

Ginning and Spinning Operation

Level II

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MODULE TITLE: - PERFORMING COTTON GINNING OPERATIONS

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Acknowledgment

Ministry of Labor and Skills wish to extend thanks and appreciation to the many representatives of TVET instructors and respective industry experts who donated their time and expertise to the development of this Teaching, Training and Learning Materials (TTLM).

Acronym

(TTLM):-Teaching, Training and Learning Materials

SCI: spinning consistence index

Mic: Micronaire value

UHML: upper half means length

EFS®: Incorporated's Engineered Fiber Selection®

Str: strength

CGrd: color grade

TrAr: trash area

DR: double roller

OAQPS: Office of Air Quality Planning and Standards

HVI: HIGH VOLUME INSTRUMENT".

P.M.: Preventive Maintenance

Introduction to the Module

Ginning is the process of separating cotton fibers from the seed bolls. It is the first mechanical process involved in processing cotton. Ginned cotton referred to as lint and it is used for spinning operations, where lint is converted to yarn.

This process removes foreign matter, control moisture and remove other contaminants that significantly reduce the value of the bale. This module covers the skills and knowledge required to prepare and operate cotton ginning machinery and performs relevant operator level maintenance. It includes the appropriate recycling and waste disposal processes, determining parameters such as final moisture content and standardization of bale weights.

This module is designed to meet the industry requirement under the Ginning and Spinning Operation occupational standard, particularly for the unit of competency:

This Module is developed to provide you the necessary information regarding the following content coverage and topics:

- Check seed cotton for moisture
- Evaluate trash content of cotton modules
- Operate cotton ginning machinery
- Operate bale or mote press
- Carry out operator maintenance
- . Dispose of waste materials
- Monitor product quality
- Communicate process information

Learning Objective of the Module

- Check seed cotton for moisture
- *Evaluate trash* content of cotton modules
- Operate cotton ginning machinery
- Operate bale or mote press
- Carry out operator maintenance
- Dispose of waste materials
- Monitor product quality
- Communicate process information

Unit one: Check seed cotton for moisture

This unit is developed to provide you the necessary information regarding the following content coverage and topics:

- Calibrating and preparing test equipment
- Testing and reporting moisture content of seed cotton

This unit will also assist you to attain the learning outcomes stated in the cover page.

Specifically, upon completion of this learning guide, you will be able to:

- Apply Calibrating and preparing test equipment
- Determine Testing and reporting moisture content of seed cotton

1.1 Calibrating and preparing test equipment

Instruments are calibrated for fiber length, length uniformity, micronaire, and fiber strength through the use of calibration cottons. Tiles are used to calibrate color and trash measurements. Calibration is performed at regular intervals for each quality factor. Calibration is about managing risk and finding errors in measuring systems.

Trash is a measure of the amount of non-lint materials in cotton, such as leaf and bark from the cotton plant.

What are the 3 ways to test seeds?

Accuracy

1. Evaluation (examining the seed for a color change in the embryo).
2. Purity test: The percentage of seed described on the label that is actually found in the quantity of seed.
3. Weed test: Examines a sample of seed and identifies every seed that is different from the labelled seed kind.

What are the 5 methods of seed testing?

Methods of Seed Testing | Botany

Some of the common terms and methods have been described below:

- I. Seed Lot: ...
- II. Purity Test: ...

Thus, if the initial weight of a seed sample is 50 gm and the pure seed portion weighs 40 gm, then the purity of the lot is:

- I. Seed Weight: ...
- II. . Seed Moisture Content: ...
- III. Germination Test: ...

What are the 4 methods of testing the viability of seeds?

- The Paper Towel Method. This is one of the easiest tests you try. ...
- Water Test. This test is fast and easy, but it's not the most reliable way to test seed viability.
- Sand Germination Test. This test takes 7-10 days, on average. ...
- The Soil Test.

What is the easiest method of seed testing?



Fig 1 seed testing

A Simple Germination Test for Seeds

- Sow seeds onto moistened paper towels to monitor germination rates.
- Bag up your test seeds but check them regularly for signs of germination.
- 100% germination is nice, but not essential.
- Don't waste your sprouted seeds – eat them

indirect Tests of Viability

- Cutting test. The simplest viability testing method is direct eye inspection of seeds which have been cut open with a knife or scalpel. ...
- Topographical tetrazolium test. ...
- Excised embryo test. ...
- Radiographic methods. ...
- Hydrogen peroxide. ...
- Authenticity. ...
- Damage, health. ...

- Purity.

The seed testing procedures which are described below are based mostly on the international rules because most of our rules are based on,

Method of mixing and dividing

- Mechanical dividing.
- Modified halving method.
- Hand halving method.
- Random cup method.
- Spoon method.

1.1.2 preparing seed cotton for tests

Checking moisture content prior to ginning taking accurate readings

Moisture: The Roller Gins can take up to 10-11% moisture but above that the drying process should be adopted before feeding the seed cotton to the ginning machines and the moisture Contents should be brought down to below 10% before ginning.

1.2 Testing and reporting moisture content of seed cotton

The moisture absorbed by any textile fiber depends upon the surrounding climatic conditions. If the re Ideal Cotton Moisture. When measuring the moisture of cotton prior to ginning it, the ideal moisture content for cotton, according to information cited 6.5% relative humidity is high or more than standard, the fibre absorbs.

1.2.1How to test for seed moisture content

With years of experience in seed testing, we offer a great variety of methods for seed moisture content testing, adjusting to characters of different plant species, and various research purposes. First of all, as a direct testing approach, moisture content can be measured by quantifying water loss from dried seeds.

What is the ideal temperature and humidity for cotton fibre testing?

Some laboratories utilize ISO 139:2005 which calls for a temperature of 21 ± 1 °C and 65 ± 4 % relative humidity considering the measure uncertainties of the probes. The strength and elongation tests of cotton fibre is subject to change based on moisture content, with other physical measurements subject to a lesser amount of change

The ASTM standard calls for a temperature of 21 ± 1 °C and 65 ± 2 % relative humidity when testing cotton fiber and a relative humidity specification of 65 ± 5 % for testing.

Self check-1

Test-I Matching

Instruction: select the correct answer for the give choice. You have given 1 Minute for each question. Each question carries 2 Point.

A

B

___1. standard Relative
humidity

___2. standard temperature

___3. Germination Test
for Seeds

___4. Seed Viability Tests

A. A. 21 ± 1 °C

B. $65 \pm 2\%$

C. The Paper Towel Method

D. easiest method of seed testing

E. Used when ruler is too long

Test II: short Answer writing

Instruction: write short answer for the given question. You are provided 3 minute for each question and each point has 5Points.

1. How to test for seed moisture content?
2. What is the easiest method of seed testing?
3. What are the 3 ways to test seeds?

Note: Satisfactory rating – above 60% Unsatisfactory - below 60%

You can ask you teacher for the copy of the correct answers

Unit Two: Testing and reporting moisture content of seed cotton

This unit to provide you the necessary information regarding the following content coverage and topics:

- Types of trash in cotton seed
- Quantifying types trash
- .Reporting and recording outcomes of evaluation

This guide will also assist you to attain the learning outcomes stated in the cover page.

Specifically, upon completion of this learning guide, you will be able to:

- Identify Types of trash in cotton seed
- Determine Quantify types trash
- Perform record or report evaluation

2.1 Types of trash in cotton seed

(i) **Seed:** Seed impurity is the largest type of impurity present in raw cotton and it includes un-ginned seeds with fibers attached to it, ginned seeds and parts of seeds.

(ii) **Chaff:** vegetable fragments consisting of leaf particles, bract, shale and stalk of the cotton plant. Bract is a small type of a leaf that grows beneath the cotton boll and shale is the silvery interior lining of the cotton boll.

(iii) **Dirt:** Dirt impurity includes soil and particles that may be added from the cotton fields due to mishandling of the fibers' and also the cotton fibers pick up dust and sand if they are transported by open trucks.

(iv) **Micro-dust:** micro-dust includes very fine particles of chaff, dirt, small fiber fragments and spores of mildew. These particles are extremely small and are often a fraction of the fiber diameter. They generally get embedded around the natural wax of the cotton fibre

v) **Abnormal Impurities:** The abnormal impurities are very rare however when found in the cotton fibres, they can cause serious problems. These impurities include pieces of stones, pieces of iron, cloth fragments, foreign fibres such as jute, polypropylene, etc.

That may be included due to the bagging , grease and oil (from machine harvesting or ginning), tar and coal (from the air while the cotton fibres are transported openly), small pieces of wood, etc

2.1.1 Trash in cotton seed

1. Trash is a measure of the amount of non-lint materials in cotton, such as leaf and bark from the cotton plant.
2. Trash in cotton refers to non-fibre particles such as leaf, seed coat, bark, grass, dust and other foreign matters.
3. Trash content in cotton is a strong consideration in the present cotton grading system, because the presence of trash degrades yarn evenness,
4. Yarn strength and fabric appearance and causes problems in textile processing.
5. The methods that have been used for assessing trash content in cotton may be divided into two basic groups: geometric and gravimetric.

The geometric methods estimate the trash portion in a sample according to sizes of particles, while gravimetric methods evaluate trash content by trash weight.

The classer's grade is the most commonly used geometric method by which a classer compares trash contaminants in a cotton sample with those in the standard samples.

The HVI trash meter is a replacement for this visual assessment method using the video image technology.

The typical gravimetric devices are the Shirley Analyzer (mechanical separation of foreign matter from fibre) and the Micro Dust and Trash Analyzer (aero-mechanical separation).

The AFIS-T (Advanced Fibre Information System, Trash module) uses the aero-mechanical technique to separate a fibre sample into fractions, and an electro-optical sensor to measure particle size in each fraction.

The HVI trash meter is a very efficient trash measuring instrument, and the result is correlated to the classer's grade.

However, current image analysis techniques used in the HVI trash meter limit its data to the count and the percent area of trash particles.

It lacks an ability to provide information about detailed particle size distribution and trash classification, which is extremely useful for process optimization and prediction of cleaning behaviour during processing. Since the trash meter employs a black and white video camera and a simple image thresholding technique, trash misidentification, such as surface shadow areas, cannot be effectively avoided, thus undermining the accuracy of trash measurements. The typical type of ruler used for measurement.

We have been conducting a research project to develop a new image analysis system for comprehensive, accurate and fast cotton colour and trash analysis (CCTA). In this paper, we focus on the explanation of a new thresholding method, multi-dimension thresholding, for trash identification, and the methods for characterizing size, shape, colour and density of trash particles..

2.1.2. Definition trash in cotton seed

1. Shirley trash analyzer is used
2. 100 g cotton sample is processed & fibrous portion collected in ‘trash tray’ is processed again through trash analyzer
3. Collected trash (after second passage) is weighed & expressed as % of weight of cotton
4. It is trash % of cotton & invisible loss is ignored
5. Non-lint content = 100- lint% is not used (as it includes invisible loss)
6. Obtained trash content gives good correlation with B/R droppings, & can be used to predict process waste in B/R

If cost consists of seeds...

1. Test 100g fresh sample (without seed) for trash %
2. Estimate % of seed weight by manually separating
3. seeds from 1 kg of cotton
4. This weight % of seeds should be added to trash % of
5. cotton to obtain total trash content

E.g. Trash content in cotton is 5.5% and weight of seeds is 20 g in 1 kg, then total trash content

$$\text{Total trash content} = 5.5 + (20 \times 100) \% 1000 = 7.5\%$$

Determination of Seed coats

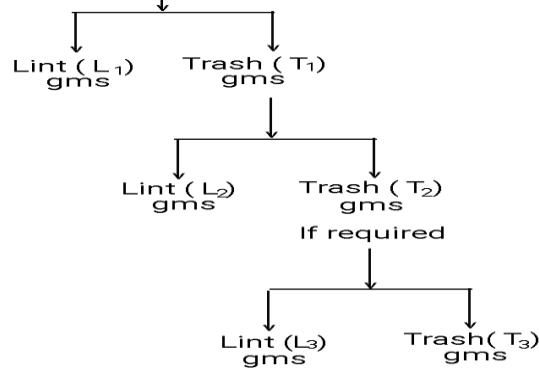
- Due to use of hybrid cottons, proportion of seed coats has increased
- These seed coats have fibers attached to it, and are difficult to remove
- Causes thick places, neps, & short length slub like faults in yarn
- Therefore, % of seed coat type trash in mixing must be determined
- Can be measured by sieving trash obtained in above procedure through a mesh-10
- Matter that remains above is called as seed coats

Trash Analysis in Cotton Fibres: When the cotton bolls pass through the ginning machine, the cotton seeds get separated from cotton fibres. The broken leaves, dust also get removed up to some extent. Some cotton seeds also get broken during the ginning process. The seed coats do not eliminate from cotton. The ginned cotton has many impurities in it. We can say that any type of impurities present in cotton fibres is called trash. Such impurities are plant leaves, seed coats, and dust etc. The amount of trash in the cotton fibres is expressed in terms of percentage. Trash percentage plays a decisive role in the cotton price. The quality of the yarn is also affected by the trash percentage present in cotton fibres. Low trash percentage ensures a better quality of yarn. Low trash percentage cotton has a high price in comparison to cotton having a high trash percentage.

Trash elimination process:

- 1) The cotton lints are placed on the feed table.
- 2) The cotton lint's are opened manually by hand before placing them on the feed table.
The lint's feeding is done uniformly.
- 3) A fairly thin fleece of cotton lint feeds in the analyzer. The hard lumps of trash and full cotton seeds are picked up manually from the test samples and are weighed with trash.
- 4) If these trash lumps and full seeds are allowed to feed with cotton lints, the feed table plate and taker-in wire points may get damaged.
- 5) The airflow control valve is opened at beginning of the test and this valve is closed after the end of each test .Method of trash analysis in cotton fibres:
- 6) The whole method of trash analysis is given below: 1 - 100 gm of cotton is weighed accurately. It is passed through a Shirley trash analyzer.
- 7) The cotton lint's are passed a minimum of two times through the trash analyzer.
- 8) Half of the lint's are placed on the feed table in the form of a uniform fleece before starting the trash analyzer. The remaining lint's are added during a test. If the trash is still found to contain a sizable amount of lint's the trash is further processed through a trash analyzer.
- 9) The lint's found after two or three times proceedings are weighed together.
- 10) The amount of trash is weighed after the final proceeding.
Now the trash percentage and invisible loss are calculated. Generally, two samples of 100 gm each are analysed separately.
- 11) The average of both samples is calculated

100 GM's cotton



Lint % = $(L_1 + L_2)$
 Trash % = T_2
 invisible loss % = $100 - (\text{lint\%} + \text{trash \%})$

if the sample is processed for three times, then the trash percentage is calculated as below

Lint % = $L_1 + L_2 + L_3$
 Trash % = T_3
 Invisible loss = $100 - (\text{lint\%} + \text{trash \%})$

$$\text{Cleaning efficiency of a machine (\%)} = \frac{T_1 - T_2}{T_1} \times 100$$

Where ,

T_1 — Trash in the material fed

T_2 — Trash in the material delivered

$$\text{Cleaning efficiency of a machine (\%)} = \frac{T_1 - T_2}{T_1} \times 100$$

Where ,

T_1 — Trash in the material fed

T_2 — Trash in the material delivered

2.2 Quantifying types trash

Quantitative analysis of cotton lint trash by fluorescence spectroscopy the presence of cotton plant botanical components, or trash, embedded in lint subsequent to harvesting and ginning is an important criterion in the classification

of baled cotton considered the clean ability as the easiness or the difficulty for cotton to get rid of its impurities. Simultaneous research from the machinery industry quantified five variables which could perfectly affect the cleaning behaviour. These are: the initial trash and dust content, cotton characteristics, the type of machinery, production rate and cotton moisture content On the other hand, the preparatory processing is defined as the necessary spinning preparation to lead the cotton for given trash levels.

It mainly depends on the trash content and the cotton clean ability
In addition, the use of second raw material is related to the spinning process, the quality of fibre and the yarn to be produced. Many published papers have discussed the reuse of recovered fibres in spinning. Confirmed that these fibres can be reused for the open end spinning. The requirements of quality imposed on the finished products allow only the addition of tiny quantities of recovered fibres. Therefore the proportion of secondary raw material blended with primary material must be carefully studied. In a study consecrated to the rotor spinning process, concluded that up to 20% of recovered fibres can be blended with primary raw material without noticeable changes in quality.

Reporting and recording outcomes of evaluation

Detailed Report (DPR) on cotton ginning & processing gives you access to decisive data such as:

Market growth drivers

- Factors limiting market growth
- Current market trends
- Market structure

Self check-2

Test-I Matching

Instruction: select the correct answer for the give choice. You have given 1 Minute for each question. Each question carries 2 Point.

- | | |
|---|--|
| <p>A</p> <ol style="list-style-type: none"> 1. Micro-dust 2. Chaff: 3. Abnormal Impurities 4. Seed 5.dirt | <p>B</p> <ol style="list-style-type: none"> A. vegetable fragments consisting of leaf B. impurity includes soil and particles C. impurity is the largest type of impurity D. very fine particles of chaff, dirt. E. very rare however when found in the cotton fibers, |
|---|--|

Test II: short Answer writing

Instruction: write short answer for the given question. You are provided 3 minute for each question and each point has 5Points.

4. What are the Determination of Seed coats?
5. What is the Quantitative analysis of cotton?
6. What is the Trash elimination process?

If cotton consists of seeds...

1. Test 150g fresh sample (without seed) for trash %
2. Estimate % of seed weight by manually separating
3. seeds from 1 kg of cotton
4. This weight % of seeds should be added to trash % of
5. cotton to obtain total trash content

E.g. Trash content in cotton is 6.5% and weight of seeds is 30 g in 1 kg, then calculate total trash content?

Note: Satisfactory rating – above 60% Unsatisfactory - below 60%

You can ask you teacher for the copy of the correct answer

Unit Three: Operate Cotton Ginning Machinery

This unit to provide you the necessary information regarding the following content coverage and topics:

- Ginning machine settings
- Operation of ginning machine
- Housekeeping of workplace

This guide will also assist you to attain the learning outcomes stated in the cover page.

Specifically, upon completion of this learning guide, you will be able to:

- Perform Ginning machine settings
- Operate of ginning machine
- To keep workplace

3.1 Ginning machine settings

A cotton ginning is a machine that quickly and easily separates **cotton fibers** from their seeds, allowing for much greater productivity than manual cotton separation. This process removes foreign matter, control moisture and remove other contaminants that significantly reduce the value of the bale.

Purpose of ginning

To separate lint cotton and seed

To remove foreign matter,

To control moisture

To remove other contaminants that significantly reduce the value of the bale

3.2 Operation of ginning machine

Operate, maintain, and repair gin equipment, vehicles and machinery in connection with the ginning of cotton; load and unload bales in gin and for transport; operating large farm equipment and primarily John Deere machinery equipped with GPS such as tractor, picker, combine for cultivating, tilling, fertilizing, planting, moving, storing, harvesting grain and oilseed crops such as soybeans, corn, cotton; assisting with the grain bin and auger operation; assisting with the

installation, operation, and maintenance of irrigation systems for watering crops; driving farm vehicle; minor daily and incidental upkeep to equipment and worksite.

3.2.1 Types of ginning machines

There are two main types of ginning machines:

A Roller gin

This consisting of two rollers turning together by means of a hand crank. It is used only for extra-long staple fibers loosely attached with seed. It is not used for fuzzy fibers.

Roller gins have a lower capacity than saw gins and consequently, the cost of roller ginning is higher than saw ginning.

Roller-covering material is made from 13 layers of plain-woven cotton fabric cemented together with a white rubber compound. Rotary-knife roller separate fiber from seed by using the frictional forces between a moving roller and fixed stationary-knife surface.

During normal ginning, the roller-to-fiber force is greater than the stationary-knife-to fiber force; therefore, the fiber sticks to the roller surface and slips on the stationary knife surface. Cotton is ginned as fibers adhered to the roller surface slip under the stationary knife which holds the seed. The rotary knife clears the stationary knife edge of accumulated seed cotton and ginned and partially-ginned seed. Partially ginned seed are either pulled back to the stationary knife or swept along with the seed and later reclaimed.

At the ginning point, seed cotton trash is separated with about 45 to 50 percent going with the lint and the remainder with the seed.

The carryover declaimer removes un-ginned and partially-ginned cotton from the seed flow and returns them to the distributor for ginning.

Cleaning equipment includes cylinder cleaners, stick machines and revolving screen (impact) cleaners. Tower dryers and hot-air cylinder cleaners are commonly used for seed cotton drying.

Optimum fiber-moisture content for roller ginning is 5 to 6 percent. Drying below 4 percent cause increased static-electricity problems and fiber breakage

Roller ginning is the most primitive way of removing lint from seeds. There have been many variations and refinements in the machines working in many countries around the world but the fundamental principle of a harsh pulling of fibers from the seed coat has not changed. Fibers are gripped between rollers, blades or a roller and a blade and stretched to be separated from seeds.

The space through which fibers are stretched is so narrow that, it does not permit seeds passing through with lint. The process is comparatively slow but considered to be gentle.

Roller-type gins include the reciprocating knife single roller the double roller and the rotary knife roller in a double roller (DR) gin, two leather rollers, pressed against a stationary knife, rotate in opposite direction. When the seed cotton is fed to the gin, fibers adhere to the rough surface of the roller and are carried in between the fixed knife and the roller, and partially gripped between them. Oscillating knives beat the seeds from top and separate the fibers, which are gripped from the seed end. The seeds are carried forward on the roller and doffed out of the machine. F fiber comes out from the bottom side.

The roller gin utilizes a leather roller to draw the fibers between a fixed knife and the roller. The pulling action of the roller on the fibers combined with the pushing action of the moving knife are required to remove the fibers from each seed. The seed then falls through a seed grid and the fibers are removed from the roller by a rotating doffer.

In a rotary knife roller gin, seed cotton is applied to the ginning roller, with the separation of fiber and seed taking place as the lint is pulled under the stationary knife. The rotary knife directs seed cotton to the ginning point, sweeps cottonseed away from the ginning point, and releases the seed cotton that was not fully ginned to be drawn back to the tip of the stationary knife for further ginning.

The number of roller gin stands installed determines the capacity of the ginnery (provided that it is not limited by the capacity of the bale press).

Roller ginning systems in the US normally include similar seed cotton cleaning as used for upland cotton. Cleaning equipment may include cylinder cleaners, stick machines, and revolving screen (impact) cleaners, depending on seed cotton cleanliness (whether it is machine picked or handpicked.) To wet dryer and hot- air cylinder cleaners are commonly used for seed cotton drying. Lint cleaning in roller gins is different from saw gins and varies among locations. The most common lint-cleaning sequence utilizes Inc line, impact, and air-jet cleaners. Saw-type lint-cleaners are only used for machine picked cotton to remove motes broken seed, entanglements and pin trash not removed in seed cotton cleaning. Roller ginned cotton is baled using the same pressing equipment as up and cotton.

B Saw gin

Saws were spaced on a shaft to provide openings and allowing the seed to drop out the bottom. It is the modern one and separates fuzzy fibers.

The cotton ginning is a machine that is used to pull cotton fibers from the cotton seed

A cotton gin—meaning "cotton engine"—is a machine that quickly and easily separates cotton fibers from their seeds, enabling much greater productivity than manual cotton separation. The fibers are then processed into various cotton goods such as calico, while any undamaged cotton is used largely for textiles like clothing. The separated seeds may be used to grow more cotton or to produce cottonseed oil.

Whitney's gin used a combination of a wire screen and small wire hooks to pull the cotton through, while brushes continuously removed the loose cotton lint to prevent jams. It revolutionized the cotton industry in the United States, but also led to the growth of slavery in the American South. Whitney's gin made cotton farming more profitable, so plantation owners expanded their plantations and used more slaves to pick the cotton. Whitney never invented a machine to harvest cotton, it still had to be picked by hand.

Purpose Cotton fibers are produced in the seed pods ("bolls") of the cotton plant where the fibers ("lint") in the bolls are tightly interwoven with seeds. To make the fibers usable, the seeds and fibers must first be separated, a task which had been previously performed manually, with production of cotton requiring hours of labor for the separation. Many simple seed-removing devices had been invented, but until the innovation of the cotton gin, most required significant operator attention and worked only on a small scale.

Mechanism[The gin stand uses the teeth of rotating saws to pull the cotton through a series of "ginning ribs", which pull the fibers from the seeds which are too large to pass through the ribs. The cleaned seed is then removed from the gin via an auger conveyor system. The seed is reused for planting or is sent to an oil mill to be further processed into cottonseed oil and cottonseed meal. The lint cleaners again use saws and grid bars, this time to separate immature seeds and any remaining foreign matter from the fibers. The bale press then compresses the cotton into bales for storage and shipping. Modern gins can process up to 15 tones (33,000 lb) of cotton per hour.

This section needs expansion with: How the cotton gin actually separates the fibers from the seeds. The functional components of the machines and their action on the raw cotton, differences between types, how the waste is remove

Diagram of a modern cotton gin plant, displaying numerous stages of production

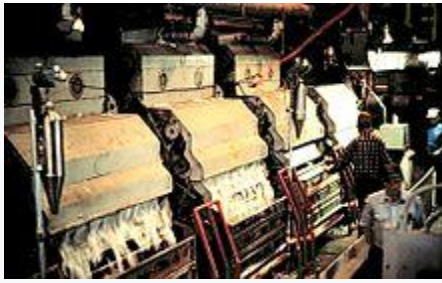


Fig 1 Modern cotton gins

In modern cotton production, cotton arrives at industrial cotton gins either in trailers, in compressed rectangular "modules" weighing up to 10 metric tons each or in polyethylene wrapped round modules similar to a bale of hay produced during the picking process by the most recent generation of cotton pickers. Trailer cotton (i.e. cotton not compressed into modules) arriving at the gin is sucked in via a pipe, approximately 16 inches (41 cm) in diameter, that is swung over the cotton. This pipe is usually manually operated, but is increasingly automated in modern cotton plants.

The need for trailers to haul the product to the gin has been drastically reduced since the introduction of modules. If the cotton is shipped in modules, the module feeder breaks the modules apart using spiked rollers and extracts the largest pieces of foreign material from the cotton. The module feeder's loose cotton is then sucked into the same starting point as the trailer cotton.

The cotton then enters a dryer, which removes excess moisture. The cylinder cleaner uses six or seven rotating, spiked cylinders to break up large clumps of cotton. Finer foreign material, such as soil and leaves, passes through rods or screens for removal. The stick machine uses centrifugal force to remove larger foreign matter, such as sticks and burrs, while the cotton is held by rapidly rotating saw cylinders.

The gin stand uses the teeth of rotating saws to pull the cotton through a series of "ginning ribs", which pull the fibers from the seeds which are too large to pass through the ribs. The cleaned seed is then removed from the gin via an auger conveyor system.

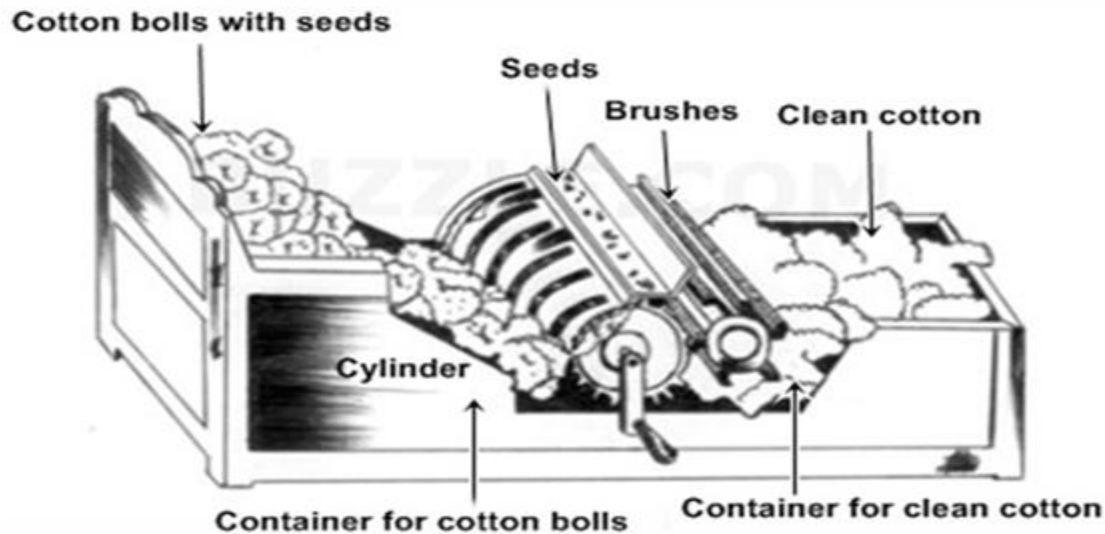


Fig: 2 Eli Whitney's patent Gin

Modern Cotton Ginning Machine:

- In modern cotton production, cotton arrives at industrial cotton gins either in trailers or in compressed “modules”, which weigh up to 10 metric tons each. Cotton arriving in trailers is sucked into the gin via a pipe, approximately 16 inches (41 cm) in diameter that is swung over the cotton. This pipe is usually manually operated, but is increasingly automated in modern cotton plants.
- The need for trailers to haul the product to the gin has been drastically reduced since the introduction of the module. If the cotton is shipped in modules, the module feeder breaks the modules apart using spiked rollers and extracts the largest pieces of foreign material from the cotton. The module feeder's loose cotton is then sucked into the same starting point as the trailer cotton.

Description of each cotton ginning machine is given below:

1. Feeder:

- The stationary head feeder employs a dispersing head with spiked rollers for breaking apart the module. the modules are transported to the stationary dispersing head on a series of beds: each bed is the length of a module and is constructed of flat wire-mesh belts or of chains similar to those of the module truck live bed.
- A minimum of 1-1/2 beds is required, but additional beds can be added to increase ginning time. The stationary dispersing head is equipped with a series of horizontal spiked

cylinders that remove cotton from the face of the module and deposit the cotton onto a conveyor or into an airline for mechanical or pneumatic conveying to the gin.

2. Dryer:

- In the first stage of drying, heated air conveys the cotton through the shelves for 10-15 sec. The temperature of the conveying air is regulated to control the amount of drying.
- To prevent fiber damage, the temperature to which the cotton is exposed during normal operation should never exceed 350 F. Temperatures above 300 F can cause permanent physical changes in cotton fibers. Dryer-temperature sensors should be located as near as possible to the point where cotton and heated air mix together.
- If the temperature sensor is located near the exit of the tower dryer, the mixpoint temperature could actually be 100-200 F higher than the temperature at the downstream sensor. The temperature drops downstream results from the cooling effect of evaporation and from heat loss through the walls of machinery and piping.

3. Cylinder Cleaner:

- The drying continues as the warm air moves the seed cotton to the cylinder cleaner, which consists of six or seven revolving spiked cylinders that rotate at 400-500 rpm.
- These cylinders scrub the cotton over a series of grid rods or screens, agitate the cotton, and allow fine foreign materials, such as leaves, trash, and dirt, to pass through the openings for disposal. Cylinder cleaners break up large wads and generally condition the cotton for additional cleaning and drying. Processing rates of about two bales per hour per foot of cylinder length are common.



Fig:3 Cylinder Cleaner

4. Stick Machine:

- The stick machine removes larger foreign matter, such as burs and sticks, from the cotton. Stick machines use the centrifugal force created by saw cylinders rotating at 300-400 rpm to “sling off” foreign material while the fiber is held by the saw. The foreign matter that is slung off the reclaimer feeds into the trash-handling system. Processing rates of 1.5-2.0 bales/hr/ft of cylinder length are common.

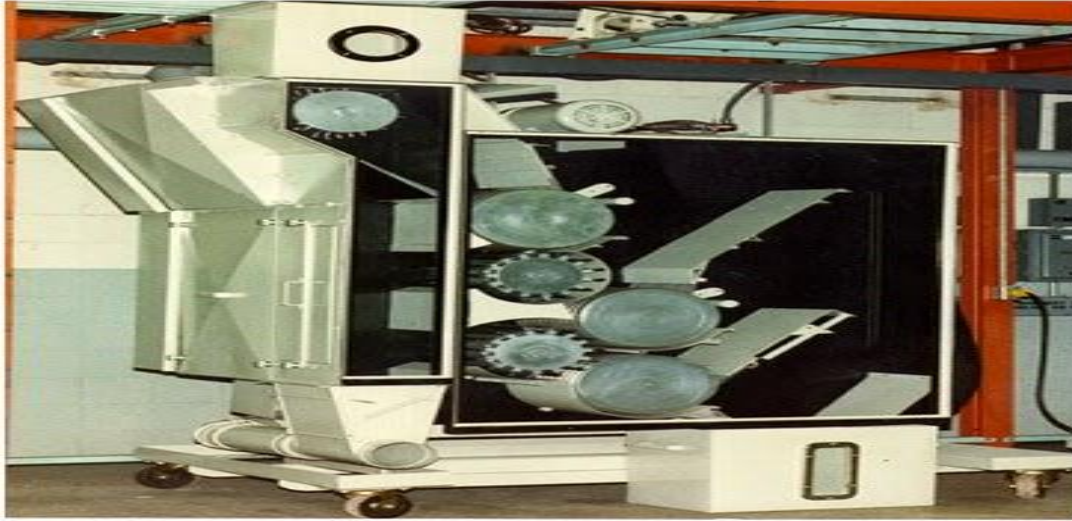


Fig:4 Stick machine

5. Extractor Feeder:

- The primary function of the extractor-feeder is to feed seed cotton to the gin stand uniformly and at controllable rates, with extracting and cleaning as a secondary function. The feed rate of seed cotton is controlled by the speed of two star-shaped feed rollers located at the top of the feeder directly under the distributor hopper.

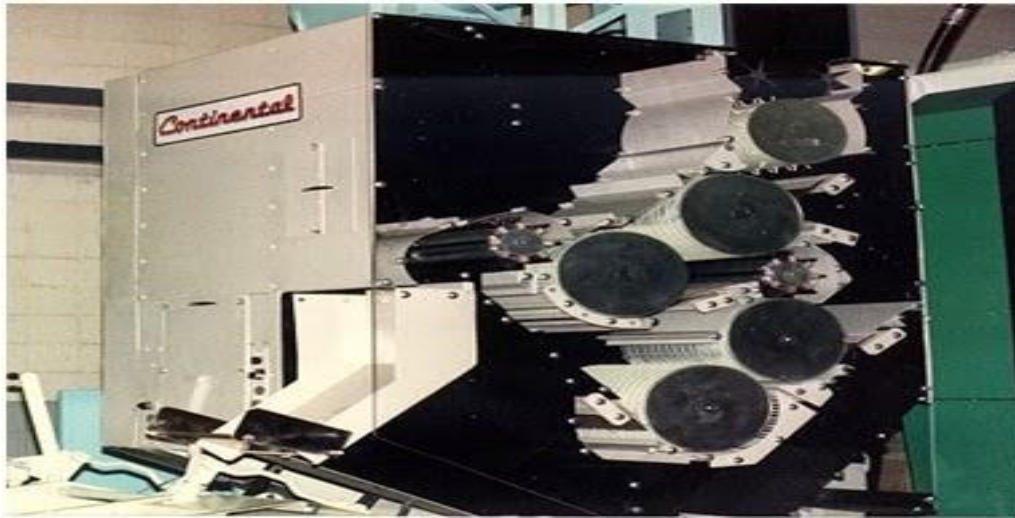


Fig:5 Extractor Feeder

6. Gin Stand:

- The modern gin plant typically has multiple gin stands. Cotton enters the gin stand through a huller front. The saws grasp the cotton and draw it through widely spaced ribs known as huller ribs. The locks of cotton are drawn from the huller ribs into the bottom of the roll box.
- The actual cotton ginning process—separation of lint and seed—takes place in the roll box of the gin stand. The ginning action is caused by a set of saws rotating between ginning ribs. The saw teeth pass between the ribs at the ginning point. Here the leading edge of the teeth is approximately parallel to the rib, and the teeth pull the fibers from the seed, which are too large to pass between the ribs.
- Ginning at rates above those recommended by the manufacturer can cause fiber quality reduction, seed damage, and checkups. Gin stand saw speeds are also important. High speeds tend to increase the fiber damage done during ginning.

7. Lint Cleaner:

- It is very important for cotton to flow uniformly and be well dispersed, particularly as it leaves the gin stand. Cotton is conveyed from the gin stand through lint ducts to condensers and formed again in to a bats.
- The bats is removed from the condenser drum and fed into the saw-type lint cleaner. The bat should be of uniform thickness and be evenly spread over the entire width of the lint cleaner; otherwise, poor cleaning and excessive fiber loss will result.

8. Bale Press: The cleaned cotton is compressed into bales, which must then be covered to protect them from contamination during transportation and storage. Three types of bales are produced: modified flat, compress universal density, and gin universal density. These bales are packaged at densities of 14 and 28 lb/ft³ for the modified flat and universal density bales, respectively.

Modified flat bales are recompressed to become compress universal density bales in a later operation to achieve optimum freight rates, about 90 percent of the bales in the United States were gin universal density bales.

Bales should be packaged and tied only in material approved for storage by the Commodity Credit Corporation loan program.

In most gins cotton is packaged in a “double-box” press wherein the lint is initially compacted in one press box by a mechanical or hydraulic trampler; then the press box is rotated, and the lint is further compressed to about 20 or 40 lb/ft³ by modified flat or gin universal density presses, respectively. Modified flat bales are recompressed to become compress universal density bales in a later operation to achieve optimum freight rates.

96 percent of the bales in the were gin universal density bales. Bales should be packaged and tied only in material approved for storage by the Commodity Credit Corporation loan program.

Operation Principle Of Gin Stand:

The gin removes the seeds so that the lint can be packed into tight bales. The quality and price of cotton are determined based on several factors: length of individual fibers, or staple; grade (color, brightness, and amount of foreign material contaminating the final product); and character (diameter, strength, uniformity, and smoothness of individual fibers).



Fig:6 Operation Principle Of Gin Stand

The ginning of cotton produces tons of seeds, which were once deemed a waste-disposal problem but are now a valuable by-product. The separated seeds go to oil mills, where they are further de lint of the shorter, fine hairs that adhere to the seed coat after initial ginning. This shorter lint, sometimes called linters, is used to make paper, furniture padding, and the tips of cotton swabs

TYPES OF GIN STAND:

a. Saw-Roller Gin,

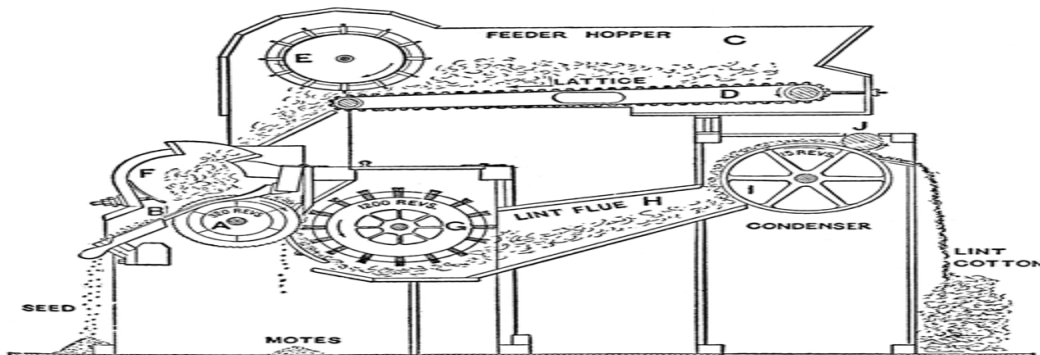


Fig:7 SAW-ROLLER GIN

b. Knife Roller Gin,

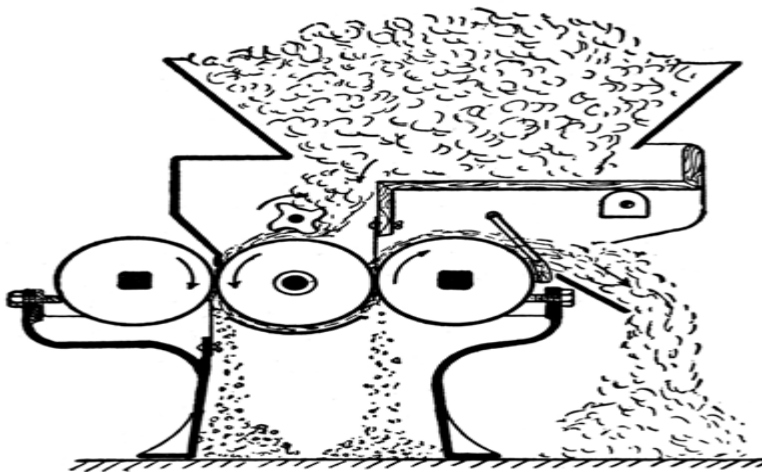


Fig:8 Knife Roller Gin

Comparison of Saw Ginning and High-Speed Roller Ginning with Different Lint Cleaners of Mid-South Grown Cotton

- Four cotton cultivars were ginned with a saw gin equipment line and also with a high-speed roller gin line. The saw gin line using an air-jet and controlled-bat saw-type lint clearer was compared to the high-speed roller-gin line including one of three designs of lint cleaner; either of

two versions of an experimental lint cleaner, of a basic design not used with commercial roller ginning, one design with a lint re claimer and the other without the lint re claimer or a commercially available mill-type lint cleaner.

- The high-speed roller-gin processed the seed cotton at the same rate as the saw gin stand per m of machine width; however, the roller-gin stand is narrower than the saw gin stand.
- The roller-gin line produced lint with better fiber length properties than the saw gin line. The roller-gin stand did less damage to the fiber than the saw gin stands and each of the three lint cleaners following the roller gin stand did less damage to the lint than the controlled-bat saw-type lint cleaner. Fewer neps were created in the roller-gin line than the saw gin line.
- The experimental lint cleaner did not remove as much non-lint material as the traditional controlled-bats lint cleaner but the measurements of the negative effects of the experimental lint cleaner were significantly lower than for the controlled-bat lint cleaner. The mill-type cleaner removed even less material but added still fewer neps than the experimental lint cleaner and did little damage to the lint.
- The fiber processed with the lint cleaner with the re claimer had lower quality than the fiber processed with the same lint cleaner without the re claimer; also, the lint cleaner with the re claimer removed nearly as much material as without the re claimer. Therefore, the re claimer will not be included in further testing.

Buying cotton. For more information, contact Cotton Incorporated's Fiber.

3.3 Housekeeping of workplace

Definition of Housekeeping in the Workplace

- Keeping work areas neat and orderly;
- Maintaining slip, trip and fall free working environment;
- Removing of waste materials and other fire hazards from work areas

Housekeeping is not just cleanliness. It includes keeping work areas neat and orderly, maintaining halls and floors free of slip and trip hazards, and removing of waste materials (e.g., paper, cardboard) and other fire hazards from work areas

Why should we pay attention to housekeeping at work?

Effective housekeeping can help control or eliminate workplace hazards. Poor housekeeping practices frequently contribute to incidents. If the sight of paper, debris, clutter and spills is accepted as normal, then other more serious hazards may be taken for granted.

Housekeeping is not just cleanliness. It includes keeping work areas neat and orderly, maintaining halls and floors free of slip and trip hazards, and removing of waste materials (e.g., paper, cardboard) and other fire hazards from work areas. It also requires paying attention to important details such as the layout of the whole workplace, aisle marking, the adequacy of storage facilities, and maintenance. Good housekeeping is also a basic part of incident and fire prevention.

Effective housekeeping is an ongoing operation: it is not a one-time or hit-and-miss cleanup done occasionally. Periodic "panic" cleanups are costly and ineffective in reducing incidents.

What is the purpose of workplace housekeeping

Poor housekeeping can be a cause of incidents, such as:

- tripping over loose objects on floors, stairs and platforms
- being hit by falling objects
- slipping on greasy, wet or dirty surfaces
- striking against projecting, poorly stacked items or misplaced material
- cutting, puncturing, or tearing the skin of hands or other parts of the body on projecting nails, wire or steel strapping

To avoid these hazards, a workplace must "maintain" order throughout a workday. Although this effort requires a great deal of management and planning, the benefits are many.

What are some benefits of good housekeeping practices

- Effective housekeeping results in:
- reduced handling to ease the flow of materials
- fewer tripping and slipping incidents in clutter-free and spill-free work areas
- decreased fire hazards
- lower worker exposures to hazardous products (e.g. dusts, vapours)
- better control of tools and materials, including inventory and supplies
- more efficient equipment cleanup and maintenance
- better hygienic conditions leading to improved health
- more effective use of space
- reduced property damage by improving preventive maintenance
- less janitorial work
- improved morale

- improved productivity (tools and materials will be easy to find)

How do I plan a good housekeeping program?

A good housekeeping program plans and manages the orderly storage and movement of materials from point of entry to exit. It includes a material flow plan to ensure minimal handling. The plan also makes sure that work areas are not used as storage areas by having workers move materials to and from work areas as needed. Part of the plan could include investing in extra bins and more frequent disposal.

The costs of this investment could be offset by the elimination of repeated handling of the same material and more effective use of the workers' time. Often, ineffective or insufficient storage planning results in materials being handled many times and being stored in hazardous ways. Knowing the workplace layout and the movement of materials throughout it will help when planning work procedures.

Worker training is an essential part of any good housekeeping program. Workers need to know how to work safely with the products they use. They also need to know how to protect other workers such as by posting signs (e.g., "Wet - Slippery Floor") and reporting any unusual conditions.

Housekeeping order is "maintained" not "achieved." Cleaning and organization must be done regularly, not just at the end of the shift. Integrating housekeeping into jobs can help ensure this is done. A good housekeeping program identifies and assigns responsibilities for the following:

- clean up during the shift
- day-to-day cleanup
- waste disposal
- removal of unused materials
- inspection to ensure cleanup is complete

Do not forget out-of-the-way places such as shelves, basements, sheds, and boiler rooms that would otherwise be overlooked.

The final step to any housekeeping program is inspection. It is the only way to check for deficiencies in the program so that changes can be made. Examples of checklists include inspecting offices and manufacturing facilities.

What are the elements of an effective housekeeping program?

The maintenance of buildings and equipment may be the most important element of good housekeeping.

Maintenance involves keeping buildings, equipment and machinery in safe, efficient working order and in good repair. It includes maintaining sanitary facilities and regularly painting and cleaning walls. Broken windows, damaged doors, defective plumbing and broken floor surfaces can make a workplace look neglected; these conditions can cause incidents and affect work practices. So it is important to replace or fix broken or damaged items as quickly as possible. A good maintenance program provides for the inspection, maintenance, upkeep and repair of tools, equipment, machines and processes.

Dust and Dirt Removal

Enclosures and exhaust ventilation systems may fail to collect dust, dirt and chips adequately. Vacuum cleaners are suitable for removing light dust and dirt that is not otherwise hazardous. Industrial models have special fittings for cleaning walls, ceilings, ledges, machinery, and other hard-to-reach places where dust and dirt may accumulate.

Special-purpose vacuums are useful for removing hazardous products. For example, vacuum cleaners fitted with HEPA (high efficiency particulate air) filters may be used to capture fine particles of asbestos or fiber glass.

OHS practices must include hazard identification and control, risk assessment and implementation of risk reduction measures specific to the tasks described by this unit, and may include:

- manual handling techniques
- standard operating procedures
- personal protective equipment
- safe materials handling
- taking of rest breaks
- ergonomic arrangement of workplaces
- following marked walkways
- safe storage of equipment
- housekeeping
- reporting accidents and incidents
- other OHS practices relevant to the job and enterprise

Self check-3

Test-I Matching

Instruction: select the correct answer for the give choice. You have given 1 Minute for each question. Each question carries 2 Point.

- | A | B |
|--------------------------------------|--|
| 1. Housekeeping | A. hazard identification and control |
| 2. OHS practices | B. Vacuum cleaners are suitable for removing |
| 3. dust and dirt removal | C. keeping work areas neat and orderly |
| 4. typically has multiple gin stands | D. High-speed roller gin line. |
| 5.knife roller gin | E. Gin stand |
| | F. Bale pres |

Test II: short Answer writing

Instruction: write short answer for the given question. You are provided 3 minute for each question and each point has 5Points.

7. What is the purpose Double Roller Gin Stand?
8. Write down at least three Double Roller Gin Stand?
9. What is the difference between Pre-Cleaning Machine and Suction fan for cotton and lint?

Note: Satisfactory rating – above 60% Unsatisfactory - below 60%

You can ask you teacher for the copy of the correct answers

Operation Sheet 1	Operation of ginning process
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Method of: task 1

Step 1-prepare seed cotton

Step 2- feed the seed cotton

Step 3- checking moisture

Step 4- dry the seed cotton

Step 5- pre-cleaning seed

Step 6- removes stick

Step 7- extracting

Step 8- lint cleaning

Step 9- bale pressing

LAP test	Practical Demonstration
----------	-------------------------

LAP test

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within --- hour.

Task 1. Do ginning process

Unit Four: -Operate Bale Or Mote Press

This unit to provide you the necessary information regarding the following content coverage and topics:

- Standard operating procedures of bale or mote press
- Bale press preparation and setting
- Operating bale press machinery
- Monitoring feed of lint
- Bale tie system

This guide will also assist you to attain the learning outcomes stated in the cover page.

Specifically, upon completion of this module , you will be able to:

- Identify Standard operating procedures of bale
- Bale press preparation and setting
- Operate bale press machinery
- Identify Monitor feed of lint
- Perform Bale tie system

4.1 Standard operating procedures of bale or mote press

Standard operating how to store and handle bales safely

The hazards commonly associated with bale handling and known to have caused serious injuries include:

- dangerous maneuvering and loading and unloading of vehicles
- unsafe use of lifting equipment
- unstable stacking of bales
- poor techniques for manual handling
- unsafe bale opening
- unsafe system of work:
- inadequate maintenance

- unplanned lifting work
- overloading
- other abuse or misuse, especially of the associated lifting tackle
- unprotected teagle openings Bale storage
- At most sites, bales are held in a warehouse or similar storage area, waiting for process or dispatch. The main safety objective in the storage area is to maintain safe and stable stacks, so bales do not fall.
- Instability can happen in two ways:
- Stacks may be unstable from the outset because of poor stacking techniques.
- Stacks may have been stable originally but have become unstable - possible causes for this could be disturbance as adjacent bales are stacked or disturbance if struck by a lift truck; slippage of bales.

Avoiding instability is not straightforward because of variations in the shape, size, weight and density of bales. These variations call for stack configurations and methods of stacking and de-stacking that differ considerably from one bale type to another. The surface texture of the bale wrappings is also significant; e.g plastic wrappings are prone to slippage and can quite easily lead to instability in a stack.

An essential safety measure is to place the warehousing and storage operations under the direct supervision of an individual who is responsible, experienced and competent. This individual, carefully selected by management and capable of making an objective assessment of the safety and stability of the stacks, should have the authority and personality to exert strict control over all aspects of the work.

Safe working procedures for stacking and de-stacking should be drawn up and agreed with all appropriate personnel. These procedures should consider:

- the limitations of storage area such as the floor space and height available
- the physical properties of the various types of bales
- the type of lifting and handling equipment to be used

Stock rotation is also necessary to optimise the stacking arrangements.

General pointers to safe storage

- Keep gangways/walkways clear within the storage area and between stacks, to allow safe movement of lifting and handling equipment

- The storage space reserved for bales should have adequate space to allow safe movement of equipment and bales in the area, maintaining clear gangways
- Floor surfaces should be firm and level
- Floors should not be overloaded, eg in multi-storey buildings
- Stacking in a pyramid fashion and using binder bales can help to keep stacks stable
- Store damaged or doubtful-looking bales separately, not in the bulk of a stack
- Inspect stacks at least weekly and keep a record of the inspections and any resulting action
- Make sure timber pallets are in good condition if they are used
- Make sure personal protective equipment worn during handling, packing and unpacking of bales is adequate
- Introduce a safe system of work and procedures for bale handling, stacking and de-stacking
- Provide training in bale handling and handling equipment
- To minimize climbing on stacks, attach identification tickets to bales where they can be read easily by a person standing at floor level.

Bale handling

- If possible, use mechanical equipment to handle bales, rather than manual handling. This equipment will bring its own hazards and you need to make sure of the following:
- All bale-handling equipment (including bale elevating systems is guarded adequately and maintained regularly
- All conveyor nip points are guarded and trap entanglement areas are guarded or made safe by design
- Access to rams or other moving parts are guarded by fixed guards or interlocked to a suitable standard
- Shearing points are guarded or made safe by distance
- Any work at height is accessible by adequate steps and platforms and these should be interlocked where moving parts are accessible

- Safe system of work, including isolation, are in place for use when working inside guards, for example during cleaning and maintenance
- Horizontal bale presses are fitted with door interlocks of a suitable design and integrity
- On swivel boxes, the control should be a 'hold to run' type
- On automatic swivel boxes there should be trip guards and warning signals
- No one on foot should be allowed near the stacks when lifting or handling equipment is operating
- This unit applies to controlling the bale or mote press operation in a cotton gin including determining moisture content and bale weight.

Work may be conducted in small to large scale enterprises and may involve individual and team activities. Work is performed within defined procedures under direct supervision.

The application of this unit is according to OHS practices of the enterprise and workplace practices, which may include:

- requirements prescribed by legislation, awards, agreements and conditions of employment
- standard operating procedures
- work instructions
- oral, written and visual communication
- quality practices, including responsibility for maintenance of own work quality and contribution to quality improvement of team or section output
- housekeeping
- tasks related to environmental protection, waste disposal, pollution control and recycling.

This unit requires the application of skills associated with planning and organising for safe and effective use of bale or mote press technology and operations. This unit also requires an ability to interpret job specifications and communicate process information to other members of the team, check the quality of outcomes and identify and address problems relating to own work, materials or machine

4.2 Bale press preparation and setting

The cleaned cotton is compressed into bales, which must then be covered to protect them from contamination during transportation and storage. Three types of bales are produced: modified

flat, compress universal density, and gin universal density. These bales are packaged at densities of 14 and 28 lb/ ft³ for the modified flat and universal density bales, respectively. Bales should be packaged and tied only in material approved for storage by the Commodity Credit Corporation loan program.

This compact press has been developed to provide the sensitive processing that is essential for wet-lap bales. Meeting the highest needs for reliability and availability, Bale Press PR-2 WL delivers Baling technology's proven cost-efficiency benefits in the production of up to 80 wet lap bales/h.

- Optimized for wet-lap baling lines
- No need for press pit
- Optimal frame design for infinite fatigue lifetime
- Superior bale positioning system reduces unnecessary stop

4.2.1 Operation principle of saw gins

Parts and working of a saw gin cotton ginning machine

This mini cotton ginning machine consists of following Components

- Raw Cotton Input Hopper: Raw cotton is fed to brush 1 through this hopper.
- Lint Cotton Output Hopper: Seed free cotton achieved through this hopper.
- Roller Saw Ginning shaft (main shaft): Saws are mounted on this shaft.
- Brush1 Shaft: Brush is mounted on this shaft which feed raw cotton through rib.
- Bearings
- Foundation frame
- Pulley (7 Nos.)
- Belt (4 Nos.)
- Brush 2 Shaft

4.2.2 Operation principles of roller gins

- The principal purpose of ginning is to separate cotton fibers from seeds.
- In a roller gin, a spirally grooved leather roller pressed against a fixed knife is made to rotate at a definite speed.
- A moving blade, known as the beater or "moving knife" oscillates by means of crank or eccentric shaft, close to the leather roller. Seed cotton, when fed to the machine, fibers adhere to the rough

surface of the roller. Then it is carried in between the fixed knife and the roller such that the fibers are partially gripped between them.

- The oscillating knife beats the seeds and separates the fibers, which are gripped from the seed end.
- This process is repeated a number of times and due to the "Push and Pull" the fibers are separated from the seed, carried forward on the roller and dropped out of the machine.
- The ginned seeds drop down to the reserve box. In these machines, the ginning efficiency primarily depends upon the surface speed of the roller and the number of effective working strokes of the moving knife.

4.3 Monitoring lint feed

In order to have uniform output or product, the bale press has to receive equal amount of input coming from lint cleaner. This throughput is controlled automatically rather than manually.

Increased production of Upland cottons with the advent of the Whitney and Holmes tooth gin Stands in created a major problem in packaging the ginned lint. , ginneries

Usually had only one gin stand and packaged the ginned lint in bags that varied from 125 to 350 lb in weight. The bags were hooked on frames constructed around holes in the floor and tied out in the basement.

The advantages of module feeding are as follows:

1. It increases ginning capacity by 10-25 percent by providing a consistent, uninterrupted flow of cotton to the gin plant.
2. It eliminates suction telescope labor.
3. It frees the module truck for long hauls by enabling continuous ginning of two to six modules.
4. It blends wet cotton in the module with dry cotton.

4.4. Bale tie system

Bale ties allow us to condense, palletize and easily move a wide variety of recyclable products and waste materials including plastics, paper, aluminum, and cardboard.

Compacting using either a horizontal or vertical baler is always followed by the use of some type of securement often times this comes in the form of a bale tie. Bale ties allow us to condense, palletize and easily move a wide variety of recyclable products and waste materials including plastics, paper, aluminum, and cardboard. Compacting using either a horizontal or vertical baler

is always followed by the use of some type of securement often times this comes in the form of a bale tie.

What is the breaking strength of a hay bale?

The breaking strength of the wire must be not less than 4,350 pounds with a joint strength of not less than 2,600 pounds. The joints must be placed on the crowns or sample sides of the bales. The six required ties must be spaced along the bale length with no less than 9 inches between adjacent ties.

4.4.1 Feeding bale tie system

Bale Packaging System

Bale packaging is the final step in processing cotton at the gin. The packaging system consists of a battery condenser, lint slide, lint feeder, tramper, bale press, and bale tying mechanism. This system may be supplemented with systems for bale conveying, weighing, and wrapping. The bale press consists of a frame, one or more hydraulic rams, and a hydraulic power system. Tying subsystems may be entirely manual, semi-automated, or fully automated.

Bale presses are described primarily by the density of the bale that they produce, such as low density (flat or modified flat) or universal density (gin or compress). Other descriptions include up-packing, down-packing, fixed box, and door less. Regardless of description, they all package lint cotton so that it can be handled in trade channels and at textile mills. Battery condensers have a slow-turning, screened or perforated metal-covered drum on which the ginned lint forms a bats. The bats is discharged between doffing rollers to the lint slide. Conveying air supplied by a vane-axial or high-volume centrifugal fan passes through the screen on the drum and is usually discharged out one end of the drum through an air duct. The discharged air then goes to dust abatement equipment and then into the atmosphere.

The lint slide is a sheet-metal trough (approximately 54-in. wide) that connects the battery Condenser to the lint feeder on the tramper. It is installed at an angle of 33°-45° to ensure Movement of the lint without rolling the bats. The length of the lint slide is based on the capacity of the ginning system and the time required to turn the press between bales.

The lint feeder is a device for moving lint from the lint slide into the charging box of the press.

There are three basic types of feeders:

- (1) Revolving paddle kicker,
- (2) Belt feed used in conjunction with the kicker

(3) Lint pusher.

All of these devices should deposit lint into the charging box with a fast but gentle action, without breaking up the bales as it is received from the condenser.

Four types of gin presses have been used; each type is named according to the bale.

Flat, modified flat (bales to be sent for recompression to become compress universal density Bales), gin standard, and gin universal. Today all of the bales produced at gins in the United States are gin universal density.

After the bale is compressed to a given density or press platen separation, ties are applied around the circumference of the bale to restrain the lint within prescribed dimensions. Bale ties are normally either wire or flat, cold-rolled steel bands, or plastic, and are placed at intervals along the length of the bale. Usually, six or eight ties per bale are used. The ties can be applied manually or with a semi-automated tying system. In order to reduce labor requirements, bale tying systems are rapidly being automated.

4.5 Work area around machinery is cleaned and maintained to meet workplace and OHS practice

5.1.1 OHS practices

Manual handling:-A manual handling operation takes place every time a load is moved or supported by a person's hands or arms, or by some other forms of bodily effort. It includes lifting, lowering, pushing, pulling and carrying the load. The definition of a load encompasses goods, baggage, humans and other living beings as well as an object that comprises or includes any living beings.

Personal protective equipment (PPE)

PPE should only be used to protect workers as a last resort and in addition to other controls where it isn't reasonably practicable to fully control the dust by other means. Take care when choosing PPE and make sure that it is appropriate for the work. PPE should be used properly and maintained in good condition.

Coveralls of close-weave fabric (or suitable disposable ones) should be worn when handling dyestuffs.

Gloves and aprons may be needed for some jobs. These should be impermeable and either disposable or cleanable. They should be removed when not needed because they may be a

continuing source of dust if contaminated. Workers should remove gloves and aprons in a way that does not contaminate skin or cloth.

Respiratory protective equipment (RPE) may be needed for short-duration jobs, such as filter changing. RPE should be carefully selected to provide adequate protection. It needs to be suitable for the wearer as well as for the task. Correct fitting is important and suppliers can help by offering face-fit testing. Beards and stubble growth prevent a good fit and facemask type respirators cannot be used in these circumstances. Where suitable for the wearer, disposable respirators giving protection against fine particulates.

6.1 Machinery is stopped or shut down in accordance with all safety and workplace standard operating procedures

Standard operating procedures

Standard operating procedures (SOPs) are a set of instructions that have been developed to define or standardize the exact steps to perform specific tasks. These steps have been found to provide consistent, repeatable results regardless of who is performing the task. Controlling costs and assuring quality are keys to being successful in any business. SOPs help accomplish both of these objectives.

In manufacturing, SOPs should be in-place for:

- Equipment startup and operation
- Equipment set up and change over
- Product assembly
- Inventory tracking
- Material ordering
- Material receiving
- Maintenance procedures
- Material processing (e.g., mixing, batching)
- Quality control
- Any business or process step that needs to be controlled

Self check-4

Test-I Matching

Instruction: select the correct answer for the give choice. You have given 1 Minute for each question. Each question carries 2 Point.

A

1. ___ needed for short-duration jobs
2. ___ (SOPs)
3. ___ Coveralls of close
4. ___Revolving paddle kicker
5. ___Bale packaging
6. ___Bale packaging

B

- A. Standard operating procedures
- B. Respiratory protective equipment
- C. worn when handling dyestuffs
- D. the final step in processing cotton at the gin
- E .types of feeders
- F. a wide variety of recyclable products

Test II: short Answer writing

Instruction: write short answer for the given question. You are provided 3 minute for each question and each point has 5Points.

1. What is the breaking strength of a hay bale?
2. Why feed control is needed? (4 pts
3. Describe the operating principle of roller gin machine
9. Write down at least two types of feeders?

Part III: Short answer writing

Direction: Give short answer to the following questions. Time allotted for each item is 2mniut and each question carry 4 point.

1. Manual handling
2. Monitoring lint feed
3. Raw Cotton Input Hopper
4. Lint Cotton Output Hopper:

Note: Satisfactory rating – above 60% Unsatisfactory - below 60%

You can ask you teacher for the copy of the correct answers

Unit Five: - Carry Out Operator Maintenance

This unit to provide you the necessary information regarding the following content coverage and topics:

- Identifying and reporting minor running problems
- Reporting major machinery and product faults
- Performing Minor maintenance

This guide will also assist you to attain the learning outcomes stated in the cover page.

Specifically, upon completion of this module , you will be able to:

- Identify and report minor running problems
- Report major machinery and product faults
- Perform Minor maintenance

5.1 Identifying and reporting minor running problems

Defects in Ginning Process:

Some common faults of ginning process are mentioned in the following:

1. Gin-cut fiber
2. Neps formation,
3. Crushed seeds,
4. A lot of wastage.

5.1.1 Causes of running problem

1. Not reading the operator's manual.

"Some farmers have never even opened the owner's manual," Bates says. "Most of what they need to know is in there."

Owner's manuals cover everything from maintenance checklists to calibration instructions. Most issues are addressed in the troubleshooting section so farmers can fix the problems themselves without having to wait for a technician.

2. **Improper maintenance.**

Skipping daily maintenance is another mistake that can cause downtime. Bates says it is important to grease all lube points daily and check engine oil and fluids such as transmission fluid and urea or diesel exhaust fluid."

"With the new Tier 4 engines, we run into issues with people who use a cheaper urea or diesel exhaust fluid, and that can cause problems with the exhaust and after treatment systems," Bates says.

Farmers also should regularly replace fuel filters and check chains, gearboxes and belts for wear and replace when wear is excessive. On gravity wagons, wheels should be checked for tightness and alignment before going to the field

3. Poor electrical connections.

This problem is hard to prevent and is becoming more commonplace as more machinery is electronically controlled, Bates says. However, cleaning away dust and dirt around the connectors can help. When cleaning, use compressed air instead of water to keep moisture away from the wires.

4. Overrunning machines.

Constantly pushing machines to run at maximum performance or at the top of the engineering curve can strain joints and cause equipment to die prematurely. "We have some operators out there that push the machines too hard for too long and try and force them to do things they weren't designed for," Bates says. He advises farmers to run machines just under their intended maximum performance level at most times to avoid undue stress and prevent premature wear.

5. Not replacing worn parts.

When a part on a machine breaks, some customers will replace only that part and not check or replace other parts that may have caused the initial failure. Examples include replacing a drive chain when the sprocket was shot or replacing a belt when the pulley was bad.

Replacing only the parts that are broken is a temporary fix that can cost money in downtime.

"When customers don't replace all the things we recommend need replacing, nine times out of 10 they will come back with bigger problems we'll end up having to fix," Bates says.

6. Misaligned tightness.

Tightness that are not tracking straight with the belt or chain in relation to the main drives can put tension on the belt or chain, causing it to break or wear excessively. It's important to replace worn bushings in the tightened pivot that may be pushing the belt or chain sideways.

"On combines, for example, you want to make sure that belts are running straight and those chains and belts are at the proper tension so that they don't slip or break," Bates says. "Also make sure that the shafts are running at the right speed

7. Improper storage.

Combines and planters can build up dust and debris, which attract rodents. Rodents gnaw on wires and the dust itself can interfere with electrical connections.

"You'll see periods where mice and rats get into machinery," Bates says. "It's not rodent proof. Once they eat up the debris they will chew on wires and seals, and you'll end up spending money on electrical harnesses and that sort of thing."

Bates recommends storing machinery inside and cleaning around all electrical connections and other areas of buildup before parking it inside. Compressed air is better and safer than water for cleanup.

8. Weather-related issues.

Operating in wet, muddy conditions can put strain on equipment, Bates says. For example, running wet, tough material through a combine can break shafts or plug up the machine, which then puts strain on everything from feeder house chains to shafts to bearings and pulleys. In tractors, mud packed in between dual wheels can result in premature wear on the tire sidewalls once the mud hardens.

While it's difficult to avoid these conditions, understanding the weather-related issues can alert you to problems to look for.

9. Ignoring warning signals.

Warning lights on screens are there for a reason, often signaling issues that need to be addressed, such as low hydraulic pressure, high engine temperature or a shaft that isn't turning. However, too often those signals are ignored, resulting in machinery failure.

That's exactly right," Bates says, "especially when it's a hired hand who's told to get the work done. Sometimes you can make it another an hour, and sometimes you can't."

The bottom line is get it checked.

10. Untrained operators.

As farms get larger, farm owners are having to hire outside help that may not be trained to operate machinery. Lack of training can result in abused machinery and costly breakdowns.

"We see that fairly often," Bates says. Time invested in training can make your machinery last longer.

Bates says these 10 problems account for close to 50% of the breakdowns he sees at the dealership. However, taking some simple precautions can go a long way in preventing these issues.

"Times are tougher financially than what they were five years ago and farmers are not updating equipment as often," Bates says. "So, it is extremely important to pay special attention to regular maintenance and preseason checks to make sure their equipment makes it through the season."

5.2 Reporting major machinery and product faults

During the review of each document, the following criteria were used to determine the acceptability of reference documents for emission factor development:

1. The report must be a primary reference:
 - a. Source testing must be from a referenced study that does not reiterate information from previous studies.
 - b. The document must constitute the original source of test data. .
- 2.. The report must contain sufficient data to evaluate the testing procedures and source operating conditions.

Data Quality Rating System'

Based on OAQPS guidelines, the following data are always excluded from consideration in developing AP-42 emission factors:

1. Test series averages reported in units that cannot be converted to the selected reporting units;
2. Test series representing incompatible test methods; and
3. Test series in which the production and control processes are not clearly identified and described.

If there is no reason to exclude a particular data set, data are assigned a quality rating based on an A to D scale specified by OAQPS as follows:

A-This rating requires that multiple tests be performed on the same source using sound methodology and reported in enough detail for adequate validation. Tests do not necessarily have to conform to the methodology specified by EPA reference test methods, although such methods are used as guides.

B-This rating is given to tests performed by a generally sound methodology

C-This rating is given to tests that are based on an untested or new

D-This rating is given to tests that are based on a generally unacceptable

But lacking enough detail for adequate validation.

Methodology or that lack of a significant amount of background data.

Method but may provide an order-of-magnitude value for the source.

The following are the OAQPS criteria used to evaluate source test reports for sound methodology and adequate detail:

1. **Source operation.** The manner in which the source was operated should be well documented in the report, and the source should be operating within typical parameters during the test.

2. **Sampling procedures.** The sampling procedures should conform to a generally accepted methodology. If actual procedures deviate from accepted methods, the deviations must be well documented. When this occurs, an evaluation should be made of how such alternative procedures could influence the test results.

3. **Sampling and Process data.** Adequate sampling and process data should be documented in the report. Many variations can occur without warning.

During testing and sometimes without being noticed. Such variations can induce wide deviations in sampling results. If a large spread between test results cannot be explained by information contained in the test report, the data are suspect and are given a lower rating.

4. **Analysis and calculations.** The test reports should contain original raw data sheets. The nomenclature and equations used are compared to those specified by EPA (if any) to establish equivalency. The depth of review of the calculations is dictated by the reviewer's confidence in the ability and conscientiousness of the tester, which in turn is based on factors such as consistency of results and completeness of other areas of the test report.

5.2.3 Emission Factor Quality Rating System'

EPA guidelines specify that the quality of the emission factors developed from analysis of the test data be rated utilizing the following general criteria:

A-Excellent: The emission factor was developed only from A-rated test data taken from many randomly chosen facilities in the industry population. The source category was specific enough to minimize variability within the source category population.

B-Above average: The emission factor was developed only from A-rated test data from a reasonable number of facilities. Although no specific bias was evident, it was not clear if the

facilities tested represented a random sample of the industries. As in the A-rating, the source category was specific enough to minimize variability within the source category population.

C-Average: The emission factor was developed only from A- and B-rated test data from a reasonable number of facilities. Although no specific bias was evident, it was not clear if the facilities tested represented a random sample of the industry. As in the A-rating, the source category was specific enough to minimize variability within the source category population.

D-Below average: The emission factor was developed only from A- and B-rated test data from a small number of facilities, and there was reason to suspect that these facilities did not represent a random sample of the industry. There also may be evidence of variability within the source category population. Limitations on the use of the emission factor are footnoted in the emission factor table.

E-Poor: The emission factor was developed from C- and D-rated test data, and there was reason to suspect that the facilities tested did not represent a random

Source category: A category in the emission factor table for which an emission factor has been calculated.

5.3 Perform Minor maintenance

Minor maintenance means routine preventive or corrective maintenance works such as minor repair, reconditioning, or replacement of spare parts to ensure serviceability of existing and new infrastructure assets procured and installed by the Contractor including, pipes, electrical equipment, flow meters, pressure monitoring equipment, and Customer meters, starter panel, electro-mechanical equipment etc

Information about a licence or certificate in minor maintenance and cleaning. Use the menu on the right to find what you need.

You must have a licence before you do any residential building work in NSW, including minor maintenance and cleaning, valued at more than \$5,000 (incl GST) in labour and materials.

Minor maintenance and cleaning means non-structural maintenance (including minor repairs) or cleaning of existing works, structures or buildings’

minor maintenance means all work relating to the maintenance of aircraft other than major maintenance. Minor maintenance includes adjustment, periodic inspection, functional testing, component replacement, minor repair and minor modification of aircraft including components and equipment.

For a sound repair program during the ginning season include the following:

1. Keep the gin clean and safe.
2. Perform inspections by competent employees trained in detecting problems before they cause lengthy shutdowns.
3. Perform preventive maintenance (P.M.) on a routine basis.
4. Shut down the gin (if possible) before making repairs.
5. Take time to think about how to do the repair safely.
6. Have the crew perform P.M. work elsewhere if the gin is shut down for a repair.
7. Have an adequate supply of parts on hand for repairs.
8. Repair machinery properly the first time.
9. Maintain a log of downtime for all repairs) and a log of maintenance performed. A dormant

Guidelines for a repair program during the dormant season include the following:

1. Keep the gin clean and safe (lock out power to a machine before working on it).
2. Follow the manufacturer's specifications when repairing machinery.
3. Spend the money to make repairs properly so that seasonal downtime is reduced.
4. Repair machinery that might otherwise not make it through the season.
5. Plan ahead to have repair tools and parts on hand.

Dormant Season Repairs

A dormant season repair program should enable the ginner to make repairs in an organized and thorough manner, thus minimizing seasonal downtime. A team consisting of the ginner, superintendent, and manager should be involved in planning repairs. All information from the P.M. reports and downtime reports can be compiled and used to determine trouble spots within the systems.

The team should have guidelines for checking each machine and a list for all the parts that may be needed for repairing each machine. The team should start at one end of the gin and systematically work their way through the gin, inspecting each machine one by one. After inspection, the team can determine the cost of the repairs and should determine if the repairs indicated on the repair checklist will solve the problems identified on the downtime report. Repair checklists will allow the ginner to obtain, in one purchase, all the parts needed for the machines requiring repair. With these parts in hand, the ginner can concentrate on repairing one or two machines at a time without waiting for delivery of repair parts.

In making any repair, particular care should be taken to ensure that speeds and adjustments are set according to the manufacturer's recommendations. Manufacturer's parts instructions and maintenance books provide all the information necessary to make the proper adjustments.

Preventive Maintenance (P.M.)

The success of a ginning operation is determined by how efficiently the cotton is ginned. The gin should be properly repaired and ready to operate at maximum efficiency with minimum downtime. The basic principle of P.M. is the reduction of downtime through the scheduling of routine maintenance and repairs. Preventive maintenance will reduce repair costs while increasing daily production. Repair costs are reduced by doing small repairs on the machinery before larger problems occur as other components are impacted. The larger problems require more downtime and cause more expensive repairs.

Preventive maintenance should be scheduled once during each operating shift. If a gin is operating 12 hr/shift, 1 hr should be devoted to preventive maintenance. If a problem is discovered during the P.M. period, the problem should be corrected immediately. If the parts or necessary pieces of equipment are not available to repair the machinery immediately, the parts should be ordered and the repair scheduled for the next P.M. period.

P.M. is an ongoing process, and the procedures to be followed depend partly on the period of gin operation. The three periods and the procedures for each period are as follows:

1. after initial break-in period (72 hr):
 - a. Lock out all equipment.
 - b. Check condition and alignment of pulleys, belts, sprockets, and chains. Check the tension
On belts and chains. Tighten all set screws and bolts used in obtaining and holding the
Proper alignment on sprockets and sheaves.
 - c. Check for adequate or excessive lubrication.
 - d. Check general appearance and condition of parts; tighten and adjust as necessary.
 - e. Check entire system for excessive wear and tagging that could check for evidence of
Loose connections or leaks in the duct system.
 - f. Check electrical wiring for evidence of arcing and insulation break- down.
 - g. Check interiors of all machines for chokes or cotton accumulations.
2. during each production run:
 - a. Observe the entire gin for a smooth, orderly flow of cotton with even distribution across the machinery.

- b. Listen for excessive noise or vibration.
- c. Listen for chattering of gears, shafts, chains, and motors.
- d. Check for evidence of worn bearings.
- e. Observe chains and sprockets for proper alignment, and check tension on chains.
- f. Check for visible signs of over-lubrication.
- g. Observe belt and pulley movement for proper alignment and tension.
- h. Check idler sprockets and pulleys for proper tension and alignment,
- i. Check air handling systems for leaks or loose connections,
- j. Check trash for excessive cotton (both seed cotton and lint cleaner trash),
- k. Check hydraulic systems for leaks, overheating, or choked filters.
- l. Check seed for excessive lint and for damage,
- m. Check final lint sample for evidence of poor machine conditions (poor preparation, excess Trash, seed coat fragments and neps).
- . between production runs:
 - a. Lock out all equipment.
 - b. Check interiors of receiving condensers for choking conditions.
 - c. Check the inlets, outlets, trash discharge, and interiors of all equipment for tags, trash Accumulations, and worn or damaged parts that could result in choking, loss of cotton, or Reduced efficiency.
 - d. Check equipment for dirt and excessive lubrication.
 - e. Check moving parts for evidence of excessive wear, such as grooving, chafing, and Binding
 - f. Check the condition and tension of pulleys, belts, chains, and sprockets.
 - g. Check for bent or missing grid bars.
 - h. Check for missing or bent spikes on cylinder cleaners,
 - i. Check vacuum wheel and condenser flashing.

Self check-5

Test-I Matching

Instruction: select the correct answer for the give choice. You have given 1 Minute for each question. Each question carries 2 Point.

A

- _____ 1. routine preventive
- _____ 2. Causes of running problem
- _____ 3. Misaligned tightness
- _____ 4. Ignoring warning signals.
- _____ 5. Defects in Ginning

B

- A. Overrunning machines
- B. minor repair
- C. causing it to break or wear excessively
- D. Gin-cut fiber
- E. bale

Test II: Choose The Best Answer You have given 1 Minute for each question. Each question carries 3 Point.

1 . which one of the following is maintenance is another mistake that can cause downtime

- A) Poor electrical connection
- B) B. improper main/nce
- C) Overrunning machines
- D) Ignoring warning

2 . which one of the following is Lack of training can result in abused machinery and costly breakdowns

- A) Poor electrical connection
- B) improper maintenance
- C) untrained operators
- D) Ignoring warning

Test III: short Answer writing

Instruction: write short answer for the given question. You are provided 3 minute for each question and each point has 5Points.

- 1) What does mean Poor electrical connections?
- 2) Write down at least three Causes of running problem?

Note: Satisfactory rating – above 60% Unsatisfactory - below 60%

You can ask you teacher for the copy of the correct answers

Unit Six : - Dispose Of Waste Materials

This unit to provide you the necessary information regarding the following content coverage and topics:

- Waste minimization
- Waste recycling
- Proper disposal of waste

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this module , you will be able to:

- Apply Waste minimization
- .Perform Waste recycling
- .Determine Proper disposal of waste

6.1 Waste minimization

Waste minimization is a set of processes and practices intended to reduce the amount of waste produced. By reducing or eliminating the generation of harmful and persistent wastes, waste minimization supports efforts to promote a more sustainable society.

Benefit of Waste Minimization

When your organization decides to improve its processes and implement a new or updated waste reduction strategy, numerous benefits come about. These benefits can affect your brand image, bottom line, as well as the environment.

Production efficiency and quality – New technological practices and innovation will not only reduce the creation of waste but also offers to improve input quality, which translates to improved products.

Reformed brand image – Once you adopt new strategies, you will boost the reputation of your company. This is due to your commitment to protecting the environment.

Economic – Since you are using efficient products, you have the opportunity to reduce your cost when purchasing material, which significantly affects your financial investment.

New customers – People love to think that the companies they buy their goods from are dedicated to improving our environment. Some consumers exclusively seek these organizations out, so you have an opportunity to reach a wider audience.

Environmental – You are able to reduce carbon, air, and water emissions while you work to conserve natural resources.

Stay ahead of the competition – When you reduce waste both in the final product and the manufacturing process, this decreases regulatory burdens associated with disposal. Reduction in time and money allows you to invest in new ideas and products.

Reduce the Use of Packaging Materials. Starting small,

You can reduce the use of packaging materials like shrink wrap by redesigning your packages to use recyclable or degradable materials.

Reduce Harmful Wastewater. ...

Hold Your Employees Accountable. ...

Update Your Recycling Program. ...

Assess Your Processes. ...

Waste minimization is a set of processes and practices intended to reduce the amount of waste produced. By reducing or eliminating the generation of harmful and persistent wastes, waste minimization supports efforts to promote a more production in ginning.

Waste minimization involves redesigning products and processes and/or changing societal patterns of consumption and production.

Proper waste minimization and disposal can save a significant amount of time and resource. Significant reduction of the waste generated in health-care establishments and research facilities may be encouraged by the implementation of certain policies and practices, including the following: Source reduction: measures such as purchasing restrictions to ensure the selection of methods or supplies that are less wasteful or generate less hazardous waste.

- Recyclable products: use of materials that may be recycled, either on-site or off-site.
- Good management and control practices: apply particularly to the purchase and use of chemicals and pharmaceuticals.
- Waste segregation: careful segregation (separation) of waste matter into different categories helps to minimize the quantities of hazardous waste.

6.2 Recycling wastes

Recycling is the recovery and reuse of materials from wastes. Solid waste recycling refers to the reuse of manufactured goods from which resources such as steel, copper, or plastics can be recovered and reused. Textile wastes also arise during yarns and fabric manufacturing, apparel-

making processes and from the retail industry. They are the post-industrial waste. Apart from these textile wastes other wastes such as PET bottles etc. are also used for recycling polyester fiber. Textiles for recycling are generated from two primary sources.

Cotton recycling Process

Cotton recycling prevents unneeded wastage and can be a more sustainable alternative to disposal. Cotton can be recycled from pre-consumer (post-industrial) and post-consumer cotton waste. Pre-consumer waste comes from any excess material produced during the ginning production of yarn, fabrics and textile products, e.g. salvage from weaving and fabric from factory cutting rooms. Post-consumer waste comes from discarded textile products, e.g. used apparel and home textiles. During the recycling process, the cotton waste is first sorted by type and color and then processed through stripping machines that first breaks the yarns and fabric into smaller pieces before pulling them apart into fiber. The mixes are carded several times in order to clean and mix the fibers before they are spun into new yarns. .

Waste materials in ginning section which cannot be reused

- coarse dirt remaining after recycled
- fly from the preliminary filters
- dust from the fine filters

6.3 Disposing machine waste

Approximately 50-60 percent of the energy consumed by a cotton gin is a consequence of pneumatic conveying. Relatively large volumes of air are needed to move seed cotton, trash, lint, and seed through the ginning process. Typically, 10-20 different fan/motor systems are used to move material from point to point. Each of these systems exhausts its conveying air to the surrounding atmosphere through some type of air pollution abatement system. Usually, centrifugal fan exhausts pass through cyclone collectors, while the axial-flow fan (condenser) exhausts pass through covered condenser drums. It is the gin manager's responsibility to capture and dispose of gin trash and to ensure that the gin's air pollution abatement system functions effectively..

The engineering associated with the trash/dust collection system of a gin plays a significant role in the total amount of dust emitted by the gin's materials handling system. Even if the gin has a well-engineered system, the total dust emitted varies with time of harvest and harvesting method.

In- creased dust emissions result from processing late-harvested cotton. Gins processing mechanically stripped cotton emit more dust than those processing mechanically picked cotton.

Cotton Gin Trash

Approximately 26 percent is trash, cotton crop is harvested by mechanical strippers; 73 percent is harvested by mechanical pickers; and 1 percent is scrapped cotton. The amount of seed cotton needed to produce one 480-lb bale of lint is about 1,500 lb for picked cotton and 2,260 lb for stripped cotton. The trash and dust in a bale ranges from 75-150 lb for picked cotton and 700-1,000 lb for stripped cotton. In a typical year, cotton gins in the United States processing spindle-picked cotton will handle 500,000-1 million tons of cotton gin trash. Those processing stripped cotton will manage 1 to 1-1/2 million tons of trash.

Common disposal methods for cotton gin trash include the following: (1) composting, (2) using it for cattle feed, and (3) direct application to land using spreader trucks. Caution should be used when feeding gin trash to cattle, since pesticide residues may be present in the trash. Cotton gin trash from a crop treated with arsenic acid should never be fed to cattle. Incineration is not allowed in most States and will likely be even less acceptable in the future. Composting of gin trash offers potential to reduce the negative attributes of "raw" gin trash. If this material is composted properly, there should be minimum live weed seeds and live disease organisms and the trash volume should be reduced 40 percent. The resulting compost is valuable as a soil additive because it contains substantial nutrients.

At \$10/ton to spread trash on the land, the cotton ginning industry would spend \$15-\$25 million each year for solid waste disposal. The gin trash, however, does return nutrients to the soil.

Air Pollution

The goal of air pollution control is to minimize deterioration of air resources so that the public can breathe the best quality air possible.

Self Check – 6

Test-I Matching

Instruction: select the correct answer for the give choice. You have given 1 Minute for each question. Each question carries 2 Point.

- | A | B |
|---------------------------|--|
| 1. ____ Recycling | A) Approximately 26 percent is trash |
| 2. ____ Cotton gin trash | B) minimize deterioration of air |
| 3. ____ air pollution | C) Economic |
| 4. ____Environmental | D) reduce the amount of waste produced |
| 5. ____Waste minimization | E) You are able to reduce carbon |
| | F) the recovery and reuse of materials from wastes |

Test II: short Answer writing

Instruction: write short answer for the given question. You are provided 3 minute for each question and each point has 5Points.

- What is the purpose of Waste minimization t?
- Write down at least three benefits of Waste Minimization?
- What is the difference between Waste minimization and recycling?

Part III: Short answer writing

Direction: Give short answer to the following questions. Time allotted for each item is 2mniut and each question carry 4 point.

- Production efficiency and quality
- Reformed brand image Slant
- Cotton recycling process

Note: Satisfactory rating – above 60% Unsatisfactory - below 60%

You can ask you teacher for the copy of the correct answer

Unit Seven: - Monitor Product Quality

This unit to provide you the necessary information regarding the following content coverage and topics:

Quality requirements for cotton ginning and bale are correctly identified and applied for all stages of the process.

- Quality requirements for cotton ginning and bale
- Monitoring standard operating procedures of cotton flow
- Maintaining bale and cotton quality
- Monitoring moisture content and weight of bale
- Product quality deviations

This guide will also assist you to attain the learning outcomes stated in the cover page.

Specifically, upon completion of this module , you will be able to:

- Identify Quality requirements for cotton ginning and bale
- Perform Monitor standard operating procedures of cotton flow
- To Maintain bale and cotton quality
- To determine Monitor moisture content
- Determine Product quality deviations

7.1 Quality requirements for cotton ginning and bale

The most reliable producer of high quality cotton.

Cotton Incorporated helps maintain through ongoing research and measurement studies. These include:

- Accurate measurements of cotton fibre, yarn and fabric properties.
- High Volume Instrument testing for fibre length, strength, length uniformity, micronaire, colour and trash content.
- Fibre tests for neps, fineness, maturity, and **non-lint content**.
- **Management of cotton property databases.**

7.2 Monitoring standard operating procedures of cotton flow

7.2.1 Material Handling and Equipment:

The cotton conveyer. During operation the flow of cotton, passing between the emitter and the detector, generates pulses. The monitor uses the pulse count to calculates the flow

Seed cotton can be safely stored in modules or trailers if its moisture content is kept at 12 percent less. Wet cotton or cotton containing the green plant material will heat during storage and quickly deteriorate. Cotton damaged in this manner produces low grades and poor quality seed. If the temperature exceeds 110F it should be ginned immediately.

Pre-cleaning: Pre cleaning is done in different ways but in this plant Hot Box is used to clean the seed cotton. It runs with 5 HP motor connected with the belt. The cotton is dried up and Seed cotton cleaners break up large wads and generally get the cotton open and in good conditions cleaning and drying.

Ginning Percentage = $\frac{\text{lint weight}}{\text{Weight of un ginned}} \times 100$

Conveying systems: After cleaning the seed cotton which is obtained from hot box it is sent to ginning machines by conveying systems. Conveying systems are of two types:

1. Belt conveyor system
2. Screw conveyor system

The main function of belt conveyor is to transport the seed cotton from hot box to cross screw conveyors. The cross screw conveyors have right and left hand screws to carry the seed cotton to the both sides of the gin houses

Ginning is the Mechanical process involved in processing cotton. Ginning machines separates cotton fibers from the seed bolls and dust particles. This works on principle operation of gin.

Working of Gins is the In a double roller (DR) gin, two spirally grooved leather rollers, pressed against two stationary knives with the help of adjustable dead loads, are made to rotate in opposite directions at a definite speed.

❖ In the monitoring of ginning process:

- Raw cotton quality must be checked
- Material feeding process is correctly managed
- Machine setting adjusted according to the process
- Quality should be checked during and after production
- Waste is managed appropriately in every stage of process

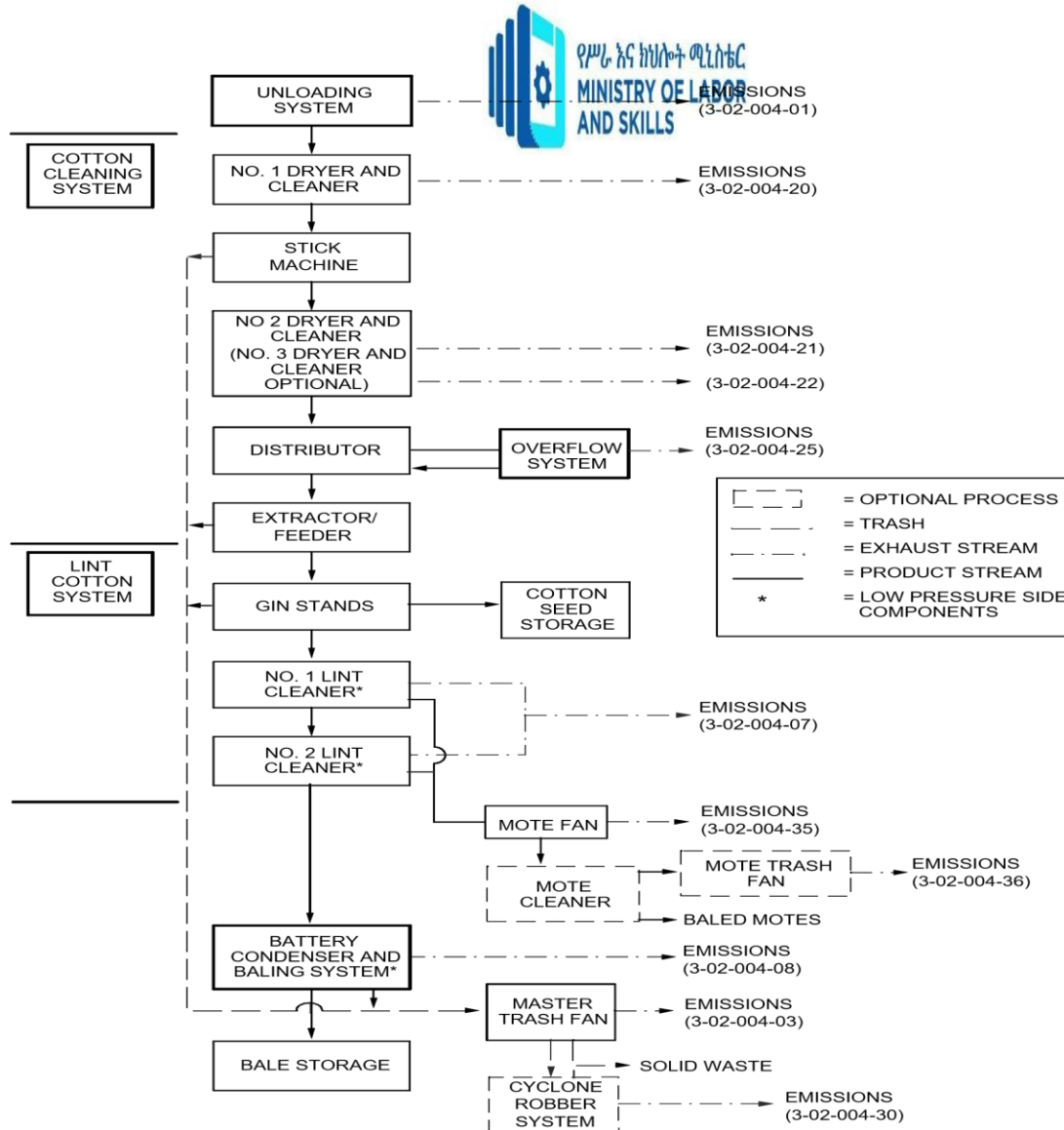


Fig.7.1 ginning process flow chart

7.3 Maintaining bale and cotton quality

Quality: is one of the most important aspects of producing a profitable cotton crop. The factors that determine cotton quality are:

Leaf grade: Leaf grade refers to the leaf or trash content in the cotton. Graded on a scale of 1 to 8, leaf grade is determined by human classers who compare a lint sample to Universal standards for the grades. A leaf grade of 8 is referred to as “below grade”, and can result in large price discounts.

Fiber length: Fiber length is primarily determined by cotton variety, but growing conditions and fertility can affect length as well. Night time temperatures of 60-70°F are optimum for fiber length development. Temperatures above or below this range result in shorter fibers. Reduced length can also result from deficit or excess soil moisture levels.

Length uniformity: Length uniformity is the ratio between the mean length of fiber and the upper half mean length expressed as a percentage. Low uniformity values are a function of fibers that are more easily broken. **Strength:** Strength is measured by clamping and breaking the beard of fibers with a 1/8-inch gage spacing between the clamp jaws. The strength reported is the force in grams required to break a bundle of fibers one tex unit in size.

Micronaire: Micronaire (mike) is a measure of the fineness of the cotton fiber. Unlike fiber length, mike is determined more by environmental conditions than variety. Mike is developed after the full fiber length is obtained.

Trash: Trash is a measurement of trash present in the lint. The measurement is made by the HVI video trash meter which measures the percentage area and particle count of trash on the sample surface. This measurement provides an estimate of the total amount of trash in the bale.

Color: Color is the measure of greyness and yellowness of the lint. Reported as a two-digit code as measured by the HVI, color usually is not affected by variety.

Moisture: The Roller Gins can take up to 10-11% moisture but above that the drying process should be adopted before feeding the seed cotton to the ginning machines and the moisture contents should be brought down to below 10% before ginning. Bale

7.4 Monitoring moisture content and weight of bale

Pima cotton (long fiber length-USA),

- Giza cotton (long fiber length-Egypt)

Parameters for categorizing cotton quality:

Following are the major parameters considered to decide quality of the cotton material.

- Fineness (count),
- Fiber length (staple length),
- Fiber's tensile strength,
- Fiber elongation,
- Fiber uniformity (CV% of diameter), and
- Fiber maturity index/ratio

7.4.1 Maintaining bale and cotton quality

Evaluation: The technique used to check the quality of fiber is “HIGH VOLUME Instrument”.

High volume instrument systems are based on the fiber bundle strength testing. The bundle testing method is automated. The time for testing per sample is 0.3 minutes.

Principles of Fiber Testing Using HVI:

Sample Preparation: The Fibro Gram method is preferred while preparing the sample for fiber length estimation. Bale cotton which is brought from the industry is maintained at room temperature with the help air conditioners for 1-2 hours. This sample is divided into three parts each weighing 10 grams and it is processed for quality evaluation using HVI. **Measurement Of Different Parameters:** Length, Strength, Elongation, Micronaire, Color, Trash and moisture. These parameters are discussed in the selection of the seed cotton criteria.



Fig 7.3.1 HVI machine

Product quality deviations

describes an investigation into moisture levels in straw bale walls used to clad a newly constructed building. The moisture content was monitored up to 10 months after the building was handed over. The sensors used for this purpose were readily available, low cost and easily installed. The moisture levels fluctuate during the first 4 months following installation of the instrumentation, followed by a period of greater stability where it is believed that the straw acts as a moisture buffer, managing the humidity levels within the building and contributing to a healthier internal environment. This ongoing study makes a contribution towards raising confidence levels in the use of straw bales as low carbon building material in mainstream construction. Like:-

- Moisture Content
- Moisture Level
- Housing Association
- Green Building
- Bale

Bale shapes and size

The best moisture level for baling hay or green feed depends on the type of baler you use. If you have a large hard-core round baler, 15% moisture is optimum. At this moisture level, the bales will keep for an extended period.

Table 1. Bale size to moisture contents

*The lower moisture range is preferred in areas of low humidity. Higher moisture percentage is best for other areas.

Bale Shape	Height (ft)	Width (ft)	Length (ft)	Volume (ft ³)	Typical weight (lb)	Safe baling moisture (%)
Rectangular	1.2	1.5	3.2	5.5	60	18-20*
Rectangular	2.7	3	7	56	900	12-16*
Rectangular	4	4	8	112	1800	12-16*
Round	4	--	4	50	500	15-18*
Round	4	--	5	63	850	15-18*
Round	5	--	4	79	1000	15-18*
Round	5	--	5	98	1300	15
Round	6	--	5	141	1900	15

Higher moisture levels

When moisture levels are higher than those shown in the table above, there will be:

- excessive heating in the bales
- mould growth

- loss of large amounts of dry matter

Moulds consume nutrients and generate heat as they grow. If the hay reaches 55 degrees C or higher, severe browning reactions begin.

Amino acids and sugars combine to form insoluble nitrogen compounds that are unavailable to animals. These reactions increase the amount of insoluble fibre. This leads to a lower digestibility or total digestible nutrients.

These reactions may also lead to spontaneous combustion.

Mould organisms under heat stress may produce toxins. These can be harmful to livestock and may reduce intake. Moulds also produce spores that, if inhaled, can cause lung disease or exacerbate existing respiratory problems.

Heating in bales occurs to some extent unless the feed contains less than 15% moisture.

For more information, see:

- Baling tips for superior hay quality
- Heat damage in silage and hay

7.51 Material Handling and Equipment:

Seed cotton can be safely stored in modules or trailers if its moisture content is kept at 12 percent less. Wet cotton or cotton containing the green plant material will heat during storage and quickly deteriorate. Cotton damaged in this manner produces low grades and poor quality seed. If the temperature exceeds 110F it should be ginned immediately.

Pre-cleaning: Pre cleaning is done in different ways but in this plant Hot Box is used to clean the seed cotton. It runs with 5 HP motor connected with the belt.

Conveying systems: After cleaning the seed cotton which is obtained from hot box it is sent to ginning machines by conveying systems. Conveying systems are of two types:

1. Belt conveyor system
2. Screw conveyor system

The main function of belt conveyor is to transport the seed cotton from hot box to cross screw conveyors. The cross screw conveyors have right and left hand screws to carry the seed cotton to the both sides of the gin houses.

➤ In the monitoring of ginning process:

- Raw cotton quality must be checked
- Material feeding process is correctly managed

- Machine setting adjusted according to the process
- Quality should be checked during and after production
- Waste is managed appropriately in every stage of process

How do I check bale moisture?

The easiest and most effective way to test hay for the moisture is to use an electronic moisture tester. Note that readings are more accurate with higher volumes of hay. Therefore, the general rule is to fill a bucket with hay that is tightly compacted. Then simply insert the tester probe and let it do its thing how do you calculate moisture content?

Calculating Moisture Content

To calculate the moisture content of a sample, divide the moisture weight removed in drying by the fresh weight of the sample, then multiply by 100 to get a percentage.

How do you measure moisture content in a straw?

Weigh the dry hay to determine the “dry weight.” Divide the dry weight by the wet weight, and convert to a percent number. Subtract this number from 100 to get your moisture content percentage

What moisture level is best for bale hay?

18 to 22 percent moisture

When hay is baled, it should not be higher than 18 to 22 percent moisture. At higher levels of moisture, bales lose large amounts of dry matter caused by excessive heating and molding . In severe cases, spontaneous combustion is possible.

We How do you check for moisture in silage?

Gather a silage sample, gram scale, paper plate or bowl, glass of water and microwave oven. Place glass of water in the back corner of microwave. Dry paper plate in over on high power for 1 – 1.5 minutes. Weigh the dry plate immediately.

1, SCI (spinning consistence index):-It determine the spin ability of the fiber.SCI>100is possible to spun our mixed sample SCI value is 118.

, Mic (Micronaier value):- reflect fiber fineness and maturity as we seen our mixed fibers micronier value (4.24) is between the premium range (3.7-4.29) therefore it is fine and matured.

3, UHML (upper half mean length) or staple length: - determine the highest fiber length from the tested sample fibers. For cotton fibers staple length between 26mm-28mm is conceder as medium long our result is 28.1mm .other point mentioned related to UHML used to determine a

ratio between UHML and ML our mixing result of UI is between intermediate (80 % - 82%) our tested UI is 80.1%.UI below 77% show there might be a high content of short fibers.

4, Str (strength):- it is the force required to break the bread of fibers the breaking strength of cotton fiber is about 3.0 – 4.9 g/denier. Strong fiber can have fiber strength between 29-30. Therefore strength result of our sample (29.5) is strong.

5, CGrd:- color grade determine the Rd and yellowness(+b). Rd show the brightness of the sample and (+b) indicate the degree of the cotton color (color pigmentation) the cotton whitens between (31-1 to 31-4) is medium white accordingly our test result is between 31-3.

6, TrAr (trash area):- it measure the amount of non-lint fibers (trash) in the fiber .the value of trash content should be within the range from 0-1.6% due to this our result of TrAr (0.69) has limited amount of trash.

7.6.1 Any deviations from normal are recognized, isolated and reported

We can use HVI tester machine data how to report recognized and isolated quality deviations As follows:

1, SCI (spinning consistence index):-It determine the spin ability of the fiber.SCI>100 is possible to spun our mixed sample SCI value is 118.

2, Mic (Micronier value):- reflect fiber fineness and maturity as we seen our mixed fibers micronier value (4.24) is between the premium range (3.7-4.29) therefore it is fine and matured.

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Reporting the result of data

Bale ID	SCI Grade	Mst %	Mic	Mat	UHM L Mm	UI %	Sf [%]	Str [g/tex]	Elg [% }	Rd	+b	cGrd	Trc nt	TrA r[%]
1	120	8.1	4.27	0.86	28.52	80.6	11.4	29.3	6.3	75.1	9.2	31-3	104	0.69
2	131	8.2	4.40	0.86	28.02	81.7	9.1	31.7	6.7	76.7	9.3	21-4	88	0.56
3	102	7.9	4.05	0.85	27.94	77.9	15.9	27.3	6.9	75.0	9.2	31-3	96	0.81
Ave Rage	118	8.1	4.24	0.86	28.16	80.1	12.1	29.5	6.6	75.6	9.3	31-3	96	0.69

Table Test result of HVI machine

Self check-7

Test-I Matching

Instruction: select the correct answer for the give choice. You have given 1 Minute for each question. Each question carries 2 Point.

A

B

- | | |
|----------------------|--|
| -----1. quality | A. primarily determined by cotton variety |
| -----2. Fiber length | B. a measurement of trash present in the lint |
| -----3. Strength | C. the breaking strength of cotton fiber |
| -----4. leaf grade | E. leaf or trash content in the cotton |
| -----5. trash | F. one of the most important aspects of producing a profitable cotton crop |

Operation Sheet- 2	Testing fiber quality parameters
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Procedure of task 3

Step 1- material preparation (HVI, fiber, weight balance...)

Step 2- weigh fiber

Step 3- start (power on) HVI tester

Step 4- feed fiber to HVI tester

Step 5- take HVI tester result

Step 6- discuss on result

LAP test -2	Practical Demonstration
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LAP Test

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within --- hour.

Task 3. Test fiber quality parameter

Unit 8 : - Communicate Process Information

This unit to provide you the necessary information regarding the following content coverage and topics:

- Records and documentation
- Information of production status

Product quality deviations This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this module , you will be able to:

- Complete Records and documentation
- Apply Information of production status

8.1 Records and documentation

After ginning preparation is completed in each batch/cycle, the operator has responsibility of recording production information. Production information may include: ginning batch, Date of ginning preparation, ginning trash, type of ginning impurities and their respective amount also. Production information also may include:

- Drawings (location drawings, component drawings and dimensioned diagrams).
- Specifications, design criteria and calculations (specification information can be included on drawings or in a separate specification, but information should not be duplicated as this can become contradictory and may cause confusion).

- Bills of quantities or schedules of work (schedules of work are 'without quantities' instructional specifications often produced by designers on smaller projects for pricing, or for items such as builders work and fixing schedules, such as sanitary fittings, doors, windows, ironmongery, light fittings, louvers, roller shutters, diffusers, grilles and manholes).
- There should be a particular emphasis on equipment with long manufacturing times, such as switchgear, chiller units, lifts, escalators or bespoke cladding systems, and on front-end construction such as service diversions, demolition, setting out details, underground drainage, piling and ground works.
- Definitions and rules relating to drawn information for 'with quantities' projects are described the New Rules of Measurement. See New Rules of Measurement for more information.
- Increasingly, software is used to prepare elements of production information such as computer aided design (CAD) to prepare drawings, common data environments (CDE), and proprietary systems for the preparation of specifications.
- The advent of building information modeling (BIM) can allow the automatic generation of all elements of production information from a single coordinated model, resulting in a reduction in errors and so costs.

8.2 Information of production status

After work is completed, not only production information recorded, but also any yarn faults, break-down or other must be recorded on separate format to find and fix solutions. Yarn faults may include: thin place, thick place, wrong yarn count, yarn contamination and etc.

A fault occurs when a human error results in a mistake in some software product. That is, the fault is the encoding of the human error. For example, a developer might misunderstand a user interface requirement, and therefore create a design that includes the misunderstanding. The design fault can also result in incorrect code, as well as incorrect instructions in the user manual.

Thus, a single error can result in one or more faults, and a fault can reside in any of the products of development.

On the other hand, a failure is the departure of a system from its required behavior. Failures can be discovered both before and after system delivery, as they can occur in testing as well as in operation. It is important to note that we are comparing actual system behavior with required behavior, rather than with specified behavior, because faults in the requirements documents can result in failures, too.

During both test and operation, we observe the behavior of the system. When undesirable or unexpected behavior occurs, we report it as an incident, rather than as a failure, until we can determine its true relationship to required behavior. For example, some reported incidents may be due not to system design or coding faults but instead to hardware failure, operator error or some other cause consistent with requirements. For this reason, our approach to data collection deals with incidents, rather than failures.

The reliability of a software system is defined in terms of incidents observed during operation, rather than in terms of faults; usually, we can infer little about reliability from fault information alone. Thus, the distinction between incidents and faults is very important. Systems containing many faults may be very reliable, because the conditions that trigger the faults may be very rare. Unfortunately, the relationship between faults and incidents is poorly understood; it is the subject of a great deal of software engineering research.

One of the problems with problems is that the terminology is not uniform. If an organization measures its software quality in terms of faults per thousand lines of code, it may be impossible to compare the result with the competition if the meaning of "fault" is not the same. The software engineering literature is rife with differing meanings for the same terms. Below are just a few examples of how researchers and practitioners differ in their usage of terminology.

To many organizations, *errors* often mean faults. There is also a separate notion of "processing error," which can be thought of as the system state that results when a fault is triggered but before a failure occurs. This particular notion of error is highly relevant for software fault tolerance (which is concerned with how to prevent failures in the presence of processing errors).

Anomalies usually mean a class of faults that are unlikely to cause failures in themselves but may nevertheless eventually cause failures indirectly. In this sense, an anomaly is a deviation from the usual, but it is not necessary wrong. For example, deviations from accepted standards of good programming practice (such as use of non-meaningful names) are often regarded as anomalies.

Defects normally refer collectively to faults and failures. However, sometimes a defect is a particular class of fault. For example, Mellor uses "defect" to refer to faults introduced prior to coding.

Bugs refer to faults occurring in the code.

Crashes are a special type of incident, where the system ceases to function.

Until terminology is the same, it is important to define terms clearly, so that they are understood by all who must supply, collect, analyze and use the data. Often, differences of meaning are acceptable, as long as the data can be translated from one framework to another.

We also need a good, clear way of describing what we do in reaction to problems. For example, if an investigation of an incident results in the detection of a fault, then we make a change to the product to remove it. A change can also be made if a fault is detected during a review or inspection process. In fact, one fault can result in multiple changes to one product (such as changing several sections of a piece of code) or multiple changes to multiple products (such as a change to requirements, design, code and test plans).

We describe the observations of development, testing, system operation and maintenance problems in terms of incidents, faults and changes. Whenever a problem is observed, we want to record its key elements, so that we can then investigate causes and cures. In particular, we want to know the following:

1. Location: Where did the problem occur?
2. Timing: When did it occur?
3. Mode: What was observed?
4. Effect: Which consequences resulted?
5. Mechanism: How did it occur?
6. Cause: Why did it occur?
7. Severity: How much was the user affected?
8. Cost: How much did it cost?

Fault Report

Location: within-system identifier, such as module or document name. The IEEE Standard Classification for Software Anomalies, provides a high-level classification that can be used to report on location.

Timing: phases of development during which fault was created, detected and corrected. Clearly, this part of the fault report will need revision as a causal analysis is performed. It is also useful to

record the time taken to detect and correct the fault, so that product maintainability can be assessed.

Mode: type of error message reported, or activity which revealed fault (such as review). The Mode classifies what is observed during diagnosis or inspection. The IEEE standard on software anomalies, provides a useful and extensive classification that we can use for reporting the mode.

Effect: failure caused by the fault. If separate failure or incident reports are maintained, then this entry should contain a cross-reference to the appropriate failure or incident reports.

Mechanism: how source was created, detected, corrected. Creation explains the type of activity that was being carried out when the fault was created (for example, specification, coding, design, and maintenance). Detection classifies the means by which the fault was found (for example, inspection, unit testing, system testing, integration testing), and correction refers to the steps taken to remove the fault or prevent the fault from causing failures.

Cause: type of human error that led to fault.

Severity: refer to severity of resulting or potential failure. That is, severity examines whether the fault can actually be evidenced as a failure, and the degree to which that failure would affect the user.

Cost: time or effort to locate and correct; can include analysis of cost had fault been identified during an earlier activity

Changes

Once a failure is experienced and its cause determined, the problem is fixed through one or more changes. These changes may include modifications to any or all of the development products, including the specification, design, code, test plans, test data and documentation. Change reports are used to record the changes and track the products most affected by them. For this reason, change reports are very useful for evaluating the most fault-prone modules, as well as other development products with unusual numbers of defects. A typical change report may look like this:

Change Report

- ✓ **Location:** identifier of document or module affected by a given change.
- ✓ **Timing:** when change was made
- ✓ **Mode:** type of change
- ✓ **Effect:** success of change, as evidenced by regression or other testing
- ✓ **Mechanism:** how and by whom change was performed

- ✓ **Cause:** corrective, adaptive, preventive or perfective
- ✓ **Severity:** impact on rest of system, sometimes as indicated by an ordinal scale
- ✓ **Cost:** time and effort for change implementation and test

8.2.1 Recording break downs and other documentations

The »Maintenance Documentation describes all measures required in order to ensure and maintain the functional capability of the system. Maintenance is scheduled and executed at certain intervals, in case of a vehicle, for example, annually or every 15,000 km. The maintenance documentation is intended for persons planning and executing the maintenance procedures

Maintenance Plan

The »Maintenance Plan describes the individual maintenance measures and their schedule. The maintenance measures may be summarized in maintenance levels. Maintenance procedures may be executed during operation or if the operation is interrupted.

The maintenance plan may also include the equipment maintenance record if an individual maintenance plan exists for every system. If this is not the case, the equipment maintenance record shall be conducted in suitable form, e.g., as service manual, maintenance manual or material history report.

A maintenance plan may include the following:

- Warning statements and notes of caution
- Serial number
- System element or test location of the measure, possibly with item number of the spare parts catalog
- Standard/special tools, measuring and test equipment
- Procedure to be executed
- Statement on admissible wear-and-tear parts, operating fluids and tolerances
- Work schedule, depending on operating parameters (e.g., hours, time, number and type of use)

Maintenance Instructions

The »Maintenance Instructions describes the execution of the different maintenance measures in repeatable procedural steps. The maintenance instruction will only be prepared for measures which require additional explanations not included in the »Maintenance Plan. The disposal of

wear-and-tear parts and operating fluids must be considered. The use of measuring and test equipment and necessary tools will be explained.

The maintenance instruction may include, but not be limited to, the following:

- Warning statements and notes of caution
- Cleaning of the system
- Standard/special tools, measuring and test equipment
- Replacement of wear-and-tear parts and operating fluids

Instructions for Shift Change:

Take Charge of the Shift

- Come at least 10 - 15 minutes earlier to the work spot.
- Meet the previous shift jobber and understand which are the machines part ready for doffing and discuss regarding the issues faced by them with respect to the quality or production or spare or safety or any other specific instruction etc.
- Understand the trash, lint in kg followed in the bale press for his allocated number bales/ machines for doffing.
- Check and understand the technical details mentioned in the total kg of ginned cotton.
- Check for the availability of the seed cotton (unginned).
- Check the availability for empty materials to press bale for doffing.
- Handing over the Shift:
- Properly hand over the shift to the incoming shift bale pressing Doffing team head.
- Provide the details regarding trash, color, average fiber length for ginning and
- Seed cotton for allocated bale/machine

Self check-7

Test-I Matching

Instruction: select the correct answer for the give choice. You have given 1 Minute for each question. Each question carries 2 Point.

A

B

-----1. Timing

A. when change was made

-----2. mode

B. type of change

-----3. effect

C. success of change,

-----4.mechanism

E. how and by whom change was performed

-----5. cause

F .corrective, adaptive, preventive

G. impact on rest of system

Test II: Choose the best answer

3. Identifier of document or module affected by a given change (2 pts.)

A. effect

B. cause

C. location D. time

4. Which one of the following is maintenance plan?: (2 pts.)

A. cleaning of the system

B. standard/special tool

C. warning statement D. All

Test III: short Answer writing

Instruction: write short answer for the given question. You are provided 3 minute for each question and each point has 5Points.

1) Discuss fault recording.?

2) Discuss break downs and other documentations. ?

3) Discuss about recording production information?

Note: Satisfactory rating – above 60% Unsatisfactory - below 60%

You can ask you teacher for the copy of the correct answers

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Utilization Of Cotton Gin Waste, Gary Huitink, University of Arkansas Cooperative Extension Service

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