

Basic Knowledge

Adhesive Technology

Fundamentals

Adhesive **Construction** Materials
Cohesion **Active and Passive** and Adhesion



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FASTENING SYSTEMS

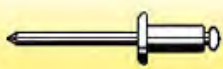
PERMANENT

Mechanically removable



(e.g. screws)

Mechanically fixed




(e.g. rivets)

Welding



Adhesion



- Contact adhesion
- Hot-Melt adhesion
- Structural adhesion
- Pressure sensitive adhesion



How does an adhesive behave?

During an adhesive process

mechanical, physical and chemical strengths are at work.

These strengths are of different kinds and intensities, depending upon the adhesive and the materials to be bonded

We differentiate here between

cohesive and adhesive strengths

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Advantages of adhesion

No

contact corrosion

No

material weakness

High

dynamic strength

Even

load distribution

Fusion

thin materials

Fusion

different materials

Fusion

heat sensitive materials

Fusion

without thermal influence

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Surface Preparation - Cleaning

Removal of

fat, dust and moisture

Removal of

loose paint and coatings

Pay attention to

identical temperature of the materials to be bonded

Cleaning only

with **clean cloths**

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Surface Preparation - pre-treatment

Mechanical

**sanding, brushing
or blasting**

Chemical

use of **activator/primer,**
or **etching**

Physical

corona treatment,
plasma treatment
or by **burning**
(short heating of the surface)

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Surface Preparation - Priming

Primer

is used when the **adhesive properties** need to be further **improved** (e.g. difficult to bond plastics such as PP, PE, PTFE, thermoplastic elastomers and silicone), or if the bond is to be **exposed to moisture or corrosion.**

a primer helps **reduce** the **undermining** of the bond due to **corrosion on the edges.**



Surface Preparation - Activating

Activator

is used for all bonds which are not in optimal **environmental conditions** (e.g. dry air, cold), or on **porous** or **absorbent materials** (e.g. wood), and on passive materials, or where **large gaps** need to be filled

Anaerobic Activator

works as a **cure accelerator** and also as an **adhesion promoter** when bonding passive materials and plastics

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Adhesive Types

Chemically curing
adhesives

ANAEROBIC PRODUCTS
(react to the exclusion of air)

CA ADHESIVES

SILICONE ADHESIVES
(react to air moisture)

UV-CURABLE ADHESIVES
(react to UV light)

Neutrally curing
adhesives

2-PART ADHESIVES

2-PART PUTTY

(react to mixing or kneading
together of two different
chemical materials)

Non curing
adhesives

**POLYMER BONDER
AND SEALANTS**
(react to air moisture)

ADHESIVE TAPES
(react to pressure)

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Materials

Active Materials

machining steel
mild steel
bronze
copper and copper alloys
brass
untempered carbon steel
unalloyed cast iron

Passive Materials

aluminium
anodised coatings
chromate coatings
high alloy stainless steel
ceramic
plastics
gold
nickel
oxide films
silver
zinc
tin

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Cohesion, Adhesion, Pot Life

Cohesion

(cohesive strength)

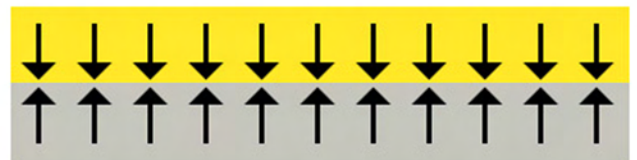
own strength of the adhesive itself after curing



Adhesion

(attachment strength)

bonding strength of the adhesive onto the surface



Pot Life

(working life)

time between mixing an adhesive and the end of the working time



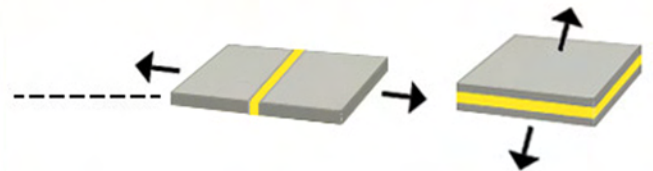
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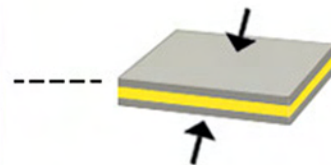
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Mechanical Stress

Tensile Load



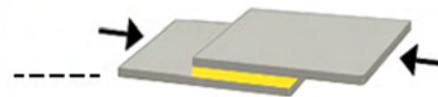
Pressure Stress



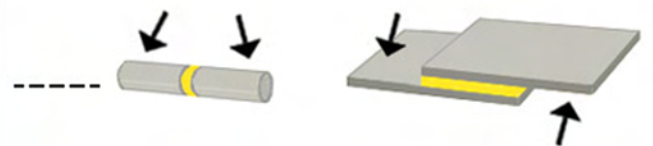
Tensile-Shear Stress



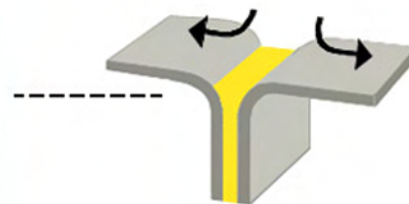
Pressure-Shear Stress



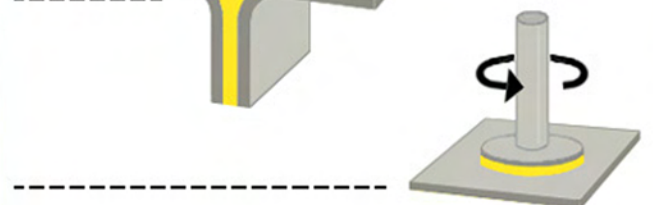
Bending Stress



Peel Stress



Torsional Stress



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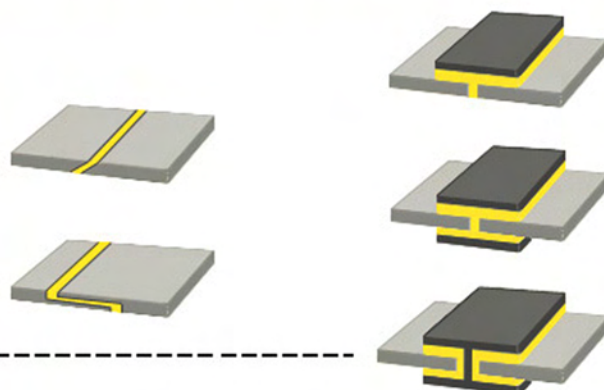


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Adhesives Construction A

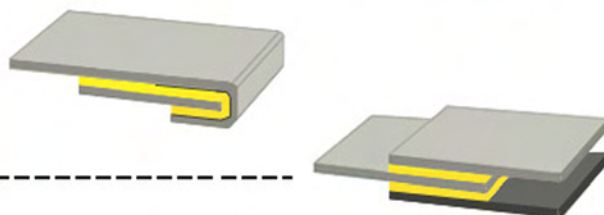
Tensile and Compressive Force

- Mounting Simple lashing
- Mounting Double lashing
- Lashing with profile



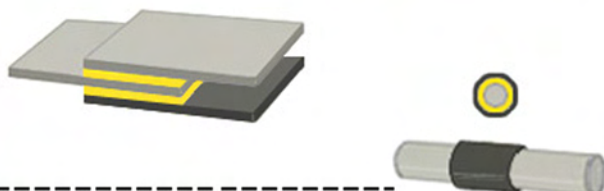
Shear Stress

- Double overlapping with folding
- Double overlapping



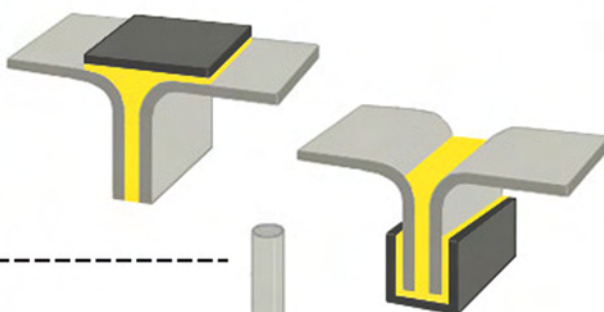
Bending Stress

- Double overlapping
- Strengthening with a sleeve



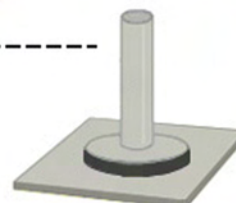
Peel Stress

- Strengthening with flat materials
- Strengthening with flat U-Profile



Torsions Stress

- Strengthening with a casing (flat ring)



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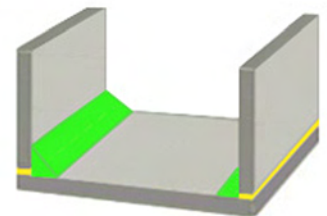
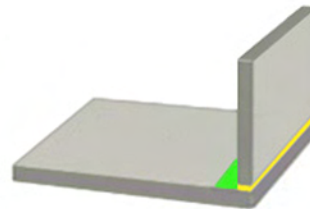
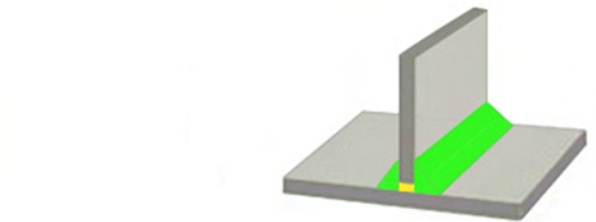
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Adhesives Construction B

Adhesion of narrow bases (brackets)

Strengthening the sides with the use of silicate fillers.

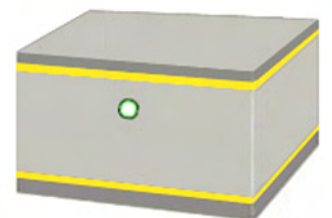
Strengthening the sides with the use of 2 part adhesives.
(methacrylate, epoxy, etc)



Adhesion of housings

Cavities arising from this method of bonding should generally be drilled to allow air to circulate.

The enclosed air would otherwise expand and negatively affect the bond.



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