# IMPROVED PACKAGING EFFICIENCY WITH AUTOMATION Doyle K. Needham L. P. Brown Company, Inc. Memphis, TN

#### <u>Abstract</u>

Valco et al. reported in *The Cost of Ginning Cotton – 2013 Survey Results* that seasonal labor costs were the largest single expense item comprising about one-third of the total variable ginning cost. By geographic region, seasonal labor costs as a percentage of total variable costs ranged from a low of 30% in the Southeast to 34% in the West. In addition to the burden of high labor cost, the availability of seasonal labor is increasingly difficult to source and retain. Bale packaging suppliers have developed systems to improve packaging efficiency and reduce variable labor cost. A generic review of available technologies and investment returns from commercial ginning operations are presented.

#### **Introduction**

In *The Cost of Ginning* – 2013 Survey Results, the largest variable cost component, on average, was seasonal labor at \$7.91 per bale. If three employees are needed to tie, package, sample and label each bale at a cost of \$11 per labor hour (includes benefit cost), then a gin producing 30 bales per hour would spend \$1.10 per bale in packaging labor alone, or 14% of the total seasonal labor cost per bale. Cotton gin operators have a wide range of systems available to help reduce this cost through automation. Benefits, in addition to reduced operating cost and thus improved profitability, stem from the use of automation. Primary among these are reduced liability and worker's compensation risk associated with an area of the gin with constant forklift traffic, bale movement and other associated risks.

Using average costs for labor and associated benefits, every "wasted" or unnecessary minute of labor costs about \$0.18. So, for a 30 bale per hour gin with four seasonal workers waiting 30 seconds for the next bale, \$0.36 could be saved. Looking at this cost of labor another way, the elimination of one worker that was on the payroll for 12 weeks, working typical seasonal hours at typical seasonal wages, would save about \$13,000 per season.

# **Overview of the Packaging Process**

To further examine the systems available, the cotton bale packaging process can be viewed as consisting of four basic components. These are 1) bale restraint, 2) sample collection, 3) bale covering or wrapping and 4) bale identification. Each sub-process has automation options that can reduce cost.

### **Bale Restraint**

Historically, bale restraint was predominantly fixed-length, wire bale ties applied by hand. This typically required three to four employees, but provided the most uniformity in bale shape and dimensions since the bale ties were of fixed length. In addition to wire, some gins used hand applied fixed length steel strapping. This process was the slowest and most costly with labor costs estimated from \$0.18 - \$0.37 per bale. The next generation was semi-automated systems, allowing for some labor reductions. For wire, the predominant system was the Jenglo<sup>™</sup> system which allowed all bales ties to be placed as a single time and required labor only to load the wires into the tying system. The next generation of automation was placement of steel strap or wire from coils in a fully automated process with estimated labor costs per bale ranging from \$0.04 - \$0.18. The systems included steel strapping systems offered by Signode and wire tying systems. Today, strapping systems are relatively simple mechanics and can rapidly apply the bale tie. Plastic strapping systems are currently offered by Samuels and Signode. An automatic wire method offered by L. P. Brown is the UltraTwist<sup>™</sup> system that feeds six galvanized wires from a spool and produces a twist lock joint. Based upon our measurements of tying speeds, the UltraTwist<sup>™</sup> system is the fastest of all automatic systems.

## **Sample Collection**

Every cotton bale must be sampled to determine fiber quality. The basic steps in this component are: to remove the sample that is cut by the "cookie cutters" in the bale press; to split or divide the sample in accordance with USDA protocol; to correctly label the split samples for USDA and storage; and lastly, to package the sample for storage or

for shipment to the USDA classing office. In a manual process, two workers are normally required for this step, and these workers may also have other packaging responsibilities. It is estimated that \$0.09 - \$0.18 of labor per bale is required to manually collect and process the sample.

With an automated sample collector, the cut sample is mechanically removed from the bale, collected and transferred by mechanical or pneumatic systems to a central location where a single employee (often a scale clerk) will split, label and package the samples. It is estimated that \$0.03 - \$0.045 of labor is required to automatically collect and process the sample.

## **Bale Covering or Wrapping**

Through the years, this process has moved from placement of sheets of fabric onto the bale press with the bale ties placed outside of the bale wrap to hold it in place. Today, bale ties are applied before the bale covering is applied and most bagging systems use a pre-formed bag of polyethylene or woven polypropylene.

The most labor intensive concept involves employee(s) placing a bag onto a chute device, holding the bag on the chute while insuring that the bale is fully placed into the bag. An employee must then seal the open end of the bag with tape, zip ties or other approved methods. Depending upon ginning rate, these employees may not be able to perform any other functions in the packaging process. It is estimated that \$0.33 - \$1.10 of labor is required to manually apply a bale bag, depending upon labor allocation and ginning speeds.

Systems today are available to partially automate this process using a device to assist the placement of a bag from a pallet or station onto the chutes. L. P. Brown offers a semi-automatic bagging system, as does Samuels. With both of these systems, bag closure remains a job function of an employee. With the L. P. Brown system, sample handling is included as part of the machine function, normally reducing the labor requirements by an additional employee. It is estimated that \$0.18 - \$0.55 of labor is required to operate a semi-automatic bagging system.

Fully automated systems allow for bale wrapping to occur, including sealing of the bale wrap and tagging (discussed later) without employee intervention. The first system offering this fully automated packaging process was the Jenglo<sup>TM</sup> bagger. Today, both L. P. Brown Company and Samuels offer systems with automated processing. The L. P. Brown system, available for both polyethylene film and woven polypropylene bags, includes sample handling and can generally be operated by one employee. It is estimated that 0.04 - 0.36 of labor is required to operate a fully automatic system.

# **Bale Identification**

Cotton bales are uniquely identified, that is, every bale must be labeled individually with the bale identity remaining unchanged from the creation of the bale until it is consumed at the textile plant. Bale identification is accomplished by application of a machine- and eye-readable tag or label that is secured to the bale covering by tape, adhesive, zip tie or wire. Only two options exist for the application of the bale identifier – manual application of tags or labels requiring one or two employees and fully automatic labelers requiring occasional labor to change rolls. It is estimated that manual application of bale tags costs between \$0.03 - \$0.06 per bale while a fully automatic system costs less than \$0.005 per bale.

#### **Summary**

Reduced ginning costs can be accomplished by evaluating and calculating the cost/benefit that can accrue from the use of automated packaging systems and investing in automation technology that lowers seasonal labor needs. Before making any automation purchase decisions, management should consider the following questions:

What is my true labor availability? Can I find and hire workers? Will they show up Saturday night or Sunday morning?

What are my financial goals?

Is it to make a minimal capital investment? or

Is it to actively reduce seasonal labor needs?

What am I getting for my investment?

Will the investment only assist my labor or will it actually eliminate labor?

How long will it take to recover my capital investment?

L. P. Brown offers a simple spreadsheet to assist in the decision making process. Using that tool, a southwestern gin determined that purchase of a fully automatic bagger from our company would save the gin almost \$63,000 in labor costs annually or a per bale savings of \$1.25. With that level of savings, gin management quickly decided to purchase the system. L. P Brown offers multiple options to automate the bale packaging process and stands ready to assist all gins in this decision-making process.

### **References**

Valco, T.D., H. Ashley, D.S. Findley, J. K. Green, R.A. Isom, T.L. Price, J. M. Fannin. 2015. The Cost of Ginning Cotton – 2013 Survey Results. 2015 Proceedings of the Beltwide Cotton Conferences, National Cotton Council, Memphis, TN.