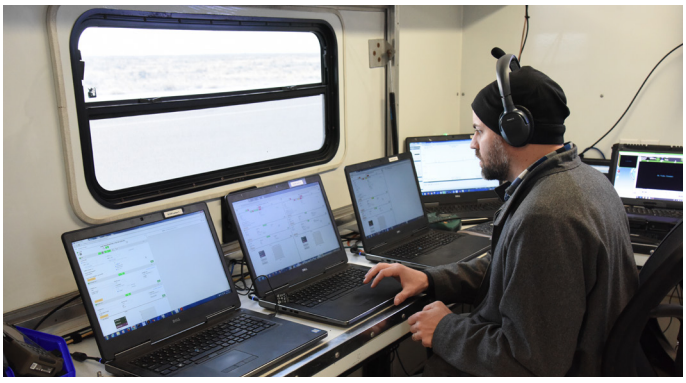
Unmanned Aerial Systems

Testing and Training Capabilities

History has shown that new technologies often start with a military application. Devices like night vision goggles, global positioning systems and digital cameras were originally made for and used by the armed forces. The same can be said about unmanned aerial systems, or drones.

In the last two decades, these sophisticated aircraft have evolved from machines of military might to routine support craft. They are increasingly used to perform tasks that would otherwise risk a person's health and safety, such as remote surveillance of a natural disaster. More and more they are also used for routine operations, including entertainment and product deliveries

No matter the application, to be effective all drones require sophisticated sensors and repetitive testing. Testing, training, demonstration and product validation is where Idaho National Laboratory excels. With hundreds of square miles of open terrain, a secure border and a sophisticated wireless test bed, INL is a prime location to test Unmanned Aerial Systems.



UAS TEST RANGE

Located in eastern Idaho, INL's 890-square-mile Site is an isolated, secure and self-contained federal environment. The laboratory has used its high-desert, high-altitude site for two decades to test new drone platforms and evaluate sensor packages to meet federal missions.

While commercial industry often designs drone platforms, INL offers unique engineering capabilities to outfit platforms with advanced sensor, electronics and communication packages. The laboratory can even manufacture custom boards, chip sets

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and electronics on-site. Newly equipped drones are then tested on INL's expansive range against a host of real-world conditions like severe weather, temperature swings and day/night operations.

Research has led to the development and integration of sensors into commercial and federal airframes to permit information collection and transmission. Sensors have been developed, tested and deployed including:

- Radiation detection.
- Infrared and hyperspectral cameras.
- Real-time image analysis and composition.
- Air sampling/ collection devices.
- High-bandwidth, encrypted communication devices.

Flight operations, monitoring and data transmission are integrated across an in-house wireless network with expansive capabilities for producing contested communication environments. Situated in a naturally occurring caldera, INL's desert Site includes three wireless towers and several mobile towers that allow for easy tower hand-off. Additional wireless capabilities include:

- Low radio frequency noise floor
- On-site spectrum manager
- NTIA experimental radio station
- 2G-5G cellular communication
- LTE, UMTS, GMS tier 1 carrier networks
- WiMax, WiFi, Zigbee, Bluetooth networks
- Full fiber backhaul
- 120db-10kHz resolution bandwidth
- Measured spectrum 31 Hz-10 GHz

As a self-contained site for testing communication systems, INL has also cultivated relationships with the Federal Aviation Administration and the National Telecommunications and Information Administration that allow it to operate over almost the entire radio frequency spectrum.

FLIGHT OPERATIONS

The laboratory's FAA authorized airspace covers more than 3,000 square miles through mutual agreements between the Department of Energy and the Bureau of Land Management. This wide-open space includes a variety of terrain from flat desert to high mountains.

Since 2012, INL has steadily trained personnel, procured a large inventory of fixed and rotary wing aircraft, and set up support facilities for operations. From its 1,000-foot runway and 30-by-50-foot enclosed shelter, INL supports more than 40 types of unmanned aerial systems aircraft using mobile control stations that incorporate power, communication, monitoring, and data acquisition capabilities.

Aircraft range in size from less than one pound to nearly 200 pounds. Some are powered by small reciprocating engines while others employ electric motors. For most craft, commercial autopilots enable full autonomous operations from takeoff to landing.

Battelle Energy Alliance manages INL for the U.S. Department of Energy's Office of Nuclear Energy.

FOR MORE INFORMATION

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QUICK FACTS

1. INL is a Department of Energy Center of Excellence for unmanned aerial systems.
2. The lab's expansive space and wireless test bed create a unique demonstration environment.
3. In-house capabilities include test design, configuration, demonstration and reset.
4. Experimental radio station status means INL controls the airwaves over 890 square miles.
5. INL researchers can support backshift, weekend and night operations.
6. Labor rates include access to the airfield and range. No additional fees.