

A Mechanical View of RFID Technology

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The components of the unit load materials handling and global logistics system for the distribution and storage of consumer and industrial products can be classified as:

Packaging

Pallets

Unit Load Handling Equipment

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- Concentrates on the interactions of these three components to better protect and distribute our products
- Historically, as the William H. Sardo Pallet and Container Research Lab, the center has become the leading expert in pallet design and performance

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- Rafsec, a Finnish RFID tag manufacturer, has partnered with the center to understand the implications of pallet handling performance and RFID durability requirements
- Using FasTrack, a simulated warehouse handling test often used to test pallet designs for durability, initial tests were done on prototype RFID tags

RFID Tags

- A lot of discussion has focused on the advantages of the ability to identify a particular pallet and its corresponding load
- This discussion will focus on:
 - Tag Durability
 - Signal Interference Problems

Like putting license plates on a car in a demolition derby



Tag Durability

- A typical trip through a distribution system will require 10-15 pallet handlings
- Limited use pallets should last 10 trips, multiple use - 20 trips
- Each handling has the potential that the lift device will impact the tag
- For a typical forklift, at 1.5 MPH, this impact translates into 4-5000 ft-lbf delivered on a small tip of the forktine

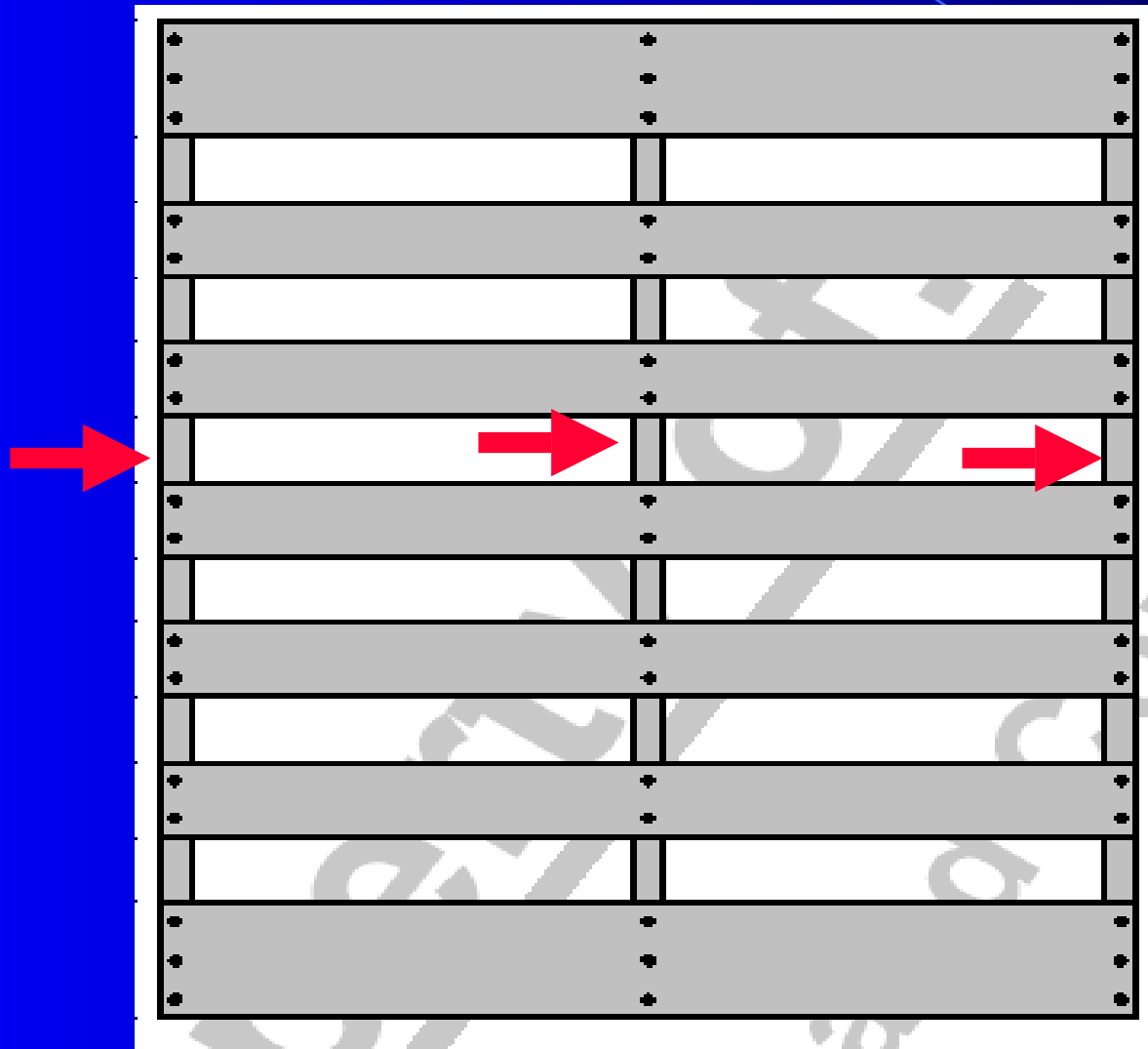


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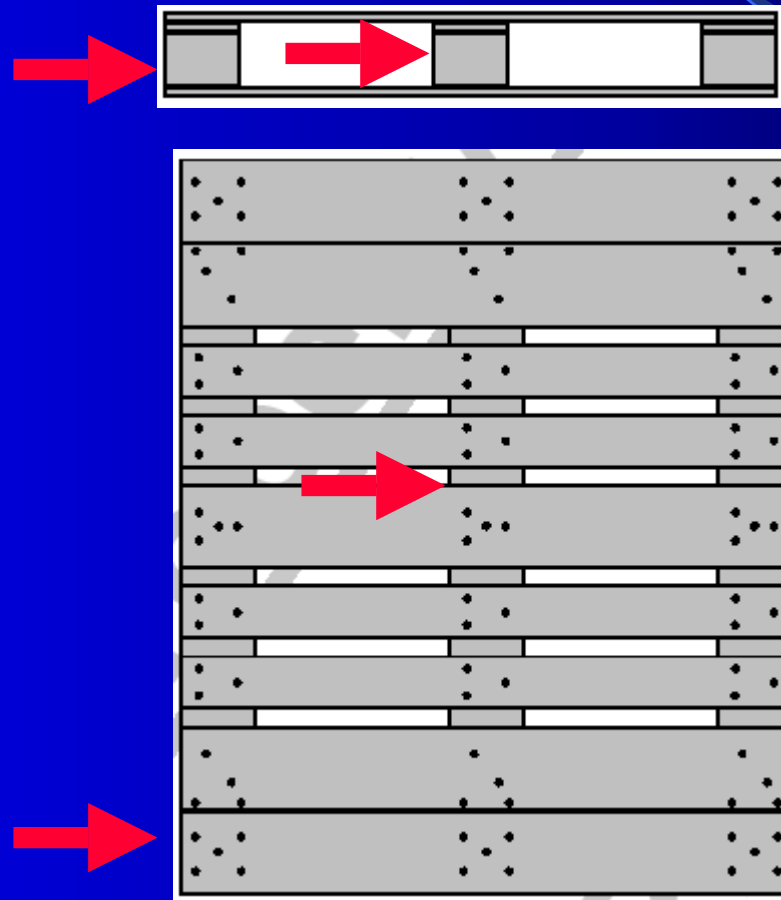
Signal Interference

- Since the RFID tag is a passive energy system – the amount of energy received by the tag is critical
- Three hindrances in the energy flow
 - Wood moisture absorbs energy
 - High impact plastic resins absorb energy
 - Poor “line of sight” prevents reception

Possible Location of RFID Tags



Possible Location of RFID Tags



Tag Requirements

- Tag needs at least 5/16” offset from wood
- Tag must use linear polymers (low conductivity)
- Tags should be as durable as pallet or easily and economically replaceable
- Poor “line of sight” will probably require 2 or more tags per pallet
- Except for the moisture issue, this would apply to pallets manufactured in other materials

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