

# Risk factors and some fields of attention

in prevention work of the textile sector in Germany



Fig. 1 by BG ETEM

## Topics

- Typical heavy accidents
- Causes of danger / technical reason or wrong behaviour?
- Main occupational diseases in textile industry
- Some fields of attention
  - Rollers
  - Dyeing
  - Manipulation of safety devices or safety guard
  - stumble, slip, fall
  - Hearing loss because of noise
- Summary

## Typical heavy accidents

### Fatal failure at carding machine

- Opened a running down carding
- Got his hand between rollers
- The hole arm was drawn in
- The safety guard was defeated by using a special option (key)
- that is only intended to be used by special trained persons

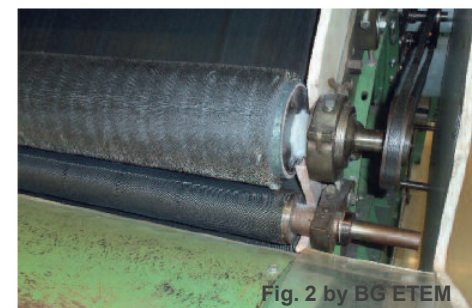


Fig. 2 by BG ETEM

## Typical heavy accidents

### Fatal failure at spinning extractor

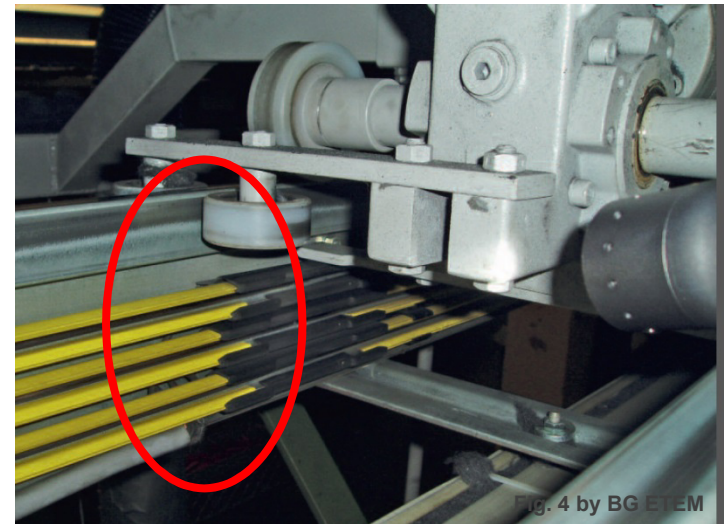
- Outer door was catapulted into work room
- The indoor went out of its holder and smashed against the outer door (bolting collapsed)
- Producer:
  - informed customer (user) about that hazard
  - Support for maintenance



## Typical heavy accidents

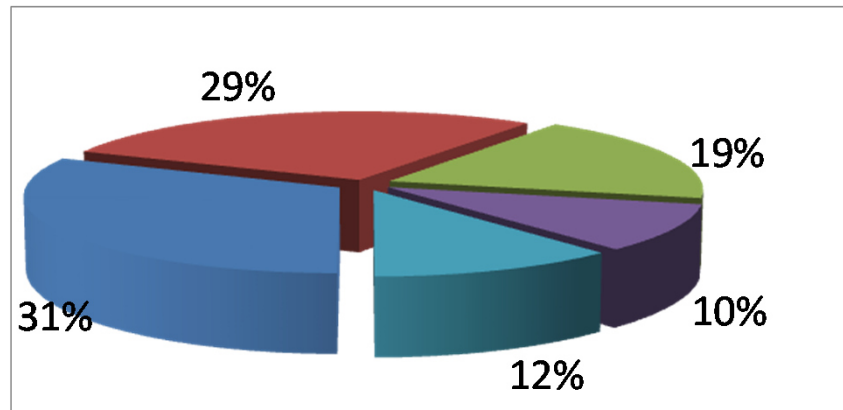
### Deadly failure at power rail

- During non electrical maintenance next to the power rail
- Power rail is “finger safe”
- slipped off and got with a screwdriver between the power rails
- Measurements
  - electrical hazards must be considered in risk assessment too
  - Switch off electrical power
  - Cover power rails

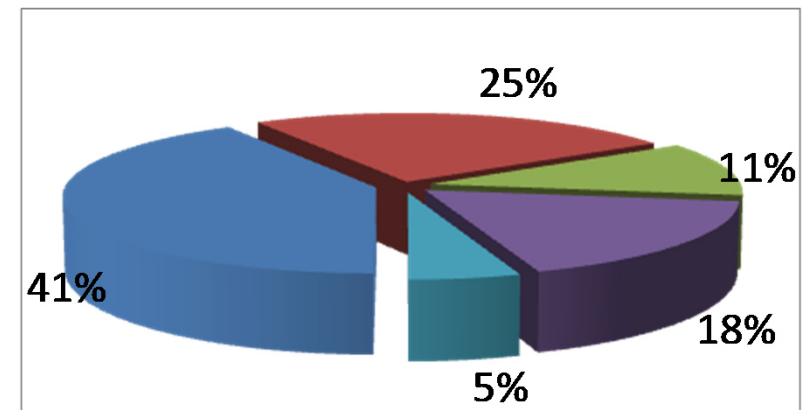


## Cases with pension payment

Cases of danger (serious accidents, 2013)



e.g. Spinning, dyeing, finishing, winding/twisting



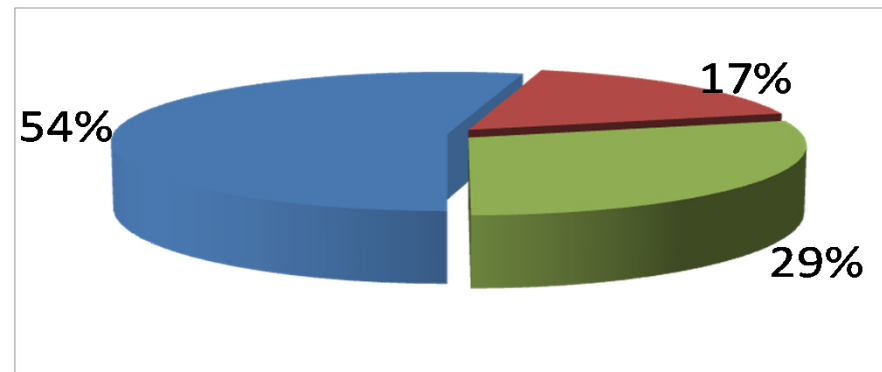
e.g. Cutting, sewing, stitching, knitting

- Machines and its parts
- in-house transport
- Other reason

- Stumble /slip/ fall / ladders
- Hand-hold tools

## Cases with pension payment

Technical reason or wrong behavior? (serious accidents 2013)



■ unsafe / wrong behavior   ■ technical reasons   ■ unclear causes



## Main occupational diseases in textile industry

### Sorted by number of cases:

1. Hearing loss
2. Skin diseases
3. Asbestos diseases



### Sorted by generated costs:

1. Asbestos diseases
2. Hearing loss
3. Skin diseases





## Main occupational diseases in textile industry

### Special occupational disease:

#### **Byssinose** (cotton fever, Monday fever)

- generated by dust from raw cotton, hemp or flax
  - disease is multi causal
  - respiratory and pulmonary disease
- 
- For anamnesis very important:
    - Description of the field of work pattern
    - Measurements of dust and endotoxin concentration



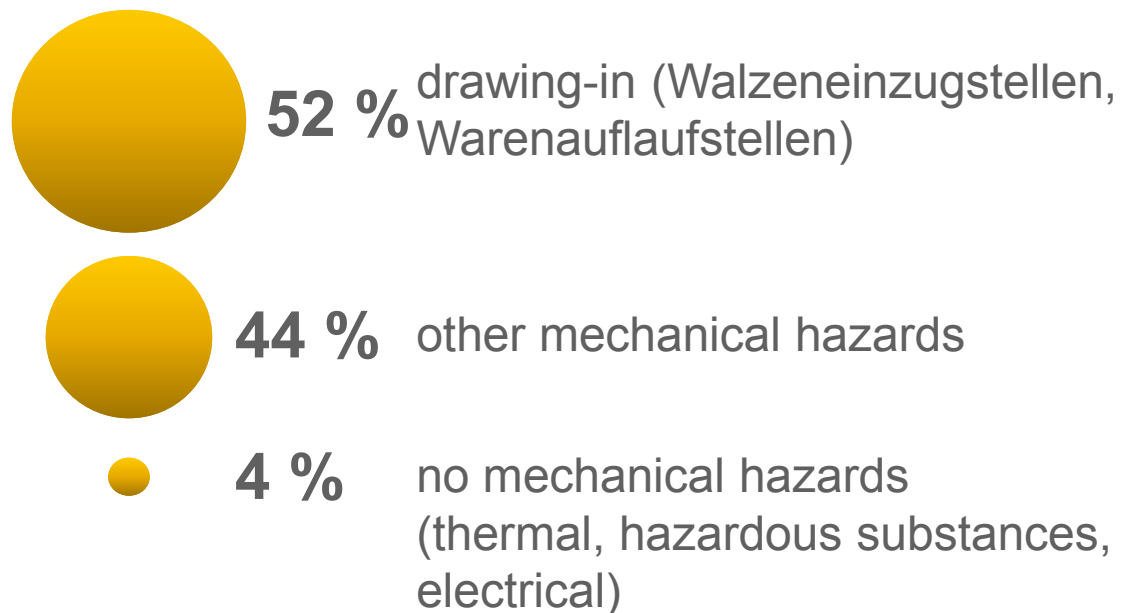
Fig. 7 by BG ETEM

## Some fields of attention

1. Rollers
2. Dyeing
3. Manipulation of safety devices or safety Guard
4. Dangerous parts at sewing machines
5. Injuring hands and fingers at weaving machines
6. **stumble, slip, fall, ladders**
7. Cutting and stitching damages
8. Hearing loss because of noise

## Some fields of attention:

### apportionment of hazards on industrial machines



## Some fields of attention:

### Specific safety requirements for CE-machines

- **DIN EN ISO 11111** Textile machinery – safety requirements (2009)
  - Part 1: [Common requirements](#)
  - Part 2: Spinning preparatory and spinning machines
  - Part 3: Non-woven machinery
  - Part 4: Yarn processing, cordage and rope manufacturing machinery
  - Part 5: Preparatory machines for weaving and knitting
  - Part 6: Fabric manufacturing machinery
  - Part 7: Dyeing and finishing machinery

## Some fields of attention

### Rollers

#### Serious injuries of upper limbs by rollers

- drawing-in between two rollers
- drawing-in between roller and casing
- drawing-in between roller and fabric



Approximately 12 % of cases with pension payment are caused by rollers.



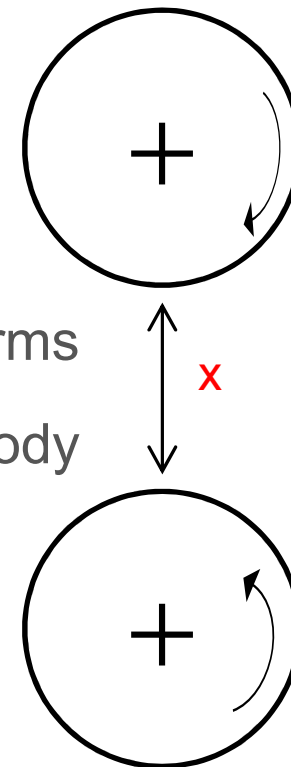
## Some fields of attention

### Rollers

- Safe distances of rollers

distance > 120 mm avoids drawing-in of arms

distance > 500 mm avoids drawing-in of body



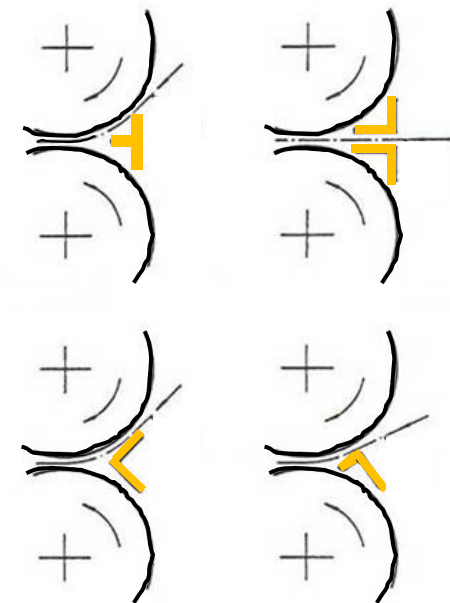
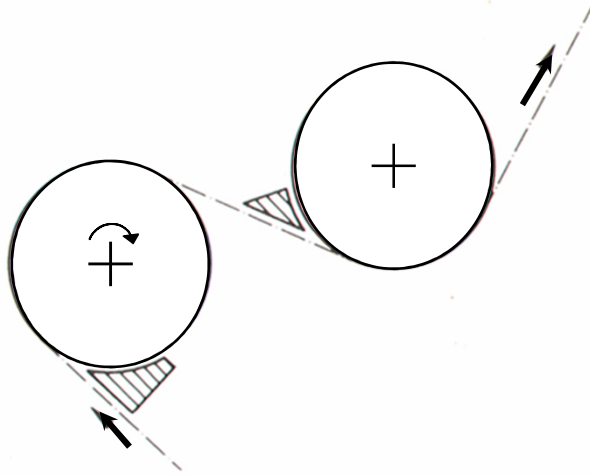
reference: DIN EN ISO 11111-1



## Some fields of attention

### Rollers

- fixed guard at danger zone
- If there is a risk of being drawn-in:  
→ protective measures are necessary



reference: DIN EN ISO 11111-1

## Some fields of attention

### Rollers

- casing of the complete machine



references: DIN EN ISO 11111-1 to 7, DIN EN ISO 13857 for safety distances

## Some fields of attention

### Rollers

- Different safety devices



Fig. 11 by BG ETEM

Bild 2: Einrichtbetrieb mit Fußschalter



Fig. 12 by BG ETEM

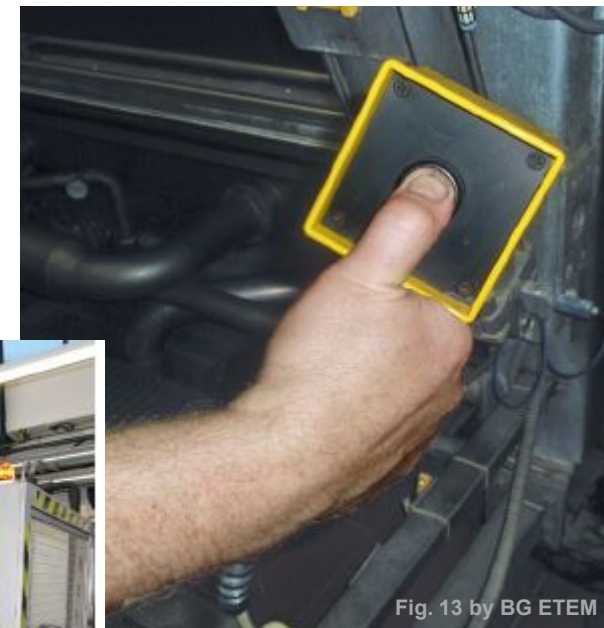


Fig. 13 by BG ETEM

references: DIN EN ISO 11111-7

## Some fields of attention

### Atmospheric dyeing machines

- Special hazards: scalding,
- Special Risks: overflowing, boiling over, steam, hot liquor
- Safety requirements:
  - Temperature < 80 °C, control device for filling level
  - Starting work cycle only when all chemicals added
  - Shut-off valves must be in a suitable distance from the vessel

references: DIN EN ISO 11111-7

## Some fields of attention

### High temperature dyeing machines

- Special hazards: mechanical combined with thermal
- Special Risks: overflowing, boiling over, steam, hot liquor
- Safety requirements:
  - Opening after shut-down of pressurising mediums (steam, Water, pneumatic) and ventilation only
  - Door/lid can be opened if the temperature has been reduced to 80 °C only (thermal safety device)

references: DIN EN ISO 11111-7

## Some fields of attention

### High temperature dyeing machines

- Safety requirements:

- Doors or lids shall be fitted with:
  - a bridge or multibolted locking device
  - a device to divert hot steam or liquor away from operator



- 1 locking element (e.g. hinge bolt with butterfly nut)
- 2 bridge
- 3 lid
- 4 deflecting ring
- 5 lug

references: DIN EN ISO 11111-7

## Some fields of attention

### Stumble, slip, fall, ladders

Two out of three cases with pension payment (serious accidents) are caused by stumble, slip, fall, ladders

#### Measures to avoid risks:

- keep building and floors in good condition
- use suitable and intact ladders
- wear suitable working shoes
- safety-conscious behaviour



## Some fields of attention

### hearing loss because of noise

typical noise areas:

- false-twist texturing  $\approx$  100 - 105 dB(A)
- weaving  $\approx$  95 - 100 dB(A)
- spinning  $\approx$  88 - 93 dB(A)
- winding machines  $\approx$  88 - 90 dB(A)
- spinning preparatory  $\approx$  85 dB(A)
- warp knitting  $\approx$  85 - 88 dB(A)
- knitting  $\approx$  82 - 85 dB(A)
- dying/finishing  $\approx$  80 - 85 dB(A)

## Some fields of attention

### Hearing loss because of noise

Measures against hearing loss:

- **reducing noise**
  - buying more quiet machines
  - noise reduction by in-housing
- **ear protection**
  - choose suitable ear protection for the employees
  - information and training how to use the ear protection
- **protective medical check up**
  - regularly hearing tests (early recognition of beginning hearing loss enables enhanced protection)

## **Some fields of attention**

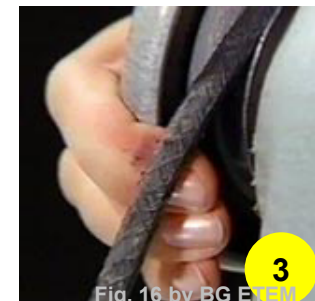
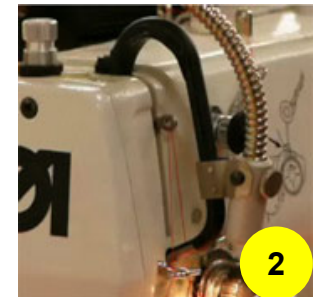
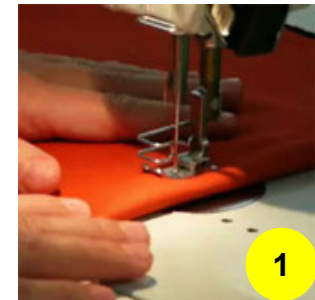
### **injuring hands and fingers at weaving machines**

- accidents often come up during removal of defects (cord break)
- significant reduce of accidents since beginning of 1980th in Germany through light barriers.

## Some fields of attention

### dangerous parts at sewing machines

- 1 action of needle  
(finger deflecting device)
- 2 action of thread levers  
(fixed deflecting bow)
- 3 belt drive (belt guard)



reference: DIN EN ISO 10821

## Some fields of attention

### sewing machines

- Make sure that robust needle guards fitted and used
- Carry out a risk assessment on the provision of eye guards
- Check that lighting is adequate and stays on when the motor is switched off, eg for safe threading.
- Vee belt and pulley drives are guarded
- Seating allows for good posture and ease of movement
- Electrical wiring is supplied from overhead or otherwise to avoid cables on floors
- Where automated making-up machines are in use, give special consideration to additional guarding requirements
- Put a system in place to inspect guards, needles and work areas on a weekly basis
- Guards should be adjusted for each individual operator's finger size
- A safe system of work includes removing feet from treadle when threading and changing needles
- Power should be switched off when carrying out adjustments and needle changing