EPRI Virtual Reality Training
Mr. Robert Eller
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Meet the Presenter

Mr. Bob Eller, is a Technical Leader II at the Electric Power Research Institute (EPRI). He currently is the innovation and technology lead for Nuclear Training, which involves researching, integrating, and implementing applicable technology for training.

He has an extensive background in the training world, first as an instructor in the US Navy, then 27 years as a DoD instructor with Hughes Aircraft, Raytheon, Lockheed Martin, and General Dynamics Advanced Information Systems training both domestic and foreign personnel.

He was later an Adjunct Professor at Rappahannock Community College where he taught Micro Computer Electronics and Programmable Logic Controllers.

Before joining EPRI he was with Dominion Energy at Surry Power Station, first as an I&C instructor, then as a fleet Instructional Technologist, and finally as an Innovation Accelerator. During this time, he created a library of over 200 training videos called NukeTube, and was the lead on pilot programs for AR, VR, and the use of 360 cameras for training. He was responsible for the research, integration, and implementation of the 21st century classroom upgrades, at the Surry Training Center. Bob was the technical lead for integration, testing, and upgrades of the fleet Distance Learning System (DLS).

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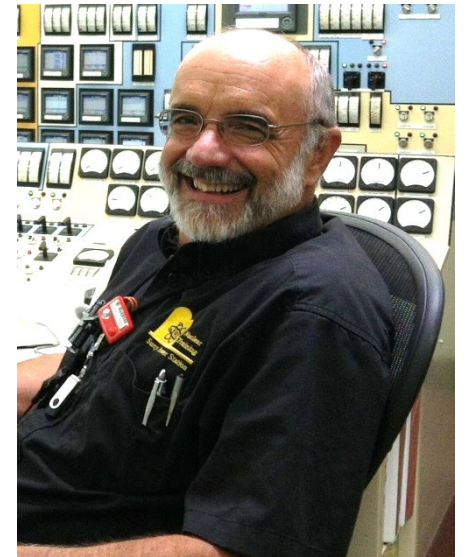
Outline

- Introduction
- How can we use VR in nuclear training
- A new paradigm for VR training
- VR is only limited by our imaginations
- Team training in VR
- What hardware is required
- Companion App
- Statistics
- What is currently available
- Coming Soon
- Key Take-Aways

Introduction

- Traditionally VR training has consisted of a student going into the virtual environment and performing a task

- VR training has been successfully employed in fields that have low tolerances for errors

  - Aviation
  - Medical
  - Military

- The immersive nature of VR makes it very effective at impacting worker behaviors – Bloom's Affective Domain

  - It tricks the brain into thinking the task is being performed

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How Can We Use VR in Nuclear Training?

- Training on equipment that is too expensive to have at a training center

- Training on equipment that would be hazardous to learners, or in a hazardous location

- Training on mission-critical equipment that is in use online

- Training on equipment that has been traditionally a simulation or discussion only due to the above or other conditions
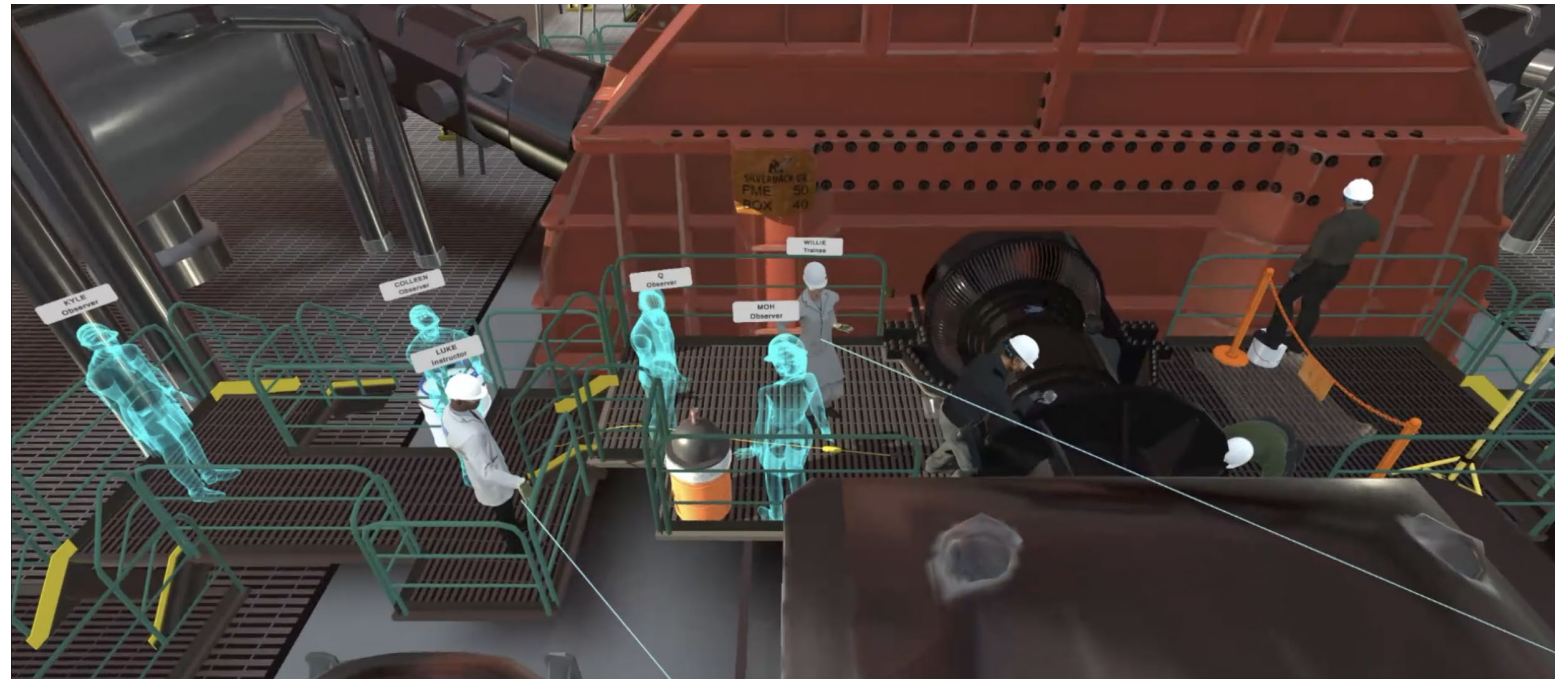
A New Paradigm For VR Training

- EPRI has developed a new cutting-edge concept for VR Training

  - Instructor led training in a virtual environment

    - Trainees can join the training from anywhere in the world if Wi-Fi is available

    - The instructor, trainee and ghosted trainee observers have full body avatars that are capable of real-world gestures and voice communication

    - Videos pertaining to the subject can be uploaded and viewed in the virtual sessions

    - Management observers can join the sessions from anywhere

A New Paradigm For VR Training Cont'd

- Applications have self-paced capability

  - The trainee can enter and take the modules at their own pace

    - Videos that the instructor uploaded can be viewed

    - Statistics are automatically sent back to the server and retained
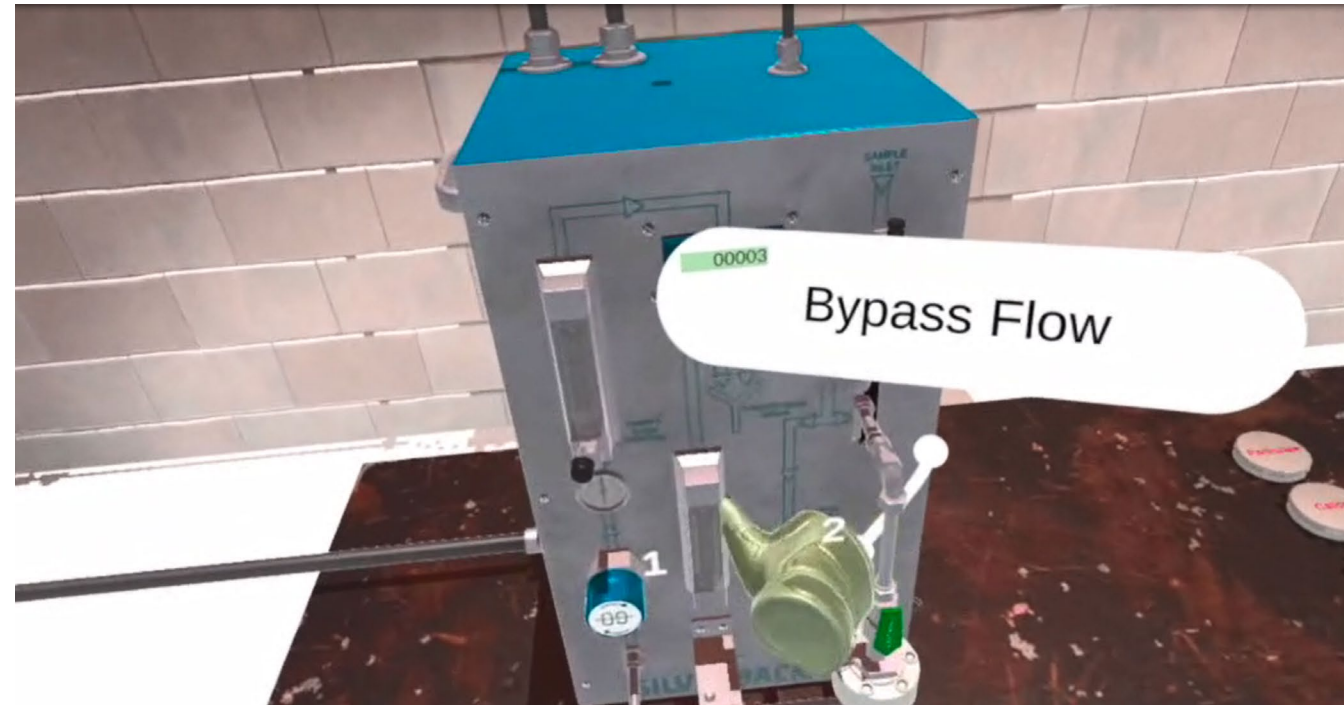
VR Is Only Limited By Our Imaginations

- In some self-pace and instructor led modules 3D models are enlarged to show trainees aspects of materials being covered

  - Here is an example in a cable inspection module

Team Training In VR?

- Team training can be done virtually

  - Here is a demo of a signalman & crane operator doing a virtual lift

  - Realistic physics are built in

  - Taking a pre-job brief to the next level

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What Hardware Is Required?

- The applications are available in 3D (VR) and 2D (PC)

  - Can be used together simultaneously

  - 3D (VR) is run on the Oculus Quest 2 headsets

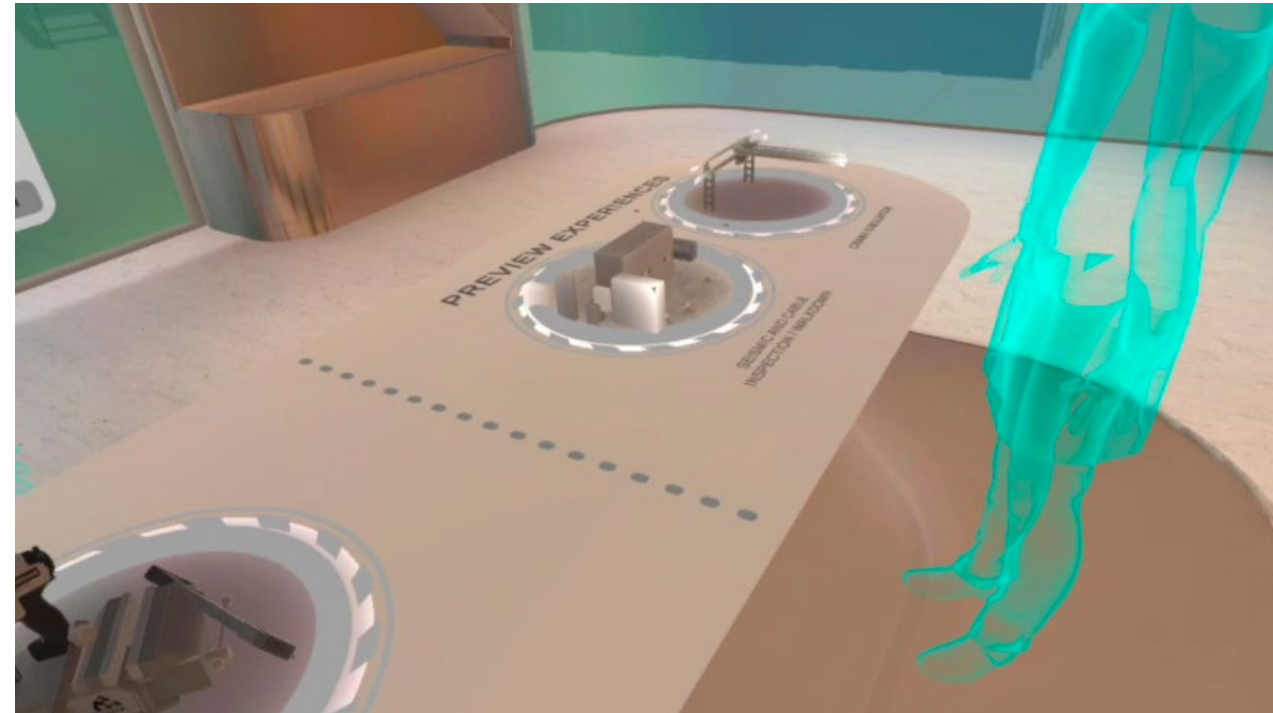 - 2D can be run on any PC with no executable file download required

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Companion App

- A Companion app for the PC is available

  - Allows a "spectator" to observe the 1st person or 3rd person view of anyone in the virtual environment

  - When in the 3rd person view you can orbit the scene to view from any angle

 - The spectator is invisible and can hear the audio
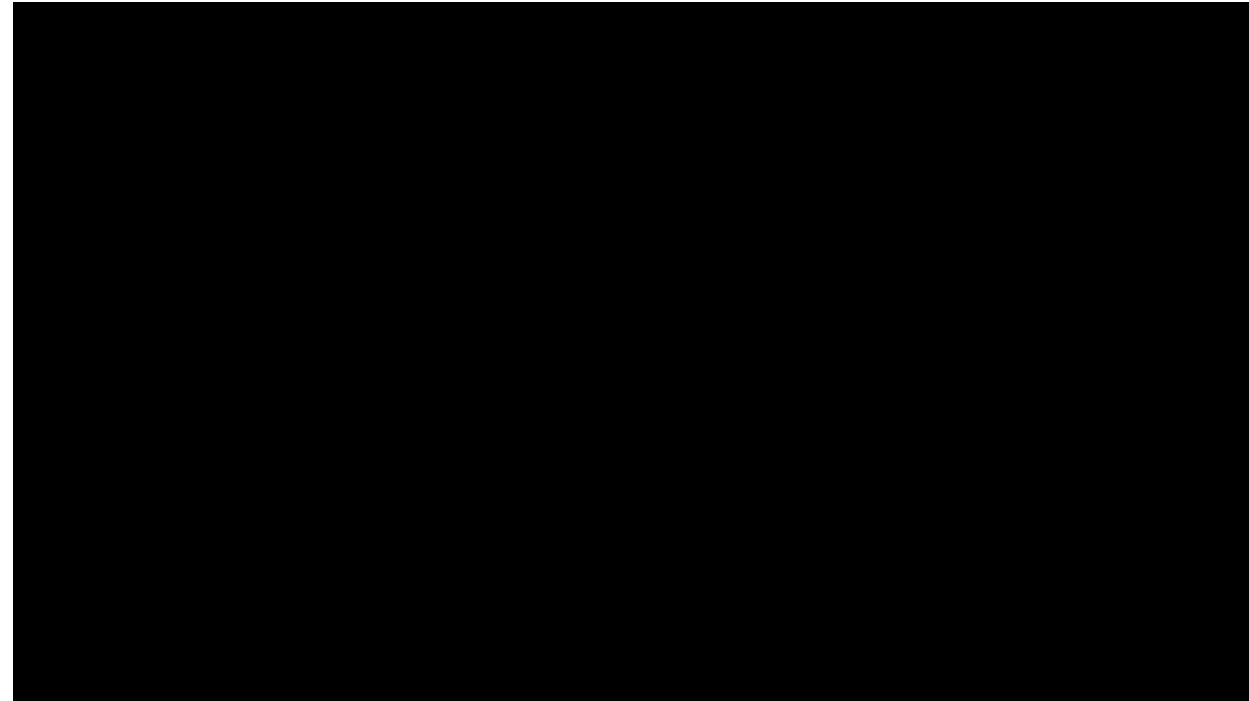
Statistics

- The applications will grade trainee performance and remediate missed infractions

- All statistics are kept on a server
  - Scores
  - Time spent
  - Most missed nodes

- Can be viewed by Instructors, and local admins assigned by site or company

What Is Currently Available?

- Industrial Safety
  - FME Counter
  - Open Turbine Site (FME)
  - Work at Height
  - Lead Exposure
  - Confined Space
  - Hot Work
  - Electrical Safety
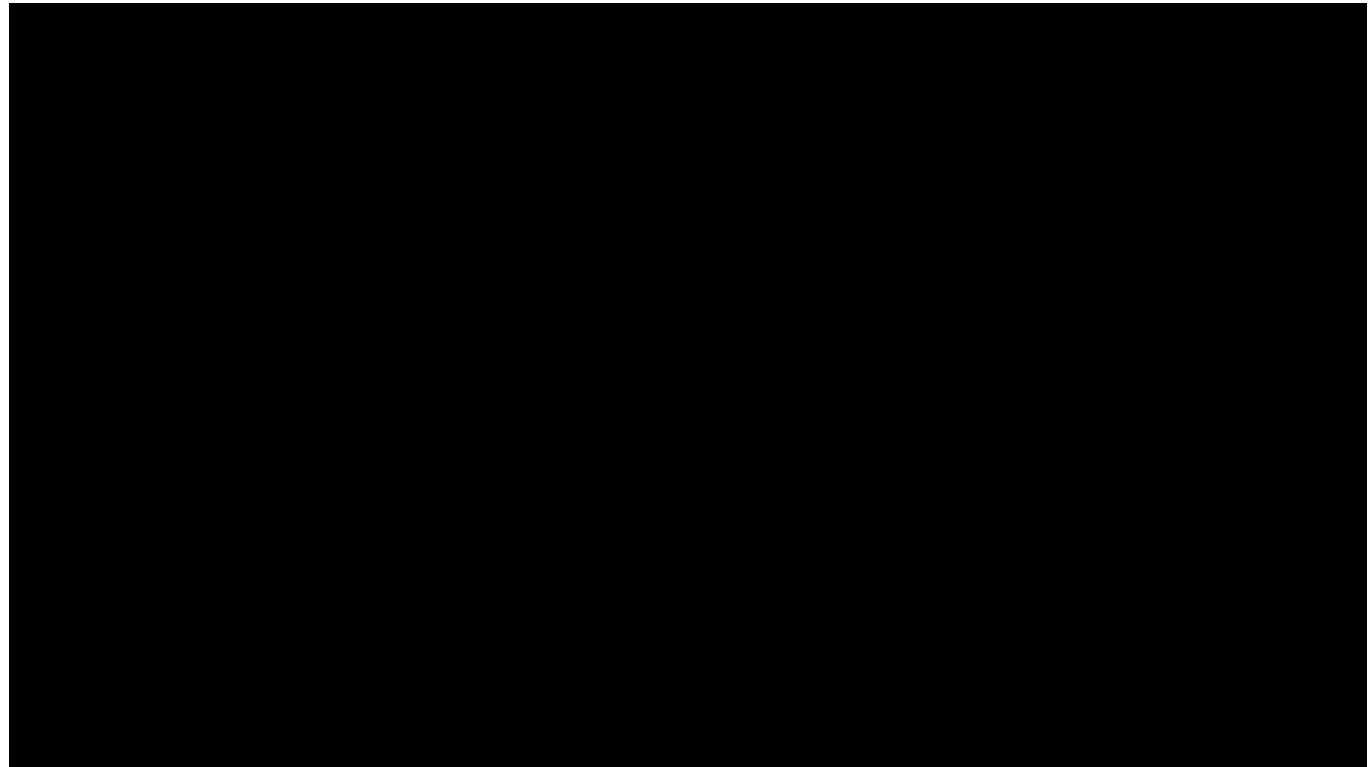 - Turbine Deck Free Roam

What Is Currently Available?

- Compression Fitting
  - Introduction
  - Preparation
  - Assembly
  - Disassembly
  - Reassembly
  - Assembly Test
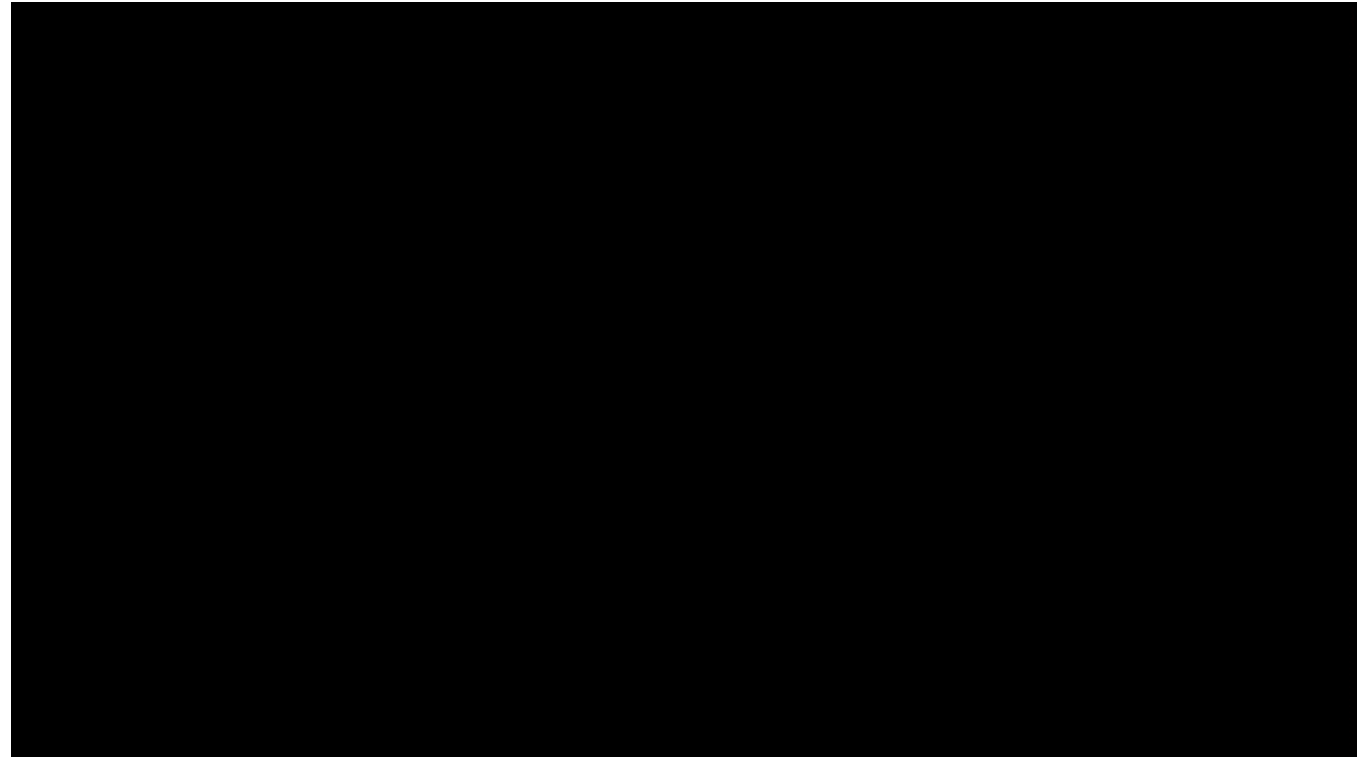 - Disassembly Test
  - Reassembly Test
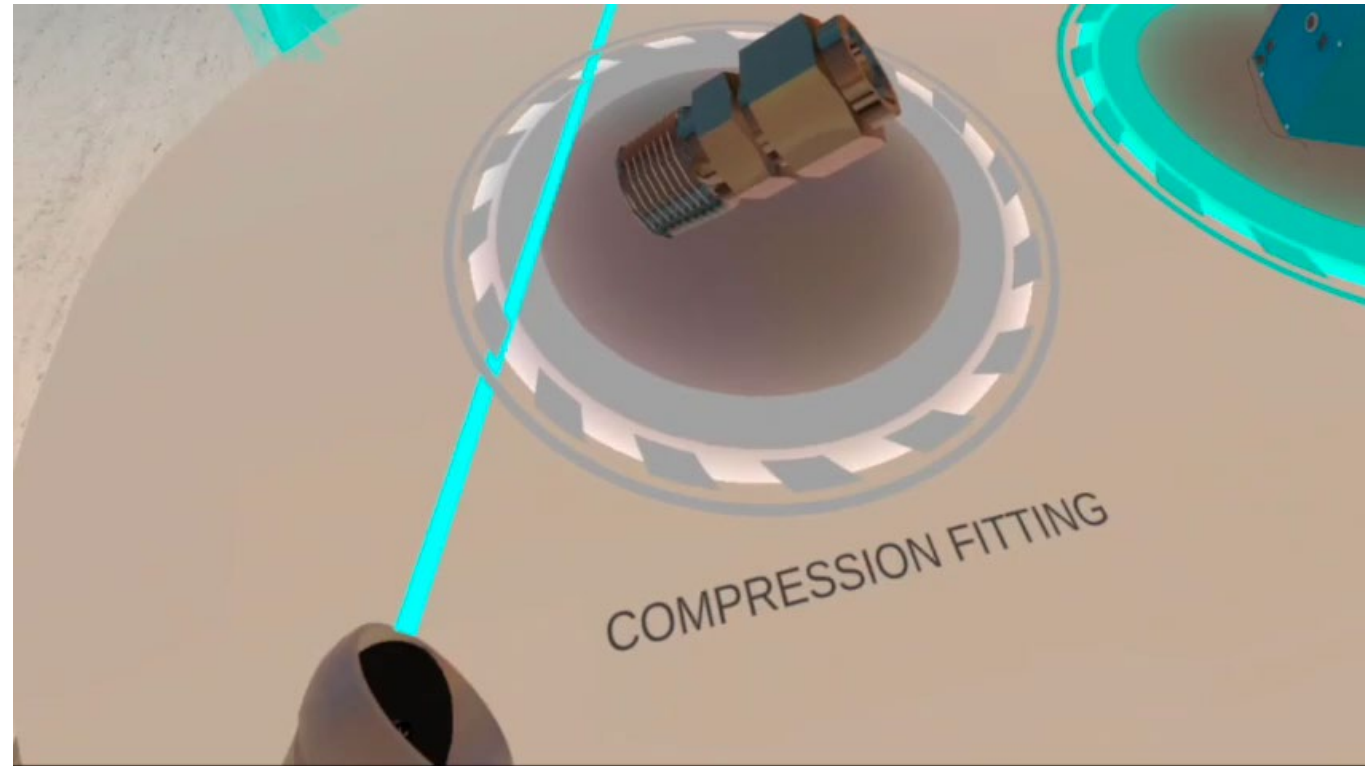
What Is Currently Available?

- Corrosion Sampler
  - Introduction
  - Corrosion Filter Collection
  - Filter Collection Test

What Is Currently Available?

- Tool Safety
  - Introduction
  - Screw Drivers
  - Hack Saws
  - Striking Tools
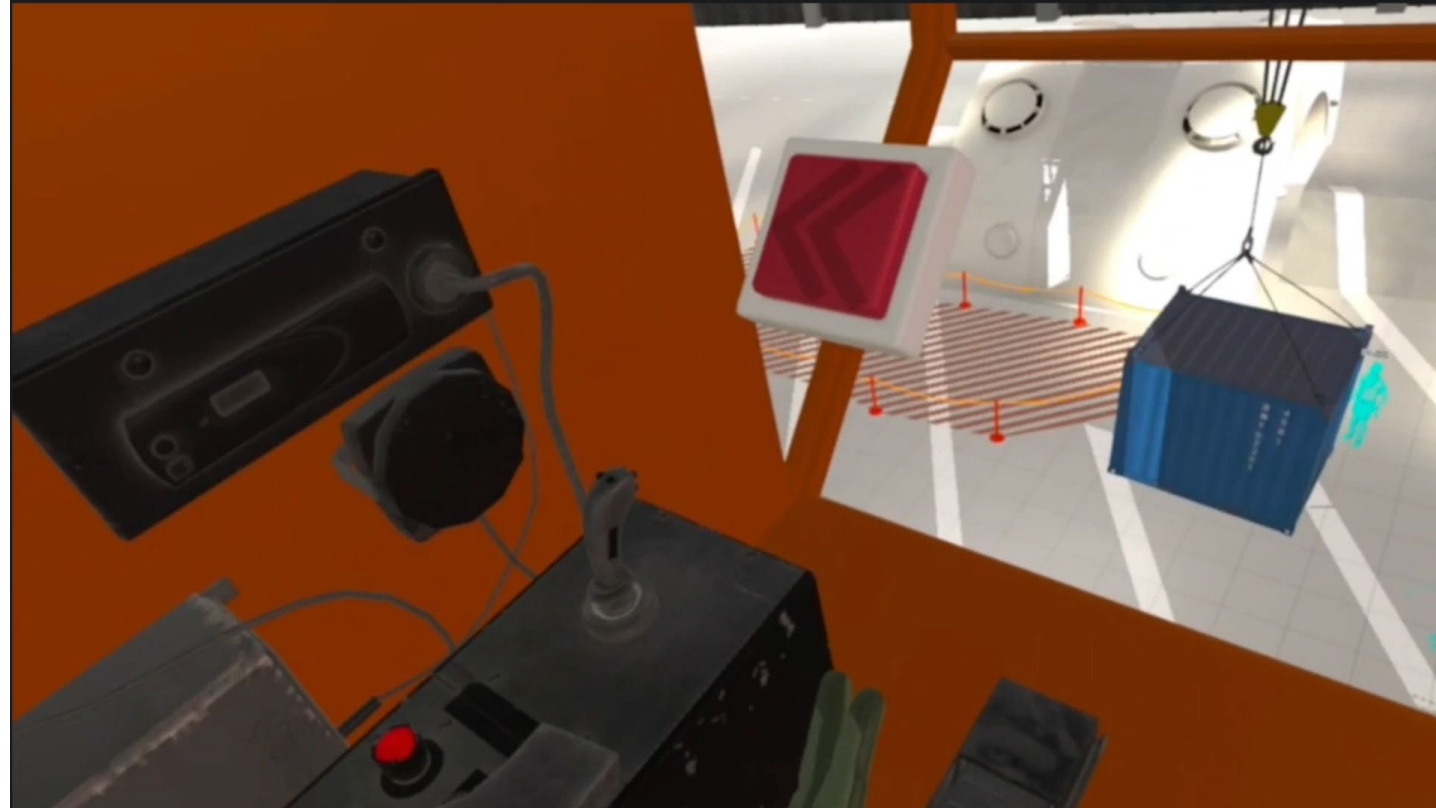 - Files
  - Power Drills
  - Power Saws
  - Pliers

What Is Currently Available?

- Seismic Walkdown

- Cable Inspection
  - Guided
  - Unguided

What Is Currently Available?

- Crane Demo
  - Crane Operator
  - Signalman
 - Material Handlers

What Is Currently Available?

- Lab Safety
  - Clean Side
  - Hot Side

What Is Currently Available?

- Creation Lab Demo

  - Demonstrates ability to configure the VR environment to match configuration of real-world turbine deck and interact with it

  - Capability to develop different environments (e.g., containments, switchyards, etc.)

  - Capability to develop an ever-expanding library of 3D models
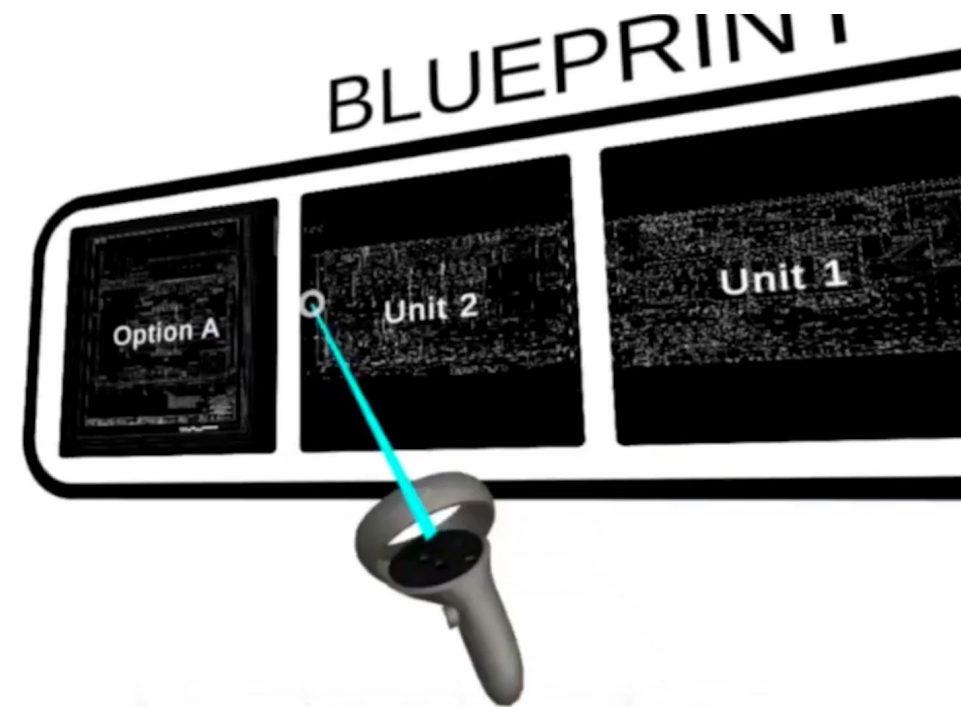
Coming Soon!

- # Steam Generator Training
  - Using the power of VR to take trainees into containment to learn about steam generators
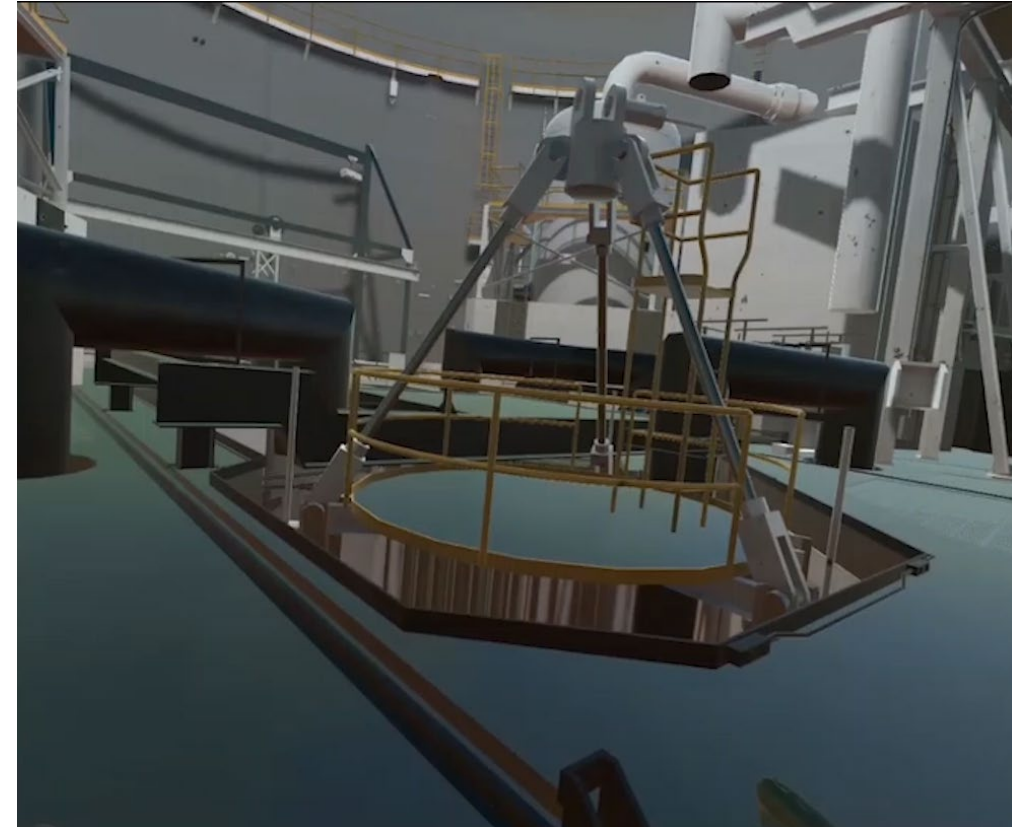
Key Take-Aways!

- Applications can run as self-pace or in multi-person mode

- Trainees are graded and remediated as necessary

- Engagement impacts worker behaviors – Bloom's Affective Domain

- Workers can learn from mistakes without real world impacts

- Capability for virtual team training

- Capability to build site specific environments

- Inexpensive hardware

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Upcoming Webinars

Date	Title	Presenter
31 October 2023	The Nuclear Workforce of The Future – Opportunities and Needs for The International Nuclear Sector	Callum Thomas, Thomas THOR, UK
02 November 2023	MOOK: The knowledge management method applied to a Gen IV project. The continuation of a successful story	Gilles Rodriguez, CEA, France
18 December 2023	Characterization of U-233 for Thorium Fuel Cycle Safeguards	Madeline Lockhart, North Carolina State University, USA

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