SFPE Engineering Solutions Symposium
Modern Storage Challenges
August 12-14, 2025
Hilton Rosemont Chicago O'Hare

Venue Location: Hilton Rosemont/Chicago O'Hare – 5550 North River Rd., Rosemont, IL 60018, USA

Exhibit Hours	
Tuesday, August 12th, 2025	12:00 p.m. – 3:00 p.m.
Wednesday, August 13th, 2025	11:45 a.m. – 2:45 p.m.

DAY 1 – Tuesday, August 12th	
8:00 – 8:30 a.m.	Registration/Badge Pick up
8:30 - 8:45 a.m.	**Welcome and Introductions** Chris Jelenewicz, PE, FSFPE, SFPE CEO & Phil Friday, PE, FSFPE, Program Committee Chair
8:45 – 9:30 a.m.	**Analysis of Automated Storage Retrieval Systems and Fire Protection Guidance** Mark Hopkins, Engineering Director and Industry Liaison, Summit Fire National Consulting *Automated Storage and Retrieval Systems (ASRS) are a broad class of material handling and storage systems incorporating automation, robotics, dense storage configurations, and innovative storage methods. As with all emerging technologies, there is an inherent lag in the development of effective fire protection and fire prevention due to the lack of experience and understanding of the hazards and challenges associated with technology. There have been several notable fires involving ASRS facilities experienced globally such as the Amazon Distribution fire in Redlands, California in 2020, the Ocado Supermarket Automated Warehouse fire in Erith, UK in 2021, and the Canadian Tire fire in Toronto, Canada in 2023.* *This presentation will discuss the current state of ASRS facilities, trends in ASRS practices, and fire protection design schemes being utilized in practice.*

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9:30 – 10:15 a.m.	**Automated Storage – Evaluating Configurations Topic** Ralph Bless, PE, CFPS, SET, Telgian Engineering & Consulting *Automated Storage and Retrieval Systems (ASRS) are rapidly transforming warehousing and distribution environments, but their fire protection challenges remain complex and highly variable. This presentation will explore how differences in ASRS design—including storage geometry, materials handling equipment, commodity characteristics, and airflow dynamics—can significantly influence fire development and suppression performance. Even seemingly similar ASRS installations may experience drastically different fire outcomes under similar protection schemes. Through large scale testing and observations, attendees will gain a deeper understanding of why careful, system-specific evaluation is essential when designing fire protection strategies for ASRS configurations.*
10:15 – 10:30 a.m.	Morning Break
10:30 – 11:15 a.m.	**AutoStore – Testing for the Future** Dr.-Ing. Ingunn Haraldseid, AutoStore AS *The consumer habits of the world are in rapid change, with next-day delivery as an expectation in the market. Growing demand and the need of quick turnover call for efficient solutions and optimal utilization of warehouse space. This has led to in significant changes to the warehouses, where automatic storage and retrieval system are introduced to meet the demands.* *The complexity of warehouses is increasing with the introduction of distributions centers with a combination of several automatic solutions, combined with traditional systems and a need for a rapid turnover. Fire protection for warehouses has become more complex as the commodities change, the size of products change and the storage method changes from the traditional solutions. The changes to the warehouse structures raise questions, and in a jungle of different types of storage solutions it is important to understand differences and complexities. A change in a parameter could have a huge impact on the fire development in a warehouse. Therefore, AutoStore has taken a proactive approach by conducting small-, intermediate- and large-scale fire tests since 2009, to be able to provide guidance on adequate fire protection solutions for the AutoStore technology.*
11:15 – 12:00 p.m.	**Automatic Storage and Retrieval Systems and FM Data Sheet 8-34** Wes Baker, Senior Engineering Technical Specialist, FM *This presentation will discuss several of the various types of automatic storage and retrieval systems available on the market, how they introduce challenges to fire protection, research that has been conducted by FM, and the general approach to hazard mitigation in FM Property Loss Prevention Data Sheet 8-34..*
12:00 – 1:00 p.m.	Networking Lunch

1:00 – 1:45 p.m.	**Firefighting Challenges in Warehouses: The Battle against the Bots** Sean Gray, Fire Captain, Cobb County Fire and Emergency Services *As modern logistics and e-commerce rapidly evolve, warehouses are increasingly adopting Automated Storage and Retrieval Systems (ASRS) that rely on robotics, conveyors, and high-density racking. While these systems improve operational efficiency, they also create unique and complex challenges for firefighters.* *This presentation will explore the fire dynamics, access obstacles, and suppression difficulties presented by ASRS-equipped warehouses. Participants will examine real-world incidents, including large-scale ASRS fires, and analyze contributing hazards such as lithium-ion batteries, concealed fire spread, and impaired smoke control. Attendees will learn about updated tactics, necessary pre-incident planning, and the integration of new technologies (such as drones and robotics) to enhance firefighter safety and operational effectiveness.*
1:45 – 2:30 p.m.	**ASRS Q&A Panel** Panelists: Mark Hopkins, Ralph Bless, Ingunn Haraldseid, Wes Baker, Sean Gray
2:30 – 3:00 p.m.	Afternoon Break
3:00 – 3:45 p.m.	**Water Supply Analysis and Considerations for Storage Occupancies** Virginia Charter, Ph.D, P.E, FSFPE, Associate Professor & Program Coordinator, Oklahoma State University *Due to the urban sprawl across the globe, large industrial and warehouse facilities are increasingly being developed in rural areas, in order to support the need for logistics and distribution outside of the urban centers. As such, these facilities have created new challenges in fire protection system design, particularly in the area of water supplies. Considerations of both volume and pressure must be made to support these systems, and the suburban or rural system may not be able to support these demands. Furthermore, with the urban sprawl and climate change, water supplies change over time, which can impact fire protection systems effectiveness. This presentation will present common water supply arrangements, testing, and analysis methods as well as improvements that can be made for facility water supplies to meet their fire protection systems demands.*
3:45 – 4:30 p.m.	**Commodity Classification – A Critical Consideration in Automatic Fire Sprinkler System Design** Christopher Gates, Staff Engineer, UL Solutions *An important design consideration associated with a fire sprinkler system intended to provide protection for stored commodity is determining the fire challenge a commodity represents as it relates to a sprinkler system designed in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems. NFPA 13 includes detailed*

	prescriptive information that can be used to categorize a commodity (determine the commodity classification as referenced in standard) which considers not only the construction of the product, but also the packaging and the type of storage pallet if used. *There are a large number of situations in the field where a commodity classification cannot be easily determined using the prescriptive information provided in NFPA 13. This session will focus on UL Solutions commodity testing that generates data that can be considered by system designers and authorities to help them identify appropriate sprinkler system design criteria.*
4:30 – 5:15 p.m.	**The Role of Fire Testing in Performance-based Design** Matt Guilfoyle, PE, Harrington Group, Inc. *Over the last ten years, the way in which a warehouse is used has significantly changed. As new technologies are incorporated to better support the operational needs of the facility, new approaches to fire and life safety are also necessary to ensure safety. This presentation will discuss the evolution of performance-based design in storage occupancies and how full-scale fire testing can be used to address the unique challenges associated with the modern storage occupancy.*
5:15 – 6:00 p.m.	**Q&A Basis of Design Panel** Panelists: Virginia Charter, Christopher Gates, Matt Guilfoyle
6:00 – 7:00 p.m.	**Networking Reception**

DAY 2 – Wednesday, August 13th	
8:30 – 9:15 a.m.	**Indoor Battery Energy Storage** Noah Ryder, Chief Operating Officer, Fire & Risk Alliance, LLC *As battery technologies proliferate across modern infrastructure, it is essential to distinguish between the passive storage of batteries as commodities and the active deployment of batteries as energy storage systems (ESS). While the former involves warehousing and logistics considerations, this presentation will focus on the growing use of ESS installations—particularly those located indoors in both dedicated enclosures and mixed-use occupancies.* *Indoor battery energy storage systems are increasingly used for load shifting, backup power, and renewable energy integration in commercial, residential, and industrial settings. These systems can present unique fire protection challenges distinct from traditional storage arrangements, though the hazards associated with them remain consistent with other fire protection challenges, and as will be shown by focusing on a sound framework for risk analysis the hazards and their consequences can be both understood and mitigated.* *This session will examine current codes and standards, such as NFPA 855, UL 9540A, and the International Fire Code (IFC), and how they apply to indoor ESS installations. We will discuss key considerations including system sizing, separation, ventilation, detection, suppression, and emergency response. Emerging trends in system design and fire testing will also be addressed.*
9:15 – 10:00 a.m.	**Lithium-ion Battery Manufacturing and Storage – Understanding Loss Prevention Recommendations and the Research Behind Them** Benjamin Ditch, Principal Research Engineer, FM *We live in an increasingly electrified world. Everything from cell phones that fit in our pockets to utility scale energy storage systems are now battery based. This ever-increasing use has led to greater quantities of lithium-ion batteries being manufactured and stored to keep up with demand. However, hazard evaluations within the manufacturing process and fire protection guidance within the lithium-ion battery industry has struggled to keep pace. Release of the new FM Property Loss Prevention Data Sheet 7-112, Lithium-ion Battery Manufacturing and Storage, seeks to consolidate and expand upon the existing loss prevention strategies. A key aspect is the differentiation between non-battery-related hazards where protection solutions are already established and battery hazards where new guidance is needed. In this presentation, we will walk through the hazards associated with the main steps of the battery manufacturing process. Research supporting our understanding of the hazards and the experimental basis for the fire protection approaches to mitigate the hazards will also be introduced.*

10:00 – 10:15 a.m.	Morning Break
10:15 – 11:00 a.m.	**In-Rack Sprinkler Independence** Brandon Telford, The Reliable Automatic Sprinkler Co. Inc. *NFPA 13 and Factory Mutual Data Sheet 8-9 offer options to protect rack storage using in-rack automatic sprinklers that are considered independent of the sprinklers installed at the ceiling-level for design purposes. This session will detail the three vastly different options available the installing contractor. Learn what hazards can be protected when choosing to install them. Understand how to hydraulically calculate both the ceiling-level system and the in-rack sprinkler system. Differences between NFPA 13 and FM Data Sheet 8-9 will also be touched on providing a comprehensive look at these protection schemes.*
11:00 - 11:45 a.m.	**Q&A Panel** Panelists: Noah Ryder, Benjamin Ditch, Brandon Telford
11:45 – 12:45 p.m.	Lunch
12:45 – 1:45 p.m.	**Panel Discussion – Key Revisions to NFPA 13 and Their Impact on Storage Protection** Panelists: Wes Baker, Senior Engineering Technical Specialist, FM, Tracey D. Bellamy, PE, FSFPE, CFPS, CWBSP, Ralph Bless, PE, CFPS, SET & John Denhardt, PE, FSFPE Moderator: Phil Friday, PE, FSFPE *Join a panel of industry experts as they examine major updates in the 2025 edition of NFPA 13, focusing on the evolving requirements and considerations for fire sprinkler systems in storage occupancies.*
1:45 – 2:30 p.m.	**Fire Protection Systems for Retail Storage Occupancies** Mark Fessenden, Managing Director, International Fire Suppression Alliance *This presentation provides a comprehensive overview of fire protection strategies for retail storage occupancies, focusing on the unique hazards posed by high-challenge commodities such as Group A plastics. Through a detailed examination of fire codes, hazard classifications, storage configurations, and sprinkler technologies, the presentation equips design professionals and facility managers with the knowledge to implement effective suppression solutions. The presentation explores historical testing benchmarks, performance criteria for sprinkler systems, and practical applications of extended coverage and large K-factor sprinklers in retail environments. It also highlights retailer-specific design allowances from major chains like Home Depot, Walmart, and Target, offering real-world guidance on compliance and performance. The presentation emphasizes system design calculations, NFPA 13 requirements, and best practices to prevent fire growth and ensure life safety in complex retail storage scenarios.*

2:30 – 2:45 p.m.	Afternoon Break
2:45 – 3:30 p.m.	**Cold Storage Performance Based Design Solution** Melisa Rodriguez, Vertical Business Development Lead – Storage, JCI *When considering options for fire suppression in refrigerated and freezer warehouses, in-rack sprinkler options often pose a challenge to installers and building owners due to potential for damage during daily operations. The options for ceiling only protection are limited at higher ceiling and storage heights when applying the prescriptive standards. This presentation will review the development of Quell, a performance-based design solution that was proven through full scale fire testing and using a combination of available technology and a specific method of design to be able to protect high-piled storage in cold storage applications with a dry system that is as effective as a wet system.*
3:30 – 4:30 p.m.	**Sprinkler Protection for Multiple-Row Rack Storage Systems – How Big is Too Big?** Tracey D. Bellamy, PE, FSFPE, CFPS, CWBSP, Chief Engineering Officer, Telgian Engineering & Consulting *With the ever-increasing demand for more efficient use of storage space to maximize the quantity of stored materials with a given space, multiple-row rack depths have continued to increase to take advantage of the available space. For many years, the provisions of NFPA 13 did not restrict the depth of such storage arrays provided the arrangement included 6 in. transverse flue spaces at a maximum interval of 5 ft. During the revision cycle for the development of the 2022 Edition of NFPA 13, a public input was submitted that questioned this unlimited depth allowance and triggered a change that resulted in a maximum depth of a multiple-row rack array of 20 ft unless 1)the arrangement included both 6 in. longitudinal and 6 in. transverse flue spaces every 5 ft, or 2) in-rack sprinklers were installed at every tier of storage based on solid shelf rack storage. A similar provision was also introduced into FM 8-9 in this same timeframe. This posed a significant impact when using traditional "push back" style multiple-row rack arrangements that included abutted loads, one to the other, without longitudinal flue spaces. As a result, a Fire Protection Research Project was initiated to conduct a literature review and develop a research plan to address potential gaps in knowledge with respect to protection of multiple-row racks. This session will explore the results of that research project and provide insight into the history of the development of the legacy protection criteria contained in NFPA 13 for multiple-row racks. Additionally, the session with provide an overview of the current state of ongoing research on this topic.*
4:30 – 5:15 p.m.	**Applying Storage Criteria in the Real World** John Denhardt, PE, FSFPE, American Fire Sprinkler Association

	Design criteria for storage have and continue to evolve as more testing is completed. Addressing commodity classifications that do not fit into the examples provided in the annex of NFPA 13 can be a complex issue. Many times, the design criteria specified for a project is not applicable for the actual building being built. The design team needs to coordinate the design criteria with the building design before a sprinkler contractor has been selected to avoid issues during the construction phase. Having a system installed in a building that does not meet the design requirement restrictions can lead to failures.
5:15 – 5:45 p.m.	**Q&A Panel** Panelists: Mark Fessenden, Melisa Rodriguez, Tracey Bellamy, and John Denhardt

DAY 3 – Thursday, August 14th	
7:15 – 7:45 a.m.	**Bus Departs Hotel**
7:45 – 10:45 a.m.	**UL Solutions Tour** *Experience an exclusive tour and witness a full-scale fire experiment at the UL's built environment test lab, located in Northbrook, IL. Attendees will be able to explore the test structure firsthand and interact with fire scientists and industry experts. This is an excellent opportunity to see fire safety and research in action! PPE will be provided, and light refreshments will be available. SFPE will arrange for a bus shuttle from the event hotel for all tour registrants. (Registration Required. Limited Capacity.)*
10:45 – 11:15 a.m.	**Bus Returns to Hotel**

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