

# Welcome!

*Collano*<sup>®</sup>

Innovation in Adhesives



# **Thermoplastic Film Adhesives**

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# 1. Introduction

## Thermoplastic adhesive films (dry adhesive films)

- **Co-Polyolefins**
- **CoPA**
- **CoPET**
- **polyurethane-types (aromatic and aliphatic, ester and ether)**
- **multi layer films (with or without barrier)**
- **films on carriers**

# 1. Introduction

**The adhesive film must sufficiently adhere to both surfaces**

**→ Adhesion**

**The film must have an inner strength sufficient for  
The application**

**→ Cohesion**

# 1. Introduction

## Characteristics

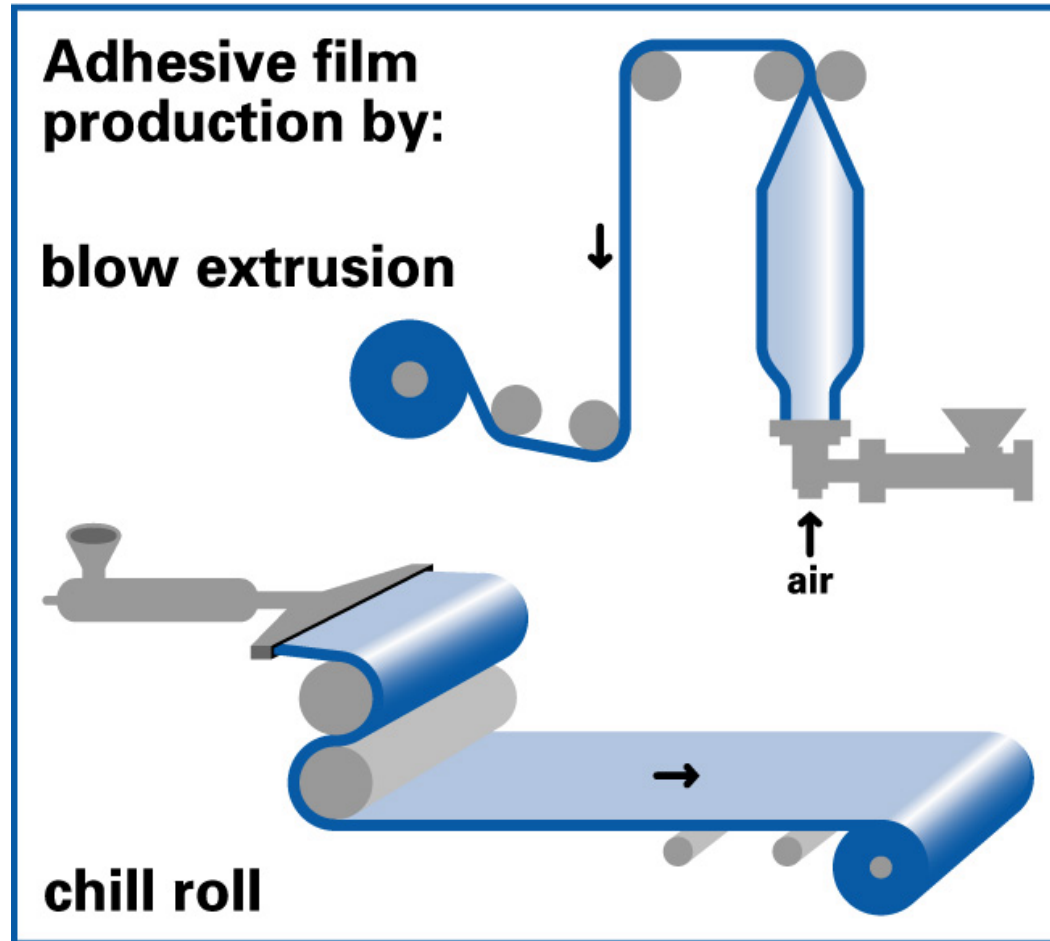
- **Allows for high degree of assembly automation**
- **High green strength and fast processing**
- **Custom designed width and thickness**
- **Consistent quality**
- **Processing of large surfaces**
- **No toxic substances**
- **No solvents**
- **No machine clean up**
- **No shelf life problems**

# 1. Introduction

## Important assembly parameters to consider

- **Bond polar substrates with polar films**
- **Bond non-polar substrates with non-polar films**
- **Bond line temperature (wetting)**
- **Pressure**
- **Compression time**
- **Surface preparation**

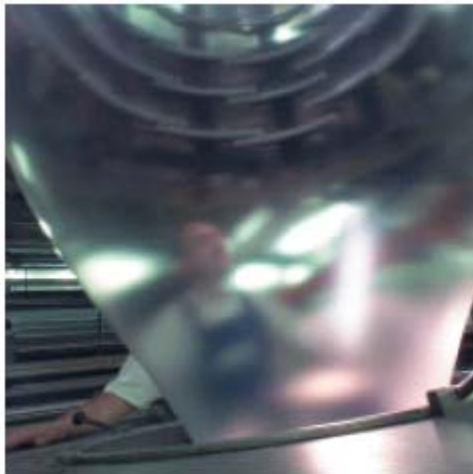
## 2. Manufacturing Methods





# 2. Manufacturing Methods

## Blow Extrusion



# 2. Manufacturing Methods

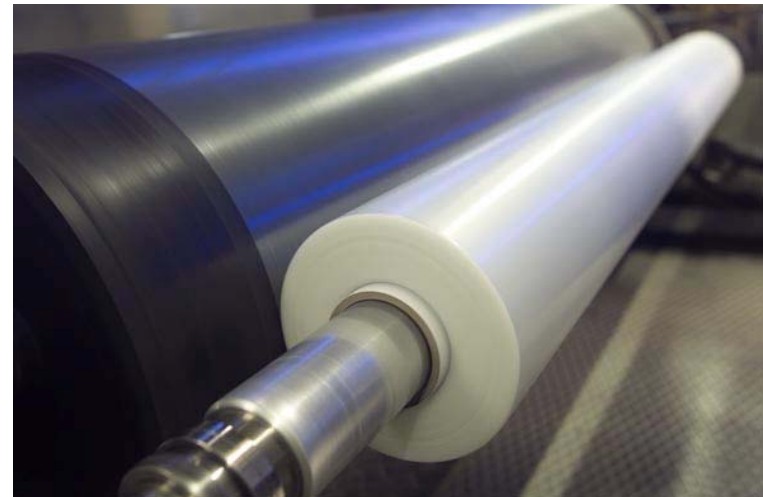
## Slot Die Extrusion



# 2. Manufacturing Methods

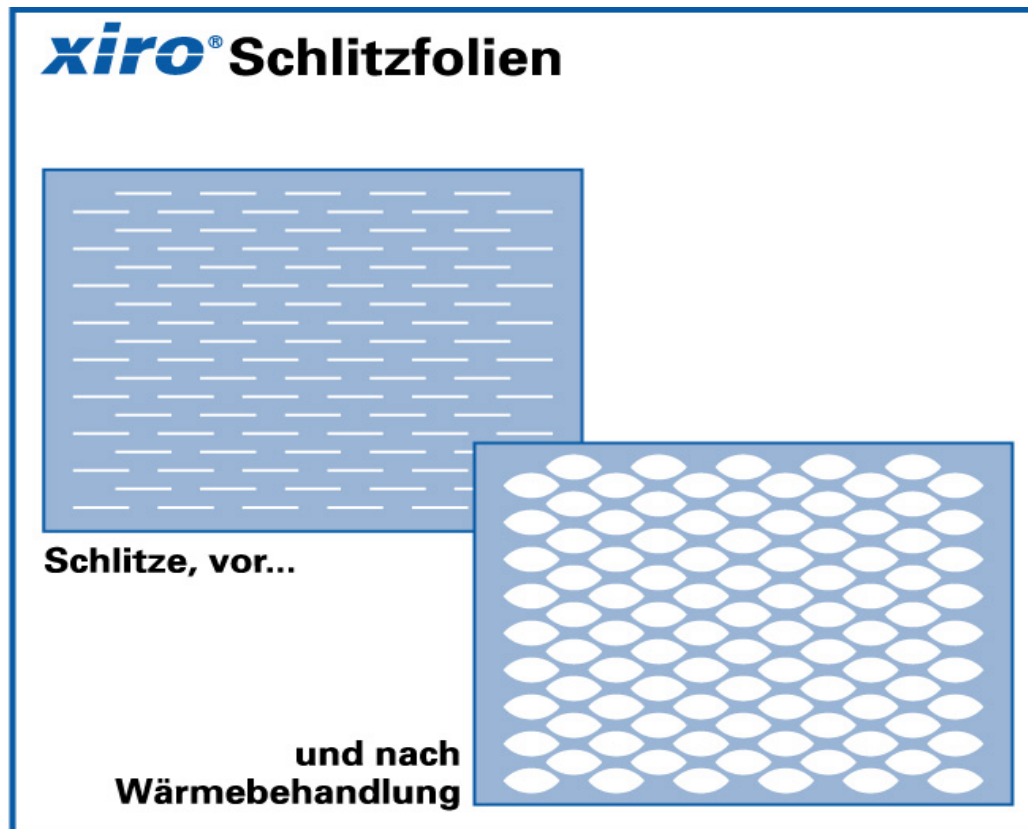
## Thermoplastic Adhesive Films

	<b>Slot Die Extrusion</b>	<b>Blow Extrusion</b>
<b>Thickness</b>	<b>15 <math>\mu\text{m}</math> to 500 <math>\mu\text{m}</math></b>	<b>15 <math>\mu\text{m}</math> to 200 <math>\mu\text{m}</math></b>
<b>Width</b>	<b>10mm to 2000mm</b>	<b>10mm to 3000mm</b>



# 2. Manufacturing Methods

## Slit films



**before heat treatment**

**after heat treatment**

# 2. Manufacturing Methods

## Slit films

- perforated films up to width of 2100mm
- slits are generated by rotating slitting knife assembly (patented process)
- slits are 4mm apart (across machine direction)
- slits overlap by 0.1mm front and back (in machine direction)
- there are 68,000 slits per m<sup>2</sup>
- perforation size, slit density and shape are fixed as result of mechanical slitting knife assembly

# 3. Adhesive Bonding

## Failure Modes

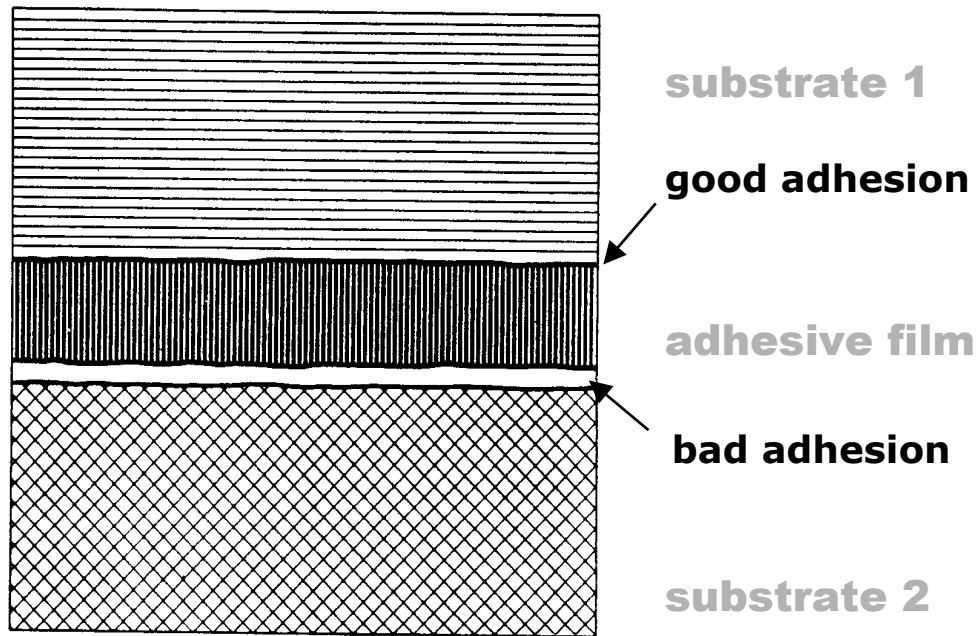
**Failure will occur at the weakest point of the assembly.**

**We differentiate between**

- **Adhesion failure**
- **Cohesion failure**
- **Substrate failure**

# 3. Adhesive Bonding

## Adhesion Failure





# 3. Adhesive Bonding

## Adhesion Failure

**Because of high cohesion and low adhesion force, The glue detaches from substrate without damage to the bonding surface.**

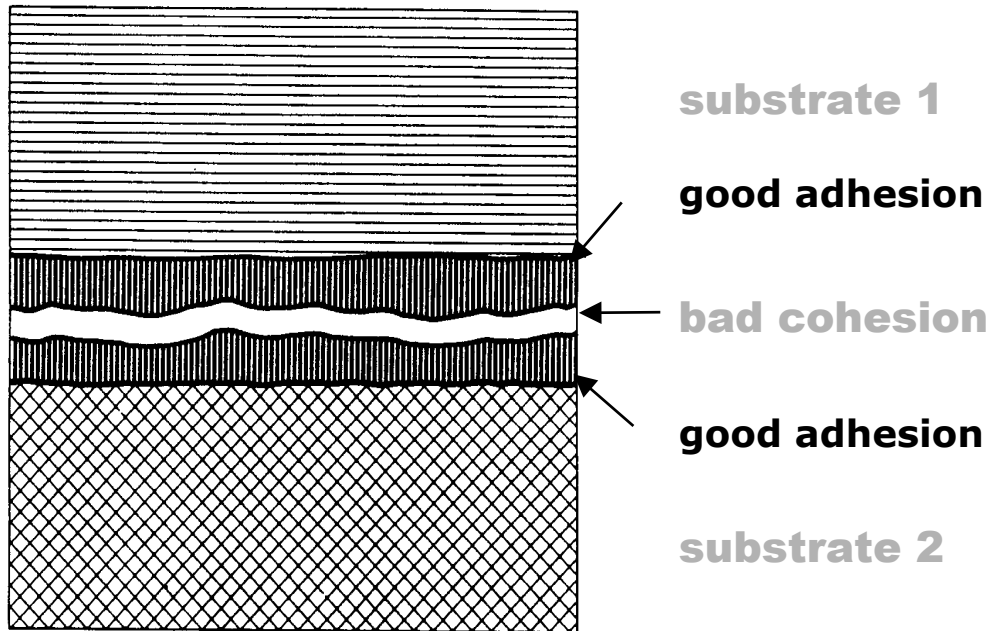
### **Common reasons for adhesion failure:**

- **open-time limit exceeded (viscosity/wetting)**
- **unsuitable adhesive (polarity)**
- **contaminated surface (grease/moisture)**



# 3. Adhesive Bonding

## Cohesion Failure



# 3. Adhesive Bonding

## Cohesion Failure

**Because of high adhesion and low cohesion strength, the adhesive film breaks.**

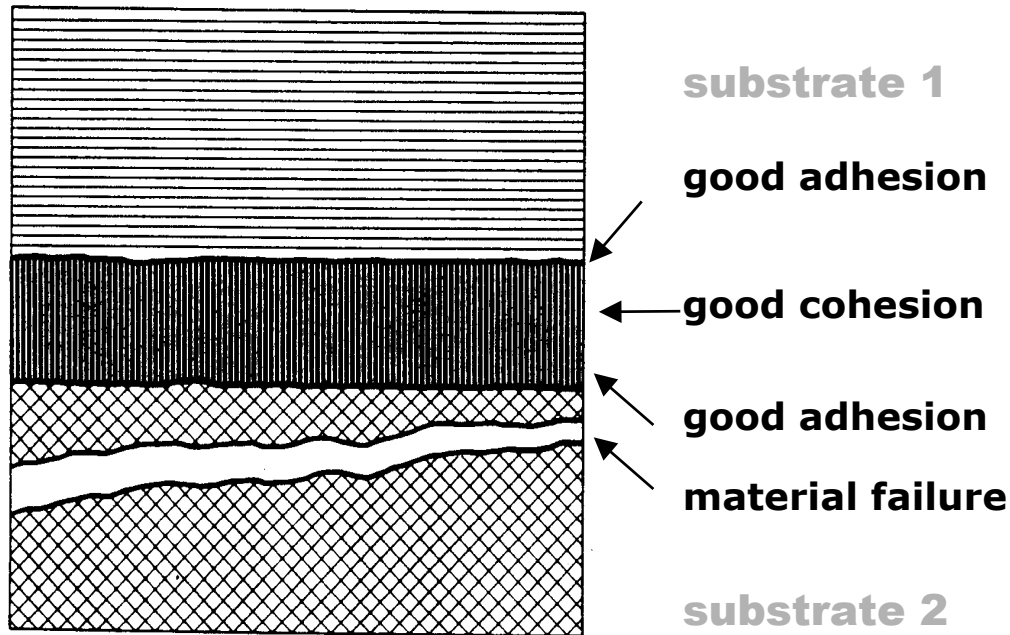
**Adhesive remains on both substrates.**

### **Common reasons for cohesion failure:**

- **glue line not thick enough**
- **unsuitable adhesive**
- **press time too short**
- **glue line too thick**
- **bond temperature too low**

# 3. Adhesive Bonding

## Substrate Failure



# 3. Adhesive Bonding

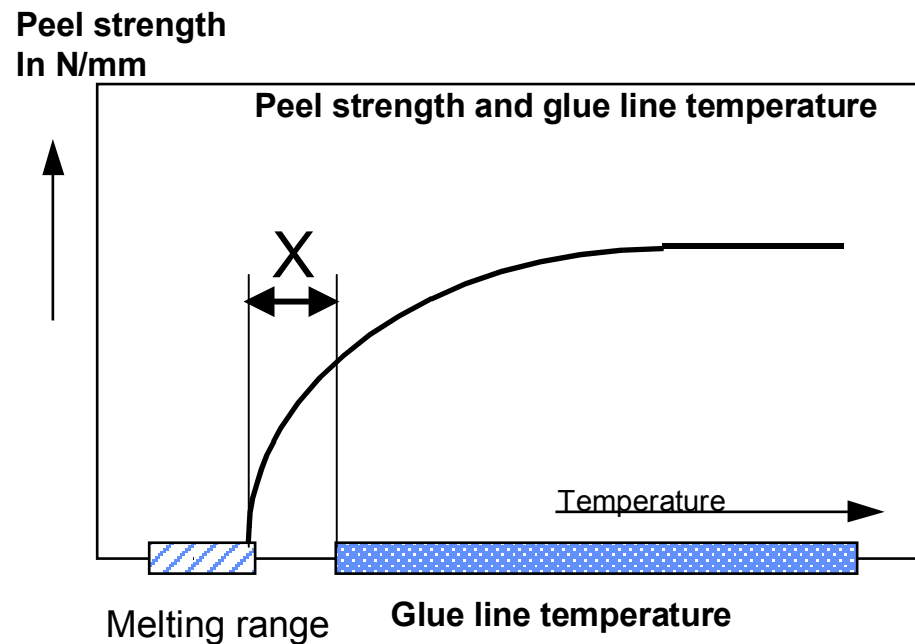
## Substrate Failure

**Failure occurs inside the substrate. That means cohesion and adhesion strengths are higher than the substrate strength.**

# 3. Adhesive Bonding

## Optimization of bonding conditions

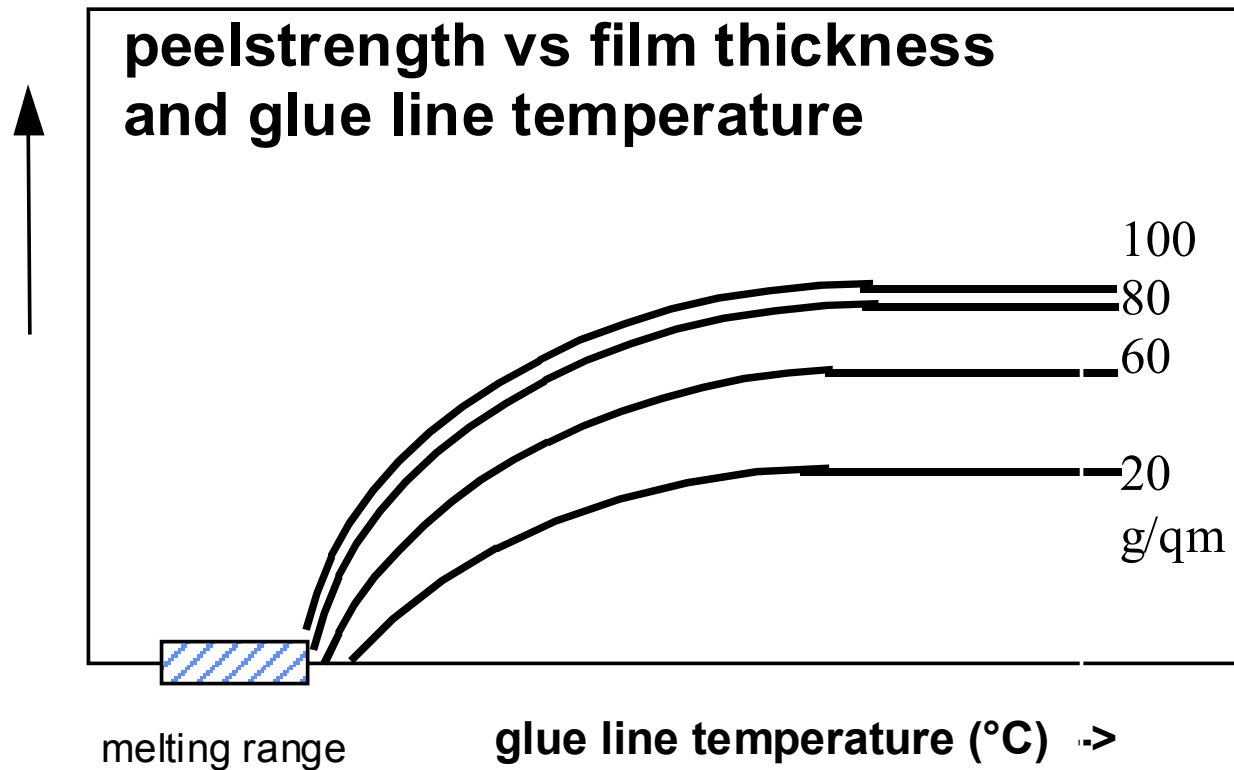
- Heating up (melt range + X °C)
- Pressing substrates together to achieve wetting
- Cooling down (melt range - X °C)



# 3. Adhesive Bonding

## Optimization of bonding conditions

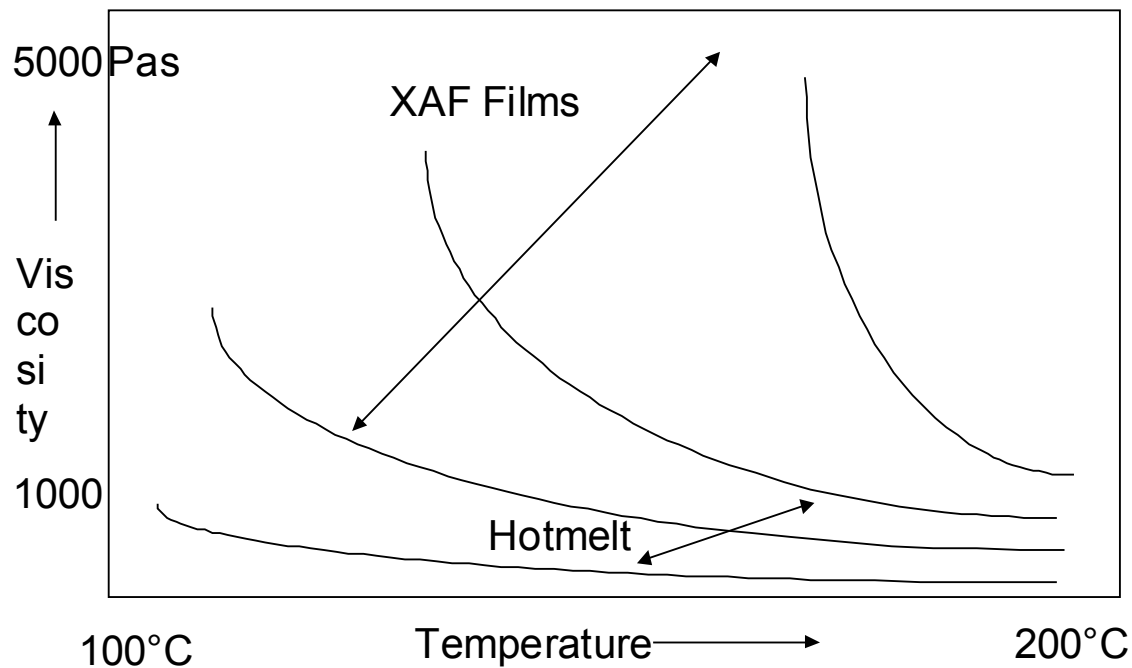
peelstrength  
In N/mm



# 3. Adhesive Bonding

## Comparison of viscosity

### Viscosity vs Temperature



# 4. Applications



## Automotive interior components

- door panels
- instrument panels
- seats
- headliners
- pillars
- sunvisors etc.

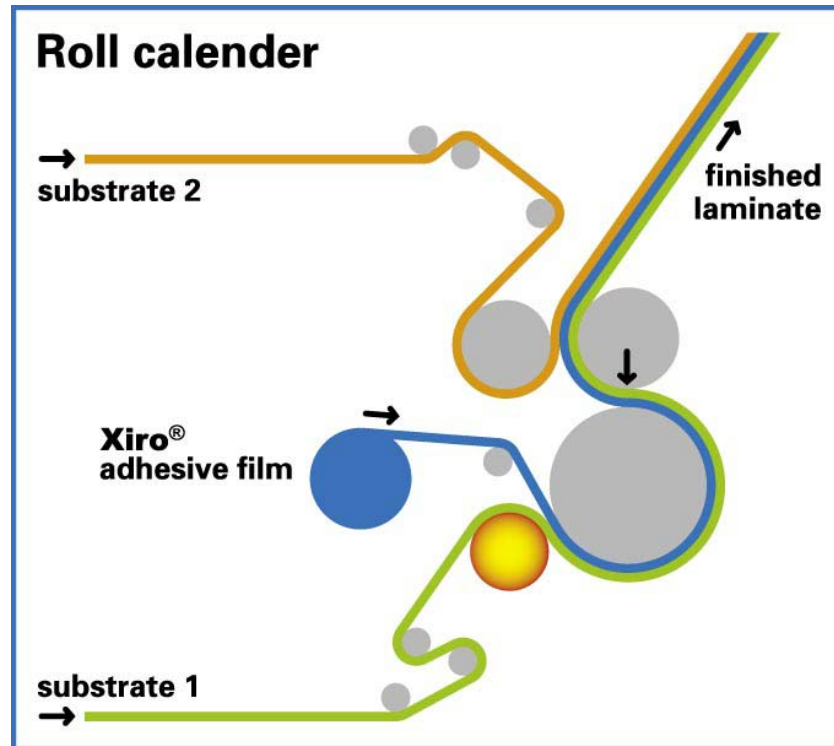




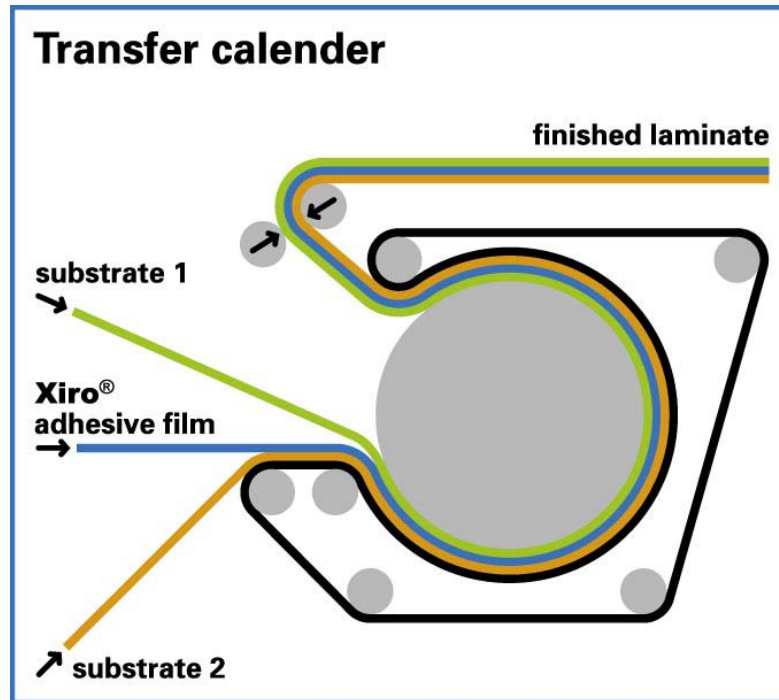
# 4. Applications

- **Armor plates**
- **Leather**
- **Metals (aluminum, steel)**
- **EPDM weather strips**

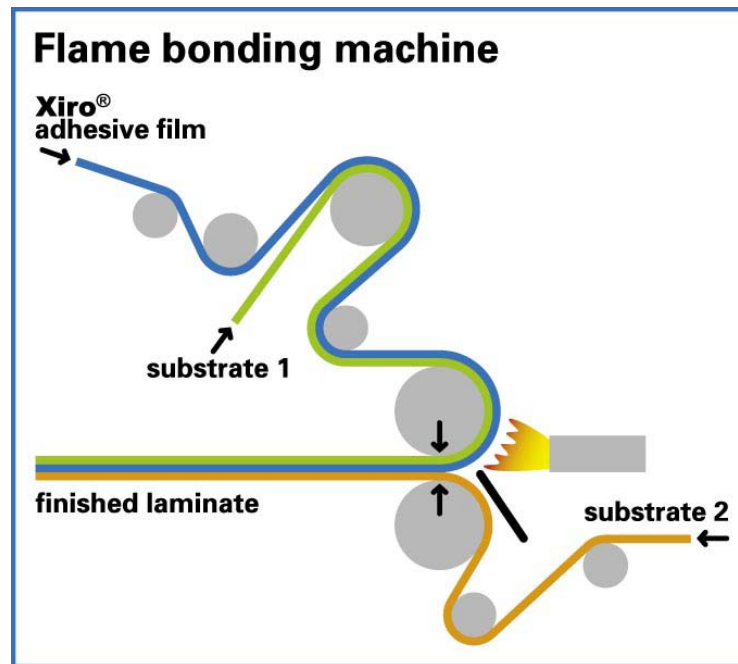
# 4. Applications



# 4. Applications

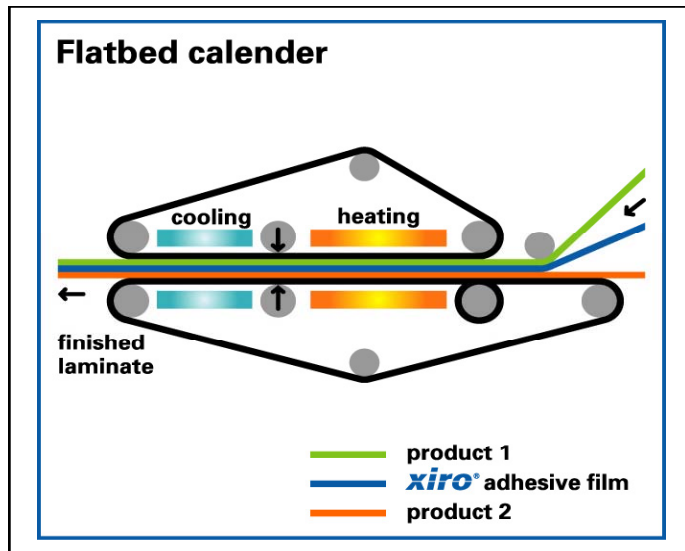


# 4. Applications

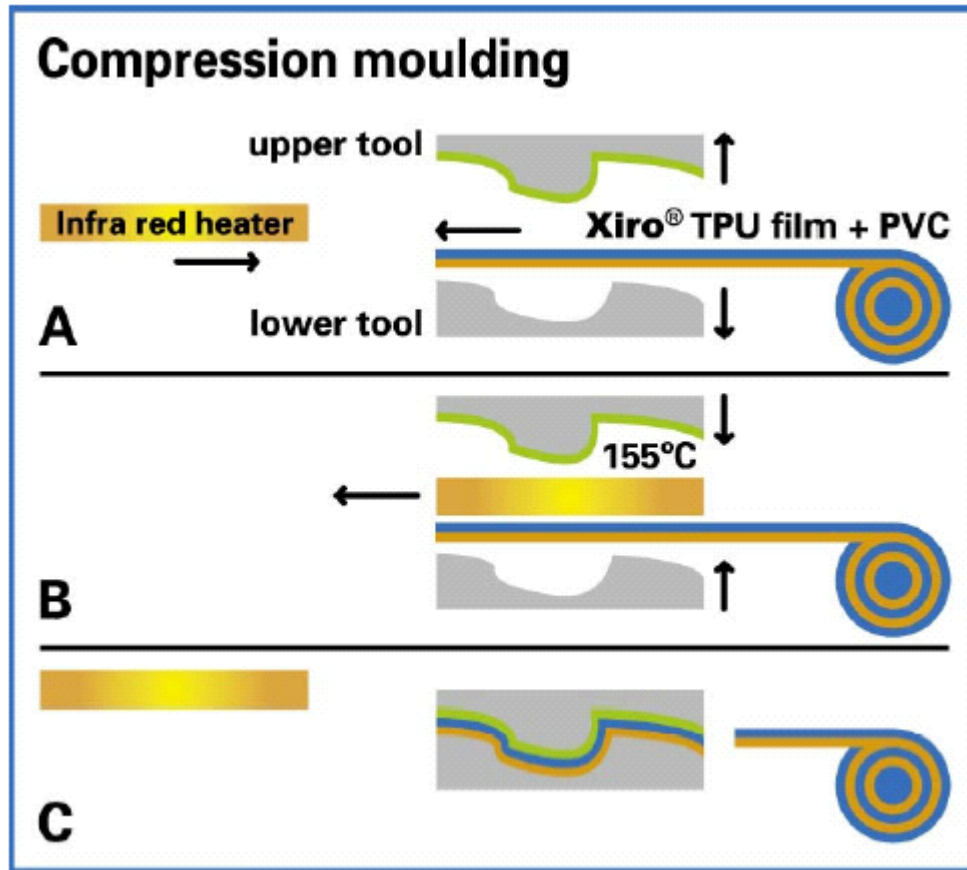


# 4. Applications

## Flatbed calender

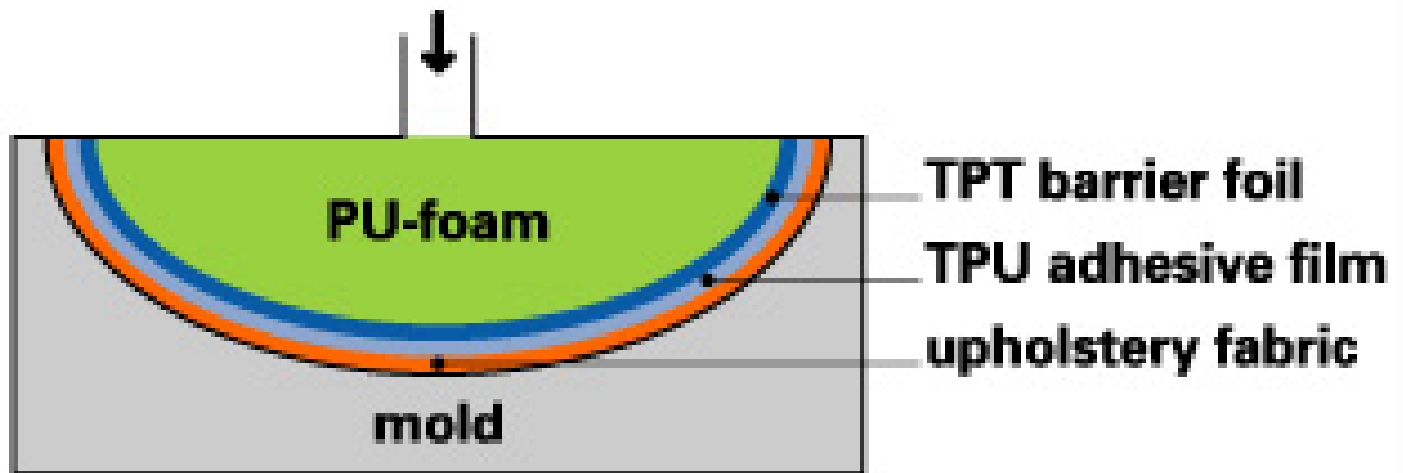


# 4. Applications



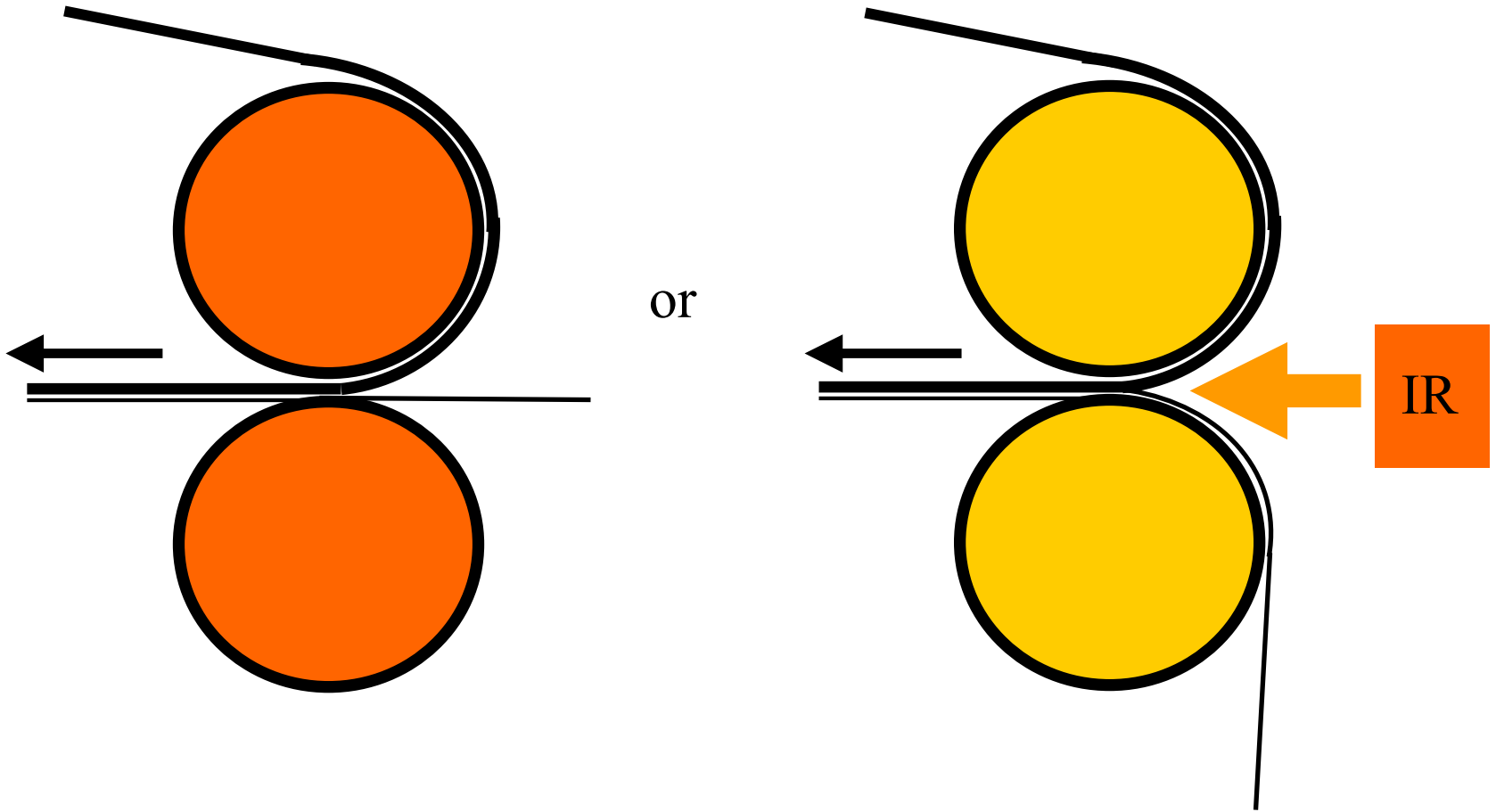
## 4. Applications

### Injection moulding tool for upholstery



# 4. Applications

Continuous process: calanders





# 4. Applications



# 4. Applications



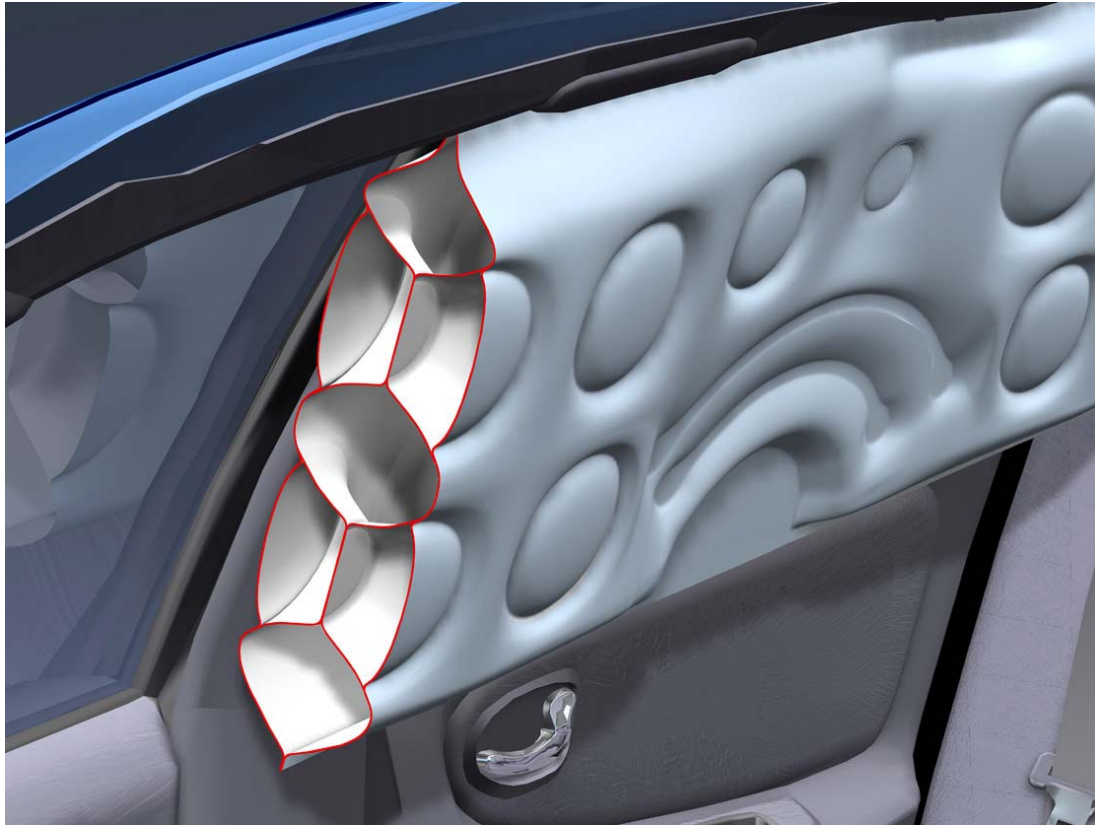
**trunk liners**

**decorative center console**



# 4. Applications

**Side curtain airbag using dual layer film**



# 4. Applications



**headliners**

**Seating**

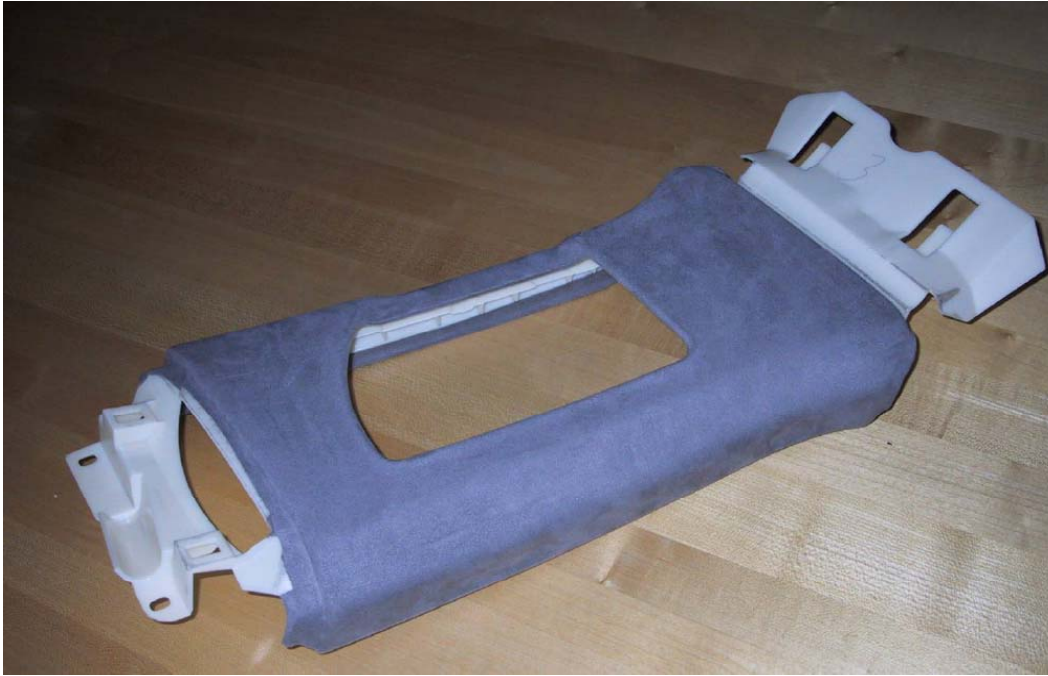


# 4. Applications



**Door panels are complex systems, consisting of several parts and different Materials**

## 4. Applications



**B-column of an Audi. ABS body covered with Alcantara**