

Printing and finishing among hot roundtable topics

The Corrugated Containers Production Roundtable provides an opportunity for suppliers, box makers, and end users to pose questions and discuss topics relevant to the industry.

During the 1991 TAPPI Corrugated Containers Division Conference, the Production Roundtable drew more than 200 attendees who listened to and exchanged ideas and information about the industry. Topics included printing, the corrugator, finishing, and waste. Session highlights are captured in this article in a question-and-response format. Questions that were submitted or asked and were unanswered have been omitted from this article.

Printing

Q: Does anyone have any current ideas/experiences in doing large block printing and rotary die cutting in one pass with minimal offset?

R: General comments were to use a finer-screen, lower-volume anilox roll, or a doctor blade system as opposed to a roll-to-roll system. The solids content of the ink must be higher than normal.

There is a consensus that surface tensions of both the inks and the substrates have a great deal to do with the ability to be successful in large block printing. Some people are adding water and others wetting agents to try to achieve the viscosities desired. Most, however, feel if this is required the ink supplier should formulate and make the required changes in the ink. Increasing the solids in the ink and reducing the film thickness of the ink should be the general direction to work towards. One converter also commented that the use of "extender varnish" also will help reduce offsetting and still maintain ink drying speeds.

One machine supplier felt that surface tensions of ink could become a part of ink specifications in the future, and also advised to pay attention to the surface tensions of the printing plates, substrates, and anilox rolls. The issue of surface tension seems to be the area most feel critical to ink offset, yet not a great deal appears to be known about it at this time.

Q: Has anyone experienced the doctor blades on Ward verigraphics picking up ink when running a roll-to-roll system? What did they do about it?

R: A representative from Ward advised that if the doctor blades are picking up ink, the wiper blade should be fully

retracted when running roll-to-roll. If the blade should build up dirt behind it, it will wipe off ink when it is not supposed to wipe it off.

The blade only retracts 1/16 in., so it does not take a lot of dirt to interfere. If the problem occurs in the blade mode, check to make sure blades are mounted properly, blade pressure is correct, and the blades are not excessively worn. If problems still exist, contact Ward for assistance.

Q: Reports continue to circulate that quality graphics are being produced using inks that vary with viscosities ranging from 25 seconds to 125 seconds. Why the variation of viscosity? What are pros and cons of each?

R: The variance is due to the cohesive properties of the ink and the solids content. With today's technology, high-solids ink dictates higher viscosities, but this could change in two to five years with more development work by the ink companies. The higher-viscosity inks tend to wick less than the lower-viscosity inks, which tend to spread more. Therefore, the higher-viscosity inks tend to stay more where they are put, providing a more exact reproduction of the printing roll in determining what type of ink (high or low viscosity) performs better.

Q: To what extent are plants using printing plates of less than 0.250 in. for postprinting?

R: One converter commented that his company converted all of its plates to 0.185-in. photopolymer using sponge-type backing with excellent results. A desire to improve printing quality without incurring capital expenditures prompted the company to convert.

One person reported that there are presses in Europe running with a total undercut of 0.145 in. (0.125-in. plate, 0.010-in. backing, and 0.010-in. sticky back). Another converter reported that his company runs anywhere from 0.067 in. on preprint with a 0.020-in. backing up to 0.250-in. solid photopolymer in postprinting. No one reported much success at running plates less than this.

A supplier advised using caution when changing plate thickness to ensure the same overall thickness is maintained or surface speed difficulties will result. The thickness that is

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specified by the print cylinder manufacturer should be maintained to avoid surface speed problems.

In Asia, it was reported, plates as thin as 0.125-in. photopolymer are in use with a 0.003-in. double-sided tape on 0.005-in. mylar, with some type of thin foam backing to obtain the proper print diameter. It was advised not to exceed 0.050 in. of the foam backing or a wave effect will result as speeds increase. The trend in Asia appears to be going to thinner plates and thin backing.

A supplier cautioned that thin plates alone were not the answer and leave a great deal to be desired when printing solids, even when used with higher cylinders. The foam backing must be kept thin unless a closed cell foam is used, and in this case, some are in use up to 0.090 in. and working well.

Corrugator

Q: What hot plate lubricants are being used? What paper lubricants and application methods are being used?

R: One converter reported using an oil mist system with good results. Another party referred to molybdenum disulfide, saying it had been in use for years and did not transfer to the board or cause printing problems. It must be applied manually, and at a regular frequency.

Q: Is Krytox grease a toxic substance? If so, what is the recommended disposal procedure? What are the benefits of using such a product?

R: *Krytox* grease appears to be very effective, according to a number of remarks at the roundtable. It has greatly reduced the frequency of lubrication on the corrugator and other machines. According to its manufacturer's representative, the grease is not toxic, and is stable at normal corrugator operating temperatures. Forced draft ventilation is recommended when the grease is heated to temperatures in excess of 550°F, to avoid breathing any toxic decomposition products that may be formed. Maintenance workers should wash their hands of the grease before smoking. The only known solvent for cleaning the grease from bearings is *Freon* TF or 113. The representative suggested referring to the solvent's material safety data sheet for handling and disposal methods.

Q: Is anyone having trouble with the Marquip cutoff knife crushing small one-outs (20 in. and under), causing stacks to lean to one side?

R: A representative from Marquip reported that this crushing could be caused by a misalignment of the pull roll into the knife, and there is a maintenance procedure that will correct this situation.

One person said that on the Model I knife the hold-down roll is pneumatically loaded and if the operator does not have it properly adjusted, it can cause crush problems.

Q: Is anyone experiencing problems with knife motors on Marquip cutoff? If so, what type of preventive maintenance program, if any, has been incorporated?

R: One converter commented that his company has the Marquip knife with brushless motors and they have had no failures in three years running 24 h/day. The same converter reported he goes through the system at least once a month

with a vacuum to clean. He also mentioned that there is a small detector available to check the condition of the bearings.

Another converter reported that his company had problems with the motor bearings on the Model II knife, but a redesigned bearing housing resolved this problem. He cautioned that if the brushes are allowed to wear too far and they short, the motors and the drive will be taken out. There is a ground fault detector available from Marquip that will fit some drives to help this situation.

Q: What is the best procedure for checking corrugator belt speeds to make sure top and bottom belts are in time?

R: One supplier mentioned a system that can be assembled with tachometers that compares the top and bottom belt speeds and gives a signal if approximately a 1% variation exists. Several converters and suppliers commented on the tried-and-true method of sticking a tack about 0.5-in. long through the bottom belt and seeing if it leaves a drag mark on the bottom liner. This test can give accurate readings easily to 0.10% speed differential.

Q: Regarding lagging, should both drums be changed simultaneously?

R: Converters and suppliers universally indicated it is preferable to change the lagging on both drums simultaneously. This also applies to corrugator belts, belts on folder gluers, and power transmission belts.

Q: Is anyone using an engraved glue roll on a finger-type, single facer? If so, are you running a higher solids mix in the starch? What experiences have you had?

R: One supplier said an experiment was conducted in this area years ago, but it did not have positive results because the glue fill on the roll was uncontrollable. A converter said his company, too, had tried this with similar negative results.

Q: Are there any comments or performance rating from plants running Interfic's new Contact Bar rider roll replacement conversion?

R: Four converters stated the device is performing well. It does not crush the single face, and this must be considered if a converter has poor-quality single face because the ability to crush out the highs and lows is lost. One converter advised that the early model could during certain run characteristics induce edge crush, but this problem has been eliminated with a new shoe configuration. One supplier commented on being able to run E to C flutes with no operator adjustments and very little maintenance.

Finishing

Q: Is anyone kicking out more than 5000 pieces per total crewed hour on a 66-in. rotary die cutter? If so, what are your average pieces fed/order, average pieces fed/total, area/piece fed, and average number of colors?

R: The 1991 TAPPI Productivity Survey reported only four rotary die cutters out of a group of hundreds reported kicks in excess of 5000 per hour. The averages reported in this overall

group were 6300 sheets per order, 69,000 ft² per order, and 2093 kicks per hour. Setup times were reported at approximately 30 min. The machines that reported in excess of 5000 kicks per hour reported about the same setup time and same order size.

One converter reported running 200,000 ft²/h on a 30-ft² blank (6666 kicks per hour). He did state that only a limited number of setups are the norm for this plant.

Q: What are current experiences with the Dicar Equalizer? Has anyone experienced any problems?

R: One converter reported what he felt was excessive blanket wear and rotation, but could not definitely trace the difficulty to the Equalizer. He said Dicar is working with his company to resolve the situation. Four other converters said they are very successful with the Equalizer in terms of dimensional accuracy, extended anvil life, and required time between anvil rotation. A 20–30% increase in anvil life was reported. One converter reported a rigidity loss on a 150-in.-wide die cutter, but reported the benefits of the Equalizer outweighed this shortcoming.

Q: Is the industry expecting too much to assume a specialty folder gluer can make a quality regular slotted container at an acceptable production speed? Do all blanks have to be platen die cut to fold squarely?

R: The 1991 TAPPI Productivity Survey indicated that boxes (regular slotted container, die cuts and complex die cuts grouped together) were run on specialty folder gluers at run speeds averaging between 2500–2600/h (machine hour run).

Some plants reported as high as 5000/h, average crew size between four and five people. The runs average 12,000 pieces and approximately 60,000 ft²/h. One converter reported running 10,000–12,000 die-cut boxes per hour on a 64-in. Post flexo folder gluer, and said the boxes do not have to be platen die cut to make good boxes. The boxes run fine on specialty gluers if they are die cut correctly, but as with any item, if incorrectly cut they can cause difficulties. One other converter reported running 6500 pieces/h on rotary die cuts on an Automatan specialty gluer, which was reported to be the second such machine in the United States.

Q: Are there any converters present that are actually making one-box setups on their flexo folder gluer operations? If so, how is it done? Do you really sell the first or second box?

R: Two converters responded they could achieve one- or two-box setups. The key is zeroing in the machine, and noting the various cylinder locations and slotting section locations for future reference.

One converter puts a tag on its print cards with this information, and if the machine is zeroed in prior to the setup and the locations previously recorded are used, the first box out is acceptable and the second box out can be sold to customers. It is helpful when using new operators, but the key is insisting the operators mark on each card where the cylinders were.

Another converter noted similar results, except when running three- and four-color print jobs that might require that a few more boxes are run.

Computers and Maintenance

Q: What is the most important function of the computerized maintenance systems on the market? What are the benefits?

R: One converter reported initial success using an MHI maintenance manager program. While not fully implemented, he said, it is very user friendly and provides many daily reports and forms required in plant maintenance.

Another converter commented that his company has divided the available programs into five function categories: preventive maintenance, normal work orders, parts inventory, purchasing, and report writing. Individual needs dictate which programs to use. According to this converter, there are good off-the-shelf programs for project management and parts inventory. To link the five function categories together, a different level program is required, at considerable cost. Money dictates the difference in the programs, in his view.

A third converter said that his company developed its own programs because those available at the time were not flexible enough to meet the company's needs. He reminded attendees that any program is a tool that has value only if people use it. The people who will use the program daily need to be involved in its formulation.

Management by exception is the key to his company's program. If an item is not on an exception report, those referring to the report conclude that the item has been addressed. If the item is listed on a backlog report, and many items are listed, the manager has an idea how far behind his maintenance department is. If the report is small, the presumption is everything is up to date; this works best for this converter.

A converter from Michigan commented that his company is successfully using a system out of Ann Arbor that handles the five function categories. And, the company found that the system works best when management allows the employees to use it, especially project managers.

Q: Traditionally, we have not maintained accurate information on maintenance cost (labor, replaceable spares) on flexo folder gluers. However, it appears that these costs are significantly higher on newer machines than on older, less sophisticated ones. Is this true? Has anyone documented cost/performance ratios in this area?

R: The consensus of converters was that the cost to maintain the new style of flexo folder gluers has increased rather dramatically. Most attributed this to the new electronic controls not available on the older models. One converter cautioned that when these costs are computed, such benefits as reduced crewing and greater productivity must be factored in to get a true picture of the increased costs. Many converters agreed that the newer machines are more reliable. However, when something does go wrong the cost is significantly higher, so the incidence of required repairs must also be factored into the overall cost.

Several converters commented that initial costs appear at first to be low. Some of this reduced cost can be attributed to replacing aged machines with all new machines. The new machines are expected to run with less cost due to their age, and a true comparison cannot be made until they have run as long as the machines they are replacing. One converter suggested converters possibly using TAPPI as a forum to push for inter-

changeability among electronics components to try to keep costs under control.

Q: Has anyone tried computerized inventory control, computerized preventive maintenance, or computerized work order generation in maintenance? What are your results? Are there any success stories on computerized preventive maintenance programs?

R: One converter reported that a maintenance crew, when directed by a maintenance program to the starch silo, identified a major problem and was able to correct the situation. Without the program directing the crew to make this check, the problem would not have been identified before it would have been of serious impact to the production operation. This incident turned a skeptical crew into believers who would argue if someone tried to take their preventive maintenance program away.

Waste

Q: At the Production Roundtable in Nashville, TN, in 1990, a show of hands indicated that approximately 20% of the audience (40–50% of the converters) used TAPPI's 12–videotape series, "Waste Reduction and Control in a Corrugated Boxplant," with varying degrees of success. Can anyone explain exactly what they did or what must be done to attain the TAPPI excellence ratings?

R: One converter replied that his company is successfully using the tapes as the basis for an in-house waste control program. The employees watched the tape about peel waste and after focusing their efforts in the peel waste area, reduced their peel waste to less than 0.20%. Next they will work on core waste and when they succeed, they will proceed with the other tapes in the series.

James F. Stevenson of SAS International presented some of his findings regarding the TAPPI waste reduction videotape series and its effects at different plants. Based on the June 1991 TAPPI Productivity Survey, the top 15% of the plants achieved a waste reduction level of 9.5%. According to Stevenson's findings, the true indicator should not be baled waste but controllable waste, defined as baled plus unit protectors, plus salvage, plus ghost waste. Only when you have a system reporting controllable waste do you know whether to be concerned or not.

Eight of the 12 TAPPI waste-reduction videotapes are corrugator-related. Subjects include peel, core and splice, sidetrim, trim and scheduling, misalignment, warp, bonding, and stops and order change. A tape entitled, "Walk Through a Boxplant," shows the general manager how to walk through his plant and interpret what he is seeing in terms of waste. The other tapes cover material handling, and two tapes address converting. The converting series covers order entry, planning, setup, printing plates, cutting dies, maintenance-related items, and the waste beyond the feed table. According to Stevenson, TAPPI's definition of controllable waste is all waste, except slots and tabs and die cuts. The die cuts include both external and internal cuts. Examples of successes achieved less than one year after implementing waste programs based on TAPPI tapes include, for controllable waste reporting systems: 8% to 5.7%; 6.7% to 5.3%; and 7.5% to

6.5%. For baled waste reporting systems, two examples were cited: 13.9% to 11.3% and 10.6% to 8.9%.

One other example mentioned involved a new manager going into a plant that had gross waste of 15.5% and reducing this to 11.2% in just a few months. This particular plant had a problem with corrugator stops. Determining that the double backer was down 42% of the time that crews were present, the plant cut downtime to 17% and reduced overall waste by 4%.

According to Stevenson, short- and long-term management commitments are required when using the videotapes to implement an effective waste program. Feedback to the involved employees is a necessity, and recognition for success is required. The tapes themselves are not the solution, but only a tool. They are not self-training devices. Waste control does not happen in an office, it happens at a machine on the floor, Stevenson reported. Identifying and resolving problems on the floor is encouraged. A plant must believe that waste is an issue in order for waste reduction to be addressed.

Q: When calculating controllable waste are most plants deducting die cut waste (customer paid) from their total?

R: A show of hands indicated approximately three out of four people present deduct die cut waste from their total. One attendee noted that by definition, die cut waste is not included in controllable waste figures.

Q: What are the lowest waste percentages actually being attained by full converting plants (not sheet plants or sheet producers) using the yield method (1000 ft² in the back door in the form of roll stock less 1000 ft² out the front door in the form of sales)?

R: One attendee said that he knew of three plants where there is commitment, and these are large plants, and for one full year their average controllable waste is 4.7, 5.7, 5.1, and 5.3. Three different plants, three different companies, but with a committed production management.

Q: In the past, most box plants' primary index of waste control was baled waste—a known readily available number. However, baled waste is a poor measure of controllable waste. A yield method comparing paper in vs. board out is a much more accurate system. How many still use baled waste as a waste index? How many use a yield method?

R: A show of hands indicated about 50% of plants using baled waste, approximately 50% using a yield system.

Corrugator communications

Q: By a show of hands, how many converters use communication systems on their corrugators? What was the justification for their use (i.e., blind faith or solid measurement of waste, quality, or productivity)?

R: Approximately 30 people raised their hands in response to this question. Some of these people were responding for more than one plant.

Q: Is wearing communication equipment a condition of employment? Which members of the crew are on the system: operator, clamp, foremen, or all?

R: One converter responded that his company is just introducing communication equipment, with one crew being open to the change and one crew bucking the change. They initially will only use the equipment with the crew in favor of the equipment, and based on the results obtained by this crew will decide later whether to make the equipment mandatory, and who will use it.

Q: What type of ongoing costs do users of communication systems incur? Availability and cost of service and replacement parts? Reasonable or outrageous?

R: One supplier reported that his company successfully uses communications equipment on its installation crews and the crews feel they cannot work without the headsets.

Another supplier commented that there is a wide range of maintenance costs, based on how individuals handle their equipment. He reported about 125 corrugators using their equipment in North America, and reports maintenance costs (assumed to be annual) range from a low of 3–5% of the original or current value of the units to a high of 20%.

A third converter responded that in one of their plants they used communications equipment with good initial results, but after six months the novelty of the headsets wore off. Hot, humid weather made the sets uncomfortable, so the crews went back to hand signals. In their other plant they used a telephone-type communication system, with an alert buzzer at key location. If two parties need to communicate, they will alert each other with the buzzer, pick up the handset, and talk. He reported that this system is working quite well.

Another converter said his company is successfully using a microphone- and speaker-type arrangement (intercom) that is restricted to the corrugator and roll room. When the system breaks down there is a noticeable loss of productivity and the crew is quite dependent on the system. They are considering installing similar systems at their other facilities.

A fifth converter said that his company has a similar system that works quite well. A sixth indicated that his company uses the communications equipment, and although the company requires a great deal of everyday “operator”-type maintenance, has improved productivity significantly. He noted that the headsets are uncomfortable, particularly in hot weather, but the crew demands they have the headsets to use; he does not think they could operate without them.

Another converter said that although they cannot pinpoint a productivity increase due to the use of the equipment, they have experienced an increase in quality and feel the people using the equipment are more efficient in their respective jobs. He said they incurred their greatest cost when the equipment was relatively new, but if the equipment is treated with a little respect, it will last.

Q: What are suppliers doing to improve resolution, reduce interference, reduce battery charge time, and improve battery life?

R: One supplier reported a new series of headset that has a battery life of 60–80 h in the ordinary simplex mode. He advised if alkaline batteries are purchased by the case, significant savings can be realized. In low-power operation, which can be used in many operations, battery life close to 100 h can

be obtained, again, dependent on the amount the radios are used. The units are reported to be lighter yet stronger, more comfortable for the user, and more durable.

One converter who is using the new-style headsets reported they have solved many problems by assigning headsets to each crew member; the battery life is running anywhere from 80 to 160 h. Maintenance has decreased dramatically and cleanliness is not a problem. The finger-pointing when shared units were damaged was eliminated. Some crew members said that the headsets were uncomfortable, but the benefits override the drawbacks and the crews would be lost without them. He also reported improved productivity on the job and “dramatically improved productivity on the corrugator.”

Q: Any legal problems with “shop floor” chatter on radio frequencies shared with the general public?

R: No legal problems were reported. One supplier said that some consideration should be given to the type of radio and frequencies used to minimize outside interference. For the most part, the radios seem to allow the crews to be more productive and are beneficial when on-machine problems need to be resolved quickly because no one needs to hunt for a microphone. Crew mobility is increased and the floor chatter seems to help tie the crew together into a team.

Open questions

Q: Can anyone provide assistance in running a 40H type of coating on the wet end of a corrugator, in regards to controlling normal warp? The liners involved are very heavy, also using heavy-weight mediums.

R: One converter’s response was to monitor the amount of coating being applied; he stated he thought the target was two or three wet pounds per 1000 ft². Another converter said that in a similar situation, his company will use a Keytech unit as a water spray to spray water on the double face liner to counteract the normal warp. Another converter advised that the only way they could successfully run 40H without excessive warp was by adding 40–50% water and working with the various preheaters to get as much heat as possible.

Q: Roll hardness has been mentioned as the best way for checking incoming roll stock. I conducted several tests and couldn’t find a consistent, reliable prediction correlating roll hardness with a bad streak. Has anyone done anything with roll hardness that disproves or proves what the article, “The effect of linerboard roll hardness deficiencies on corrugator performance,” says (*Tappi Journal*, Oct. 1991, p. 67)?

R: One converter said that his company uses a Schmidt hammer to test for roll hardness and looks for consistency across a roll. He advised this is particularly true when dealing with preprint and if a gradient exceeding 10 is noted across the roll, the roll is rejected. He stated that rolls that are overly soft on one side can contribute to twist warp based on their finding. Consistency across the roll, preferably with a gradient of less than 5, is what they are seeking. □