

In The News

NASA Propulsion Controls & Diagnostics Workshop
Cleveland OH
16-17 September 2015

Bruce Wood
Pratt & Whitney

This Document Has Been Publicly Released by Pratt & Whitney

Associated Press

Volume MMXV

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Flights Canceled After Mexican Volcano Spews Ash

MEXICO CITY - For the second time in 10 days, the Popocatepetl volcano east of Mexico City spewed ash into the sky, forcing cancellation of flights at the nearby Puebla International Airport.

According to Mexico's National Center for Disaster Prevention, a series of explosions at the volcano overnight tossed hot rocks 760 yards (700 meters) down the volcano's cone and sent a column of ash nearly 2 ½ miles (4 kilometers) into the sky.

Volcanic Ash In The News

- 1500 Volcanoes – 80 Aircraft Encounters – 7 Engines Lost Power
- Eyjafjallajökull in 2010 Cost Airlines >\$1 Billion in Cancellations
- Timely Aircraft Dispatch versus Engine Degradation
- Vehicle Integrated Propulsion Research - *Collaboration*

Opportunities for Controls & Diagnostics Community

- In-Situ and Virtual Sensing for Atmospheric Conditions
- Damage Interpretation for Real-time Operational Decision Support

Cable News Network

Volume MMXV

May 18, 2015

FBI: Hacker Claimed To Have Taken Over Flight's Engine Controls

By Evan Perez

A cybersecurity consultant told the FBI he hacked into computer systems aboard airliners up to 20 times and managed to control an aircraft engine during a flight, according to federal court documents.

Chris Roberts was detained by the FBI in April following a United Airlines flight to Syracuse, New York, after officials saw Twitter posts he made discussing hacking into the plane he was traveling on.

Cybersecurity In The News

- Digital Hijacking: Real-time and Latent Embedded Threats
- Aircraft and Engine Data Hacking
- Malware Corruption of Fleet Management Systems

Opportunities for Controls & Diagnostics Community

- Smart Cybersecurity Regulations
- Secure and Trusted FADEC Architectures and Components
- Big Data Techniques to Help Identify Cyber Attacks

Jet Engines Have Not Been Tested Against Drone Strikes

By Tom Winter and Jay Blackman

Close calls between small drones and passenger planes have been skyrocketing, but no tests have been done to determine what would happen if an unmanned craft was sucked into a jet engine. The federal government has long required that planes be tested for how well they tolerate the impact of bird strikes, but none of the major jet engine manufacturers has done the same for drone impacts.

Drones In The News

- Proliferation of Drone Aircraft
- Safe Drone Highways in the Sky - NASA / Google / Amazon
- Aircraft and Engine Robustness to Drone Damage

Opportunities for Controls & Diagnostics Community

- Ensured Safe Operation of Drones
- Intelligent Autonomy
- Advanced Damage Monitoring

How Cheap Oil Could Become Real Problem for Airlines

By Justin Bachman

“If it [the price of oil] keeps trending lower, it will totally change the economics of the industry again,” says Seth Kaplan, managing partner of Airline Weekly, an industry journal. With oil cheaper, he predicts many airlines will probably fly their planes in off-peak periods because of the low costs associated with those extra flights.”

Low Oil Prices In The News

- Oil Prices Recently Dropped Below \$40 a Barrel
- Cheap Fuel May Spur Increased Flights
- Concerns of Volatile Oil Market – Prices Could Rise Quickly

Opportunities for Controls & Diagnostics Community

- Renewed Focus on Engine Time-on-Wing
- Performance Retention

The Conversation Media Group

Volume MMXV

August 21, 2015

Electric Aircraft – Future of Aviation or Wishful Thinking?

By Peter Wilson

With oil resources declining and penalties on greenhouse gas emissions increasing, is the future of aviation dependent on finding an alternative power sources? “More electric aircraft” jet-powered planes use electricity for other aircraft systems. The idea is to significantly reduce fuel consumption by improving overall energy efficiency. In practice, this means reducing the weight of the aircraft, reducing drag with improved aerodynamics and optimizing the flight profile to use less fuel.

More Electric Aircraft In The News

- “More Electric Aircraft” in Service Today with Boeing 787
- Offers Significant Reductions In Aircraft Size and Fuel Burn
- Improved Reliability

Opportunities for Controls & Diagnostics Community

- Electric Actuation using Wide-Band Gap Power Electronics
- Distributed Controls w/ High Temp Digital Electronics
- Flight Profile Optimization Thru Real-Time Adaptation

Air France Flight 447 - Safety Paradox of Automated Cockpits

By Roman Mars

Complex and confusing automated systems may also have contributed to the crash... “A lot of what’s happening is hidden from view from the pilots”. “It’s buried. When the airplane starts doing something that is unexpected and the pilot says ‘Hey, what’s it doing now?’ “We appear to be locked into a cycle in which automation begets the erosion of skills and lack of skills ... then begets more automation.”

Control Software In The News

- Increasingly Complex Control Systems
- Software Intensive Systems – 24 Millions Lines of Code in F-35!
- Sophisticated Multi-Computer Control Systems

Opportunities for Controls & Diagnostics Community

- Design for Verification & Validation Toolsets
- Real-time Continuous V&V
- Control Software Integration w/ Cockpit

Why Every Flight You Take Is Obsessively Monitored

By Dan Bobkoff

"Maybe [the plane] is burning more fuel than it should because of wind conditions. Or maybe something happened on the aircraft - a part is broken or a system is malfunctioning" ... Modern plane sensors are generating so much data - terabytes of it in some cases - that airlines have to be ready to make use of it all. "You're going to have to have the tools to mine it. Otherwise it's just a bunch of data you're not tapping into".

Big Data In The News

- "A terabyte of Engine Data (or More) Per Flight"
- 25000 Commercial Aircraft @ 5-to-10 Flights per Day"
- "Volumes of Data ... Most Industries Couldn't Conceive Managing"

Opportunities for Controls & Diagnostics Community

- Novel Compact Reliable Sensors
- Real-Time Data Reduction, Reasoning, Fusion - Knowledge Capture
- High Bandwidth Secure Data Transfer

Summary

Flights Canceled After Mexican Volcano Spews Ash

Associated Press – February 25, 2015

<http://www.msn.com/en-us/weather/topstories/flights-cancelled-after-mexican-volcano-spews-ash/ar-BBhXCdA>

FBI: Hacker Claimed To Have Taken Over Flight's Engine Controls

By Evan Perez for CNN - May 18, 2015

<http://www.cnn.com/2015/05/17/us/fbi-hacker-flight-computer-systems/>

Jet Engines Have Not Been Tested Against Drone Strikes

by Tom Winter and Jay Blackman for NBC News - August 13, 2015

<http://www.nbcnews.com/tech/tech-news/engine-makers-havent-tested-drones-n408711>

How Cheap Oil Could Become a Real Problem for Airlines

By Justin Bachman for Bloomberg - October 20, 2014

<http://www.bloomberg.com/bw/articles/2014-10-20/how-cheap-oil-could-become-a-real-problem-for-airlines>

Electric aircraft – The Future of Aviation or Just Wishful Thinking?

By Peter Wilson for The Conversation Media Group - August 21, 2015

<http://theconversation.com/electric-aircraft-the-future-of-aviation-or-just-wishful-thinking-45817>

Air France Flight 447 and the Safety Paradox of Automated Cockpits

By Roman Mars for Slate.com - June 25 2015

http://www.slate.com/blogs/the_eye/2015/06/25/air_france_flight_447_and_the_safety_paradox_of_airline_automation_on_99.html

Why Every Flight You Take Is Obsessively Monitored

By Dan Bobkoff for Business Insider - June 16, 2015

<http://www.businessinsider.com/airplanes-and-big-data-sensors-2015-6#ixzz3jfiH5Lpi>