PACKAGING WORLD

packager's playbook series

education for packaging professionals

2013 Edition

END-OF-LINE EQUIPMENT PLAYBOOK

HOW TO SUCCESSFULLY IMPLEMENT END-OF-LINE PACKAGING EQUIPMENT PROJECTS

- Tips for selecting cartoners
- Choosing case-packing equipment
- Trends in robotics
- Alternatives to stretch wrapping for pallets

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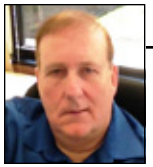

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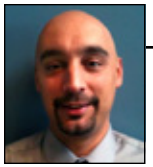

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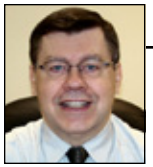

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Accutek, All-Fill, Beumer, Cozzoli Machine Co./MRM/Elgin, Delkor Systems, Douglas Machine, Econocorp, Inc., EDL Packaging Engineers, Fanuc Robotics, Fox IV, Griffin-Rutgers, H.B. Fuller, Hartness, Intelligrated, JLS Automation, Lantech, Lock 'n Pop (ITW), MGS Machine, Pearson Packaging Systems, Schneider Packaging Equipment, Spee Dee Packaging Machinery, Videojet, Yamato

Your Playbook for building a better packaging line

It's not so long ago that even sophisticated packagers with state-of-the-art filling operations were hand-packing their products into cases and even hand-palletizing them. Not anymore. Now the end of the line is swiftly being updated with automated case packing, case coding and labeling, and automated palletizing. Retail customers demand it. But there are still improvements to be made. It's been said that while every dollar of savings has already been wrung out of the main packaging line, there are still savings to be had at the end of the line.

That's why we conceived this Playbook. We wanted to create one source that spells out all the tricks and tips associated with buying, testing, commissioning, and starting up packaging equipment. To unlock these secrets, we spoke with or consulted with over 45 sources. Most of this interaction consisted of in-depth phone interviews with experts in the field—engineers and managers at leading consumer packaged goods companies.

We also talked to suppliers, which gamely set aside their "sales" hat and spoke honestly about best practices and pitfalls to avoid. Remember that while you may buy one filler or inspection system or coding/marking system in a given year—if that many—the companies selling that equipment have been through dozens of projects in that same time period. Learn from their experiences.

continued

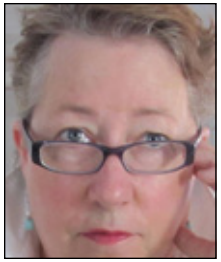
Your Playbook for building a better packaging line

In short, what you're reading is the collective thinking of an industry, representing hundreds of years of packaging experience, distilled into a short, actionable, bulleted style that makes for easy reading.

This particular Playbook has been updated for 2013, with new material on robotics, case coding, and alternatives to stretch wrapping. We discuss when to use PackML on your line, and how to compare packaging machinery at a trade show.

In this Playbook, we cover the back half of the packaging line, from cartoning, case packing, and shrink bundling through palletizing and stretch wrapping. You will also want to download the Primary Packaging Line Equipment Playbook, which covers everything on the front half of the packaging line—from unscrambling through induction sealing. The two Playbooks will equip you well for your next project. (See all our Playbooks at Packworld.com/playbook.) Our successful Playbooks in the areas of flexible packaging, labeling, and package development have also been updated for 2013. All of our Playbooks are designed to be read either on the screen, or printed out.

A final word. The entire cost of producing and distributing this Playbook has been underwritten by the companies that have sponsored it. We thank them for their support, and we thank you for reading. ■



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Our Editor:

Melissa Larson has been writing about the packaging and converting industries since 1984. She was senior editor of Packaging *magazine, was the founding editor of* Pharmaceutical and Medical Packaging News, *and was managing editor of* Converting. *She has also blogged for PMMI's Connected Communities and other packaging industry clients. She resides in Barrington, IL.*

Best practices for buffering and end-of-line design

There are some special considerations for packaging line buffering as it relates to the end of the line:

Buffering Model
(Negating wastage & rework)

C1
d1

C2
d2

M1 = Machine 1
M2 = Machine 2
B = Buffer
C1 = Output of M1
C2 = Input into M2
C1 = C2 = Y
d1 = average stoppage duration for M1
d2 = average stoppage duration for M2

Figure 1 Buffer between two machines.

d1	= average stoppage duration for M1
d2	= average stoppage duration for M2
C	= output rate of M1 or input rate of M2
R	= ratio of actual reserve containers to total containers - capacity preloading of the buffer (in steady state)

Ideal Capacity of buffer should be (d1 + d2)C. This assumes the output of M1 is equal to the input of M2. Most buffers only buffer the downstream or M2, especially end-of-line machinery.

Number of containers staged in the buffer as a standby reserve should be d2 (C).

1. Set increasingly higher capacity downstream. A rule of thumb is for the first machine upstream to have 110% of the capacity of the second, and so on, in intervals of 10%. If calculations show that a piece of modern equipment has 95% availability, this can be pared to allow the downstream machine to draw product away 5% faster when run in a catch-up mode to avoid backups. A 150/min bottling line that experiences five minutes of downtime will need downstream equipment to absorb 750 bottles. The key is to have 20% to 40% extra speed and capacity downstream to allow the line to catch up after a downtime incident. Over-specifying downstream capacity is a key to recovering from stoppages. It also helps smooth out system flow perturbations.

2. Find the line's "sweet spot" by determining the process centerline. Some lines run best at breakneck speed; others are most efficient at a slow and steady pace. Practitioners of the manufacturing and packaging art often make the mistake of setting speeds too high, too close to design specifications. One failure can be disastrous to productivity. Installations vary, but trial and error become evident when you document your results to arrive at the optimal combination of speed and product quality on a balanced line with minimal upsets or downtime. Trained personnel can choose from a wide array of

continued

Best practices for buffering and end-of-line design

statistical analysis tools to arrive at the right speed for your equipment and overall line.

3. Leave sufficient space between machines.

Just as automated lines are often set to run too fast, machines on automated and highly integrated lines are often spaced too closely to one another. If automation isn't state of the art and fully trusted, plan sufficient space between machines and stations to allow for placement of buffer zones. Designing in reliable unit operations can help to minimize buffering requirements, so if floor space is at a premium, focus on equipment reliability, especially generous tolerances for material variations.

4. Prevent stoppages at the case packer.

Case packers can be sources of inefficiency, as seen in situations where corrugated materials or gluing fail to meet specifications. This can back up upstream processes and cause upstream line stoppages and reworks, wasting all the efforts to maintain high production efficiencies upstream. Buffering can be minimized or eliminated when off-spec

continued

Best practices for buffering and end-of-line design

product and materials are quickly, automatically inspected and rejected from the line to prevent hiccups. Bear in mind that it can be very difficult to put containers back into a close-coupled line without knocking over other containers and causing further problems. Choose your case-packing solution well, with reliability carrying just as much importance as speed.

5. Don't let your accumulator reach top capacity. For some accumulators, such as a vertical carton accumulator, a completely filled accumulator requires the line to be stopped and cartons to be unloaded. If there's not enough floor space to unload them, or if the downstream machine isn't sufficiently fast, you may find your line running an empty filler.

Remember… reliability is king, and buffering is your insurance policy. ▪

Nine tips for selecting cartoning equipment

Here are some tips to keep in mind when purchasing cartoning equipment:

1. Know your operation. Choose cartoning equipment based on how it works in your specific plant, with your compressed air system, and with your blanks.

2. Let the product choose either vertical or horizontal equipment. The product will dictate the type of cartoning machine needed. For example, if the product is free-flowing (granular in nature like detergent powder or loose pieces like boxes of cough drops), you may be able to focus mainly on vertical-style cartoning equipment. However, for products that can load horizontally or vertically, horizontal equipment is often better. Most cartoning machines are horizontal loaders. Generally, they perform with more flexibility at a lower cost.

3. Determine the most productive speed. First determine if the operation will be online or offline. For online speed, calculate the maximum rate possible to make the product and divide it by the number of products per carton. Then factor in "surge capability": the potential to increase the rate via new processes or technologies. For offline speed, consider the daily, weekly, or monthly shipping quotas. Make sure to use realistic numbers for days per week and "true" hours per day to calculate required cartons per minute.

continued

Nine tips for selecting cartoning equipment

4. Focus on materials. Cartoning equipment is relatively simple machinery; when there is a problem in cartoning, it is usually a material problem. Understand the material. For reliability, make sure it is of good grade or quality. Is it virgin board or recycled material? The answer has a significant impact on how the carton is handled. The design of flaps and glue patterns must be considered. You can use less glue in a stitching pattern. When you're loading a bag into a carton, the amount of air in the bag has a material impact. You can use a deflator on the filler or a confiner on the cartoner; either way, plan for this ahead of time rather than discovering the need when the equipment is on the floor. Always test your products and materials at the vendor's facility.

5. Match the equipment to your company's technical capabilities. Cartoning equipment should match your company's technical prowess. Acquiring an overly complex machine could prove problematic. Conduct a reference check during your supplier investigation, and

continued

Nine tips for selecting cartoning equipment

talk to companies comparable to yours to determine if the equipment you want is something that will perform to your specs and be manageable for you. Make sure you align the vendor's technology expertise with your product, and know the limitations of any piece of equipment you're thinking of purchasing.

6. Look closely at the picking mechanism. This is often overlooked. Look at the specific technology used to pick carton blanks, and look its compatibility with your particular substrate. If the machine doesn't pick your blank correctly, nothing else matters.

7. End load or side load? End-load cartoning is appropriate when you have good control over the contents and can slip them into the smaller end opening. Higher speeds are also achievable this way. Side load is usually used when you have multiple items going into the carton (example: granola bars) and are "dropping" them into the larger, lengthwise opening.

continued

Nine tips for selecting cartoning equipment

8. Don't forget parts. Have as few change parts as possible when you go from one size to the next. (Obviously, the ability to perform quick changeovers is a key benefit when using many different carton sizes.) Standardizing with components you already have is much more difficult for end users than vendors realize. Keep parts on hand to facilitate repairs.

9. Be aware of future needs. Will you need larger packs or multipacks in the future? If the machine only goes between size A and size B, you may need different equipment. Retrofitting can be prohibitively costly. Plan for flexibility and change. Eventually you may need machines for multiple geometries. ◘

Ten tips for buying coding/marking equipment for cases and pallets

The handling of cases hasn't changed, but the information required on the cases has. This is driven by documentation concerns (i.e., traceability) and the growing realization that all space is marketing space; so, cases, once considered dumb carriers, are now being leveraged to display corporate branding. Corrugated cases are moving closer to primary packaging.

Also, ink-jet technology has improved considerably. Connectivity and footprints are smaller, and machines are easier to use. There are common touchscreen interfaces, levels of control, and higher resolutions. Instead of bottles of ink that you turn upside down, today's technology features self-sealing cartridges and meters for easy visual checks.

Here are some best practices to follow and pitfalls to avoid when buying coding/marking technology for cases and pallets:

1. Understand your application fully to reduce costs. It's cheaper to use ink-jet than it is to use a label, but will your application allow for it alone? Assess the technology in detail in terms of what you're doing. Research the technical aspects of coding and marking to fully understand the role of yield, imaging, and performance to compare models and brands. Learn how the equipment works; understand what different yield and imaging capacities mean for your specific applications.

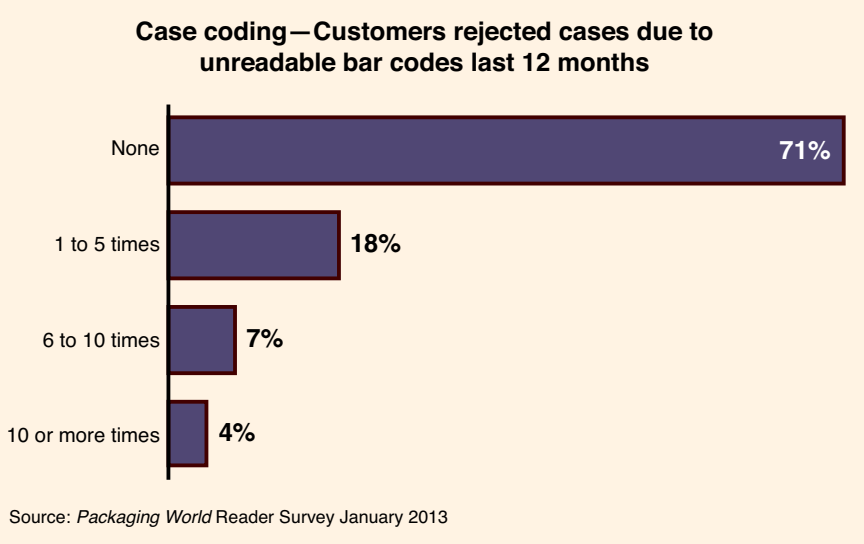
Download Survey

Packaging World magazine recently surveyed coding end users about their current and possible future usage of coding technologies.
To see the full survey, click here.
http://bit.ly/Coding_Survey

continued

Ten tips for buying coding/marking equipment for cases and pallets

2. Ensure that coding quality will meet customer needs. Large-character printers may not give you the highest-quality scannable code. Companies such as Walmart want better-quality coding on what they call high-velocity goods, which they process in a highly automated warehouse. For your product to qualify as a high-velocity good, you may find that print-and-apply technology works best, but at a higher total cost of ownership, including equipment and consumables (labels and ink).



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Ten tips for buying coding/marking equipment for cases and pallets

3. Understand the impact of product distribution. Refrigerated items will go through freezers and refrigerators. Be aware of where they sit at ambient temperatures, where condensation is a risk. If the ink and glue on the label aren't designed for your distribution cycle, the label will likely be compromised and can even fall off. Your distribution process may move through different environments, so consider how they will challenge the packaging materials used.

4. Assess the impact of recycled content. Corrugated cases come with increasingly higher recycled content, which can impact label appearance, label adherence, and printing. The higher the recycled content, the darker the box. Sometimes it is necessary to print a light background before applying a bar code to a case to obtain a functional contrast.

continued

Ten tips for buying coding/marking equipment for cases and pallets

5. Closely track database activity. Database integration ensures that coding on the cases ties into the package itself. Handling hasn't really changed, but the information you want on the cases has. For example, the Produce Traceability Initiative (PTI) is only a guideline; how you implement it depends on your customer. If you're doing bar codes, the most important thing is that you have a good, scannable image. Know your customers, as they will drive the standards you'll have to meet.

6. Be ready for changes. The packaging landscape is increasingly fluid. Retailers such as Costco and Sam's Club are driving a trend toward shelf-ready cases. More companies are conscious that packaging space has become a branding and messaging opportunity. Due to the economic climate of the past few years, anything to get the message out rules. Corrugated cases used to be generic; in some instances, they're moving closer to primary packaging.

continued

Ten tips for buying coding/marking equipment for cases and pallets

7. Consider more than price. Besides cost, a host of factors need to be considered before buying coding and marking equipment, including the equipment's history of use in applications similar to yours. Buying a system or machine because it is on clearance, or is the highest priced so it "must" be the best, is shortsighted, as is thinking that the mid-priced item is most sensible. Exercising due diligence is essential to successful equipment specification. Contact customer references who have purchased and use the equipment in a similar setting to obtain feedback on performance and reliability.

8. Avoid generic equipment. Generic coding and marking equipment typically suits businesses with very basic needs. Do you need more unique solutions or customizable, robust functionality? Opt for an equipment provider that can grow and adapt as your company's vision and objectives evolve in response to the market.

continued

Ten tips for buying coding/marking equipment for cases and pallets

9. Don't forget maintenance and repair. Dig deep to fully understand the equipment reliability. Again, reach out to current users of the equipment to gain insight into daily maintenance as well as the floor perspective. Ask about operating costs related to the life of the machine in terms of ink, maintenance frequency, and the cost of repairs and parts replacement. You may think the up-front cost is the biggest factor; however, the lifetime costs can put a big dent in the budget and affect the supply chain relative to production schedules.

10. Consider online case printing. Instead of housing pallets of preprinted cases, consider moving to generic cases that can be printed online and labeled for any SKU. This creates a tremendous reduction in inventory. The print quality of digital and online case-printing systems has improved considerably, making this an option well worth exploring. ▪

Trends in case-packing equipment

There are a number of trends that are driving the design of modern case-packing equipment:

1. Retail-ready case packing. Originally driven by club stores, secondary packaging that can be deployed right on the retail floor with attractive graphics and tear-away sections or panels has been one of the biggest developments in secondary packaging in recent years. The latest challenge is to be able to produce smaller-count cases at higher speeds to maintain processing speeds. Also, using shelf-ready packages with visible product (such as windows or exposed carton corners) requires automated machinery that minimizes surge pressure during packaging. The kind of vacuum used to pick up a case really matters in these applications. Machines cannot mark, mar, or damage the cases in any way, because they're now being used as displays. Package design of retail-ready packs has an impact on the entire line, from denesting to pallet handling and everything in between (checkweighing, inspection, coding, etc.). The design and implementation are different enough that there are contract packagers that specialize in the design, packaging, and fulfillment of club packs.

2. Lightweighting. Partly for sustainability reasons but also for cost savings, packagers are seeking to use thinner bags, thinner corrugated board, and thinner cartons. Machines have been redesigned accordingly, handling product a lot more gingerly than they used to, but still at high speeds. End-of-line packaging machines used to be typically fixed-automation machines. But what is required now, to handle the proliferation of container shapes, sizes, and lighter weights, is more low-pressure conveyance, more customization, servos, and more robotics. Robotics can be more efficient at handling lighter-weight packaging because the

continued

Trends in case-packing equipment

amount of pressure and stress put on containers can be more tightly controlled. Pick-and-place robots might be less likely to cause package damage versus more conventional fixed-automation and drop-pack systems.

3. More recycled-content cases. Previously, case packers handled virgin corrugated board all the time. As packers are now seeing a lot more recycled content, machines must be more forgiving and provide for more tolerance of variation in the quality of the cases and trays. Recycled corrugated board also shows more variation in how it reacts to the environment than virgin board. Humid or cold environments add to the need to build more-tolerant machines. Vendors see this as an opportunity to differentiate, showing that they can handle these variations. This leads to design changes, different engineering, or reengineering, including the greater use of high-strength, lightweight materials in machines, such as carbon fiber for end-of-arm tools, lighter-weight metals, and other advances in control and precision.

continued

Trends in case-packing equipment

4. Machines that accommodate packaging variety. Marketing requirements are pushing the use of so many different packages that suppliers must be able to deliver case packers that can, with just a few change parts, swiftly change over and accommodate the larger variety of case sizes and formats. The challenges are to convey, accumulate, carton, case, and/or wrap these packages at high speeds, while keeping them well protected, and to be able to rapidly change over to different package types, pack configurations, or various "rainbow" pack combinations (for example, on-the-spot changeover of flavor selections in a multipack of beverage bottles). The increasing use of servo technology is permitting this flexibility. Quicker changeovers are driven by the desire to offer greater customer choice to address occasion-based marketing—the right product in the right package at the right time and place. Occasion-based marketing depends on the ability to produce multiple packaging formats for venues as diverse as hotel chains, restaurants, club stores, and convenience stores. Machinery users want to be able to run all these diverse formats on the same equipment.

continued

Trends in case-packing equipment

5. Adhesive advances. Manufacturers of adhesives and adhesive applicator equipment have not stood idly by either, but have introduced innovations such as non-heated adhesive application systems that deliver a foamed adhesive with rapid set properties. Advantages include using up to 50% less adhesive than conventional systems, and room-temperature pumping and flowing of adhesive that eliminates the need for heated tanks and hoses, increasing safety. Also, newer hot melt fast-set adhesives are debuting, eliminating the need for excessive heating and hot system engineering, resulting in savings opportunities on wear parts and maintenance.

6. Closer integration. Packagers are pushing for more integration in their lines; instead of buying discrete pieces of machinery and cobbling them together, they really are requiring that OEMs integrate complete end-of-line solutions that achieve the desired output for the entire line. Packagers are looking at the lines holistically, and want machines that can communicate with each other. They want the HMIs to have a similar look and feel, and they're specifying standardization of pumps and controls. Adoption

continued

Trends in case-packing equipment

of PackML is streamlining integration between machines. A common platform also makes it easier for packagers to train their operators. In short, what's driving case-packing design is packagers' need for equipment that is easier to use, more accessible for less-experienced operators, simpler, faster to change over, and more flexible because packaging styles are changing at an unprecedented rate. ◘

Checklist for buying case-packing equipment

When you approach case-packer manufacturers, it's best to do your homework. Prepare a document that answers all of the following questions:

1. Product and package. What is your product? What is the package type (e.g., carton, tub, bottle, can, blister pack, etc.)? Does this product have different sizes that you want handled on a single machine?

2. What are the dimensions of the primary package? If it is a round container, you'll want to specify diameter and height. Or length, width, and depth (LxWxD) if it's a carton. Most case-packer manufacturers will want LxWxD dimensions according to how the product will be placed in the container relative to the container opening.

3. How will the product be delivered to the machine? Will the package be standing up? On its side? Which way will it face as it is entering the machine? Sometimes it helps to draw a little sketch showing how the package will be oriented on the infeed conveyor. Also, what do you want to see when you open the case? Which way should the package printing or labels be facing?

continued

Checklist for buying case-packing equipment

4. Line speed. How fast will containers be coming into the case packer, in packages per minute?

5. Case count and pack pattern. How many product packages will go into each size container? What are your desired pack patterns? This can be communicated by indicating the pack count along each dimension. For example, 24-count 3x4x2 (LxWxD) means there are three products along the longest flap (length dimension), four products along the shortest flap (width dimension), and two layers of product (stacked two high) in the depth dimension.

6. Weight/handling issues. Is your product very heavy, or very light? Wet, sticky, or slippery? Hard or soft? Hot, cold, or frozen? Sturdy or wobbly? Liquid or solid? What is the room temperature and humidity level where the machine will run?

continued

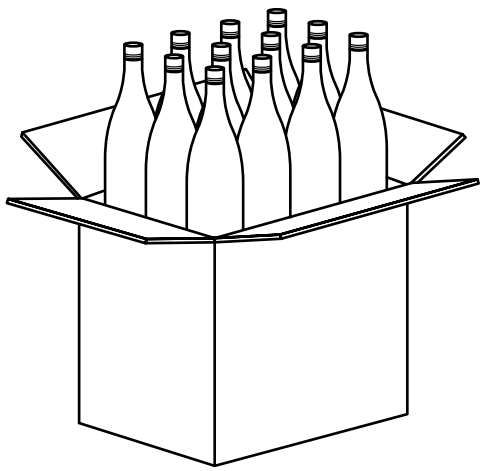
Checklist for buying case-packing equipment

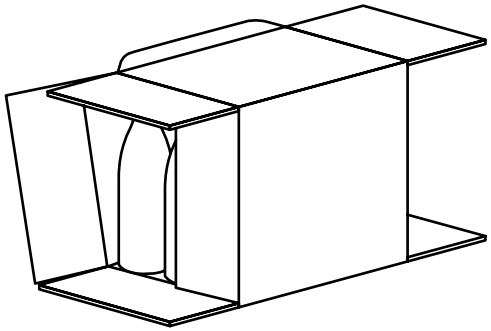
7. What configuration are you looking for?

Semi- or fully-automatic? Wraparound, horizontal, or top or bottom load? Left or right hand? In-line, perpendicular, or counterflow? Glue (hot or cold) and/or tape sealing? Do you have a controller preference or special electrical or automation standards?

This article was excerpted from a handbook from Schneider Packaging Equipment Co., Inc.

Wraparound versus RSC cases





It may be possible to save corrugated costs by switching to wraparound cases from regular slotted cases. To calculate potential savings, measure the length and width of each flap and panel in your existing RSC, and sum the resulting figures. Include the manufacturer's joint in your measurements. Compare the totals for equivalent wraparound-style case blanks. There may be more waste with one wraparound case design than another, so less area alone does not always mean a cost savings. To be sure, ask your corrugated manufacturer. The square footage of the corrugated can be less, and the charge for gluing the manufacturer's joint is eliminated.

Other benefits of wraparound-style cases: A case magazine can hold twice as many wraparound cases versus a standard RSC style. Also, the wraparound case is strong and offers a tight product fit, which increases column strength and pallet efficiencies.

Though a well-engineered case packer can be forgiving with badly made cases, it's not worth saving a few pennies. Invest in quality cases for maximum uptime.

Tip: Ask your corrugated supplier to put a mark along one case fold. This mark tells operators whether a case is in the magazine upside down or backwards. It's a real time saver on a busy production line.

This article was excerpted from a handbook from Schneider Packaging Equipment Co., Inc.

Nine tips for selecting multipacking and shrink-bundling equipment

In today's multipacking and shrink-bundling environment, the need for flexibility and precisely repeatable changeovers is taking precedence. This is driving equipment design, even on highly complex equipment. It is also influencing the "dumbing down of machines," specific to changeover and flexibility, where responsibility is taken out of the hands of operators, or removed entirely. Users are demanding higher overall equipment effectiveness (OEE), longer mean time to failures, and greater predictability.

Machine builders are adding control with fully integrated robotics instead of integrating with another machine for added functionality. Rather than having three axes of linear movement (e.g., a pusher), the vendor may install a delta or Cartesian robot. Robots are simpler and cheaper than they used to be, and utilize smaller footprints.

The proliferation of SKUs and brands has driven down shelf space, which in turn has increased inventory turns and the desire for smaller packages. This need has dramatically increased bundling speed. The costs of bundling, labeling, and coding have almost doubled due to sending the same tonnage in smaller bundles!

continued

Nine tips for selecting multipacking and shrink-bundling equipment

Here are some tips to consider for those selecting equipment in this challenging environment:

1. Look to downgauge. The use of polyethylene and similar thin films is a huge cost-cutting opportunity. Fifty percent of customers use heavier-gauge film than they need. Why? A thicker gauge buys a lot of "forgiveness," allowing companies to get away with sloppier setup, less efficient machines, and less competent operators. Premium films are being used to accommodate these shortcomings. While downgauging involves a lot of work, it can pay off. Instead of using a film that costs $4 a pound, you can use one that costs $0.71 a pound with the right bundling machine. In fact, film suppliers are producing better-quality, inexpensive thin films.

2. Identify the right technology platform, especially if it's a new process for the business. Whether it's a wraparound tray, corrugated pad, or unsupported shrink bundle, see what your product and distribution environment can handle. Rigid containers

continued

Nine tips for selecting multipacking and shrink-bundling equipment

such as metal cans easily transition from a tray to a pad. But what if you're dealing with a 3-oz plastic bottle with an hourglass shape? Be very careful and do a lot of testing to see if it's even possible to move from a tray to a pad to an overwrap. Shrink-only packs will obviously save corrugated costs, but such a move requires foresight and planning to ensure package integrity with package development experts.

3. Speed matters. The speed at which you're packing or bundling is a key parameter. The number of products on a pad or shrink bundle remains on the upside of the growth curve. Consider this as you examine potential equipment. While there are no hard-and-fast rules, the impact of product development on bundling speed cannot be ignored.

4. Size matters as well. Pay attention to the length of the shrink tunnel. Don't undersize it. Film takes a certain amount of time to heat up and shrink. Selecting shorter heat tunnels with higher heats is not good logic. For higher

continued

Nine tips for selecting multipacking and shrink-bundling equipment

speeds, tunnels can become long and are often a target for footprint reduction. Tunnels with small chambers have a tendency for hot spots that can result in poor packages.

5. Look for shrink tunnels with lower air velocity. Tunnels with high-velocity airflow can disturb the film, causing more wrinkles.

6. Storage and handling issues are important. For shrink film, proper storage is essential. Are film roll tolerances within specifications (e.g., tension consistency, minimum edge curl)? Pay attention to what the equipment incorporates to manage film tension and consistency, including features such as vacuum control for film edges.

7. Don't shirk on capacity. Flexible robotics requires extra capacity; have one or two extras so if one machine fails, your whole line isn't down. Designing in excess packing capacity can improve overall uptime.

continued

Nine tips for selecting multipacking and shrink-bundling equipment

8. Consider the ultimate environment and display. If a product is affected by temperature, case packing is preferable to shrink bundling. If product visibility is important, shrink packing is better, unless the product is affected by shrink-bundling pressure.

9. Flexible implications. Flexible materials are having an impact on multipacking. Certain flexible bags cannot be shrink-bundled because they are prone to distortion; they must be tight-wrapped. Otherwise the shrink bundle could be fused onto the primary packaging. ■

Alternatives to spiral stretch wrapping

Stretch wrapping is a popular method of unitizing cases or bags for shipment. However, it is not the only choice. Making the right choice of pallet packaging method involves a thorough analysis of many parameters that influence not only the daily operating costs, but also the entire distribution chain performance. Cost-effective alternatives can wring significant savings out of end-of-line operations. When product leaves the production facility, it is at its highest value-added state, and ideally should arrive at the customer's facility in the same condition. In addition to manual strapping and banding, here are some other automated or semi-automated alternatives to stretch wrapping worth considering:

Cohesive/adhesive spray

A water-based cohesive/adhesive is sprayed onto boxes or bags and keeps them in place without wrap, corner protectors, or tear sheets. The material exhibits very high shear strength, yet when pulled straight up, pieces easily come apart again. The ideal application for this approach is boxes or industrial bags for food, beverages, chemicals, and edible animal feed. Four reasons to consider this method over stretch wrap:

- Reduced materials costs, by getting rid of wrap, corners, and slip sheets.
- Sustainability: spray is organic and has no effect on recyclability of bags or boxes.

continued

Alternatives to spiral stretch wrapping

- Even packagers who must use stretch wrap, per the requirements of retail customers such as Walmart and Costco, can reduce their film use by up to 60% and add stability by spraying the pallet load first. Even with the added costs of the adhesive and applicator, the net overall spend is less, according to cohesive suppliers.

Stretch hooding

Introduced in the late 1980s, the stretch-hooding method of pallet packaging is suitable not only for bagged products, but also for products in bins, cases, pails, and other primary packaging formats. Domestically available coextruded stretch-hood films allows for prestretch percentages exceeding 80%, providing materially improved film yields than were possible even a few years ago. This performance, combined with film thickness reduction down to 1.6 mils, means that the per-pallet film cost with stretch hooding is extremely competitive with that of spiral stretch wrapping. Advantages include:

- The height of the pallet load is measured automatically as the pallet enters the machine, ensuring that only the amount of film required for the application is dispensed.

- Energy consumption is low since the film is not heated, and available servo-drive technology further reduces energy and maintenance costs, while helping to drop noise levels.

- For products sold at retail outlets, such as home centers, the clear, one-layer stretch-hood film provides much better product recognition at point-of-sale than multilayer

continued

Alternatives to spiral stretch wrapping

spiral stretch-wrap film does. It is also possible to print advertising or handling instructions on the film.

- Stretch hood film allows for easy bar-code scanning, virtually eliminating misreads.
- Stretch hood film consistently maintains its tension, and is particularly well suited to products that, due to their physical properties, tend to settle after being bagged and palletized.
- Stretch hooding represents the least labor-intensive method of pallet packaging. The film roll can be up to 39 in. in diameter, allowing for 10 times-longer film-change intervals. The film roll is handled by forklift, but the roll change is a very simple procedure, typically taking no more than 10 minutes.
- Stretch hooding provides tamper-evidence. It is impossible to remove an item from the pallet without destroying the film. This means that it can

continued

Alternatives to spiral stretch wrapping

easily be established if the pallet load has been tampered with.

- Stretch-hood film is fully recyclable.
- Stretch hooding works well for irregularly shaped pallet loads as opposed to stretch wrapping where the top sheet can be displaced or slide off during conveying or wrapping.

Shrink hooding

A space-saving, compact shrink-wrap machine combines hood application and shrinkage in one operation, and can package up to 100 pallets per hour. The machine head can be lowered to ground level, simplifying maintenance. Pallet-sized systems feature pallets or single products passing through a film curtain, which packages different pallet or product formats at up to 130 pallets, or 400 product pieces (domestic appliances, for example), respectively, per hour. Advantages include:

continued

Alternatives to spiral stretch wrapping

- Low energy consumption and great packaging flexibility in pallet shrink wrapping.
- Recent improvements all but eliminate fusing of the shrink film to the PE-packed product beneath it, as well as creasing of the film.
- Available undershrink system adapts itself automatically to the pallet contour in order to ensure secure freeing of the pallet. The undershrink is carried out well under the runners of the pallet—an essential precondition for optimum load stability and the use of thin film.
- Surface of the film after shrinking is high quality, permitting an optimum display. Bar codes under the film can be read without any problem.

continued
Alternatives to spiral stretch wrapping

Pallet choices for packagers

As the National Wooden Pallet and Container Association states, "Pallets move the world." Pallets, particularly wooden pallets, are the basic units used to transport goods throughout the country. More than 600 million pallets are manufactured in the U.S. every year. Approximately 90% of those manufactured were wooden pallets, while the remaining 10% were manufactured from corrugated paperboard, metal, or plastic. During the past two decades, both timber prices and landfill fees have increased and have compelled businesses to modify the way pallets are managed.

Pallets made from plastic, metal, or composite materials are a long-lasting alternative to wooden pallets. All three materials are durable, reusable, easy to clean, and recyclable. Despite higher initial costs, these pallets save money in the long run. According to the Purdue University AGVS Research Group, the average life of these pallets is 100 trips, where one trip is defined as five handlings. These pallets usually meet both USDA and FDA standards for pharmaceutical, chemical, grocery, and food processing operations as they can be sanitized and steam-cleaned. They also exhibit low breakage rates and work well with automated material handling systems. Product damage is lowered, and employee safety is increased when using these pallets, because they have no nails, staples, or broken boards.

Plastic, composite, and metal pallets are best used in a closed-loop or slave system where shipping is restricted to moving goods within or between specified plants and facilities. Closed-loop systems operate best under one or more of the following conditions: short-

continued

Alternatives to spiral stretch wrapping

distance shipments, frequent deliveries to the same customer, delivery to a limited number of customers, and/or delivering with company-owned vehicles.

Plastic pallets are created in three general forms. Plastic lumber pallets resemble the wooden pallet with the exception that the boards are made from extruded plastic. Structural foam and thermoformed pallets are distinctive in their style, as they are one solid piece of plastic. These pallets have no nails, screws, or staples, thus reducing product damage and employee injuries. They often offer a grooved deck, a raised lip on the outer edges, and hollow feet that provide nesting of pallets to save storage space. Plastic pallet manufacturers are still trying to create a truly rackable structural-foam or thermoformed pallet. Heat and weight have proven a detriment to these types of pallets because they bend under open racking conditions.

Composite pallets, as their name states, are made of two or more distinct materials. Some are made from a combination of plastics, while others are extrusions of sawdust, wood shavings, and recycled plastics. Composite pallets are fairly new to the pallet industry. They have high loading capacities and racking ability like wooden pallets, but are easily cleaned like plastic pallets.

Metal pallets generally are made of aluminum or stainless steel. They are most often used as slave pallets, which do not leave a facility. Metal pallets are the strongest and most durable pallets on the market. They usually are heavier than their wooden counterparts and have a much higher initial cost. Metal pallets are most often used in a manufacturing setting where a pallet is needed to withhold heavy racking weights, high temperatures, the rigors of conveyor systems, and cleanliness standards set by the FDA and USDA.

continued

Alternatives to spiral stretch wrapping

Corrugated paperboard pallets

Approximately 4% of manufactured pallets are made from corrugated paper or pressed wood composites. Reasons for using corrugated pallets include light weight, ease of disposal (corrugated board recycling stream), and strength. Some corrugated pallets boast static load capacities as heavy as 30,000 lb (at 70° F and 50% relative humidity). Corrugated pallets are also able to meet the special dimensions and disposal needs for shipping goods to Europe. Some European customers request corrugated pallets because they can be recycled with corrugated boxes. For those interested in completing the loop and buying recycled, corrugated pallets are typically manufactured from recycled paper.

This information was excerpted from the Arkansas Department of Environmental Quality's Pallet Management Fact Sheet, available as a PDF here.

Download Software

Quick Pallet Maker software

Quick Pallet Maker is a pallet loading/package design software application that allows the user to calculate the optimal secondary package dimensions and pallet arrangements, thus reducing shipping costs. The user enters primary package or box dimensions and rapidly assembles optimal pallet and container configurations that can be viewed with easy-to-understand graphics. Read more: http://cnet.co/13RS2Oi

What to look for when selecting palletizing equipment

Here are some tips and trends to consider when choosing palletizing equipment:

1. Look for more hybrid solutions and simultaneous operations. The effort to reduce secondary packaging is accelerating, which is having a significant impact on the design of palletizing equipment. The trend is driving hybrid palletizing solutions involving both conventional and robotics technology. Simultaneous operations are also becoming more prevalent, such as palletizing and stretch wrapping in a single integrated piece of equipment. Increasing numbers of package applications are better suited to fully automated equipment; thus, the need for package handling flexibility involving quick "tool-less" or fully automated technology.

2. Weigh total cost of ownership and future needs. ROI tends to favor conventional palletizers at very low and very high speeds. Despite varying opinions, proponents of robotics claim to handle a wider range of SKUs and package types, and cite applications involving more than 60 cases (or multipacks, etc.) per minute. Beyond speed and costs, consider your application. For example, when one bottler's conventional palletizer was damaging lightweighted bottled-water multipacks, the company chose robotics for gentle handling and newfound sustainability cost savings.

continued

What to look for when selecting palletizing equipment

3. Don't forget about safety when updating palletizing technology. Safety systems are having a huge impact on the design of equipment today, with an ever-increasing importance placed on the use of safety-rated devices such as PLCs, VFDs, and automatic air dumps. Some palletizing equipment is pretty wide, and must be cordoned off. Adhere to all safety procedures. Establish strict protocols to make sure safety is not compromised.

4. Consumer-level developments and graphics technology may affect your machine decisions. Warehouse stores are driving more display-type pallet loads and cases. In turn, this drives the need for graphics-out palletizing, often requiring the placement of tier sheets between layers and corner boards to improve load integrity and warehouse stackability. It may also require you to think about hooding versus stretch wrapping—a single layer of hood film will show off graphics and bar codes more easily.

5. The growing use of shrink film impacts palletizing flexibility. Shrink-wrapped loads often require different handling methods within the machinery, compared to corrugated cases or paperboard packages. In addition, both very small and large pack sizes create the need for greater flexibility. This explosion in SKUs has resulted in frequent production line changeovers and further highlights the importance of versatility.

6. As the costs of complex equipment rise, careful budgeting is even more important. Newer, lighter-weight packages with little or no secondary materials, combined with the need for greater flexibility and automated changeover are driving up the cost and complexity of palletizing equipment. It is also resulting in an accelerated use of robotics technology. Be sure to consider all bottom-line costs before purchasing equipment;

continued

What to look for when selecting palletizing equipment

assess if the investment proves its worth in empowering you to handle higher-quantity outputs and lower per-pack weights.

7. Make sure to look at machine builder risk assessments. Machine builder risk assessments are supposed to be available to end users, but palletizing equipment purchasers are not necessarily aware of them. Ask the machine builder for the risk assessment, or at the very least, the information that the machine builders must disclose to OSHA.

8. Consider slip sheets for pallet stability. With new technologies, it becomes very complex to add slip sheets or tier sheets later. Think about how you supply slips or tiers to a palletizer; if those sheets aren't straight, a robot may not know that, and the placement might be incorrect.

continued

What to look for when selecting palletizing equipment

9. Machine controls should meet site norms and existing controls standards. Keep your controls constant and up to standards on all equipment. With the increase in globalized manufacturing, you often need to meet international standards, and you should always have independent testing done to make sure your potential palletizing equipment is in compliance. ■

Trends in robotics for the packaging line

Here are some of the latest trends in robotics for packaging:

1. Sanitary design. Certain robots have recently been approved by the U.S. Department of Agriculture (USDA) specifically for handling meat and poultry products. As meat and poultry processing is a messy business, these robots are now being built with sophisticated coatings, seals, and parts to withstand all the substances involved. Many improvements were made to pass the strict hygiene requirements, including the use of food-grade grease, manipulators engineered to be completely clean and smooth, hollow arms to keep all cabling and wiring protected, and joints constructed without crevices where mold or bacteria can build up. These attributes will also be important in complying with the Food Safety Modernization Act.

2. Flexibility due to more powerful controls. Today's robots use more powerful controllers that interface more easily to other equipment on your line. With this added power comes the ability to better respond to variations in packing and palletizing patterns demanded by different retailer customers.

3. Gentler handling with more precision. Because of lightweighting of materials, robotics suppliers have designed gentler-handling tools for more delicate packages, especially shrink film-covered multipacks. Handling is also more precise. Previously, a robot

continued

Trends in robotics for the packaging line

might have used a vacuum pack to pick up a box, whereas now it's more likely to use fork gripper or clamp for better control.

4. More robotic packaging choices. For building robotics into your packaging line, you now have more choices than ever before. There are machine builder suppliers that have incorporated robotics into their product lines, especially for end-of-line operations. There are robotics integrators ready to partner with you for custom solutions. In the not-too-distant past, integrators with automotive assembly experience were doing their best to adapt their knowledge to packaging operations. Now there are expert integrators whose specialty is packaging. The right integrator brings expertise in all the components of a robotic system, plus knowledge of your packaging line.

5. Increased safety. Robotics safety has improved, enabling people to work in closer proximity than ever before.

Best practices for specifying stretch-wrapping equipment

Here are some tips and considerations to keep in mind when shopping for stretch-wrapping equipment:

1. Determine the optimum force needed. Primary packaging is being drastically lightweighted to control costs and meet sustainability initiatives. This affects the ability of stretch-wrapping equipment to contain and unitize loads without crushing or damaging goods. Consider equipment that incorporates technology that ensures the use of the optimal containment on each load.

2. Understand how the equipment will impact freight and labor costs. In markets where competition means seeking advantage everywhere, companies need to control freight and labor costs. Some semi-automatic stretch wrappers enable operators to stay on fork trucks while wrapping their loads, saving time and labor while reducing safety risks. Cut transportation costs dramatically by simply weighing each load to ensure quality and gauge freight. Integrated scales allow operators to wrap and weigh loads simultaneously.

3. Know the speed at which you want the equipment to run. High-speed equipment isn't as expensive, comparatively, as you might think. Buy flexibility to accommodate future needs.

continued

Best practices for specifying stretch-wrapping equipment

4. Consider greater integration. Pallet wrappers tend to be standalone pieces in a warehouse. Some suppliers are incorporating robotics technology into the wrapping process to move pallets to the pallet wrapper and ensure that the palletizers can communicate with automated guided vehicles (AGVs). Control systems need to be worked out if adopting a more sophisticated approach.

5. Always ensure safety. Make certain that stretch-wrapping equipment is safe; it can hurt personnel if not properly guarded or curtained.

6. Allocate budgets for beefier frames and more robust machinery. Ensure that conveying systems associated with the stretch wrapper are as robust as possible. If someone hits a 3,000-lb machine with a fork truck, the fork truck is going to win. Don't forget the human factor; fork-truck drivers are rarely Mario Andrettis, or the gentlest people in a factory. Machines need to withstand the abuse personnel will subject them to, wittingly or unwittingly.

7. Weigh the imperative to automate. Hand wrapping is the biggest culprit for using too much film. If you're wrapping by hand, you can easily compare stretch-film costs by performing a simple cut-and-weigh test on a typical load. Take a hand-wrapped load, cut off the film, and weigh it. Then compare that number to the amount of film applied by a machine. If you're using too much film, it's simple to calculate the payback time period on the machine based on the film savings alone. ■

A resource you should know about: GS1

GS1 US (www.gs1us.org) administers the GS1 System of bar-code standards, provides education and support, and connects communities interested in supply chain standards through events and online forums. The organization is neutral and not-for-profit. GS1 Standards provide premier industry resources to help users create, and make the best use of, bar codes and the technical management of bar-code systems.

Here is just a sample of the resources that are available on the Web site:

Data Driver. Data Driver is an online tool for creating, managing, and printing bar codes. It takes users through step-by-step instructions so they can create accurate bar codes for all packaging levels. No technical knowledge is required. http://bit.ly/13nXKkR

Check Digit Calculator. If you need to calculate a check digit for your GS1 Identification Numbers (GTIN-12, GTIN-13, GTIN-14, SSCC, Global Shipment ID/Bill of Lading, etc.), you need the Check Digit Calculator: http://bit.ly/WZwhab

GLN Registry for Healthcare. The GLN Registry for Healthcare offers a comprehensive list of healthcare and healthcare-related facilities in the U.S. with corresponding Global Location Numbers (GLNs). Using the GS1 GLN and the GLN Registry to standardize location identification ensures that the right product arrives at the right place at the right time, facilitates efficient

continued

A resource you should know about: GS1

business practices, and drives down supply chain costs. Click here to log in to the GLN Registry: http://bit.ly/WZwpGB

Rapid Recall Exchange. The Rapid Recall Exchange® is an online solution that applies industry expertise and best practices to standardize product recall and withdrawal notifications between retailers/wholesalers and suppliers. Rapid Recall Exchange takes advantage of global GS1 Standards to ensure accuracy and enhance speed of recalls, enabling prompt and accurate exchange of information. Click on http://bit.ly/Vz2vYI for more information.

GEPIR. Need to find a company linked to a GS1 US bar-code number? Then you need GEPIR (Global Electronic Party Information Registry) http://bit.ly/13o00c2, a unique, Internet-based service that gives access to basic contact information for companies that are members of GS1. These member companies use GS1's globally unique numbering system to identify their products, physical locations, or shipments. By simply typing a product bar-code number into GEPIR, anyone can find the owner of that bar code's contact information.

EPC Adoption Roadmap. GS1 US is your EPC/RFID implementation readiness partner, here to help you develop and execute a successful EPC/RFID Implementation Program for your organization. Whether you are tagging products on a pallet, case, and/or the actual selling unit, the EPC/RFID Adoption Roadmap is the guide you need, outlining the activities necessary for a successful deployment. Click http://bit.ly/ZkD50D to get started with the EPC/RFID Adoption Roadmap.

Barcode Verification Services. If you have created bar codes with GS1 US, you want to ensure that they scan the first time, every time. GS1 US tests determine if your bar codes comply with

continued

A resource you should know about: GS1

GS1 Standards, and check each bar-code symbol on a variety of point-of-sale scanners. GS1 US will only verify bar codes that encode numbers created with GS1 US-issued company prefixes. GS1 US tests the bar code for compliance to the GS1 Standards through a verification process and the GS1 General Specifications. This method assesses size, color, print quality, and quiet zones. GS1 US also assesses bar-code height, location/placement of the bar code, and the correct calculation of the check digit. To download the necessary form, click http://bit.ly/13o1gvC. ■

Ten financial justifications for new equipment

BY PAUL ZEPF

Financial justifications for new equipment come in two varieties: hard and soft. Focus on the hard justifications, which will require you to provide data to demonstrate a return on investment. Then back it up with additional soft justifications for which you don't have data but which support clear benefits. For example, you may be able to provide three hard justifications that will generate more than $590,000 in savings over a three-year period. Then you may be able to pick out seven other soft justifications for which you can't produce data.

You should never try to justify a project solely on soft justifications—at most companies, there are too many accountants who will require hard justifications. Be sure to include cost avoidance, not just cost savings, in your justifications.

1. Reduction/elimination of excessive maintenance costs. Even if you track the cost of breakdowns, repairs, and maintenance to keep an older machine going, the math sometimes doesn't justify a replacement machine. The key in looking at maintenance costs is to take a take holistic view of costs over the life cycle of a given machine. And maintenance costs, including costs of spares, vary widely in given applications and given environments.

2. More sales due to more uptime. You can only realistically use this justification if you're selling 100% of what you make, you're maxed out in shifts, and if it's indisputable that any marginal additional amount you can produce also will be sold.

continued

Ten financial justifications for new equipment

3. Reduced work periods, shifts, and overtime. This is tricky due to the nuances in separating fixed costs that you incur anyway (overhead, lighting, rent, etc.) from variable costs (hourly workers staffing the line). Also, by eliminating downtime you may not actually reap as much savings as you thought because you aren't necessarily going to send people home and save that money.

4. Full depreciation at the end of its useful life. At the end of the depreciation period, the justification is that you need a new machine to remain competitive. Some engineers have found more success with this justification versus relying on justifications related to downtime or maintenance costs.

5. Flexibility for the future. Financial justifications must acknowledge the fact that packaging itself now changes so frequently, it requires machinery that can satisfy not only the current project but package designs yet to be created. In other words, flexibility can be its own justification.

continued

Ten financial justifications for new equipment

6. Material savings. If you switch to a machine that will enable the running of a different or thinner material, the material savings can partially justify the investment in new equipment. You must be able to support this with in-depth analysis of potential efficiencies.

7. Less rework. This has associated costs in labor, space, scrap, and material disposal, and the time lost to produce product that needs rework versus producing good product the first time.

8. Keep scope in check. Scope creep can render all prior financial justifications useless. Ensure that critical success factors are fully vetted during the financial justification process.

9. Take the long view. Once financial justification is agreed upon, it needs to be held accountable. Often projects are justified, but a year later, it's discovered that the goals were never achieved. From scrap reduction to labor

continued

Ten financial justifications for new equipment

savings or whatever the anticipated objective was, you need to ensure those dollars come to fruition.

10. Total cost of ownership (TCO). The topic of TCO is among the most provocative of any in this Playbook. Some CPGs swear by it, some swear at it, and some use it as part of a process. "TCO is a great concept that doesn't get implemented well probably 80% of the time," says one CPG engineer. While it's easy to quantify acquisition and installation costs, it's a different story when it comes to maintenance or sustainability. The fact that there's no standard, accepted metrics for these can make true TCO difficult. Another CPG engineer provides a contrarian view of any attempt at estimating a TCO up front: "You can make up whatever kind of number you want on a new machine; it's crap on top of BS, it's all based on assumptions. TCO only works after five years, when you look at an installed asset and compare it to an installed asset someplace else over the same time period."

Best practices for specifying packaging machinery

BY DAVID HOENIG

There are a number of basic best practices that should be observed when buying packaging machinery of any stripe:

1. Document and discuss your requirements. Every machine purchase should start with an in-depth user-specification requirement so that no gray areas can slow or stall the equipment-building process. CPGs sometimes neglect to spend time conferring with suppliers on certain critical functionality aspects, and sometimes such aspects don't necessarily make it into the specs. Not only is it a good idea to document all of the details, but it's also crucial to follow up with frequent teleconferences and checks. Some experts believe it's important to project-manage the supplier and machine buildout, going so far as to get dates and the names of the people on the supplier's staff who are responsible for hitting those dates.

2. Get operators and technicians involved early on. Cross-functional teams are often composed of employees who are too far removed from the production floor. While the executives will, and should, eventually make the call on a specific machine, the input from the operators, technicians, and mechanics (as well as the container, film, or material suppliers) can prevent missteps resulting in having to refabricate parts halfway through a project. One technique to involve line-level personnel is to hang the blueprints up in the break room for weeks before you actually purchase equipment for a brand new line. The operators can

continued

Best practices for specifying packaging machinery

take ownership, be involved, and make notes right on the blueprints—and their specific knowledge of the floor space can be extremely insightful, and not readily apparent to someone who doesn't spend eight hours a day there.

3. Flexibility of equipment for other applications. Don't assume you're developing requirements just for one particular package. Marketing will most likely come knocking a year later with a request to go to a different package size. All of your assumptions in the beginning are no longer valid, and suddenly, your equipment has limited capabilities. You'll be at fault because you didn't think about what's coming next. People put in high-speed lines that are not flexible enough to change: Suppose a consumer unit changes from a 12-pack to a six-pack; somehow you need to get more throughput to makes sixes or fours in the same machine, so you need to use more foresight when specifying equipment.

continued

Best practices for specifying packaging machinery

4. Don't just replicate what you've done before. Doing so may be easier, more comfortable, and less risky, but you won't be exposing yourself to new technologies and new vendors that may give your package and operation significant cost and time-to-shelf advantages. But, especially if it's a new piece of machinery, something you never had before, make sure maintenance has all the documentation they need.

5. Don't fall in love with technology. The machinery you specify ultimately depends on what the product is: Leave your engineer's hat behind and think like a businessperson. If you specify machinery purely as an engineer, you may be prone to fall in love with a cool technology. But if you think like a businessperson, you'll find the right tool for the problem. And that's not necessarily the cheapest machine, but the one that works best for your product. The idea that one piece of machinery is "good enough" because it comes with a lower price tag, or an extremely lower price tag, can really create problems.

continued

Best practices for specifying packaging machinery

By trying to save money up front, you end up spending more due to machine downtime, poor support and parts availability, poor accuracies, material waste (product and packaging materials), and so on. Buy the equipment that is right for your product.

6. Determine speed requirements. This really breaks down into multiple components — throughput (nominal, jog, surge) as well as the conveyor speed. Devise two speed requirements: the speed required to produce enough product for the initial launch, as well as the speed required for ongoing production. The overall strategy in approaching this is the balance between short and long term. Try to build in excess capacity (15% is a rule of thumb) for future growth.

Specifying speed requirements for machines can be dicey and is subject to many conflicting opinions. If the first machine should run X, and the next runs 15% more, the next runs 15% more, by the time you're at the end of the line, that machine is really running more than twice as fast

continued

Best practices for specifying packaging machinery

as it needs to. And vendors tend to overstate what the machine can do. If a machine is supposed to run 30 cases a minute, it may actually run 26 really well. So the machine becomes a bottleneck at 30. If you need 30, consider designing it for 35. Running a machine slightly less than what it's designed for usually yields consistent and reliable operation.

7. Put cost in proper perspective. When initially canvassing vendors, don't eliminate a machine based on cost. One manufacturer's price may include more options relative to the other manufacturer's. Also, don't automatically choose the lowest-cost machine, because you may pay an additional price later on in reliability. Initial cost pales into insignificance when you consider all these other questions: How willing and able are they to customize the machine to your needs? Every plant is different, can they adjust to that? Do you have dirty air, flour everywhere; can they adjust to your system, your environment? How willing are they to do that? In short, many experts feel that buying

continued

Best practices for specifying packaging machinery

machines on price is a bad idea; it's an important criterion, but it is not even in the top five. You may end up spending more money in the long run modifying an inexpensive machine or getting it to work for your application.

8. Conduct ongoing risk assessments. An underutilized best practice is to revise your risk assessment throughout the project, perhaps on a monthly basis. The act of continually questioning where things might go wrong may not avert every problem. But having thought through potential pitfalls and having contingency plans in place better prepares you for when problems do crop up.

9. Don't skimp on training. Consider sending production people to the vendor's factory for in-depth equipment and safety training, during or even separate from the Factory Acceptance Test. Not only does it pay off in the end, but it can also provide the equipment manufacturer with more feedback to design better equipment and operator interfaces. It's also critical to schedule follow-up training, either to reinforce certain

continued

Best practices for specifying packaging machinery

things after the equipment has been running for a time or to address issues that have cropped up. Be sure to specify both types of training as part of your requirements. It's key to have trainers with real-world, in-plant experience. The best training curriculum includes a combination of both classroom and on-floor tutorials.

10. Plan for spare parts. Make sure that your specifications include the identification of common wear parts and that your vendor guarantees their ability to stock them in-house.

11. Pay attention to service contracts. Also be sure to establish good preventive maintenance practices and schedules to minimize downtime.

12. Don't force the vendor into a corner. Do not make the vendor promise something they can't deliver. Some vendors are tempted, even with the best of intentions, to agree to conditions that both parties know aren't realistic. It only sets up both parties for failure down the road.

12. Consider outsourcing versus in-house. You don't have to install a production line for every new product, particularly if the longevity of that product is far from clear. Ask whether someone else—a contract packager—can do this project better, or cheaper, than you, saving you the capital investment. Other considerations are whether the launch window is extremely tight, or whether this project makes the best use of existing plant space that might be better used for another project. ▪

Vendor evaluation methodology for packaging equipment

BY PAUL ZEPF

When evaluating packaging machinery suppliers, it's important to follow a disciplined methodology to eliminate as much subjectivity as possible. What follows is an Intermediate Vendor Evaluation Analysis methodology that is well-suited to critical packaging machines such as fillers, labelers, case packers, etc. Broadly, the process breaks down into four phases:

1. Canvass the field. Before you put together your Request for Quote (RFQ) document, take some time to broadly canvass the field of suppliers and look at options, getting a rough idea of prices and capabilities. A simple checklist of requirements will suffice at this stage. You're just looking for a rough guide—don't hold them to it without furnishing a formal RFQ.

2. Write your requirements document and RFQ. Put together a detailed requirements document of what the project will require, and use that as the basis for the RFQ. It's critical to have everyone on your cross-functional team review the RFQ before it goes out to the vendor, to ensure that it addresses areas important to each team member.

3. Issue the RFQ. You'll want to issue your RFQ to ideally three, but no more than six, packaging suppliers. With the responses you get back, rate them using the Intermediate Vendor Evaluation Analysis spreadsheet tool (see download link, next page).

continued

Vendor evaluation methodology for packaging equipment

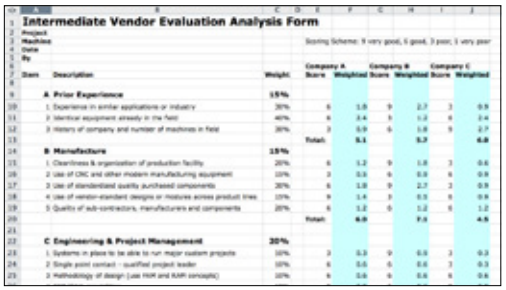
4. Conduct the Intermediate Vendor Evaluation Analysis. When you get quotes back from vendors, rate their responses and plug them into the Intermediate Vendor Evaluation Analysis spreadsheet. Make sure your entire cross-functional team's input goes into the scoring procedure! This can be achieved either by everyone sitting around a table and achieving a group consensus score-by-score, or by having each team member score the vendor quotes separately, and then compare results—whichever works best for your team. This team scoring approach is especially critical if the machine or technology is a first-time buy.

The Intermediate Vendor Evaluation Analysis spreadsheet tool separates the assessment of the machine builder from the machine. The tool rates each vendor across seven key areas, including prior experience, manufacturing capability, engineering and project management, company management, support, delivery, and references.

Use the bottom tab to select a second worksheet that allows the rating of the actual machine itself across nine key areas, including technical risk assessment, throughput, reliability and maintenance, changeover, machine design, ergonomics, operator interface, safety, and cost. You can alter any of criteria within these sections to be more specific to your company or to the type of machine that you are evaluating.

To mitigate against the tendency of giving a middle-of-the-road "5" score to ambiguous criteria, restrict your scores to a 1, 3, 6, or 9 (on a hypothetical scale of 1 to 10, where 10 is best). This will force out a differentiation. If you don't have prior experience with the vendor, it helps to speak to the vendor's other customers who have similar products, and use that as the basis for your scores. ■

Download Spreadsheet


Intermediate Vendor Evaluation Analysis Form

Intermediate Vendor Evaluation Analysis
http://bit.ly/intermediate-vea

Tips on finding the right equipment supplier

When choosing an equipment supplier, be well aware that you're not just buying a piece of machinery to accomplish a certain task. If the machine is an integral part of your line, you're entering into a relationship that is more akin to a marriage. Here are a few things to consider:

1. Be transparent and consistent. Suppliers can only quote solutions based on what you've told them. If you're not consistent with the information you provide to suppliers, you're not getting apples-to-apples comparisons. Try to avoid keeping small pieces of information from certain suppliers just because they seem inconsequential. Often, they can be quite the opposite.

2. Look for industry-specific experience. A company whose strength is in snack packaging may not be the wisest choice for a frozen entrée application. Manufacturers often build areas of strategic expertise around certain industries and applications. Request customer references for applications in your industry.

3. Don't make assumptions based on past history. Don't automatically eliminate a supplier because of a supposedly poor reputation or a bad experience from long ago. Conversely, don't skip customer reference checks from a supplier with a supposedly good reputation. Things change all the time, and companies that provided bad service years ago may provide good service today, and vice-versa.

continued

Tips on finding the right equipment supplier

4. Get out of the office and look around. It's vitally important to go out and look at different machines in person—whether at the supplier's plant or another customer's operation. For some packagers, there seems to be an overreliance on equipment suppliers to make the case for their machines. A supplier salesperson can visit your site many times before you learn what's possible from one visit to a machine supplier's factory. If a trip to the supplier's factory isn't worth it, it's likely not a good fit. Most importantly, when dealing with vendors, consultants, packaging distributors, and other end users, remember this: No question is a dumb question.

5. Learn the supplier's processes. As you will likely be entering into a long relationship with your vendor, you need to know how they act or react in a given situation, from sale to delivery, from testing to implementation, and from training to support. Although all of these processes can be stipulated in the contract, it's really a good idea to see how the vendor normally carries out such processes. If you force a supplier into agreeing to something they don't normally do, it

continued

Tips on finding the right equipment supplier

stands to reason that they may have some problems fulfilling that obligation. Look at service: Do they have service in the country you're in; in the continent you're in? Do they have a 24/7/365 support line? How soon can they get to you? What's their guaranteed time to get a mechanic to you? Things break, screws fall out all the time, the world is an imperfect place; how willing are they to help you with the machine when it inevitably breaks? Finally, try to choose vendors with qualified service technicians stationed close by. Paying travel and accommodation expenses for "factory-trained" service reps isn't a bargain. Companies without good transparent processes leave you open to mistakes; look closely at every detail of the proposed relationship. Knowledge of processes can also give you a leg up on risk analysis and mitigation of issues that may arise.

6. What kind of relationships do they have with other vendors? As it's unlikely you'll be equipping an entire line with machines from one vendor, it's important to know how they conduct themselves when they need to integrate with disparate machines both

continued

Tips on finding the right equipment supplier

upstream and downstream. Is the supplier interested in trying to understand your process? What happens downstream of their machine? If you're looking at robotic machinery, look at the vendor's capability and experience in integrating robotics.

7. Can they take on integration? If you're looking to purchase some major pieces of machinery, maybe you'd like to completely outsource integration issues to one of the equipment suppliers—without hiring an integrator. If you can find a supplier that meets all of your other criteria, assess whether that supplier can also serve as a single integrator with full accountability.

8. Involve operators and maintenance techs. Many experts on both sides of the table believe there is not enough involvement of people actually running the equipment in the buying decision, and that purchases are made at too high of a level. Maintenance people and production people need to contribute a clear set of expectations. Get firsthand feedback from operators, the people on the line, because the operations teams are solving

continued

Tips on finding the right equipment supplier

whatever problems your existing machines have day after day. Conduct a project kickoff meeting with personnel, including engineering, operations, tooling, and control teams, to clearly define what will and won't work in your factory. It could be valuable to involve human resource personnel in the kickoff meeting, as they might have specific insight into the technical knowledge of a given workforce in a given plant. The best machine in the world won't work at all if your operators lack the skill set required to use it!

9. Pay attention to machine construction details. When you're looking at machines, take a hard look at machine construction details such as finish, platings, welds and general durability. You know the conditions in your plant better than any supplier ever could. Does the construction of their machines look like it would stand up to your environment?

10. Assess flexibility. How willing and able are they to customize the machines to your needs? Every plant is different—can they adjust to that?

continued

Tips on finding the right equipment supplier

11. Find out how they react when the chips are down. When things go well, everyone slaps one another on the back. But when a project runs into trouble, you don't want suppliers pointing fingers at one another. Though you may not get it, try asking for a customer reference on a difficult install to learn what the supplier has done to make it right.

12. Clearly define and communicate your critical success factors. And if a supplier is unwilling to agree to those factors, it may be time to walk away. Setting milestones for schedule and revision is key; highlight your management's expectations and cost schedule. Is the supplier amenable to these factors? Work closely with the application engineers in the project management group, throughout the entire process. Too often communication dries up after the initial purchase is made. Figure out exactly what you need from an overall system, and communicate that. Is the supplier willing to engage in open communication, with weekly status meetings? It's important that you have clear objectives of

continued

Tips on finding the right equipment supplier

what you want to accomplish, that you communicate those objectives, and that you have qualified personnel on hand at installation. Make sure it's clear that you're only prepared to accept the equipment in the manner that it was specified. You also have the responsibility to deliver information about variations in your product or process to the supplier, before you actually receive the new equipment, so that the supplier can determine any changes that might need to be made.

13. Commitment to support during start-up. Vendors must commit to being present as long as it takes to install the line successfully. This requirement must be clearly defined in the specifications. Whatever and whenever your start-up is, if you've defined it, and the vendor has signed off on it, the vendor must honor that commitment. ■

Roadmap for a successful Factory Acceptance Test

BY PAUL ZEPF

Factory Acceptance Tests (FATs) are a key milestone in any new capital equipment project. With proper focus, detail, and team participation, a successful FAT can be the difference between a successful vertical start-up and frustration as the plant struggles for days or even weeks. Consider the following tips as a roadmap to a successful Factory Acceptance Test:

1. Provide a detailed test plan. The FAT is the time to discover failures or issues, determine reliability, verify efficiencies, and explore how the machine should handle failures. The test plan should be prepared up front and submitted to the supplier as part of the Request for Quote (RFQ). The machine will not perform as expected if the criteria aren't specified; neither will performance be competently assessed. Clearly state in the contract all the responsibilities, accountabilities, and deliverables, in a measurable way. These must be quantifiable and agreed upon to eliminate finger-pointing. Doing so makes it easier for all parties by eliminating second-guessing. Specify how long the machine should be dry-cycled; 24 hours minimum is recommended. Specify how many packages should be produced and at what speed. Specify disposal plans for finished packages. Although you'll pay for the FAT, most equipment suppliers will agree to a provision that if the machine fails, any subsequent test is free. Having a detailed test plan will help ensure that you don't shortchange the FAT. Performing a brief, shallow FAT will inevitably show up as a problem in the third shift, nine months down the road.

continued

Roadmap for a successful Factory Acceptance Test

2. Push the envelope, but use the right materials as well. In the FAT, use the materials that will be put in operation during actual production. Not using them may compromise test validity. You can stretch the system with noncompliant materials and processes to better understand operational flexibility (wildcard testing), but the most important results will be those gleaned from using the materials you actually employ in your process.

3. Engage the operators and technicians. Focus on the personnel who will ultimately be responsible for running the machines, those who "own the line." Sending engineers isn't sufficient; the operators will see what makes the most sense on the line. The people who will run the equipment daily are uniquely qualified to make observations beyond the specifications and recognize issues or flaws prior to delivery. Additionally, the ownership aspect is invaluable, as the best technology going into a plant is not going to work if the operators are not comfortable with it, or have no faith in it. Enaging the production team early in the process is one of the most

continued

Roadmap for a successful Factory Acceptance Test

important aspects of new equipment design. The FAT provides a structured and empowering opportunity. Do not miss this one!

4. Be smart about training. If training is provided as part of the FAT, make sure the people being trained are those who will run the line, not the engineers. Train and educate the right people.

5. Create and follow a detailed "failure script." Make an inventory of the type of failures that you've experienced or might experience in production, as well as expected outcomes. Use this checklist to fully assess machine performance during the FAT. Machines have a natural backup curve that is all about early failures. Running, even dry running, is very critical; you can find leakage, electronic failures, and more, and then make sensible engineering changes. You can't reap the benefits of testing if you don't do the testing. Changes made at the FAT stage are the least-expensive ones; many times you don't even pay for them.

continued

Roadmap for a successful Factory Acceptance Test

6. Test parts replacement and changeover procedures. Test how long it takes to replace the most common wear parts. Determine how to remove a defective part and document the process in an easy-to-use format such as a One Point Lesson (OPL). Using your technicians and operators at the FAT, practice changeovers, and start-up and shut-down protocols. See where the users encounter difficulty and elicit their input and ideas. Leverage the opportunity to modify the equipment, standardize the procedures, and document in an OPL format with numerous pictures.

7. Check safety with a keen eye. Complete a review of the equipment from a safety perspective. Look for poorly guarded areas and pinch points. Run your hands across the machine (carefully), looking for sharp edges and burrs. Test to ensure all limit switches and emergency stops are fully functional, robust, and appropriately placed. Test for flaws in all built in safety components. Are there any safety options missing? Is making the machine LOTO (Lockout/Tagout) easy, or are there unexpected sources of energy that could cause injury? (Lockout/Tagout refers to the act of disabling all sources of energy such as electricity and compressed air while physically locking down the machine so that it doesn't cause injury due to movement while the machine is being worked on.)

8. Take your time. Take your time on the FAT, especially with highly customized machines. Why would you take a million-dollar project and squeeze the FAT into a six-hour window? Don't worry about relatively small expenses. Some testing will be more challenging than others. For example, high-speed testing can be difficult due to the sheer volume of product needed for the test. Never trade away adequate factory testing to meet a shipping deadline. You will ultimately pay the price for this in longer start-ups and lost productivity at the factory.

continued

Roadmap for a successful Factory Acceptance Test

9. Get a good integrator. This is key. Tie into other equipment suppliers; test everything together. Sometimes it's worth the money to run everything together on the integrator's floor. It costs money, but saves it in the long run. Get as much of the peripheral equipment together on the same floor at the same time as soon as you can. Test as much as you can. You can never over-test equipment reliability and range of operation.

10. Work with your supplier, and your supplier will work with you. A successful FAT is in both parties' interest. Not all (or many) machinery suppliers have factories set up to perform a well-rounded FAT for customers. Some will build or mock up complete systems, but duplicating a customer's process can be very difficult and expensive. Suppliers may be able to prove to the end user that their machine can perform in the manner desired during pre-sales (or pre-PO) product-testing procedures. Once customers are satisfied that equipment can do what they want it to do, POs are issued. Increasingly, customers are simply looking for a video testimonial that the machine actually runs before it leaves the supplier's facility, in lieu of a FAT. That being said, savvy customers will continue to demand FATs and training in a supplier's facility before the machine ships. Some suppliers are expanding their facilities to include more FAT handling, in a private, secure environment, where strict confidentiality of all technologies is assured.

11. Know the difference between a Factory and Site Acceptance Test. One of the biggest areas of confusion surrounding the FAT is over whether it should simulate how the machine responds under actual factory conditions. In fact, that is the purpose of the Site Acceptance Test (SAT). In the machinery builder's plant, it may be difficult or even impossible to simulate both the production volume and the conditions of your product, especially for more than a few minutes. This is especially true if the product will be packed at

continued

Roadmap for a successful Factory Acceptance Test

a certain temperature, or has a certain consistency or rate of speed coming out of production. Much time, energy, and money has been spent in vain trying to address "failures" in the machine builder's plant, only to find that the machine works perfectly once in production at the customer's plant.

The purpose of the FAT is to verify the desired functionality of the machine. On acceptance of a FAT, you'll be looking for items such as:

- Completed FAT protocol
- Maintenance and users' manuals
- Easy-to-use training materials (OPLs, videos, etc.)
- Standard work procedures
- Standard maintenance procedures
- Recommended spare parts lists
- Certificates of compliance
- As-built technical drawings (electrical, mechanical, pneumatic, and process schemes)
- Materials certificates and data sheets

continued

Roadmap for a successful Factory Acceptance Test

- Main equipment data sheets
- Instruments calibration certificates
- Welding processes qualifications

The purpose of the SAT is to affirm that the machine runs your product to your specifications in its operating environment. Knowing the difference between a FAT and SAT can save you and the supplier time, money, and aggravation.

Ten tips for a successful packaging line start-up

Here are some useful tips for line installation and start-up:

1. Involve operators and production personnel from the get-go. While engineering and purchasing may seem to know everything about a project, production personnel have to live with the equipment on a daily basis. Get the production manager, line operators, and maintenance personnel involved as close as possible to the beginning of the project. (In the healthcare industries, it's also vitally important to involve quality and regulatory/compliance personnel early on as well.) Production people don't need to be at every meeting, but they should be at the critical ones. The more familiar they are with the equipment when it reaches the floor, the more likely the installation will go smoothly.

2. Don't be penny-wise and pound-foolish about the install. Engineers often think they can save the company money by installing the equipment themselves. However, having the supplier install its own equipment—or at the least, oversee installation according to its standards—will save you time now and money down the road. The supplier's technicians really should be present for the whole ramp-up curve; it's better to pay for three weeks of their time than to have them there for a day and then have the line go down for three weeks.

continued

Ten tips for a successful packaging line start-up

3. Use your best production people. Don't choose mediocre or unenthusiastic operators for something as important as a line start-up. Staff it with your best and brightest who can then teach the others. While the oldest staff members are likely to have the most experience, younger personnel may be more open to new technologies and more readily learn how to properly run and change over the equipment. This is especially important if the machines are brand-new technology for the plant, or are considered critical to ongoing operations.

4. Document what you learn from suppliers. Depending on the complexity of the equipment, it may be worthwhile to keep a supplier technician or technicians in your factory an extra few days. During that time, follow the technicians and learn everything you can to fill in any knowledge gaps among operators. Use all the tools at your disposal to capture this information, from shooting video to taking digital snapshots to simply writing notes. This information may prove invaluable over time.

continued

Ten tips for a successful packaging line start-up

5. Document last-minute changes to line layouts. Often during installation, adjustments are made to equipment positioning that deviate from the line layout drawings prepared at the beginning of the project. Take the time to go back and modify these drawings so that the final versions reflect the actual line as built. Down the road, you'll avoid lost time caused by a mismatch between what the drawing says and the reality on your floor.

6. Finish the punch list. During the line start-up, it's common to compile a punch list of minor adjustments and then never follow up once product is being successfully produced. Unfortunately, this can lead to problems down the road that impact product quality. Operators are less likely to bring these problems to anyone's attention because "it's always been done this way." The punch list should be reviewed and approved by engineering, production, and management, with ownership transferred from engineering to production in a formal sign-off procedure.

continued

Ten tips for a successful packaging line start-up

7. Don't forget spare parts. Things do fail during start-up. Remember to request a spare parts list and order the critical spares so they are delivered prior to the equipment arriving at your factory.

8. Get complete equipment documentation. Collect all the necessary equipment documentation and specifications such as mechanical and electrical schematics, equipment drawings ("as built"), and bill of materials.

9. Establish performance criteria. Linking a vendor payment to the equipment's performance at start-up can be a strong incentive for the vendor. As part of a formal acceptance test, consider an extended testing period, covering enough shifts (or even weeks) to really understand the machine's abilities and limitations. Consider extended warranty and service contracts, especially for mission-critical equipment. Be fair to the supplier, though, when demanding so much; don't delay tests, or introduce a product change or variation, without consideration of the supplier's time.

10. Consider pre-integrating the line off-site. Many packaging machinery engineering veterans insist it's worth the extra time and expense to integrate at an off-site facility, rather than doing it in your plant. Remember, once the machines are in production, the expectation is they'll be in production quickly. For this pre-integration, try to select the vendor with the furthest upstream machine that has the space for integration, or even at the company that builds the processing equipment. Often something breaks or fails during this critical period, and if a machine part needs to be redesigned, it can be done far more quickly at the machine builder's plant. It's not going to be done for free, and not everyone has the space to support it. Machine builders that do are well worth engaging. Some packagers

continued

Ten tips for a successful packaging line start-up

have even rented a warehouse near one of their machine builders and installed the complete line, wiring the machines together, bringing in air, integrating controls, etc. It adds cost and time to the schedule—typically two to three weeks—but weigh it against the cost and time impact of running really poorly for the first month.

11. Be realistic. Don't do too much too soon. Have a reasonable ramp-up curve. Many projects fail in hour number two because they're running at 100% too early.

Benefits of PackML and when to use it on your line

What is PackML?

PackML stands for the Packaging Machinery Language. It provides a standardized way to collect uniform data across machines, lines, shifts, plants, and business units. This uniformity is essential to productivity-enhancing initiatives such as Overall Equipment Effectiveness (OEE) analysis and to simplify MES functions. It is being incorporated into ISA 88, the standard that for nearly two decades has proven its viability in the process control world.

PackML:

- Standardizes commonly used machine modes, states, and tag names, plus a modular approach to machine control code. PackML does not impinge on a machine builder's intellectual property, it simply standardizes aspects of communication the way that Ethernet TCP/IP did for non-real-time networking.

- Benefits packagers who include it in their electrical specifications and requests for quotation. The greatest benefits come from integrating entire packaging lines so that individual machines, machine-to-machine communications, and line control and data acquisition are standardized.

continued

Benefits of PackML and when to use it on your line

- Makes it easier for end users to get consistent data out of machines on a packaging line from different OEMs with different control systems.

- Reduces the learning curve for plant personnel by providing a common look and feel. PackML is independent of the control system vendor or programming language in use. It integrates readily to business systems with OPC, and promotes standardized, flexible data sets.

- Makes the machine builder's initial investment reusable across machines, which reduces subsequent software development costs and time to market, while reducing the amount of customized code to test and thereby increasing reliability. It predefines machine interface, integration, and start-up. It also simplifies after-sale support.

When does it make the most sense to include PackML in your specification?

- When ordering a new packaging line

- When retrofitting an existing line

- When gathering production data for OEE or MES in a multivendor environment

- When implementing Six Sigma or lean manufacturing projects

continued

Benefits of PackML and when to use it on your line

Currently, the OMAC PackML committee has an initiative to document potential cost savings for implementing PackML simultaneously with best practices for software modularity.

TR 88.00.02 is the official ISA Technical Report that provides the PackML state models, modes, and tag names. But don't expect it to be called PackML. It's an international standard that can actually be applied to any discrete control process. The other half of the standard is in progress, called ISA 88.05, and it promotes modular control architectures.

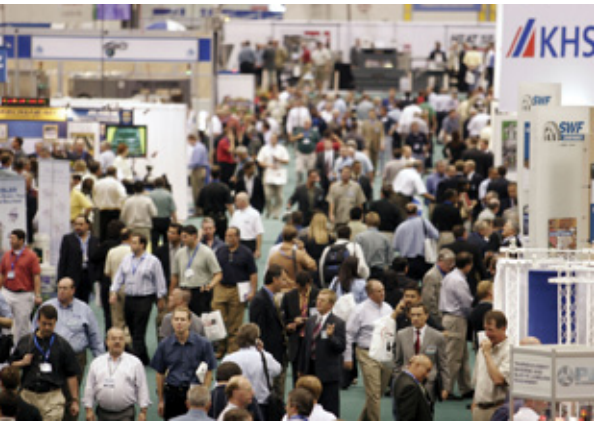
PackML state model demo
Download an interactive Excel demo that shows how the state model works.
http://bit.ly/packml-demo

PackML defined
In this Wikipedia entry, see some of the development history, objectives, and PackML functions.
http://bit.ly/packml-defined

PackML at Procter & Gamble
How P&G reprogrammed an unscrambler to be PackML-compliant.
http://bit.ly/packml-pg-unscrambler

Order the standard
TR 88.00.02 is the official ISA Technical Report that provides the PackML state models, modes, and tag names.
http://bit.ly/order-packml

Seven tips for comparing machines at a trade show



Packagers look forward to the industry's major trade shows as a chance to see what's new, and to shop for their next machinery purchase. You can make better use of these events by following a few tried-and-true tips. When the purchasing decision is made, you'll know that your team properly evaluated the alternatives.

1. Do your homework in advance. Major trade shows do a great job of getting the word out, weeks in advance, about who will be exhibiting, where booths are located, and even which machines will be on display in each booth. Take advantage of this advance information, and make plans to visit specific suppliers.

2. Choose a cross-functional team. Experienced packagers assemble a cross-functional team to attend a trade show so that different points of view can be combined. You should, at least, involve representatives from operations, R&D, engineering, purchasing, and marketing. Agree on a plan for covering the show, either as a team or in smaller groups that convene later to compare notes.

continued

Seven tips for comparing machines at a trade show

3. Agree on machine criteria. Everyone on the team needs an agreed-upon list of what criteria are important: Whether it's quick changeover, versatility, robust design, maximum speed, or a combination, make sure everyone is evaluating the machines on exhibit using the same criteria. Some experienced show-goers recommend tablet computers as a quick way to take photos and notes, record conversations, etc.

4. Set up appointments with the chosen suppliers. It's usually preferable to set up appointments with three to five different suppliers at the show. This will assure that supplier representatives make time for your team, take your questions, and are able to learn a little more about your operational needs. Experts say that five suppliers is usually the limit for a full evaluation at one trade show, but you may choose to collect info on more candidates and narrow them down later.

5. Back home, rate equipment using a competitive matrix. When everyone has returned from the show, you can begin the process of rating each of the suppliers according to whatever Competitive Matrix your company uses. Leave plenty of room for verbatim comments from team members that reflect their own areas of expertise.

6. Perform a financial stress test. As more American packagers purchase from multinational suppliers, it has become customary to ask for financial info as part of the evaluation process. This goes further than simply pulling a Dun & Bradstreet report. As a prospective customer, you are in a position to ask for financial information from the supplier's CFO or other top officer. Due diligence now may save headaches down the road.

continued

Seven tips for comparing machines at a trade show

7. Invite finalists to present at your facility.
Some veteran trade-show teams narrow the supplier list down to two or three finalists, and invite each of them to make a separate, more formal presentation at the packager's facility. This provides a chance for the prospective supplier to tailor the presentation to your company's specific needs. It also lets company representatives who did not go to the show have input.

Trade-show team members, numbering up to 60, from one large Midwestern CPG craft a Consolidated Report on both new and established suppliers, based on information gleaned at the show. This report is then uploaded onto the company's intranet so that everyone can access the gathered intelligence. Suppliers that pique interest from anywhere in the organization are invited to one of several "lunch and learn" sessions at headquarters, where they can talk about a specific machine, and take specific questions from the group. ■

How projects fail: 11 pitfalls to avoid

Packaging machinery projects fail for a number of reasons. Here are stumbling blocks to look out for:

1. Unrealistic expectations on both sides. Sometimes CPG companies set a higher level of performance, either to help justify the project internally, or to pad the number under the assumption that the machinery builder will fall short but still meet the actually desired speed. The machinery builder may feel pressure to commit to a performance requirement while suspecting—or knowing—it's an unreasonable goal. Both sides are now set up for failure and disappointment. Better to have a frank discussion over the real performance requirements and align expectations before the project starts.

2. Poor vendor/application fit. Most machinery building companies are founded or run by engineers, and most engineers have never met a problem they didn't think they could solve. Vendors that contract to build machines outside their core competence area, or that are simply too overloaded, may end up disappointing their CPG customer.

3. Poor or incomplete project scope. Don't ever assume that anything can be taken for granted; for example, that the supplier knows your upstream or downstream processes, or that they know the ambient temperature in your factory. Something that may seem obvious to you may be a surprise to the company building your machines.

continued

How projects fail: 11 pitfalls to avoid

4. Not adjusting the schedule for changes. Changes do happen, but projects get into hot water when the CPG company expects machinery vendors to accommodate changes without impacting the delivery schedule. An eight-week machinery project that's already slipping into nine weeks may use a change request to justify that delay. ("We're going to be a week late anyway, so sure, we'll take on that request.") In reality, such a change may turn it into a 12-week project, much to everyone's surprise.

5. Insufficient expertise on both sides of the table. When specifying equipment, you need to consider absolutely everything, and sometimes the folks who will be operating the machinery know something that engineers on the supplier and customer side won't know. You need to get them involved early in the process. Here's a war story from a supplier that shows a good reason why: "We were building a machine for a company that sold processed and packaged spices. Garlic is extraordinarily sticky in a certain humidity range. We didn't know that! It was not included in the 50 pages of specifications, they just assumed everyone knew. We might have built them a grossly inappropriate machine; luckily, we averted disaster because they happened to mention it at one meeting! Vendors don't know the eccentricities and idiosyncrasies of your product that you do. The operators know, but the 26-year-old engineer that draws up the specs doesn't."

6. Missed launch windows due to different interpretations of lead time. It's not unusual for the customer and the machinery builder to make completely different assumptions about what "lead time" really means. A machine builder may define lead time as the time from when the order is placed to when that machine is ready for a Factory Acceptance Test (FAT). That could turn into trouble if the customer thinks that lead time extends to when the machine is up and running on the plant floor. Not accounted for are FAT

continued

How projects fail: 11 pitfalls to avoid

itself, training, modifications, shipping, installation, and start-up. To avoid scheduling problems, make sure everyone agrees what lead time really means.

7. Not adequately preparing for the machine's actual delivery. You as the customer have work to do after you sign the contract and perform the FAT, and before the truck rolls up with the new machine. Are all the utilities ready? Is there a clear path from the loading dock to the machine's new location? A recent war story details the preparation the customer did NOT do in advance….leading to a two-day delay while an interior wall of the plant was knocked down. Do your preparation homework.

8. Unanticipated additional container sizes/ shapes. A machine designed to handle an oval container will have tooling that's not suited to handling a round one. Take the time to think through all the possible containers you'll be running and communicate that to your equipment vendor up front. If there's an oddball container that's throwing a wrench into the machine design process, the

continued

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vendor needs to know what percent of the time that size will run, so it can be addressed accordingly. Conversely, tell the vendor which container sizes and shapes are expected to account for the bulk of the production volume. That enables them to optimize the equipment, to the extent possible, for those sizes and shapes.

9. Pay attention to the line speed details. For example, avoid over-specifying your speed requirements. Many assume each machine in the line should run 15% faster than the next closest machine to the critical machine on the line. But if your labeler is the fifth machine down from the filler, using this logic will require it to run 2X faster than the filler, which may not be close to reality. Another detail often missed is ergonomics. One manufacturer told us they have factory workers approaching thirty years of seniority, and they wouldn't have been effective if they didn't have ergonomically correct height-adjustable tables. Adjusting the equipment, rather than the people (like using a step stool), could lead to fewer injuries and downtime.

10. Don't count on integration unless you pay for it. It's a mistake to assume a machine builder will serve as your engineering department and take responsibility for your entire line—unless you explicitly hire them to do so. The machine builder's job is to build the machine, not to take responsibility for the line.

11. Define what success looks like. When it comes time to validate your purchase, do you know what a successful implementation looks like? Failure is likely if expectations are unrealistic and/or vendor promises are not verified prior to purchase. You can only declare success at the end if you define it, and agree to that definition, in the initial specifications you present to your supplier. ■

Glossary of case-packing terms

This glossary was adapted from a handbook by Schneider Packaging Equipment.

Bottom load machine – Product is loaded vertically up through the open flaps on the bottom of a case.

Basis weight – Weight of various containers given in pounds per 1,000 sq ft.

Boxmaker's Certificate – Statement printed on a corrugated or solid fiberboard box guaranteeing that all applicable construction requirements of the carriers have been met. Also identifies the box maker.

CSO (Center Special Overlap Slotted Container) – All flaps are the same length; inner flaps meet, and outer flaps overlap at random.

CSSC (Center Special Slotted Container) – Inner and outer flaps meet at center.

Containerboard – The paperboard components (linerboard, corrugating material, filler chip) used to manufacture corrugated and solid fiberboard.

Corrugated board – Board consisting of two outer plies that sandwich a fluted middle layer.

Cycle – Process by which product package or container moves from station to station in accumulator or main machine. (see Station or Pockets)

continued

Glossary of case-packing terms

Double wall – A combination of three flat facings and two intermediate corrugated parts.

Enclosure types – Electrical connection protection level for the operating environment. (see the basic NEMA Ratings)

Facings – A form of linerboard used as flat members of corrugated fiberboard.

Fiber or fiberboard box – A container made of either corrugated or solid fiberboard; fiberboard is fabricated paperboard (three or more plies of walls).

Flute or corrugation – One of the wave shapes in the inner part of combined corrugated fiberboard.

Flutes per linear foot		Approximate height (not including facing thickness)
A-flute	33+3	3/16 inch
B-flute	47+3	3/32 inch
C-flute	39+	9/64 inch
E-flute	90+4	3/64 inch

continued

Glossary of case-packing terms

FOL (Full Overlap Slotted Container) – All flaps same length; outer flaps overlap not less than inside width of box minus a maximum of one inch.

Half-slotted case – An RSC style with bottom flaps and no top flaps.

Hand, machine – Left-hand machine means accumulator is on left side of main machine when looking in the flow direction, and conveyor is on right side of main machine discharge.

Horizontal machine – Product is loaded (horizontally pushed) into the side or end of a carton, case, or tray.

In-line machine – Main machine is placed lengthwise in the same direction as the conveyor delivering product.

Knocked-Down (KD) – A term denoting that a carton, case, or tray is partly or entirely taken apart; not set up.

Liner (sleeve) – A creased fiberboard sheet inserted in a container and covering all side walls.

Manufacturer's joint – The joint is that part of the box where the ends of the scored and slotted blank are joined by tapping, stitching, or gluing. When finished in the box manufacturer's plant, it is known as a manufacturer's joint; when the box flaps are sealed in a box-user's plant (usually on automatic equipment), it is called a "user's joint."

continued

Glossary of case-packing terms

NEMA Ratings – Rating scale for measuring the level of protection for electrical connections given the operating environment.

NEMA 1 – General purpose; indoor usage; no unusual service conditions.

NEMA 2 – Drip-proof; indoor usage; protect against noncorrosive liquids and dirt.

NEMA 3/3R – Dust-tight; rain-tight and sleet (ice)-resistant; outdoor usage; protects against windblown dust and water.

NEMA 4 – Watertight and dust-tight; indoor and outdoor usage; protects against splashing water, water seepage, falling or hose-directed water, severe external condensation.

NEMA 4X – Watertight, dust-tight, and corrosion-resistant; indoor and outdoor usage; see NEMA 4 above plus corrosion protection.

NEMA 7/9 – Explosion-resistant; indoor hazardous locations; airbreak equipment to protect against entrance of explosive amounts of hazardous dust.

NEMA 12 – Dust-tight and drip-tight; indoor industrial usage; protects against fibers, filings, lint, dust, dirt, light splashing or seepage, dripping, and external condensation of noncorrosive liquids.

continued

Glossary of case-packing terms

NEMA 13 – Oil-tight and dust-tight; indoor usage; houses limit switches, foot switches, pushbuttons, selector switches, pilot lights, etc. to protect against lint, dust, seepage, external condensation, and spraying of water, oil, or coolant.

Orientation – How a product is delivered to an infeed conveyor, discharge conveyor, or loaded into a container—e.g. largest dimension perpendicular or parallel to flow; largest dimension perpendicular or parallel to case length, width, or depth. Product length, width, and depth are relative to how it loads into the case.

Overlaps – A design feature where the top and/or bottom flaps (usually outer only) extend over the other. Overlap is measured from flap edge to flap edge and is known as partial or full overlapping flaps.

Pocket – Space reserved in main machine to do one of the following operations: case select, case erect, case fold, case load, case flap tuck, case seal, case seal compress. Some of these operations can be done in the same horizontal space under certain conditions (slow speed, small product, smaller footprint needed). Product is passed from one pocket to another by pushers.

RSC (Regular Slotted Container) – All flaps same length; outer flaps meet.

Single face – A combination of one corrugated part glued to one flat facing.

Single wall – Also known as double face. A combination of one corrugated inner part glued between two flat facings.

continued

Glossary of case-packing terms

Standard test conditions – Tests on paperboard and boxes are normally done at 73ºF and 50% RH + or 2.5%; high humidity is temperatures above 73ºF at 85% RH; cold storage is below 40ºF at 85% RH; tropical storage is above 90ºF at 90% RH.

Station – Divisions within the main machine that mechanically perform functions necessary to erect, fold, load, tuck, glue or tape, and seal a container. These stations can be combined under certain circumstances into multipurpose units. (see Pockets)

Test – Bursting strength of linerboard and combined board except for those grades of corrugated fiberboard where a puncture test is substituted for bursting strength. There are many kinds of tests done depending on environment.

Top load machine – Product accumulated and loaded vertically downward into the open flaps at the top of a case.

Triple wall – A combination of four flat facings and three intermediate corrugated parts.

Wraparound case blank – A prescored and preslotted sheet of corrugated fiberboard that is formed into a box around its contents. Advantages are that less board is required, it can be fully automated, it produces a very tight pack, it increases column strength and pallet efficiencies, there is greater magazine capacity, and there is no manufacturer's joint (user's joint instead), and no ridges on shipping surface.

PPC Glossary Intro

The Paperboard Packaging Council (www.ppcnet.org) offers plenty of resources for those in the industry, including a comprehensive glossary of terms. We've included some of the most commonly used. To view the entire glossary, click on http://bit.ly/Zh7cpW.

basis weight	The specification of boxboard as density of weight per unit area. In the U.S., it is measured as "pounds per thousand square feet," and in Europe, as "grams per square meter"(gsm). It ranges from a light weight of 60 pounds per thousand square feet to as heavy as 200 pounds per thousand square feet in a single ply; however, any one machine is ordinarily not capable of making this complete range.
blank	A folding carton after cutting and creasing but before folding and gluing.
bottom liner	The surface of the boxboard that forms the interior of the carton, also called the "back-liner."
boxboard	A general term designating the grades of paperboard used for fabricating folding cartons, set-up boxes, and fiber cans. Also referred to as "board," "paperboard," or "folding boxboard." (see paperboard)
caliper	A dimensional term used interchangeably with the word "thickness" in connection with paperboard. It is expressed in units of thousandths of an inch and is usually written decimally but may be referred to as "points."
carded packaging	Packaging that consists of a stiff paperboard card onto which a product is held by a preformed plastic blister (blister card) or by a film vacuumed onto the product and card (skin or contour packaging). Blister cards are usually covered with a special coating that allows the blister to be heat-sealed to the card.
carton	A unit container made from bending grades of boxboard. (see folding carton) It is a shortened term for "folding carton," the preferred designation for folding boxes, folding paper boxes, and folding paperboard boxes. The word carton does not refer to set-up boxes, corrugated, or solid-fiber shipping containers.

chipboard	A low-quality, non-test paperboard made of waste paper for use where specified strength or quality are not necessary. May be bending or non-bending.
clay-coated board	A high-grade bending boxboard, the top surface of which has been coated with a fine clay that provides an excellent printing surface.
coating	A substance applied in liquid form to the surface of boxboard to enhance and protect printing or impart special functional properties. Coatings include varnishes, water-based, and energy-curable coatings (such as ultraviolet or UV).
computer-to-plate (ctp)	The use of an entirely digital workflow to design and transfer copy to the printing plate output device (platesetter) without the use of films.
containerboard	A general term applied to both solid fiberboard and corrugated fiberboard, which are used in the manufacture of shipping containers. Containerboard grades include medium and linerboard.
converter	A manufacturer that fabricates folding cartons from boxboard and other packaging materials. In general, can refer to any manufacturer that fabricates packaging materials from various unfinished, raw materials.
corrugated board	A structure made from containerboard grades of paperboard. Corrugated consists of a medium that has been fluted on a corrugator, to which one (single-face) or two sheets (double-face) of linerboard are attached to create the structure. A double-face corrugated container is referred to as a single-wall container. Corrugated is primarily used for shipping containers. The height of the fluted medium varies and is referred to by a letter; common flute sizes are a-flute, b-flute, c-flute, e-flute, f-flute, g-flute, and n-flute.
die	A form used for shaping, cutting, or stamping out parts and blanks. Usually made from hard metal but may be made of wood or other suitable material.
die cutting	The cutting of paperboard or paper by a die.
embossing	(1) Raising the letters or areas of a design above the flat surface of carton blanks or paper sheets by means of pressure applied through the action of male and female dies on cutting and creasing presses. (2) Embossing done by means of engraved rollers on sheet- and web-fed converting equipment.

engraving	In the graphic arts and converting industries, this term is often used in referring to original photoengravings from which the actual printing plates are duplicated or produced.
fiber	In packaging, this designates converted paperboard products such as fiberboard, fiber boxes, fiber containers, fiber drums.
fiberboard	The general term indicating boxboard that contains center plies of a different furnish than used for the top and bottom liners.
folding carton	The generally accepted designation of containers made of bending grades of plain or printed boxboard, cut and creased in a variety of sizes and shapes, and delivered to the user in a flat, or glued and collapsed form.
gluing	The operation of applying an adhesive substance to the surface of a material, which causes it to bond or adhere to another.
glue flap	Structural element or panel of a folding carton blank which is held in position by an adhesive to form a carton. Also referred to as manufacturer's joint.
grain	The longitudinal arrangement of the fibers in paper or paperboard, which results as they settle in the direction parallel with the travel of the paper or board machine. Direction of the grain is important in carton design, as greater tearing strength exists across the grain, and greater tensile strength in grain direction. Grain is more pronounced in paperboard made on a cylinder machine than on a fourdrinier machine.
gravure	Printing (rotogravure)- an intaglio printing process using cylinders on which an image is etched in the form of a series of cells. These cells are filled with ink and the excess removed by means of a doctor blade. Ink from the wells is transferred by the rotary action of the press to the board in either sheet or web form.
hot stamping	The impressing of lettering or a design through foil upon a carton blank by means of a heated die or type.
impression	Transferring an image to boxboard from a printing plate, blanket, or cylinder by one of the printing processes. It may be a single-color design or one in a series of multicolor patterns.

Imprint	(1) The trademark or legend reproduced on a carton during the process of printing to identify the manufacturer. (2) The subsequent printing of additional identifying information on a previously printed carton blank, such as stock retail boxes.
Ink	A fluid or viscous substance consisting of pigments, dyes, or other materials dispersed in a carrier or vehicle by means of which a printing press imparts the desired image on boxboard. Character of the ink varies according to the printing process and application.
ink receptivity	The degree of penetration of printing inks on the surface of boxboard.
kraft	Paper or paperboard made from virgin pulp produced by the sulfate process. Natural kraft is unbleached and has a characteristic light brown color; bleached kraft is a sheet having a higher brightness rating then natural kraft.
laminated board	A combination of different kinds of boxboards, films, foils, papers, or other materials bonded by adhesives in webs or sheets, may also be designated as "lined board."
letterpress printing	The printing process by which ink is transferred from the raised portions of printing plates or type to board.
liner	The outer or inner ply of a sheet of cylinder board.
lithography	A printing process using plates whose printing surfaces are partly water-repellent and partly ink (oil)-repellent. The plates are made of flexible sheets of metal such as zinc or aluminum or of two metals as in bimetal plates. These plates are photographically imposed, chemically etched, and run on either sheet-fed or roll-fed presses. The term lithography is often shortened to "litho."
offset lithography	The lithographic printing process by which a photographically made ink-receptive image on flexible metal plates is transferred by means of a rubber blanket to boxboard or the material being printed.
overprint	To print additional material, such as a varnish or another color, on a previously printed sheet.
overwrap	A plain or printed sheet of paper, foil, or flexible film applied over a filled carton or tray for decorative or protective purposes.
package	A container that provides protection and identification, and promotes the sale and use of a product.

pallet	A low, portable platform of wood, metal, plastic, or fiberboard that facilitates the handling, storage, and transportation of materials as a unit.
panel	A face, side, top, or bottom of a folding carton.
paperboard	A general term descriptive of a sheet of fibrous material usually made on a cylinder or fourdrinier machine from either virgin wood fiber (pulp), or recycled paper stock (old newspapers, old corrugated), or a combination of these fiber sources. Paperboard differs from paper in that is heavier, thicker, and more rigid. The two general classifications of paperboard are containerboard, which is used principally in making corrugated and solid-fiber boxes, and boxboard, the bending grades of which are used in the manufacture of folding cartons.
prepress	The collective activities of preparing copy for printing. In an analog workflow, it would include color separation, the production of films and analog proofs, using the film to make printing plates, and the makeready of the press. In a digital workflow, this would include manipulating the digital files for producing the printing plates, digital proofing, and makeready of the press.
proof	A trial impression made in conjunction with a printing process to determine the need for corrections. Impressions must be taken singly from each color plate of a set, showing each color alone, and in combination with each of the other colors in proper sequence. Proofs should be made on the board and with the inks to be used for actual production.
pulp	The basic cellulose fibers resulting from the disintegration of wood, rags, or other vegetable matter by chemical and/or mechanical processes or combination from which all paper and paperboard are made.
rotary press	A press on which both the printing and impression surfaces are cylindrical.
rotogravure	(see gravure)
score	A crease along which the adjacent elements of a die-cut carton blank are folded without cracking or breaking to form a carton.

scrap	Material or product made non-usable for its original purpose during the manufacturing process or spoilage depreciation, which may be reclaimed as a raw material or as a component of another material or product. Also, the trim areas between cartons on a sheet.
set-up box	A stiff paperboard box in three-dimensional construction, generally overwrapped with printed paper or covering materials, and delivered "set-up" ready to use, as distinguished from a folding carton.
shell	A plain, unprinted carton designed to be overwrapped with plain or printed paper or other material.
shipping container	A corrugated or solid-fiber box used to pack and transport products or packages.
slitter	A machine to cut rolls of boxboard in the long direction utilizing adjustable disk knives or blades mounted on shafts.
small flute	(see mini-flute)
solid bleached sulfate (sbs)	A grade of boxboard made entirely of virgin sulfate pulps. Usually made on fourdrinier machine.
standard size	A boxboard sheet 25" x 50" in size, which is the basis for all board computations.
traystyle carton	Those constructions whose side panels and ends are attached or held in position by sealing or locks. One edge may be extended to form a lid or cover. Common styles of this classification are Brightwood Trays, Diagonal Infolds or Diagonal Outfolds, Cracker Styles, etc.
trim size	The maximum width that can be efficiently produced on a paperboard manufacturing machine, printing press, or paperboard converting machine, minus an allowance for trimming off edges. The size of something after a trimming operation.
virgin material (fiber)	Fiber gleaned from organic materials, such as wood chips, that haven't been used in the manufacture of another product.
waxing	The application of paraffin to printed board or carton blanks as a preservative coating and results in a high-gloss or impregnated finish.

web	A continuous sheet of boxboard or other flexible material coming from the machine that produces it. It may be slit and rewound into rolls or cut into sheets. Also refers to the belt or blanket on which boxboard is conveyed through paperboard-making machines. Roll stock is used on some printing and converting equipment.
wet strength board	A specially treated board, usually kraft, that is resistant to moisture. Wet strength board is often used for beverage carriers, frozen foods, or in any application where the board will be exposed to excessive amounts of moisture, condensation, etc. (see carrier board)

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