

MOTORIZED GRID BARS ALLOWS VARIABLE LINT CLEANING

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Abstract

Many applications require that the leaf count of the lint will be below a certain number, however the ginner does not have a direct means of obtaining that objective. By providing a method to vary the amount of lint cleaning performed in the cotton gin, the grower can specify a grade and benefit from increased turn out.

Motorized grid bars and an algorithm for controlling the operation of a lint cleaner provide a solution. The motorized grid bars can be positioned in an engaged or disengaged position. When the grid bar is in the engaged position it participate in the lint cleaning process. When it is in the disengaged position it does not participate in the active cleaning process. The grid bars can be engaged or disengaged in the cleaning operation by pneumatic actuators which are activated by the system processor. The system also includes an operator interface terminal, to allow the operator to enter the desired cotton gin output leaf content. An imaging device, such as a digital camera or a scanner, measures the amount of trash present in the lint before cleaning and another after the lint cleaning process. The signal received from the imaging device is analyzed and the trash content is determined. The system algorithm determines which grid bars should be engaged in the cleaning process to obtain the operator's (or grower's) desired output trash content.

Introduction

Lint cleaning machines, employ stationary grid bars to remove trash, leaves and other particles from the lint during the cleaning process. It has been demonstrated that during the cleaning process the grid bars also remove some usable lint from the rotating saws, causing a loss to the producer [1]. It has been further determined that the amount of trash and lint removed during the cleaning process is dependent on many factors. It has been demonstrated that loss of useable lint can decreased by reducing the amount of cleaning the machine performs. It has also been demonstrated that reduction in the amount of cleaning results in longer fibers and reduction in short fibers. Existing lint cleaners do not allow to vary the amount of cleaning the machine performs. Its grid bars are fixed and cannot be dynamically repositioned.

Anthony describes new design of a lint cleaner which to reduce fiber waste using rotating louvers. In this design the space between the grid bars is closed by louvers while the grid bars themselves remain stationary during the cleaning process. The disadvantage of Anthony's invention is that it does not remove sheet metal edges from contacting the lint.

Some trash particles are not removed by the lint cleaner, and they remains with the lint through the remainder of the ginning process. The amount of trash remaining in the lint is measured as a leaf count. The leaf count is one of the parameters used to determine the quality of the lint.

Materials and Methods

A single lint cleaner was fitted with seven rotating grid bars. The gin was operating with one gin stand such that all lint pass through the retrofitted lint cleaner.

Test Description and Results

The purpose of the test was to verify the concept of rotating the bars during operation, and to observe the make up the motes and how it varies as function of the grid bars rotation.

Measured amounts of lint were processed by the cleaner under several grid bar deployment configurations. The estimated turn out and amount of motes was assessed for each configuration tested.

The following observations were made: Rotation of a single grid bar reduces the amount of motes, however not all grid bars affect motes content the same way. Removal of consecutive grid bars followed by an active grid bar causes increase in motes contents.

Discussion

The concept of rotating grid bars has not been used up until now. From small number of test it has been demonstrated that savings in lint can be materialized by rotating grid bars. The lint should be kept close to the saws by a retaining surface in order to reduce the amount of lint lost in the cleaning process. The amount of motes, in addition to the leaf content should be monitored in order to obtain accurate condition of the cleaning process. The affect of the individual grid bars should be measured and characterized in order to provide accurate control algorithm for the system. Additional test, lasting a full ginning season needed to obtain quantitative results for the utilization of the rotating grid bars.

References

Mayfield et al.; Effects of Grid Bars On Lint Cleaners Performance; The Cotton Gin and Oil Mill Press; June 13, 1992

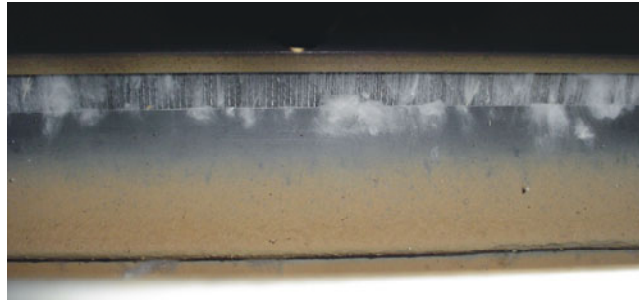


Figure 1. Grid bar on the saw causing lint loss.

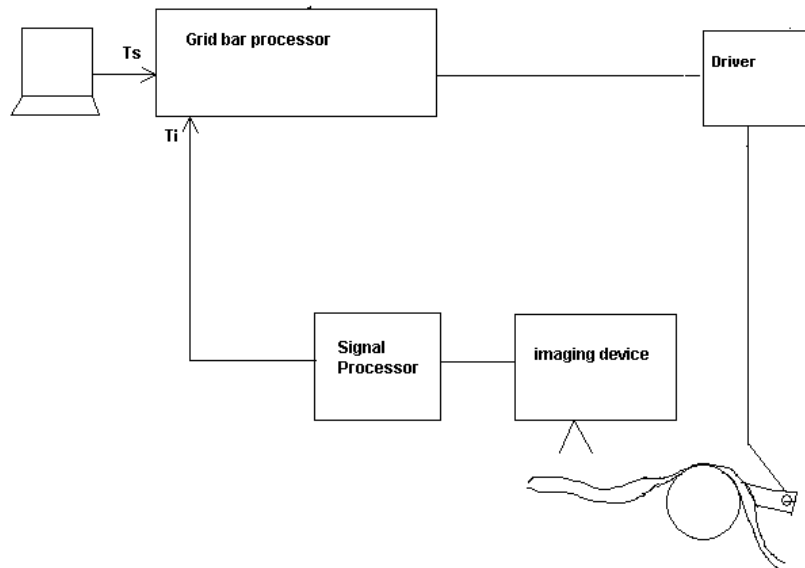


Figure 2. System Diagram