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DEPARTMENT OF THE NAVY

# NAVY SBIR/STTR SUCCESS



## MATH MODEL UPGRADE SOLUTION FOR FLIGHT SIMULATORS

Bihrlé's StallBox is a flight simulator update solution designed to provide airlines and training centers with the stall models and instructor displays necessary to conduct Upset Prevention and Recovery Training (UPRT), for increased situational awareness.

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## THE TECHNOLOGY

StallBox provides the ability to upgrade existing flight simulators with enhanced aircraft stall models without the need for aircraft original equipment manufacturer (OEM) data sets or modifications to the existing baseline flight model code. This is accomplished by hosting the enhanced stall model in an external host computer (i.e., the "StallBox") which interfaces with the simulator host via a communication link. The StallBox blends the post stall model with that of the OEM's pre stall model. The transition between models is transparent to the operator.

**"THE TECHNOLOGY AND CAPABILITY DEMONSTRATED HAS BEEN CRITICAL TO THE COMMERCIAL SUCCESS OF STALLBOX. THIS PRODUCT HAS ALLOWED BIHRLE APPLIED RESEARCH TO HOLD A UNIQUE POSITION IN THE INDUSTRY, AND TO PARTNER WITH THE U.S. NAVY, AS A COST-EFFECTIVE METHOD TO UPDATING EXISTING TRAINING DEVICES TO MEET THE STALL MODELING REQUIREMENTS FOR SIMULATOR QUALIFICATION."**

David Gingras, VP Bihrlé, Inc., StallBox Project Lead

## THE CHALLENGE

In concert with recent training requirements for commercial pilots, increased emphasis has been placed on identification and awareness of stall to post stall encounters. This is critical for Navy operations as the Navy mission requires more aggressive maneuvering and reduced margin to the edge of the flight envelope. Recent commercial mishaps have identified the lack of recognition of stall cues and

inappropriate recovery procedures as contributing factors to aviation mishaps. Pilots are now armed with a new tool. The StallBox is a low-cost method for enhancing stall-and-post stall recovery training to avoid the considerable cost associated with a major simulator host model update.

## THE TRANSITION

Originally sponsored by PMA-290 and PMA-205, the SBIR-funded project StallBox will be integrated into the current P-8 Operational Flight Trainers at NAS Jacksonville, Fla. Phase III funding by PMA-290 enhanced StallBox by validating the model with flight test data and improving the buffet cueing leading up to, and at full aerodynamic stall. Improvements will be implemented into the next trainer software release (TSR-14) which will be integrated into the trainers at NAS Jacksonville and Whidbey Island, Wash., during late 2018.

## THE NAVAL BENEFIT

The mission of the P-8 dictates that flight operations near stall be routine. Gust upsets or loss of situational awareness may result in flight beyond stall where rapid recognition and application of appropriate recovery procedures are required. Intentional in-flight stalls for training purposes reduce tail fatigue life and are often deemed too risky. High fidelity piloted simulation stall training is a low cost method to improve safety and reduce operating costs and potential loss of aircraft.

## THE FUTURE

This technology may be implemented with any aircraft simulator with or without the OEM's flight data. The FAA has approved the Stallbox as an alternate method to satisfy new requirements for post stall training for commercial aircraft, and has certified commercial airline trainers for Boeing and Airbus type aircraft using the Bihrlé StallBox technology.