

The Economic Impact of Solid Wood Packaging Material Pest Reduction Strategies

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Until a few years ago, most solid wood packaging material (SWPM) for international trade merely needed to be “bark free” with no large insect holes. Other than Australia, countries gave very little thought to the SWPM entering their borders. How things have changed! First, the United States required treatments on nonconiferous SWPM from China to stop the Asian longhorned beetle. China then imposed restrictions on U.S. coniferous SWPM to halt the pine wood nematode. Brazil, Russia, and Finland enacted restrictions. The European Commission is currently considering regulations. The targeted pests, wood species, acceptable treatments, and required paperwork varied between these countries. Satisfying the different SWPM requirements has been a logistical nightmare for many shippers. Today, international shippers must consider many factors in selecting packaging materials for international trade. Each of these factors carries an economic impact.

The transfer of destructive pests has been a disadvantage of international trade for centuries. Pests can travel by many avenues, and one common carrier is SWPM, or solid wood pallets, crates, and dunnage. Alternatives to SWPM have been readily available in the United States for decades, but solid wood remains the primary packaging material. It is estimated that the United States produced 454 million new pallets in 1999 (6). According to the most recent survey by Modern Materials Handling and the National Wooden Pallet & Container Association, 91% of pallets purchased in the United States in 1999 were solid wood (2). It is likely that the percentage of wood pallets used for international shipping today is greater than 91%. Primary reasons for the preference of SWPM are availability, purchase price, and performance. Killing pests in SWPM is not the big issue. Effective, economical, and environmentally friendly pest treatments are available. The difficulty today is not how to kill pests, but how to meet the inconsistent regulations and enforcement procedures of individual countries. The good news is that we are moving to a uniform worldwide pest treatment standard that will relieve the current inconsistencies between countries (1).

In the past, the primary economic decision for international shippers was the cost of the pallet, crate, or dunnage. Because most shipments were one way, the least expensive SWPM that protected the product was chosen. Today, international shippers must consider four factors, each of which must be balanced to minimize the economic burden. Shippers must balance the cost of these four factors in making a decision on international packaging. These factors are:

- The cost of time for designers to ensure packaging is compliant
- The cost of penalties for nonconforming shipments
- The cost of delays as nonconforming shipments are held at entry ports
- The cost of SWPM compliance or an alternative to SWPM

The ideal balance of these factors will vary for different companies, products, global location, and modes of transportation. The only given as we reduce the spread of pests is that the cost of international packaging will increase. Each of the four factors is discussed in more detail below:

1. The cost of time for designers to ensure packaging is compliant

Shippers have spent countless hours with their packaging suppliers over the past 2 years in attempts to ensure compliance with pest regulations. Much of this time was spent by company owners or senior management. One senior corporate packaging engineer for an electronics company estimated that their company has invested 2 man-months over the last 2 years in addressing the various pest regulations. Large companies may be able to dedicate these resources, but this investment would be a severe impact on many small businesses.

2. The cost of penalties for nonconforming shipments

If shipments do not conform due to actual pest infestation, improper treatments, missing paperwork, or inspector error, the penalties imposed by the importing country can be severe. Typical penalties are treatment at the port of entry, incineration of suspect packaging, repackaging using compliant packaging, or export of the suspect container. For shipments into the United States, APHIS can levy fines up to \$1,000 per violation (4).

3. The cost of delays as nonconforming shipments are held at entry ports

The economic impact of noncompliant shipments also delays product delivery to the customer. Any time the product remains in port increases the likelihood of theft, spoilage, or additional damage. Delays can have a severe economic impact on time sensitive products needed for production and customer satisfaction.

4. The cost of SWPM compliance or an alternative to SWPM

Shippers can choose to use SWPM that complies with a regulation or choose an alternative to SWPM. They evaluate SWPM treatments and the alternatives to SWPM to balance cost, availability, performance, environmental impact, and the potential to minimize the cost of the time, cargo delays, and penalties. The various treatments mentioned below will make SWPM compliant for some countries, but unfortunately no desirable treatment will make SWPM complaint for all countries. Methods to gain SWPM compliance include:

- **Coniferous versus nonconiferous species:** For some countries, compliance may be as simple as switching from an untreated coniferous species to an untreated nonconiferous species, or vice-versa. The economic impact is minimal, depending on the availability of alternative species.
- **Fumigation:** This is typically methyl bromide (MB). The economic impact is relatively small, and MB is readily available in most countries. The environmental impact makes this treatment undesirable. Alternative fumigation chemicals are more expensive or difficult to perform.
- **Heat treated (HT) to 56°C for 30 min (56/30):** This carries a small to large economic impact. Most kiln-dried coniferous lumber meets 56/30 HT, and is already commonly used in packaging. This lumber is readily available in many countries, but other countries would need to import this lumber. Many nonconiferous species could be heat treated (without moisture reduction) at a minimal cost, but there is currently no infrastructure to heat treat nonconiferous species.
- **HT to 56°C for 30 min (56/30) and <20% moisture content:** The addition of a moisture requirement to heat treatment carries a small to large economic impact. In the United States, most kiln-dried coniferous lumber meets 56/30 HT and the moisture level, and is already common in packaging. The cost and time to treat nonconiferous species is significantly greater, and would be cost prohibitive for many common packaging species such as oak. There is no infrastructure for this treatment for nonconiferous species.

- **HT to 71°C for 75 min (71/75):** The higher temperature and time required for 71/75 would significantly increase the economic impact. Some, but not all, kiln-dried coniferous species are treated to this level, and the cost to treat nonconiferous species would be uneconomical for most packaging purposes given current technology. The addition of a moisture requirement to 71/75 would further increase the economic impact.
- **Chemical pressure impregnated (CPI):** This type of treatment will satisfy the pest regulations for any country, but is a significant cost and leaves the wood with a negative recycling value. Some CPI treatments would render the SWPM hazardous waste after use. This treatment is not recommended unless other treatments are unviable. CPI lumber is not readily available in all countries.

It is recommended that SWPM be marked or branded to aid in recognition. Bob Sanders, Senior Engineer, Corporate Packaging Programs at IBM, has drafted a marking system for use by the electronics industry. You can review these marking procedures at the Electronics Industry Pallet Standard website (5).

As mentioned above, there are also alternatives to SWPM. These are listed below:

Alternative Packaging Materials: Packaging materials manufactured of plastic, metal, wood composites, and paper are all currently exempt from pest regulations for all countries. Therefore, this is the easiest alternative to comply, but performance will vary and the economic impact can be large. Typical one-way plastic pallets cost from \$10 to \$75. Composite wood pallets are \$25 to \$50. Metal pallets are \$30 to \$100. Paper pallets are only slightly more expensive than solid wood pallets, but offer lower performance. These are all viable alternatives for some shippers, but the relationship between cost and performance needs to be carefully studied. Alternatives to SWPM are not available in all countries.

Slipsheets or Floor Loading: Some companies have eliminated pallets for products such as steel drums, or have converted to slipsheets. Without pallets, the packaging cost may be lower, but manual labor or specialized handling equipment is required at all shipping transfers, and many products may experience greater damage rates.

Returnable Packaging: Today, most international shipments are one way, and the original shipper does not reuse packaging. As the rates of exchange increase, and tracking systems improve, the use of returnables will represent one of the most economically attractive alternatives for international shipments. The substitution of more expensive alternative materials is more economical with returnables. It is also more economical to treat returnable SWPM once than to treat a new SWPM for each trip. Examples of the trend to international returnable pallets are the decision to allow EuroPallet production in the United States in 2000 (6) and the Electronics Industry Pallet Standards study of reusable international pallets (5).

As our rate of international trade increases, the international exchange of damaging pests needs to be reduced. Solid wood pallets and crates can harbor pests, but there are treatments available that are effective, relatively inexpensive, and environmentally friendly. Consistent worldwide SWPM treatment standards are needed to reduce the current confusion and inconsistent standards. Alternatives to SWPM are available. Conforming to the increasing pest control regulations will increase the cost of international shipping. Stay informed, be open to change, and know your options in order to minimize the economic impact on your company.