Chillventa Specialist Forums 2024
Chillventa Fachforen 2024

CONNECTING EXPERTS.


HYUNDAI
333-4

INFICON

Inspired by visions. Proven by success.

Efficient, automated leak testing and leak localization

by the example of refrigerators

Reasons for automation

higher throughput

savings in labour cost

higher quality

seamless data recording

Leak test automation in other industries

- pressure decay or flow, using compressed air
- accumulation leak test, using tracer gases
- hard vacuum leak test, using tracer gases
- robotic sniffer leak test, using tracer gases

Automated leak test of HVACR components

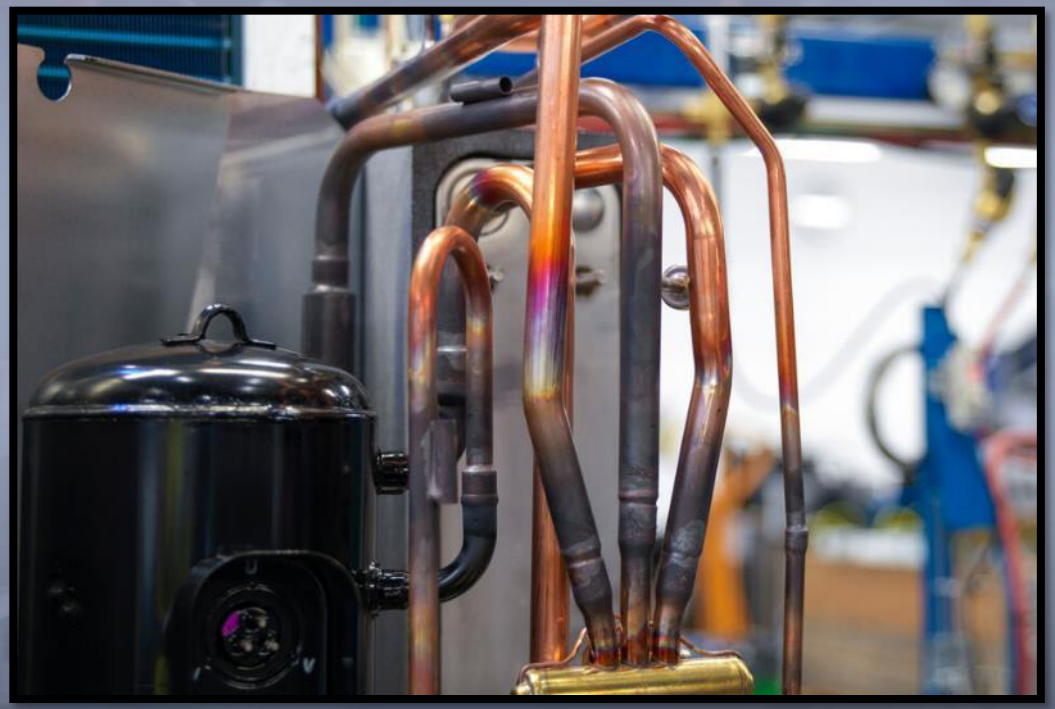
Automated leak test of HVACR components

- Components of HVACR products (chillers, compressors, valves & fittings) can easily be tested with the same test methods

- **not so with many HVACR final products (fridges, AC systems, Heat Pump)**

Challenges of leak testing HVACR-final products

- dimension & complex geometry
- foams and other isolation material
- tough leak specs, close to physical detection limits
- large production tolerances
- high number of variances



Challenges of leak testing HVACR-final products

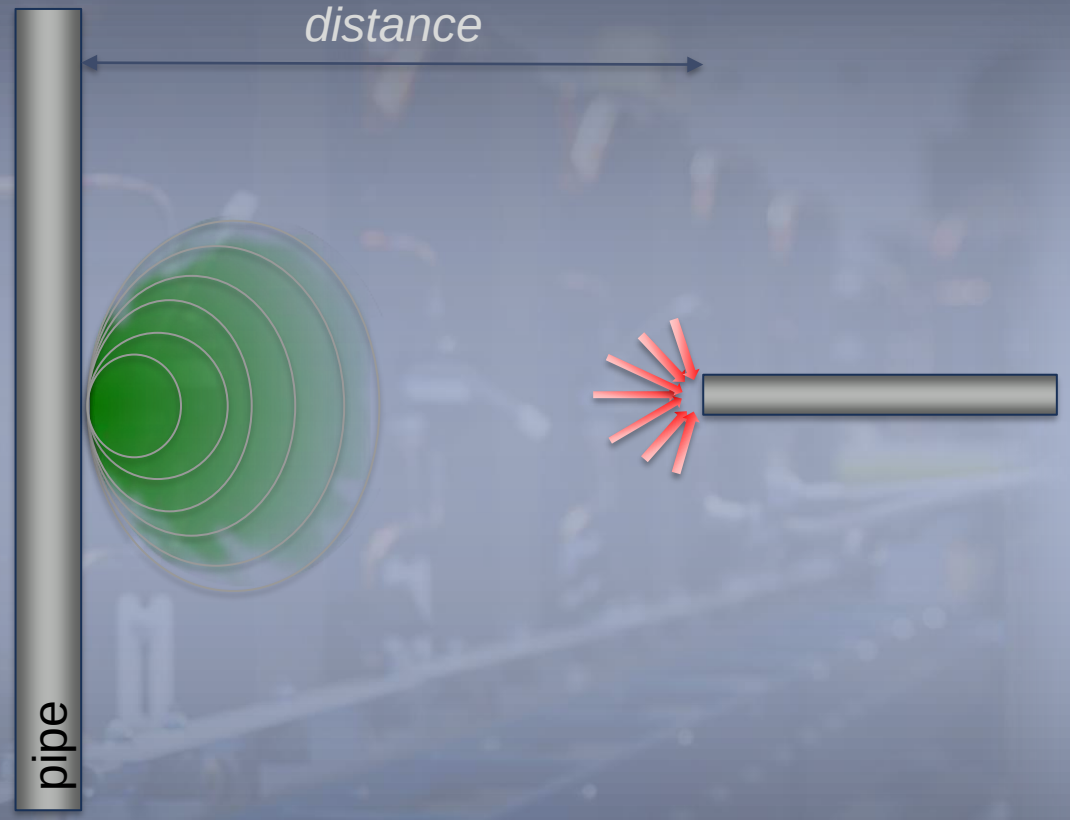
- dimension & complex geometry
- foams and other isolation material
- tough leak specs, close to physical detection limits
- large production tolerances
- high number of variances

state of the art test method: manual sniffing

Challenges of leak testing HVACR-final products

tough leak specs

- usually 3 g/a down to 0.5 g/a refrigerant loss
- close to physical detection limit of sniffing method
- consider the „practical“ detection limit (worker, background condition)

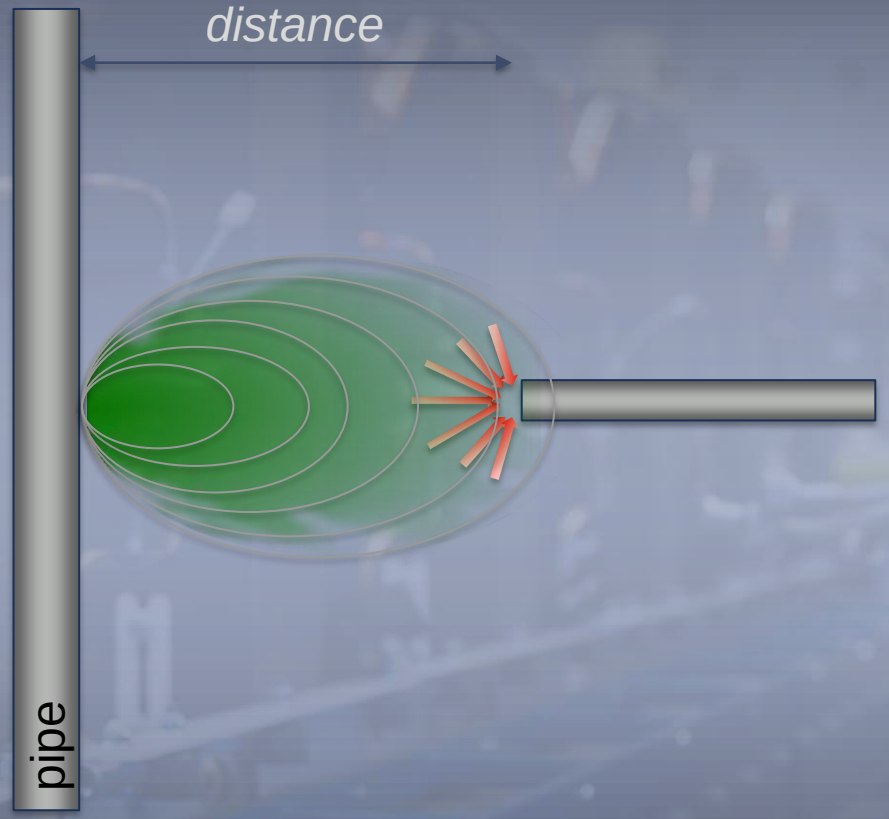


→ most important recommendation: stay close to potential leak spots!

Challenges of leak testing HVACR-final products

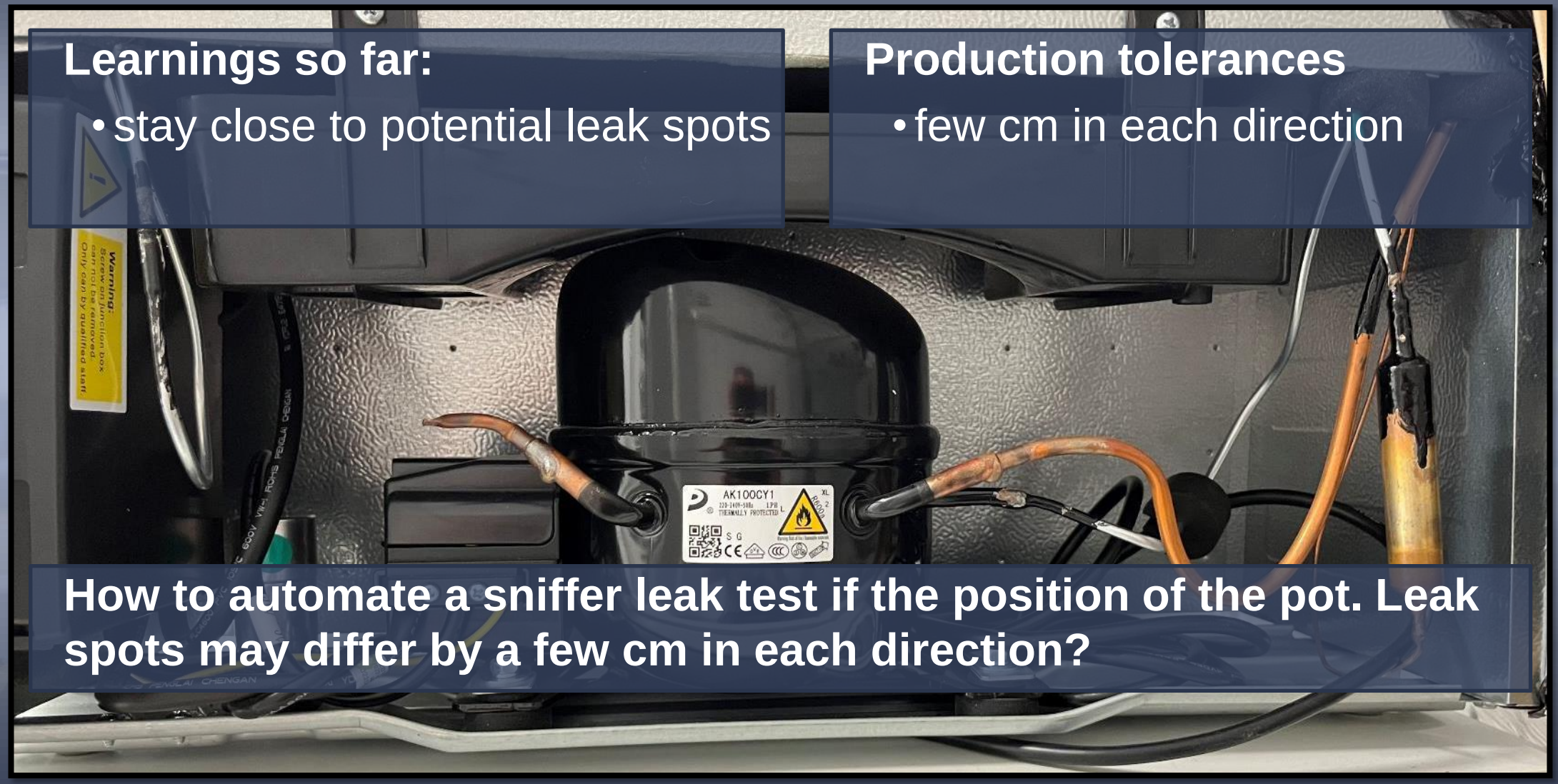
tough leak specs

- usually 3 g/a down to 0.5 g/a refrigerant loss
- close to physical detection limit of sniffing method
- consider the „practical“ detection limit (worker, background condition)



→ most important recommendation: stay close to potential leak spots!

Challenges of leak testing HVACR-final products



Learnings so far:

- stay close to potential leak spots

Production tolerances

- few cm in each direction

How to automate a sniffer leak test if the position of the pot. Leak spots may differ by a few cm in each direction?

How to cope with challenges

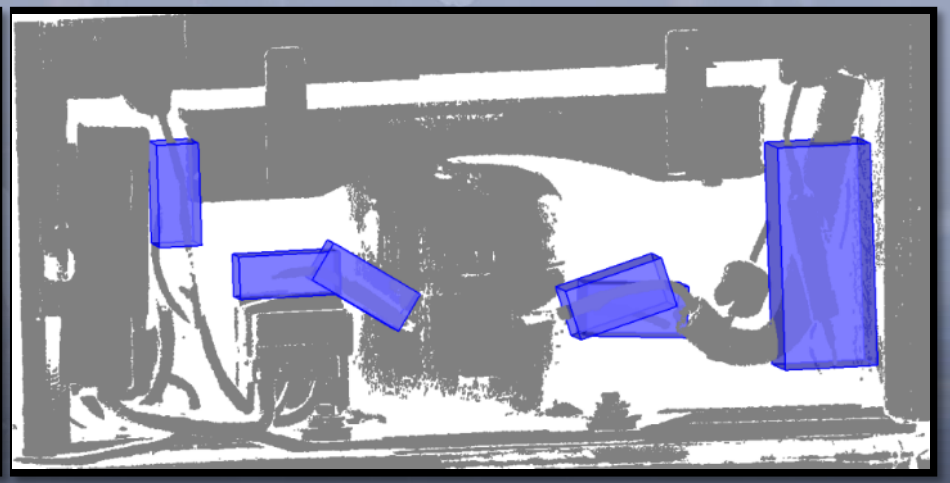
Production tolerances

- stay close to the leak
- integrate a precise, intelligent 3D camera system to detect true position of test spots

How to cope with challenges

Production tolerances

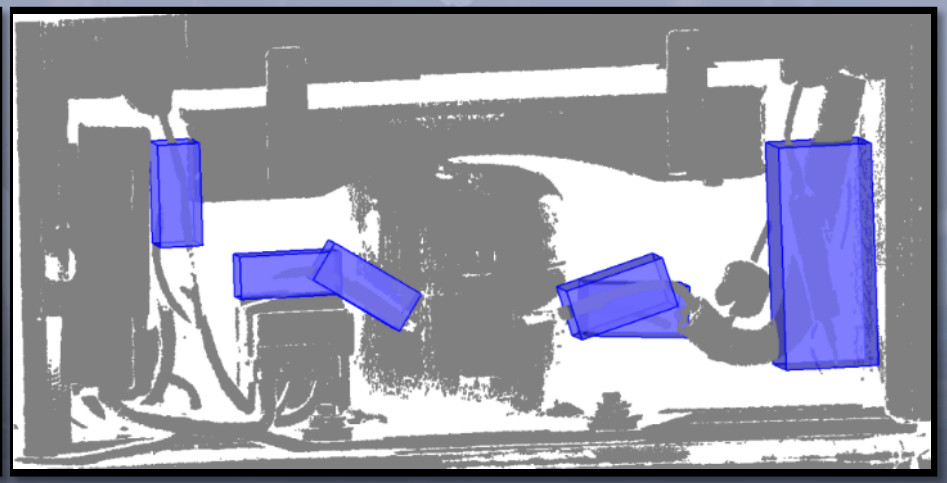
- stay close to the leak
- integrate a precise, intelligent 3D camera system to detect true position of test spots

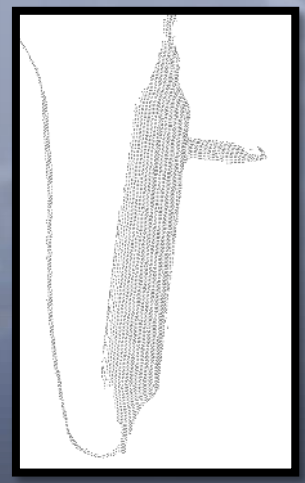


How to cope with challenges

Production tolerances

- stay close to the leak
- integrate a precise, intelligent 3D camera system to detect true position of test spots

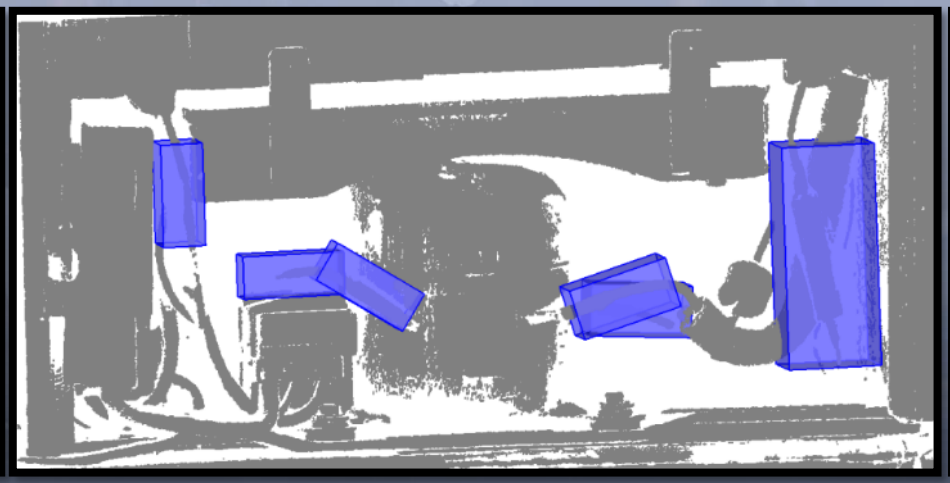


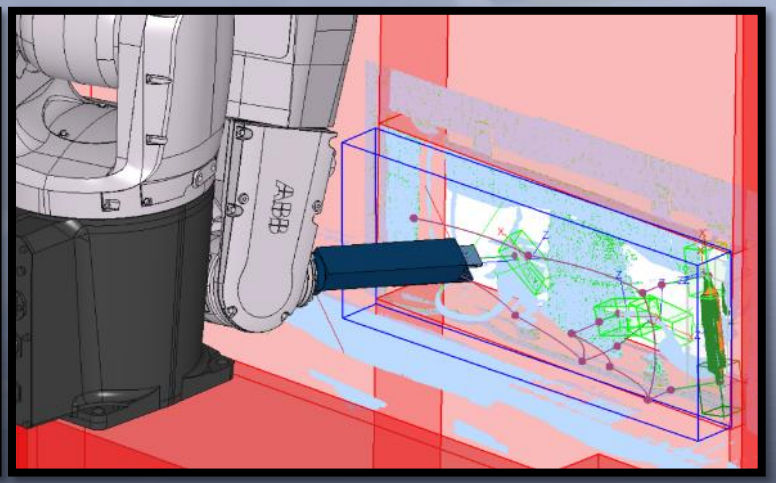


How to cope with challenges

Production tolerances

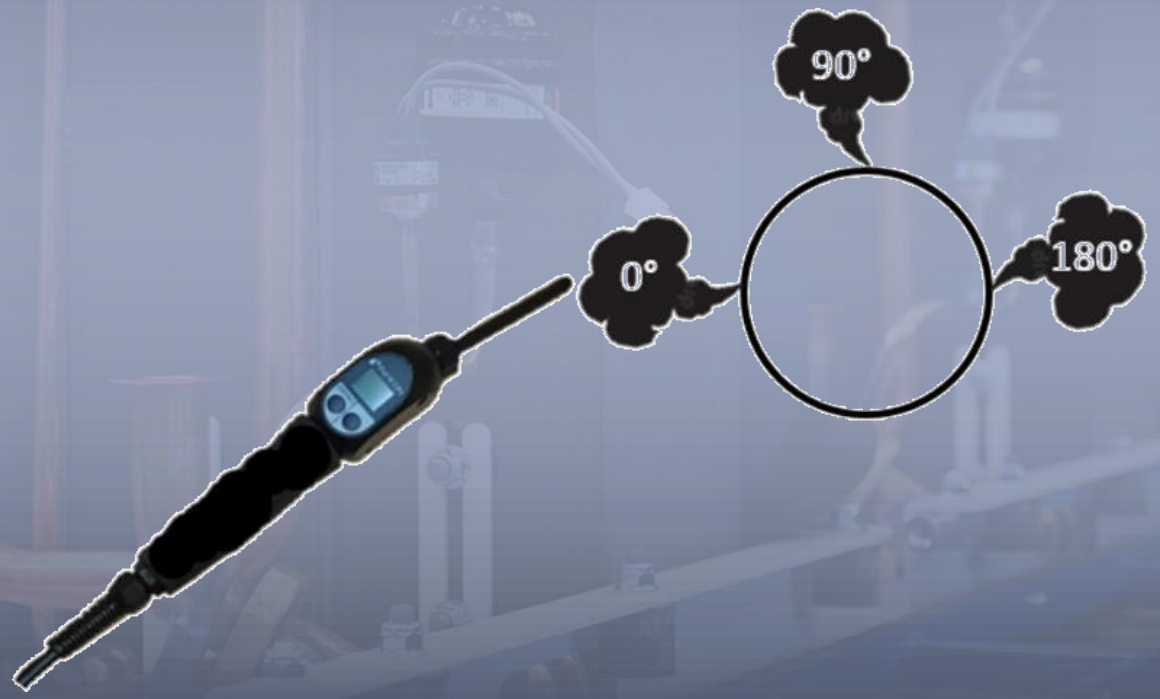
- stay close to the leak
- integrate a precise, intelligent 3D camera system to detect true position of test spots
- intelligent robot control and path planning





How to cope with challenges

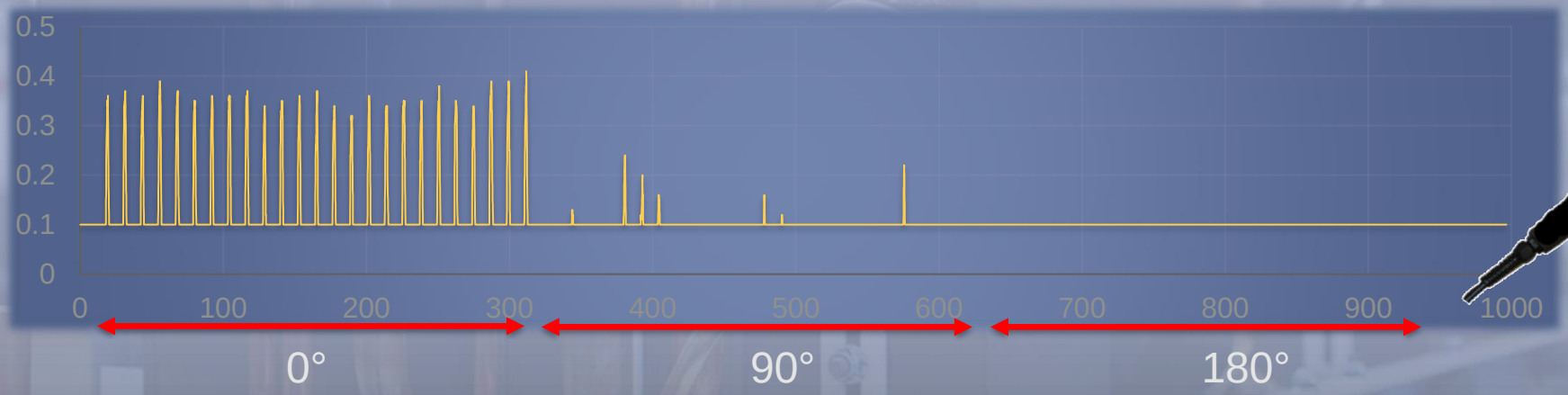
recommendation: stay close to potential leak spots!

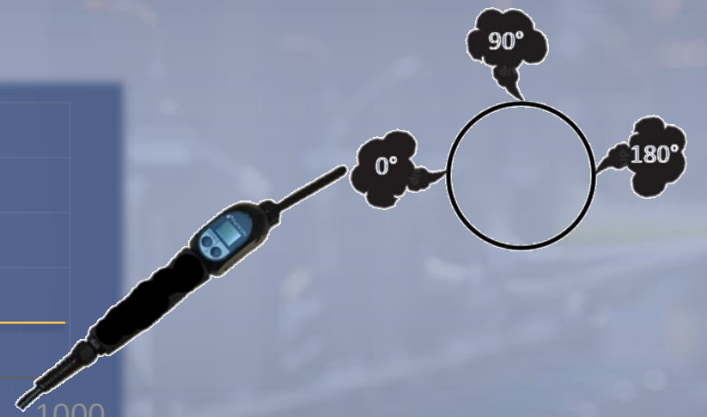


How to cope with challenges

recommendation: stay close to potential leak spots!

Robotic leak test measurements on a 0.33 g/a R600a leak

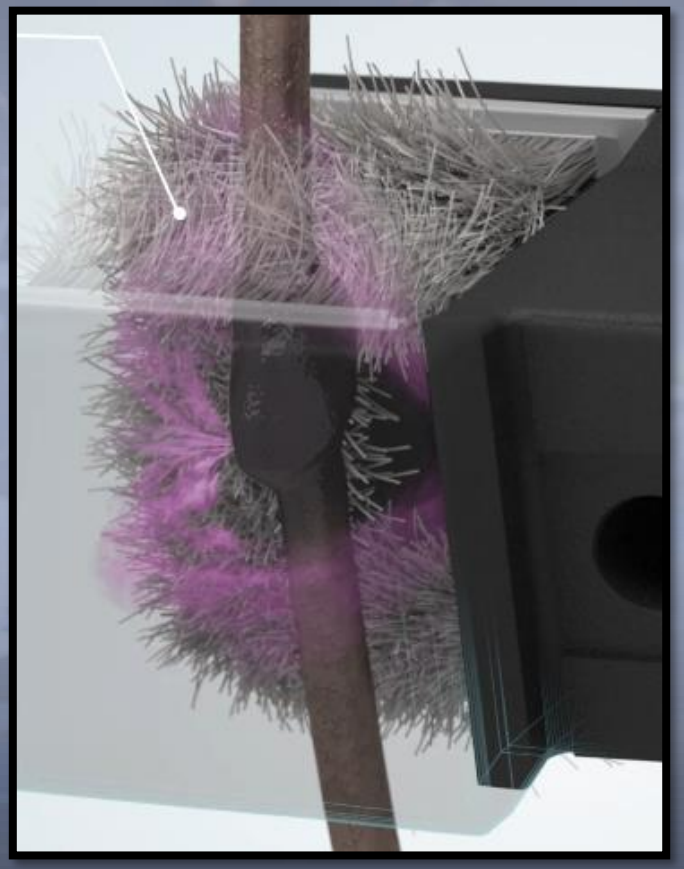




How to cope with challenges

Positioning of sniffer tip:

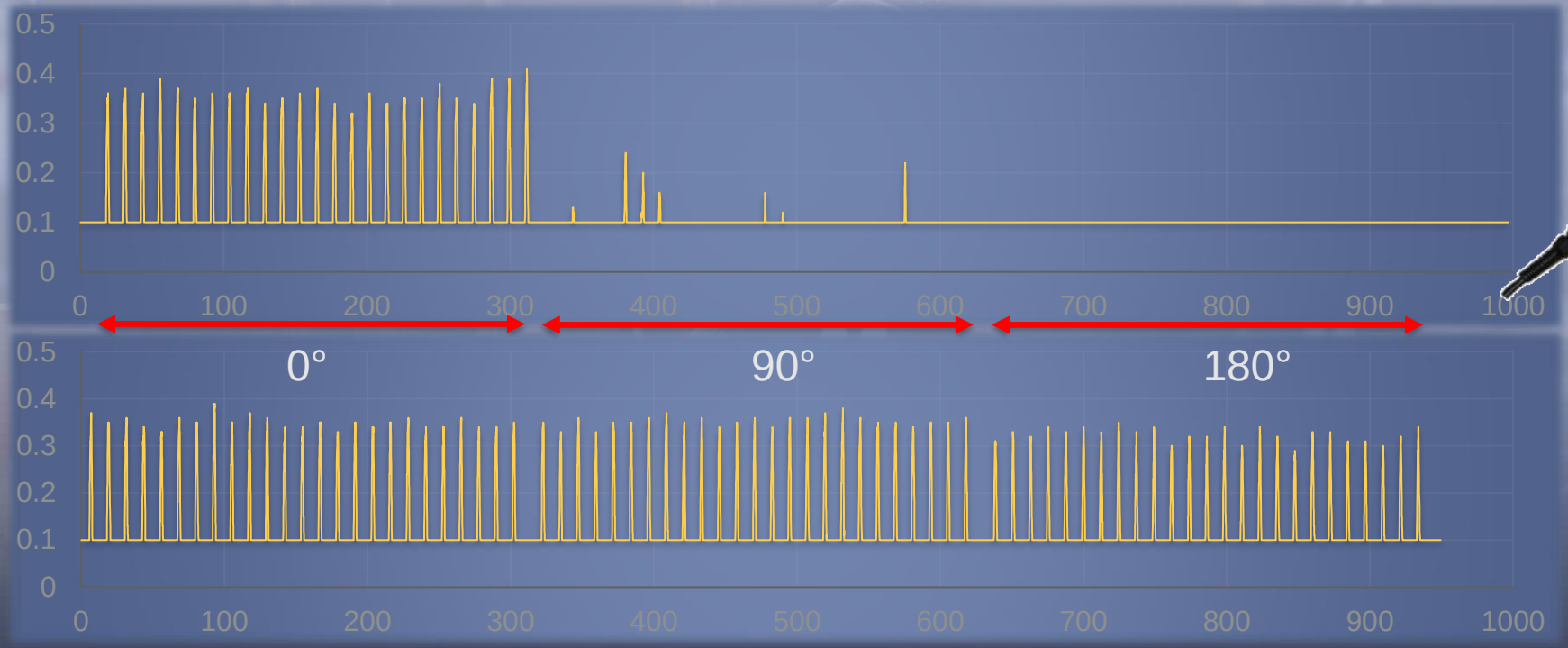
- special brush tip
  to cover and shield the potential leak spot

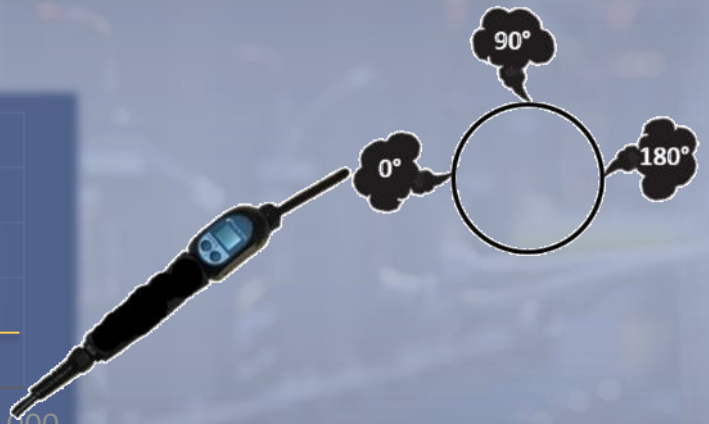


how to cope with challenges

recommendation: stay close to potential leak spots!

Robotic leak test measurements on a 0.33 g/a R600a leak

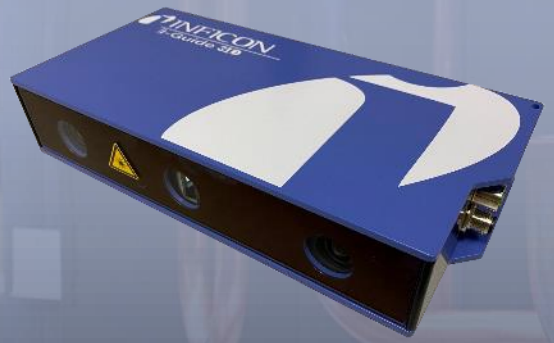


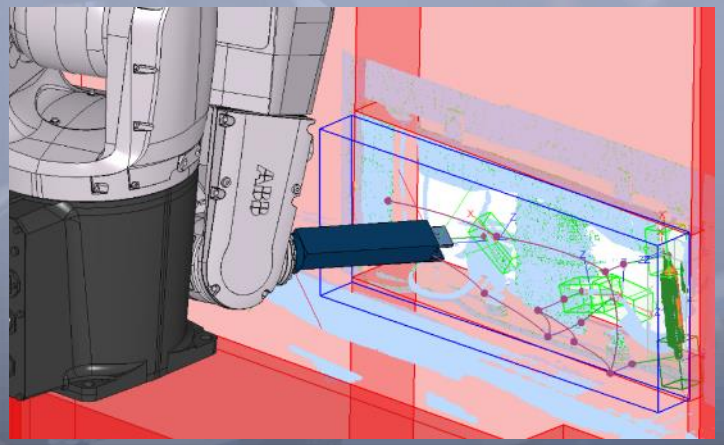


solution

How to get sniffer leak test automated in HVACR applications?

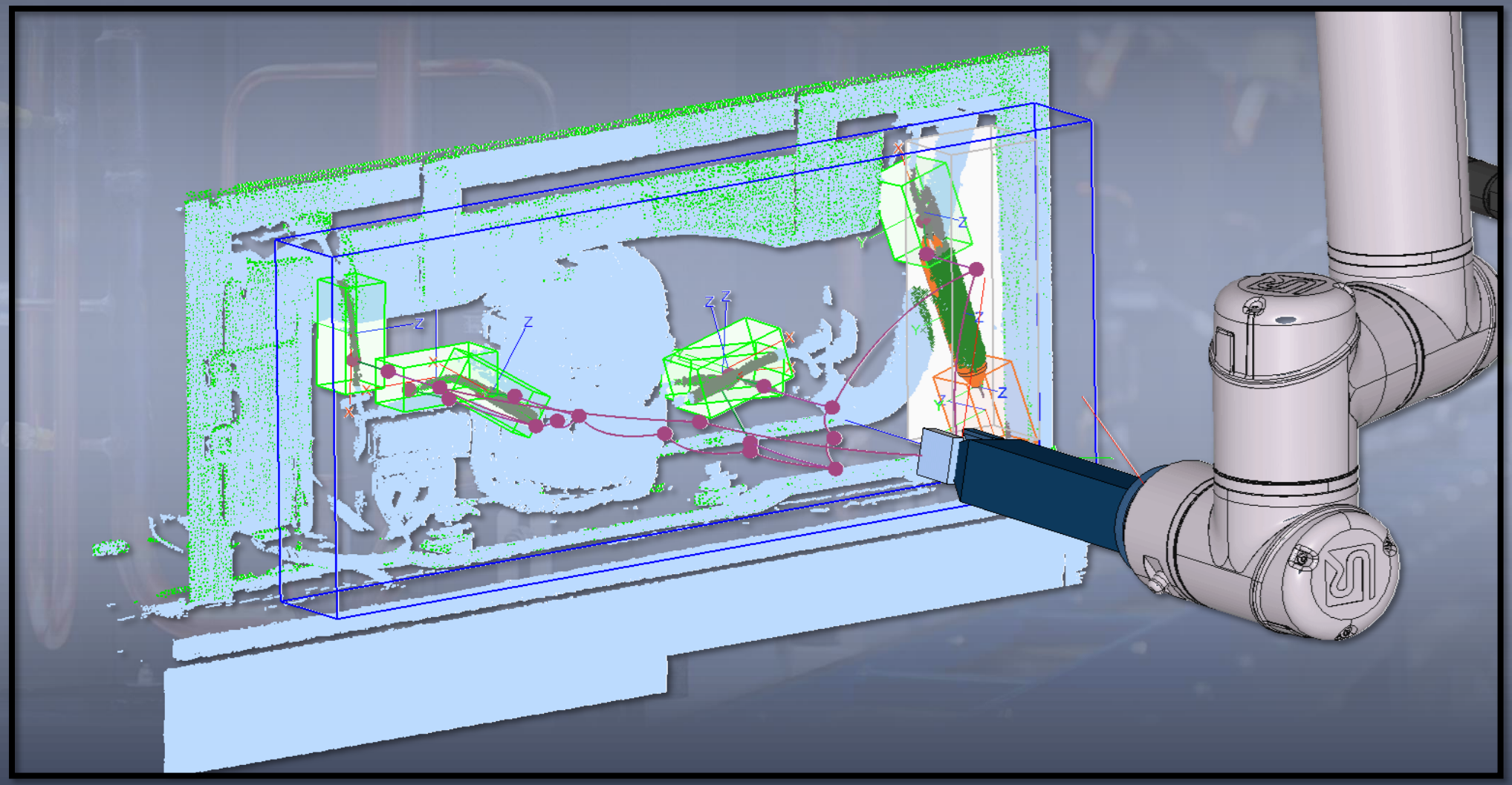
- combine a sniffer leak detector
  - with a robot
  - with an intelligent, precise 3D camera system
  - with customized sniffer tip to reach required sensitivity



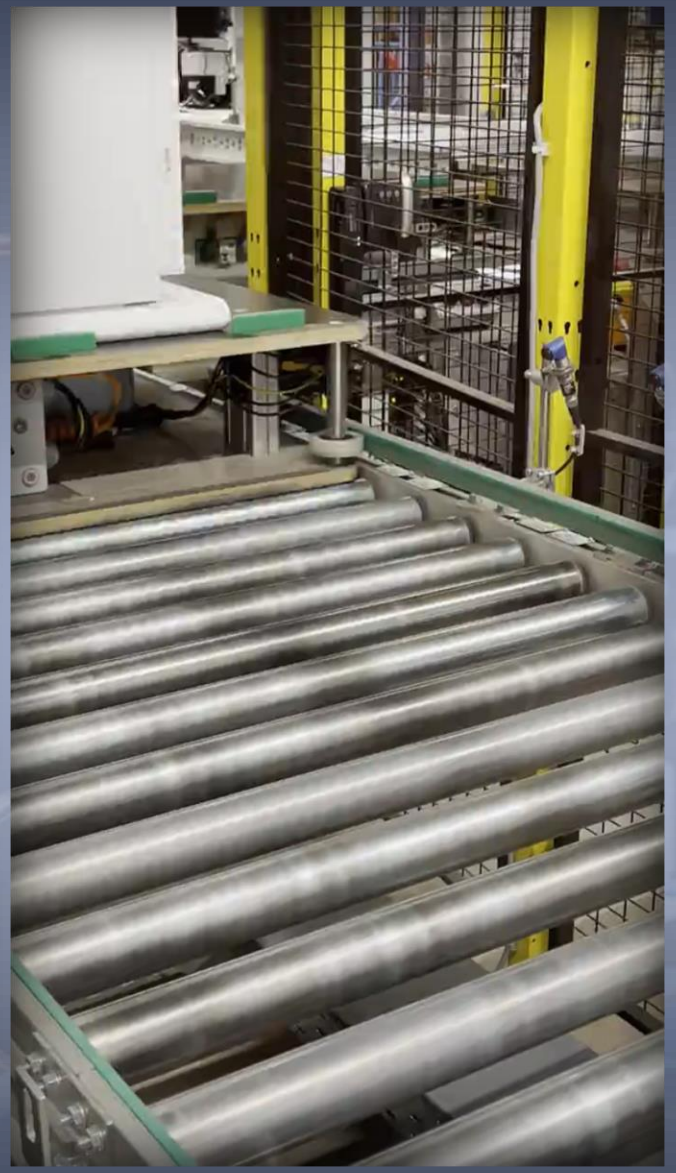


solution

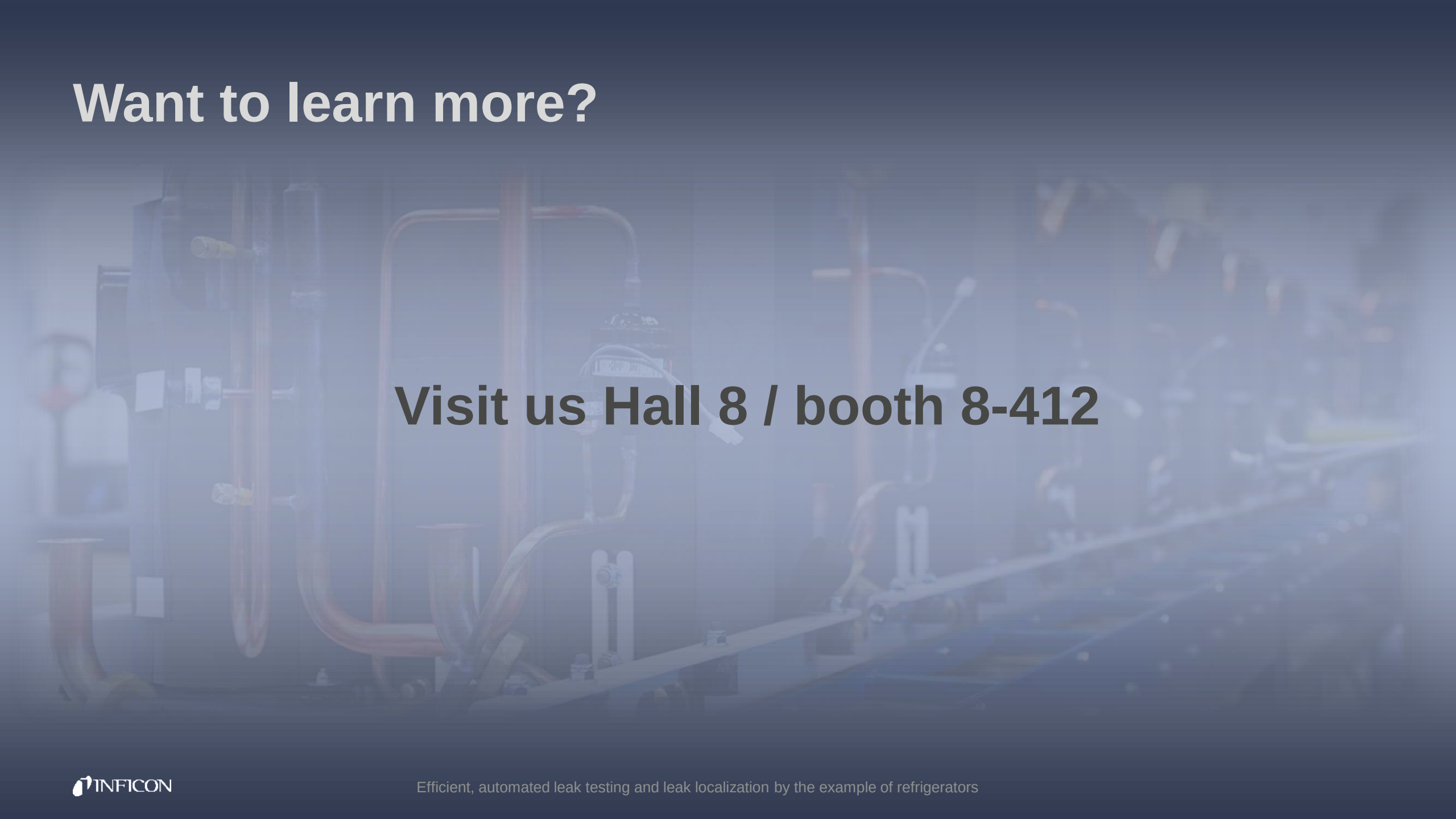
solution



solution



Want to learn more?



Visit us Hall 8 / booth 8-412

Hall 8

NürnbergMesse, Efficient, automated leak testing and leak localisation by the example of refrigerators, Datum