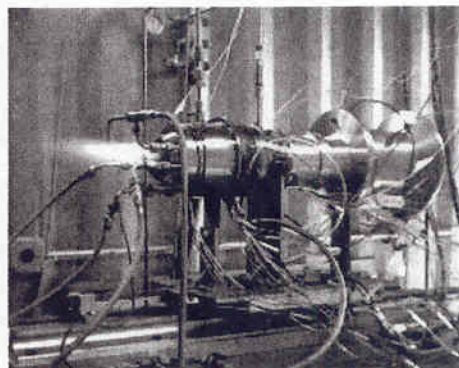
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A team of Puerto Rican engineers at Florida Turbine Technologies Inc. (FTT) in Cabo Rojo have co-developed, along with engineers from the company's Florida headquarters, the world's smallest and most fuel-efficient turbofan engine. The engine, referred to as FTA37F, can fit in the palm of a person's hand and was developed

by FTT under a \$7.5 million contract to develop high-efficiency turbine engines for remote-controlled unmanned aerial vehicles (UAVs) for the U.S. Army. The fuel consumption measured during recent engine tests is 35% less than the state-of-the-art turbine engine in its size range.

The FTA37F is designed using two concentric shafts, while other small turbine engine designs are based on only one shaft. The two-shaft configuration allows the engine to perform at high fuel-efficiency with better performance operability. FTT overcame several extremely difficult design challenges associated with the engine's small size. The second shaft (the low rotor) enables the incorporation of a fan rotor at the front of the engine to give the engine a "bypass" stream which helps increase thrust without increasing fuel burn. The presence of the fan, the low rotor, and the bypass stream make the engine a true turbofan, like large jet engines used to power commercial aircraft.

"What we have achieved here is to come up with a true turbofan design for an application that is so small. A turbofan is a combination of a turbojet and a large fan in front of the engine. When you look at the front of a jet engine on a commercial airplane at the airport, what you are actually seeing is the fan in front of the turbine. Part of the air that enters a turbofan engine actually goes through the turbine, while at the



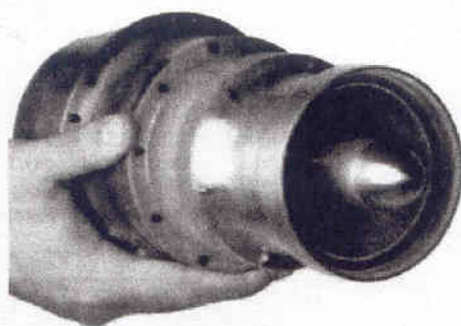
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same time air also goes around the turbine to the exhaust, which is called a bypass. Large commercial engines are usually made with high bypass ratios that allow for better efficiency. Our engine does have a bypass ratio, which in a package so small is quite an achievement," said Antonio Negrón, engineering manager, Puerto Rico operations, Florida Turbine Technologies.

He added, "Development of this engine has taken about three years. When you are designing an engine, you are looking for certain targets, mainly thrust and fuel consumption. There were specific guidelines that were provided to us during the design phase that were met. We just finished the performance testing, proving the general function of the engine. There will be two or three more additional phases before we get to actual production," noted Negrón.

Asked if they (FTT) could develop an even smaller turbofan engine without compromising performance characteristics, Negrón said, "The size of the FTA37F was basically part of the specifications that were requested. Can it go smaller? Maybe, but it gets harder as a lot of these technologies don't scale linearly with size."

As a whole, the company works on the development of aerospace and industrial gas turbines. "Although we work in the gas turbine industry just like other companies here on the island, we are completely different in the fact that we are really a think tank, a technology company, not a factory. In terms of a knowledge economy, the most important thing here is how much technology you are developing (not necessarily jobs). We are at the cutting-edge of technology and all about quality and not quantity. One of my goals is to maximize the number of patents that are generated out of this office. To me that is the value-added component of our presence here," concluded Negrón. ■



The FTA37F, the world's smallest and most fuel-efficient turbofan engine can fit in the palm of a person's hand.

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