

**FUTURE REFERENCE**

Boeing engineer Carissa Pajel pours jet reference fluid into a jar for sealants immersion testing in a laboratory.

PHOTO: BOEING



## Liquid Asset: The Way to Net Zero Is Fluid

Team aims to enable 100% sustainable aviation fuel-compatible airplanes by 2030

BY ELISA HAHN AND ED MUIR, BOEING WRITERS

Inside a laboratory, Boeing engineer Carissa Pajel pours fluid into a glass beaker – a clear substance that could be liquid gold.

A cross-functional Boeing team will use the liquids, known as jet reference fluids (JRFs), to understand how airplanes interact with 100% sustainable aviation fuel (SAF).



**TEST TEAM**

(From left) Mindy Miller, Product Development Advanced Materials Associate Technical Fellow; Pajel, Boeing Research & Technology Materials Process and Physics engineer; J.P. Belieres, Propulsion Systems Division, Engines and Fuels Technical Fellow; and Ilya Kosilkin, Fuel Properties group lead, developed the JRFs in Boeing's laboratory in Seattle.

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**The Challenge:**  
**Getting to 100% Compatibility by 2030**

Pajel is part of Boeing's SAF Aircraft Compatibility Integrated Product Team. They are tackling the technical challenge to ensure all the commercial airplanes Boeing delivers can fly on 100% SAF by 2030.

Two years ago, Boeing committed all its commercial airplanes will be 100% SAF-capable by 2030. SAF has the potential to reduce carbon emissions by up to 80% over the fuel's life cycle.

"Our systems and materials on our airplanes were designed for conventional jet fuel," said Propulsion Systems Division, Engines and Fuels Technical Fellow J.P. Belieres.

"Now that we're moving to cleaner and more efficient fuels, which may not have some of the chemical compounds of petroleum-based jet fuels, we need to make sure our systems are compatible."

This includes testing anything fuels come into contact with on the airplane – primers, sealants, finishes, metals, composites and O-rings, for example.

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**J.P. BELIERES,**  
 PROPULSION SYSTEMS DIVISION,  
 ENGINES AND FUELS TECHNICAL FELLOW



**FUEL FOR THOUGHT**

A vial of SAF sits in a Boeing laboratory.

PHOTO: BOEING



**SAF FACTS**  
 What you need to know.





**The Achievement:**  
**A Reference for Testing SAF Interaction**

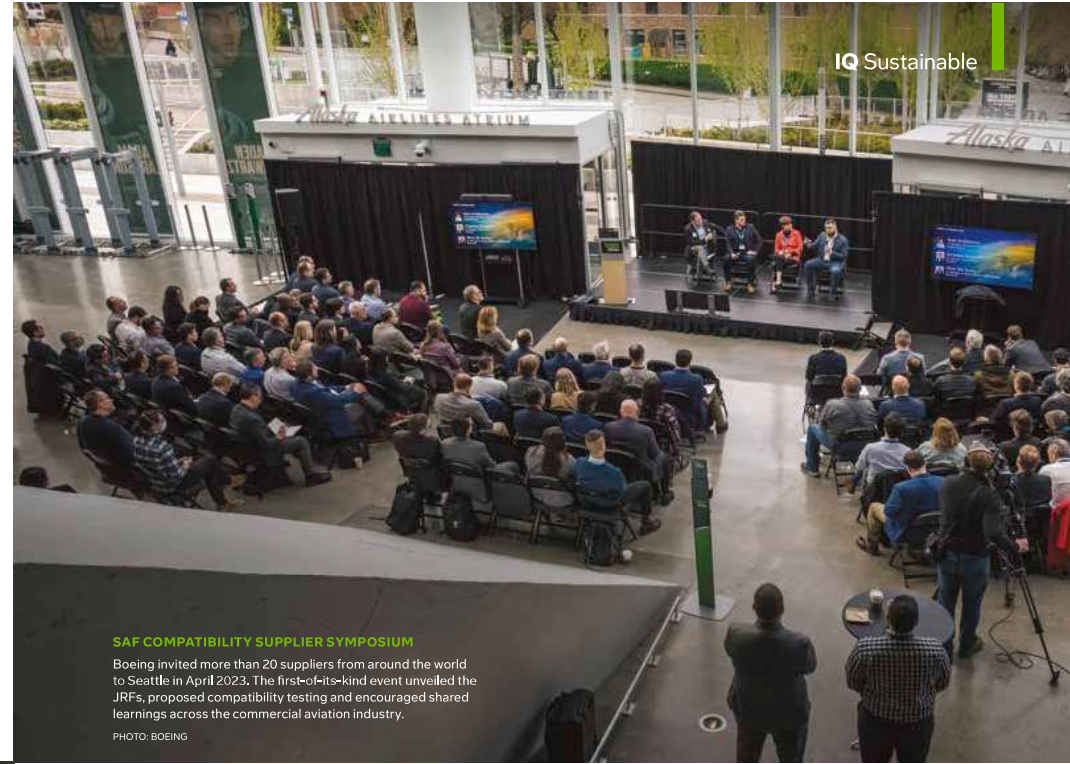
The team reached a significant testing milestone by successfully developing a SAF JRF, the first in a variety of fluids that mimic the chemistry and behaviors of sustainable aviation fuels. The chemical makeup of SAF can vary depending on the feedstock and refining process. With this in mind, the team developed the JRFs to test how SAF interacts with airplane materials differently from conventional petroleum-based jet fuel.

Pajel and team, for example, will immerse sealants in the JRFs to see how the sealants behave when exposed to SAF for certain durations and temperatures.

**GOOD POUR**

Pajel uses the JRF to test sealant by soaking it in the fluid for various periods of time and at a variety of temperatures. The goal is to determine any effects on sealant performance. Sealant is used in several areas of the airplane, such as the fuel tank.

PHOTO: BOEING



**SAF COMPATIBILITY SUPPLIER SYMPOSIUM**

Boeing invited more than 20 suppliers from around the world to Seattle in April 2023. The first-of-its-kind event unveiled the JRFs, proposed compatibility testing and encouraged shared learnings across the commercial aviation industry.

PHOTO: BOEING

**Why It Matters:**  
**Net Zero in Sight**

“To reach net zero by 2050, SAF is required,” said Sheila Remes, vice president, Environmental Sustainability. “And while SAF is the answer, it isn’t an easy answer. There is so much work to be done in scaling SAF.”

**What’s Next:**  
**Supplier Collaboration**

“The team’s achievement allows Boeing to move into a new phase of collaboration with our engine manufacturers, suppliers and SAF producers. This enables a collective focus on reducing the environmental impact of our industry,” said Product Development Associate Technical Fellow Mindy Miller.

“It is the true spirit of sustainable aerospace together.”

In addition, these fluids can serve as a standardized reference for the industry to enable testing of various materials that come into contact with SAF on an airplane. Boeing is already requesting that suppliers conduct similar assessments. **IQ**

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**MINDY MILLER,**  
**PRODUCT DEVELOPMENT,**  
**ASSOCIATE TECHNICAL FELLOW**

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