# RACK STORAGE

## Fitness Through the Life Cycle

Sponsored by:

RMI

RACK MANUFACTURERS INSTITUTE

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PROMAT 2013

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www.ProMatShow.com

# Seminar Objectives

**The objective of this seminar is to expose the participant to many of the issues and resources that should find their way into purchasing, installation, operation and assessment activities. Among the highlights that we will explore will be:**

- **Section I**
  - **About RMI and why our Members should be a preferred resource**
  - **Types and styles of racks and accessories**

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# Seminar Objectives

- Section II
  - Racks as part of an integrated operating system
  - Codes, Standards and Normative References
  - Highlights from RMI/ANSI MH16.1-2012
  - Roles and Responsibilities
- Section III
  - Some frequently asked questions
  - Creating an assessment protocol
  - Ongoing resources
- Summary and Conclusions

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# About RMI



- Not-For-Profit Trade Association
- Founded in 1958
- Members are manufacturers of industrial steel storage racks and structural rack decking products
- Accredited developer of American National Standards
- R&D programs over nearly 55 years resulting in virtually all advancements to the state of the art
- R-Mark Certification Program
- Extensive National and International Liaison Programs
- Wide array of education and research programs
  - Special Note – RMI has recently completed an extensive considerations document for purchase and use of industrial steel storage racks. This document is being distributed to attendees of this Seminar compliments of RMI.

# Types and Styles of Racks

## Selective

## Double Deep

# Types and Styles of Racks

## Drive In/Drive Through

## Push Back

# Types and Styles of Racks

## Pallet Flow

## Cantilever

# Types and Styles of Racks

## Wide Selection of Accessories

# RMI Announces a New Resource Publication


"Considerations for the Planning and Use of Industrial Steel Storage Racks"

# Racks as Part of an Operational System

Your racks are actually a sub-system that to perform as intended must operate as part of a fully integrated operational system. System components will generally include, but, certainly not be limited to:

- The building
- The flooring and sub-soil
- The racking
- Anchorage
- The load platform (pallets, etc.)
- Decking, load support and fall protection
- Handling equipment

# Racks as Part of an Operational System

- Load containment and confinement protocols
- Guarding of workers and structures
- Load notices and safety labeling
- Lighting and HVAC
- Fire safety
- Inspection and maintenance
- Worker training
- And others suited to or unique to a specific site or operation

# Codes and Standards

- International Building Code (IBC – 2012)
  - Editorial Note: Model Building Codes (formerly ICBO, BOCAI, SBCCI)
- NEHRP Recommended Provisions (Seismic)
- ASCE – 7 (minimum design loads)
- AISI (Spec. for Design of Cold-Formed Steel Structures)
- AISC (like AISI, except for structural steel shapes)
- ACI 318 (concrete flooring)
- FEMA 460 (Guidelines and seismic considerations for racking accessible to the public)
- NFPA 5000 (building construction and safety)
- NFPA 13 (sprinkler systems)
- AWS (welding)
- RMI/ANSI MH16.1-2008 and 2012 and MH26.2-2007

# Codes and Standards

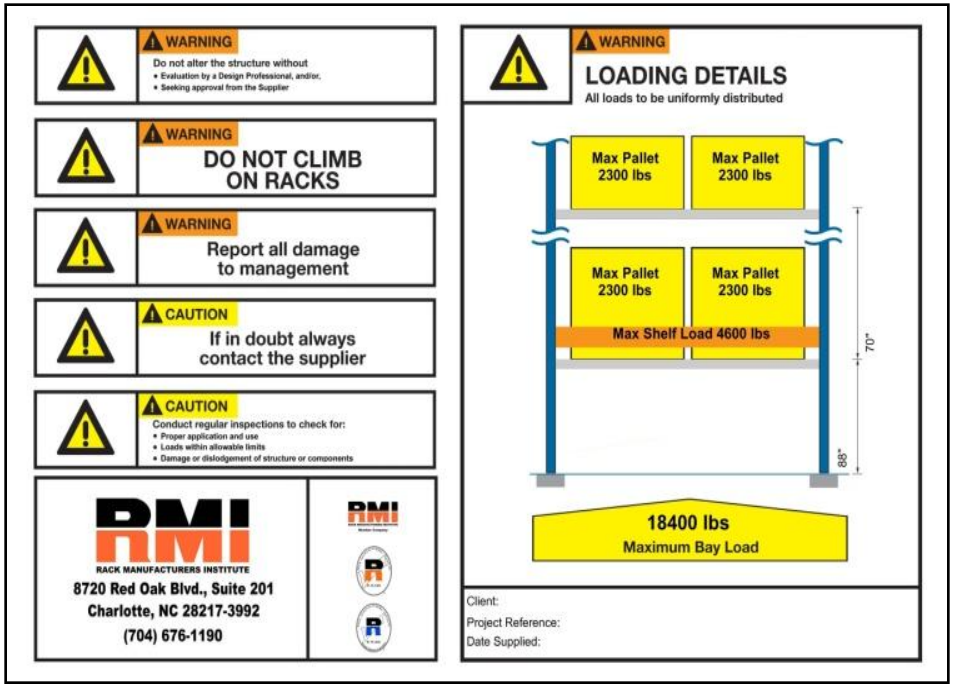
# RMI/ANSI MH16.1 - 2008 & 2012 Highlights

This baseline document will prove helpful to your operating protocols on many levels. While a design guide, this American National Standard incorporates provisions that end users will find important in developing operational protocols.  Among provisions are:

- A detailing of owner responsibilities
- Floor loading
- Pick-module design
- Stair design
- Handrail and guardrail design
- Discussion of product fall protection

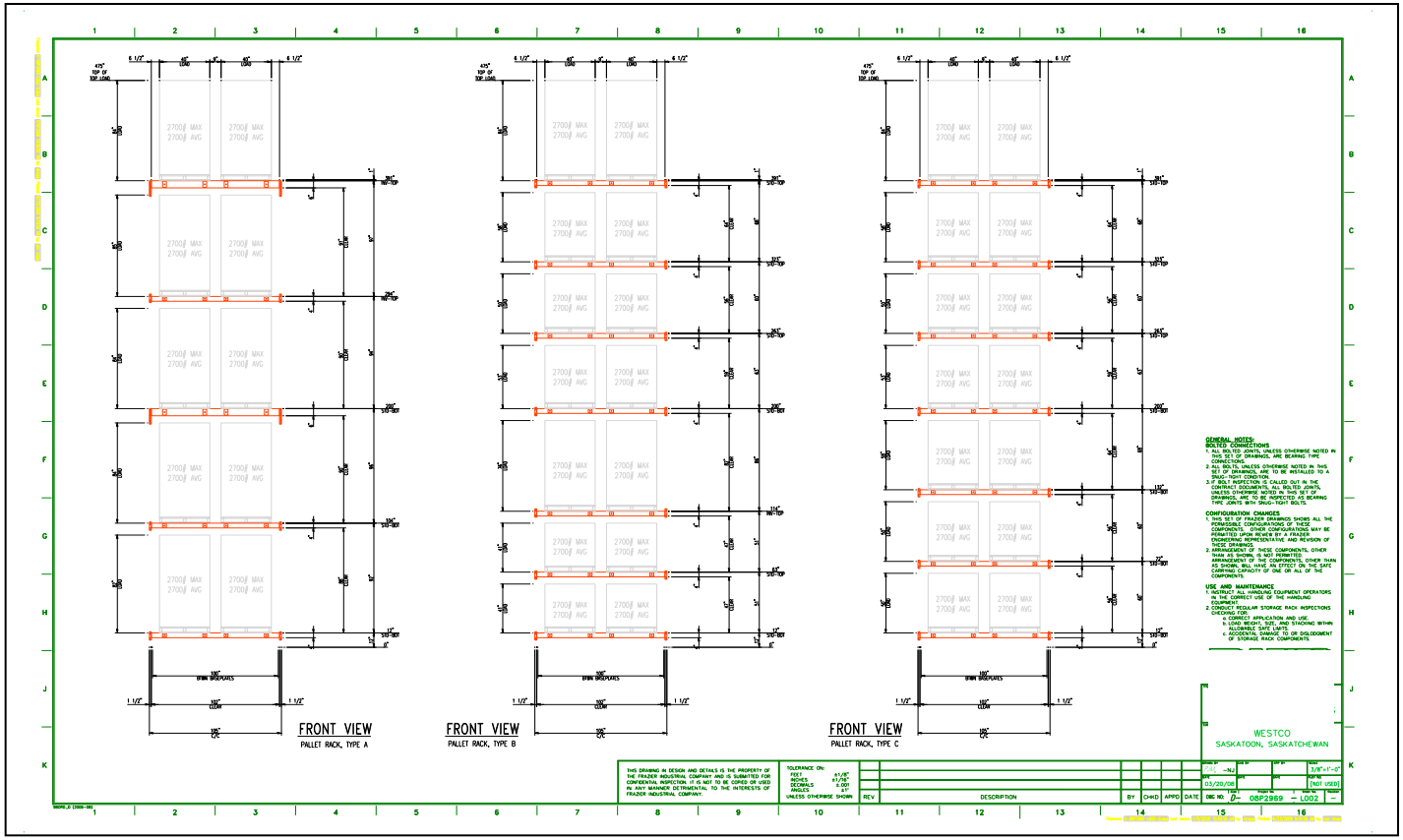
# RMI/ANSI MH16.1 - 2008 & 2012 Highlights

## Load Notices (Plaques) – Load Generalities



# RMI/ANSI MH16.1 - 2008 & 2012 Highlights

## Load Application & Rack Configuration



# RMI/ANSI MH16.1 - 2008 & 2012 Highlights

- Loads on racks
- Load combinations
- Details of base-plates and shimming
- Performance of shelf-connection locking device
- Shelf-beam deflection limits
- System plumb and straight requirements
- Requirements for cross-aisle tying and anchoring
- Seismic design requirements
- And many more . . .

# Roles and Responsibilities

The process of procuring, and operating rack storage will include many individuals/organizations whose involvement will be critical to the fitness of the installation throughout its life cycle. Included, but not intending to be exclusive would be:

- The owner/operator
- The architect and building contractor
- The consultant and/or independent design professional
- The manufacturer
- The reseller (as appropriate)
- The installer
- The authority having jurisdiction (AHJ)
- The fire safety official
- The insurer
- And, certainly others . . .

# Some Frequently Asked Questions

- Why should racks be ordered and installed to conform to American National Standards?
- What is a uniformly distributed load (UDL) vs. a point load? Why is this important?
- Why should racks be anchored?
- How far out of plumb can your racks be?
- Can you tie racks to the building structure?
- What should you know about height-to-depth ratios?
- Are there recommended clearances between pallet-loads?
- How much beam/shelf deflection is acceptable?
- What is an acceptable repair?
- What should you know about used or repurposed racks?

# Creating the Assessment Protocol

The following will be included among the many considerations in your rack assessment protocol. Other features as well as assessment frequencies will be unique to each operating environment:

- Missing, loose or damaged anchor bolts
- Missing or damaged connection locking devices
- Missing or damaged rack guards
- Damaged, dented, buckled or bent rack framing members
- Weld fractures that are detectable by visual inspection
- Corrosion or deterioration that might affect capacity

# Creating the Assessment Protocol

- Rack frame misalignment
- Rack beam spreading or excessive deflection
- Improper beam installation
- Appropriate pallets and load-platforms
- Condition of pallets and load-platforms
- Containment and confinement of loads
- Presence and accuracy of load-notices (plaques)
- Consistency to load application and rack configuration drawings on file
- Other considerations as may be appropriate to the operating environment in question

# Ongoing Resources – Highlights

- American Iron & Steel Institute – www.steel.org
- American Institute for Steel Construction – www.aisc.org
- American Society of Civil Engineers – www.asce.org
  - ASCE 7
- American Welding Society – www.aws.org
- American Concrete Institute – www.concrete.org
  - ACI 318
- Building Seismic Safety Council – www.bssc.org
  - NEHRP
- Federal Emergency Management Administration – www.fema.gov
  - FEMA 460

A more extensive list can be found at
www.mhi.org/rmi

# Ongoing Resources – Highlights

- International Code Council – www.iccsafe.org
  - International Building Code (IBC)
- National Fire Protection Association – www.nfpa.org
  - NFPA 13
  - NFPA 5000
- Rack Manufacturers Institute – www.mhi.org/rmi
  - RMI/ANSI MH16.1-2012
  - RMI/ANSI MH16.1-2008
  - RMI/ANSI MH26.2-2007
  - FAQs
  - More comprehensive list of resources
- US Geological Survey – www.usgs.gov

A more extensive list can be found at
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# Members

Advance Storage Products
Bulldog Rack Company
DACS, Inc.
Elite Storage Solutions, Inc.
Engineered Products
Equipement Boni Inc.
Frazier Industrial
Hannibal Industries, Inc.
Interlake Mecalux Inc.
ITC Manufacturing
J&L Wire Cloth LLC
Konstant
Nashville Wire Products, Inc.
Nedcon USA, Inc,
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SpaceRak, Division of Heartland Steel Products, Inc.
Speedrack Products Group, Ltd.
Steel King Industries, Inc.
Twinlode Corporation
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# Q & A