The Rubber Pallet Revolution

A position paper by
Envirokare Tech Inc.

Why care about pallets?

Our continent is in motion. By rail, sea, air, and especially by road, goods move constantly from farms, factories, offices, and warehouses to distributors, wholesalers, retailers, and eventually to consumers like you. Early this century, those goods moved in crates, sacks, and drums. Today, most of them move on pallets.

In essence, a pallet is just a portable and rigid platform that a forklift can handle. Pallets seem like simple things—and they are. Most people don't think about the pallets that move the things they buy. They have no reason to. But you do.

Millions of pallets, billions of dollars

Pallets are a huge industry in North America, measured in billions of dollars each year—more than the budget of the state of Nevada, the province of New Brunswick, or the country of Kenya.

The average U.S. company that uses pallets buys 23,000 of them annually, spending about $275,000. In the United States and Canada, those companies together buy more than 500 million pallets each year to assemble, store, stock, handle, and transport millions of tons of stuff, from groceries to machine parts, from running shoes to the daily mail. The pallets cost close to six billion dollars. The western states and provinces alone account for a quarter of them: 125 million pallets, worth $1.5 billion.

Companies are starting to calculate the total cost of a pallet by its service life and secondary costs, not just by its purchase price

Some companies own their pallets, some rent them, some share them with others in a pallet pool. There is no single dominant maker of pallets in North America, but organizations with small portions of the pallet market are not small themselves: the Commonwealth Handling Equipment Pool (CHEP), for instance, has some 14 million high-quality wooden pallets in circulation, worth at least $150 million. They represent less than 3% of the market.

Envirokare Tech Inc. has a new molded-rubber technology that can capture a small but significant portion of the North American pallet market in the next few years. Envirokare has a pallet design the industry and pallet users need, right when they need it. A new design and new materials are necessary because people are now realizing the true cost of the traditional wooden pallet.

The cost of wood

Over 90% of all pallets are made of wood. It's cheap, strong, versatile—and easy to dispose of. Ten million trees are cut each year to make pallets, almost half of which are thrown away as "disposable." A few are then recycled; many end up in landfills.

Wood prices are rising. Governments and the public are more aware of the costs of disposables, realizing that even before we recycle, we should reduce and reuse.

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The true price of a wood pallet has been estimated at more than five times its purchase cost. Some of the other 80% of the price goes to carrying costs, recycling fees, workers' compensation, preparation, administration, repair, and sorting. The largest portion of the cost comes from damage—a full 23%.

Wood is inexpensive and flexible, but also can be damaged easily by being dropped, hit by a forklift, overloaded, or improperly handled. Government and company regulations usually require that a damaged wood pallet be taken out of service and either repaired or replaced unless the damage is very minor. Otherwise there are significant risks of harm to the goods being transported, or even injury to workers.

As a result, in the past ten years many companies have made a good business out of repairing damaged wooden pallets. Envirokare Tech Inc. is one of them, but we have also come to realize that repair and replacement drive up the cost of using pallets, which makes the goods they transport more expensive for the companies that use them, and in the end for consumers.

The alternatives

Envirokare is not alone in seeking other designs and materials for pallets. Wood by-products are used to make pressed wood fibre pallets, and less demanding applications can even use corrugated fiberboard. Although both are inexpensive (between $6 and $7, compared to $25 for a new, high-quality wood pallet), light, and recyclable, they are also susceptible to damage and cannot be repaired.

Metal pallets are very strong and light, hard to damage, and repairable. They are common in heavy-duty work for the military, aerospace, and heavy equipment industries. However, they are quite expensive, costing as much as $350 apiece, and are not really practical for general use.

What the industry needs is a happy medium – a pallet less expensive than plastic but more durable and lighter than wood

Pallets made of a variety of light, durable, reusable, and recyclable plastics have been more successful, and now make up some 3% of the pallet market, with 15 million pallets worth $500 million in use across the continent. Companies as large as Nike and the U.S. Postal Service have moved from wood to plastic.

Nevertheless, plastic is not without its problems. Like wood, it can be damaged by forklift tines, or by being dropped, twisted, or overloaded. It can splinter and cause injuries. And it remains expensive: good plastic pallets cost between $75 and $90 each.

What the industry needs is a happy medium—a pallet less expensive than plastic but more durable and lighter than wood, and one that can take rough treatment without needing repairs. Even better would be a pallet made from recyclable materials that are currently piling up, unused, in dumps and landfills across the continent.

The solution is pallets like the ones Envirokare has developed.

The best option: good for buyers, good for the environment

The recent success of plastic pallets shows that pallet buyers understand the benefits of alternative materials. But there is one resource ideal for pallet production that has not been exploited: used tire rubber.

Plentiful raw material, and a desire to use it

Rubber is a remarkable material: elastic, moldable, strong, and extremely durable. As the main ingredient for tires on cars, vans, and trucks, it can travel tens of thousands of miles before wearing out. Eventually, though, it does wear out, and the tires are shipped off to dumps and storage facilities.

A new industry

Until 1986 there was no tire recycling industry, but rapid strides have been made in the last decade. Even so, less than 5% of used tires are recycled—though between 250 and 350 million car and truck tires are discarded each year, many of them illegally, in vast piles across North America. These tire dumps are susceptible to difficult-to-extinguish fires (experts estimate that two recent U.S. tire dump fires will burn for 6 to 24 months before going out), and may even breed mosquitoes in the standing water trapped inside the tires.

A single pallet plant running at capacity can recycle hundreds of thousands of used tires each year

As with wood, governments and the public realize that the current tire disposal system is unsustainable. Regulators have moved to encourage recycling of tire rubber. Now most jurisdictions require consumers who buy tires to pay a recycling deposit, and rubber recyclers receive "tipping fees" for tires they use, but since rubber recycling is still in its infancy, much of the money hasn't been spent because there aren't enough applications for recycled rubber—yet.

To encourage the use of tire rubber, governments such as that of the province of British Columbia—which has a 10-million-tire stockpile, and throws away another 3 million tires annually—offer matching grants to companies that find uses for used tires.

How Envirokare can seize the opportunity

Envirokare's research has shown that "crumb" rubber, produced by shredding old tires and separating out non-rubber materials such as steel belts (which can also be recycled), is an ideal material for pallets. They can be produced for sale at $25 to $50 each, depending on design and application—precisely the middle price point that the industry needs between wood and plastic.

Envirokare will start by producing a few tens of thousands of pallets a year in B.C. to consume a small percentage of the tires now sent to dumps. Once there is enough demand, a single pallet plant running at capacity can recycle hundreds of

thousands of used tires each year—a significant proportion of those B.C. now simply throws out.

Within four years we plan to exceed a million pallets a year, capturing about 1% of the western North American market, then move on to the central and eastern regions, eventually covering approximately 1% of the full continental market—several million pallets a year.

This kind of rapid growth is possible because the Envirokare rubber pallet fits into a niche that has only just opened, and which is growing rapidly. Our unique manufacturing process also promises to make Envirokare rubber pallets extremely efficient—and profitable—to build.

Bringing the factory to the resource

Current rubber recyclers can sell raw crumb rubber for about 35¢ per pound, and they receive a tipping fee for each tire they consume. However, making a profit is difficult because the old tires need to be moved from the tire dump to the recycling plant. Since tires are bulky, they are expensive to move: each truck transporting them may be filled to the brim with tires, but carry only a fraction of its weight capacity.

Envirokare's solution is to move the recycling plant—and the pallet manufacturing machinery—right to the tire dump. Using proven prefab shelter buildings, such as those built by Weatherhaven Industries of Burnaby, B.C. for the armed forces to use in deserts and the high arctic, we can set up a full, functioning crumb rubber and pallet molding plant on site.

A typical dump containing a few million tires can supply the plant for two to five years, after which the facility can be dismantled and moved to another site. While the demand for rubber pallets grows, the plant can sell any excess crumb rubber at market price.

Overhead stays low and money can be directed to producing high-quality, innovative pallets

Most importantly, the finances work very well: the government tipping fees alone cover the prefab building, equipment, and installation costs, and there is no need to transport bulky tires. Because the plant consumes the problem tire waste for which governments and industry are seeking a solution, land rental will be free or of negligible cost. Profit will come from the sale of finished pallets and excess crumb rubber for other applications such as roads, park benches, athletic flooring, and building materials.

Although the finished pallets will need to be distributed from warehouses, those on site waiting for pickup can be stored outdoors because the rubber pallets are weatherproof, unlike those made of wood or some metals.

As demand increases, more prefab pallet plants can be brought on-line. Our plan is to set up a new one every six months until there are some two dozen plants, enough to handle about 1% of the North American pallet market. With the manufacturing facilities moving from tire dump to tire dump, overhead stays low and money can be directed into producing high-quality, innovative molded rubber pallets that meet the needs of producers, wholesalers, shippers, and retailers.

Envirokare molded rubber pallets

Crumb rubber is a very adaptable substance, and Envirokare Tech Inc. has found a method to produce three different types of pallets for different applications and budgets, all using high-tech rubber molding methods that are superior to the ones used to make other types of pallets.

Parts of a pallet

As we mentioned, pallets seem simple, and when properly designed and manufactured, they are. Fundamentally, a pallet has a top deck on which the load is placed and an underlying structure which supports the load and lets lift trucks handle it.

Traditional wooden pallets consist of planks, called pallet boards, on the top deck. The understructure comprises either "stringers"—wooden supports that run the entire length of the pallet—or blocks of wood at each corner and in the middle of each side. (See other Envirokare documents for diagrams of the two types.) Depending on the design, there may or may not be a bottom deck.

A stringer pallet is "two-way"—that is, the tines of a forklift can only enter from the two ends, not from the sides. A block pallet can be either two-way or the more versatile four-way, where the tines can enter from all four sides.

There are no nails or protruding fasteners to twist, loosen, or break, and no inflexible parts or joints that might snap or produce slivers

There are many sizes and shapes of pallets for different applications, especially in the U.S., where pallet standards have been much slower to emerge than in Canada, Europe, and the rest of the world. Nonetheless, many organizations, including the U.S. Grocery Manufacturing Association, the Canadian Pallet Council (CPC), and the Commonwealth Handling Equipment Pool (CHEP, see page 1)—who together have tens of millions of pallets in the marketplace—have standardized on a 40-by-48 inch pallet footprint, which is also very close to the European 1200-by-1000 mm "Europallet" standard.

Basic design of Envirokare pallets

Envirokare Tech Inc.'s designs have the standard 40-by-48 inch footprint and are likewise similar in shape and dimension to conventional wood and plastic pallets. They can handle similar loads, so they will be familiar to lift truck operators and others who handle them. But the Envirokare pallets are considerably different in construction and design.

Construction

All Envirokare pallets are molded from strong, elastic, heated crumb rubber. The simplest Envirokare pallet design is molded as a single, inseparable piece. Other designs are put together using U-bolts or bonded rubber plugs from a minimum number of single-mold parts.

There are no nails or protruding fasteners to twist, loosen, or break, and no inflexible parts or joints that might snap or produce slivers, as in wood or plastic pallets. The molded rubber is durable and hard to break.

Design

Wood pallets are nailed together. Under the stresses of daily use, the joints can loosen or pull apart, requiring repair at the least and causing damage and injury at the worst. Envirokare pallets are designed to resist most damage, such as that from being dropped or hit by forklift tines. When one is damaged, most often only a small chunk of rubber chips off without affecting the pallet's structural integrity—it can continue to be used safely and efficiently.

Each rubber pallet manufactured removes tires from dumps, keeps wooden pallets from landfills, and saves trees that won't make those wooden pallets in the first place

The rubber surface of Envirokare pallets is naturally non-slip and meets the specifications of the grocery, hard goods, and consumer products industries. The multi-piece models have a patent-applied-for top deck with built-in, convenient hand-holds so that they can easily be moved and stacked by one person when empty.

Each pallet can handle up to 2800 pounds when evenly loaded. Models are available in two-way or four-way configurations. The one-piece versions are extra-strong, while the multi-piece models are lighter and more versatile. One type can even be disassembled in minutes to make the best use of shipping space when moving empty pallets.

Benefits

In addition to avoiding the repair and replacement problems inevitable with wooden pallets, Envirokare rubber pallets are much less expensive than comparable plastic or metal ones. They improve on wooden pallets even further by being designed for long life. Since their purchase price is spread over many trips, they work out to be less expensive, on average, than wood. They are lighter too, and their top-deck handles make them easier to move by hand.

Best of all, Envirokare rubber pallets use a previously under-used resource that was, until recently, considered merely another pollution problem. Each rubber pallet we manufacture removes tires from dumps, keeps wooden pallets from landfills, and saves trees that won't make those wooden pallets in the first place. And since we'll make them on-site at the tire dump, less fuel will be used moving materials for the pallets from one place to another.

When the Envirokare rubber pallets finally do wear out, they can be recycled again using the same process—even into new rubber pallets! They're the best of both worlds: good for business and for the environment.

Envirokare pallet models

Envirokare Tech Inc. has three pallet designs ready to manufacture. Each uses the same molding technology, but is designed for a different purpose. (See other Envirokare documents for drawings.)

The Journeyman

The Journeyman is a one-piece, two-way design with a plank-like top deck and stringer-board undercarriage. It has no nails or joints of any kind, and is the most durable rubber pallet available.

The Nomad V

Envirokare designed the Nomad V as an all-around performer. It combines the one-piece top deck and bottom deck boards, made of high-density rubber, with nine strong but low-density rubber edge, corner, and center blocks to make a light-weight, durable four-way pallet that resists damage and lasts a long time.

The Roamer

The Roamer is unique: a fully-functional pallet like the Nomad V, but put together with surface-flush U-bolts that make it easy to disassemble. Four disassembled pallets can be stacked on one assembled one for empty-load shipping, increasing the number that can fit into a truck or container by 250%. Other pallet designs waste space when shipped this way because they are simply stacked, fully assembled, with much of the shipping space taken up by empty air.

The right idea, the right time

Envirokare Tech Inc. has a pallet design the industry needs, just as the industry is coming to understand that wooden pallets are not as ideal or inexpensive as they have long seemed to be.

Governments are cracking down on waste and wood is becoming more valuable. As a result, wood prices are rising (making wood pallets even more expensive) and there are more and more incentives to make use of former "junk" products such as old tires.

By manufacturing a few million pallets a year, we hope to generate hundreds of millions of dollars in annual sales

Making practical, durable, and inexpensive rubber pallets will allow Envirokare to save trees, prevent wood pallets from being thrown away, and recycle millions of previously unusable old tires. In the process we will manufacture several million pallets, which can themselves be recycled later on, and generate hundreds of millions of dollars in annual sales.

These are not unrealistic goals—less than $^{1}/_{12}$ of the number of tires discarded in North America each year, and only about 1% of the continent's pallet market. When the market is in the millions of units and billions of dollars, even modest goals can bring great rewards.