UPDATE ON HIGH-PERFORMANCE GINNNING AND LINT CLEANING FROM LUMMUS Mark D. Cory Lummus Corporation Savannah, GA Ross D. Rutherford Lummus Corporation Lubbock, TX

Abstract

As presented at the 2015 Beltwide technical Conference, the 2014-2015 ginning season marked the introduction of a new high-performance ginning and lint cleaning line from Lummus Corporation. At that time, the features of this new line were described in detail, but the system in whole had not yet been operated in the field. Mention was made that we would follow up this year, which is part of the purpose herein. The portion of the ginning process being discussed includes the extractor-feeder, gin stand, centrifugal-type lint cleaner, and saw-type lint cleaner. In addition to the items mentioned above, we would like to briefly mention some of the other new development work at Lummus.

Introduction

This paper aims to briefly recap some of the new features found in the specific gin line including: the 120-inch wide Model 700TM III Extractor Feeder, the 222-Saw Gin Stand, the 120-inch wide Super-Jet[®], and the 144-inch wide SentinelTM II Lint Cleaner. The new features found in the 144-inch wide SentinelTM II Lint Cleaner have proven to have so much appeal that we redesigned the 108-inch wide SentinelTM II Lint Cleaner to include these same features starting this year, and also will offer selected features in the form of upgrade kits to existing 108 SentinelTM customers. We installed and ran nine new gin lines with each of these new machines for a complete gin season this year.

Materials and Methods

In the form of a brief recap to last year's paper, we offer the following background on this gin line.

<u>120-inch wide Model 700™ III Extractor Feeder</u>

There are a number of important and distinguishing features in the Model 700[™] III not previously found in the Model 700[™] II. Many of the features in this offering are unique to the Lummus design.

1. The inlet feed rollers are now directly driven by a multi-voltage, 1 horsepower gearmotor with a hollowshaft drive.

2. The channel saw cylinders and spiked cleaning cylinders are outfitted with our proprietary Star-Lobe[™] hubs and stub shafts that facilitate easy replacement.

3. The v-belt drive system has been reengineered to remove the jackshaft, jackshaft bearings, and jackshaft sheave.

222-Saw Gin Stand

The 222 was introduced a few years ago, but has undergone some important changes since that time.

1. An optimized doffing brush chamber is now an integral part of the 222 design to facilitate an increased lint removing potential.

2. The agitator / oscillator cylinder is driven by two separate 7-1/2 horsepower motors on each end of the gin stand.

3. The 222 now includes an outboard bearing on the saw shaft and a heavy-duty timing belt drive.

120-inch wide Super-Jet[®]

The Super-Jet[®] lint cleaner was the first of its kind when introduced by Lummus over 50 years ago, and to this day, its cleaning performance has not been bested by any other centrifugal-type lint cleaner. This season marked the first 120-inch wide version and further enhancements to include a long-life, low-voltage LED lighting system. Also, the front panel includes a new access slot for improved operator cleaning and maintenance during operation.

144-inch wide Sentinel[™] II Lint Cleaner

The field results from the 144 SentinelTM II Lint Cleaner exceeded our expectations because not only did it bring the proven fiber quality preservation inherent in the patented technology originating in the 108 SentinelTM II Lint Cleaner (U.S. Patent 7,779,514) to a 144-inch wide machine, but it did so with a lower pressure drop across the separator cylinder than the previous design. This reduced pressure drop can equate to incrementally less energy required for the exhaust fan and cyclone system.

1. The grid bar section is split in the middle, which allows for easier adjustment and access due to shorter grid bars and doors.

2. There is an additional clean-out door for the Separator Brush Cylinder from the front side, at the top of the machine. This door has the same safety interlock as the doors in front of the grid bars.

3. The heavy-duty, full-width steel Feed Plate has an adjustable center support.

4. There is an additional clean-out access near the bottom of the front doors to allow the use of a blow-down wand to clean the dust off the lower grid bars.

5. The support stand (an item that shipped loose on the 108 Sentinel[™] II) is now an integral part of the machine, which provides for increased stability during shipping, simplified installation, and rugged operational performance.

6. The exhaust plenum has improved accessibility for set-up and clean-out. There is also an adjustable panel inside to manage the pressure drop and air distribution across the full width of the machine.

The cleaning cylinder on the 144 Sentinel[™] II turns at the same RPM as its smaller brother in order to maintain proven fiber quality results without sacrificing throughput per foot of width. By virtue of an increase in width without a decrease in RPM of the cleaning cylinder, the capacity of this machine has been truly increased by 25%.

There were nine of these high-performance gin lines installed this year; eight were in Australia with two different customers, and the ninth one in North Carolina. Overall, the gin lines performed well. The Australian customers were so pleased with how smoothly the 144 SentinelTM II Lint Cleaners performed, that they both made the comment; "We forgot the Sentinels were even back there." The 222 gin ribs presented some challenges during the break-in period, and we will address some of these rib concerns in the new products section below.

For this season, the 4-way values used with the 144 SentinelTM II Lint Cleaners when set up in a tandem arrangement were offered with a new remote control option. This version of the traditional 4-way value is powered by pneumatic cylinders which can be controlled from the gin console.

New Products for 2016

Several new offerings have come about as a direct result of the research and testing related to the new 144 Sentinel[™] II Lint Cleaners. The biggest of these is the complete redesign of the 108-inch wide Sentinel[™] II Lint Cleaner to include most of the new features and heavier construction employed in the 144-inch wide version.

The new upper clean-out door providing access to the separator cylinder brushes and the redesigned lower door have proven to be popular, and are now offered in upgrade kits to existing 108 Sentinel[™] customers.

The new 700[™] Feeder III is also now available in the 96" width and it made its premier at PPF Gin in Texas, this year.

The new Super-Jet[®] features are also now available in the 94" wide version.

For 2016, we completely redesigned the 4-way valves used to connect back-to-back lint cleaners. The new freestanding design is of a sturdier construction, with integral slip joints, and streamlined ductwork to reduce leaks and pressure losses. Because the 4-way valves used with the new 144-inch wide lint cleaners for last season powered with air cylinders were so well received, we added this same powered valve option to the new product line. This new system is offered for use with both the 108 and the 144 lint cleaners.

The new PPF Gin & Warehouse in Paris, Texas, was selected as one of the test sites for the new Signode GinFast[™] System this year, where they produced finished cotton bales making use of this new bale package. Lummus was

selected to develop and produce the unique bale handling system utilized at this particular gin per Signode specifications. Variations on this and other specialized bale handling systems can be provided by Lummus to customers who adopt this new bale package.

Lummus introduced the High-Speed, Variable-Stroke (HS/VSTM) tramping system a couple of years ago and reported on this technology at the Beltwide. At that time, we had only applied this patented technology to presses producing High Density bales in Australia. This technology was based on testing originally performed at Southeastern Gin in Surrency, Georgia. This year marks the first use of the HS/VSTM system on a UD bale uppacking press, and it was integral to the success of the new Lummus PremierTM III Dor-Les[®] Press at United Cotton Growers in Texas.

Last year, we made mention of a next generation of Lummus Digital Gin Controls under development. This system includes a color touchscreen with more intuitive graphics and several new features. It allows more flexibility in how operators can change the settings using either the typical arrows for increasing and decreasing values, or alternatively allowing for a quick direct numerical input with a pop-up keypad. The automatic operation can also be tailored by the operator to key primarily off of seed roll density only, or saw load only, or even a combination of the two depending on conditions. The customizable features can easily be reset to the original factory settings at the touch of a button. We installed, tested, and refined new controls at Southern States Gin in Statesboro, Georgia. These are now available for the 2016 season.

With the introduction of smaller seed varieties in recent seasons, one of the problems facing ginners today is an increased tendency for seed to find its way past the gin stand. Unfortunately, the new 222 gin stands we ran last year were not exempt from this universal concern. In a joint developmental effort with Richard Kelly at Burlison Gin in Tennessee, we manufactured, installed, and tested a prototype gin rib insert to help address the small seed loss in their Consolidated 184 gin stands. This curved insert fits the standard Consolidated cast 184 or 222 gin rib. We are happy to report that the test proved to be very successful, and these special inserts will be made available for the 2016 ginning season.

At the same time, we have been developing a new patents-pending ginning rib system for use with Consolidated gin stands. This prototype approach introduces a new heavy-duty rib rail, allowing a 222 gin stand to be converted to a 234 saw gin stand. The first test took place at Silver Lake Growers Gin in Elm City, North Carolina, last month. The results were very encouraging, even though the weather conditions did not provide an ideal sample of seed cotton. Their 222 gin stand has a 250 HP motor on the saw shaft, providing an excellent test bed for the new rib rails and increased number of saws. The general manager, Donald Smith, reported a capacity of 28 bales per hour sustained for about $\frac{1}{2}$ an hour before they ran out of cotton. He also reported a significant improvement in how much cleaner the seeds were after the conversion; but most importantly, the goal of dramatically reducing seed loss was achieved to his satisfaction. This prototype rack of ribs and saw cylinder was removed and relocated to Carson County Gin in White Deer, Texas, for further testing. We hope this new location will allow us to gin with a 222 and a 234 side-by-side for turnout comparison with the next few days.

We are making two more small lots of 234 test ribs to refine the design prior to offering these for sale to the public. We plan to make these new ribs and rib rails available to convert many existing Consolidated 198 and 222 gin stands to 234 saws, and existing Consolidated 164 and 184 gin stands to 194 saws. We CNC machine this new Consolidated steel rib entirely in the USA. Incidentally, Lummus is no stranger to offering CNC machined steel ribs made in the USA; Lummus Imperial 170 and 158 customers have enjoyed this option for over 15 years.

We also introduced a new heavy-duty rib rail for Lummus Imperial 170 Gin Stands for this season and placed the first unit in the 158 to 170 conversion sold to Suffolk Gin in Virginia. It performed well and is expected to allow gins electing to use a 200 hp saw motor to bring this power increase to its full potential.

<u>Summary</u>

This was an exciting year of new developments and testing, along with the new high-performance ginning and lint cleaning lines that were installed in both Australia and the U.S. We are looking forward to further improvements to our product line this year, and plan to bring more new products to the industry next year.