

Baker Hughes' Waygate Technologies, GE Aerospace to Deliver new AI-assisted Commercial Jet Engine Borescope Inspection Solution to Enhance Defect Recognition

- *Successfully integrated cutting-edge AI techniques that help increase detection rates by ~34%, while reducing false alerts by >13% vs. previous Gas Power-assist model version 4.1.*
- *AI to assist inspectors with engine inspections, making them more reliable and ergonomically friendly*
- *New AI-enhanced version will be made available to customers through an upcoming software update for the Mentor Visual iQ+ video borescope later this year*
- *New inspection solution part of a broader technology push to improve reliability and turnaround times at MRO shops and remove supply chain bottlenecks*

Huerth, Germany / Skaneateles, NY and Cincinnati, OH - Monday, October 28, 2024 – Waygate Technologies, a Baker Hughes business, and GE Aerospace announced they have jointly developed a new, AI-assisted commercial engine borescope solution that will be available to Waygate Technologies customers and introduced to GE Aerospace's MRO network later this year. The development represents the successful completion of their first development program under a [Joint Technology Development Agreement](#) between the two companies announced in May of 2023.

As part of this first program, GE Aerospace and Waygate Technologies focused on enhancing machine vision-based assisted defect recognition (ADR) systems using AI for commercial aviation engine borescope inspections. Specifically, High Pressure Compressor (HPC) inspections were targeted, as these are one of the most critical and time-consuming tasks in the engine Maintenance, Repair, and Overhaul (MRO) process.

“The latest results of this collaboration demonstrate the value added by technological partnerships that are firmly anchored in the business strategy of Waygate Technologies,” said Michael Domke, General Manager Visual at Waygate Technologies, a Baker Hughes business. “The combination of GE Aerospace's extensive customer data and our market-leading advanced borescope solutions promises to be an extremely valuable optimization for the entire MRO sector.”

“At GE Aerospace, we increasingly are seeing the value AI technologies are bringing to help improve the speed, accuracy, and reliability of commercial jet engine inspections,” stated Nicole Jenkins, Chief MRO Engineer, GE Aerospace. “Collaborating with Waygate Technologies, we have successfully combined our industry domain knowledge and digital expertise to integrate new AI techniques with the right data to improve the detection capabilities of commercial engine borescope inspections.”

Jenkins noted that once the new AI-assisted borescope solution is deployed to its MRO shops, it will be used to perform HPC inspections for its GENx and CFM LEAP* engines.

Jenkins added, “This joint development illustrates a bigger effort to give our inspection engineers more advanced tools using AI, computer vision, and automation to help them work productively and meet the needs of our customers. We believe this AI-assisted borescope

system will help significantly reduce the time it takes to perform HPC inspections, while delivering high accuracy at the same time.”

Through this joint development effort, GE Aerospace provided Waygate Technologies with a comprehensive dataset of engine inspection videos, which resulted in thousands of new representative images used for training Waygate Technologies’ Gas Power-assist ADR model. GE’s Services Technology Acceleration Center (STAC) and GE Aerospace Research brought subject matter expertise to ensure accurate and complete data labeling was performed. Waygate Technologies then leveraged this data and applied cutting-edge AI techniques, including a compute-optimized, state-of-the-art object detection algorithm and a novel temporal smoothing algorithm.

Key technical advancements, as compared to the program starting point (Gas Power-assist ADR model v4.1), include:

- **Increased True Positive Rate:** Model recall rates realized a **33.6%** increase, indicating a dramatic improvement in identifying HPC defects.
- **Decreased False Positive Rate:** Model precision rates realized a **13.5%** increase, indicating a reduction in previously falsely identified defects. This improvement was achieved both by an increased training dataset and the temporal smoothing algorithm used for detection confirmation.

The new AI-assisted features will be integrated and available for deployment through a software update to customers for Waygate Technologies’ [Mentor Visual IQ+](#) borescope later this year. In addition, GE Aerospace will be introducing the model to its MRO network for use in High Pressure Compressor inspections for its GENx and *CFM LEAP engines.

To ensure greater reliability in borescope inspections, the new AI-assisted features will improve the inspection workflow by both significantly reducing the learning curve for new inspectors while simultaneously aiding existing inspectors by assisting in the detection of previously difficult to detect defects. All users of this technology should see an increased probability of detection and a reduction in mental fatigue from inspection.

In addition to the improvements made to the Gas Power-assist ADR model, an automated data anonymization tool was developed during this program. This tool enabled the protection of sensitive partner data, while allowing it to be added to the training dataset efficiently.

**The CFM LEAP engine is produced through a 50/50 joint venture between GE Aerospace and Safran.*

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Images



An operator using a Mentor Visual iQ+ video borescope to inspect a GE engine



Mentor Visual iQ+ video borescope with Gas Power-assist 5.0 analytic showing dent indications on the leading edge of a high-pressure compressor blade

Media Contacts

Henning Juknat
Global Communications Leader
Waygate Technologies
Baker Hughes

+49 2233-601272

henning.juknat@bakerhughes.com

Todd Alhart

Director, Innovation Communications

GE Aerospace

+1 518-338-5880

Todd.alhart@geaerospace.com