

**Unsettled Issues
Regarding the Use of
eVTOL Aircraft during
Natural Disasters**

Johnny Doo

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About the Editor



Mr. Johnny T. Doo is President of International Vehicle Research Inc., focusing on innovative flight vehicle and electric vertical takeoff and landing (eVTOL) technologies and unmanned aerial vehicle (UAV) and wing-in-ground vehicle development and applications.

He is Lead of the National Aeronautics and Space Administration (NASA) Transformative Vertical Flight Working Group on Public Services, teaming with over 100 industry leaders and experts to develop the roadmap and use cases for disaster relief, humanitarian aid, search and rescue, police and firefighting, medical transport, and military eVTOL applications. He also supports aviation industry growth by providing strategic consulting, including business planning, product development, and market strategy to selected global clients.

He has over 30 years of experience in manned and unmanned aviation products, with many years of executive-level responsibilities in aviation product development, program management, and supply chain development, as well as marketing and business development. His technical and program experiences range from high-performance piston aircraft, personal and business jets, and regional aircraft to new-generation aircraft engines and

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He was Executive Vice President of Advanced Technology, Executive Vice President of Marketing and Business Development, and Senior Vice President of Engineering and Product Integrity at Continental Motors Group. He not only managed the product line expansion of the Avgas and Jet-A diesel aviation engines but also developed multiple new market segments, achieving significant growth of the global original equipment manufacturer customer base and sales revenue. He was also the president of a flight training subsidiary with an innovative training model and was responsible for the maintenance, repair, and overhaul business unit, quadrupling business growth over three years.

Prior to Continental Motors, he was Vice President at Diamond Aircraft in Canada, with full responsibility for the new-generation personal jet program. He built a new program team from the ground up and led the successful development of the all-composite, single-engine personal jet in three years. At the same time, he established the design, test, and certification capabilities, negotiated with all the key suppliers, and managed the new supply chain to support the development and production operations. His hands-on experiences with the high-performance business jet at Sino Swearingen Aircraft, regional aircraft at Fairchild Aircraft, and new-generation piston aircraft at Mooney Aircraft formed a broad spectrum of technical and project management knowledge base.

He has a bachelor's degree in Mechanical Engineering from Chung Yuan Christian University and a master's degree in Aerospace Engineering from the University of Colorado. He is the author of two SAE EDGE™ Research Reports, "Unsettled Issues Concerning the Opportunities and Challenges of eVTOL Applications during a Global Pandemic" and "Unsettled Issues Concerning eVTOL for Rapid-Response, On-Demand Firefighting." He is the co-author of the book *WIG Craft and Ekranoplan—Ground Effect Craft Technology* and is a eFly Master Lecturer on "eVTOL for Public Services—Design and Applications."

contents

About the Editor

Unsettled Issues Regarding the Use of eVTOL Aircraft during Natural Disasters 3

Introduction	4
<i>State of the Industry</i>	4
<i>Unsettled Topics on the Use of eVTOL Aircraft during Natural Disasters</i>	4

eVTOL Technology: Past, Present, and Future	6
<i>eVTOL Systems Currently under Development</i>	6
<i>Potential Ways to Use eVTOL to Complement Natural Disaster Response Capabilities</i>	7
Rapid Disaster Response	7
First Responder Deployment	7
Search and Rescue	7
Medical Transport	7
Civilian Evacuation	7
<i>Technology Readiness Level</i>	8

Natural Disasters and Current Response Operations	8
<i>Hurricanes</i>	8
<i>Tornados</i>	9
<i>Flooding</i>	9
<i>Earthquakes</i>	10
<i>Tsunami</i>	10
<i>Landslides</i>	10
<i>Volcano Eruptions</i>	10
<i>Snowstorms/Ice Storms and Avalanches</i>	10
<i>Wildfires</i>	10

eVTOL Capabilities for Natural Disaster Applications	11
<i>Pre-event Aerial Operations</i>	11
<i>Civilian Emergency Evacuation</i>	12
<i>Search and Rescue</i>	12
<i>Distributed On-Demand Logistics</i>	12
<i>Medical Transport</i>	12
<i>Post-disaster Services, Repair, and Logistics</i>	12
Challenges and Development Needed	13
<i>Vehicle-specific Capabilities</i>	13
Mission-specific eVTOL Development	13
Modular Mission-adaptable Configurations	14
Multi-sensor Suites and Sensor Fusion	14
Detect and Avoid, Terrain Sensing, and Auto-land	14

Compact Design and Transportability	14
<i>Autonomy, Simplified Vehicle Operations, and Training</i>	14
Autonomous and Semi-autonomous Capabilities with Remote Control	14
Coordinated Multi-vehicle Operations and Swarm Capabilities	15
Simplified Vehicle Operations and Remote Operations	15
<i>Dynamic Airspace Management</i>	15
Current Practices and State of the Art	15
Urban Air Mobility Airspace Management	16
Future Dynamic and Integrated Airspace Management	16
<i>Operations, Logistics, and Support</i>	16
Operating Base and Charging/Fueling System	16
Ground Support, Spare Parts Logistics, and Maintenance	18
Distributed On-demand Network System	18
<i>Inconventional Disaster-response Mode Evaluation</i>	18
Distributed On-demand Aerial Disaster Operations	18
eVTOL Disaster Response Best Practices	18
Command System Integration with Current Operations	19
<i>Funding, Acquisition, and Acceptance</i>	19
Federal, State, and Local Government Funding and Support	19
Commander, Operator, and User Acceptance	19
General Public and Community Support	19
Regional and Global Challenges	19
Social Benefits	20
<i>Lifesaving Power</i>	20
<i>Environmental Benefit</i>	20
<i>Enhanced Society Acceptance of eVTOL Technology</i>	20
Summary	20
<i>SAE EDGE™ Research Reports</i>	20
<i>Next Steps for eVTOL Vehicles and System Development for Natural Disaster Response</i>	21
<i>Recommendations</i>	21
<i>Definitions</i>	21
<i>Acknowledgments</i>	22
<i>References</i>	22
<i>Contact Information</i>	24



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Abstract

Recent advancements of electric vertical takeoff and landing (eVTOL) aircraft have generated significant interest within and beyond the traditional aviation industry, and many new and novel applications have been identified and are under development. One promising application is rapid response during natural disasters, which can complement current capabilities to help save lives and enhance post-disaster recoveries. With the global increase of occurrence and scale of natural disasters, and the varying and dynamic operations facing rescue and recovery teams, eVTOL can offer timely, on-demand, and potentially cost-effective aerial mobility components to the overall solution. Rapid response to natural disasters could translate into the preservation of life, effective rescue, and timely care for injured persons. These eVTOL aircraft may not currently have the capacity of larger aerial transportation and logistics assets, but for targeted missions they can be effective in pre- and post-disaster response.

Some challenges need to be addressed before identified capabilities and benefits can be realized at scale. These include mission-specific eVTOL vehicle development, detect-and-avoid capabilities in complex and challenging operating environments, autonomous and remote operations, charging system compatibility and availability, operator and controller training, and dynamic airspace management, as well as vehicle/fleet logistics and support. Acceptance from stakeholder agencies, field commanders, first responders, relief teams, and the public is also critical for the successful implementation of these new capabilities. The purpose of this report is to identify the benefits and challenges of integrating eVTOL aircraft into natural disaster response operations.

NOTE: SAE EDGE™ Research Reports are intended to identify and illuminate key issues in emerging, but still unsettled, technologies of interest to the mobility industry. The goal of SAE EDGE™ Research Reports is to stimulate discussion and work in the hope of promoting and speeding resolution of identified issues. These reports are not intended to resolve the challenges they identify or close any topic to further scrutiny.

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