



Potential Impact of Contamination

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Presented by Greg Holt at Southern Gin School - June 2017



Gins

- 41 Super high capacity gins (all with SJ and 2 stages of LC)
- 3 'combo' gins
- Average production $\geq 1,000$ (227 kg) bales per day and $\geq 100,000$ bales per season.
- 1 bale of cotton produced every 40 to 60 seconds
- 90% RM
- Module yard can store 5 to 18,000RM

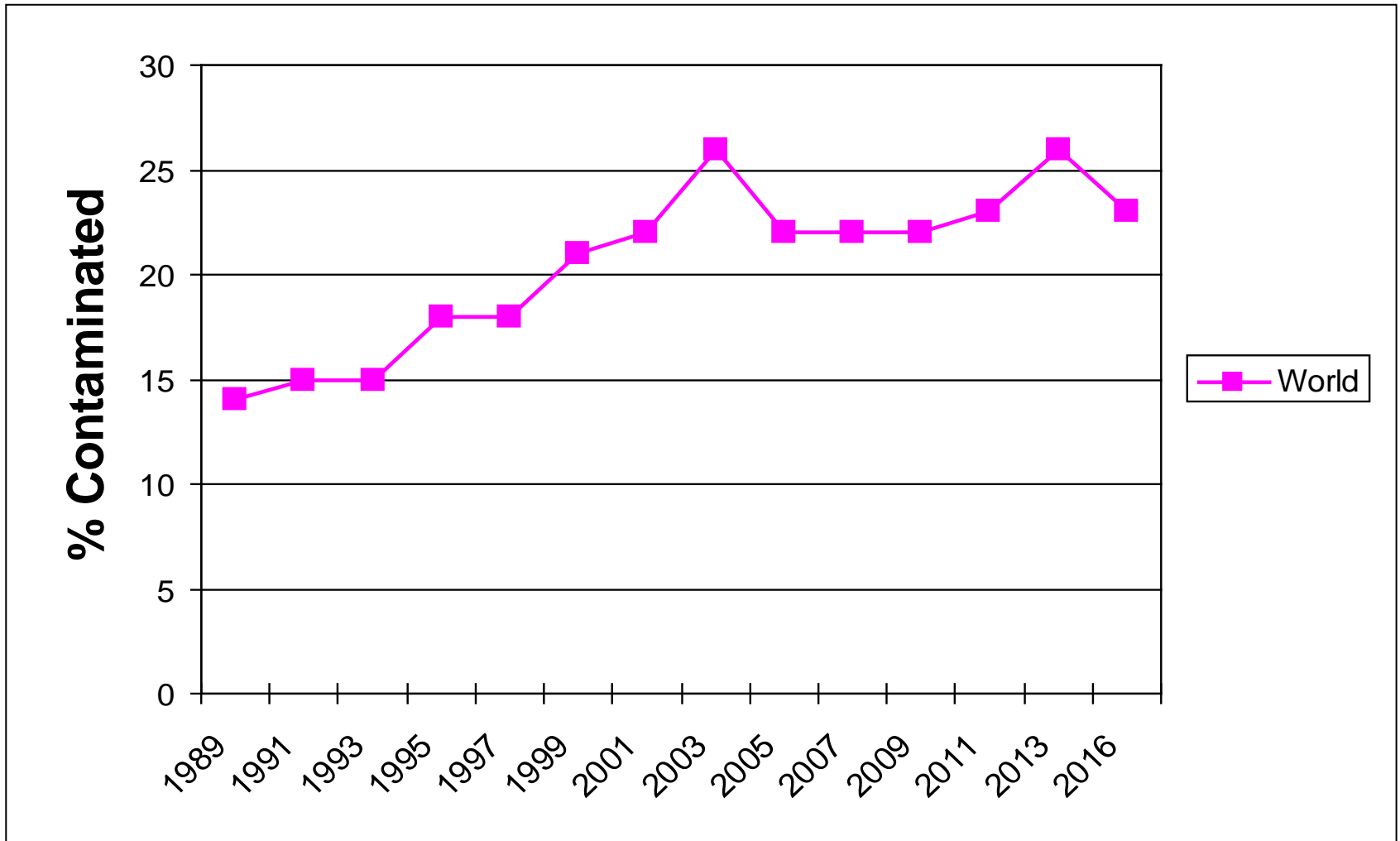


Contamination

- Contamination, even if it is a single foreign fiber, can lead to the downgrading of yarn, fabric or garments to second quality or even the total rejection of an entire batch and can cause irreparable harm to the relationship between growers, ginners, merchants and textile and clothing mills
- Most contamination arises from impurities incorporated into the bale as a result of human interaction during harvesting, ginning and baling.



Contamination



ITMF Contamination Survey 1989 - 2016

Main Source of Contamination

- Organic matter

Leaves, feathers, paper, leather, etc.

- String

Jute/hessian, cotton, woven plastic, plastic film.

- Fabric

Woven plastic, plastic film, jute/hessian, cotton.

- Inorganic matter

Sand, dust, rust, metal.

- Oily substances/chemicals

Round Modules

- The adoption of the JD 7760 round module harvester in Australia has been rapid and widespread.
- 90% of the modules processed by the gins being round modules from the JD 7760 or newer CS690.
- **BUT** the modules are covered with an engineered polyethylene film that both protects the seed cotton and provides compressive force to maintain the module density.
- **WHICH...**



-can lead to the Contamination of lint bales



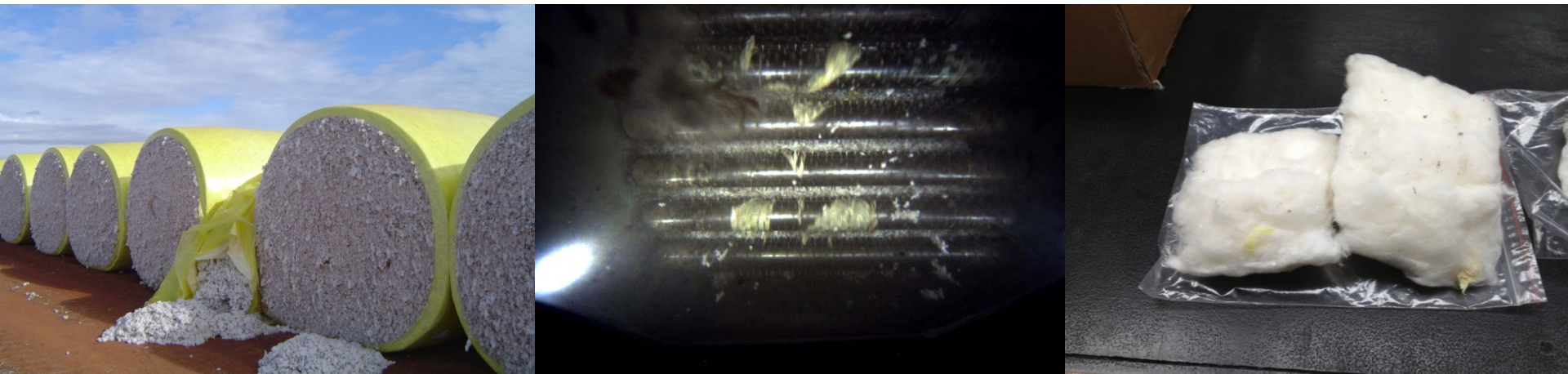
Aim

- To design a system for the detection of contaminants early in the ginning process. Early detection and intervention is imperative as contaminants (plastic) entering the ginning process are still fairly large which will aid their detection.



Contamination

- Modules are covered with an engineered polyethylene film.
- Gins forced to adopt unwrapping systems.
- CSIRO Module Hood sensors show that contamination occurs irrespective of feeding method.
- Studies by USDA suggest 3-4% of plastic retrieved in lint.

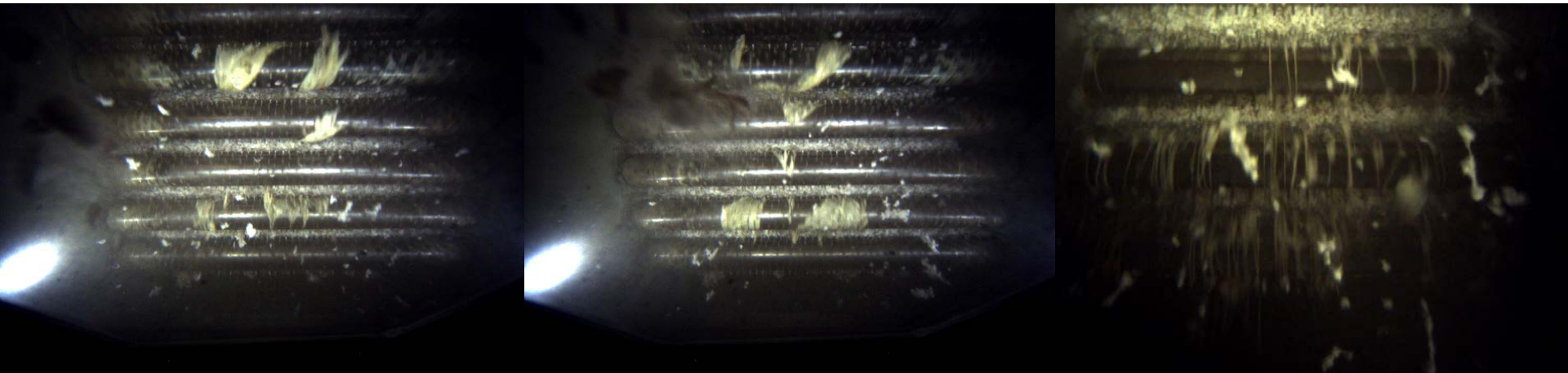


Ways of Feeding Round Modules

- 46% feed the round modules in a wagon wheel configuration into the gin after manually cutting and removing the plastic from the module.
- 6% use the Stover Unwrapper Gin Improvement System (GIS) which feeds the round modules into the gin in a sausage configuration once the plastic has been automatically removed.
- 40% use the Claw system which feeds the modules in an upright position into the gin and uses gravity to free the cotton from the plastic wrap without the plastic being cut during the process.
- 9% use the Spider V1 Dual Tube Round Module Cotton Module Handler which feeds the round modules into the gin in a sausage configuration once the plastic has been automatically removed.

Study Details

- Only 66% of the plastic contaminant was removed from the beaters within five hours of the occurrence of the contamination event.
- With 34% remaining on the beaters for more than five hours.
- With 6% of the plastic contaminant wrapped around the beaters for more than one day which increases the probability of contaminants being fibrillated and passing through the system into the bale.



Contamination in Export Bales

- Breaking open and manually inspecting suspected bales.
- On average 4-8 grams of plastic found in bales.
- 3 Bales contaminated at the gin with contaminants removed through manual sorting.
- Process one bale with 6g of plastic in a commercial textile mill.
- Determine the effect on yarn and fabric processing performance and quality.



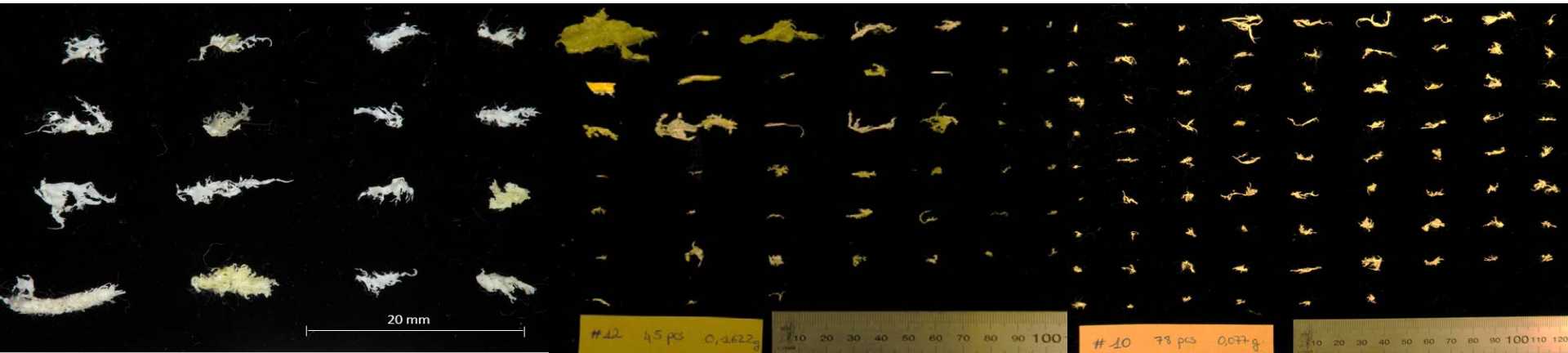
Removal of Plastic Wrap during Textile Processing



Results – Waste

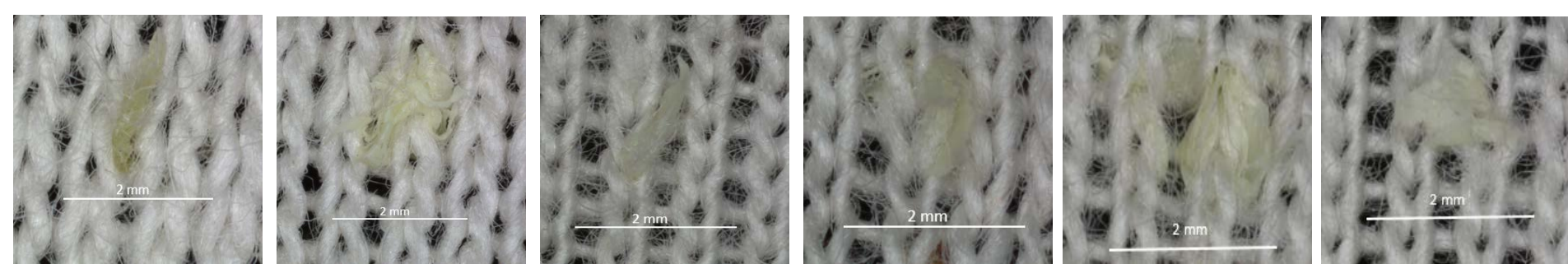
PART OF THE PROCESS	WEIGHT (KG)
COARSE FILTER	9.4
FINE FILTER	0.5
CLEANOMAT	1.4
DRAW FRAME	1.9
COMBER	0.1
CARD SILVER	0.3
TOTAL WASTE	13.6

- A total of **3.82 grams** of plastic was found in the 9.4kg of waste, which equates to 64% of the initial amount of plastic in the bale.
- Over 4000 pieces of various sizes.



Results – Greige Fabric

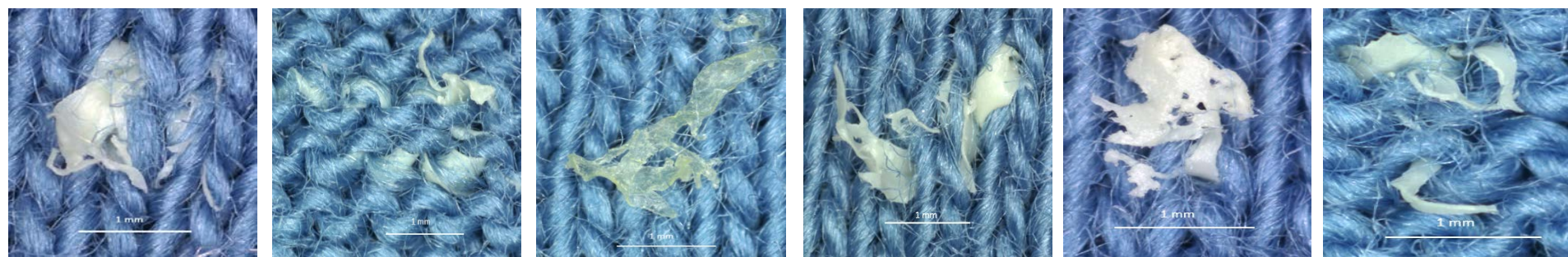
SPINNING SYSTEM	SPINNING CODE	NUMBER OF ROLLS	TOTAL LENGTH (M)	TOTAL PLASTIC PIECES FOUND	PLASTIC PIECES / 100 METRES
OPEN-END	O-E	5	202.7	20	10
RING SPUN FRAME CARDED UNCLEARED	RFCU	2	133.8	8	6
RING SPUN FRAME CARDED CLEARED	RFCC	2	132.4	7	5
RING SPUN FRAME COMBED UNCLEARED	RFCmU	1	114.5	11	10
RING SPUN FRAME COMBED CLEARED	RFCmC	2	113.8	17	15



Pictures taken by the Wild M420 photomicroscope, which was designed to observe and photograph objects primarily in the 7.9x to 40x magnification range.

Results – Dyed Fabric

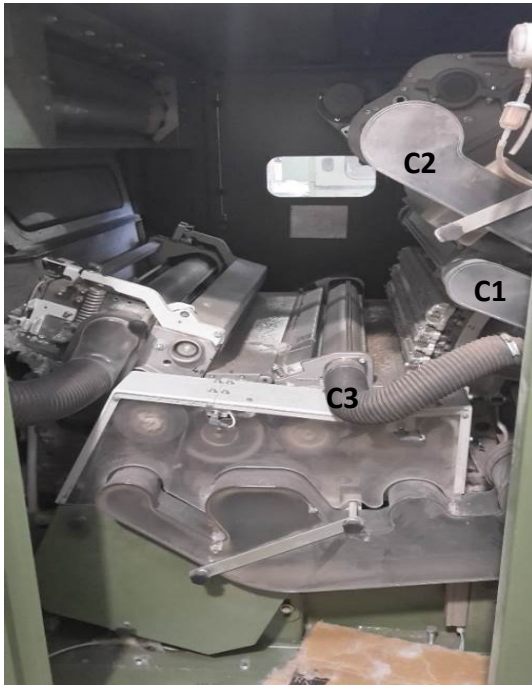
SPINNING CODE	TOTAL LENGTH (M)	TOTAL PLASTIC PIECES GREIGE	TOTAL PLASTIC PIECES DYED
O-E	46.4	6	23
RFCU	70.1	6	35
RFCC	69.8	4	22
RFC _M U	65.5	12	44
RFC _M C	100.5	10	45



Pictures taken by the Wild M420 photomicroscope, which was designed to observe and photograph objects primarily in the 7.9x to 40x magnification range.

Current Work

- 1 Bale with 8g of plastic processed through blowroom and carding to assess where most of contamination is removed during processing.



Overview

- It is estimated that less than 1% of the modules received by the gins are damaged.
- Damaged modules are not the major concern. The major concerns are: (a) how to handle small modules, (b) where the module is cut and how it is ensured that the tail is removed and (c) 'hidden plastic' which is not noticed, until the module is being ginned.



- What is the reaction to contamination entering the gin? Is the gin stopped and plastic removed, or does the gin continue running hoping for the best

The Biggest Issue!



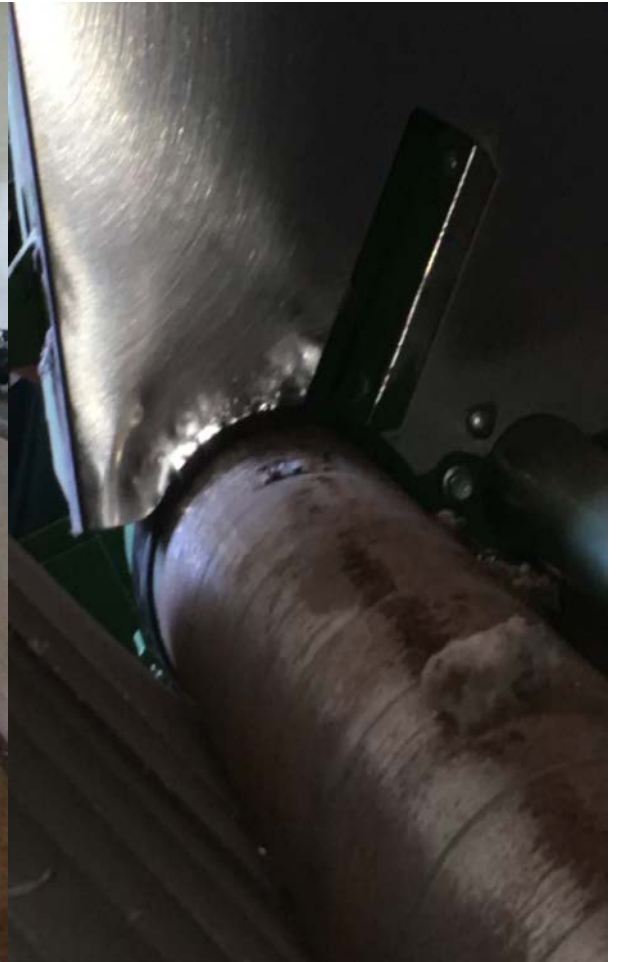
Harvester Setup and Process

Modern machines harvest cotton at great rates - 20 to 30 ton seed cotton/hour

- Maintenance
- Spindle condition
- Settings
 - ✓ Pressure doors (0.5F/2.0B)
 - ✓ Spindle Tip Clearance (6/3mm)
 - ✓ Scrapping Plates (B)
 - ✓ Ground /Spindle Speed
 - ✓ Additives in water
- Moisture pad x spindle x doffer work face



Be Careful!



Inspection & Maintenance Guide

Keys for Trouble-Free Operation of Wrap System



Thank you

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