Keeping it TOGETHER

There are many ways to unitize a load, but the common goal for most operations is to stabilize and protect products while they are in motion.

By Lorie King Rogers, Associate Editor

Last month, *Modern* reviewed some of the basic practices and packaging equipment designed for palletizing a unit load. This month, we're taking the next step. Once you have a palletized load, how do you maintain the load's integrity as it travels through the supply chain or your warehouse? Here's where unitizing comes into play.

Not only do sound unitizing practices help an organization save money over the long haul, the right application secures and stabilizes the load and protects the product while in transit. It can also significantly reduce the amount of product returned as a result of shipping damage and ultimately reduce the overall cost of packaging while increasing throughput, explains Tony Barr, vice president of Beumer.

Even though unitizing is the final packaging step before product goes out the door, a great deal of consideration and planning goes into selecting the right application before any wrapping or strapping begins.

"There are a number of things to consider when making a choice, but unitizing is always application specific," says Fred Hayes, director of technical services for the Packaging Machinery Manufacturers Institute (PMMI). "While all techniques are valid and each has a role to play, there's no magic bullet," Hayes adds.

From manual operations to fully automatic equipment, here's a look at common ways to unitize a load.

Manual

Manual unitizing involves little in the way of equipment and is done by hand. In this application, a worker moves around the load holding the handles of a roll of film, unrolling, applying and wrapping the product as they circle. Strapping, or banding, can also be applied to a load manually using a handheld device that cuts and secures the straps.

Manual unitizing can be cost effective in a very slow speed process, but it's not commonly used in most industrial environments, explains Hayes. However, there are always exceptions. Products that are unusual in shape and size, such as curtain rods, doors and siding, are good candidates for manual unitizing.

Semi- and fully-automatic equipment

An operation that unitizes more than 15 loads per day can likely justify some level of automation based on savings in labor, back strain and unitizing material costs.

In a semi-automatic unitizing operation, some degree of worker involvement is required. This could mean that an

Stretchwrapping is the most frequently used method to unitize a load. Whether being applied manually, semi-automatically or automatically (shown here), film is stretched during the wrapping process then contracts to create the force needed to secure the load.

operator delivers a pallet load of product by lift truck to the unitizing equipment or has a hand in applying, guiding and detaching the binding material during the process.

In a fully automatic operation, product is delivered to the unitizing equipment by conveyor. The four main types of in-feed conveyor include roller, belt, chain and walking beam. Walking beam conveyor is typically used when moving very heavy duty, durable product such as concrete blocks and bricks. Roller or belt conveyor are best when there are no pallets carrying the load; roller or chain conveyor work well with pallets.

Stretchwrapping

So where is the conveyor taking the load? In many cases, it's feeding product into a stretchwrapping machine.

Stretchwrapping is the most common way to unitize a load. Stretchwrapping equipment can range in price and in sophistication, from semi-automatic turntable models to fully automatic rotary arm or rotary ring models with automatic programming. A semi-automatic stretchwrapper needs an operator to tie the film to the load before wrapping begins and to cut the film after wrapping is complete.

Fully automatic stretchwrapping systems attach and cut the film without human intervention. Most systems use photoelectric eyes to detect loads, so an operator is not needed in the process. These systems are best suited for routine opera-

Unitizing equipment manufacturers

Company	Web site	Stretchwrap	Stretch hood	Shrinkwrap	Strapping
ARPAC Group	arpac.com	x		x	
Beumer	beumer.com	x		x	
EAM-Mosca	eammosca.com				x
ITW Muller	itwmuller.com	x			
Highlight Industries	highlightindustries.com	x			x
Lantech	lantech.com	x			
Nitech	nitechindustries.com	x			
Möllers North America	mollersna.com	x	x	x	
Orion	orionpackaging.com	x			
Phoenix	phoenixwrappers.com	x			
Premier Tech Systems	premiertechsystems.com	x	x		
Signode Packaging Systems	signode.com	x			x
TopTier	toptier.com	x			
vonGAL	vongal.com	x			x
Wulftec	wulftec.com	x	x	x	x

This table represents a sampling of leading unitizing equipment manufacturers.

tions where the same product comes down a conveyor line many times a day.

A number of stretchwrapping machines are available. For example, platform, or turntable, style equipment spins the load as it is being wrapped. These machines are the least expensive and slowest, wrapping 40 to 50 loads per hour.

Rotary arm machines wrap the film around the load while the load remains stationary. These machines are best for heavy or unstable loads. They are also faster than turntables, wrapping 100 to 120 loads per hour.

Rotary ring type wrapping machines, which are similar to rotary arm machines in speed, also have a mechanism that moves while the load stays still. In this case, a large mechanical ring holding the stretch film moves up and down the load while applying film.

The best stretchwrap solution depends on two important factors: stability of the load and the need for throughput, says Guy Lopes, engineering director for Wulftec. For example, if the product being wrapped is stacked in a column instead of an interlocking pattern, turning it could be risky. In this case, a rotary arm or rotary ring machines work best. But if the load is stable, any of the three styles are acceptable, Lopes explains.

All three stretchwrapping solutions also share the same laws of physics in regard to the film. The film is stretched during the application process and when the process is complete, the film returns to its original size. This contraction creates the tension needed to hold the load together.

Today's strapping machines can run thinner, narrower plastic strapping. This means there's less material, which is especially important when it comes to recycling or disposal in the landfill.

Stretch hooding and shrinkwrapping

This law of physics also applies when unitizing a load with stretch hooding. With this method, the unitizing equipment stretches a hood or bag over a load, which then contracts back to its original size once in place.

Like stretch hooding, shrinkwrapping also uses a bag to unitize the load. In this process, however, an over-sized bag is placed over the load then heated to shrink around the load. Heat can be applied to the load manually with a heat gun or the load can move by conveyor through a heat tunnel to shrink the material.

Both stretch hooding and shrinkwrapping use only a single layer of binding material which lends itself to easy bar code scanning. Another advantage is that both methods provide product protection on five sides of the load, which is a key factor if product is going to be stored outdoors.

Strapping

Strapping is a good option for a variety of products where surface protection is not the primary concern, says Mark Hughes, manager of application development and research for Signode.

Strapping can be applied to a load by hand using manual and pneumatic tools, or using semi-automatic or fully automatic strapping machines that include strapping heads that unroll the materials as needed.

"The strap's joining method is dependent on the type of strap and the joint strength required by the application as well as the equipment being used to apply the strap," says Hughes. In some manual hand tool applications, plastic strapping is joined by using metal seals and special sealers to form crimp joints.

Protective materials can be placed on the top, bottom and corners of a unit load to prevent the product from being marked by strapping or damaged during transit.

Crimp joints are formed by compressing the seal onto overlapping straps. The holding power of the joint is generated by squeezing the straps and the seal together.

Strapping materials include steel and plastic, with plastic having a number of benefits. According to Hughes, plastic strapping has excellent elongation and recovery characteristics, stays tight and absorbs impacts without breaking. It's also safer to handle than steel and reduces indentation at unprotected package corners.

Cornerboard

As its name implies, cornerboard can protect product corners by adding a strong, hard edge to the load. It also serves to support the load, add stacking strength and improve load stability during transit. Cornerboard, which comes in 90-degree angle strips of a variety of materials, can be sized for the demands of the environment and task required.

Cornerboards can be a good option any time you have layers of small boxes (think of a pallet of strawberry bins) that when stacked are not stable, says Pat Fitzgerald, new market development manager for ITW Angleboard. At the same time, cornerboards provide significant benefits when shipping lumber, plastics, metal, furniture, appliances and other products that need edge protection from strapping that secures the unit or simply from transit induced damages.

In the majority of cases, says Fitzgerald, cornerboards are hand-applied to loads; however, there are automatic wrapping machines that apply the protective product automatically to the load and then secure it in place with stretch film.

Greener unitizing

Over the last decade unitizing machines have evolved in performance, speed and quality, says Wulftec's Lopes. "Today's machines are more durable than they were 10 years ago. We're seeing better construction and better choices in components across the industry."

One of the most recent enhancements is the introduction of sensors and computer logic that optimize the machine's energy usage. These new tools are able to look at the product coming into the machine and determine whether or not there's a backlog. If there is a backlog, the machine runs fast, if there's no backlog, it runs at a slower, energy-efficient speed. □

Understanding containment force

Containment force is what keeps a load together. Too much force could damage the product, too little might mean load failure. There are equations to help calculate the right containment force. For example, light loads like empty plastic bottles might only need about 2 pounds to 4 pounds of force; stable loads like boxes and cartons might need about 5 pounds to 7 pounds of force; but unstable loads that are tall or have low column strength could require anywhere from 8 pounds to 18 pounds of containment force. To be 100% sure how much containment force your loads need, consult a professional.