

# ***UAS Aircraft and Capabilities***



**UNMANNED SYSTEMS  
RESEARCH INSTITUTE**

College of Engineering, Architecture and Technology



**AT OKLAHOMA STATE UNIVERSITY**

# ***A World Leader in Autonomous Systems Research***

- Engineering powerhouse that focuses on unmanned technologies
- USRI and affiliate faculty specialize in multiple areas
- State-of-the-art facilities and equipment
- PhD faculty, post docs, staff engineers, undergraduate and graduate students are available to assist on all projects
- Access to design, manufacturing and testing facilities



# Manufacturing and Testing Overview

## LIGHT MANUFACTURING

- Traditional machining
- Laser, large and small CNC
- 3D printing
- Composite layup capabilities

## FLIGHT TESTING

- CENFEX Test Range
- OSU Unmanned Airfield (UAFS)
- Elgin
- Choctaw Nation – Daisy Ranch

## ACOUSTIC/ RF TESTING

- Acoustic anechoic chamber
- Anechoic chambers
- Reverb chamber

## AERODYNAMIC AND PROPULSION TESTING

- Large wind tunnel
- Small wind tunnel
- Propulsion labs
- Autonomous / autopilot labs





# FACILITIES



**THE HAMM INSTITUTE FOR AMERICAN ENERGY AT OKLAHOMA STATE UNIVERSITY**

**EXCELSIOR**

**FLIGHT FIELDS**

- Located in the Oklahoma City Innovation District
- Hub for commercial and military contracting
- Center of Excellence location
- Advanced Air Mobility Testing capabilities
- Staging location for military efforts
- Rapid prototyping capabilities

- Located in Stillwater, Oklahoma on USRI campus
- Hub for theoretical research and student projects
- Light manufacturing capabilities
- Composite layup capabilities
- Acoustic and RF testing capabilities

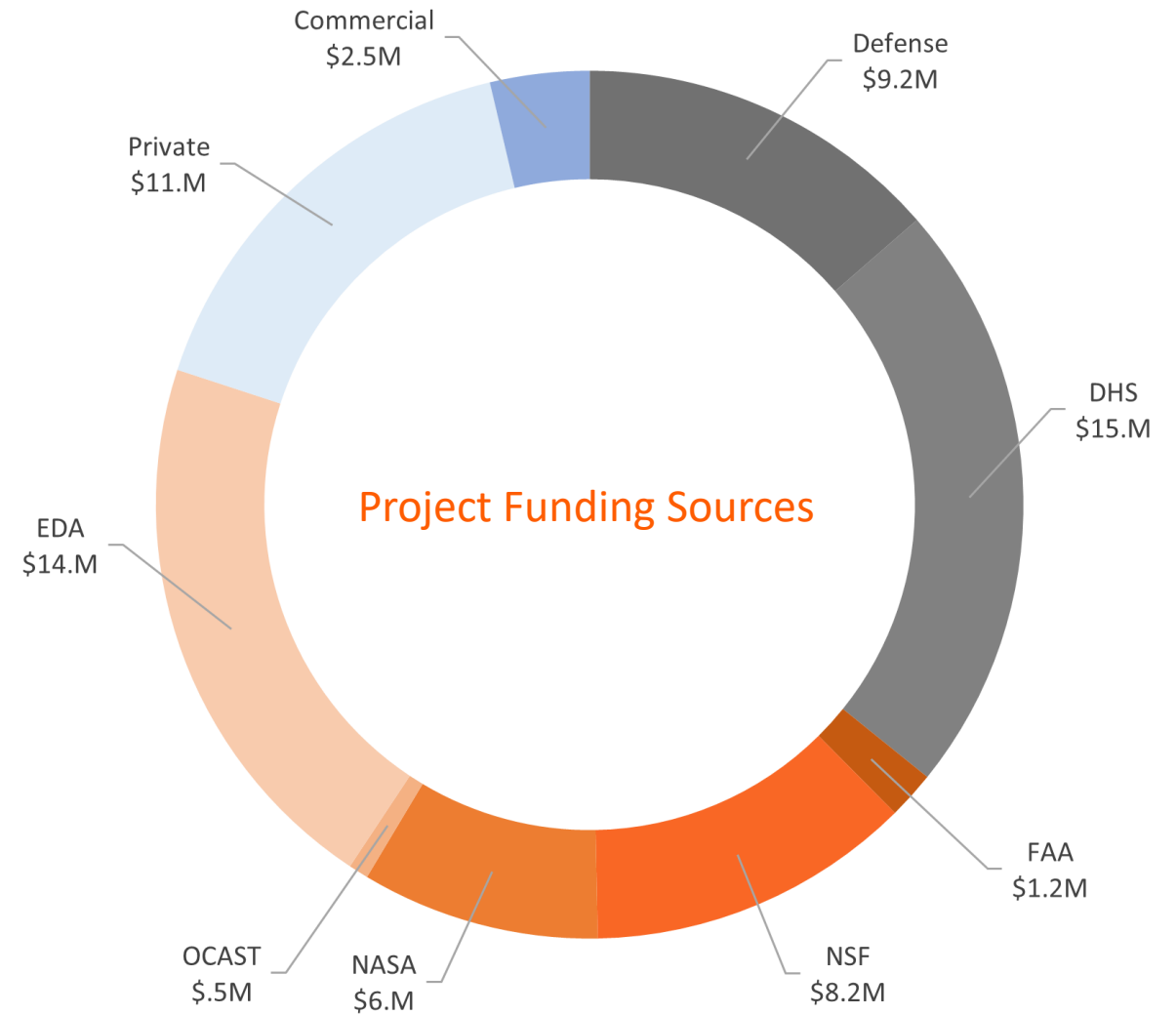
- OSU Unmanned Aircraft Flight Stations
  - 30 mins outside of Stillwater
  - BVLOS Certificate of Authorization
  - Waiver for UAS flight airspace above Part 107 restrictions
- Legion Field
  - Within Fort Sill airspace
  - 2,200' paved runway
  - Hangar and ground control facilities



# OSU: A \$50M+ Drone Powerhouse

OSU has become a **powerhouse in the drone industry**, establishing a reputation as a **world leader** in unmanned technology and providing innovation and insight at the local, national, and global levels of the aerospace industry.

Funding breakdown is shown on the right, based on source of funding. **State funding has been very limited**, particularly when compared to competitor states (TX, NC, NY, ND, OH).



# \$38M EDA Grant Awarded in Sep. 2022 to Establish the LaunchPad Center for Advanced Air Mobility at OSU-Tulsa



- \$5M+ for cutting-edge academic research to develop new technologies with commercialization potential and \$8M+ to develop a flight corridor with the Osage Nation
- Unmanned-focused business incubator to uniquely **support high-growth businesses**
- **Partnerships with industry** to create an environment that attracts new businesses and fosters cross-industry collaborations
- Position **OSU as the program-of-choice** for students interested in aerospace engineering and unmanned aerial systems research
- Foster collaborations across OSU that **invest in students and create opportunities** to stay in the region post-graduation
- Matching funds from Tulsa Innovation Laboratory and George Kaiser Family Foundation to bring total over \$50M



Working with the Osage Nation and the Tulsa Innovation Laboratory, the OSU-Tulsa LaunchPad Center for Advanced Air Mobility will bridge the gap from idea to product to build a city of the future with drone-friendly skies



# CENTER of EXCELLENCE

**GOAL:** Establish a Counter-UAS Center of Excellence through congressional funding to support DOD and law enforcement with threat replication, red team operation, white team analysis, system development and testing

- Establish statewide testing capabilities to support a variety of operational scenarios
- Strengthen engineering knowledge base and establish training pipeline
- Develop infrastructure at multiple sites
- Increase simulation and testing capabilities
- Develop avionics and AI models
- Support ad-hoc and adaptive swarming technologies
- Increase focus on future threat intel
- Connect various organizations across counter-UAS systems, simulation and threat systems
- Serve as knowledge base
- Align corporate and government partners to rapidly advance emerging technologies
- Support Army initiatives such as Fort Sill UAS school and meeting CFT and other customer requirements







# COUNTER-UAS

- Adaptive red team operations
- Threat replication
- White cell analysis
- Future threat aircraft design
- Co-op pipeline program with sponsored graduate research in counter-UAS technologies

## Currently supporting multiple DOD customers

- Bold Quest, Fort Stewart, Joint Staff J6, Joint Deployable Analysis Team
- Maneuver Fires Integration Experiment (MFI), Fort Sill, U.S. Army Fires Center of Excellence (FCoE), U.S. Army C-UAS Lead
- Counter Rocket Artillery & Mortar (C-RAM), Yuma Proving Ground (YPG), U.S. Army Intelligence and Information Warfare Directorate
- Desert Chance, YPG, U.S. Army Asymmetric Warfare Group (AWG)
- C-UAS technology and feasibility analysis, SOCOM

# Unmanned Aircraft Flight Station



- Dedicated UAS flight development and test facility 12 miles east of Stillwater; two runways, hangar and state-of-the-art control room
- Provides Oklahoma with a unique educational, research and outreach resource in *UAS–BVLOS Corridor*

# UAS Flight Fields - CENFEX

**Partnership with OSU's Center  
for Fire and Explosives, Forensic  
Investigation Training, and  
Research**



- *320-Acre isolated range with low public visibility*
- *800-foot gravel runway with explosive pads*
- *Facilities and personnel to detonate explosives up to several hundred pounds*
- *Decommissioned manned aircraft fuselages for training and testing*

# USRI Legion

**USRI Legion is a flight facility owned by OSU within Fort Sill airspace. Operating at this facility does not require COA for operations but does require a DOD contract. This facility supports demonstrations, proof of concept and training flights for day/ night operations.**

## Key Parameters:

- Access to Fort Sill restricted airspace
- No COA required
- 2,200-foot runway
- Hangar/ UAS workspace

## Key Areas of Support

- DHS Robotic Aircraft for Public Safety (RAPS)
- USSOCOM projects
- Inert Munitions Drops
- Sensor/ Payload Testing
- Multiple UAS operations simultaneously





## INDUSTRY SUPPORT: System Evaluation

- Performed C-UAS Red Team operations for commercial customers
- Supporting Epirus High-Powered Microwave system at Nevada National Security Site
  - Constructed 10+ target aircraft and provided UAS operators for test events
  - FISTA Member interested in range locations in Lawton area
- Providing U.S. STRATCOM support to test base defenses at Minot AFB, North Dakota

# FLIGHT TESTING LOCATIONS

## CENFEX Range & Ordnance Testing

- Explosive ordnance and radar testing
- Partnership with OSU's Center for Fire and Explosives and Forensic Investigation
- 320-acre range
- 800-foot gravel runway
- Facilities and personnel to detonate explosives up to several hundred pounds
- Decommissioned manned aircraft fuselages for training and testing
- Low public visibility

## Unmanned Aircraft Flight Station (UAFS) & BVLOS Corridor

- Dedicated UAS flight development and testing facility
- 12 miles east of the OSU campus
- Two runways
- Hanger and control room
- FAA approved Beyond Visual Line of Sight (BVLOS) Corridor to CENFEX Range

## Legion Flight Center

- Facility is owned by OSU and within Fort Sill restricted airspace
- No COA required for operations
- DOD contract required
- Access to Fort Sill restricted airspace
- 2,200-foot runway
- Hanger/UAS workspace
- Inert Munitions Drops
- Multiple UAS operations simultaneously

## OSIDA (Clinton-Sherman)

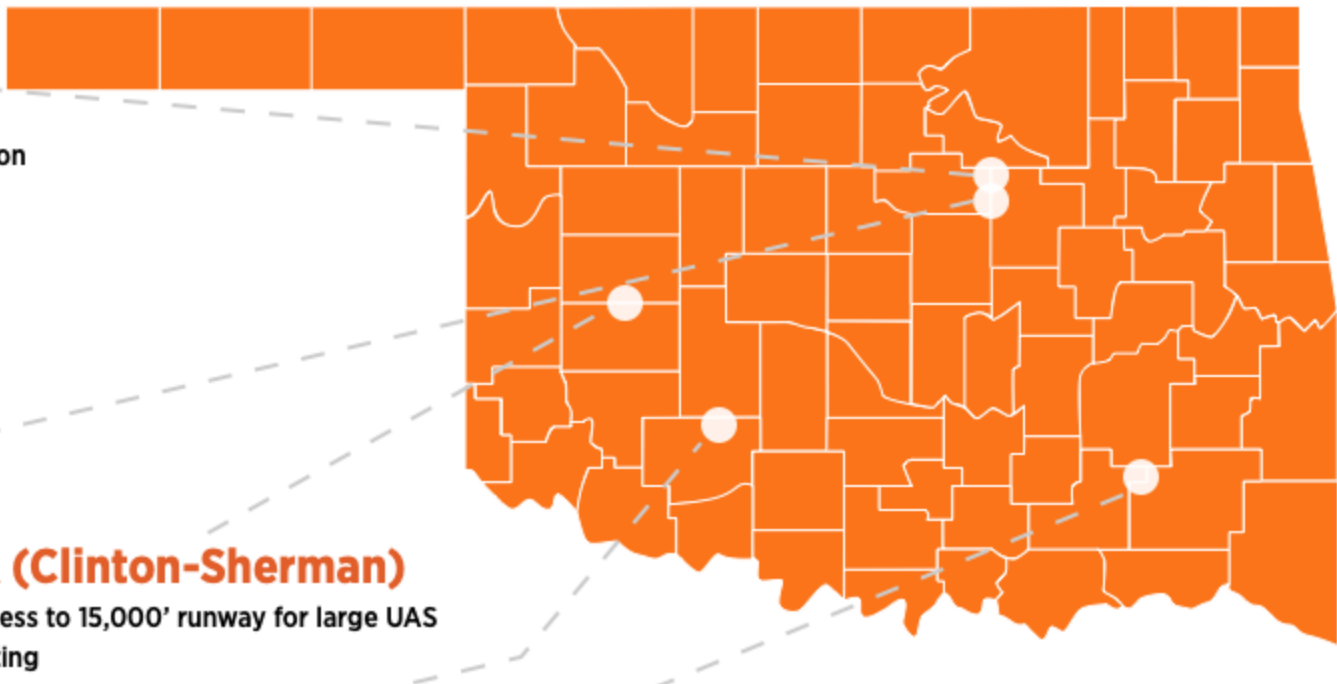
- Access to 15,000' runway for large UAS testing
- Space-flight corridor

## Choctaw Nation — Daisy Ranch

- Owned and operated by OSU partner organization — Choctaw Nation
- Within the FAA BEYOND program
- Pathway for unique airspace authorizations within the FAA BEYOND program
- 45,000-acre range

## Additional Capabilities

Statewide COA to 2,500' AGL  
Moored kite waivers ranging from 6,000' to 17,000' AGL



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