HIGHER CAPACITY GIN LINE REDUCES COSTS Mark D. Cory Cherokee Fabrication Company, Inc. Salem, Alabama

Abstract

A gin line can be defined to include a saw-type gin stand along with its accompanying extractor feeder, followed by an air jet lint cleaner, and finally one or two stages of saw-type lint cleaning. Each machine in the gin line must be able to handle the desired capacity in order to fully realize the reduced operating costs associated with higher ginning rates. If each gin line has a great enough capacity, the number of gin lines required in any one contemporary volume gin plant can be reduced.

Introduction

Most industries today are being asked to produce more than ever before, while at the same time tightening their financial belts. The cotton ginning industry has not been exempt from these same economic pressures. As demands for new gin plants or changes to existing plants arise, careful planning can help control the costs associated with new equipment purchase, energy costs, and personnel requirements. Overall productivity, another important point to consider when discussing operating costs, suffers any time the lights are on and bales are not going out the back door. The goal of this paper is to introduce the Cherokee Magnum gin line, and at the same time demonstrate ways to take advantage of related cost saving strategies that might otherwise go unrecognized.

Materials and Methods

At the heart of any ginning operation is the gin stand. The new Magnum 244 saw gin stand is 12 feet wide, with the greatest number of saws found in any single machine on the market today. When joined in series with the new Magnum extractor feeder, the Magnum pneumatic jet lint cleaner, and the Magnum 142 saw-type lint cleaner, a single Magnum gin line as seen in Figure 1 can operate at over 30 bales per hour. Using this gin line as a foundation, costs can be controlled in several ways.



Figure 1. Magnum Gin Line at Keich-Shiver-Miller Gin in Monette, AR.

Equipment Costs

When the total number of gin lines required to reach a specific desired plant capacity is reduced, it becomes clear that fewer pieces of equipment are required. In addition, there must be a section of conveyor distributor over each gin stand, which can be reduced in length along with the number of hanger bearings required when there are fewer gin stands. Each gin line requires ductwork to connect the gin stand to the air jet cleaner, and then to the lint cleaner. Each gin line requires ductwork or a conveyor to remove the extractor feeder trash, the gin stand motes, the lint cleaner trash/motes, and finally the fiber leaving the lint cleaner. Each gin stand needs a section of screw conveyor to remove the seed, and another to remove the trash beneath the air jet cleaner. Each machine in the gin line needs power and control wiring, along with corresponding motor controls and switch gear. In addition, there are one-time labor costs associated with installing each of these items.

Personnel Requirements

Fewer gins to watch means fewer eyes required to watch them. Also, as gin stands have become wider through the years, it has become more difficult to open the roll box door. With many contemporary models, the ginner must have a helper to safely handle the door. Quite often there are latches or pins that must be disengaged before the door can be opened, and these can become bent or difficult to disengage due to rust or contamination. In contrast, the Magnum 244 has a powered roll box door, which is opened by a single ginner at the touch of a button. A safety feature prevents the roll box door from opening unless the breast is out and the agitator motor is not powered up.

Overall Productivity

Along with the powered roll box door, the seed roll retainer forms part of the final roll box configuration in the Magnum 244 gin stand. The seed roll retainer itself can also reduce costs in at least three ways: In some systems, ginners risk choking up the seed line if all of the gin stands dump their seed rolls at the same time, which will cause a substantial loss of production for a period of time. Secondly, good lint is lost anytime a partially ginned seed roll is dumped, which reduces the overall turnout. Finally, there is no loss of production when the breast is returned to ginning position if the seed roll is already present, since it would otherwise take some amount of time to build up a new seed roll.

If the roll box door is opened, the seed roll retainer swings away to allow the seed to more easily escape out of the bottom of the roll box. A partial cross-section drawing of the seed roll retainer is shown in Figure 2; on the left the breast is in the ginning position, on the right the breast is out of the ginning position. The seed roll retainer is shown in the normal ginning position with solid lines, and in the retaining position with the dashed lines.



Figure 2. Seed roll retainer.

Ease of maintenance must also be included when considering machine productivity. As the time finally comes to replace a saw cylinder, the front of the Magnum 244 can simply be un-pinned up top and the front can be lowered to the floor allowing easy access to the saw. In addition, the agitator can be changed without having to disassemble the cylinder stub shaft, and can be removed through either end or through the top of the gin stand.

The heads and legs of the machine are made from 1-1/2" thick steel plate to provide stability and endurance. The rib rails are machined from 2" x 4" solid steel bar stock to resist bowing during heavy ginning loads. The agitator, picker roller and optional upper moting screw conveyor are equipped with direct drive motors as seen in Figure 3, which reduces the number of bearings and belts required for any one gin stand.



Figure 3. Direct drive motors on the Magnum 244 at Bernie Farmers Gin in Malden, MO.

Cherokee introduced these concepts with the 2007 installation of the first Cherokee Avenger 174 gin stand in West Texas. Many more Avenger 174 gin stands have been installed since then, and The Magnum 244 is built upon the foundation of these same rock-solid, field-proven features.

The color touch-screen control panel is easy understand and has one of the widest viewing angles available on the market today. The large display makes it easy to see the feeder rate, saw motor load and agitator motor load. Each of these is displayed in a bar graph and a numeric percentage format. The screen also includes pushbuttons for increasing or decreasing manual feed rate, breast in and out and the gin hood pressure switch values. There is also a true automatic feed rate control switch.

We are also pleased to let you know The American Society of Agricultural and Biological Engineers (ASABE) announced that Cherokee Fabrication has won an AE50 award for the Magnum 244 Gin Stand. It was deemed one of the year's most innovative designs and is featured in the January/February 2013 special AE50 issue of ASABE's *Resource* magazine.

Additional Considerations

When looking at the bigger picture, the plant layout also plays a large role in controlling costs. One such example can be seen in Figure 4 at the Bogue Chitto gin in Macon, MS. There are two Magnum gin lines in this plant, with room to add a third in the future. There is no overflow hopper at the end of the conveyor distributor, so that all of the cotton overflow drops into the module feeder hopper. This arrangement provides a much simpler plant layout and eliminates the need for a traditional overflow hopper, vacuum wheel, diverter valve, elevator fan, separator, and cyclone. Each of these machines would also have needed ductwork, steel supports, motors, starters, wiring, controls, and installation labor. Each time a new gin plant is designed, we like to think there are opportunities to make improvements in the machinery and at the same time look for ways to reduce the overall complexity and operating costs.



Figure 4. Bogue Chitto Gin in Macon, MS.

Summary

When coupled with the new Magnum Extractor Feeder, Magnum Jet Lint Cleaner, and Magnum 142 Saw-Type Lint Cleaner, the 12 foot wide Cherokee Magnum 244 Gin Stand is at the heart of the highest capacity gin line to date. The new Magnum 244 saw gin stand has an extra heavy-duty construction plus the same unique high-capacity and ease-of-use patented features found in the Cherokee Avenger 174 saw gin stand: a powered roll box door, automatic seed roll retainer to prevent seed roll loss when ginning is interrupted, and ease of access for saw cylinder changes.

When each gin line has a great enough capacity, the number of gin lines required in any one contemporary volume gin plant can be reduced, along with the associated connecting ductwork, fans, screw conveyors, controls, and related equipment. Overhead savings can also be realized with higher hourly through-put and fewer machines to maintain and operate.