



PROMAT

2015

McCormick Place South | Chicago
March 23-26, 2015
promatshow.com

Best Practices for Getting the Most out of your Wooden Pallet

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Presented by:

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Pallet Industry in the U.S.

- 1.9 billion are in use in the U.S. each year.
- Solid wood pallets are 92% of the market.
- 441 million new wooden pallets were manufactured in the U.S. in 2006.
- 321 million pallets were recovered/repaired/remanufactured in the U.S. in 2006.





Common Pallet Sizes in the U.S. (2012)

Pallet Size (in.)	Annual production (%)
48X40	24.4
42X42	4.8
40X48	2.8
48X36	1.5
36X36	1.8
48X48	3.8
44X44	3.0
800 x 1200 (Euro)	0.7
Other	57.1

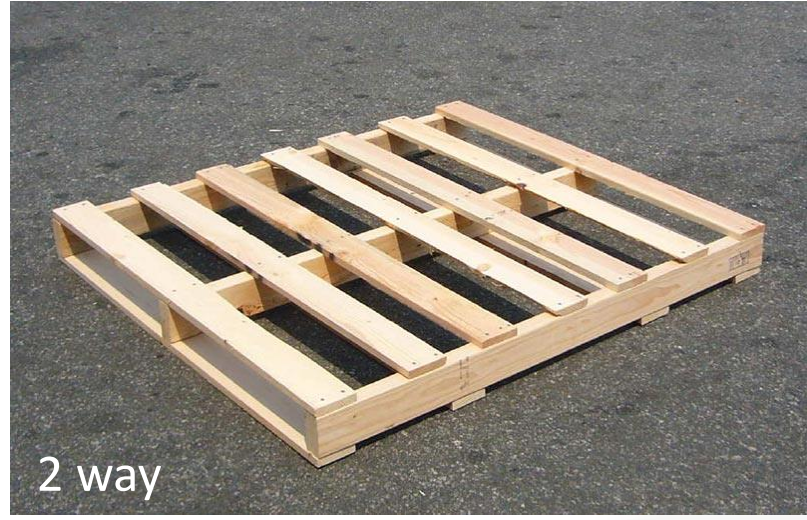
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2 way



Partial 4-way



Full 4 way

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Unidirectional Base



Unidirectional Base



Perimeter Base



Cruciform Base



Solid Wood Pallets (92%)

Advantages

- Inexpensive
- Easy to prototype
- Strong
- Stiff
- Recyclable
- Can be designed using PDS
- Existing equipment and packaging is designed to the performance of wood pallets

Disadvantages

- Fasteners
- Can harbor bugs
- Splintering
- Gaps between boards
- Give off moisture
- Variation between pallets
- Different lumber specs for different locations



Plastic Pallets (2-3%)

Advantages

- Bug Free
- Durable
- Washable
- No fasteners
- Weather resistant
- Design Potential
- Custom colors

Disadvantages

- High purchase price
- Expensive to prototype
- Low Friction
- Low Stiffness
- Fire safety rating
- Not repairable
- Slower production times



Composite Pallets (1-2%)

Advantages

- Smooth deck
- Dry
- Bug-free
- Good product protection
- Durable
- Design flexibility
- Can be designed with pallet design software

Disadvantages

- High purchase price
- Expensive to repair
- Splintering
- Less recyclable
- Less water resistant
- Fasteners



Paper Pallets

Advantages

- Lightweight
- Ergonomics
- Smooth deck surface
- Recyclable
- Lower freight cost
- Dry
- Bug free

Disadvantages

- High purchase price
- Susceptible to moisture
- Poor performance with flexible loads
- Not durable
- Less product protection



Metal Pallets

Advantages

- Strong and Stiff
- Durable
- Recyclable
- Fire Resistant
- Bug free
- Sanitary
- Dry
- No Fasteners
- Impervious to extreme temperature
- Excellent product protection

Disadvantages

- High purchase price
- Weight
- Sharp edges
- Low friction
- Susceptible to rusting

Fundamental Pallet Design Parameters:

- Strength
 - Racking
 - Static (Floor Stack)
 - Dynamic (Fork tine)
- Functionality:
 - Stiffness
 - Durability
 - Size
 - Weight
- **Cost!!!!!!**



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PALLET STIFFNESS

Cost breakdown of packaging within a typical unit load



Stretch wrap	\$1.80
Pallet	\$8 - \$9.00
Corrugated cases	\$45.00
HDPE 32 oz bottles	\$324.00



Stretch wrap	\$1.80
Pallet	\$8 - \$9.00
3 1/2 gallon pails	\$210.00

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Buckling in walls of plastic pails



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Pail failures during storage





Best Practices for Stiffness

- Always know the stiffness of your pallet design.
- Measure the the increase in stress distribution before you make a decision.
- Consider the stiffness change of the pallet before modifying the support conditions.
- Stiffer is better!!!!!!

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DURABILITY



Durability

- Life of a pallet specified in Number of Trips
- Expendable pallets need to last 1 trip
- Reusable pallets are designed to last for more than one trip.
- Don't design for more than 10 years.
- Don't design for longer than you can retain ownership of pallets.



Pallet Durability



Lead-edge board failure



Fastener Failure



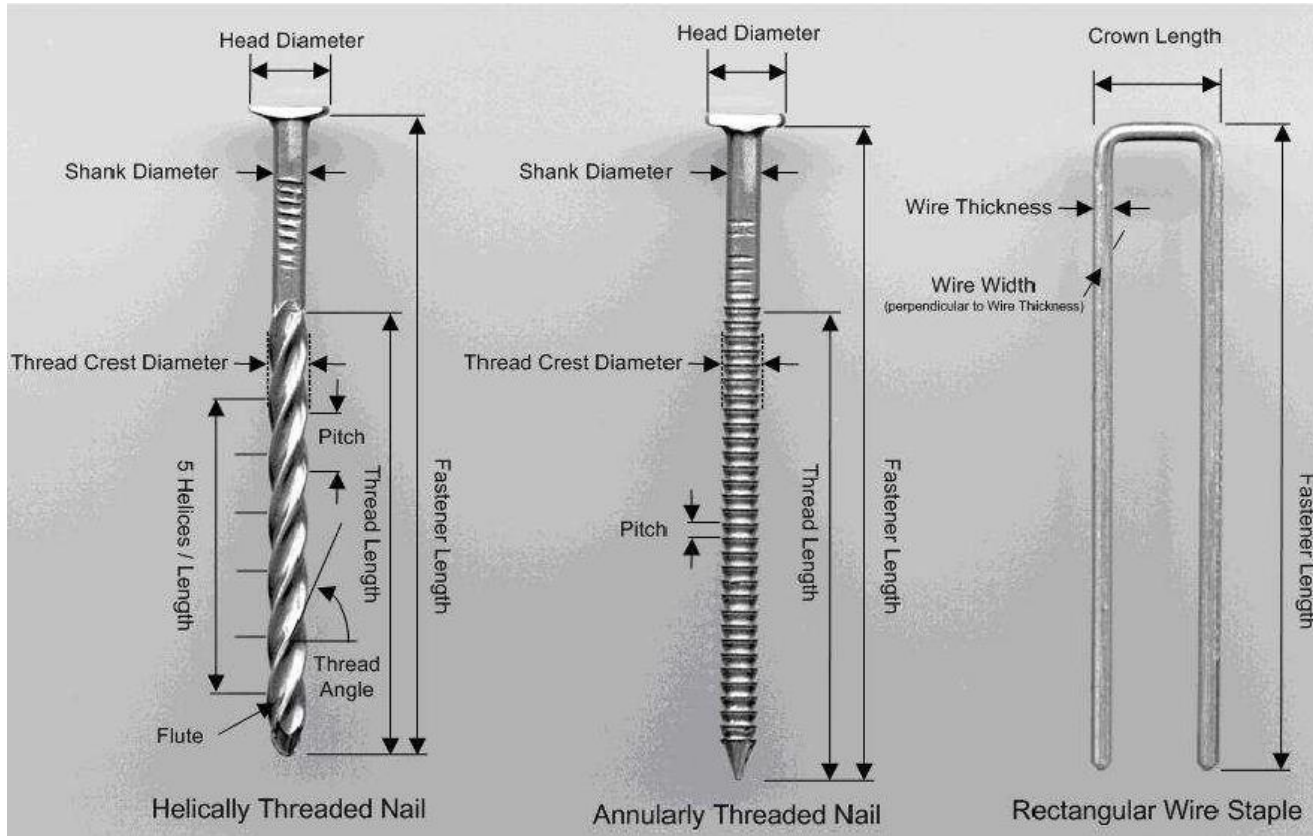
Splits

Pallet Fasteners

- Helically Threaded Nail
- Twisted Square Wire Nail
- Annually Threaded Nail
- Plain Shank Nail
- Round Wire Staple



Measurement of Fasteners



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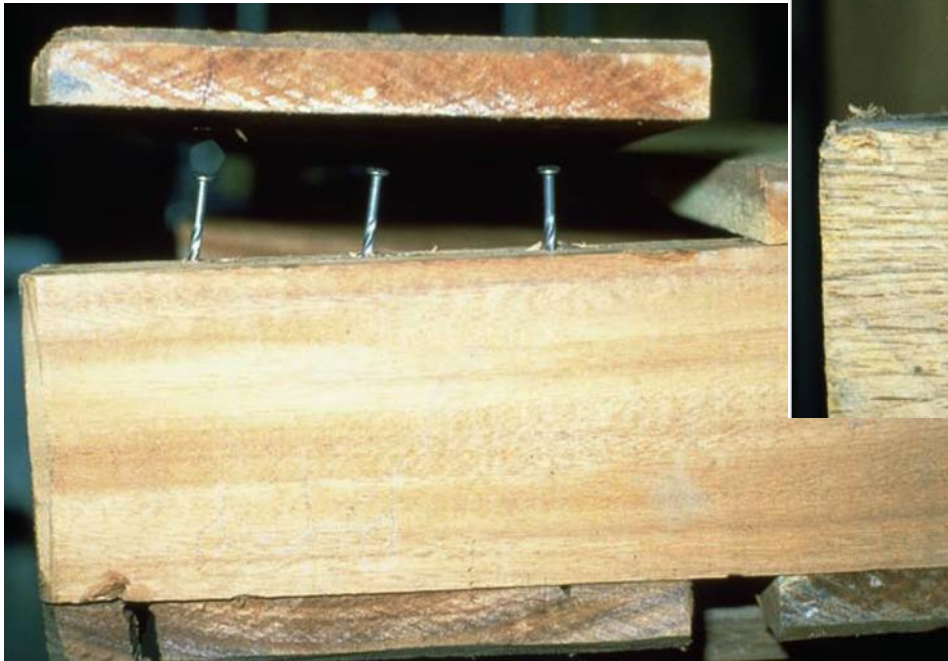


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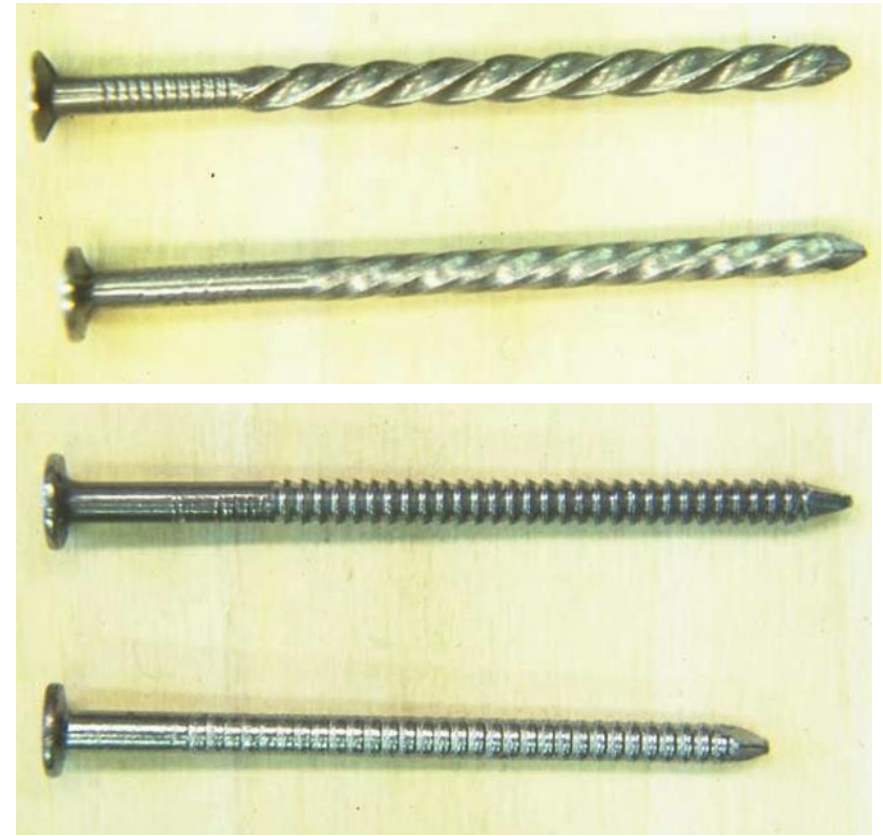
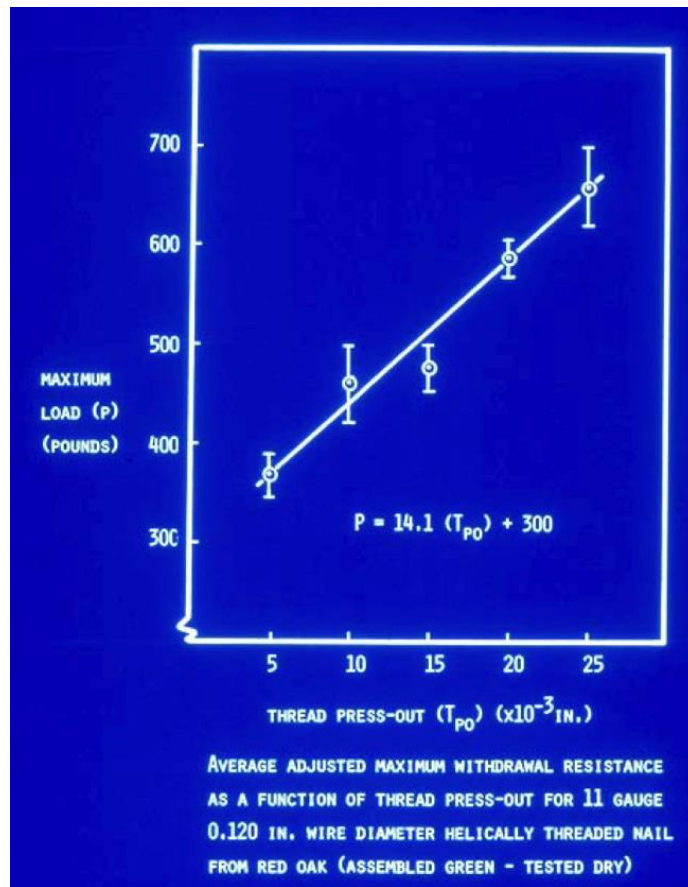
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Fastener Bending vs. Splitting



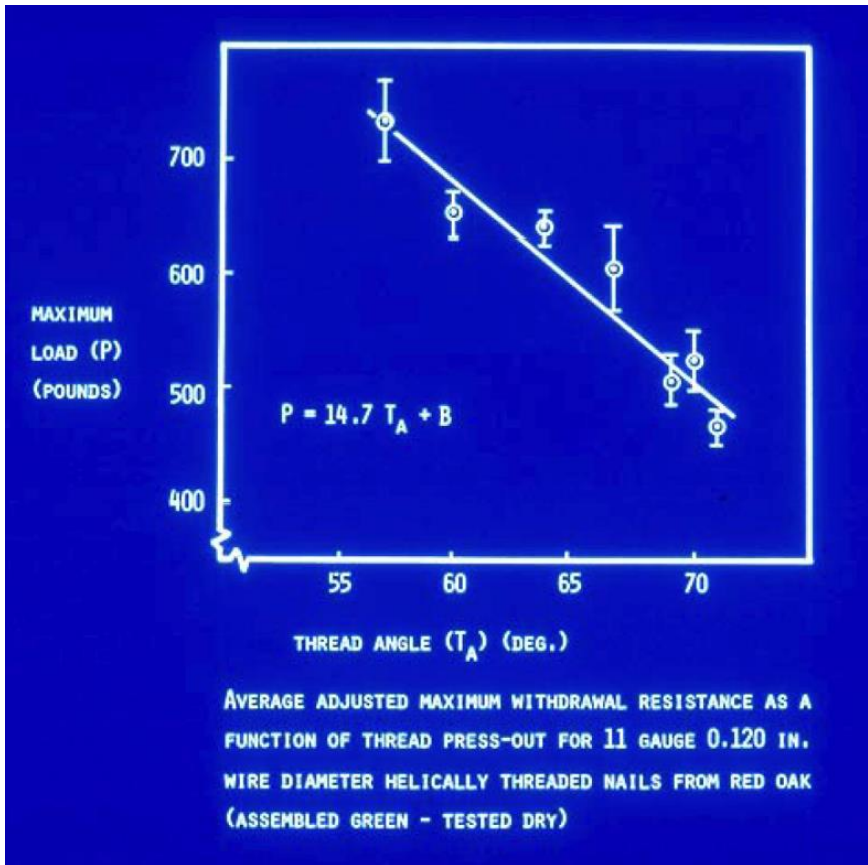


Effect of Thread Press-Out





Effect of Helix Angle





Potential Durability Improvement

- 5-6% increase in the number of fasteners → 56% improvement.
- Butting lead-edge deckboards → 38% improvement.
- Split-inhibitors in leading-edge deckboard → 48% improvement.
- Use dense hardwood instead of medium density hardwood → 38% improvement.
- Use dense hardwood instead of Douglas-Fir → 165% improvement.
- Use air-dry pallet instead of green → 43% improvement.

Technology to Improve Durability



- Pallet protector attached to fork tines
- Distributes the load on a larger area



- Pallet protector attached front of the pallet
- Reduces the severity of impacts on blocks and stringers and lead-edge boards



Best Practices for Durability

- Use butted double nominal 6in boards as lead-edge boards.
- Use hardwood boards for the lead-edge of the pallet.
- Use BETTER nails.
- Protect the lead-edge and blocks or stringers from impacts.
- Don't design for more than 10 years.
- Don't design for longer than you can retain ownership of pallets.

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Q&A

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