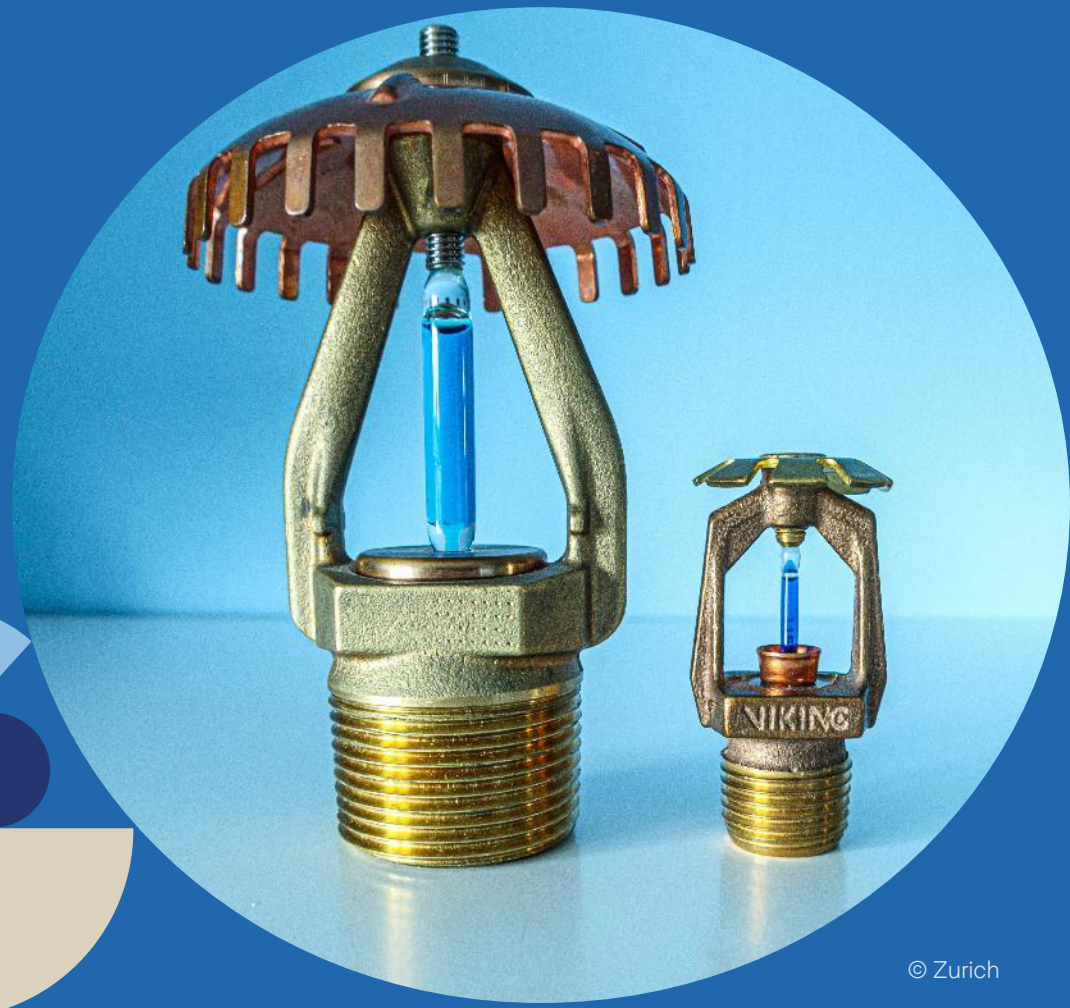
Trends and Challenges in Distribution Warehouses – Too tall, Too dense?

‘Sprinkler systems may be losing the battle to limit loss’



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Zurich Risk Engineering

Agenda

- Sprinkler systems are important to insurers
- How is a storage fire extinguished?
  - a two-step process
- Trends and Challenges in Distribution Warehouses
- Future needs

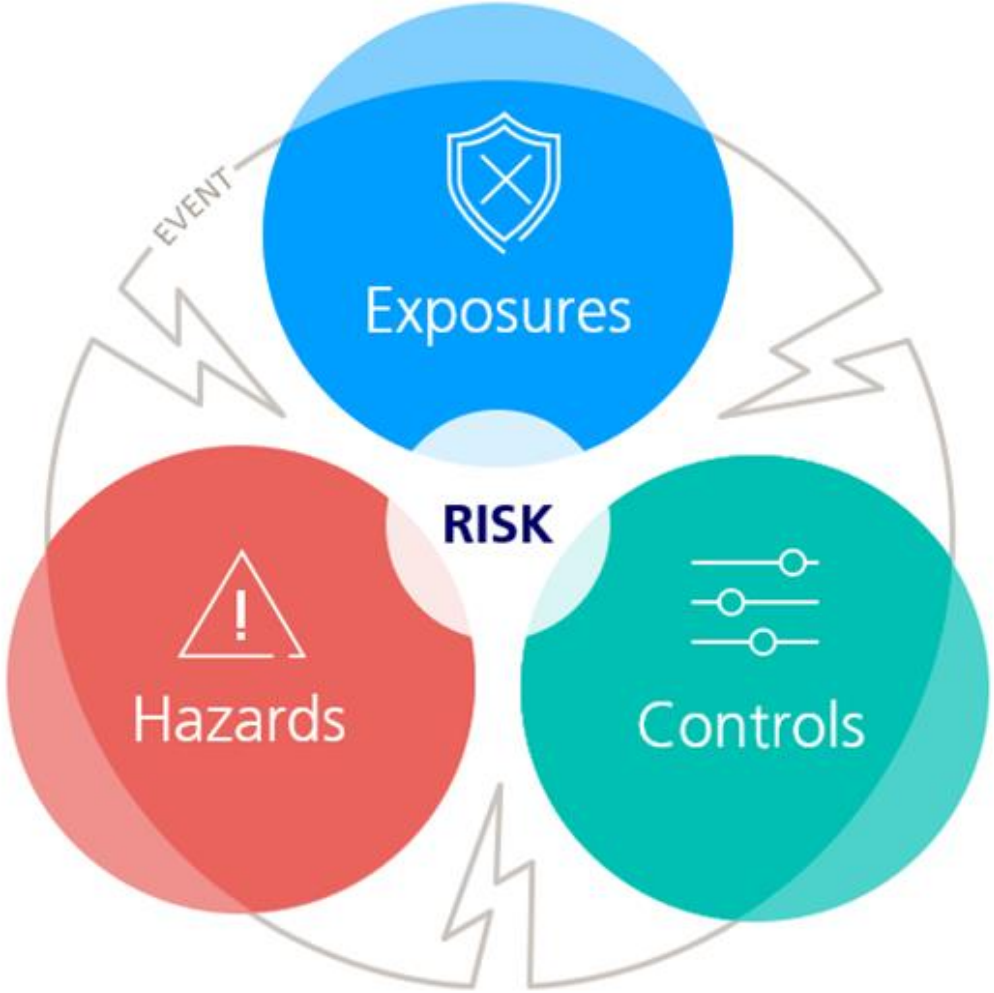
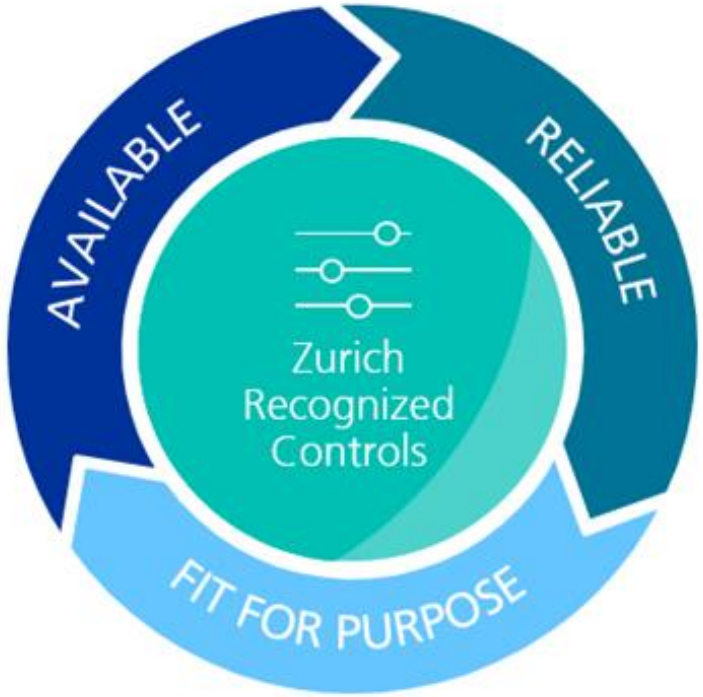


Image: Zurich

Sprinkler systems stop large losses – right?
How is a storage fire extinguished?

- Step 1 - Sprinklers of an adequate design control or suppress the fire
  - We identify suitable sprinkler systems as ‘Zurich Recognized Controls’



- Step 2 - Firefighters achieve final extinguishment of the fire

Note

Zurich’s definition of an extinguished fire is when the fire is out

and

All fire damaged materials have been removed from the building

Images: Zurich

The storage and distribution warehouse in many minds

These types of storage locations are a thing of the past

- Clear spaces between blocks of storage
  - Supports step 1
- Accessible for fire service to extinguish fires
  - Enables step 2

Images: Zurich

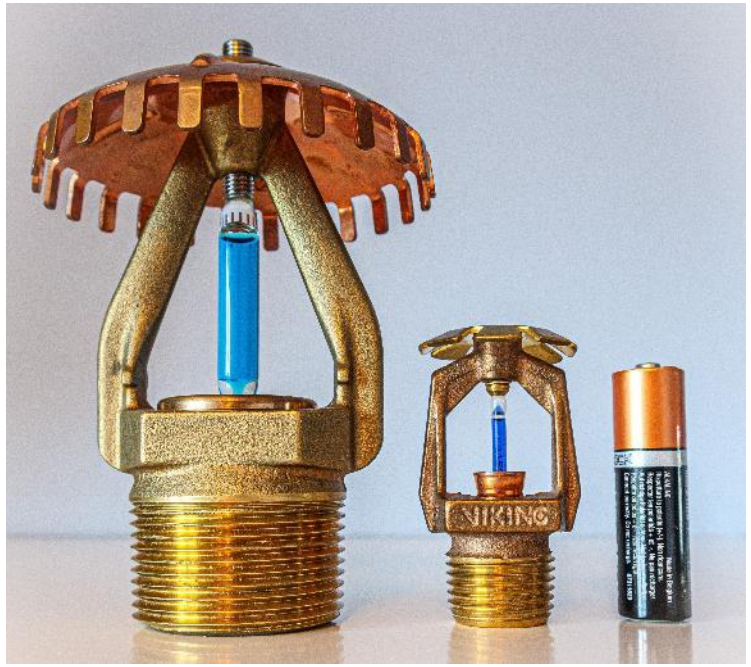
Trends and Challenges in Distribution Warehouses

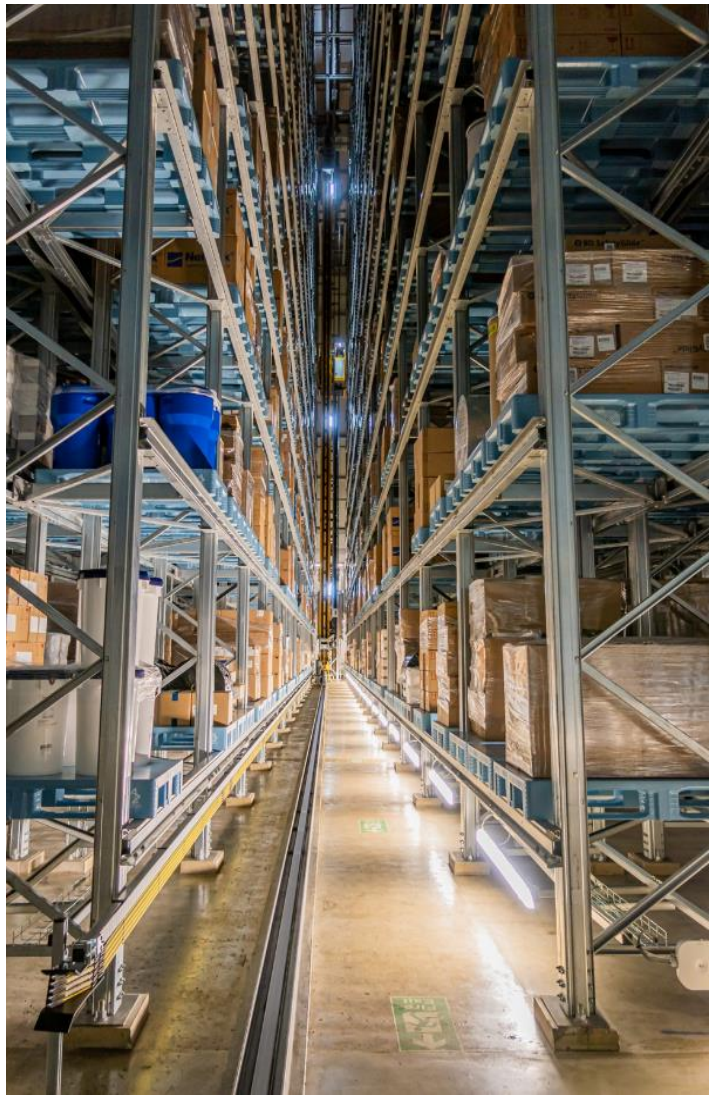
What has changed, and continues to evolve?

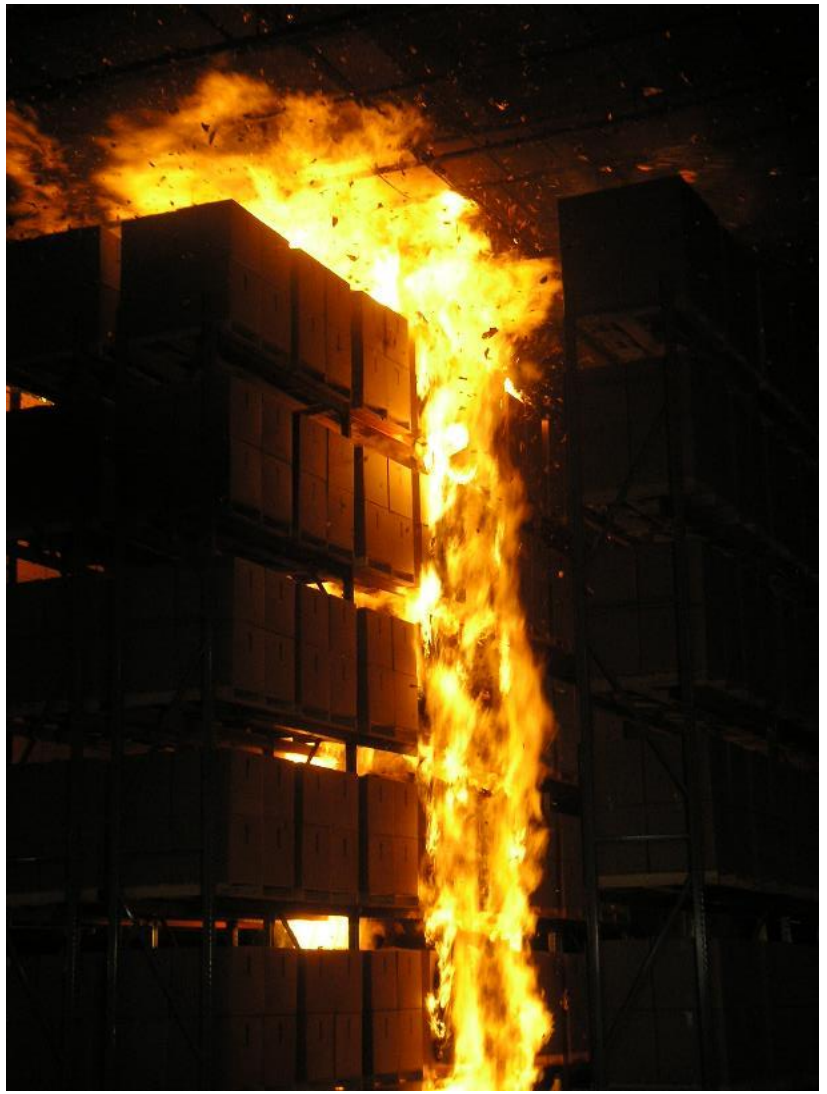
Taller warehouses

The challenge to develop more sprinkler solutions to support step 1

- Warehouses become taller
- Aisles become more narrow
- Expensive large scale fire tests
- Sprinklers get bigger
- Concern for final extinguishment







Images: Zurich

Dense automated storage arrangements

Pandemic fueled direct to door demand

- Massive rise in online sales
- Stores closing on high streets
- Malls becoming ghost towns

DEMAND

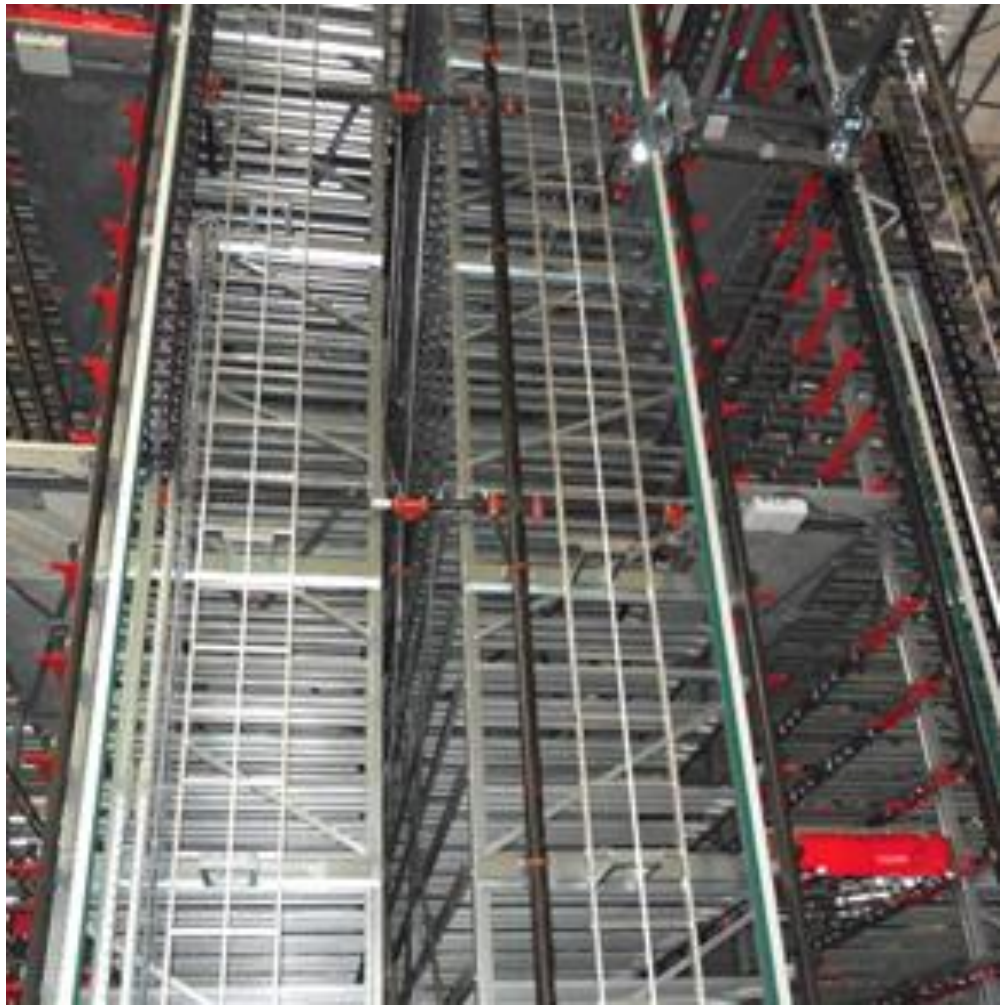
- New online customers
- Next day delivery
- Grocery shopping increasing

COMPETITION

- More warehousing demand
- Storage system changes
- Efficiency of automation

INNOVATION

- Proven fire protection systems are not readily available



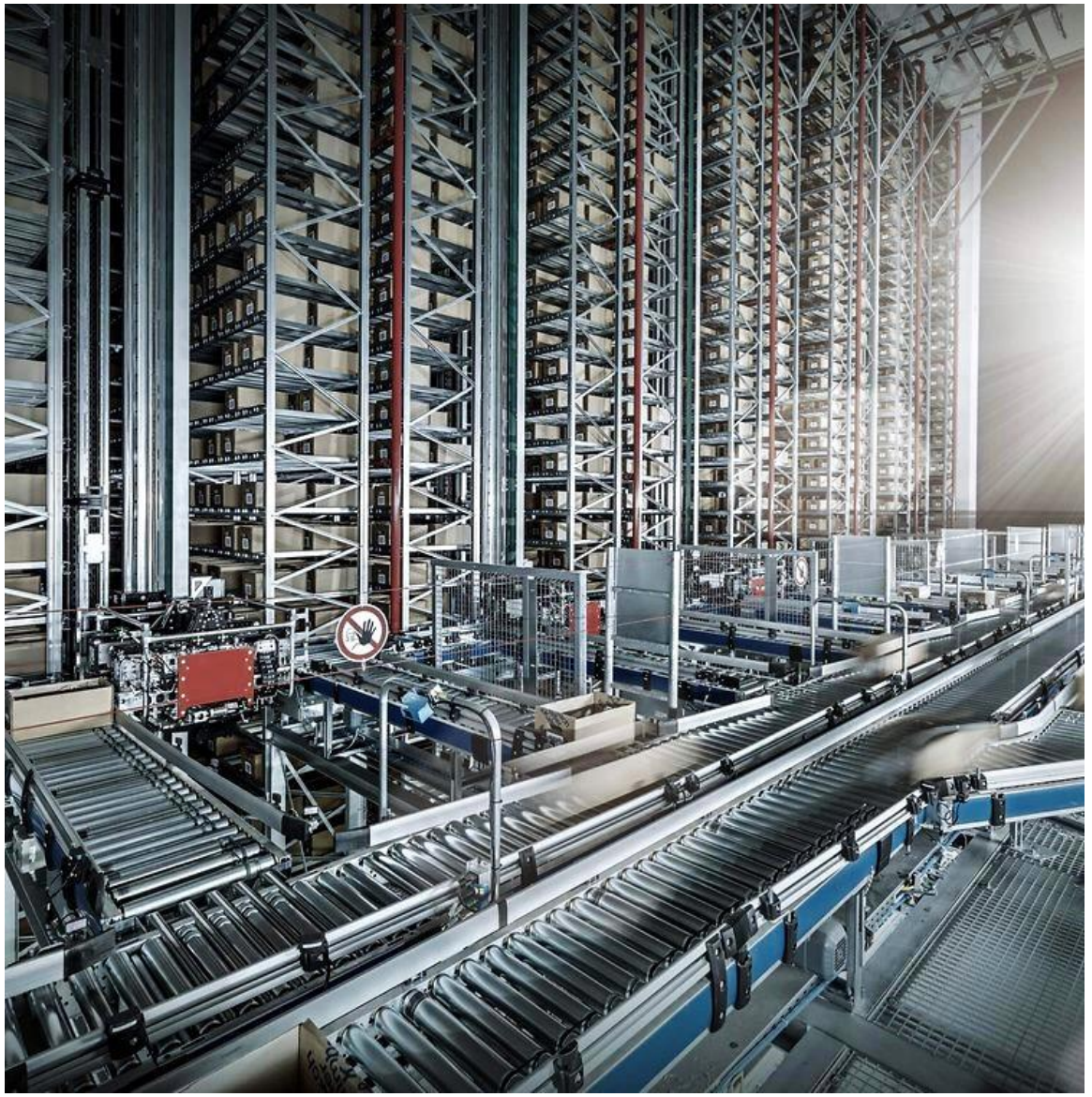
New custom-made storage systems

Image: Zurich

Mini-load ASRS and conveyors

Dense automated storage of plastic containers

- Many levels, usually very high storage
- Lots of flues and open top containers
- Obstacle course for fire fighters



Dense storage is not limited to boxes or pallets

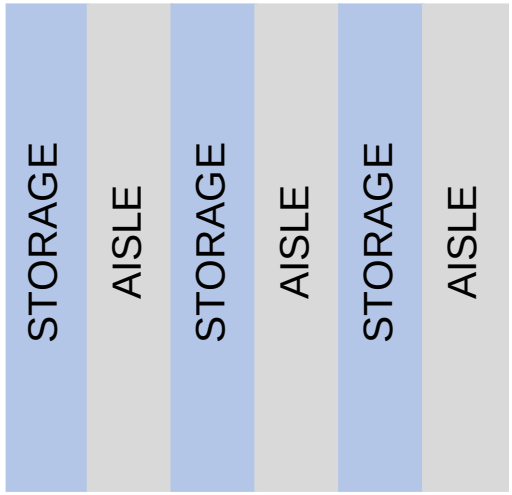
Example - Automated suspended pocket/pouch track system

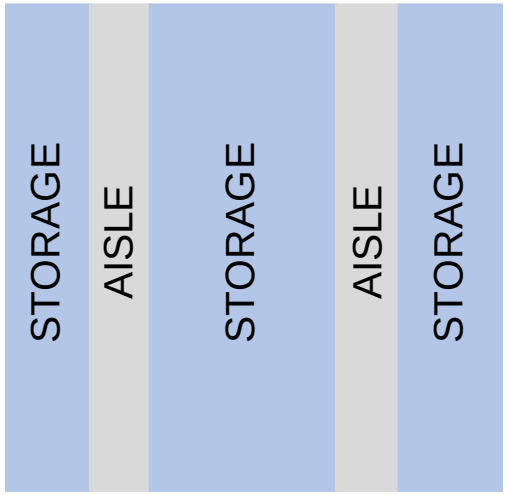
- 40m (130 ft) x 80m (260 ft) footprint - 3200m2 (34,400 sq ft)
- 5 floors of storage - 2 tracks high per level
- No aisles
- No barriers
- No proven protection scheme

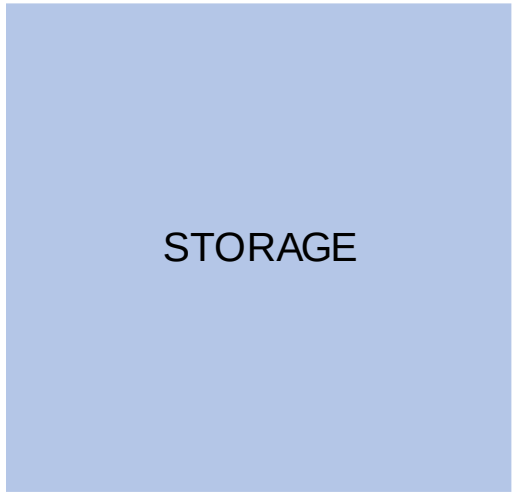
No new land – let's go more dense

Space and automation is being optimised

- Relative storage floor area and available fire service access







Expensive storage systems
Higher stock values
Increased loss potential
BI impact multiplied

- Fire fighter challenge increased

Fewer persons at risk
Fires deep in storage
Automated systems
Limited sprinkler duration

Images: Zurich

Insurers do experience losses of suitably protected premises

The final extinguishment challenge is becoming more prevalent

- When sprinklers are successful, we don't hear much about the event
- Sometimes things don't work out and that is when insurance comes into play
- Large warehouse and distribution cases are becoming more frequent
- Some of these cases were a severe challenge to manual fire fighting efforts
- Sometimes the fire is believed to be out, based on good indications

Does test data and standards provide all the answers?

Step 2 and the large-scale fire lab

- Consider final fire extinguishment – the real-world vs. laboratory
  - The large-scale fire test lab environment is
    - Excellent for evaluating the challenges of Step 1
    - Poor for evaluating the challenges of Step 2

Real-world - Much storage, little open space

Lab - Little storage, much open space

(Photo source - Zurich)

What happens after fire tests?

Step 2 and the large-scale fire lab

- Consider final fire extinguishment – the real-world vs. laboratory
  - The large-scale fire test lab with limited storage depends heavily upon industrial vehicles to extinguish storage fires

Scissor lift
Used to raise firefighter and hose to reach elevated fire damaged goods.

Forklift
Used to unload target rack from behind, and once the target rack is empty, the forklift moves the target rack out of the way.

Small loader
Used to clear fire damaged goods that fell into the aisle. Note that the target rack has been removed.

(Photo source - Zurich)

Future needs

Maintaining the value of sprinklers as the preferred solution

Sprinklers provide a window of opportunity

Fire fighters need to be part of the solution

- Never really needed to consider fire fighters in the picture to save protected premises and business
  - The challenge of final extinguishment needs to be considered more when developing and providing solutions that meet step 1

- Pre-fire planning needs to be developed with end users to support fire fighting efforts
  - NFPA 1620
  - Site familiarization for local fire service – regularly
  - Appointed responsible persons to support responders
  - Management of sprinkler valves and pumps to support final extinguishment and during smoke venting until all fire damaged goods are out of the building

- Research is being pursued via the NFPA Research Foundation for guidance on fighting fires in sprinklered buildings

Closing thoughts

Don’t waste or compromise the window of opportunity!

- As an insurer we absolutely support the provision of sprinklers and applaud the research to develop new sprinklers and design solutions.
- We are seeing new sprinkler technology and solutions to protect the new storage system challenges

- We do not have a definitive solution to identifying that a fire is actually extinguished in dense storage
- We are concerned that water supplies may not provide a sufficient window for extinguishment
- We are pleased to see some activity to meet this challenge, but more is needed

- **Step 1** - Sprinklers have always rose to the challenge and created the window for step 2
- **Step 2** – Final extinguishment has been taken for granted based on historical success

Note

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Any Questions?

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