

**SAE =DGE=™**  
RESEARCH REPORT

**Unsettled Topics on the  
Use of IVHM in the Active  
Control Loop**

Rhonda D. Walthall

# Unsettled Topics on the Use of IVHM in the Active Control Loop

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Rhonda D. Walthall, photo by SAE International

**Rhonda D. Walthall** is a Technical Fellow at Collins Aerospace in Charlotte, NC, a division of Raytheon Technologies Corporation (RTX). In her role, she focuses on Design for Prognostics and Health Management (PHM) and Digital Thread initiatives. She is an industry-recognized leader in the development of standards and best practices for PHM and Integrated Vehicle Health Management (IVHM).

Walthall earned her Bachelor of Science Degree in Aeronautical and Astronautical Engineering from Purdue University and her Master's Degree in Business Administration from Pepperdine University. She began her career as a Flight Test Engineer for the McDonnell Douglas Aircraft Company before working for Northwest Airlines as a Powerplant Engineer. In 2003, she joined Hamilton Sundstrand and has held positions of increasing responsibility, leading to her role today as a Technical Fellow.

Walthall is a member of the SAE International Board of Directors and is the Vice President of the PHM Society Board of Directors. She has been actively engaged in SAE standards development and leadership since 2004. She was recognized by SAE as a Top Contributor of the Year (2011) and received the Rodica Baranescu Award for Technical Excellence in Leadership (2018) and the James M. Crawford Technical Standards Award for Outstanding Achievement (2016).

She holds three patents and has contributed significantly to numerous SAE documents and authored chapters in SAE and IEEE publications. She has presented technical papers and has participated as a keynote speaker, invited speaker, or panelist at numerous PHM-related conferences.

In 2020, Walthall received the Outstanding Aerospace Engineer Award from Purdue University, where she is a member of the Industrial Advisory Council to the School of Aeronautics and Astronautics.

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# Unsettled Topics on the Use of IVHM in the Active Control Loop

## Abstract

The growth in global economies has led to a world that has become much more mobile in the last few decades. The number of enplanements has increased and is expected to continue to do so at an annual average rate of 1.8% through 2039 [1]. Prior to the COVID-19 pandemic, the number of aircraft in service was expected to increase annually to meet the travel demand. Next-generation, more-complex aircraft were scheduled to replace the older aircraft at a pace that still allowed sufficient capacity to meet the increasing demand. The events of 2020 have driven the industry to accelerate retirement of older aircraft while deferring the introduction of new aircraft. While the length of the industry recovery period cannot be predicted, most analysts believe that demand for travel will return once a vaccine is widely available. The impact to the design of next-generation aircraft will likely be shaped by technologies that are being accelerated for the post-COVID world as well as for new mobility platforms. Technologies, such as artificial intelligence and fault-tolerant and self-adapting control, will use integrated vehicle health management (IVHM) capabilities as part of the decision-making processes. This SAE EDGE™ Research Report seeks to explore the unsettled topics surrounding embedding IVHM information into the active control loops of modern aircraft systems and in future generations of aircraft designs.

**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. SAE EDGE™ Research Reports are not intended to resolve the challenges they identify or close any topic to further scrutiny.

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