

Making our world more productive



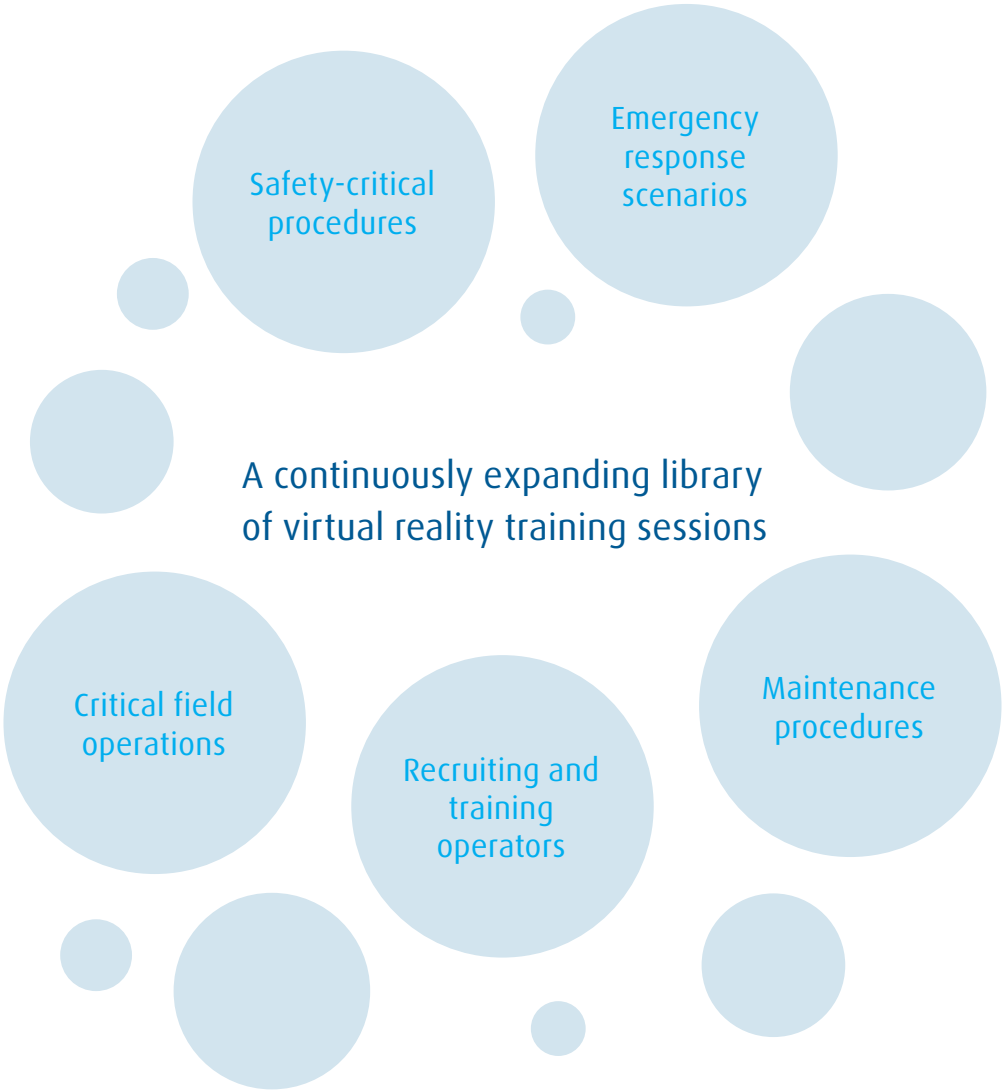
Linde Virtual Academy

Standardized field training catalog for
hydrogen and syngas plants



Linde Virtual Academy

Building on best practices from LINDE PLANTSERV®
to empower operating staff



Safety-critical
procedures

Emergency
response
scenarios

A continuously expanding library
of virtual reality training sessions

Critical field
operations

Recruiting and
training
operators

Maintenance
procedures



How it works

Acting like a virtual extension of your internal skills and capabilities, our LINDE PLANTSERV® team maximizes asset performance through practical coaching, consulting and training services.

Linde Virtual Academy is one of their offerings. This centralized training library was created specifically to support field operators of natural gas plants. It gives you instant access to Linde's extensive, hands-on experience and expertise in the engineering and operation of industrial plants.

The Academy contains a wide selection of standardized modules covering both routine on-site tasks and unforeseen situations. This allows you to increase operational efficiency through "learning by doing", and to prepare for critical incidents by practicing emergency response drills in a safe, virtual environment.

The courses visualize standardized process plant environments covering around 95% of all plant designs.

Once you have enrolled with the Academy, you can browse the modules on offer to select the skills or scenarios of interest to you and start your training session in a matter of seconds. The Academy also lets you document and track lessons learned to help you consolidate the skills you have built over the longer term.

Unbeatable service at a competitive price!



Session 01: Emergency response to a pump fire

Rapid response in a hazardous situation

Call to action

While carrying out a daily plant inspection, you notice smoke coming from a pump.

You must quickly activate the fire alarm from the nearest manual call point (MCP). After notifying the control room about the incident, you must then find the deluge valve for the pump in question and activate it. Once this has been done, you must exit the area and find a safe location.

Why take this course?

An inappropriate response could exasperate the situation, causing the fire to spread to other units, or release toxic substances. All of which can pose a risk to people, property and the environment.

Take-home skills

This course gives you the skills to:

- Become more aware of hazards
- Practice response protocols for hazardous situations in a safe environment
- Keep calm in actual emergencies



Session 02: Manually switching between desulfurization reactors

Practicing a critical operating procedure

Call to action

Desulfurization reactors are filled with a catalyst that cannot be regenerated. This means that the catalyst has to be replaced after a certain time, and the operator needs to switch from the non-active reactor to the active one to do this.

In this session, you can practice the changeover step flow. This includes isolating, cooling and purging one reactor without impairing ongoing production. The session also covers the steps you need to align with the control room.

Why take this course?

Incorrect execution of this task could lead to sulfur breakthrough in the product, or material damage. This could result in product impurities, production interruptions or expensive repair work.

Take-home skills

Through this module, you will

- Learn how to carry out this critical process safely and efficiently
- Gain practical experience to prepare you for a task you only need to carry out once a year



Session 03: Filling liquid hydrogen into a tank truck

Safe handling of hazardous materials

Call to action

Liquid hydrogen is a hazardous material. It must be handled safely during loading into tank trucks. You must follow a specific set of steps to prepare for, execute and follow up on all loading operations.

In this training session, you learn how to execute each of these steps. The session covers the entire process flow from draining the lines and replacing old gaskets through connecting the hose and cooling the pump to completing the entire loading operation safely.

Why take this course?

Executing this procedure incorrectly could result in a safety hazard. Hazardous material could be released, causing harm to people, property and the environment.

Take-home skills

This module equips you with the skills to:

- Safely execute a critical procedure
- Work in an efficient, standardized way



Session 04: Manually switching between safety valves

Practicing a safety-critical field task

Call to action

There are many reasons why an operator may have to switch between parallel safety valves.

In this training session, you learn how to execute each step of this critical safety procedure during ongoing operations. The entire process must be coordinated with the control room. First you will open the upstream and downstream valves on the fail-over side before blocking the valve that is being deactivated.

Why take this course?

Incorrect execution could result in over-pressurization, which may cause harm to people, property and the environment.

Take-home skills

You learn how to:

- Safely execute a critical procedure
- Work in an efficient, standardized manner



Session 05: Igniting reformer burners

Enhancing process efficiency and safety

Call to action

Burners are manually ignited in the field in many plants.

Before ignition, you have to perform a leak test, communicating closely with the control room at all times. Once the leak test is complete and the reformer has been purged, you must ignite the burner with a torch and regulate the flow of fuel in close collaboration with the control room.

Why take this course?

Failure to carry out this task correctly may lead to delays when starting up a reformer. There is also a risk of the reformer warming up too quickly, which can damage equipment.

Take-home skills

You learn how to:

- Practice this step in advance
- Execute it safely and efficiently when the need arises



Session 06: Responding to an incident in a confined space

Safe, rapid response to field incidents

Call to action

An operator enters a confined space after a purging procedure and loses consciousness.

You witness this incident and have to respond rapidly. First, you must raise the alarm without entering the confined space. Then you have to measure the atmosphere in the confined space to determine if it is safe to enter. If the atmosphere is enriched with purge gas, you cannot help without appropriate PPE. You must assess the situation and make the right decisions.

Why take this course?

Failure to act appropriately could cost you your life if you enter a hazardous confined space to help a person in danger.

Take-home skills

This module enables you to

- Respond correctly to a rare but potentially life-threatening situation
- Practice a response drill that you cannot train for in day-to-day operations



Session 07: Massive liquid leak during a truck loading operation

Safe, rapid response to field incidents

Call to action

As a tank is being filled, the truck driver makes a mistake and starts to drive the truck away while the hose is still connected. This results in a massive leak.

In this scenario, you must immediately push the manual call point (MCP) to inform the control room about the leak. You must then push the shut-off valve button to isolate the tank's outlet pipe before moving to a safe location.

Why take this course?

Trying to stop the leak on your own, for example, could cost you your life. There is also a major risk of explosion or damage to nearby equipment.

Take-home skills

This module enables you to

- Respond correctly to a hazardous situation that is rare but could have a severe impact
- Gain valuable experience in responding to incidents that you cannot train for in day-to-day operations



Session 08: Emergency response to a hydrogen jet fire

Safe, rapid response to field incidents

Call to action

A jet catches fire as a result of flange leaks in a hydrogen-rich process.

You must immediately push the manual call point (MCP) to inform the control room about the fire. You then have to isolate the unit to eliminate the source of the fire before moving to a safe location.

Why take this course?

Failure to act appropriately could lead to an explosion or damage to nearby equipment.

Take-home skills

This module enables you to

- Respond correctly to a hazardous situation that is rare but could have a severe impact
- Gain valuable experience in responding to incidents that you cannot train for in day-to-day operations

Your partner for the production and processing of gases

Delivering reliable process plants for maximum capital efficiency

Linde has been optimizing gas processing technologies for 140 years, successfully delivering more than 4,000 plant engineering projects around the globe.

Operational excellence along the entire plant lifecycle

We work closely with our customers to gain an in-depth understanding of individual needs. The LINDE PLANTSERV® service team supports customers every step of the way – from maintenance and repairs to full revamps.

Making the impossible possible

From the desert to the Arctic, from small- to world-scale, from standardized to customized designs, Linde's engineering specialists develop solutions that operate under all conditions.

Discover how we can contribute to your success at www.linde-engineering.com

Get in touch with our LINDE PLANTSERV® service team: vr@linde.com

Core competencies at a glance

Plant engineering

- Air separation plants
- LNG and natural gas processing plants
- Petrochemical plants
- Hydrogen and synthesis gas plants
- Adsorption plants
- Cryogenic plants
- Carbon capture and utilization plants
- Furnaces, fired heaters, incinerators

Component manufacturing

- Coldboxes and modules
- Coil-wound heat exchangers
- Plate-fin heat exchangers
- Cryogenic columns
- Cryogenic storage tanks
- Liquefied helium tanks and containers
- Air-heated vaporizers
- Water bath vaporizers
- Spiral-welded aluminum pipes

Services

- Revamps and plant modifications
- Plant relocations
- Spare parts
- Operational support, troubleshooting and immediate repairs
- Long-term service contracts
- Expert reviews for plants, operations and spare part inventory
- Operator training

