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ADVANCED ADHESIVES REPORT

Your corrugating newsletter from Harper/Love Adhesives Corporation

The reality: get used to higher corn prices

By Rex Woodville-Price

The world corn crop for 2012 has been decimated by severe drought in the midwestern portion of the U.S., a climatological phenomenon the onset of which was so quick that the term *flash drought* has been coined to describe it. Corn reserves are at their lowest levels in decades. With industrial cornstarch being literally at the bottom of the corn food chain, and other foodstuff uses competing for the dwindling remains, we are already seeing a trend for industrial starch to increase in price.

Since starch for food uses can come from other crops such as wheat or tapioca, the price of these starches will also be affected and will not likely present a lower cost alternative for the production of corrugated board.

The impact of the drought is amplified by the Renewable Fuel Standard (RFS) mandate which provides that biofuels such as ethanol produced from corn must be used in the national transportation fuel supply. This was passed by Congress in 2005 and greatly expanded in 2007 so that use now consumes almost 40 percent of the corn crop annually. The wicked combination this year of Mother Nature coupled with the RFS mandate is playing havoc with the price of corn futures.



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The remedy: fight back with low-solids adhesive

By John Kohl

The price of industrial cornstarch, and the cost of the corrugating adhesive made from it, will rise again this year. Next year's increase will be dramatic compared to past increases. This is due to the low crop forecasts, the large volume of corn being sold to China, and the ever-increasing amount of corn being used for the production of ethanol for gasoline. Ethanol will consume 40 percent of the corn crop this year and exacerbate the shortage. Current corn prices are at \$7.65 per bushel vs. \$6.65 per bushel a year ago and \$3.65 in 2010. This is an increase that will be passed on to the starch users at the box plant level.

For many years, box plants were accustomed to paying \$0.11 to \$0.15 per pound of starch. After the ethanol mandate went into effect, the price has been climbing roughly 10 percent year after year. There were some plants

that paid \$0.27 a pound for pearl starch in 2012 and will see this cost rise to over \$0.32 in 2013.

The earlier trend to higher solids

The original Stein Hall adhesives of 40 years ago were in the range of 25 percent solids due to the lack of mixing and shearing capacity of the old two tank systems. As the industry evolved, the introduction of high shear mixers with higher horsepower motors allowed for higher solids without the high viscosities associated with the older systems. These high shear mixers became the norm and the solids were pushed into the 29 percent to 32 percent range. It was thought that the higher solids adhesive with less water was ideal for high speed corrugators since there was less water that needed evaporation from the glue line in a very small window of time. Corrugating starch adhesive formulas have thus remained in the 28 percent to 32 percent solids range for the past 20 years; when we talked about lower solids we were referring to the old 25 percent to 26 percent range.

Today, low solids usually means in the range of 23 percent to 24 percent. The savings to a plant, based on starch adhesive batch cost with solids reduced to this level, are dramatic.

continued

What makes lower-solids adhesive possible

The common misconception that adhesive with solids this low will resemble warm milk and just soak the medium with water, is false. Properly formulated with a performance-enhancing polymer, the low solids starch has the same viscosity and rheology of a 29 percent solids adhesive made with a 300 lb modified carrier. These adhesives are more readily metered down to thinner films for low application rates, resulting in lower consumption with reduced energy cost. The low solids adhesive also has more water available to wet hard-to-penetrate liners faster at high speeds. This helps develop a strong bond with good fiber tear on high speed corrugators.

ADHESIVE COST COMPARISON

FORMULA	HIGHER SOLIDS	REDUCED SOLIDS
CORNSTARCH	770 lbs	575 lbs
WATER	1870 lbs	1915 lbs
PERCENT SOLIDS	29 percent	23 percent
STARCH COST	\$192.50*	\$143.75*
BATCH SIZE	292 gallons	280 gallons
COST PER GALLON	\$ 0.659	\$ 0.513

Reduced solids savings \$48.75
Batches per day 20
Savings per month \$21,450
Savings per year \$257,400

*Calculations based on starch cost of \$0.25 per pound

Ultimately, it's not about batch cost; it's about applied cost per msf

Consumption rates as low as 1.3 lbs per msf C-flute equivalent have also been achieved at speeds of 1200 fpm, with excellent pin values, using adhesive solids as low as 22 percent. This low consumption rate adds up to additional savings of 0.7 lbs/msf of starch from the 2.0 lbs/msf the plant started at. For a plant that produces 1 billion square feet per year and purchases starch at \$0.25 per pound, this adds up to a savings of \$175,000.

Keep in mind that these savings are based on the 2012 starch price of \$0.25 per pound, which will likely be in the \$0.30 range for 2013. This represents a 20 percent increase in cost and savings for the reduced solids adhesive and a possible \$210,000 annual savings. These starch usage reductions are easier to achieve by using reduced solids. When you apply liquid adhesive it is by the gallon, not the pound. If each gallon has less starch due to lower solids, but the same rheology and viscosity, the usage will drop proportionally.

Remember, also, to look at the savings based on *cost per msf produced* as opposed to just batch cost. Ultimately, it is not the total cost of the batch of adhesive that matters, but what it costs to bond a thousand square feet of board (msf). To determine this we first calculate the consumption rate in dry pounds per msf.

Consumption Rate 2.0 lbs/msf x \$0.25 = \$0.50 / msf
2.0 lbs/msf x \$0.30 = \$0.60/ msf

Adhesive cost of \$0.60 per msf may not seem like much but when calculated over a plant's entire production of 80 to 100 mmsf per month; the number becomes huge. If solids reduction can help reduce this controllable cost even a few tenths of a percent, the savings can add significantly to the bottom line.

Jim Carbone receives TAPPI Lifetime Achievement Award

(From remarks by Peter Snyder, presenting the award)

Every so often that rare opportunity comes along that provides us the chance to honor and pay tribute in a public forum to deserving individuals and colleagues who have gone the extra mile for our Industry and our trade association, TAPPI.

The Lifetime Achievement Award, gives deserved recognition to an individual who has spent an extensive career working in our industry and participating in what we used to call the Corrugated Division.

This year's recipient is Mr. James T. Carbone.

Seated with us today are Jim's family, his brothers Donald and Kenneth along with his son James, daughter-in-law Kris and, grandson Jonathan who is an active duty Coast Guard officer currently under consideration for a position as special liaison to the situation room in the White House.



Peter Snyder presents Lifetime Achievement Award to Jim Carbone

James T. Carbone—we call him Jim—has worked in the paper industry since 1954 when joined Flint-Kote mills in San Leandro, CA, after his time in the National Guard. If you do the math that adds up to a 58 year career that is still active, including 30 years as an active TAPPI member.

Jim went to college while working at the mill and earned a degree in Industrial engineering, which he made use of to specialize in:

- The maintenance of paper machines
- Fingered single facers
- Fingerless single facers
- Steam boiler systems
- Corrugator belt technology and heat transfer on the hot plates
- Automatic liner and medium splicers
- High speed corrugating machinery

His employment history includes:

- Flint-Kote Mills—3 years
- Container Corporation of America—18 years
- Westvaco—10 years
- Ogilvie Mills—6 years
- Harper/Love Adhesives—21 years (since 1991)

Lifetime Achievement Award

From a product supplier perspective, our industry creates an unrelenting need to travel. We all travel to visit our customers to conduct audits, service our products and solve customer problems. While some territories are local, some regions actually stretch the entire length of the western hemisphere. This larger territory has been Jim's arena during his time with Harper/Love.

Jim's son James told me that the family nickname for his Dad is the Iron Man. With his career duration and the great distances he still travels this nickname fits him very well.

Based now in Tennessee, Jim has spent extensive time traveling to customers in the U. S. as well as those in Canada, the Caribbean, Central America and South America. As a machine and steam specialist his skills were used extensively at numerous banana box plants in locations such as Ecuador, Panama and Honduras.

These same skills were also employed in industrial box plants throughout Mexico as well as specialty box plants in Toronto, Vancouver and Quebec.

At Harper/Love we have an internal travel calendar that we can use to see the daily/monthly/annual schedule for each field service person. Based on my research using this tool Jim travels well in excess of 60,000 miles a year.

All those corrugating plants, all those miles, all those years add up to a wealth of industry experience.

Jim Carbone has always been willing to share his mechanical knowledge, process expertise and management skills in the TAPPI forum, the ACCCSA forum and with his extensive customer base.

Jim, we thank you for your service and congratulate you again on your many accomplishments. I hope we can be together for a long time.




Jim's family shares his moment of recognition. Back row, left to right, are son James, brothers Ken and Donald and grandson Jonathan. Front row, left to right are daughter-in-law Kris and fiancée Beverly Ricks.

Fortunately Jim's employers have always allowed him to participate in TAPPI activities and serve on technical committees. His activities and accomplishments include the following:

- Corbotec Committee—22 years, twice going through the chairs
- Scholarship and Awards Committee—14 years
- Production Roundtable Coordinator—3 years
- Standards Review Committee—3 years
- Fiscotec Committee—5 years
- Community of Leaders—2002
- Chairman of the 6th Edition of the Corrugating Defect Manual.
- International Advisory Committee—2003
- Marketing Advisory Committee—4 years
- TAPPI Roundtables 1998—2001
- Heat Transfer Workshop—Dallas
- High Performance Workshop—Seattle
- Process Control Committee^o—10 years
- Chicago local section member
- Minnesota local committee member
- CPD Technical Award and Bettendorf Prize winner—2002
- CPD Special Certificate of Appreciation
- Outgoing Chairman Awards
- Kal Linke Technical achievement award
- The 2012 Lifetime Achievement award




Leaders in the science
of making
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LOW-SOLIDS POLYMER PERFORMANCE ENHANCER

Put your corrugator
on a low-starch diet
without sacrificing
adhesive performance

LSP boosts productivity and quality with a lower-solids adhesive. You use less starch and reduce adhesive cost.

- Higher corrugator speeds
- Improves bond quality
- Improves water holdout
- Helps reduce score-cracking in dry weather
- Batch cost neutral: more than pays for itself through reduced starch cost
- Lower BTUs to gelatinize

For detailed technical information, contact your Harper/Love representative or call us toll free at 800-438-3066