Improve End-of-Packaging Line Sustainability By Reducing Stretch Film Consumption

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The sustainability of packaging is less about the physical package and more concerned with lowering the social, environmental, and economic impacts of packaging across the supply chain. Reducing stretch film consumption is essential for improving the sustainability of transporting pallet loads.

If at first glance conserving a packaging material as insubstantial as stretch film seems trivial, consider that in 2006, the year the Freedonia Group used as a base for an analysis of U.S. stretch film consumption, organizations spent $1.5 billion on this material. Freedonia analysts predict that the U.S. market for stretch film used in pallet wrapping will increase 4.7 percent annually from 2006 through 2011. At that time, more than 1.9 billion pounds of petroleum-based resin will be consumed in the manufacture of stretch film for the U.S. market. With the cost of a barrel of oil at unheard of highs, companies must effectively reduce usage of all petroleum-based materials, including stretch film, to contain costs.

Another look at the impact of stretch film comes from the Dow Chemical Company. Dow reports that advances in chemistry and enhanced products, processes, and services have allowed it to down-gauge stretch film by more than 25 percent in the last decade. The company calculates that this reduction saves on a global basis one billion pounds of polyethylene resin a year. This is the

equivalent energy savings of 293 million gallons of gasoline or heating and cooling for 643,000 homes for one year. As Freedonia and Dow indicate, there is nothing insubtantial about stretch film.

Application techniques

Stretch film is a highly engineered material and every film is designed to be pre stretched within a specified range in order to bring out the material's maximum strength characteristics. This range is usually between 200 to 300 percent.

There are two ways to apply stretch wrap, by hand and by machine. Hand wrapping is labor intensive and slow. Manual effort cannot effectively stretch the film greater than 10 to 20 percent on average. This has negative consequences on holding strength and unit stabilization. To increase stabilization, personnel often over wrap the pallet and consume more material than necessary. Workers are prone to injuries from tripping, falls, and repetitive motion.

Stretch wrap machines are the preferred means of obtaining high performance from the material and eliminating the negatives of hand wrapping. The more the material is stretched, the lower the usage and the greater the savings. Other advantages include lower labor costs, greater load stabilization, and less damage to pallet loads during transportation. Stretch wrap machines are typically justified on a return-on-investment basis by calculating material and labor savings.

For example, companies A, B, and C wrap identical pallet loads per day using the same type of stretch film that costs $45 per roll. Company A's machine

achieves 25 percent stretch while Company B achieves 150 percent stretch, and Company C achieves 250 percent stretch. Annual film cost for the three companies:

Company	90 pallets/day	250 pallets/day	500 pallets/day
A 25% stretch	$15,376	$42,712	$85,425
B 150% stretch	$ 8,491	$23,587	$47,175
C 250% stretch	$ 5,967	$16,575	$33,150

Material savings add up quickly and justify the investment in a high performance pallet wrapping machine.

In terms of improving the sustainability of the operation, Company C at 250 percent stretch and 500 pallets a day will consume about 1,135 fewer rolls than Company A and 285 fewer rolls than Company B on an annual basis. Company C not only lowers operating costs, it improves the sustainability of its end-of-line packaging operation. The reason is that Company C decreases the number of deliveries of rolls of film into its plant over the other two companies and the also the weight of every pallet leaving the plant. These efficiencies in transportation will result in reduced energy consumption and carbon dioxide emissions.

Look for pallet wrapping machines that achieve at least 250 percent stretch, which is optimum for today's high performance films. For more details on what to look for in a pallet wrapping machine by application, see *Specifying the Ideal Stretch-Wrap Machine for the Application,* a white paper by Mark Collins, http://www.orionpackaging.com/white-papers/.

Film stretch and load stabilization considerations

To achieve 250 percent stretch, the film must undergo powered pre-stretch before the film is wrapped around the pallet. The pallet wrapper's film carriage uses an electric motor to turn two specially surfaced rollers, with each roller rotating at different speeds. The speed differential stretches the film. When investigating the powered pre-stretch capabilities of a machine, look for:

- Precision-machined pre-stretch rollers for ultimate consistency
- State-of-the-art polyurethane roller surface with lifetime warranty
- Full speed range (stop to full speed) motor speed control
- Drop in threading for easier and safer film threading

If you take a rubber band and stretch it to its limit, you will see the band become thinner — it loses width. The same thing happens to stretch film during powered pre-stretch. Equipment manufacturers minimize the loss in width by making sure the two pre-stretch rollers are relatively close to one another. Look for this feature when considering a pallet wrapping machine because the object is to lose the least amount of width possible.

As the stretch wrap machine applies film over sides and corners of pallet loads, payout speed must constantly change for uniform hold strength and unit stabilization. The reason for this is that the film must be played out faster around a corner. The film carriage's response time at corners should be virtually instantaneous or the lag in speed-up will increase the drag on the film and promote tearing. Operations personnel may compensate for frequent tears by buying higher gauge wrap, which costs more and in effect wastes material. They do not understand that the root cause of the problem is not the thickness of the

film but in the application around corners. Specify a machine with state-of-the-art corner compensation/motion control technology. Operations personnel will find they can actually use a thinner gauge film with this equipment.

Also look for advanced force-to-load control. Heavier, more rugged pallet loads, for example manufactured concrete products, require more force to load than lighter and more easily crushed loads, PET bottles for example. The pallet wrapping machine must have easy-to-use and automatic force-to-load settings.

Power pre-stretch, corner compensation, and force-to-load settings all impact the consistency and quality of the stretch wrapping process. These capabilities on high performance machines also mean operations personnel will be able to use the lightest weight material for the application and improve sustainability.

While recovery and reuse of material is preferable, recycling stretch film for most companies is not economically feasible. The more effective means of conservation of this material is to use less by stretching the film at least by today's performance standard of 250 to 300 percent. Knowing what to look for in stretch films and advanced pallet wrapping machines helps ensure improvements in sustainability — economic, social, and environmental.

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