

HIGH-PERFORMANCE GINNING AND LINT CLEANING FROM LUMMUS

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Abstract

The 2014-2015 ginning season marked the introduction of a new high-performance ginning and lint cleaning line from Lummus Corporation. Desire for greater capacity, improvement in lint quality, and ease-of-use features often drive market demands for machinery in the cotton ginning field, and the current industry climate proves to be no exception. The portion of the ginning process being discussed here includes the extractor-feeder, gin stand, centrifugal-type lint cleaner, and saw-type lint cleaner. Experimentation, empirical evidence, and customer input have yielded results leading to significant improvements in each product offering representing these aspects of the ginning and lint cleaning process. While simply increasing the width of each machine may, at first glance, seem to provide the desired results, there are a number of other factors to consider. Take, for example, the challenges relating to power transmission techniques and electrical demands. An increase in width also brings about additional concerns relating to vibration and the sheer increase in machine weight. Serviceability, operator safety, and ease of installation must be addressed, all the while responding to the current needs of the industry. Many of these areas of concern will be addressed. The specific machine models being presented here are the 120-inch wide Model 700™ III Extractor Feeder, the 222-Saw Gin Stand, the 120-inch wide Super-Jet®, and the 144-inch wide Sentinel™ II Lint Cleaner.

Introduction

This paper aims to specifically cover some of the new features found in the 222-Saw Gin Stand, and present three new machines: the 120-inch wide Model 700™ III Extractor Feeder, the 120-inch wide Super-Jet®, and the 144-inch wide Sentinel™ II Lint Cleaner. Together, these make up the new high-performance Lummus ginning and lint cleaning line for the 2014-2015 ginning season.

Materials and Methods

Due to the introductory nature of this paper, we will be able to provide descriptions, line drawings and photographs to demonstrate the points being made herein. Because data has not yet been collected in the field testing of all of these machines, such information can be prepared in a subsequent paper. The new version of the 222 gin stand ran at two locations in West Texas during the 2014 gin season. The other machines covered here are currently being shipped to customers in Australia and will be running in early 2015.

120-inch wide Model 700™ III Extractor Feeder

Lummus previously introduced a 120-inch wide extractor feeder to accompany the 198 & 222 ginstands, however this season marks the introduction of the Model 700™ III. 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. (Figure 1)

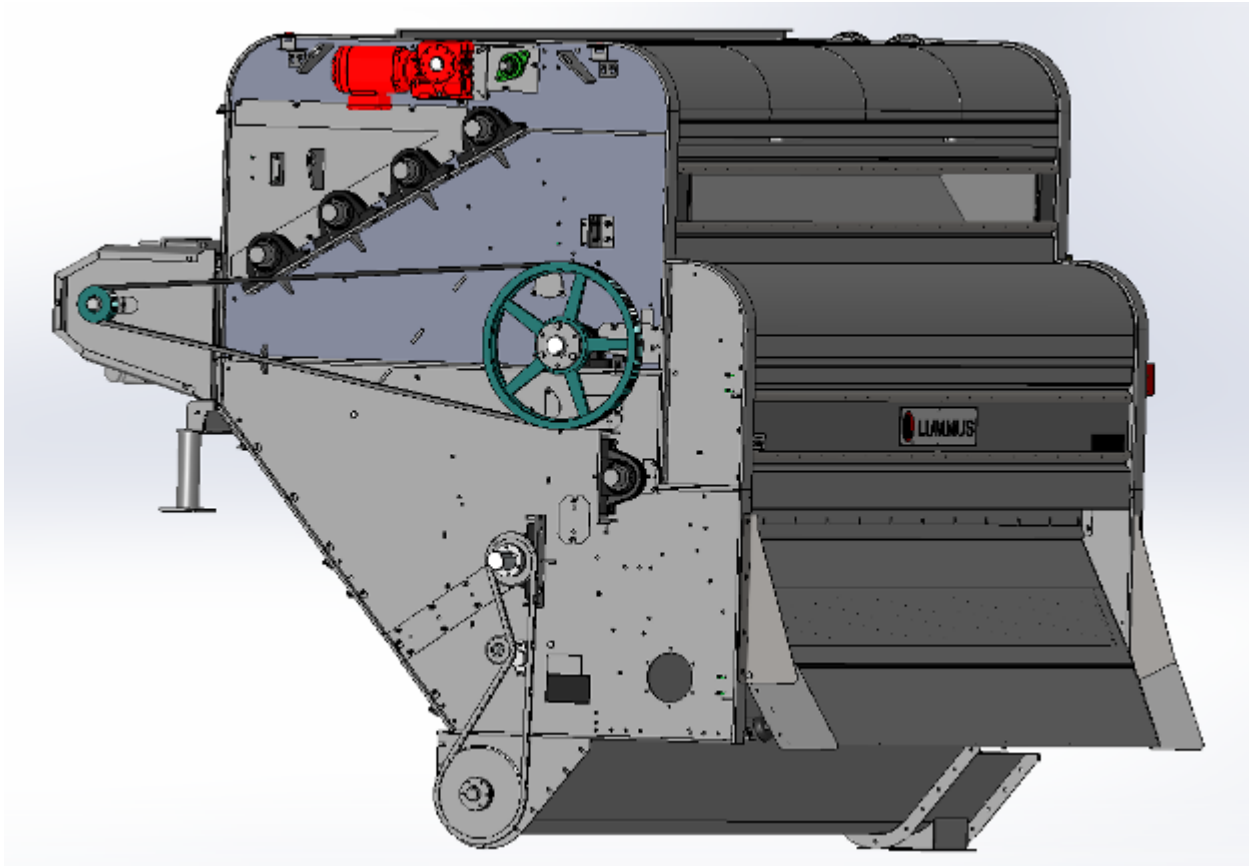


Figure 1. 120-inch wide Model 700™ III Extractor Feeder

1. The inlet feed rollers are now directly driven by a multi-voltage, 1 horsepower gearmotor with a hollowshaft drive. This means the gearmotor slides over the shaft of one of the feed rollers and is mounted at the top of the feeder. This eliminates the maintenance requirements associated with the previous sprockets, idler shaft, and roller chain. There is an increase in horsepower from 3/4 to 1 over previous offerings, so this gearmotor allows for a greater capacity range.
2. Both channel saw cylinders are identical and maintenance-friendly, being outfitted with our proprietary Star-Lobe™ hubs and stub shafts that facilitate easy replacement. The same is true for the four spiked cleaning cylinders.
3. The v-belt drive system has been reengineered to remove the jackshaft, jackshaft bearings, and jackshaft sheave. This reduces possible sources of vibration and lowers maintenance requirements.
4. The machine end heads and channel saw grid rack end heads have been stiffened to allow the grids to be adjusted with set screws in a fashion similar to what has been a common practice with grid bars in lint cleaners.

222-Saw Gin Stand

The 222 was introduced a few years ago, but has undergone some important changes since that time. (Figure 2)



Figure 2. 222-Saw Gin Stand at Carson County Gin in White Deer, TX

1. New gin and feeder guards have been designed to compliment the marriage between the Model 700™ III Extractor Feeder and the 222-Saw Gin Stand.
2. An optimized doffing brush chamber is now an integral part of the 222 design to facilitate an increased lint removing potential.
3. The agitator / oscillator cylinder is driven by two separate 7-1/2 horsepower motors on each end of the gin stand. This design distributes the torque evenly across the width of the machine to increase shaft life.
4. The 222 now includes an outboard bearing on the saw shaft and a heavy-duty timing belt drive. The outboard bearing is mounted on an easily-adjustable base, which provides a two-fold advantage; the saw shaft is not exposed to excessive over-hung loads and stresses when the belt is properly tensioned, and, the engineered timing belt drive system allows for maximum utilization of available horsepower.

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 marks 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 Lummus 144 Sentinel™ II Lint Cleaner brings fiber quality preservation and economy of scale together utilizing the proven and patented technology originating in the 108 Sentinel™ II Lint Cleaner (U.S. Patent 7,779,514). Using this technology, individual tufts of fiber are applied directly to the saw, rather than agglomerating the lint into a batt on a low-speed revolving condenser drum. The 144 Sentinel™ II also adds several features not found in other members of the Sentinel family of machines, and unique within the ginning industry. (Figure 3)



Figure 3. 144 Sentinel™ II Lint Cleaner

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%.

The 4-way valves used when 144 Sentinel™ II Lint Cleaners are set up in a tandem arrangement come with a new remote control option. This version of the valve is powered by pneumatic cylinders which can be controlled from the gin console.

New Products

Several more new products are under development. One of these is the next generation of Lummus Digital Gin Controls. This system includes a color touchscreen with more intuitive graphics and new features. There will be limited availability for 2015.

Summary

This new high-performance ginning and lint cleaning line includes features unique to the Lummus product line, while also allowing better utilization of available horsepower and ease of access for maintenance. The improvement in capacity comes without sacrificing fiber quality. The superior fiber quality comes without increased fiber loss.