

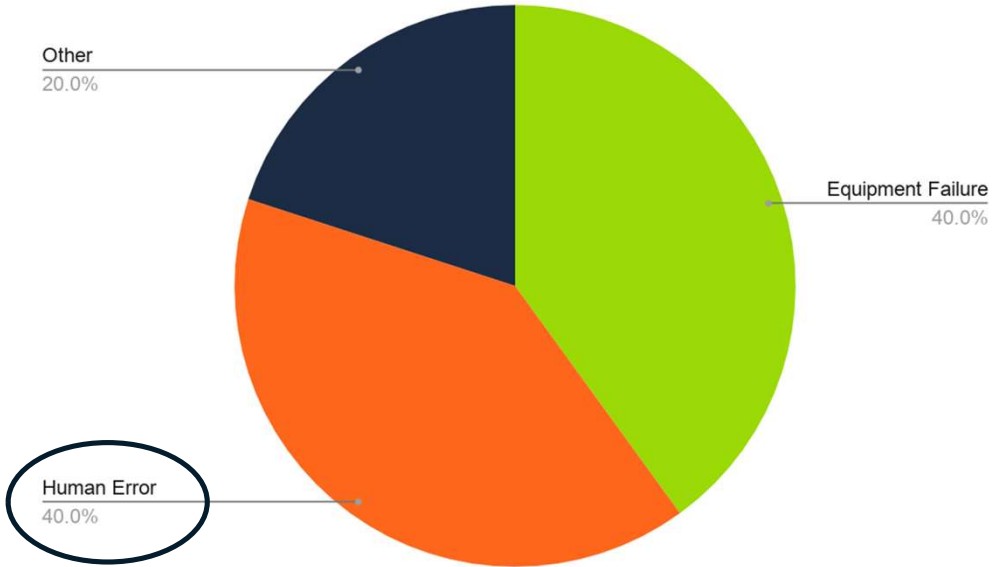
Operation Errors: Procedure Clarity or Operator Execution?

Dr. Susanna Voges, Voovio Technologies

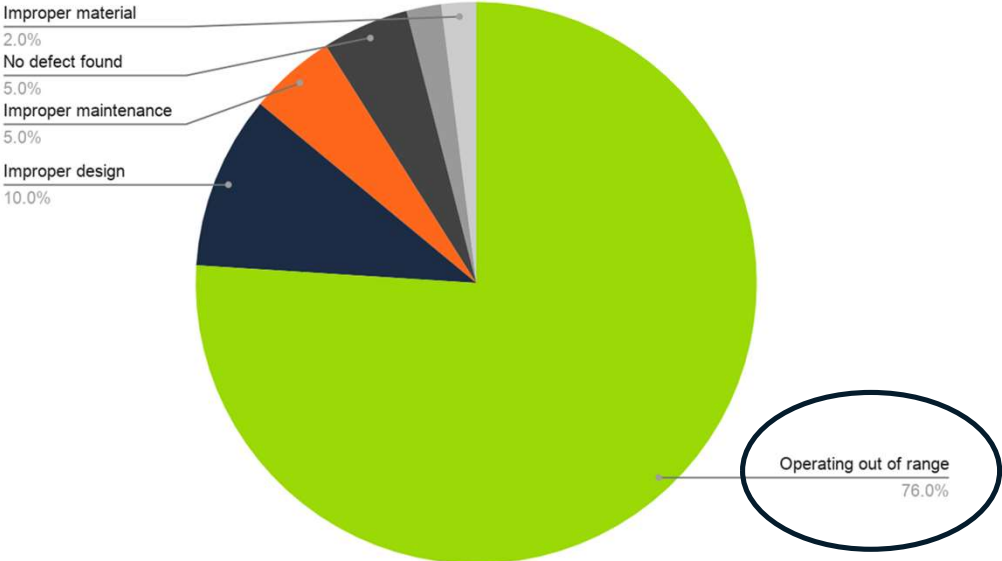
3rd European Conference on Plan & Process Safety 13.12.2023

Human Reliability & Procedure Quality are major contributors to process upsets & equipment failure.

Causes of Process Upsets



Causes of Equipment Failure



Honeywell

A background image of an industrial facility, possibly an oil or gas processing plant, with a complex network of pipes, valves, and machinery. A worker in a red uniform is visible in the center. The image is dimmed to allow text to be overlaid.

Technology & automation will
not solve **human reliability issues.**

“40 - 60% of field operator tasks are not automatable.”

McKinsey
& Company

It's not just about money...

Quotes from CSB's final report on the fatal acid release at LYB La Porte (2021)

"[...] The recurrence of these types of incidents points to the need to further re-design plug valves so that it is more difficult to remove pressure-retaining components while attempting to remove actuating equipment."

"The recommendations seek to address gaps in equipment design and labeling, procedures, communication of past incidents, and worker training."

"The CSB found that both the company and the contractor considered the removal of the actuator a simple task and did not provide the work crew with any sort of procedure or training."

Don't over-rely on inherent safety, people still matter!

<https://www.csb.gov/csb-releases-final-report-into-2021-fatal-acid-release-at-lyondellbasell-la-porte-complex-in-la-porte-texas/>

Procedure Clarity - A very common Example.

1 step

Open the non-instrumented fuel gas cock valves and air dampers.



10 actions



Also common and very open-ended...

1 step



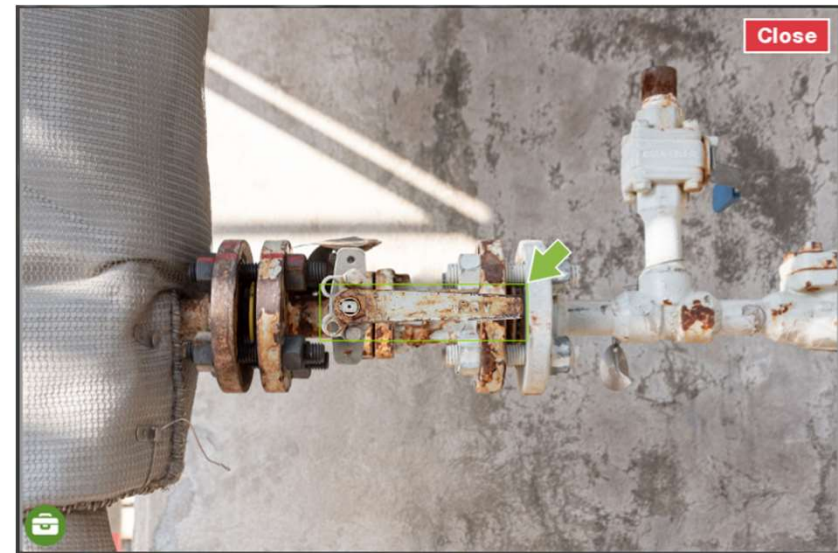
53 actions

Actuating 15 different valves

MANUALLY FLUSH all CTO's, top/bottom flushes, bypasses around flush flow meters, and any other isolation flush valves

CAUTION

Failure to properly flush all CTOs may result in a reactor poisoning event



Operation Errors: Procedure Clarity or Operator Execution?

Procedure Clarity

- Ambiguities and generalizations
- Assumption that operator already knows how to do it
- Procedure does not reflect practices
- Mismatch between assumed and actual qualification level of the operator

Operator Execution

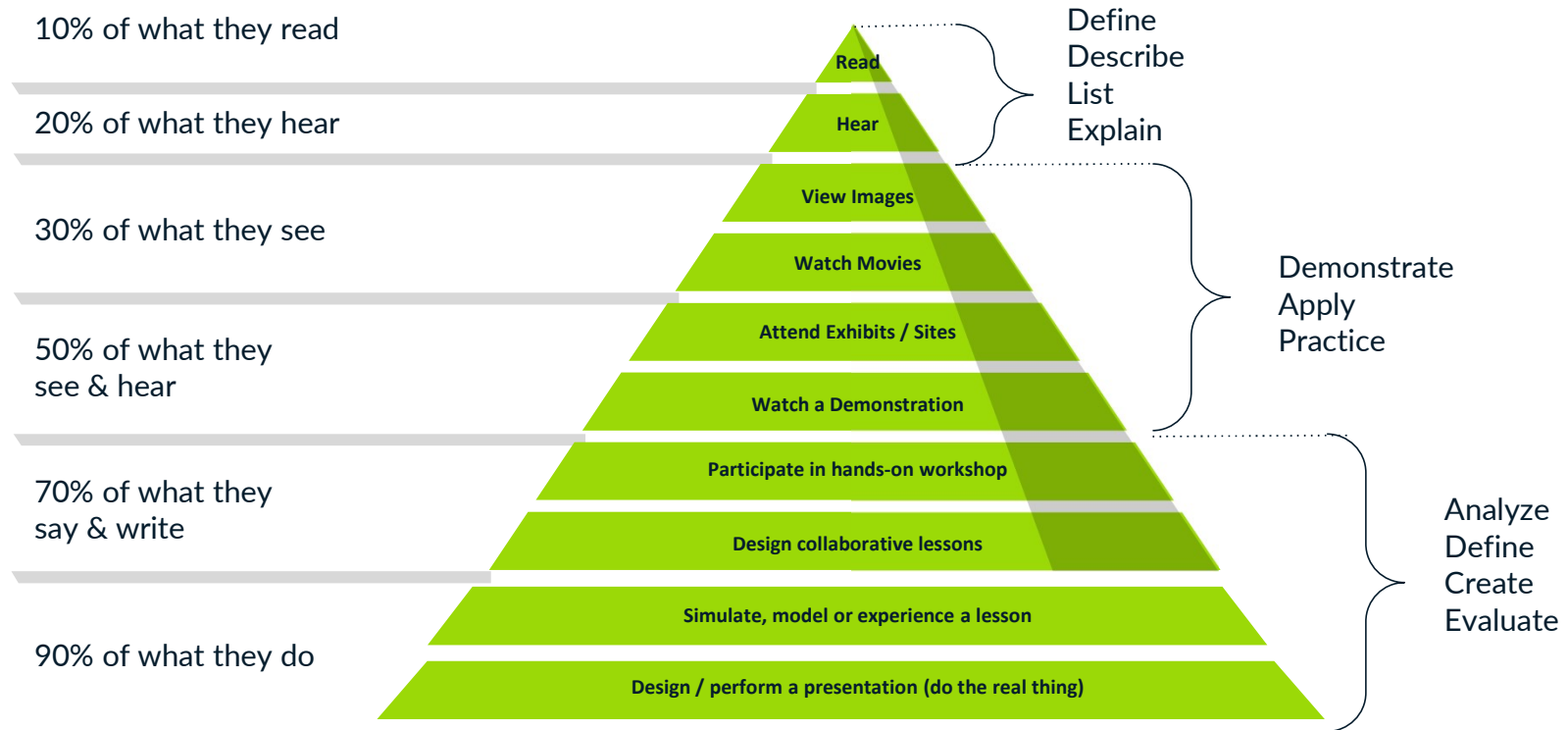
- Didacticts – SOPs hard to digest
- Execution not standardized across shifts
- Mass retirements, high turnover – SME's overwhelmed by training needs



It's not either or, it's both!

The Power of Simulation.

People generally remember...



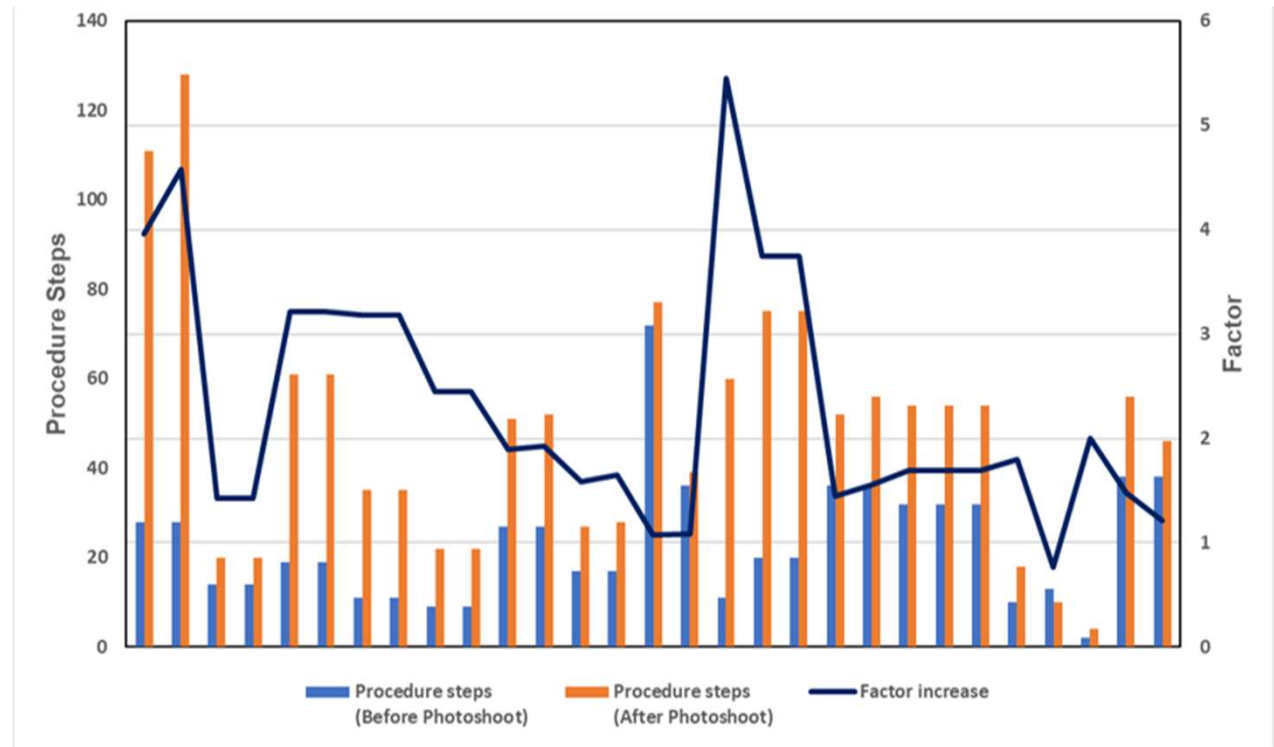
The Learning Pyramid

Let's see a demo.



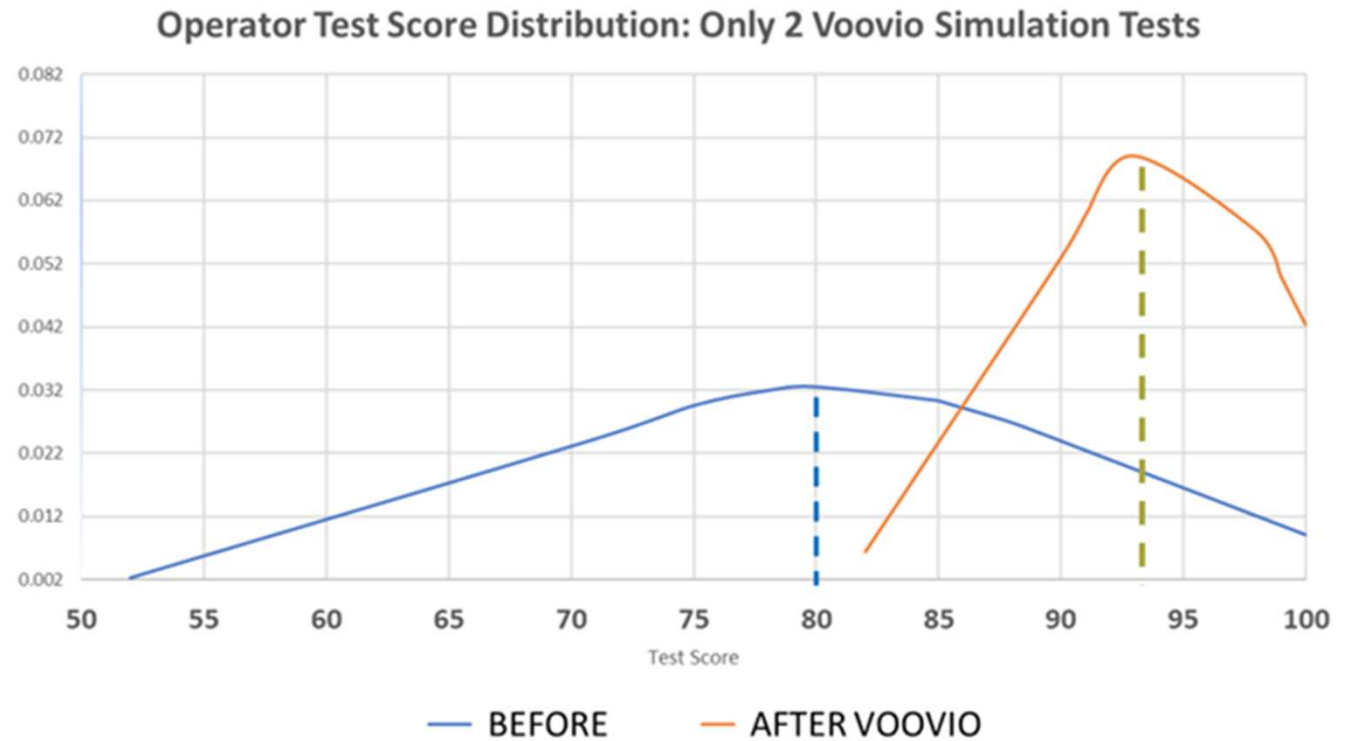
Improved procedure clarity.

We randomly sampled and analyzed ~300 customer procedures:



1st Workforce Performance Data

- Data from 14 customers
- 1 critical SOP was assigned to each **qualified** operator.
- 1 month of autonomous practice.



Global Footprint:



Questions?

Global Footprint:

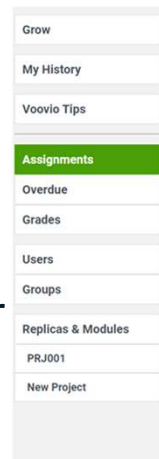


Impact.



Refinery's Self-Loading Racks Transformed.

- ~150 trucking companies
- ~900 drivers
- Email notification of assignments.
- Practice, learn and take Test via web browser
- Content available 24/7
- Email notifications
- Documented driver records
- Gate access on successful completion of Test

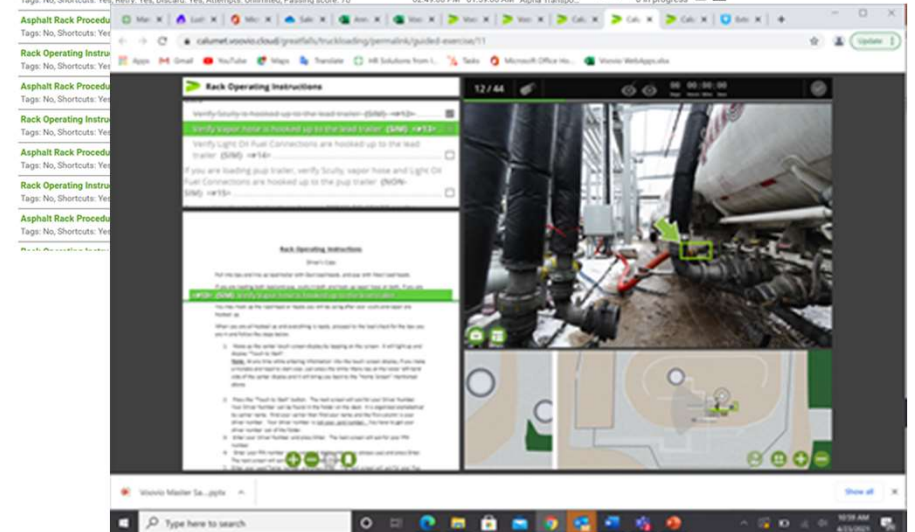


Assignments

New Assignment

Filter Apply Reset
Simulation Module: All ▼
(68 results) Pages: 1 2 3 4

Assignment Information	Start Date	Due Date	Assignees	Status	Progress
Asphalt Rack Procedure and Driver Training Record Tags: No, Shortcuts: Yes, Retry: Yes, Discard: Yes, Attempts: Unlimited, Passing score: 70	04/22/2021, 02:49:00 PM	06/23/2021, 01:59:00 AM	2 Alpha Transpo...	Open	1 completed 0 in progress
Rack Operating Instructions Tags: No, Shortcuts: Yes, Retry: Yes, Discard: Yes, Attempts: Unlimited, Passing score: 70	04/22/2021, 02:49:00 PM	06/23/2021, 01:59:00 AM	2 Alpha Transpo...	Open	1 completed 0 in progress



Fewer incidents and more efficient loading operations.

- Time savings for operators: 75-80%
- Structured training and consistency between operators
- Drivers know what to expect and better prepared
- Drivers are more familiar with equipment/site and recognize issues early
- Drivers give better feedback on issues
- New confidence in drivers
- Automated, documented truck driver test results

“This is now an area we worry less about. Life is a little easier!”




CALUMET
SPECIALTY PRODUCTS PARTNERS, L.P.

Refinery – fewer environmental releases.

Site:

- Refinery

Challenge:

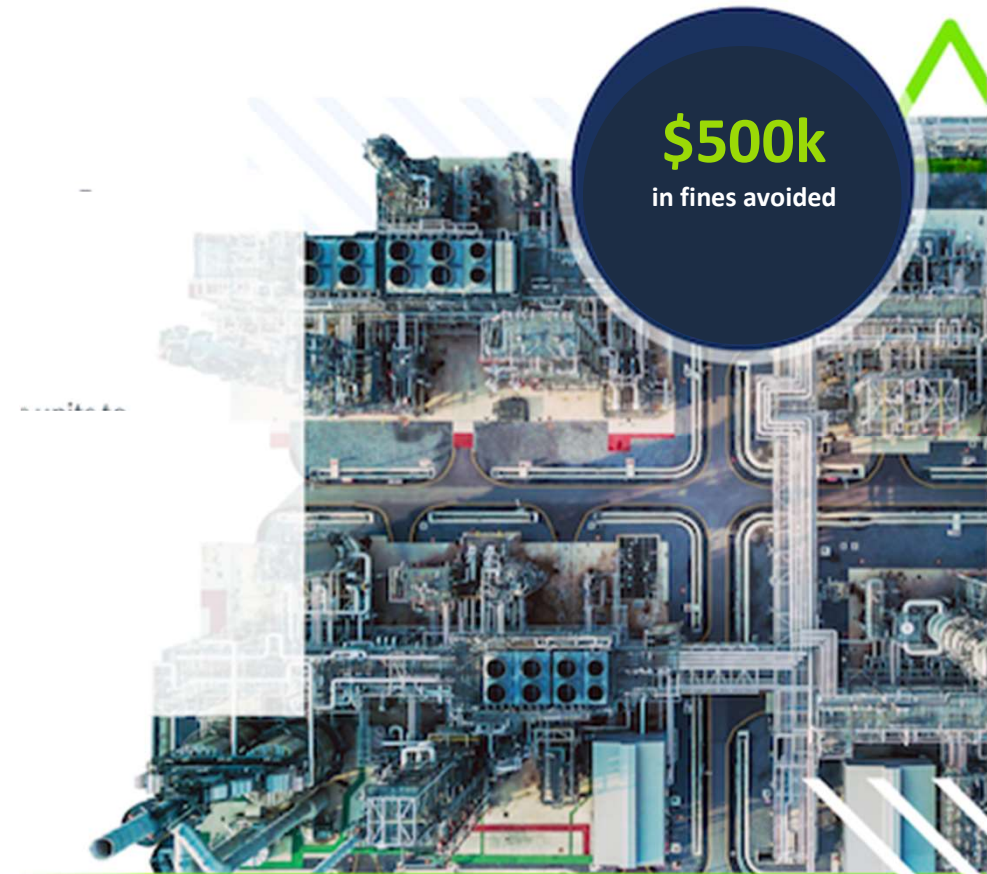
- Eliminate loss of containment of process materials resulting in reportable incidents and regulatory fines
- Procedure generalizations
- Lack of exposure to entire startup procedure and lack of competency

Use of Enhanced Reality/improved clarity:

- Line Walk process to create action checklist clearly defining all release sources
- Practice procedure simulators prior to procedure execution
- Field execution tool

Main ROI contributor:

- Elimination of environmental releases



Feedback.

Operator Trainee Feedback:

"I think I could go out into the field right now and startup the Extruder. I feel now very familiar with the area and procedure."



"This is engaging. Reading a procedure is not engaging. This is the most engaging and effective training I have ever done."



"We went through the SOP in about 10 min in the field because we already were familiar with the area and the SOP. The trainer couldn't believe it."



"When we were out in the field, we knew where everything was and felt familiar with the area. I like the way you learn the detail and sequence of a procedure, so when you're in the field training you learn new things faster and retain the info better because you're more familiar."



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"I feel better armed and have more confidence because I was able to practice in Voovio first."



Trainer Feedback:

"Trainees can see and operate the equipment virtually, having direct report back to how they are performing. Instead of me walking a student through a process 40 min individually, I can now have 16 students do the same task at once. It's a timesaver! It could shorten our training from 6h to 40 min."



"I was fairly impressed with the thought process of how Voovio trains a new operator. It is a really unique approach. My opinion has only changed by getting stronger because after learning how to operate Voovio, I've really seen how it can do a lot of great things."



"Voovio gives the opportunity for seasoned operators to ask questions, check things etc. whereas without Voovio you might not be willing to ask questions".



"It absolutely works. It is a legitimate tool and has a defined place."



"Well done. It was truly a noticeable difference" (between those who had used Voovio & those who hadn't)



"I think Voovio helped a lot for the trainees. There is a time factor when looking through procedures & trying to relate the real world to the procedures. Using Voovio provides clarity on what exactly needs to be done & helps create muscle memory."

