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Study Of The Process Of Cleaning Seedcotton

Yoldashev Khasanboy

Namangan Institute Of Engineering And Technology1,

Komiljon Abduraximov

Namangan Institute Of Engineering And Technology1,

Maftuna Inamova

Namangan Institute Of Engineering And Technology1,

Kamoldin Mirgulshanov

Namangan Institute Of Engineering And Technology1,

ABSTRACT: The quality of fiber depends on the amount of impurities in the seed cotton. The cleaning of seed cotton has a great impact on the quality of fiber. Therefore, the theoretical and practical study of the cleaning process leads to the production of quality fiber. If the cleaning process is applied to the fiber quality without theoretical and practical calculations, the quality of the fiber will deteriorate.

KEYWORDS: Burs, limbs, branches, extractor-feeders, impact cleaner, Air line cleaners

INTRODUCTION

The term “seed cotton cleaning” is often used interchangeably by the ginning industry when referring to the process performed by either the total cleaning and extracting system of a gin or by specific types of machines within the system. In its more restrictive sense, "cleaning" refers to the use of various types of cylinder cleaners designed primarily for removal of dirt and small pieces of leaves, bracts, and other vegetative matter. "Extracting," on the other hand, refers strictly to those processes designed to remove large trash, such as burs and sticks, from the seed cotton. Bur machines, stick machines, extractor-feeders, and combination bur

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and stick machines are examples of extracting-type machinery. The cleaning and extracting system in a modem gin serves a dual purpose. First, large trash components, such as burs, limbs, and branches, must be extracted from the seed cotton so that the gin stand will operate at peak

efficiency and without excessive downtime. Second, seed cotton cleaning is often necessary to obtain optimum grades and market values, especially when ginning high-trash-content cotton. Also, cleaners and extractors help open the seed cotton for more effective drying, which is usually done concurrently

with cleaning. The amount of cleaning and extracting machinery required to satisfactorily clean cotton varies with the trash content of the seed cotton, which depends in large measure on the method of harvest

Table 1

№	Typical trash levels for machine-picked and machine-stripped cottons[1]		
1	Type of trash	Trash level (lb/bale)	
		Machine-picked[2]	Machine-stripped[3]
2	Burs	34	450
3	Sticks	9	115
4	Finetrash[4]	26	110
5	Motes	30	25
6	Total	99	700

1Typical seed cotton trash levels are based on the results of standard fractionation tests
conducted at the USDA-ARS ginning laboratories.
2 Based on 1,400 lb of first-picked seed cotton with an initial trash content of 7 percent. Second-picked or scrapped seed cotton will contain about twice as much trash as first-picked cotton.
3Based on 2,150 lb of stripper-harvested cotton with an initial trash content of 32.5 percent.

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4 Includes soil, leaves, bracts, etc.

Cylinder Cleaners

Virtually all cotton produced in the United States today is harvested mechanically, either by pickers

(74 percent) or strippers (25 percent). A small amount (1 percent) of machine-scrapped cotton is recovered from the ground each year by specially designed salvage machines after the regular harvest. The trash contents of seed cotton vary widely as a result of the different harvesting methods employed and the year-to-year variations in the weather during the cropping season. While these variations in trash level appear to be very wide when viewed from a beltwide perspective, variations within a given ginning community are usually not nearly as great. Most gins process either picked or stripped cotton and are usually equipped with only the amount and type of cleaning and extracting machinery required for the most severe conditions expected in their trade area. For less severe conditions, part of the system should be bypassed to prevent excessive weight losses and to reduce the possibility of overmachining the cotton. Seed cottoncleaning should be restricted to that which is necessary to ensure smooth, trouble-free ginning and that which is needed to obtain optimum balevalues.

The principle of operation of cylinder cleaners

Cylinder cleaners are used for removing finely divided particles and for opening and preparing the seed cotton for the drying and extraction processes The cylinder cleaner consists of a series of spiked cylinders, usually 4-7 in number, that agitate and convey the seed cotton across cleaning surfaces containing small openings or slots The cleaning surfaces may be either concave screen or grid rod sections, or serrated disks, such as those found in impact cleaners. Foreign matter that is dislodged from the seed cotton by the action of the cylinders falls through the screen, grid rod, or disk openings for collection and disposal. A typical screen is made of 2-mesh woven galvanized wire cloth.

Although screen-type cylinder cleaners have been largely replaced by the more durable grid-type cylinder cleaners, screen-type cleaners continue to be popular in some areas as the last inclined cleaner in the cleaning sequence. Grid sections are normally constructed of

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3/8-inch-diameter rods spaced about 3/8 inch apart). Grid spacings in excess of 3/8 inch provide additional cleaning, but they also allow more cotton to be lost in the process The Trashmaster cleaner (Lummus Industries), however, overcomes this problem by employing a seed cotton reclaimer to recover the cotton from the trash The Trash master cleaner uses a 5/8-inch grid spacing. In another type of machine, the impact cleaner (Continental Eagle Corp.), cotton is conveyed across a series of rotating serrated disks that form a unique revolving grid system. This cleaner is also equipped with a cotton reclaiming section. The reclaimer sections used in the Trashmaster cleaner and impact cleaner not only reclaim locks of cotton lost during the initial cleaning but also clean the locks before returning them to the main

cotton stream. Cylinder cleaners can be further classified with respect to how they are used

in the gin. In this respect they are either air line, air-fed, or gravity-fed cleaners

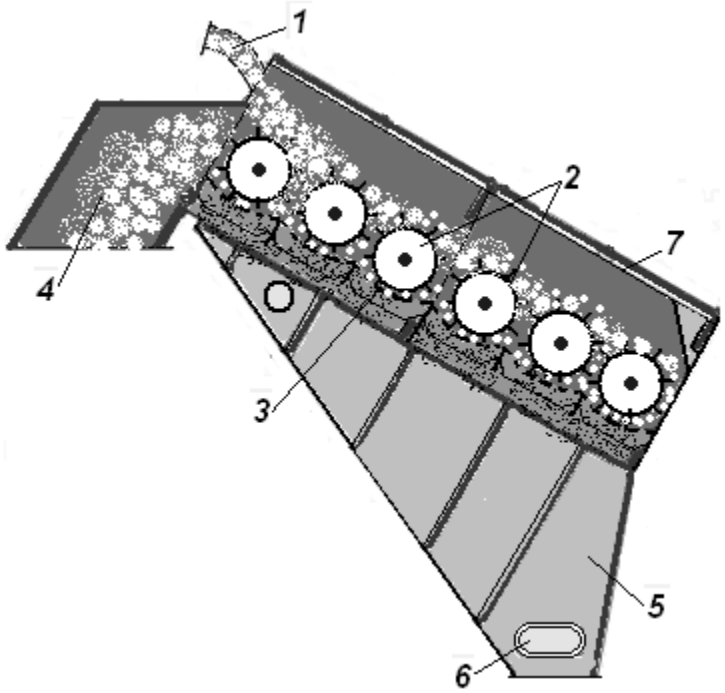

Figure 5-12. Six-cylinder, air-fed inclined cylinder cleaner equipped with screen sections (courtesy of Continental Eagle Corporation)

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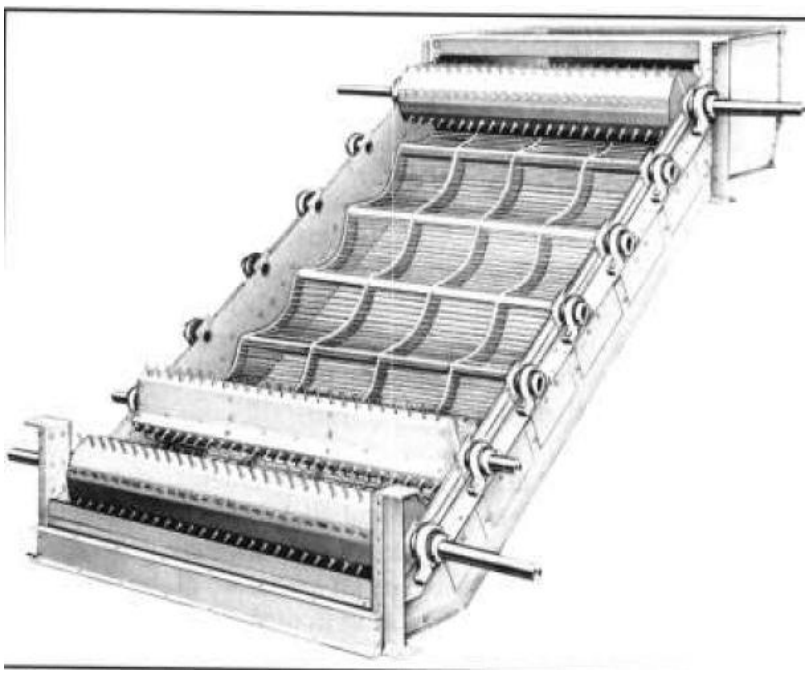

Figure 5-13. Inclined cylinder cleaner equipped with grid-rod sections (courtesy of Continental Eagle Corporation)

Air line cleaners are usually mounted in a horizontal position in the unloading-system air line. These installations normally permit both the air and seed cotton to pass through the cleaner. In some designs an air line cleaner is combined with a separator to provide both cleaning and seed cotton/air separation. Air line cleaners have gained wide acceptance in stripper areas as a means for removing soil particles from seed cotton and for opening partially closed bolls and wads of seed cotton for further cleaning. Air-fed and gravity-fed cylinder cleaners (fig. 5-18) are usually used immediately with grid-rod sections

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№	Sizes and characteristics of commercially available cylinder cleaners					
1	Manufacturer and type	Width(s) Available (ft)	Cleanng cylinders		Approximate capacity per foot of width(s) (bales/hr)	Horsepower requirement per foot of width
			Number	Speed (rpm)		
2	Consolidated Inclined 6,8,10 7 450 2.0 1.8 Air line^ 6 4 450 2.5 2.5	6,8,10	7	450	2.0	1.8
3	Air line^ 6 4 450 2.5 2.5	6	4	450	2.5	2.5

Cylinder cleaners are currently manufactured in widths of 6, 8, 10, and 12 ft, with rated capacities of 1-1/2 to 2-1/2 bales/hr/ft of width. For higher capacities two cleaners can be installed in parallel, with each machine cleaning half the seed cotton. Specifications of commercially available cylindercleaners are given in table 2

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