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CONVERTING INDUSTRY OVERVIEW

ROCKWELL AUTOMATION WHITE PAPER

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Rockwell Automation

Changes in packaging technology, security requirements, safety requirements, consumer expectations and the increasing need for information and efficiency on the production floor all mean new opportunities for converters and their control systems. But what is "converting?"

While googling the words "Converting Industry" will cite more than 250,000 web pages, most manufacturers agree there is no Converting "Industry," per se. Converting is more a family of loosely-related applications. By "converting", people are usually talking about a process that occurs at or near the end of a web forming line to improve the characteristics of the web, or to "convert" it into products. A web usually refers to a continuous sheet of relatively flexible material, like paper or film. It is usually formed by pouring or extruding liquid material onto moving belts and/or rotating rolls which dry it, heat it, cool it, tangle it, and in general, form it to a point where it can be wound into large rolls. A large number of converting operations don't occur on the web forming line itself, they are a separate operation, in a separate location, beginning with the large wound roll of material from the primary operation, often called a "parent" roll.

Converting Application Examples

One example of a converting application is the machinery that takes parent rolls of tissue paper (say, 60" diameter, and 100" long) and perforate, emboss, slit and rewind them into rolls of paper towels. Another tissue example is the equipment that embosses, cuts and stacks it as folded napkins. Diaper machines "convert" as many as fifteen rolls of various nonwoven webs, each with different characteristics, first into a layered web, then into stacks of folded diapers with elastic lined leg cutouts and waistbands. Bag machines "convert" parent rolls of polymer film into consumer-sized rolls of garbage bags with sealed ends and integral pull ties at the open ends. Medical gown machines produce disposable gowns from rolls of nonwoven or laminated material. The list can go on and on. As new uses for web-based products are invented just about every day (think about the proliferation of specialized, nonwoven "wipes" products which didn't exist five years ago), new applications to produce them are also constantly evolving.

Converting also usually refers to some of the processes that are part of the web forming line, for example, applying a coating of adhesive to paper, or laminating pressure-sensitive label stock to backing material. Printing on corrugated board, tissue, packaging film and label material is another large and very important converting application. Again, demands for new product characteristics are constantly changing. For example, in packaging, the barrier properties of the material used in food or pharmaceutical packaging is becoming quite important, as are the properties of "tamper evidence." And consumers are demanding better graphics on the packaging of the products they buy. The applications that provide these properties to the packaging material are further examples of converting.

One reason that converting is difficult to define is that the boundaries are rather vague. Some applications are similar across most industries; some are quite unique to a specific industry. For example, winders are used across all industries; but some are much more sophisticated than others. Flexo-folder-gluers, on the other hand, are relatively unique to the corrugating industry segment. Functionally, some process applications occur at different locations in the process for different materials. For example, a shear is used near the beginning (wet end) of a corrugating line, and performs a very similar function – cut

to length - as a sheeter does at the very end of a fine paper line. Many machine builders, leveraging their process knowledge, build equipment from one end of a process to the other – from extruder to laminator to winder in film, or from wet end to dry end to finishing equipment in corrugating, for example. It is difficult, and maybe pointless, to try to separate equipment offerings into categories.

Another complication is that the converting function is applied to these various processes in several different industries and industry segments. Since market data tends to roll up by industry, rather than application, it is quite difficult to develop summaries or broad pictures of this interesting marketplace. Paper, nonwovens and film are clearly the primary industries involved, but many products are manufactured that are composites of several substrates, further complicating a definition.

Prominent Industry Segments

Even though converting includes a group of loosely related applications, it is probably easiest to organize this overview by the industry segments that are most prominent. Table 1 presents a graphical summary of the different industries, and roughly shows where in the process the various applications occur. Of course, there are literally hundreds of exceptions, and applications that are not included. The column identified as "Specialty" is intended to include composite materials (say, film laminated to paper, or metallized film), and includes the Label-making Industry, which could arguably require its own column. Also, the row labeled "Converting Line Supply" is meant to show that in many cases, but certainly not all, the output of a primary production line is large rolls of material, called "parent rolls", which are then used as the starting point to the secondary, or "converting" line.

Table 1: Relationship among applications associated with converting

<table>
<tr><th>Process</th><th colspan="3">Paper</th><th colspan="2">Film</th><th colspan="2">Nonwovens</th><th>Specialty</th></tr>
<tr><td>Webforming</td><td colspan="3" rowspan="2">Papermaking</td><td>Blown Film Extrusion</td><td>Cast Film Extrusion</td><td>Airlaid</td><td>Spunmelt Extrusion</td><td></td></tr>
<tr><td>Bonding</td><td colspan="2">Thermobond, Chemical Bond, Hydroentangling, Needle Punch</td><td></td></tr>
<tr><td>Drying</td><td colspan="3">Dryers</td><td colspan="2">Dryers</td><td colspan="2">Dryers</td><td></td></tr>
<tr><td>Web Improvement</td><td colspan="3">Supercalendar, Coater</td><td colspan="2">Tenter, Calendar, Coater, Laminating</td><td colspan="2">Calendar, Embosser, Coater Laminating</td><td>Laminating, Coating</td></tr>
<tr><td>Winding</td><td colspan="3">Winding</td><td colspan="2">Winding</td><td colspan="2">Winding</td><td>Winding</td></tr>
<tr><td></td><td>Tissue</td><td>Fine paper</td><td>Kraft paper</td><td colspan="2"></td><td colspan="2"></td><td></td></tr>
<tr><td>Converting line Supply</td><td>Unwinds</td><td>Unwinds</td><td>Corrugating Wet ends, Dry ends,</td><td colspan="2">Unwinds</td><td colspan="2">Unwinds</td><td>Unwinds</td></tr>
<tr><td rowspan="2">Specialty Converting</td><td>Printing</td><td rowspan="2">Sheeters, Envelope Machines, Gift Wrap Rewinders, etc.</td><td>Printing</td><td colspan="2">Printing</td><td colspan="2">Printing</td><td>Printing</td></tr>
<tr><td>Embossing, Towel and Toilet Paper Rewinding, Napkin machines</td><td>Finishing Machines (diecutters, folder-gluers)</td><td colspan="2">Slitter/Rewinders, Bag Machines, Tape machines, etc.</td><td colspan="2">Slitter/Rewinders, Wipes machines, Diaper machines, Medical Gown machines, etc.</td><td>Foil machines, Diecutters, Tag and label machines, metallizing equipment, etc.</td></tr>
</table>

Traditionally considered "Converting"

Converting /Print/ Web (CPW): also includes , Web Forming, Extruders, Metals Processing Lines, Glass Coaters, Glass Tempering Lines, RFID Implants Web, Solar Web, Newspaper & Commercial Printing.

Paper Converting

General Description:

The Paper Industry is a large and mature industry. Converting applications are relevant in three Paper Industry market segments - Fine Paper, Tissue, and Corrugating.

Fine Paper:

Fine paper production capacity is fairly stable around the world with some growth in Asia pacific region, and the demand for fine paper products is also stable and large.

Primary Converting Application for Fine Papers:

1. **Sheeters:** Sheeters are used to convert rolls of fine paper into stacked sheets of paper. The sheet size may be large or small, but typically the cut dimension is extremely critical. In addition to accurate, reliable speed control of the cutter knife, the cutter knife often must accelerate and decelerate during each revolution requiring accurate torque control.

2. **Folder-gluers, envelope machines:** Folder-gluers are an important application for board stock, and yield products like aspirin boxes, cereal boxes and french fry packets. Again for both applications, cutting accuracy is critical, and folding and glue application require precise positioning.

Both of these applications are motion centric, typically relying on servo control.

Tissue:

Tissue production continues to grow, more than other paper segments. The major tissue producers have been adding capacity in recent years.

Primary Converting Applications Tissue:

1. **Tissue Converting Lines:** The conversion of large rolls of tissue to packages of toilet paper or paper towels is often sold as a complete line. The individual machine sections include unwinds to maintain tension, accumulators to store tissue, core machines to make the roll core, metered winders to precisely wind the advertised length into a precise package dimension, and log saws to cut the wide log into towel-sized rolls. Embossing and/or printing of designs are also common value-add line sections. These applications call for very precise speed and tension control, usually supplied by coordinated vector drive systems, with some motion components.

The Solution

2. **Wrappers and Bundlers:** The tissue and towel rolls are then collated and wrapped into different sized bundles of rolls (four-packs through twenty-four packs, for example). High-speed wrapping and bundling requires sophisticated motion control and a human machine interface (HMI) to allow the operator to select from many different configurations. This application could also be considered packaging, but many wrapper OEMs also provide upstream converting equipment as well.

3. **Napkin machines, etc.** Cutting, folding and interfolding napkins, tissue and towels is an intricate operation. There are many combinations of folds available, and the machinery must have the flexibility to accommodate many of them, as well as count, stack and eject the bundles into a wrapper or bundler downstream.

Corrugating:

Paperboard and corrugated box manufacture is a major use for kraft paper. The locations that take kraft paper and turn it into corrugated boxes are usually referred to as board

converters. The process can be subdivided into three application segments. The initial process, or wet end equipment, unwinds two or more rolls of kraft paper and glues them together into a sheet of corrugated medium. That sheet is cut into blanks and stacked by the dry end equipment. Finally the blanks are slit, scored, printed, folded, glued and stacked by the finishing equipment. Retail market emphasis on point of sale displays, the demand for high-quality printed boxes, and the availability of low-cost machinery from the Pacific Rim are all key issues affecting manufacturers in this industry segment.

Primary Converting Applications:

1. **Wet end:** As high speed and fairly tight coordination are important, many machines on the wet end rely on coordinated Variable Frequency Drives (VFDs). The shear application involves a cutter knife, which, in some cases, like sheeters in fine paper, must be accelerated and decelerated within each revolution to properly position the cut. This requires very precise torque control.

2. **Dry End:** Very repeatable, accurate positioning and coordination of the slitter-scorer knives, and quick changeover times between short production runs are key to this application segment. Lost material during changeover must be minimized, and is practically eliminated in good designs. Servo positioning and tightly coordinated drives are needed for this application. The output of this section is a stack of box blanks, usually slit and/or scored in one direction.

3. **Finishing:** Flexo-folder-gluers take the stack of blanks from the dry end, rotate them 90° and feed them through multiple print sections, a die cutter (which finishes the cutting and scoring of the blank), a folder and gluer. The flat boxes are then fed into a counter-ejector which counts, stacks and removes the stacked boxes. Tightly coordinated motion is needed to provide good print color registration and coordination with the die cutter. Strong servo performance is important for these applications. And the servo drive must be able to overcome a step function torque demand when the individual sheets hit the rolls.

Primary Paper Industry Converting Groups and Trade Publications

- TAPPI (Technical Assoc of Pulp & Paper Industry) www.tappi.org
- AICC (Association of Independent Corrugated Converters) www.aiccbox.org
- Paperboard and Packaging Magazine (Advanstar Publications) www.packaging-online.com
- Tissue World Magazine (Paperloop Publishing) www.tissueworldmagazine.com
- ACIMGA (Italian organization for Paper & Converting machine builders) www.acimga.it

Nonwovens

General Description:

The Nonwoven Industry has experienced explosive growth in the last 10 – 15 years. The Industry is defined by the web-based product it is built around. The web is made primarily of an extruded polymer (polyester, polypropylene, etc.) and is tangled rather than woven together as other textile webs. The tangled web is then bonded by various means (heat and pressure, chemical, needle punch, or water jets) to give it strength and other properties. The type of base polymer, the bonding method and several other processes determine the physical properties of the web. Also, multiple layers with different properties can be laminated together. The end result is a literally unlimited variety of web-based "fabrics." Typical end products include housewrap and shipping envelopes, disposable diapers, kitchen wipes, lotion-soaked baby wipes, automotive headliners and trunkliners, disposable medical gowns, and dialysis filter media. The relatively high speed and low cost of production and virtually infinite variety of characteristics ensure the continued growth in this Industry.

Special Implications for Automation:

The machines used to manufacture nonwoven webs are rather unique. A typical nonwovens line will consist of 10 - 15 machine sections, all from different OEM suppliers. A number of OEMs will offer to supply and integrate the whole line; some build most machine sections themselves, while others integrate from multiple vendors. But in many cases, the end user buys equipment from many different OEMs. This requires a major additional investment by the end user in project management and coordination. From spare parts and training to easy access to line production information, an integrated control architecture from one vendor is a much more efficient operation. Most end users recognize this and it is quite common for them to specify one. Because of this, it makes sense to consider all the machine sections, including the primary operations, as one related industry segment, and handled together.

Primary Converting Applications Unique to Nonwovens:

In general, nonwovens lines begin in one of two ways. Relatively soft, bulky products begin as air laid or dry laid webs. These webs begin as large packed bundles of short, crimped fibers (staple fiber). The fibers are scraped from the bundles, mixed and transported by air to feeders that lay them as a mat. This mat then goes to a carding machine, which combs (cards) the fibers into a web of uniform thickness and density, and lays it gently on a belt, since it has no strength. It is then bonded to give it strength, and goes on to additional processing to achieve other properties. A common example is baby wipes.

Stronger, thinner products begin as spunmelt (spunbond or meltblown) fiber, in which thousands of individual filaments are extruded directly in a kind of curtain down onto a moving belt. This action forms a tangled web which has more strength than the airlaid mat described above. It still must go to a bonder to provide more strength, and then to other processes to impart other properties. An example here is Tyvek® housewrap.

Many products are made using layers of both types, as well as other materials. For example, some products, like diapers, are made with a soft absorbent inner layer sandwiched between stronger outer layers.

Some of the major applications are:

1. **Opening and Blending:** The material used in airlaid webs is supplied in large bales like cotton. The staple fibers are packed tightly together and must be "opened" to reduce clumping, and blended across several bales to produce a uniform web. The resulting loose fibers are moved in air ducts to the beginning of the line and fed through a chute feed into the cards. Automation for this operation requires VFD control and some software required to direct blends to the right lines.

2. **Carding:** This application is primarily a combing action to eliminate the tufts and produce a uniform layer of single fibers. The output of a card is a web of some thickness, but almost no strength since the individual fibers are just laying across each other. Automation is primarily servo-based because of motor dimensions for worker and stripper rolls, with the main web transport rolls primarily based on vector VFD control.

3. **Spunbond/Meltblown:** Polymer laid webs are extruded directly onto a moving belt called the forming table. A "curtain" of very fine filaments are extruded across the belt, and allowed to lay in a tangled web. Spunbond filaments are heavier and continuous, often used for external, stronger layers. Meltblown filaments are often used for inner, higher bulk and more absorbent layers. Subjected to high-speed heated air as they exit the spinneret holes in the extruder, the fibers stretch and break into finer, discontinuous filaments similar to airlaid webs. Automation typically requires vector-controlled VFDs for the forming table belt, along with automation for the extruder (described below).

4. **Bonders**

- **Calendars:** Calendars help bond the nonwovens web by providing precise nip pressure as well as heat (many rolls are heated). This thermobonding melts portions of the tangled fibers and forms bonds at the fiber intersections. In chemical bonding, a latex binder is added to the web by dipping, spraying or printing. This latex resin is usually in a water solution, so the heat of the calendar dries and sets the resin into the fabric web. Calendars provide other functions to the web discussed further below. Automation requires precise speed control, pressure and sometimes temperature control.

- **Needlepunch:** Needlepunches work by mechanically tangling the fibers in the third dimension (through the web). They are typically large plates of barbed needles that pound up and down through the web, with the barbs grabbing fibers on the way down, and releasing them when they reverse direction.

- **Hydro entangler:** Hydro entanglers work like needlepunches, but are faster and more efficient as they use high-pressure water jets to tangle the fibers in the third dimension. They also break the fibers as they tangle them, imparting softness along with the strength. This machine is in large part responsible for the fabric-like qualities, and huge popularity of consumer wipes products. Automation uses vector controlled VFDs for web transport, software for flexible machine configuration, and large VFDs for pump and vacuum control.

5. **Dryers:** Hydro entangled webs have a high water content and must be dried. Large through-air drum dryers are typically used. Automation is accomplished with vector controlled VFDs for web transport, and large horsepower V/Hz drives for air handling.

6. **Water Filtration:** Hydro entanglers circulate and filter very large quantities of water through high pressure jets. Circulating systems move a large volume of water through tanks of filter media, requiring large horsepower V/Hz drives and AC motors.

7. **Converters (Machines producing products such as wipes, medical gowns, filters and diapers):** The number of products produced using nonwoven materials is unlimited, consequently demanding a number of converting machines to make them. Most are quite complex and involve high speed, sophisticated coordinated motion.

Primary Industry Groups and Publications focused on Nonwovens

- INDA (International Nonwovens & Disposables Association) www.inda.org
- EDANA (European Disposables and Nonwovens Assoc) www.edana.org
- Nonwovens Division of TAPPI www.tappi.org
- NCRC (Nonwovens Cooperative Research Center) www.tx.ncsu.edu/ncrc
- Nonwovens Industry magazine www.nonwovens-industry.com
- Nonwovens World magazine www.nonwovensworld.com

Film

General Description:

There are two main types of plastic film manufacture, both of which are extruded. **Blown film** is extruded through a circular die and forced upward by air pressure around and inside the center of the die. A large plastic "bubble" travels upward to a point where it is dry enough to handle. It is then collected and slit into two sheets or left as a tubular film web. It is then wound into rolls. Most blown film lines are provided as complete systems often standing 2 to 3 stories high.

Cast film is extruded as a wide film, usually onto a chill roll which cools it sufficiently so it can be moved through subsequent rolls. It can be stretched, both in the machine direction and cross-machine direction, and/or coated with various materials, and/or laminated onto other webs. Finally it is wound into rolls.

Primary Converting Applications Unique to Film

Blown film lines: Usually supplied as complete lines, these machines produce a roll of film that may be tubular (no seams) or two sheets, which may have different characteristics on each side of the film web (from the inside or outside of the "bubble"). Automating these lines requires extruder control, and very precise winding control, usually with vector controlled VFDs or servos.

Cast film lines: Featuring extruders, these machines require very precise speed and tension control of the film web. Since film can be very thin and elastic, tension and speed control are quite important. The thickness of the film is controlled by the material flow from the metering pumps and "draw" (speed ratios) between rolls in the line.

Tenters: Tenters are machines that stretch film in the cross-machine direction, as well as in the machine direction via "draw ratios." The cross-machine stretching is accomplished by grabbing the edges of the film and gradually moving the "grabbers" out laterally as the web moves forward. Stretching film crystallizes the polymers, providing strength and inelasticity to the web. The stiff plastic film used to wrap CDs is a good example of this biaxially stretched film. This application requires close coordination of the drives moving both sides of the film.

Converters (e.g Bag machines): Converting the film rolls into useful products is the final step. Bag machines may "convert" the film into trash bags with incorporated draw tapes, or bread bags, sandwich bags, etc. Slitting and rewinding the film for consumer use, like Saran Wrap® is another example. These applications often require extremely precise servo motion and very precise tension control.

Primary Industry Groups and Publications for Film (see also General Converting)

- Society of the Plastics Industry (SPI) http://www.socplas.org
- American Plastics Council http://www.americanplasticscouncil.org
- Assocomaplast (Italian Plastics and Rubber Machinery Manufacturers Association) http://www.assocomaplast.com
- PlasticsEurope Deutschland http://www.vke.de

Narrow Web

General Description:

The Narrow Web and the Tag and Label Industries are essentially the same group. Many of the applications are identical or similar to the ones described throughout this paper, but the machines are much smaller. The applications are primarily printing-based. Label converters use label-making machines that center around the printing operation. There are usually unwinds and die cutters, often metal foil stamps, and winders for the matrix (unused material cut from the label material) and label stock. In many cases, a single OEM supplies the entire machine, however, the unwind and winder can be sold separately. A major trend in the industry is toward more flexibility in the machines – made possible by affordable servo control. Manufacturers are offering machines with interchangeable sections and variable size print roll sleeves, and demonstrating how quickly a converter can change jobs. This flexibility, and the servo control that enables it, are major factors influencing the selection of controls in this industry.

Primary Converting Applications:

Narrow Web Presses: These presses are typically in-line flexographic printing presses, often with a winder (or two) incorporated at the end. Again, the current trend toward short production runs is pushing machine builders toward more flexible offerings. Since labels, unlike newspapers or magazines, vary widely in size, as well as in substrate and material requirements, the ability to quickly change machine sections or roll size is very important. That, along with precise print registration from machine section to machine section and coordination with the foil stamp and diecutters, is key to this application and to the quality of the product. (described below).

Unwinds: Most narrow web applications begin with a parent roll. A major function of the unwind is to provide a starting tension for the web. Narrow web unwinds are similar to those described below, but usually smaller.

Diecutter: A machine section that must be closely coordinated with the print sections is the diecutter. It cuts out the label from the "matrix", cutting only the label layer, which it must cut completely, but not the backing material, which forms the continuity and strength for the wound roll. Position of the rolls, sharpness of the dies and coordination with the rest of the line are key to this application.

Rewinders: Also described below, some rewinds for the narrow web are very unique. Pressure sensitive labels are supplied on coated backing material that allows for easy, automated removal and application to a product. The material between the labels must be removed before the labelstock is wound up. This material, called "matrix" is typically separated from the labelstock right after the diecutter, and wound onto a separate roll.

Primary Industry Groups and Publications focused on Narrow Web

- TLMI (Tag and Label Mfg Institute) www.tlmi.com
- L&NW Magazine (www.labelandnarrowweb.com)
- Labels and Labeling Magazine (www.labelsandlabeling.com)

Common Applications

General Description:

Because the products we are discussing have much in common, and often differ only in the substrate used, there are a number of applications that are common across industries. And in fact, many OEMs supply the same or similar machines to perform these functions to end users in different industries. It seems clearest to address these applications together without repeating them within the Industry discussions.

- **Unwinds:** Where a previously formed web (paper, nonwovens or film) is introduced for processing, or added to a process as in laminating, it is usually supplied as a roll that must be unwound. The main function of the unwind is to provide a predictable, controllable tension that allows uniform unwinding of the product. This can be as simple as a brake, but often is accomplished by a regenerative VFD. When the DC bus of a VFD is connected to that of the motoring drives, it reduces power consumption by sharing the electrical energy generated by the kinetic energy of the roll. Sophisticated unwinds provide on-the-fly splicing of new rolls to expiring rolls, allowing continuous operation of the downstream process.

- **Extruders:** Extruders are common to the nonwovens and plastic film segments. They require very precise control of temperature and pressure to convert polymer pellets into the liquid polymer that forms the film or filaments of the web. In many cases the automation involves precise temperature control, a large VFD to supply the pressure, and often smaller VFDs to control metering pumps to more precisely control material flow. Their requirements are roughly the same for cast film, blown film, spunbond and meltblown nonwoven filaments.

- **Coaters/Laminators:** Loosely described, coaters apply a liquid or gaseous substance to a moving web. The distinction between coaters and laminators is a gray area, but in most cases laminators start with two or more existing webs. They can often add or include an extruded liquid however. The key to coating is providing a very uniform application of the coating material. Successful applications require very precise speed and tension control, precise coordination between machine sections, and very smooth motor velocities.

- **Calendar/Embossers:** Calendars and embossers provide a surface texture to a web, and in the case of nonwovens, often provide a thermobonding function. By heating and precisely controlling the pressure of the nip, the surface of the web is processed. Embossers usually have a design texture etched into the roll or plates on the roll surface, to provide the texture of the final product. The texture of dinner napkins is a good example. Control considerations are the same for both, and include precise speed control, occasionally tension control as well, precise roll location control for nip pressure, and often temperature control of the rolls.

- **Printers:** Printing is a major application, and one described in more depth below.

- **Winders:** Winding is another application that looks deceptively simple, but can be quite complex. Winding rolls of material with varying moduli of elasticity can be difficult, and has a major impact on the quality of the product. There are two primary types of winders: center driven winders and surface driven winders. In both applications, the tension that is wound into the roll must be controlled very carefully. As with unwinds, continuous operation of the upstream process is often desirable, and sophisticated winders provide for automatic transfer to a new roll when the roll in process reaches full diameter. In general, the automation equipment includes vector controlled VFDs, with rather sophisticated application software in the control processor.

- **Slitter-Rewinders:** Similar to winders, slitter- rewinders slit the processed roll or web into multiple smaller rolls. Tension control in slitter-rewinders is quite important and quite tricky. Once the roll is slit into separate rolls, correct tension must be maintained on each separately. In reality, no web is perfectly uniform in thickness, and the minute differences are compounded with each revolution of the roll. Completely separate mandrels to wind each new roll is one solution, another is a variable clutch transferring torque to each roll from a common mandrel.

Primary Industry Groups and Publications for General Converting

- AIMCAL (Assoc of Industrial Coaters and Laminators) www.aimcal.org
- CEMA (Converting Equipment Manufacturers Assoc – merged with AIMCAL www.cema-converting.org
- Paper, Film & Foil Converter (Primedia publications) www.pffc-online.com
- Converting Magazine (Reed Business Information) www.convertingmagazine.com

Package Printing

The printing of cardboard boxes, labels, film wrapping and tissue paper is a large part of the value that converters supply in all industries. In many cases, it is the major converting value-add application.

Flexographic and Rotogravure printing are the primary printing technologies, and are part of the converting process. Offset printing and screen printing are occasionally used, along with foil stamping. Differences in printing technology depend on the requirements of the products, but the automation requirements are quite similar for all. Registration of the color from machine section to machine section is the name of the game, as holding registration in the range of .001 to .01 inch is required.

The machine builders in all industry groups are moving from mechanically-geared coordination of the print sections to ELS (Electronic Line Shaft) gearing – that is - individual servo or coordinated VFD control of the axes. The tremendous flexibility and reduced maintenance that ELS provides is a real game changer in this application. It is driving all converters and machine builders to electronic driven control architectures.

All machine builders that provide machines to package printing customers either already have or are in the process of introducing servo driven presses. And converters, to remain competitive, are moving to shaftless presses.

Primary Industry Groups and Publications focused on Package Printing

- FTA (Flexographic Technical Assoc) www.flexography.org
- FPA (Flexible Packaging Assoc) www.flexpack.org
- PLGA (Package label and Gravure Assoc) www.plga.com
- GAA (Gravure Assoc of America) www.gaa.org
- Flexible Packaging Magazine www.flexpackmag.com
- Package Printing Magazine www.packageprinting.com

Conclusion:

"Converting" then, covers a broad range of applications across a number of industries. Those applications "convert" roll goods into useful consumer or industrial products, or "convert" the roll goods into more useful packaging materials. As people invent new products and new requirements for existing products, the converting applications to provide them constantly evolve.

Rockwell Automation is uniquely suited to meet the needs in many of the applications that make up the Converting industry. These applications usually require supervisory control, operator input and tight, and often complex, coordination between machine sections. With few exceptions, Rockwell Automation has an excellent range of products to meet the range of requirements -- from the simplest to the most demanding -- and possesses the domain knowledge to provide elegant control solutions. Rockwell Automation is dedicated to helping OEMs innovate to stay on top of the industry trends while lowering their total cost to design, develop and deliver machines.

www.rockwellautomation.com

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