Ironing, pressing and shaping process

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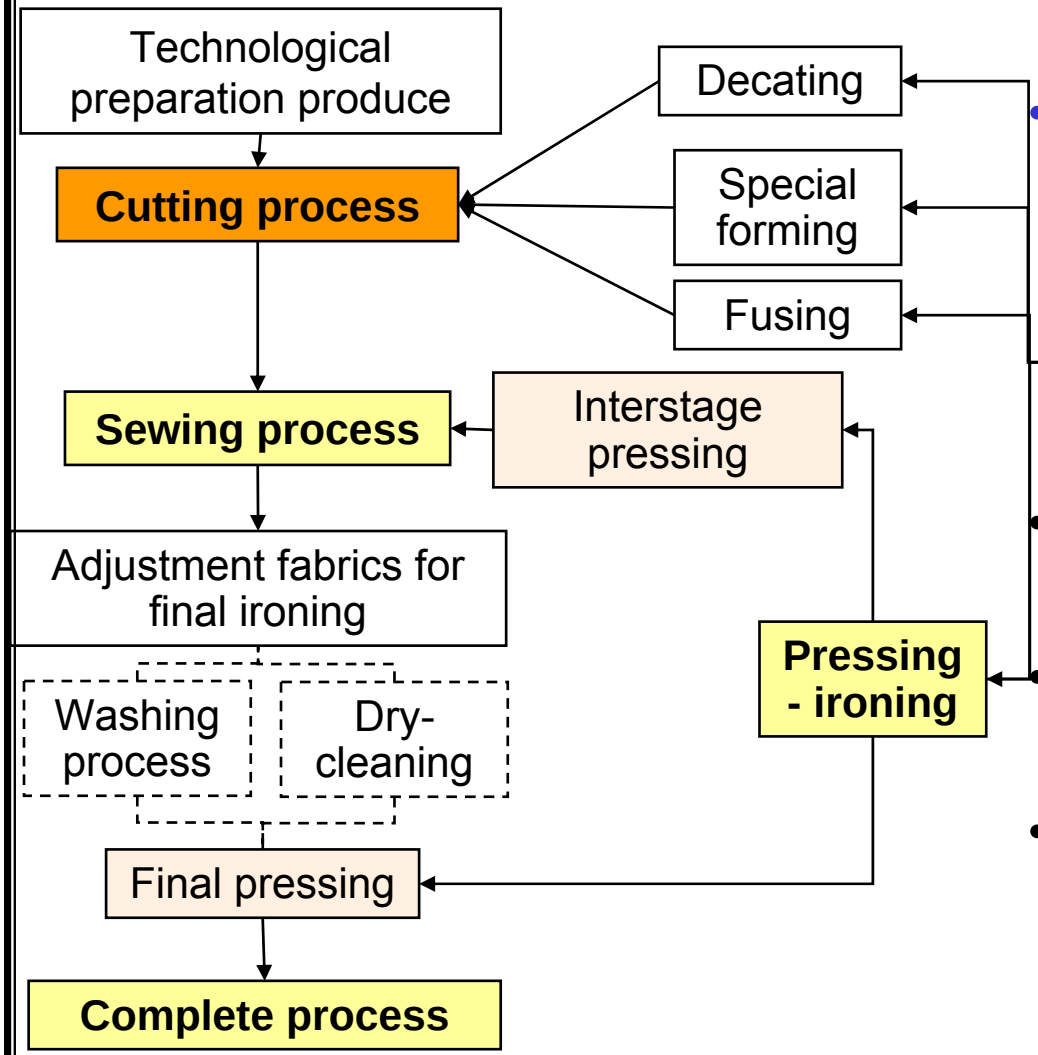
Pressing and forming process



- Pressing is heat or wet-heat processing of products, Parameters are T, t, p, φ

Pressing and forming process

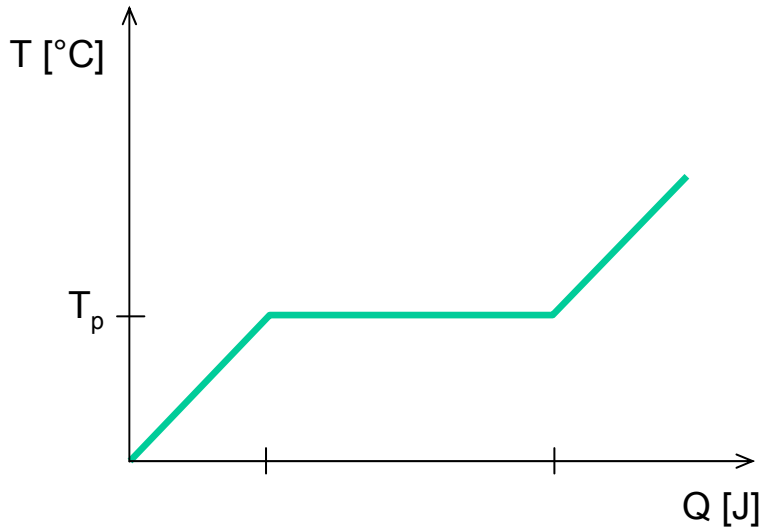
- ➢ interstage pressing (sewing process)
- ➢ final pressing (finish shape)

- Decating is action heat and steam for snapping stability of form and measurement
- Pleating is folding of material on bend edge, ladies' and girls' clothes /skirts/
- Fusing is combination fabric and interlaing using adhesive. (Parameters are T, t, p), better hand

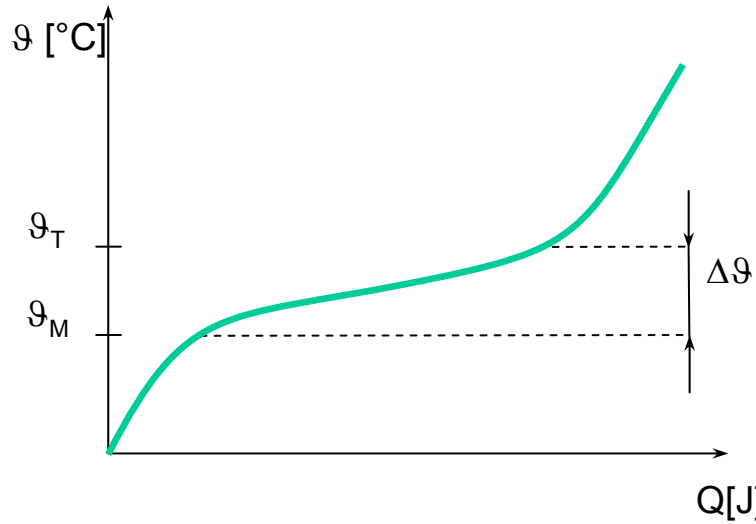
Pressing and forming process

Theoretic analysis of problem influence temperature

- **Thermoplastic**. Polymer materials soften during heating and revert during cooling (PL, PA), reversible action,the bond are released
- **Thermoset**. Polymer materials that cure, through the addition of heat, to a stronger form (epoxy). Irevesibe action.



Graph of heating low-molecular liquid (water).



Graph of heating high-molecular liquid

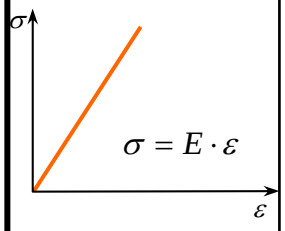
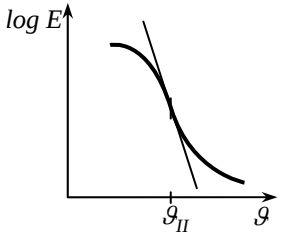
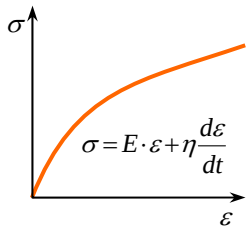
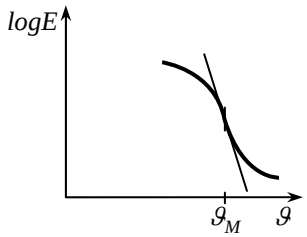
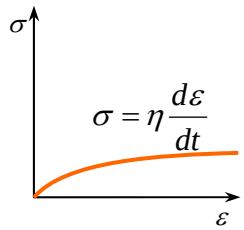
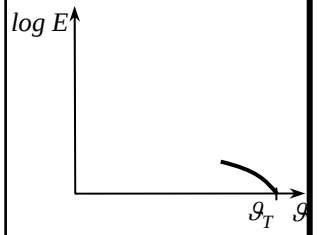
Pressing and forming process

Characteristic temperature of synthetic fibres

Fibres	ϑ_{II} [°C]	ϑ_{M} [°C]	ϑ_{I} [°C]
CA (Acetat)	180	175 ÷ 205	232
CTA (Three-acetat)	105	225	290 ÷ 300
PA 6 (Polyamid 6)	40	170 ÷ 190	215 ÷ 218
PA 6.6 (Polyamid 6.6)	47	235	245 ÷ 255
PL (Polyester)	80	230 ÷ 240	250 ÷ 260
PP (Polypropylen)	-10	149 ÷ 160	163 ÷175
PAN (Polyacrylonitril)	104	190 ÷ 220	-
PUR (Polyurethan)	-	170	183

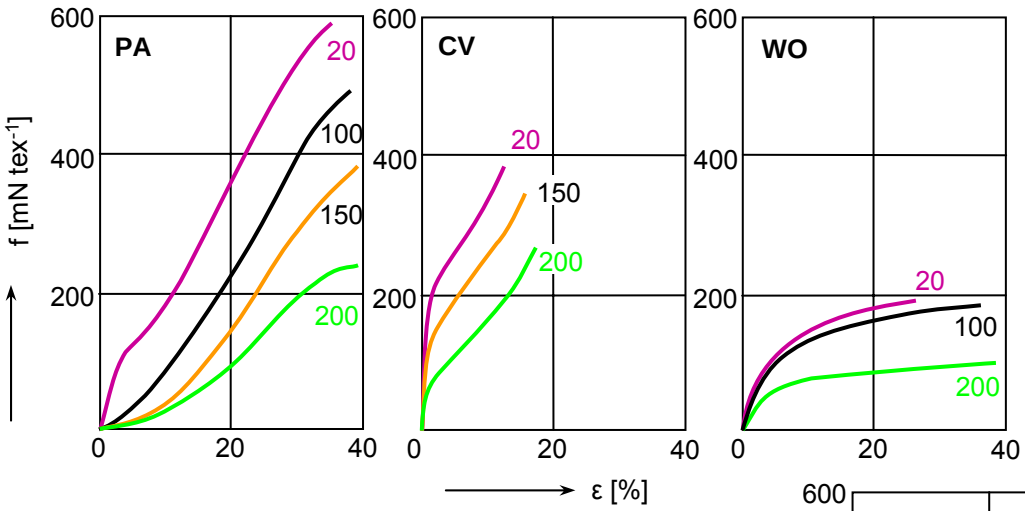
Pressing and forming process

Summary of effectiveness heat on fibres

Glass state	Transition zone	Visco-elastic state	Transition zone	Plastic state	Transition zone
					
cure polymer elastic deformation **Hooke's law**	temperature of reversion II. order $(\vartheta_{II})'$= temperature of glass state (Tg)	viscoelastic deformation elastic and plastic deformation time dependence	start of melting crystallic softening temperature ϑ_M	plastic deformation viscous flow **Newton law**	temperature of reversion I. order (ϑ_I) = temperature of fusion (T_T)

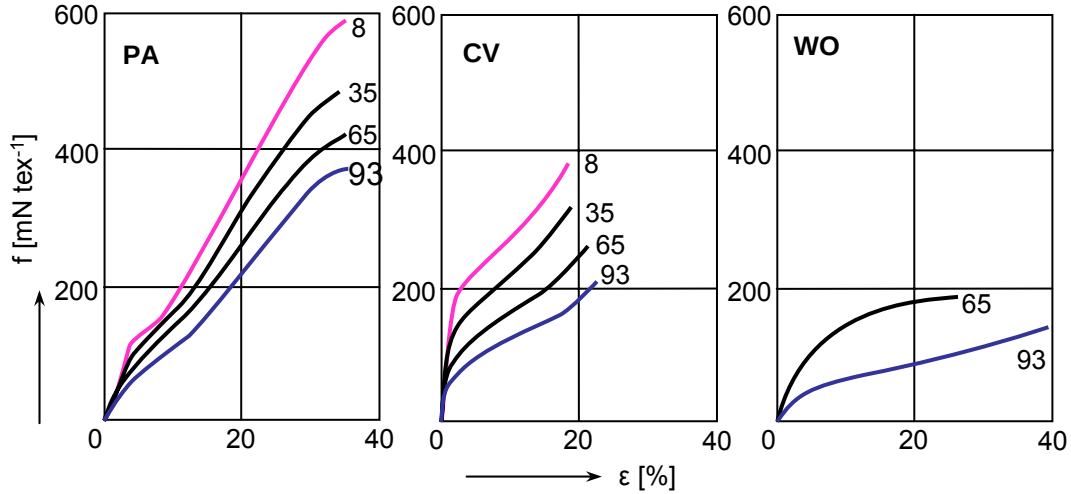
Pressing and forming process

Influence of temperature and humidity on strength fibres



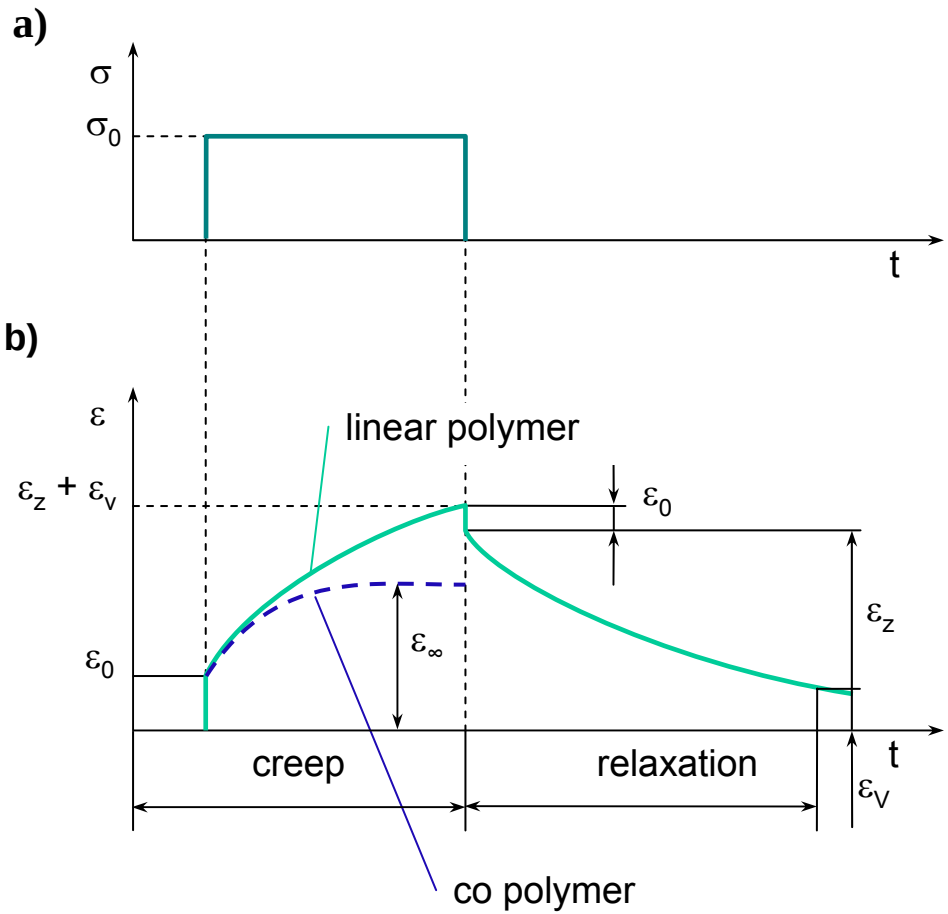
Textile fibres strength depending up temperature (20, 100, 150, 200 °C).

Textile fibres strength depending up relative humidity φ (8, 35, 65, 93 %).



Pressing and forming process

Viscoelastic behaviour at creep experiment



Total deformation:

$$\varepsilon = (t) = \varepsilon_0 + \varepsilon_z(t) + \varepsilon_v(t)$$

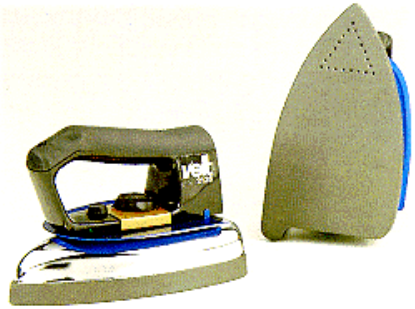
ε_0 – elastic deformation, immediate

ε_Z – elastic reversible deformation - delay

ε_V – plastic deformation

Machines for pressing and forming

- **Hand Irons**
  - Dry Electric Iron
  - Steam Iron
  - High-Pressure Electric-Steam
  - Steam-Electric Iron
  - Ironing board,table



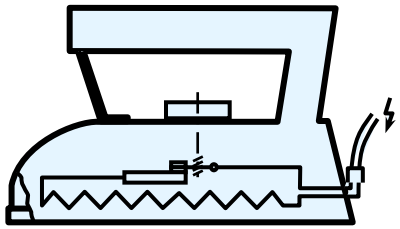
- **Presses machines**

- **Form Finisher**

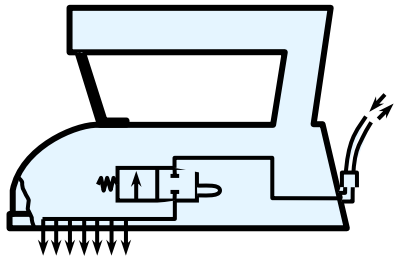
Machines for pressing and forming

Hand Irons

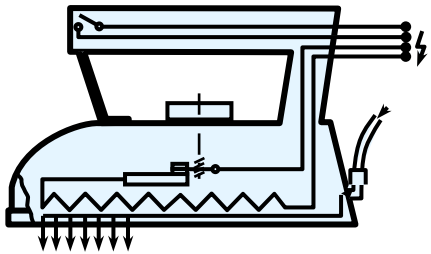
1. Dry electric iron

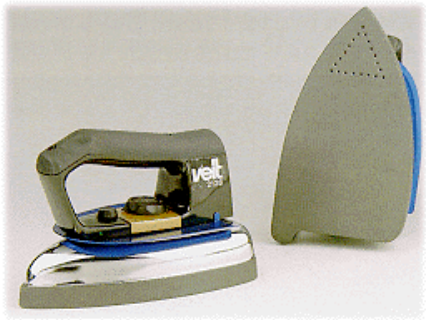


2. Steam iron



3. High-pressure electric-steam Iron



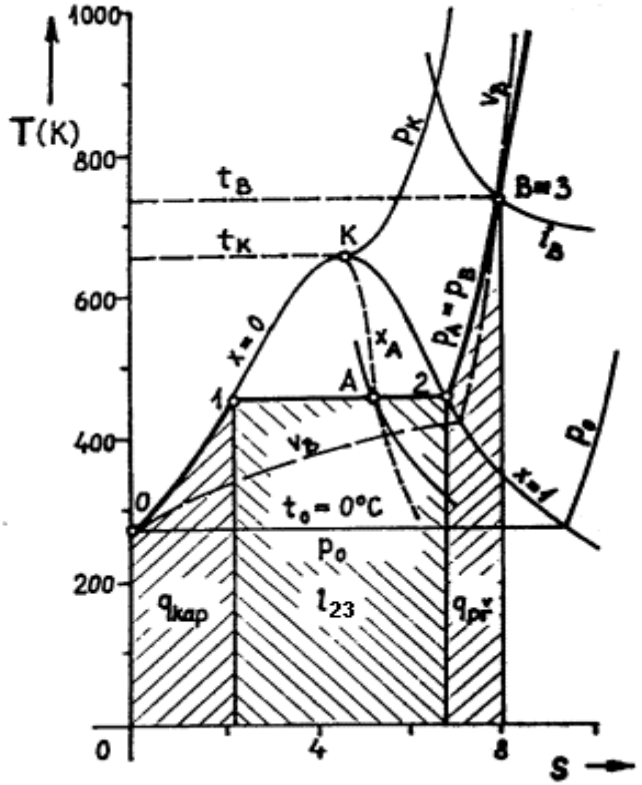


4. Steam-electric iron

- No use in industry at present

TS-diagram of steam (entropy)

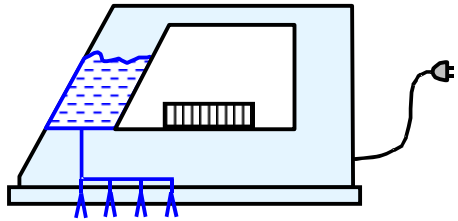
- **Boiling water**
- **Wet steam**
- **Saturated steam**
- **Dry steam**
- **Superheated steam**
- **(steamer gas)**
- **2 kg/h steam for iron**
- **2O kg/h steam for press**
- **15 kg/h steam for pupi**
- **/ finishing machine /**



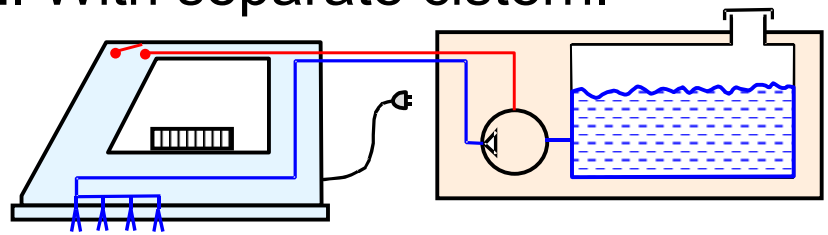
Machines for pressing and forming

Steam Generators

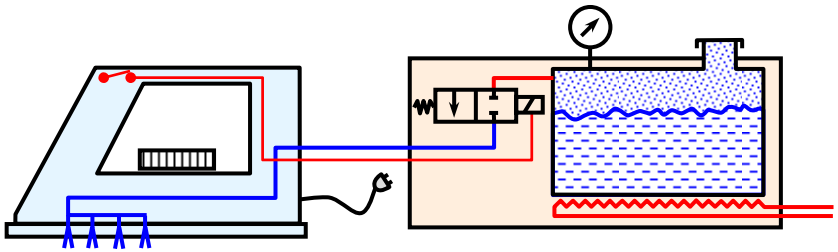
1. Domestic electron-steam iron



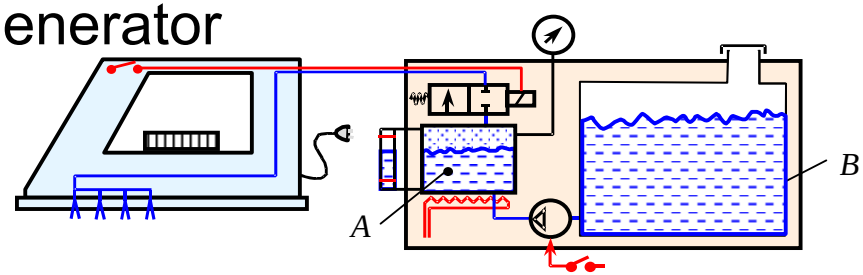
2. With separate cistern.



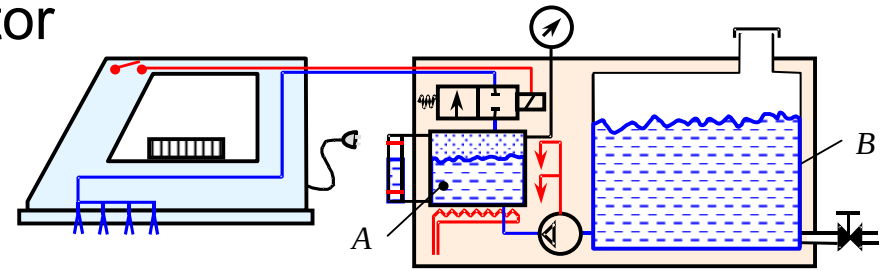
3. With separate pressure tank



4. Semiautomatic steam generator



5. Automatic steam generator

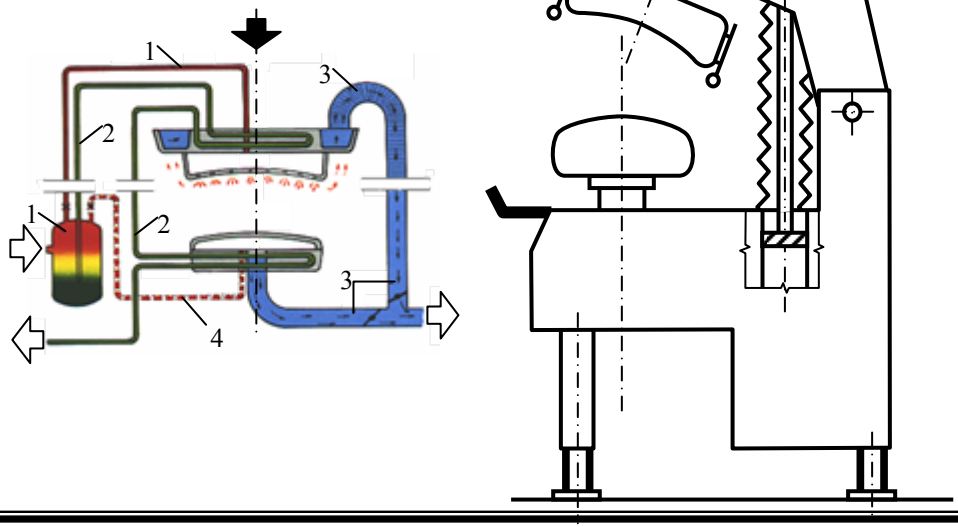


Machines for pressing and folding

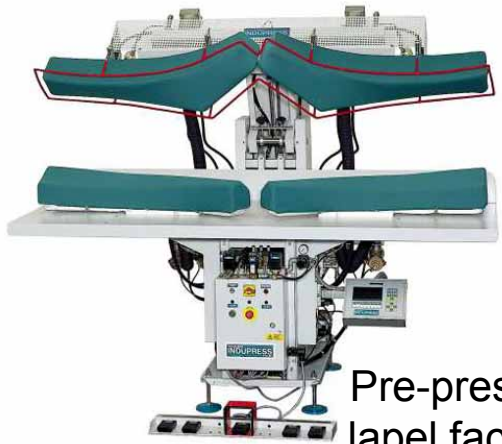
Press machine

Pressing the whole surface all at once

- Example: finishing of back parts edges and hems jacket
- upper pressing buck – steam heated
- foot electro-pneumatic operation
- opening of the machine by separate foot pedal



Universal pressing machine



Pre-pressing of edges, lapel facing and lapels

Machines for pressing and folding

Form Finisher

- automatically finds the bottom of the garment and properly adjusts the height of the form for pair of trousers
- allows for programming of 9 cycles of steam, steam/air, pause, and air times
- steam flow from within at first, then air flow
- Applications: sports clothing, trousers, jeans, child's clothes, T-shirts, clothes unlined

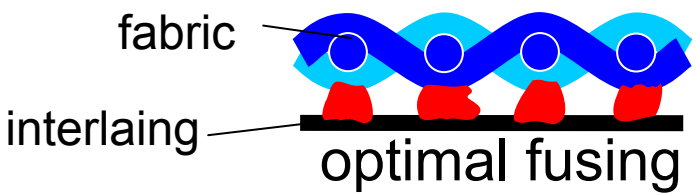
The TwinStar System

Fusing

- New technologic process for better hand, ritch hand, forming shape
- Permanent connection the face, upper fabric and interlinnig
- Apx. 4O years old, first adhesivum PE
- Exact cutting
- Exact system of size
- The production of cloht changed to industrial large- scale production

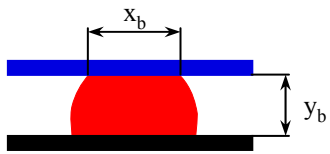
Fusing

- **plane fusing** is fusing which is made on full flat surface, no use in clothing industry, very bad physiological properties, membrane
- **point fusing** using in manufacture,better handy, better physiological properties
- interlining is textile material with adhesive that form joint of material using heat and press (woven,nonwoven,knitting)

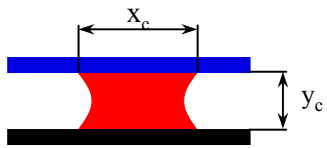


optimal fusing

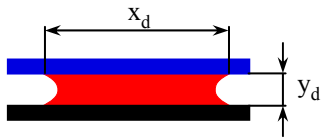
a.  no joining

b. 

deficient joining

c. 

optimal joining

d. 

instable joining

Fusing

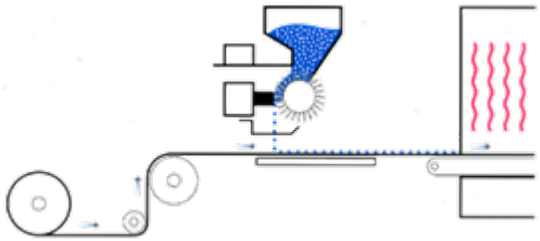
Adhesive

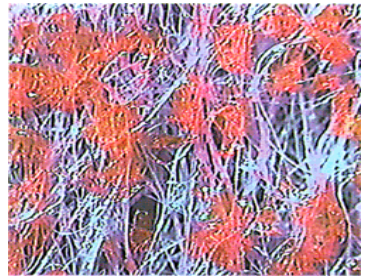
Druh	Type	Temperature between layers	Properties	Using	Wash	Cleaning
PE Polyethylen	High pressure	121/127°C	well fusing, it can be generated adhesion after chemical cleaning, but will not adhesive after pressing	Fusing of low part	60 °C	P
	Low-pressure	143/149°C	high viscosity - higher fusing press	material with special finish		P
PA Polyamid	Normal	132/138 °C	hard fusing is made with the help of more time fusing, small reaction to steam	woolen and cotton compound fabric	60 °C	P
	Modifica-tion	116/132°C	small reaction to steam		40 °C	P
	For leather	82/93 °C	low measure fusing, low viscosity, furring fusing low press	leather and furring	30 °C	P
PL Polyester	Normal	132/138°C	any reaction to steam	synthetic and compound fibres	>60 °C	P
	For leather	116/132 °C	low viscosity, low press fusing		60 °C	P

Fusing

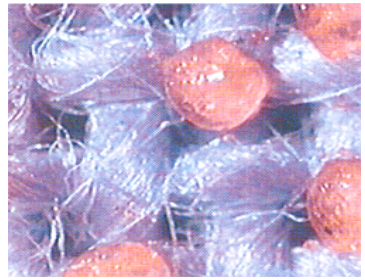
Method of application of adhesive

1. powder is strewed - screen

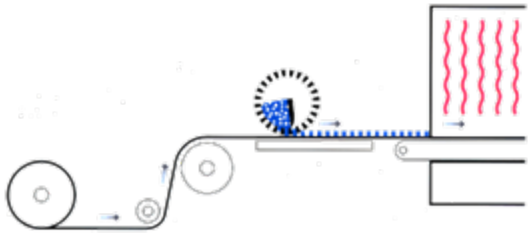


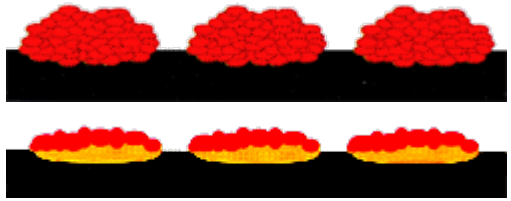


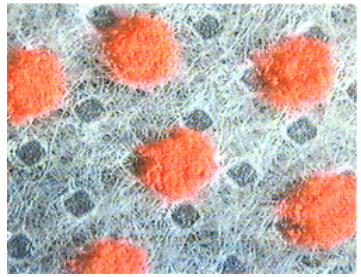
2. powder is pressed - deep-printing



3. paste is spreads - screen printing







Fusing

Method fusing

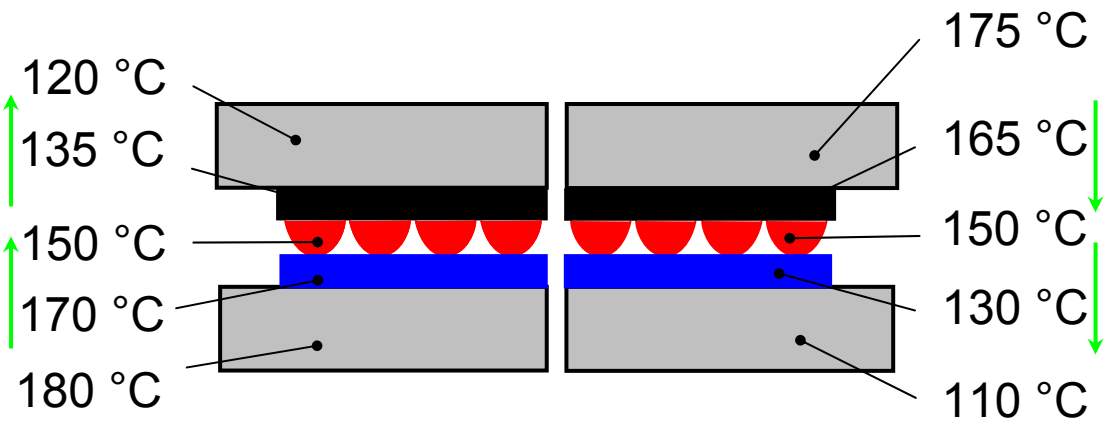
Maximum needed bond strength

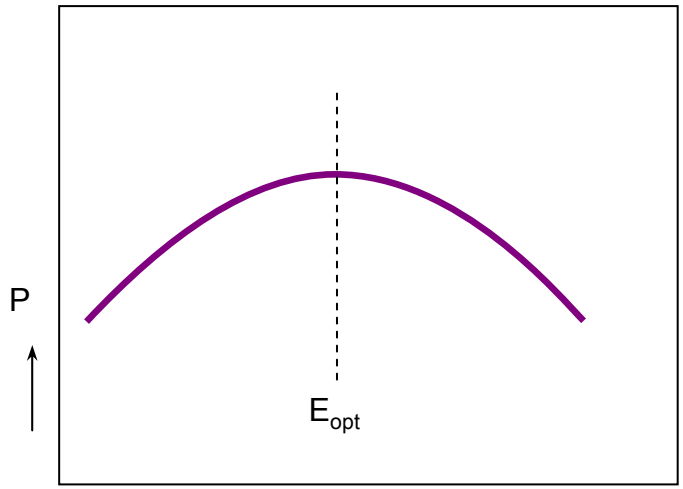
Demanding ness of clothes part	Maximum needed bond strength [N/5cm]		
	to processing	to using	to maintaining
very high	2	5	18
high	2	5	15
medium	2	5	12
low	2	5	9

Fusing

Mechanism operation fusing of factors

- temperature T [°C]
- pressure p [kPa]
- time t [s]



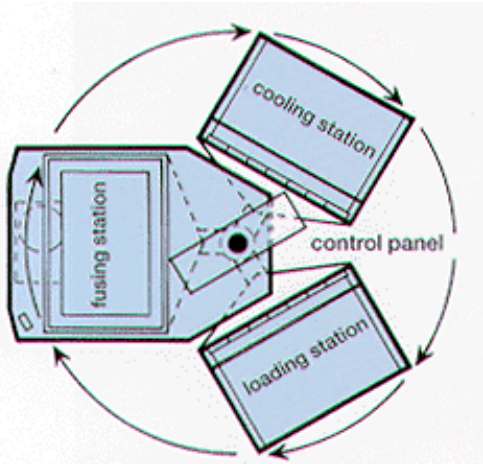


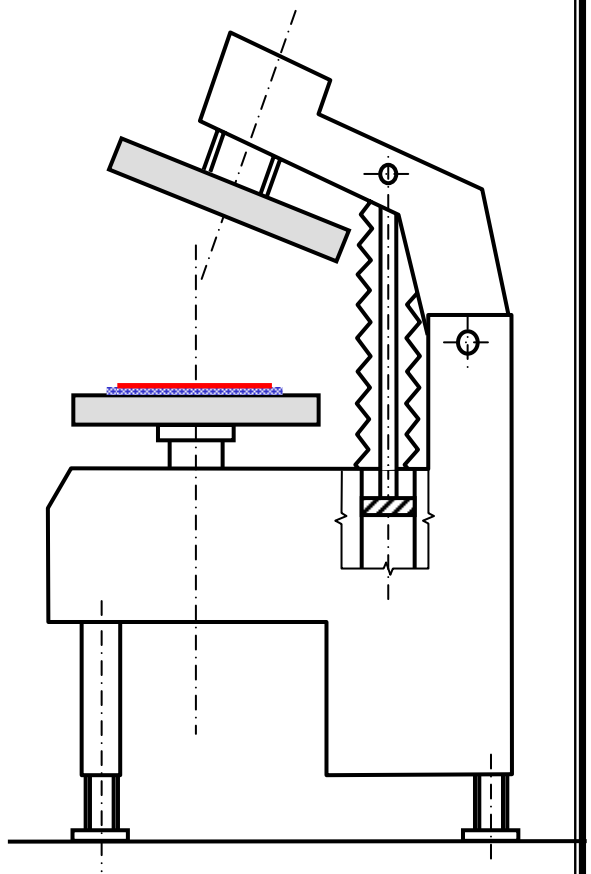
Dependence of needed bond strength P from energy E

Fusing

Discontinuous fusing machine

- hydraulic press for good performance
- high buck is always heated
- flexible application and low maintenance especially designed for medium-sized production requirements

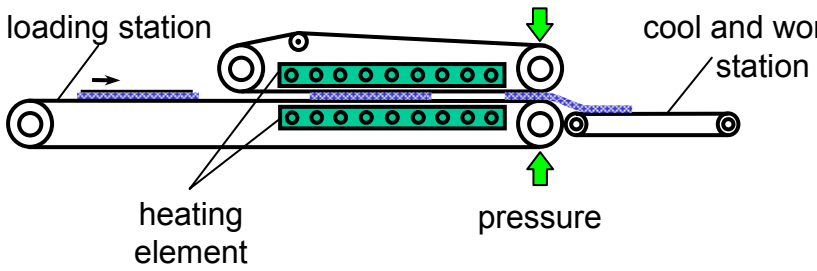




Fusing

Continuous fusing machine

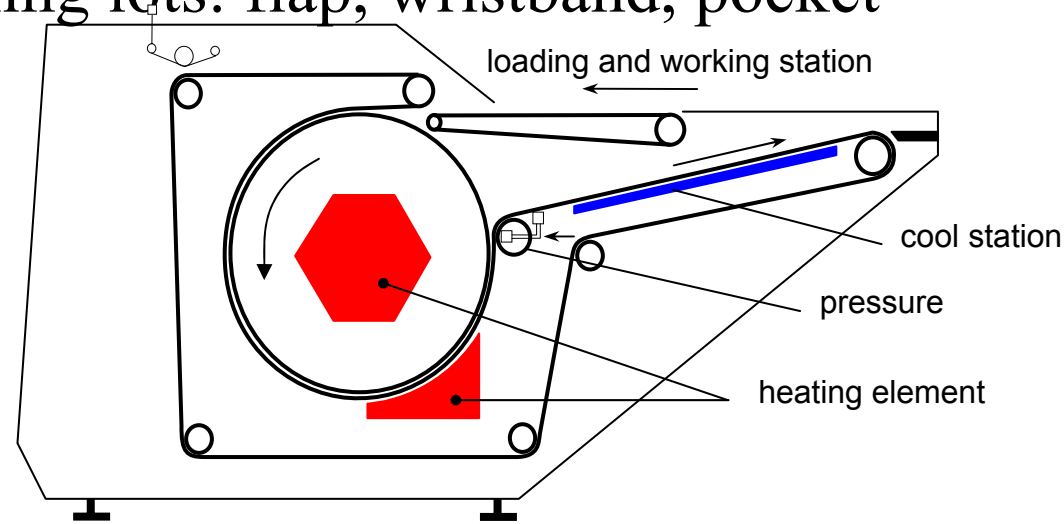
- these are equipped with new heating and pressure technologies, ensuring to meet steadily increasing quality standards with more precise results and faster reactions
- separation from loading station and machine belt, for a better working station
- over 1000 pieces of front sections of jackets per one hour



Fusing

Continuous fusing machine
Fusing cylinder machine

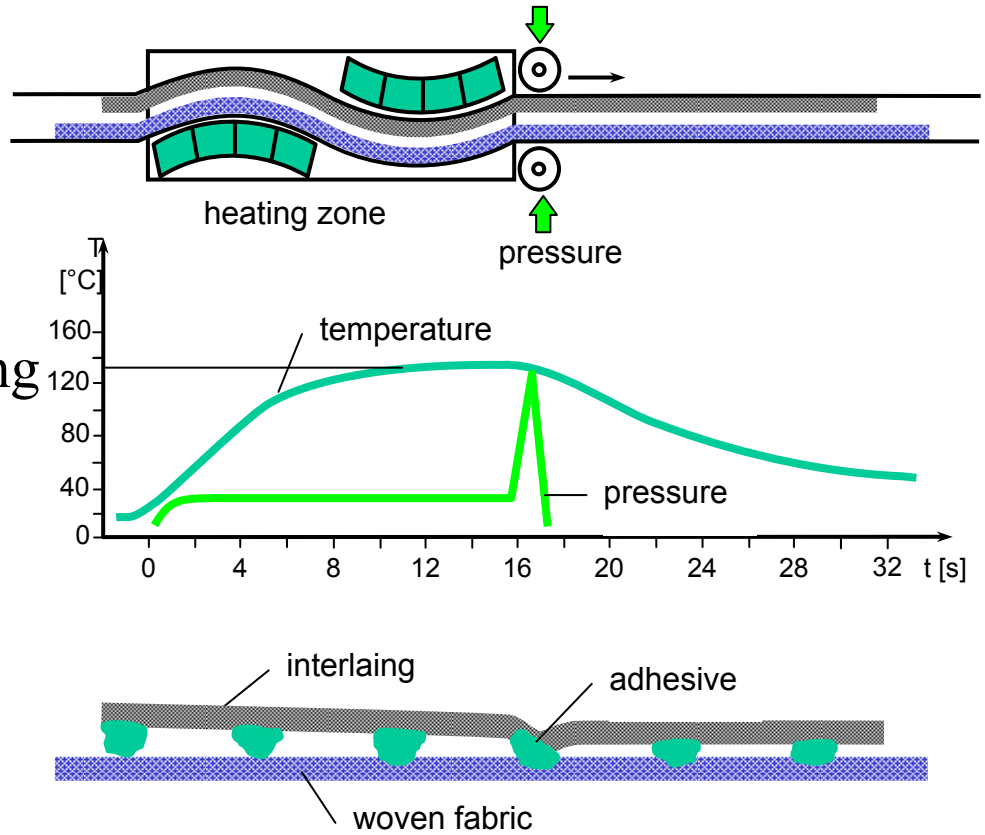
- loading station and working station on same places
- bending fabrics round cylinder
- Little bad is adjustment temperature
- for small clothing lots: flap, wristband, pocket



Fusing

Trend continuous presses fusing machine

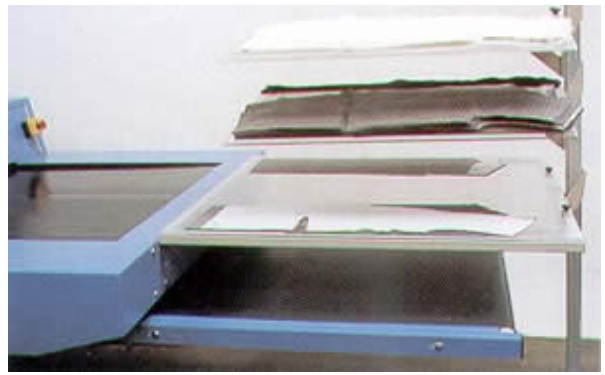
- fusing machine with convex heating elements
- constant pressure and heat transfer
- lower temperature of fusing
- temperature-time curve growing power and then stayed to constant
- Decrase **shrinking** of face fabrics
- Improve good handle



Fusing

Fusing Production Line

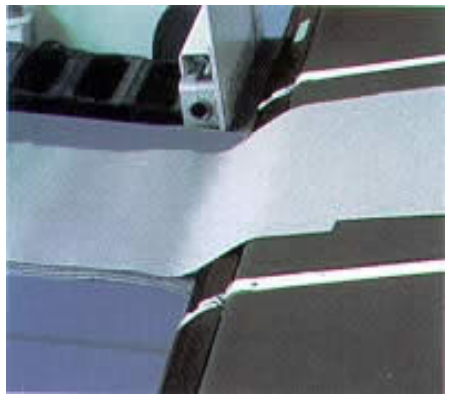
- elimination of handling and other non-value adding time
- introduction of engineering workstations complete with user-friendly work aids
- clear and simple sequencing of various fabric and interlining combinations
- easier handling and position of super-light and elastic fabrics



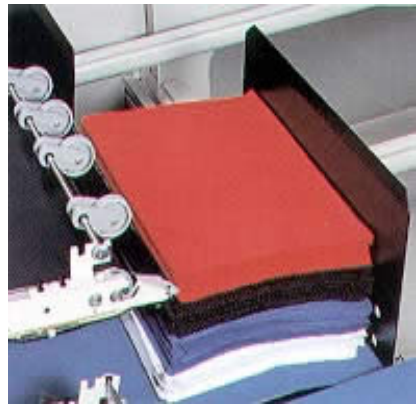
Fusing

Lay-up stacker (AST)

- the most flexible unloading solution for the widest variety of garments and production requirements
- the fused parts transfer from the cooling conveyor onto transport belts divided into lanes
- each transport belt serves an individual stacking table which moves at the same speed as the transport belt



Transfer onto Stacker Table



Small-Part Stacking