

## BELL HELICOPTER & UEI • Model-Based Design Partnership

### OVERVIEW

Bell Helicopter, a subsidiary of Textron Inc., is a pioneering aerospace manufacturer known for its innovative vertical flight solutions, including commercial and military helicopters, tiltrotor aircraft, and advanced aviation technologies. Bell introduced the Aircraft Laboratory for Future Autonomy (ALFA) based on the Bell 429 commercial helicopter, designed to test autonomous fly-by-wire technology and enhance aircraft safety and pilot workload management. Bell needed a rugged I/O system to support model-based development, enabling seamless verification testing on the ground before transitioning to inflight evaluations.



### THE IMMEDIATE CHALLENGES

- 1 Rugged and robust commercial-off-the-shelf (COTS) I/O system for the autonomous Bell 429 commercial helicopter that can be used in both ground and inflight tests for maximum hardware and software reuse.
- 2 The capability to run Simulink models and support a full range of I/O requirements—including ARINC-429, analog, digital, CAN bus, and serial—ensuring precise control of autonomous flight systems for reliability and safety.
- 3 The ability to reuse both hardware and software for flight tests, developing and verifying the control algorithm on the ground, then seamlessly using the same verified solution in flight without the need for rework.

### PATHWAYS TO SUCCESS

- ✓ Bell selected both the [DNR-12-1G 3U Industrial RACKtangle](#) and the [DNR-MIL 12-slot](#) I/O systems, the latter of which is designed to meet military standards. Bell first verified functionality on the ground using the industrial rack before transitioning to flight with the MIL system. Since both systems share the same hardware under the hood, this allows for maximum software and hardware reusability.



UEI's RACKtangle | 12-Slot Industrial Rack I/O System

✓ Both UEI chassis offer extensive support for all ARINC, AI/DIO, serial, and CAN bus I/O required. It also offers dual gigabit Ethernet ports, support for multiple operating systems, and runs modeling tools such as Simulink for versatile test and verification applications.

✓ This system allowed Bell to load their Simulink model onto UEI's hardware for initial autonomous mode fly-by-wire ground tests, and after confirming the safety and functionality of autonomous mode, the UEI hardware was easily transferred from the ground test helicopter to the actual aircraft for flight trials, with pilot support in the cockpit.



## END RESULT

AFTER A SUCCESSFUL INAUGURAL FLIGHT IN QUEBEC, SUPPORTED BY UEI HARDWARE, ALFA WILL NOW UNDERGO FURTHER RESEARCH AT BELL'S FLIGHT RESEARCH CENTER IN FORT WORTH, TEXAS AS BELL CONTINUES ADVANCING AUTONOMOUS HELICOPTER INNOVATION.

### GREAT PARTNERSHIP. OUTSTANDING SOLUTIONS.

- [WIN] Bell completed both ground and inflight testing of a next-generation autonomous fly-by-wire system through the integration of both DNR-MIL-1G RACKangle DNR-MIL 12-slot I/O systems - providing flexible and rugged test and control solutions.
- [WIN] UEI model-based design (MBD) hardware solutions provided easy integration into Bell's autonomous fly-by-wire systems allowing for seamless transition from ground to inflight tests.
- [WIN] UEI gave Bell the capability of Simulink software re-use in development and deployment capacities as UEI's hardware is all the same under the hood.

ASK US HOW UEI CAN DO THE SAME FOR YOUR COMPANY!

