VIRTUAL REALITY (VR) LAB

The VR Lab uses a computer-generated, 3-dimensional, surround-screen projection technology system to provide the illusion of being in a dangerous, real-world workplace. The moment you put on special eyewear in the Lab, an immersive experience of being in dangerous working conditions is created.

The VR Lab is used to recreate worksites, model prototypes for personal protective equipment, and build hybrid environments—where virtual reality is combined with real structures and devices. Research focuses on human behavior and decision-making skills, human movement, and physical and physiological response.

Technology

- Surround-screen projection-based virtual reality system
- Surround sound to provide a life-like experience
- 6 cameras to assess motion
- Data recorder to measure physiological responses
- Force plates to measure ground reaction forces

Research Example

A virtual construction worksite on a residential roof was created to examine how shoe design affects workers' walking balance on elevated surfaces. Findings showed that high-cut shoes with good lateral stability can aid in worker balance and reduce the risk of falls[3].

Illustration by NIOSH

The occupational injury research conducted in our labs supports the prevention, reduction, and elimination of injuries and deaths of workers across all industries.

To learn more about our traumatic occupational injury research labs, contact us:

Phone: (304) 285-6219

E-mail: jop5@cdc.gov

You can also visit our relevant web pages:
www.cdc.gov/niosh/topics/anthropometry/projects.html
www.cdc.gov/niosh/topics/falls/labs.html

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To receive NIOSH documents or more information about occupational safety and health topics, please contact NIOSH at: 1-800-CDC-INFO (1-800-232-4636) TTY: 1-888-232-6348

May 2015

DHHS (NIOSH) Publication No. 2015-179

TRAUMATIC OCCUPATIONAL INJURY RESEARCH LABS

DIVISION OF SAFETY RESEARCH

Science at Work for People at Work

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Building Safe Workforces through Occupational Injury Research

TRAUMATIC OCCUPATIONAL INJURY RESEARCH LABS SUPPORT WORKER SAFETY AND HEALTH

The National Institute for Occupational Safety and Health (NIOSH) has many research labs. A number of these labs are used by NIOSH's Division of Safety Research (DSR) to conduct research that identifies, reduces, and prevents work-related injuries and deaths across all industries. These labs provide a safe and controlled environment to study work-related injury and are housed in Morgantown, West Virginia.

The labs described in this brochure are an essential part of DSR's research program and are vital to building a safe, healthy, and capable workforce.

DIVISION OF SAFETY RESEARCH

DSR works to address the safety issues of the 21st century workplace. Using a public health approach, our research involves:

- injury data collection and analysis,
- field investigations,
- analytic epidemiology,
- protective technology, and
- safety engineering.

Photo by NIOSH

Photo by NIOSH

LEFT:
High Bay Lab

BELOW
Anthropometry Lab Head Scanner

ANTHROPOMETRY LAB

Understanding workers' sizes and shapes is the essence of anthropometry. Research in our Anthropometry Lab supports improvements to the usability of industrial tools, equipment, and personal protective devices, as well as the safety and productivity of workers.

Technology

- Head scanner
- Body scanner
- Foot scanner
- Hand-held scanner for objects

Illustration by NIOSH

Research Example

Anthropometric research revealed that truck drivers are heavier than the average U.S. population[1], and that firefighters have larger upper bodies than the rest of the population[2]. These findings have significant implications for the design of future truck cabs to aid in truck driver safety and for the sizing of protective clothing and seatbelts for firefighters.

HIGH BAY LAB

With a 37-foot high ceiling, research in our High Bay Lab focuses on fall-related injuries and improving the safety of equipment, such as aerial lifts and ladders.

Technology

- 5-ton bridge crane
- Instrumented manikin
- 10-ton test bed equipped with structural steel beams
- Hydraulic power supply and actuator system

Research Example

The high ceiling in the Lab was ideal for examining extension ladder positioning. It was this research that contributed to the development of NIOSH's very first smart phone app – Ladder Safety[4].

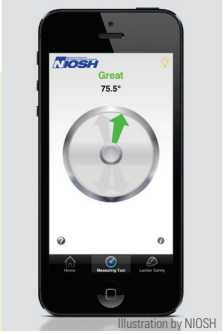

Illustration by NIOSH

HUMAN FACTORS LAB

Human factors is the relationship between people and their work environments, including the tools and equipment they use. Using biomechanics, applied physiology, and industrial psychology, research in the Lab allows us to study human motor and mental responses, machine safety, acute injuries, heat stress controls, and postural stability.

Technology

- 6 cameras to assess motion
- Environmental control unit to change temperature and humidity
- Force plates to measure ground reaction forces
- Fall-arrest system

Photo by NIOSH

Research Example

In the Lab, researchers are studying personal protective equipment (PPE) worn by healthcare first responders. This research will evaluate ergonomic and physiologic stresses imposed on PPE wearers to aid in improved PPE design.

VEHICLE SAFETY LAB

Engineering and technology-based safety intervention research helps us reduce the number and severity of work-related motor vehicle crashes. The Vehicle Safety Lab is vital to studying driver performance and evaluating vehicle safety technologies to keep workers safe.

Technology

- High-definition multi-screen motion-base simulator
- Car-, truck-, and bus-modeling software

Illustration by NIOSH

Research Example

Research in the Lab is focused on assessing automatic vehicle warning systems and developing intersection-safety best practices. This includes studying vehicle approach speed and defensive driving for workers to support safe vehicle operation.