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# Integrating Virtual Reality into the Asynchronous Learning Environment

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# Technology Is Good But It Does Not Teach…at least not yet

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# Integrating Virtual Reality into the Asynchronous Learning Environment

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**Brian Sanders**

# Overview

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- 4 presentations
- Covers a spectrum of subject matter
  - Real to virtual and virtual to real
- Want to highlight
  - What the goal was
  - How it was integrated into effective learning experiences
  - Observations

**Technology Is Good But It Does Not Teach…at least not yet**

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# Implementation of Virtual Occupational Safety Hazards Environment

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***Associate Professor, MSOSM***
***Embry-Riddle Aeronautical University***
***Worldwide Campus***

# Occupational Safety and Health

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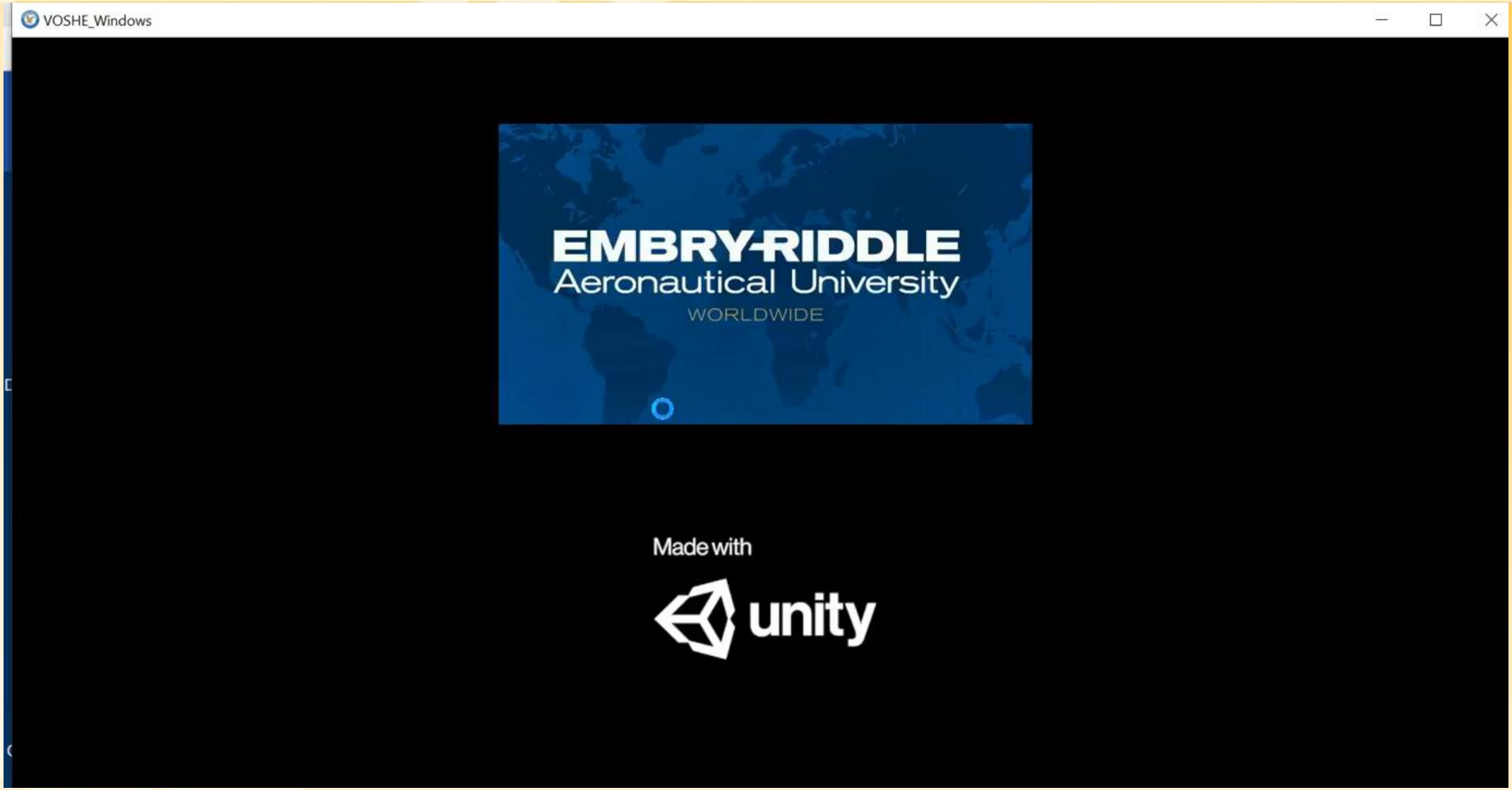
- Tools for safety professionals for evaluating workplace hazards
- How do you do “hands on” training?

# VOSHE




VOSHE_Windows
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WORLDWIDE
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# Assessment

**Confined Spaces Investigation**

At 3.5 m the gas detector showed the O2 level dropped under 19.5% to 18% therefore triggering the alarm. The manhole cover should be investigated for lurking substances.


Students take screen shots and answer the scenario questions

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# Virtual Maintenance Trainer

*Dave DelCastillo, MAS, Adjunct Professor*
*Aviation Maintenance Technology*
*Embry-Riddle Aeronautical University*
*Worldwide Campus*

# Overview

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- Teaching the methods and practices needed during an aircraft inspection
- Dual Purpose:
  - Students see a virtual environment walk through of an FAA Annual/100 Hour inspection
  - Students get practice answering related FAA Mechanic Exam questions
- Aircraft maintenance learning environment: students see and do.

# Aircraft Inspections

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- Teaching Inspection Checklists: The old-fashioned way.

| Nature of Inspection | Inspection Time (hours) | | | |
|---|---|---|---|---|
| | 50 | 100 | 500 | 1000 |
| **A. Propeller Group** | | | | |
| 1. Inspect spinner and back plate | ● | ● | ● | ● |
| 2. Inspect blades for nicks and cracks | ● | ● | ● | ● |
| 3. Check for grease and oil leaks | ● | ● | ● | ● |
| 4. Lubricate per Lubrication Chart | | ● | ● | ● |
| 5. Check spinner mounting brackets | | ● | ● | ● |
| 6. Check propeller mounting blots and torque | | ● | ● | ● |
| 7. Inspect hub parts for cracks and corrosion | | ● | ● | ● |
| 8. Rotate blades and check for tightness | | ● | ● | ● |
| 9. Check propeller air pressure (Check at least once a month) | | ● | ● | ● |
| 10. Check condition of propeller De-Icer system | | ● | ● | ● |
| 11. Remove propellers, remove sludge from propeller and crankshaft | | | ● | ● |
| 12. Overhaul propeller | | | | ● |
| **B. Engine Group** | | | | |
| CAUTION: Ground Magneto Primary Circuit before working on engine | | | | |
| 1. Remove engine cowl | ● | ● | ● | ● |
| 2. Clean and check cowling for cracks, distortion, and loose or missing fasteners | | ● | ● | ● |
| 3. Drain oil sump (See Note 2) | ● | ● | ● | ● |
| 4. Clean suction oil strainer at oil change (Check strainer for foreign particles) | ● | ● | ● | ● |
| 5. Change full flow (cartridge type) oil filter element (Check element for foreign particles) | ● | ● | ● | ● |
| 6. Check oil temperature sender unit for leaks and security | | ● | ● | ● |
| 7. Check oil lines and fittings for leaks, security, chafing, dents and cracks | | ● | ● | ● |
| 8. Clean and check oil radiator cooling fins | | ● | ● | ● |
| 9. Remove and flush oil radiator | | | ● | ● |
| 10. Fill engine with oil as per Lubrication Chart | ● | ● | ● | ● |
| 11. Clean engine | | ● | ● | ● |
| 12. Check condition of spark plugs (Clean and adjust gap, .015 to .018, as required) | | ● | ● | ● |
| 13. Check ignition harnesses and insulators | | ● | ● | ● |
| 14. Check magneto main points for clearance – Set clearance at .016 | | ● | ● | ● |
| 15. Check magneto retard points for proper retard angle (30° 30') | | ● | ● | ● |
| 16. Check magnetos for oil leakage | | ● | ● | ● |
| 17. Check breaker felts for proper lubrication | | ● | ● | ● |
| 18. Check distributor block for cracks, burned areas or corrosion | | ● | ● | ● |
| 19. Check magnetos to engine timing (20° BTC) | | ● | ● | ● |
| 20. Overhaul or replace magnetos (See Note 3) | | | | ● |
| 21. Remove air cleaner screen and clean | ● | ● | ● | ● |
| 22. Remove and clean fuel injector inlet line screen (Clean injector nozzles as required) (Clean with acetone only) | ● | ● | ● | ● |
| 23. Check condition of alternate air door and box | | ● | ● | ● |
| 24. Check intake seals for leaks and clamps for tightness | | ● | ● | ● |
| 25. Inspect condition of flexible fuel lines | | ● | ● | ● |
| 26. Replace flexible fuel lines (See Note 3) | | | | ● |
| 27. Check fuel system for leaks | | ● | ● | ● |
| 28. Check fuel pumps for operation (engine driven and electric) | | ● | ● | ● |
| 29. Overhaul or replace fuel pumps (engine driven and electric) (See Note 3) | | | | ● |
| 30. Replace hydraulic filter element and check for contamination | | ● | ● | ● |
| 31. Check hydraulic pump and gasket for leaks | | ● | ● | ● |
| 32. Overhaul or replace hydraulic pump (See Note 3) | | | | ● |
| 33. Check pressure pumps and lines | | ● | ● | ● |

| Nature of Inspection | Inspection Time (hours) | | | |
|---|---|---|---|---|
| | 50 | 100 | 500 | 1000 |
| **B. Engine Group *(Continued)*** | | | | |
| 34. Overhaul or replace pressure pumps | | | ● | ● |
| 35. Check throttle, alternate air, injector, mixture and propeller governor controls for travel and operating condition | | ● | ● | ● |
| 36. Check exhaust stacks and gaskets (Replace gaskets as required) | ● | ● | ● | ● |
| 37. Check breather tube for obstructions and security | | ● | ● | ● |
| 38. Check crankcase for cracks, leaks, and security of seam bolts | | ● | ● | ● |
| 39. Check engine mounts for cracks and loose mounting | | ● | ● | ● |
| 40. Check all engine baffles | | ● | ● | ● |
| 41. Check rubber engine mount bushings for deterioration | | ● | ● | ● |
| 42. Check firewalls for cracks | | ● | ● | ● |
| 43. Check firewall seals | | ● | ● | ● |
| 44. Check condition of alternator and stater | | ● | ● | ● |
| 45. Check condition and tension of alternator drive belt | | ● | ● | ● |
| 46. Replace pressure inlet filter | | ● | ● | ● |
| 47. Replace pressure line filter | | | ● | ● |
| 48. Lubricate all controls (Do not lubricate Teflon liners of control cables) | | ● | ● | ● |
| 49. Overhaul or replace propeller governor (See Note 3) | | | | ● |
| 50. Complete overhaul of engine or replace with factory rebuilt | | | | ● |
| **C. Turbocharger Group** | | | | |
| 1. Visually inspect system for oil leaks, exhaust system leaks, and general condition | ● | ● | ● | ● |
| 2. Inspect the compressor wheel for nicks, cracks, or broken blades | | ● | ● | ● |
| 3. Check for excess bearing drag or wheel rubbing against housing | | ● | ● | ● |
| 4. Check turbine wheel for broken blades or signs of rubbing | | ● | ● | ● |
| 5. Check rigging of alternate air control | | ● | ● | ● |
| 6. Check oil inlet and outlet ports in center housing for leaks | | ● | ● | ● |
| 7. Check turbine heat blanket for condition and security | | ● | ● | ● |
| 8. Check linkage between bypass valve and actuator | | ● | ● | ● |
| 9. Inspect induction and exhaust components for worn or damaged areas, loose clamps, cracks and leaks | | ● | ● | ● |
| 10. Inspect fuel injection nozzle reference manifold for deteriorated hose, loose connections, leaks or obstructions | | ● | ● | ● |
| 11. Check fluid power lines for leaks and security | | ● | ● | ● |
| 12. Inspect for oil leakage from the controller | | ● | ● | ● |
| 13. Check operation of compressor bypass door | | ● | ● | ● |
| **D. Cabin Group** | | | | |
| 1. Remove inspection panels | | ● | ● | ● |
| 2. Inspect cabin entrance, door and windows for damage and operation | | ● | ● | ● |
| 3. Check emergency exit latching mechanism | | ● | ● | ● |
| 4. Check upholstery for tears | | ● | ● | ● |
| 5. Check seats, seat belts, security brackets and bolts | | ● | ● | ● |
| 6. Check trim operation | | ● | ● | ● |
| 7. Check rudder pedals | | ● | ● | ● |
| 8. Check parking brake | | ● | ● | ● |
| 9. Check control wheels, column, pulleys and cable | | ● | ● | ● |
| 10. Check landing, navigation, cabin and instrument lights | | ● | ● | ● |
| 11. Check instruments, lines and attachments | | ● | ● | ● |
| 12. Check gyro operated instruments and electric turn and bank (Overhaul or replace as required) | | ● | ● | ● |

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# Embedded Simulation for sUAS Flight Training

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# ERAU Flight Simulation

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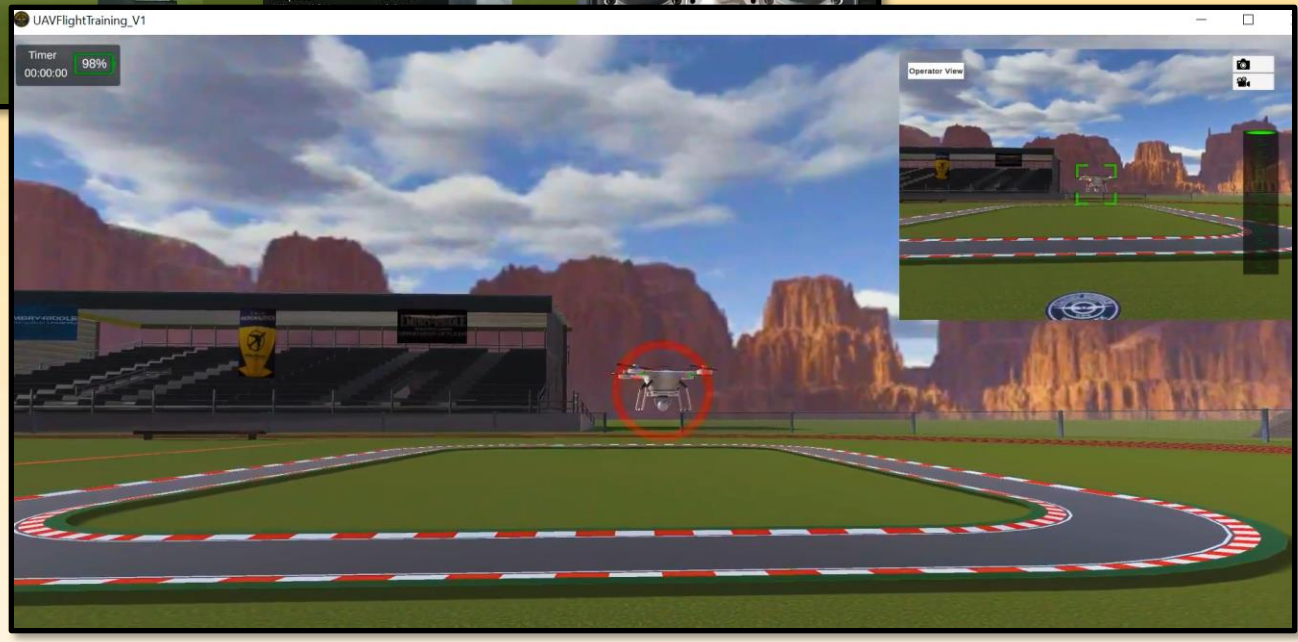

# ERAU sUAS Pilot Training (ERUPT)

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## OBJECTIVES:

- Low student cost, Win and Mac, minimum computer requirements, ERAU branded
- Basic sUAS flight training
  - Control manipulation (reverse control)
  - Simulate/practice maneuvers prior to flight
  - Reinforce habit patterns and muscle memory
  - Emphasize precise, smooth, deliberate control
- Practical Flight Assessment (PFA) practice
  - Increase “first look” success
  - Decrease required assessment time
- Avoid negative transfer

# ERUPT Training Areas

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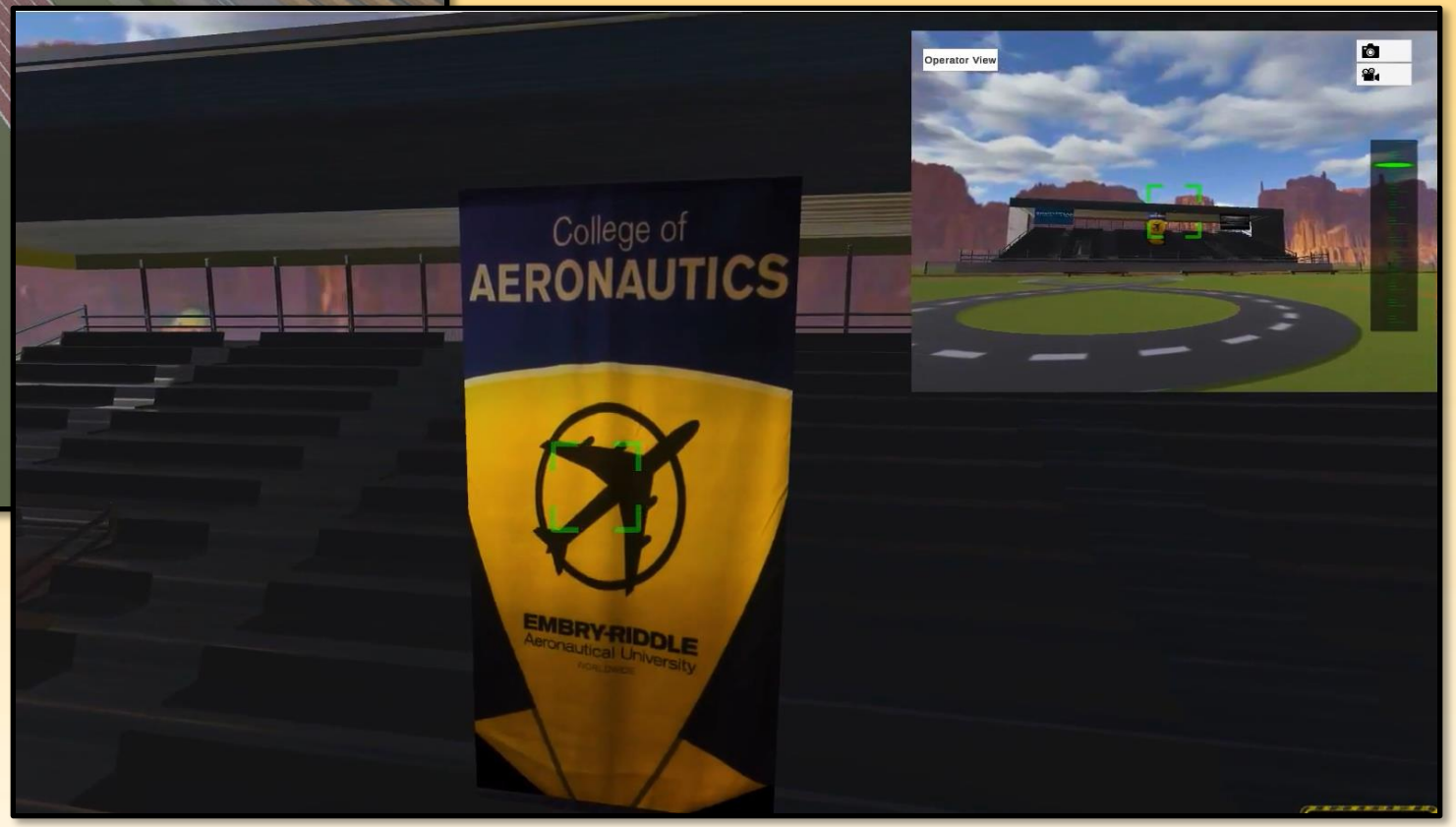
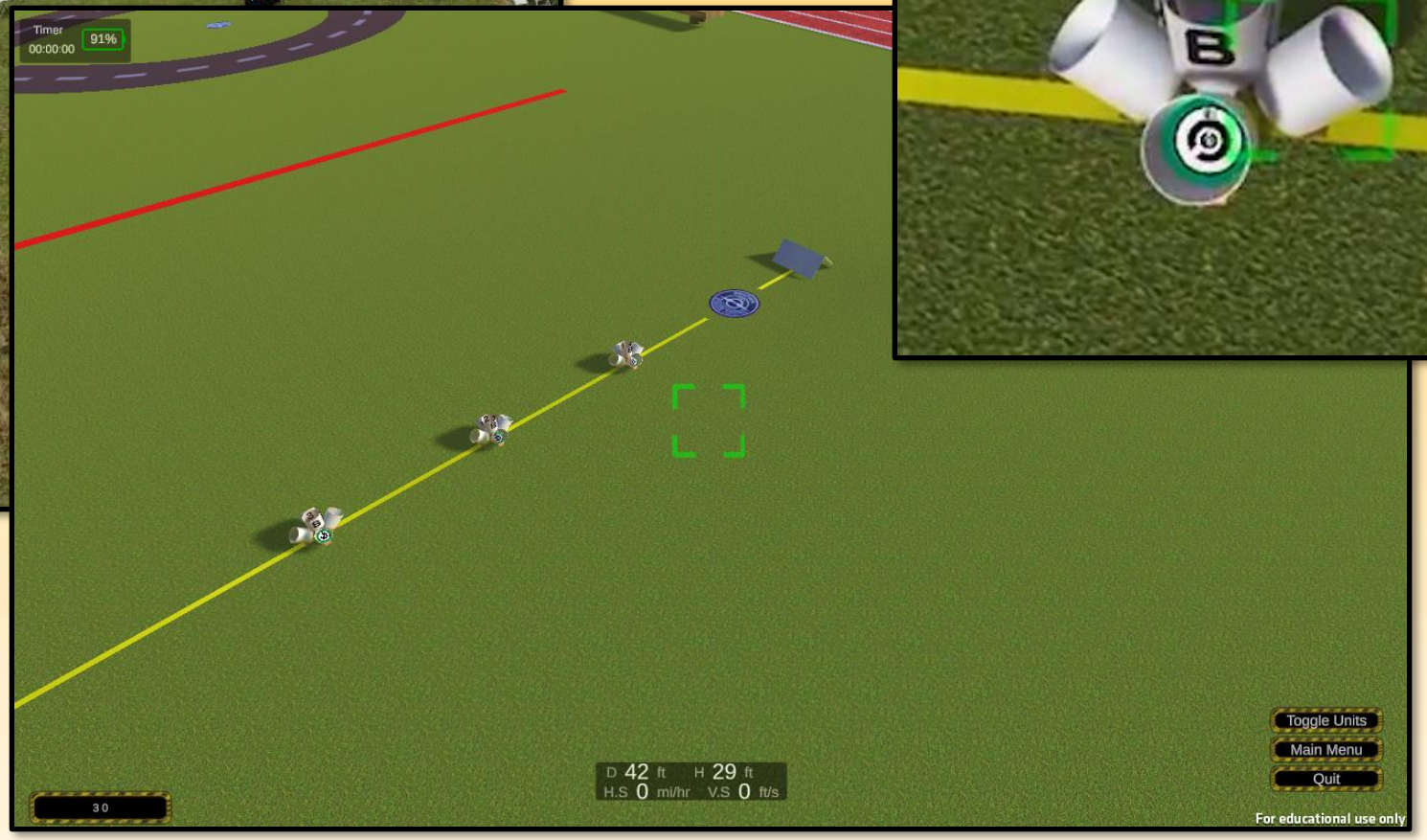


# Fidelity






- **Physical**
- **Cognitive**
- **Task**

# ERAU sUAS Pilot Training

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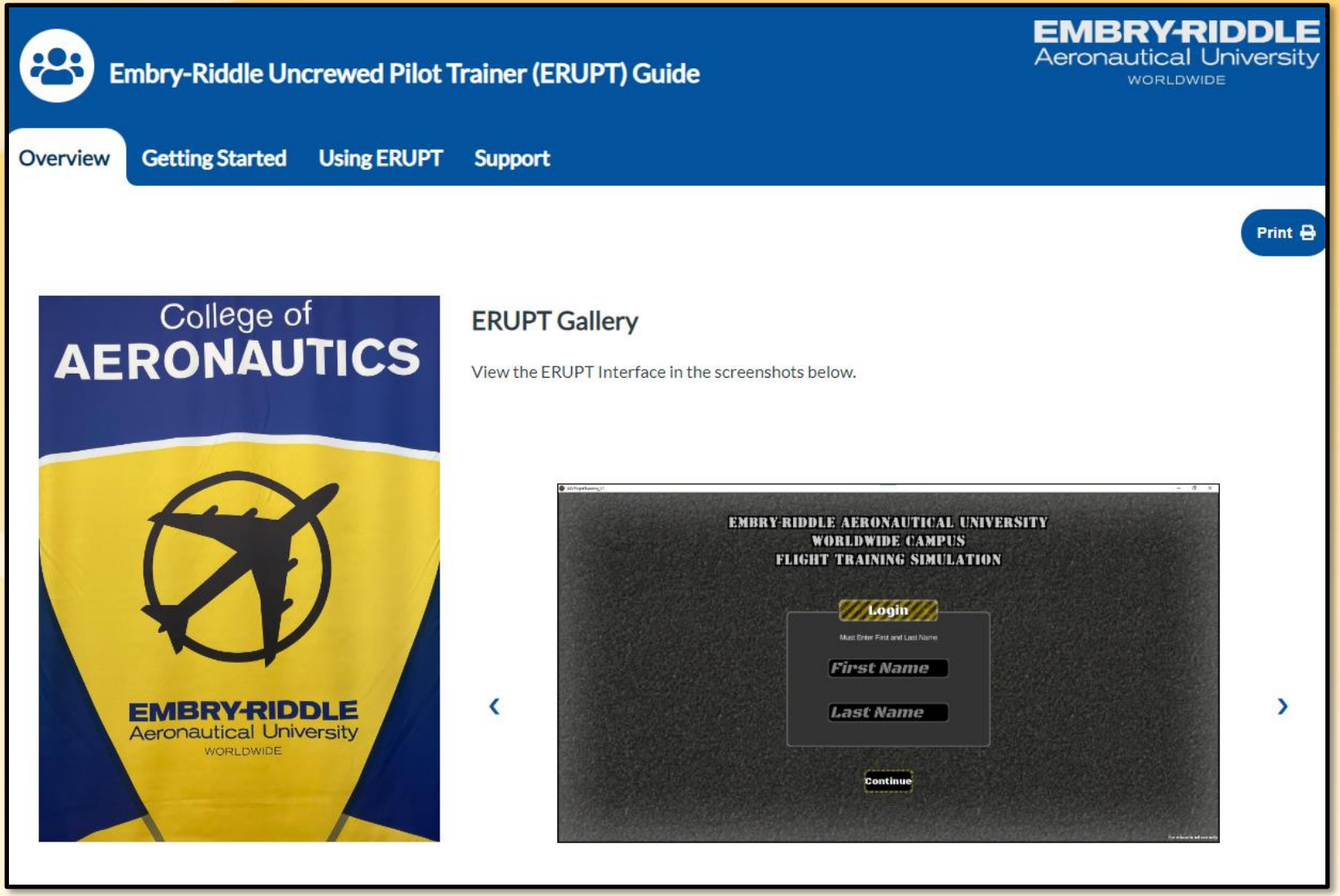
https://trainme.erau.edu/acadtech/Integration-Instructions/suas-training/index.html

Ongoing Development:

- Fixed Wing Aircraft
- Automated Routes
- Emergency Procedures



# QUESTIONS?

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# Virtual Composites Laboratory

*Dr. Brian Sanders*
*Title:Bottom Feeder*
*Embry-Riddle Aeronautical University*
*Worldwide Campus*

# Virtual Composites Lab

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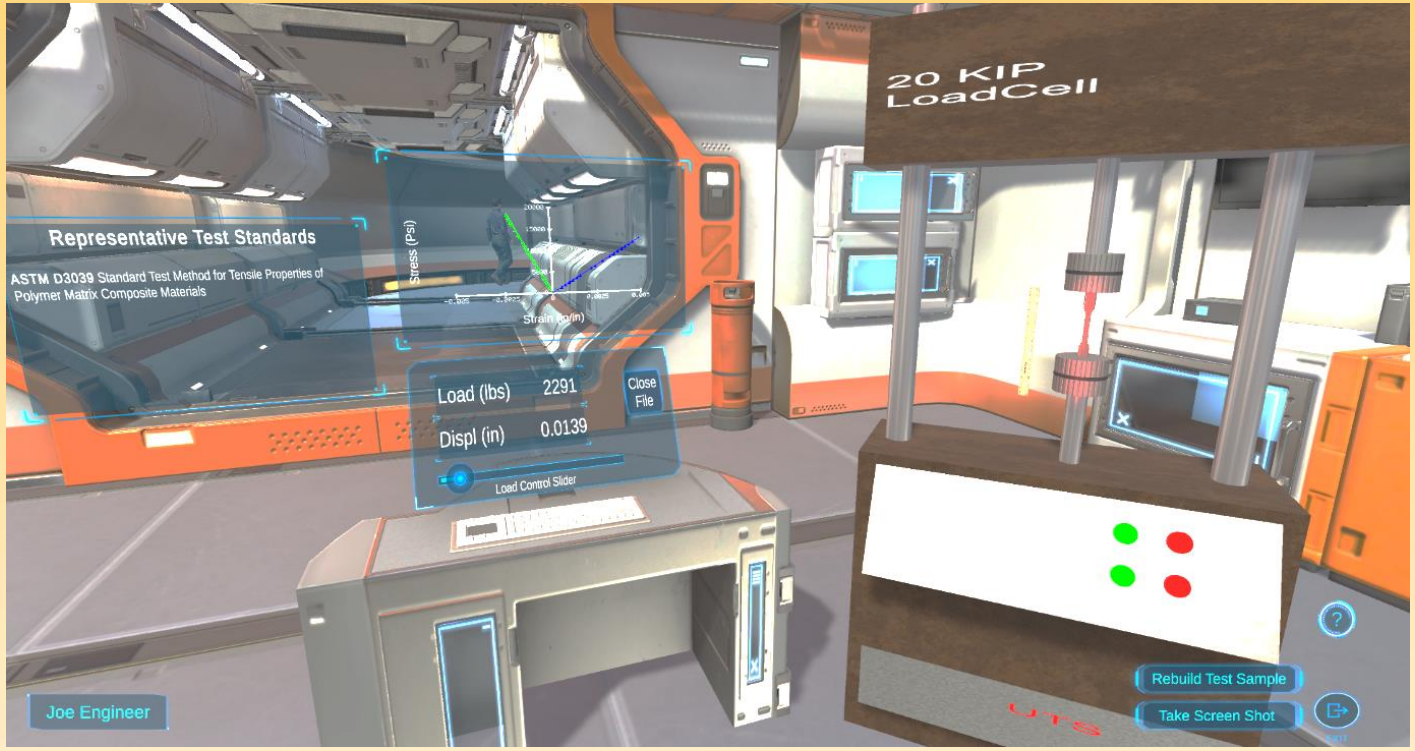
- **Engineering laboratory experience in the online environment**
- **Demonstrate in Real World - Explore in Virtual World**
- **Connected to ABET Student Outcomes**




**Real to Virtual**

# Building a Composite Material

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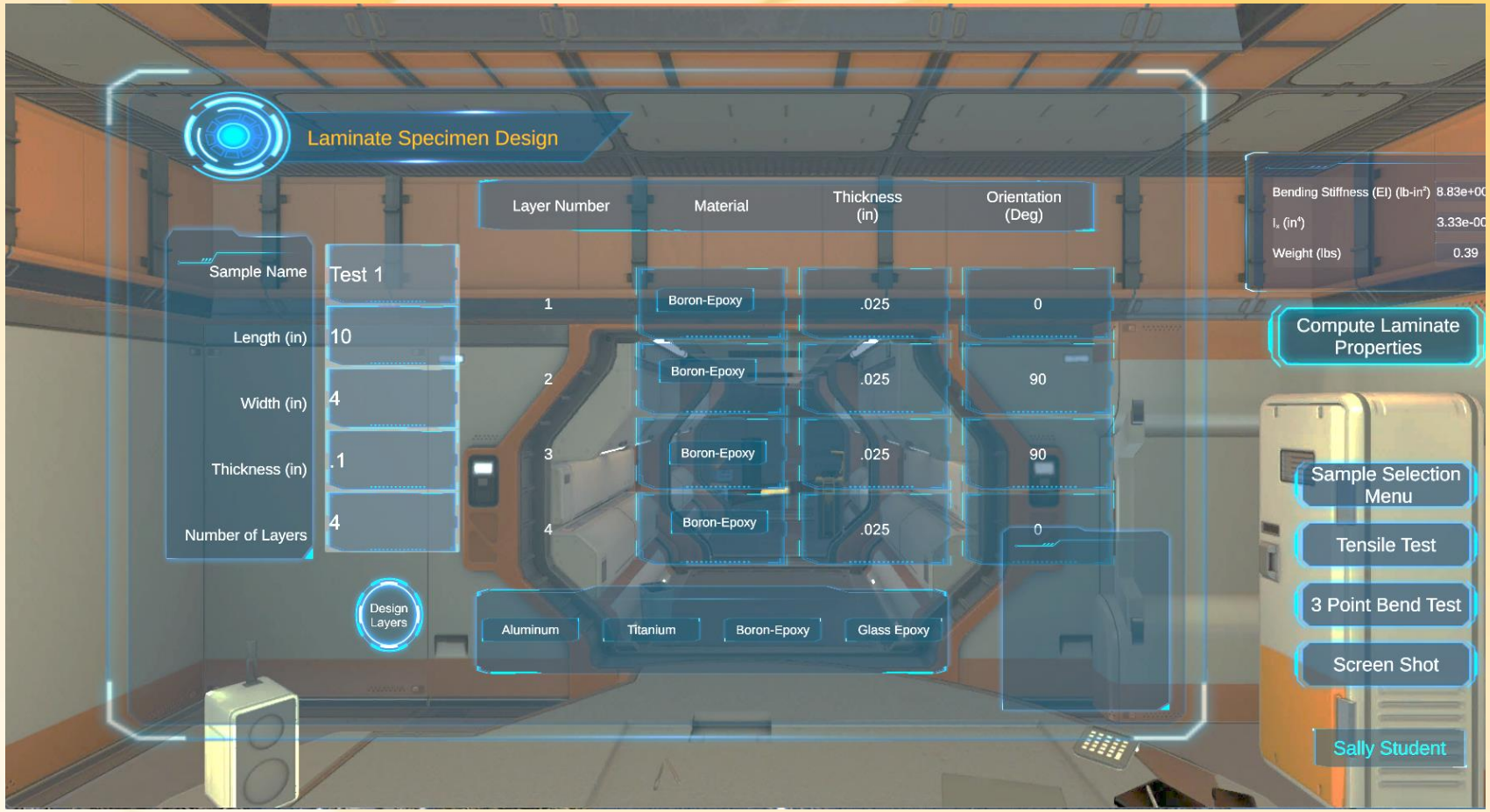


- Students can personalize
- Easy to change setup parameters – keeps it authentic

# Slide Title

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# 3 Point Bend Test

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# Tensile Test

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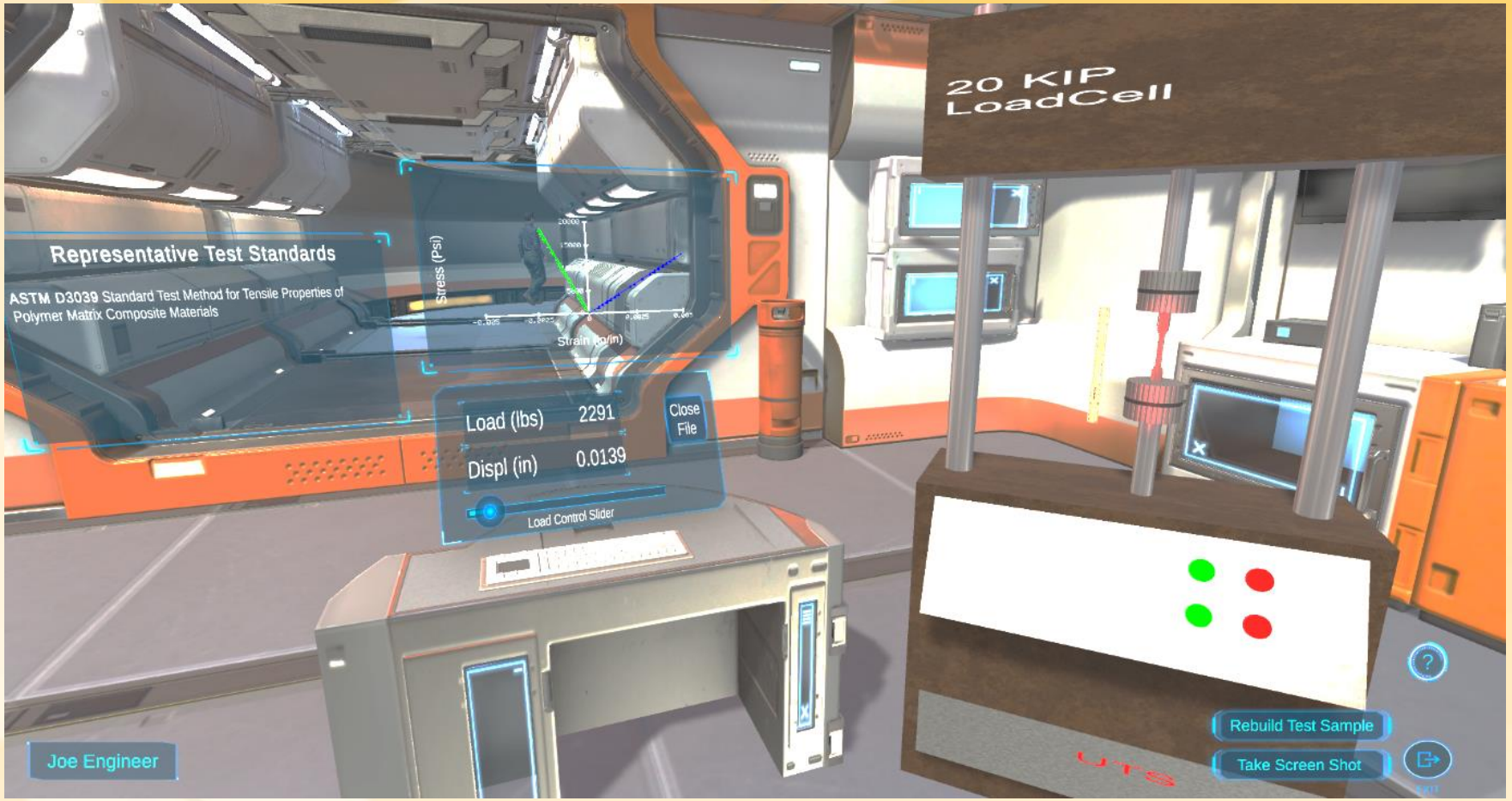


ABET SO

- Collect data
- Analyze and interpret

# Summary of Advantages

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- Enabling “hands on” training
- Skill development prior to real world application
- Personalization
- Original content
- Exploration and the “Playground Effect”

# Discussion