

Tenth Triennial International Aircraft Fire and Cabin Safety Research Conference

October 17-20, 2022

Resorts Hotel-Casino, Atlantic City, New Jersey, USA

Preliminary Conference Schedule

Opening Session:

Monday, October 17, 2022

1:30 PM–5:00 PM

Welcome: Conference Organizing Committee

Welcome: Federal Aviation Administration (FAA) Technical Center

Keynote Address: Federal Aviation Administration (FAA) Management

EASA Perspective – Ludovic Aron (EASA)

FAA Center for Emerging Concepts and Innovation – James Wilborn (FAA)

Regulatory Update – Bella Maranion (EPA)

Update on Aviation's Halon Footprint – Robert Wright (Boeing)

Revolutionary Vertical Life Technology Project – Susan Gorton (NASA)

Fire and Cabin Safety Considerations for an Hydrogen Full Cell-Powered Airplane – Universal Hydrogen

TUESDAY, OCTOBER 18, 2022 - MORNING

	FIRE RESEARCH I: Testing & Characterization	CARGO HAZARDS/RISKS I	POWERPLANT & PROPULSION FIRE PROTECTION I	CABIN SAFETY I
	Chair:	Chair: Steve Rehn	Chair:	Chair:
8:00-8:30 AM	Phosphorus Impact on Soot Formation in Flames of Condensed Phase Fuels Haqing Guo, R. Walters, R. Lyon Diakon Solutions LLC, FAA Technical Center	UN Classification - Status George Kerchner The Rechargeable Battery Association (PRBA)	Cardiac Sensitization Toxicity Testing and Implications for CF3I Risk Assessment as a Halon 1301 Replacement Britt Weldon Boeing	Live Virus Testing on Aircraft Rohit Nene Boeing
8:30-9:00 AM	An Application of the Fire Propagation Apparatus to the Measurement of Fire Toxicity Stanislav I. Stoliarov, S. Roy, F. Khosroshahi University of Maryland	Predictive Lithium Battery Thermal Runaway Analysis Using Simulation for the G27 Packaging Standard Matt Karp and Darren Nunes Federal Aviation Administration (FAA) Technical Center and Siemens	Occupational Health Risks from Use of CF3I as a Halon 1301 Replacement in APU Fire Extinguishing Systems Britt Weldon Boeing	Overall Cabin Disinfectant Models Bryan Moran Boeing
9:00-9:30 AM	History of the Milligram-Scale Flame Calorimeter F. Raffan-Montoya, X. Ding, J. DeBeer, S. Stoliarov University of Maryland	A Study of the State of Charge of Lithium Ion Batteries in Transportation Dan Keslar Federal Aviation Administration (FAA) Technical Center	Dispersion Characteristics of CF3I in APU Applications Sarah Wickham Boeing	Effects of UV-C Germicidal Irradiation on Aircraft Cabin Interior Materials Aswini Kona Ravi National Institute for Aviation Research (NIAR)
9:30-10:00 AM	BREAK	BREAK	BREAK	BREAK
10:00-10:30 AM	Automated Characterization of Heat Capacities and Heats of Pyrolysis of Flammable Materials Morgan C. Bruns, Isaac T. Leventon St. Mary's University / NIST	Assessment of the Environmental Conditions for Lithium Batteries During Transport Henry Lu Transport Canada	Does the Bulk Load Fire Test Failure Mean CF3I is Inappropriate for Engine/APU Fire Extinguishing Systems, as Well? Robert S. Wright Boeing	Effects of Liquid Disinfectants on Aircraft Cabin Interior Materials Akhil Bhasin National Institute for Aviation Research (NIAR)
10:30-11:00 AM	Experimental Measurements of Full-scale Fire Growth for Fire Model Validation M. Heck, I. Leventon, M. Bundy, K. McGrattan, R. Davis National Institute of Standards and Technology (NIST)	Evaluation and Analysis of sub-standard lithium batteries by UN 38.3 Testing Henry Lu Transport Canada	Investigating Powerplant Halon Replacement in a Generic Nacelle Fire Simulator Doug Ingerson Federal Aviation Administration (FAA) Technical Center	Safety of 222 nm Band-Pass Filtered Irradiation: A Review and Analysis of Current Data Nels A. Olsen Boeing
11:00-11:30 AM	Analysis of Sensitivity of Vertical Corner Flame Spread Dynamics to Uncertainties in the Model Input Dushyant Chaudari Underwriters Laboratories (UL)	Experimental Studies on Lithium-ion Pouch Cells Rosa Padilla, et al. NASA	Investigating Powerplant Halon Replacement in a Realistic Environment Doug Ingerson Federal Aviation Administration (FAA) Technical Center	Computational Fluid Dynamics Modeling of Cough Transport in an Aircraft Cabin Nels A. Olsen Boeing

TUESDAY, OCTOBER 18, 2022 - AFTERNOON

	FIRE RESEARCH II: Advanced Materials	CARGO HAZARDS/RISKS II	POWERPLANT & PROPULSION FIRE PROTECTION II	CABIN SAFETY II
	Chair:	Chair: Steve Rehn	Chair:	Chair:
1:30-2:00 PM	Reactive Flame Retardants for Aerospace Grade Epoxy + Carbon Fiber Composites A. Morgan, D. Klosterman, V. Benin, M. Mukhtar University of Dayton Research Institute (UDRI)	TRIP Database Batteries in Cargo David Wroth Underwriters Laboratories Inc.	Engine/APU Halon Replacement Industry Consortium-Halon Alternatives for Aircraft Propulsion Systems (HAAPS) Alan Macias Boeing	Moving Beyond the Moveable Armrest - Evaluating Design Features for Passenger Accessibility Erin Hochschild & Michelle Albert Boeing
2:00-2:30 PM	Designing Polymeric Hydrocarbons for Low Flammability Materials Todd Emrick, L. Stubbs, C. Chen, K. Murthy University of Massachusetts - Amherst	AIRPED – fire risk associated to the presence of PEDs/batteries in the cargo hold Enzo Canari European Union Aviation Safety Agency (EASA)	HFC-125 Fire Extinguishing Development Flight Testing and Analysis on the CH-53K™ King Stallion® Helicopter Noah Becker Sikorsky, A Lockheed Martin Company	Aircraft Seats Installation Layout of Passenger Accommodation (LOPA) and Proposed Occupant Injury Prediction Approach for Enhanced Passenger Safety Humayun Kabir Boeing
2:30-3:00 PM	Water-Based, Environmentally-Benign, Polyelectrolyte-Based Flame Retardant Treatments for Aircraft Foam and Textiles Jaime Grunlan Texas A&M University	Fire and Smoke Characterization and Fire Suppression of Lithium-ion Cells, Modules and Batteries Judy Jeevarajan Underwriters Laboratories (UL)	An Extended Study into the Comparison of the Carlin and Sonic Burner Olivia McAvoy Resonate Testing Ltd.	Effects of Airplane Cabin Interiors on Egress I: Assessment of Anthropometrics, Seat Pitch, and Seat Width on Egress David Weed Federal Aviation Administration-Civil Aerospace Medical Institute (FAA-CAMI)
3:00-3:30 PM	BREAK	BREAK	BREAK	BREAK
3:30-4:00 PM	Snap Cure Infusion Resin System for Fire Resistant Aircraft Structures and Interiors Henry Sodano Trimer Technologies, LLC	Detailed characterization of particle emissions from battery fires Vinay Premnath Southwest Research Institute (SwRI)	Updated Experimental Investigation of the NexGen Burner Prashant Khare University of Cincinnati	Helicopter Ditching: Rulemaking and Research Enzo Canari European Union Aviation Safety Agency (EASA)
4:00-4:30 PM	Flame Retardants from Bio-derived Materials for Aviation Textiles S. Kulkarni, S. Yu, J. Kumar, A. Morgan, R. Mosurkal, R. Nagarajan Univ. of Massachusetts - Lowell / UDRI / US Army	Beyond consumer batteries: Challenges of cell venting physics in lithium ion battery e-Aero applications Brian Engle Amphenol Advanced Sensors	A Study into Flame Ingression and Flame Arrestor Testing Olivia McAvoy Resonate Testing Ltd.	Antimicrobial Solutions in Aviation Marie-Laure Moulard and Joerg Lieberwirth Airbus
4:30-5:00 PM	Do Differences in Bench- or Small-scale Experiments Manifest in Different Fire Growth Behavior? A Case Study with PMMA Karen De Lannoye National Institute of Standards and Technology (NIST)	Safety Evaluation of Next-generation Solid-State Li-ion Battery Jitendra Kumar University of Dayton Research Institute (UDRI)	High-Fidelity Modeling and Simulation of the NexGen Burner Prashant Khare University of Cincinnati	Virtual Reality Tools to Support the Certification of the Cabin Marie-Laure Moulard and Joerg Lieberwirth Airbus

WEDNESDAY, OCTOBER 19, 2022 - MORNING

	FIRE RESEARCH III: Fire Modeling	CARGO FIRE MITIGATIONS I	POWERPLANT & PROPULSION FIRE PROTECTION III	CABIN SAFETY III
	Chair:	Chair: Mat Karp	Chair:	Chair:
8:00-8:30 AM	Modeling Cup Burner Flame Extinction by Sodium Bicarbonate Powder R. McDermott, C. Cao, P. Papas, J. Floyd NIST / Collins Aerospace / UL / Raytheon Technologies Research Center	Status of SAE standards and TSOs Jamie Lessard Federal Aviation Administration (FAA)	Powerplant and Propulsion Protection-Fire Modeling Phil Boettcher, J. Damazo, B. Moravec Boeing	Cabin Safety Interior Simulation Cesar Alberto Silva Embraer
8:30-9:00 AM	Benchmark Evaluation of Radiation Models in Simulations of Compartment Fires YJ. Kim, A. Trouvé, G. Maragos, B. Merci University of Maryland / Ghent University	SABATAIR – safe transportation of batteries by air Enzo Canari European Union Aviation Safety Agency (EASA)	An Investigation of the Hot Surface Ignition Temperature of Polyalphaolefin-Based Dielectric Coolants Albert Moussa, William Cavage BlazeTech / Northrup Grumman	Extended Reality for Cabin Safety I: A Translational Study of Extended Reality Technology in Training and Research Levi Breeding Federal Aviation Administration-Civil Aerospace Medical Institute (FAA-CAMI)
9:00-9:30 AM	A Physical Basis for Kinetic Compensation Richard Lyon Federal Aviation Administration (FAA) Technical Center	ICAO's efforts to mitigate the risks associated with transporting lithium batteries as cargo Lynn McGuigan International Civil Aviation Organization (ICAO)	Computational and Experimental Analysis of Hot-Surface Ignition of Fuel Sprays in Aircraft Compartment Fires TBD Stanford	Extended Reality for Cabin Safety II: Flight Attendant Training Levi Breeding Federal Aviation Administration-Civil Aerospace Medical Institute (FAA-CAMI)
9:30-10:00 AM	BREAK	BREAK	BREAK	BREAK
10:00-10:30 AM	Modeling Detail Turbulence-Chemistry Interactions in Flames and Fires Using the One-Dimensional Turbulence Model David Lignell Brigham Young University	Status of SAE G27 Including External Fire Doug Ferguson Boeing	Quantifying the Hazards of Onboard Hydrogen Relative to Aviation Kerosene Jason Damazo, Hubert Wong Boeing	Evaluation of Serious Games for Passenger Education: Aircraft Safety Information Retention Across Media Types Melissa Beben Federal Aviation Administration-Civil Aerospace Medical Institute (FAA-CAMI)
10:30-11:00 AM	Transported Probability Density Function Modeling of Fire Extinction Tianfang Xie, Haifeng Wang Purdue University	Discussion on G27 Testing Group Chamber Configuration and Calibration Finding Robby Kinsala Americase, LLC	SAE-A22 Committee Activities Update John Ostic, Daniel Laborie Boeing / General Electric	Exit Operation and Location: Evaluation of Type III Exit Dimensions Melissa Beben Federal Aviation Administration-Civil Aerospace Medical Institute (FAA-CAMI)
11:00-11:30 AM	Effects of Confinement on Concurrent-Flow Flame Spread Over Thin Solids Ya-Ting Liao, Yanjun Li Case Western Reserve University	Universal Packaging Bob Richards President Hazmat Safety Consulting, LLC		Fire, Wind, and Waves: CAMI Research Infrastructure Upgrade Report David Weed Federal Aviation Administration-Civil Aerospace Medical Institute (FAA-CAMI)

WEDNESDAY, OCTOBER 19, 2022 - AFTERNOON

	CABIN/FLIGHT DECK FIRE PROTECTION I	CARGO FIRE MITIGATIONS II	CARGO COMPARTMENT FIRE PROTECTION I	CRASH DYNAMICS I: Occupant Injury
	Chair: Tim Marker	Chair: Steve Rehn	Chair:	Chair:
1:30-2:00 PM	HR2 Development and Smoke Monitoring Mike Burns Federal Aviation Administration (FAA) Technical Center	UL Trusted Vendor Program Michelle Chevalier Underwriters Laboratories (UL)	Development of a Smoke Generator Handbook for Cargo Smoke Detection Matt Karp Federal Aviation Administration (FAA) Technical Center	ATD Construction Harmonization and Modernization Ian Hellstrom Federal Aviation Administration (FAA)
2:00-2:30 PM	HR2 Development - TRL6 Testing and Planning Brian Johnson Boeing	UPS Fire Mitigation Bob Brown UPS	Horizontal Velocity of Smoke - Handbook Dr. André Freiling Airbus	Comparison of Automotive and Transport Aircraft Occupant Injury Criteria H. Lankarani, R. Islam, V. Krishnamurthy NIAR, HAECO Americas
2:30-3:00 PM	HR2 Development - TRL6 Data Yaw Agyei Boeing	Dedication Full Scale Testing - An OEM's On-Site Solution Dave Lee Satco, Inc.	Passive and Wireless Fire Detection for Unit Loading Devices Using Ultra High-Frequency Radio Frequency Identification Matt Karp Federal Aviation Administration (FAA) Technical Center	The Head Injury Criterion JM Davies, P Brownson, CL Colton, WA Wallace, O Tomlin, AR Payne Univ of Calgary, Univ of Liverpool, Univ of Nottingham, GRM Consulting Ltd.
3:00-3:30 PM	BREAK	BREAK	BREAK	BREAK
3:30-4:00 PM	HR2 Development - Setting up HR2 in a Lab Yonas Behboud Boeing	On a Method to Mitigate Thermal Runaway and Propagation in Packages of Lithium-Ion Batteries James G. Quintiere University of Maryland	Modeling TCCs in a Cargo Compartment Andrew Ferraro Federal Aviation Administration (FAA) Technical Center	Tension-Bending Risk Curves for the ATD Lower Lumbar Spine Subjected to Oblique Impact under FAA Emergency Landing Conditions K. Somasundaram, J. Humm, N. Yoganandan, F. Pintar Medical College of Wisconsin
4:00-4:30 PM	A CFD Model for the OSU Calorimeter for Rate of Heat Release Predictions Dr. Baki Farouk Drexel University	Materials Perspective on Fire-Containment Dan Ziegler Marco Industries	Status Update - Cargo Compartment Halon Replacement MPS Dhaval Dadia Federal Aviation Administration (FAA) Technical Center	Compatibility of Child Restraint Systems (CRS) with Commercial Aircraft Seats Julie Mansfield, PhD Ohio State University
4:30-5:00 PM	Relationship Between 3-D Printed Materials and Flammability Daniel Keslar Federal Aviation Administration (FAA) Technical Center	Skid Fire Containment Bag – Lithium Battery Fire Test Uvin Baduge AmSafe BP	Environmentally Friendly Fire Suppression System for Cargo Michail Diakostefanis Cranfield University	Effective Aircraft Seat Development for Row to Row HIC Test Takuya Mori Toyota Boshoku

THURSDAY, OCTOBER 20, 2022 - MORNING

	CABIN/FLIGHT DECK FIRE PROTECTION II		CARGO COMPARTMENT FIRE PROTECTION II	CRASH DYNAMICS II
	Chair: Tim Marker		Chair: Dhaval Dadia/George McEachen	Chair:
8:00-8:30 AM	Experimental Study of Flammability Test on Our Test Facility Hisashi Kinoshita Iida Industrial Technology Testing Laboratory/S-Bird		Identification and Lab Scale Testing of a new fire extinguishind blend "KSC" as a cargo compartment Halon Replacemnt Adam Chattaway, Edda Liu Collins Aerospace	Tow Spreading Technology and Mechanical Properties of Thin Ply Laminates Kohei Yamada Industrial Technology Center of Fukui (ITCF)
8:30-9:00 AM	Microscale Criteria for Flammability of Aircraft Cabin Material Constituents Natallia Safronava Federal Aviation Administration (FAA) Technical Center		CFD Modeling to predict the performance of the new blend against the FAA bulk fire load MPS Test Eli Fluke Collins Aerospace	Occupant Protection for Legacy Rotorcraft Ian Hellstrom Federal Aviation Administration (FAA)
9:00-9:30 AM	Material Oil Burner Testing Tim Salter Federal Aviation Administration (FAA) Technical Center		Research Center describing Kinetic Modeling and Experimental Cupburner Results obtained using KSC blend Paul Papas Raytheon Technologies	Method Development for Full Aircraft Crash Simulation at Different Levels of Modeling Detail Paul Schatrow German Aerospace Center (DLR)
9:30-10:00 AM	BREAK	BREAK	BREAK	BREAK
10:00-10:30 AM	Vertical Flame Propagation (VFP) Test Development Tina Emami Federal Aviation Administration (FAA) Technical Center		MPS Results for an alternate agent tested at Boeing Cargo MPS test facility - Part 1 David Shaw Boeing	Battery Crashworthiness Dave Stanley Federal Aviation Administration (FAA)
10:30-11:00 AM	RTCA Development of a New Flammability Test for Electronic Equipment Steven Rehn Federal Aviation Administration (FAA) Technical Center		MPS Results for an alternate agent tested at Boeing Cargo MPS test facility - Part 2 David Shaw Boeing	Simulation Studies on eVTOL Crashworthiness in the Conceptual and the Preliminary Design Phase Mathias Waimer German Aerospace Center (DLR)
11:00-11:30 AM	Waste Compartment Fire Containment MOCs and Task Group Work Scott Campbell SAFRAN Cabin Inc.		Instrumentation and analytical methods for MPS Testing - Measurement of flammable gases during multi-fuel testing Nels Olson Boeing	Demonstration of Hybrid Physics and Machine Learning enabled Composite Failure Analysis and Calibration Suite (CFACS) for Material Characterization Humayun Kabir Boeing

THURSDAY, OCTOBER 20, 2022 - AFTERNOON

	CABIN/FLIGHT DECK FIRE PROTECTION III		CARGO COMPARTMENT FIRE PROTECTION III	CRASH DYNAMICS III Large Scale Crash Data
	Chair: Tim Marker		Chair: Dhaval Dadia	Chair:
1:30-2:00 PM	PED/Lithium Batteries Fire Risk in the Passenger Cabin/Flight Deck Enzo Canari European Union Aviation Safety Agency (EASA)		Instrumentation and analytical methods for MPS Testing - Use of Impingers to collect acid gas samples Nels Olson Boeing	A Comparative Analysis of Airframe Results Between Sub-Scale and Full-Scale Tests of Fokker F28 Aircraft Hardware Justin Littell National Aeronautics and Space Administration (NASA)
2:00-2:30 PM	Trip Database and PED Fires in the Cabin David Wroth Underwriters Laboratories Inc.		Validation of a Simulation Tool for an Environmentally Friendly Aircraft Cargo Fire Protection System Dr. Ing Victor Norrefeldt Fraunhofer Institut fur Bauphysik (IBP)	Crashworthiness by Analysis: Vertical Drop Test and Simulation of a Challenger 601 Metallic Fuselage Section Gerardo Olivares, L. Gomez, R. Huculak, V. Robinson National Institute for Aviation Research (NIAR)
2:30-3:00 PM	Toxic Hazards of Hand Extinguishants used on Lithium Battery Fires in Flight Decks Louise Speitel, Natallia Safronava, Tim Marker Federal Aviation Administration (FAA) Technical Center		Agent effectiveness vs. Lithium Battery Gases Dr. Thomas Maloney Federal Aviation Administration (FAA) Technical Center	A Comparative Analysis of Occupant Response Between Sub-Scale and Full-Scale Tests of Fokker F28 Aircraft Hardware Jacob Putnam National Aeronautics and Space Administration (NASA)
3:00-3:30 PM	BREAK	BREAK	BREAK	BREAK
3:30-4:00 PM	Cabin Battery Max Allowable Watt- Hour Matthew Karp Federal Aviation Administration (FAA) Technical Center		Lightweight CFRP Nitrogen Vessels J.B. Philipp Diehl	Photogrammetric Techniques Utilized during Sub-scale and Full-scale Testing of Fokker F28 Aircraft Hardware Nathaniel W. Gardner National Aeronautics and Space Administration (NASA)
4:00-4:30 PM	Thermal Runaway and Fire Propagation of On- board Li-ion Batteries: A Really Controlled Risk? Antoine Orth & Cristophe Montillet DGA Aeronautical Systems & DGAC/STAC - French Aviation Authority		A Fresh look at Fire Test Safety Greg Roberts Northrup Grumann	Full-Scale Crash Testing of Cargo Containers Experimental Characterization for Transport Airplane Crash Applications Mathias Waimer German Aerospace Center (DLR)
4:30-5:00 PM	Inflight Fire AC Development DK Deaderick Federal Aviation Administration (FAA)		Autoignition Study of Disinfectants in Cargo – Draft Test Plan Lindsey Anaya Federal Aviation Administration (FAA) Technical Center	Air India Express Accident David Gerlach Federal Aviation Administration (FAA)