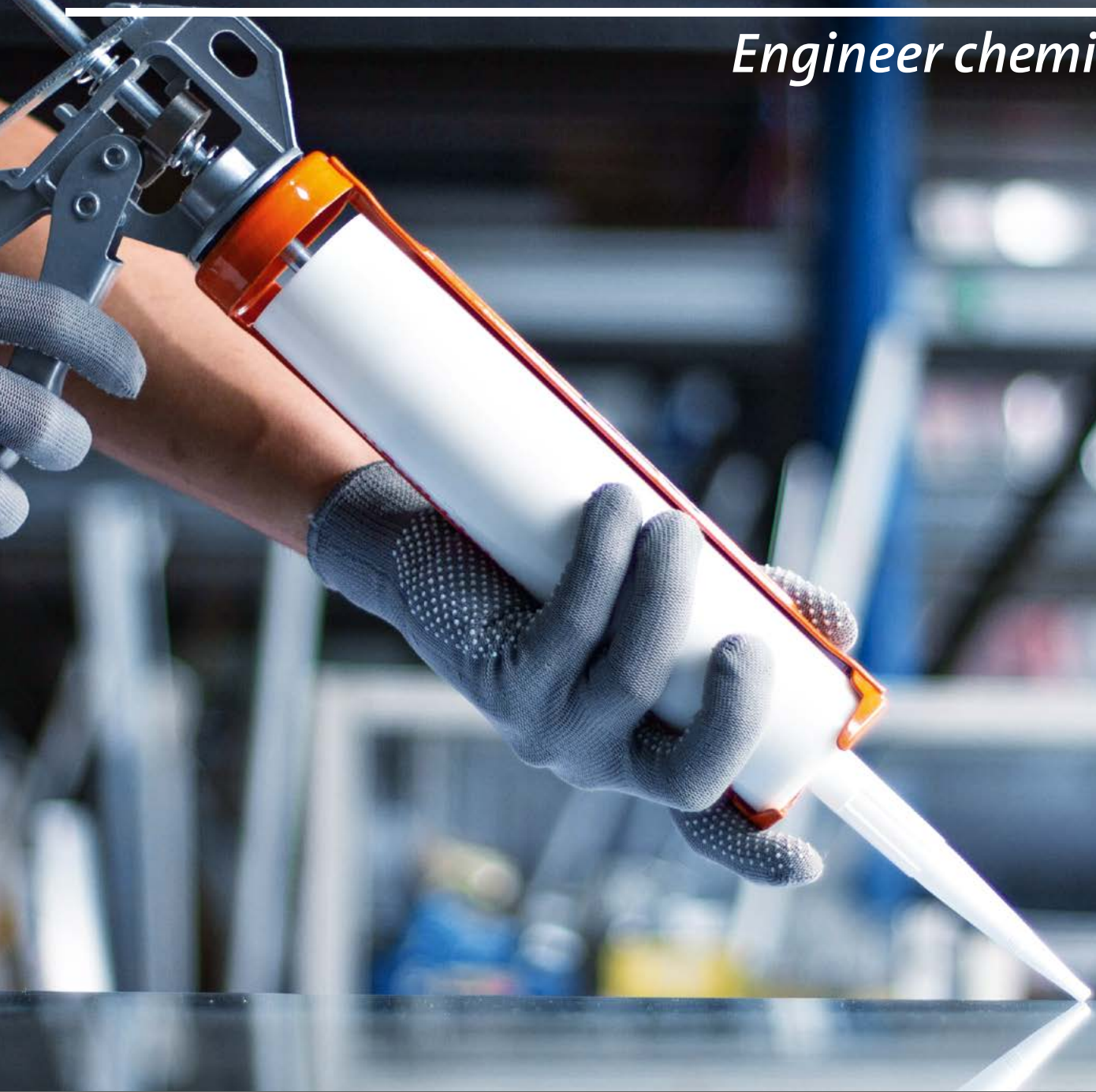


# BODO MÖLLER CHEMIE

*Engineer chemistry*



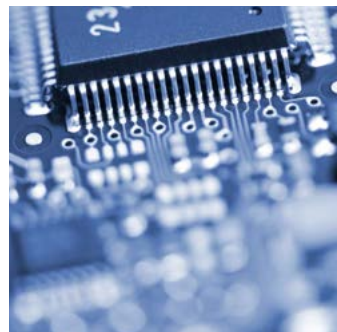
Adhesive systems  
for industrial applications

# Adhesive solutions



BODO MÖLLER CHEMIE is a specialist for adhesive systems and applications in many industrial areas, especially in the automotive, aerospace, railway, medical and electronics industries. We offer a wide range of solutions specifically tailored to structural, semi-structural or elastic bonding of different materials like metal, glass, composites, wood and plastic.

We support customers with individual services such as design of adhesive joints and testing in our adhesive laboratory, process testing and troubleshooting, customer-specific training as well as preparation and implementation of certification audits in accordance with DIN 6701 and DIN 2304.



# for various industries

# Adhesive solutions

## Epoxy resin adhesives (EP)

**Araldite®** Epoxy resin adhesives (1C / 2C)

**Araldite®** FST 40002 Resin system for RTM, infusion

**Araldite®** Epoxy core and edge fillers (2C)\*

**BERGQUIST® LIQUI BOND** Thermally conductive adhesives (1C / 2C)

**BETAMATE™** Epoxy resin adhesives (1C / 2C)

**Epibond®** Epoxy resin adhesives (2C)\*

**Epocast®** Epoxy core and edge fillers (1C / 2C)\*

**LOCTITE® AERO** Products (paste adhesives, film adhesives (with & without lightning strike protection), wet peel plies, syntactic, core fill & abradable (1C / 2C)\*

**LOCTITE®** Epoxy resin adhesives (2C)

**LOCTITE® ABLESTIK** Electrically conductive adhesives (1C / 2C)

\* partially with FR/FST fire properties

## Polyurethane adhesives (PUR)

**Araldite®** Polyurethane structural adhesives (2C)

**BETAFILL™** Polyurethane sealants (1C)

**BETAFORCE™** Thermally conductive adhesives

**BETAFORCE™** Polyurethane structural adhesives, high modulus (2C)

**BETAMATE™** Polyurethane structural adhesives (1C / 2C)

**BETASEAL™** Polyurethane adhesives for direct glazing (1C / 2C)

**LOCTITE®** Polyurethane adhesives (1C / 2C)

**Uralane®** Polyurethane adhesives (2C)

## Methacrylate adhesives

**Agomet®** Methyl methacrylate adhesives (No-Mix / 2C)

**Araldite®** Methyl methacrylate adhesives (2C)

**Araldite®** Low odor methacrylate adhesives (2C)

## Anaerobic adhesives

**LOCTITE®** Anaerobic adhesives

## Cyanoacrylate adhesives

**LOCTITE®** Cyanoacrylate

## Phenolic resins & polycondensation adhesives

**Araldite®** Phenolic polycondensation adhesives

## Hybrid adhesives & sealants

**BETAMATE™** Silane-modified polymer adhesives (1C)

**LOCTITE®** Hybrid adhesives (2C)

**LOCTITE® ABLESTIK** Electrically conductive adhesives (1C / 2C)

**L&L Seal** Silane-modified polymer adhesives (1C)

## Silicone adhesives & high temperature silicones

**Bluesil™** RTV silicones (2C)

**BERGQUIST® LIQUI BOND** Thermally conductive adhesives (1C / 2C)

**CAF®** Silicone adhesives (1C / 2C)

**Dowsil™** Silicone adhesives and sealants

**LOCTITE® ABLESTIK** Electrically conductive adhesives (1C / 2C)

**PACTAN** Silicone adhesives and sealants (1C / 2C)



## UV-curing adhesives

- LOCTITE®** UV-Alkoxy silicones
- LOCTITE®** UV-Cyanoacrylate
- LOCTITE®** Acrylate
- LOCTITE®** Acrylate Urethane

## Packaging & labeling adhesives

- Aquence®** Water-based adhesives
- Technomelt®** Hotmelts adhesives

## Furniture & building industry adhesives

- Aquence®** Water-based adhesives
- LOCTITE®** Polyurethane adhesives (1C / 2C)
- Technomelt®** Hotmelt adhesives

## Sealants

- BETAFILL™** Polyurethane sealants
- BETAFILL™** Polyurethane seam sealer (1C)
- BETAGUARD™** Rubber-based sealants, relining adhesives
- Bluesil™** RTV silicones (2C)
- CAF®** Silicone adhesives (1C / 2C)
- CeraPur®** Polyurethane foam gasket (1C)
- Dowsil™** Silicone adhesives and sealants
- L&L** Hybrid sealants
- L&L** Room temperature curing sealants/adhesives
- PACTAN** Silicone sealants
- RTF** Silicone foam gasket (2C)

## Products for surface treatment, pretreatment & posttreatment of adhesive surfaces

- BETACLEAN™** Surface cleaners
- BETAPRIME™** Primer
- BETAWIPE™** Activators
- BONDERITE® AERO** Metal Pretreatment, Chemical Milling, Depaint & Repaint, Engine Maintenance
- BONDERITE®** Cleaners
- BONDERITE®** Pretreatment technologies
- LOCTITE®** Activators & cleaners
- LOCTITE®** Polyolefin primer for pretreatment

## Adhesive tapes & sprays

- 3M™** Double-sided adhesive tapes
- 3M™ VHB™** Double-sided adhesive tapes
- 3M™ VHB™** Double-sided adhesive tapes LSE
- 3M™ Dual Lock™** Reclosable fastener
- 3M™** Spray adhesives

# For any application

The construction with adhesives joints has several advantages compared to conventional joining technologies. Adhesives are suitable for bonding a variety of different materials. With the correct surface treatments most metallic, glass, plastic and polymer composite materials can all be joined to either themselves or each other with joint strengths superior to other joining techniques.

Due to the continuous nature of adhesive bonding, it helps reducing high stress concentrations that occur in mechanical fastening systems and results in stiffer joints and structures. Superior fatigue resistance can be achieved compared with welded or riveted joints. A continuous bead of adhesive can also provide sealing properties. In addition to the mechanical properties, bonding also brings aesthetic advantages. Compared to welding or mechanical fasteners, the adhesive seam can be applied invisibly.

## Adhesive family properties comparison

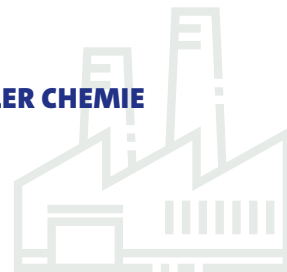
Adhesive family properties comparison

	Speed		Substrate diversity										Stability			Safe handling		
	Hand strength, time	Final strength, time	Plastic	Metals	Elastomers	Glass	Fibre composites (CFRP / GFRP)	Paper / Cardboard	Wood	Textiles	Leather	Concrete / Stone	Ceramics / Porcelain / Clay	Impact strength & resistance	Chemical resistance	Moisture sensitivity	EHS Classification labeling	Smell
1C-Epoxy resin adhesives (EP)	■	■	■	●	■	■	●	●	●	■	■	●	●	●	●	●	■	●
2C-Epoxy resin adhesives (EP)	■	▲	■	●	■	■	●	●	●	■	■	●	●	●	●	●	■	●
Polyurethane adhesives (PUR)	■	▲	●	■	■	■	●	●	●	■	■	●	●	●	●	▲	■	●
Methyl methacrylate adhesives (MMA)	●	●	●	●	■	■	●	▲	▲	▲	▲	●	●	●	●	●	■	▲
Phenolic resins & polycondensation adhesives	●	●	▲	●	▲	▲	▲	▲	▲	▲	▲	▲	●	■	●	●	■	■
Silicone adhesives & high temperature silicones	■	▲	■	■	▲	●	■	■	■	■	■	●	●	●	●	●	●	■
Hybrid adhesives & sealants	■	▲	●	■	▲	●	●	■	●	■	■	●	●	■	■	●	●	●
Cyanoacrylate adhesives	●	●	●	■	●	▲	●	●	●	●	●	●	●	■	■	▲	●	■
Hotmelt adhesives	●	●	●	■	●	■	■	●	■	●	●	■	■	■	●	●	●	●
Anaerobic adhesives	■	▲	▲	●	▲	▲	▲	▲	▲	▲	▲	▲	▲	■	●	■	●	●

● = good

■ = medium

▲ = bad



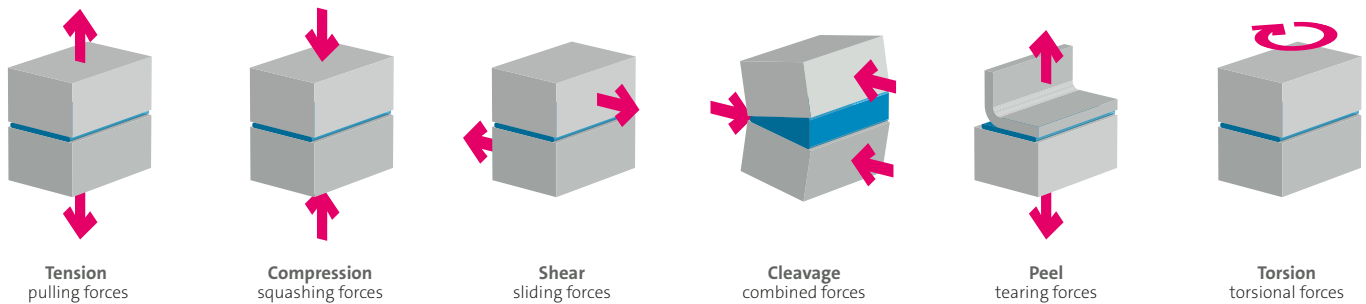
## Advantages and applications of adhesive systems

	Advantages	Applications
1C-Epoxy resin adhesives (EP)	High strength, crash-stable	Automotive, General Industry
1C-Epoxy resin adhesive films	Enables large part manufacture, bond line thickness control, uniform areal weight, long shop life	Large & complex parts manufacturing like engine nacelles, acoustic panels, flaps, spoilers
1C-Epoxy resin surface films	With or without lightning strike protection, high surface quality; low flow, process labor reduction	Large & complex parts manufacturing like wings, fuselage, radome
1C-Epoxy wet peel plies	Ease of removal, no sanding or solvent wiping required of bonding surfaces, protective layer	For substrates where most durable bonding is required
2C-Epoxy resin adhesives (EP)	High strength, very versatile, environmental resistance, cure speed	General Industry, Aerospace, BTR, Automotive and many other industries
1C-Polyurethane adhesives (PUR)	High flexibility, perfect strength too, elongation ratio, easy to use, humidity cure	Glass Bonding, General Industry, BTR, Automotive and many other industries
2C-Polyurethane adhesives (PUR)	High flexibility, perfect strength too, elongation ratio, humidity independent cure	Glass Bonding, General Industry, BTR, Automotive and many other industries
No-mix Methyl methacrylate adhesives (MMA)	Snap cure after open time, long pot life due no-mix process	General Industry, Aerospace, BTR, Automotive and many other industries
2C-Methyl methacrylate adhesives (MMA)	Snap cure after open time, very versatile, good adhesion properties without pretreatment	General Industry, Aerospace, BTR, Automotive and many other industries
Phenolic resins & polycondensation adhesives	Very high temperature resistance	Automotive, Brake Bonding
Silicone adhesives & high temperature silicones	Flexible and high temperature resistant, easy to use	General Industry, Aerospace and many other industries
Hybrid adhesives & sealants	Flexible, easy to use, EHS friendly, very wide adhesion properties	General Industry, BTR, Automotive and many other industries
Cyanoacrylate adhesives	Very fast adhesion built up, extremely versatile	General Industry, BTR, Automotive and many other industries
UV-curing adhesives	«On demand» cure possible, very fast cycle times possible	Medical, Glass & PC, PMMA Bonding
Hotmelt adhesives	Very fast cycle times	Electronics, Packaging
Sealants	High flexibility, easy to use	General Industry, BTR, Automotive and many other industries
Anaerobic adhesives	Unlimited open time on air, only reacts when in contact with reactive surfaces	Threadlocker in every industry
Products for pretreatment & posttreatment	High guarantee of bonding quality	Should be checked in every bonding process

**Do you need support in selecting a suitable product for your application?** Please contact our technical consultants for detailed product information, samples and process advice. We will be pleased to support you.

# Designing strong bonds

**Loading of adhesive joints** – The strength of an adhesive bonding strongly depends on the direction and distribution of the stresses formed in the joint as a result of the loads applied to it. Typical forces are illustrated below. In practice, a bonded structure has to simultaneously sustain a combination of forces.



Strong bonded joints need to be designed that the loading stresses will be directed along the lines of the adhesive's greatest strengths. A poorly designed joint can lead to high-stress concentrations in the joint itself and/or in the substrates connected. Adhesives are more resilient under shear, compression and tension stresses. Cleavage and peel loading are the most severe as they concentrate the applied force into a single line of high stress.

**Surface preparation and pretreatment** are decisive factors for the strength and fatigue performance of an adhesive bond. In order to ensure an optimum wetting on the substrate, a thorough surface preparation is required to remove contaminations, offer a clean surface and increase the bonding area and surface energy of the substrate. Common surface preparation methods are degreasing, abrading and special pretreatments. BODO MÖLLER CHEMIE offers a wide range of cleaners and surface technologies to provide adhesive joints an optimum strength and reliability.

## Degreasing

The removal of oil or greases residues from the surface is essential but should be combined to other surface preparation like mechanical abrasion followed by loose particle removal or chemical pretreatment for optimizing the bonding.

**Degreasing methods:** Vapor degreasing, solvent immersion, brush or wipe with degreasing agent, detergent degreasing, alkaline degreasing, ultrasonic degreasing

## Abrading

Lightly abraded surfaces provide better anchoring to adhesives than highly polished surfaces. After abrading the surface further treatment methods are required to ensure complete loose particles removal, like degreasing operation, lightly brushing with a clean soft brush or vacuum cleaning.

**Abrading methods:** Grit blasting, wire brush, abrasive cloth, abrasive paper

## Special pretreatments

Degreasing and abrading methods are sufficient for most adhesive joints. In order to obtain maximum strength, reproducibility and long-term resistance to deterioration, a chemical or electrolytic pretreatment may be required.

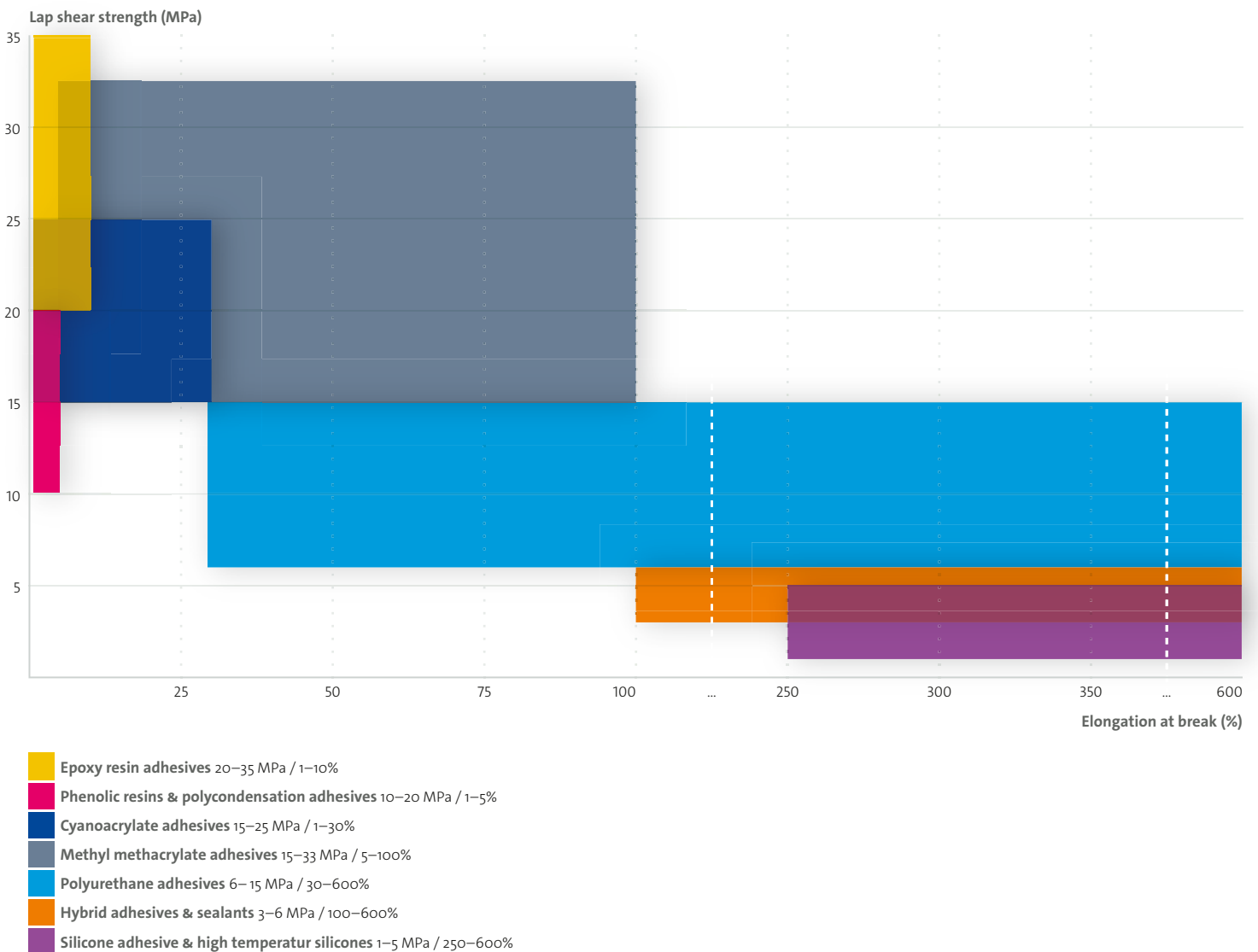
**Metal:** Acid etching, anodising, primer applications

**Plastics/composites:** Low pressure plasma, atmospheric plasma, corona treatment, flame treatment





## Shear strength and elongation at break comparison

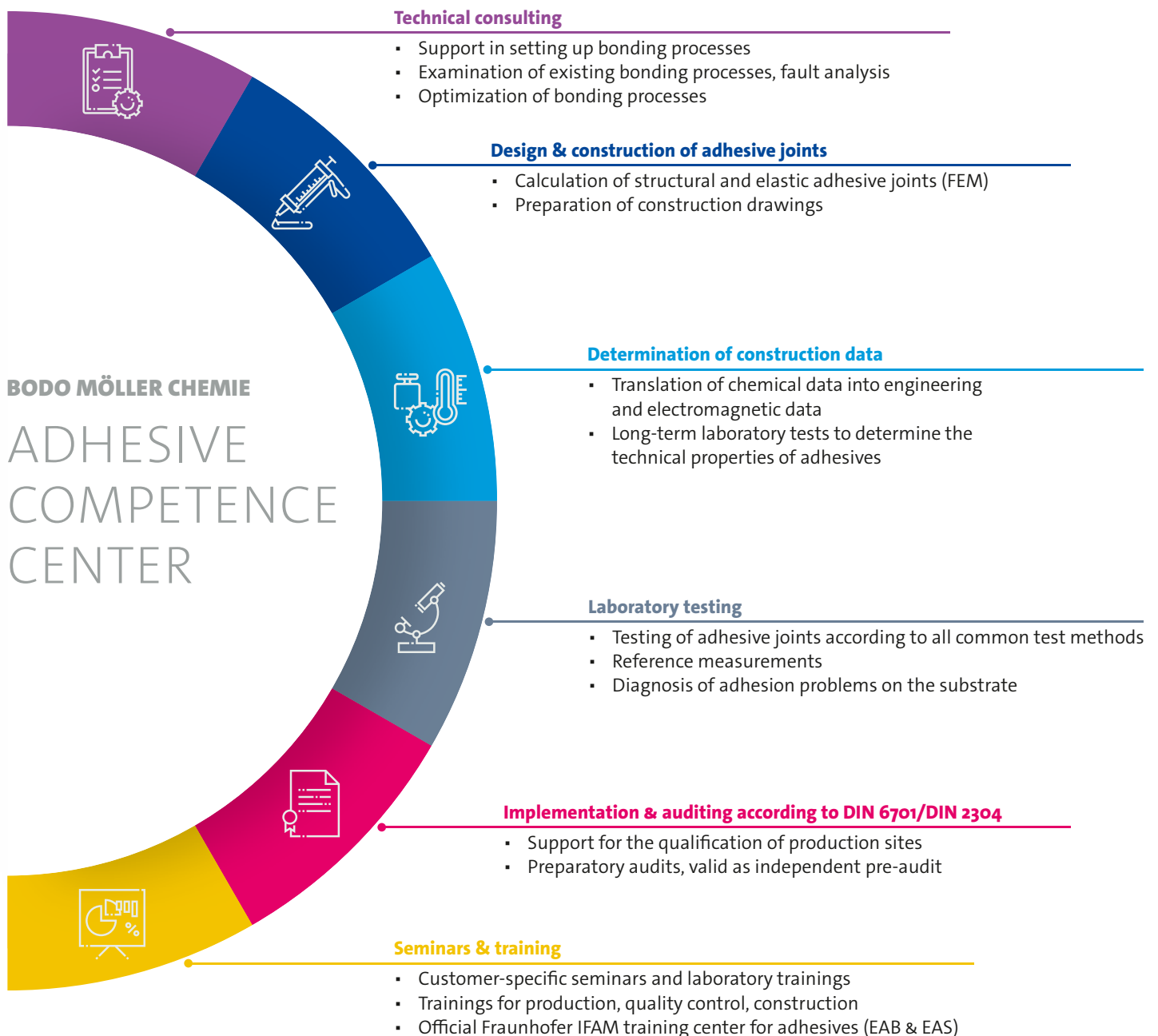


The specialists of our **Adhesive Competence Center** support customers in the design and construction of adhesive joints with extensive product and application know-how, FEM calculation and application tests in our Adhesive Laboratory.

# Application technology center

With our **Adhesive Competence Center**, we offer full service in all matters related to adhesive application technology – from product selection all the way to product validation, process simulation and engineering data.

The Adhesive Competence Center is certified for the designing of bonding joints according to DIN 2304 S1 and DIN 6701-2 A1 and our Adhesive Laboratory has a Competence Approval for DIN 2304 S1 and DIN 6701-2 A1. All measurements are carried out in accordance with international DIN, EN and ISO standards.





## QUALITY & SAFETY

**ISO 9001** Quality management

**ISO 14001** Environmental management

**ISO 45001** Occupational health & safety

**EN 9120** Distribution and repacking for aviation industry

**DIN 6701** Adhesive bonding of railway vehicles (laboratory)

**DIN 2304** Quality requirements for adhesive bonding processes (laboratory)

## AN EXCERPT OF OUR LONGTIME PARTNERS



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State 02/2024

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