

Adhesive bonding technology – indispensable for Germany's high-tech agenda

**A statement by the Alliance for Industry and Research (AIF)
(Allianz für Industrie und Forschung e.V. – AIF)**



in cooperation with

DECHEMA

Research associations of the German Association for Welding and Related Processes (DVS) / Forschungsvereinigungen des Deutschen Verbandes für Schweißen und verwandte Verfahren e.V. (DVS)

Research Association for Steel Application (FOSTA) /Forschungsvereinigung Stahlanwendung e.V. (FOSTA)

International Association for Technical Wood Issues (IVTH) Internationaler Verein für Technische Holzfragen e.V. (IVTH)

and support from industry organizations:

Industrial Association for Adhesives (IVK) / Industrieverband Klebstoffe e.V. (IVK)

**Fédération Européenne des Industries de Colles et Adhésifs (FEICA)
and Certification bodies:**

International Committee for Certification of Adhesive Bonding Processes - ICCAP

**European Committee for Adhesive Bonding of Railway Vehicles – ECARV
as well as**

Universities, Colleges, and Applied R&D Institutions involved in adhesive bonding technology

Content

- 0 Summary: Why adhesive bonding technology is indispensable for Germany's high-tech agenda
- 1 Germany's high-tech agenda and adhesive bonding technology
- 2 Adhesive bonding technology – enabler for key technologies
- 3. The central role of adhesive bonding technology in high-tech fields
 - 3.1 Microelectronics and the semiconductor industry
 - 3.2 Climate-neutral mobility
 - 3.3 Energy and energy transition technologies
 - 3.4 Circular economy and sustainability
- 4 Long recognized at the expert level – but underestimated politically and administratively
- 5 Conclusion

0 Summary: Why adhesive bonding technology is indispensable for Germany's high-tech agenda

The German government's High-Tech Agenda focuses on six key technologies:

- Artificial intelligence
- Quantum technologies
- Microelectronics
- Biotechnology
- Climate-neutral energy, and
- Climate-neutral mobility.

What is not explicitly mentioned, but underpins all of these fields from a technical perspective, is adhesive bonding technology. Adhesive bonding technology is a cross-sectional enabling technology. It allows for the reliable, lightweight, functional, and durable joining of a wide variety of materials—often in areas where traditional joining methods reach their physical or design limits. Its unique selling point lies in the preservation of the material-specific properties of the joined parts and in the targeted adjustment of product properties via the joint itself.

Adhesive bonding technology is indispensable in key high-tech fields today. It has been recognized as a key technology at the expert level for years—yet its strategic visibility and systematic consideration in national technology and funding programs has so far lagged behind its actual importance.

1 High-tech agenda Germany and adhesive bonding technology

With its High-Tech Agenda for Germany, the federal government is pursuing the goal of sustainably strengthening technological competitiveness, industrial value creation, and technological sovereignty. The focus is on six key strategic technologies: artificial intelligence, quantum technologies, microelectronics, biotechnology, climate-neutral energy, and climate-neutral mobility.

Underlying technologies that make these fields technically possible are not explicitly mentioned. These include adhesive bonding technology, i.e., the use of adhesives, sealants, and adhesive tapes. Without their systematic integration as an enabler technology, an essential component for the successful implementation of the strategic goals of the High-Tech Agenda is missing.

2 Adhesive bonding technology – enabler for key technologies

Adhesive bonding technology is a cross-sectional enabling technology. It allows metals, plastics, fiber composites, ceramics, and hybrid material systems to be joined in a durable, weight-optimized, functionally integrated, safe, and material-friendly manner.

The unique selling point of adhesive bonding technology is that it preserves the material-specific properties of the joined parts in the composite material. While thermal or mechanical joining processes often lead to material damage, notch effects, or design limitations, adhesive bonding allows the specific adjustment of product properties to meet requirements via the joint itself.

Technical studies and technological roadmaps therefore clearly classify adhesive bonding technology as a cross-industry key technology with growing strategic importance.

3 The central role of adhesive bonding technology in high-tech fields

3.1 Microelectronics and Semiconductor Industry

Advancing miniaturization, increasing integration density, and higher performance requirements make specialized adhesives, sealants, and adhesive tapes indispensable. Chip packaging, the secure fixation of sensitive components, and targeted thermal and insulation properties cannot be achieved without adhesive bonding technology. It thus contributes directly to the performance of modern electronic systems.

3.2 Climate-Neutral Mobility

Today's modern vehicles contain a significant proportion of adhesives, sealants, and adhesive tapes. In automotive engineering, they enable crash-safe lightweight construction, new multi-material concepts, reduced emissions, and—especially in electric vehicles—greater ranges.

Adhesive bonding technology is also an indispensable key technology in rail vehicle construction. It enables lightweight construction, the bonding of different materials, and structure- and safety-related functions, while at the same time improving fatigue resistance, vibration damping, and noise reduction. It thus makes a significant contribution to energy efficiency over the entire life cycle.

3.3 Energy and Energy Transition Technologies

Wind turbines, hydrogen systems, and stationary storage technologies rely on highly resilient, load-bearing adhesively bonded joints. Rotor blades in modern wind turbines, sealing systems in hydrogen applications, and modular battery storage systems cannot function reliably without adhesive bonding technology. Adhesive bonding technology plays a key role here in terms of functionality and safety.

3.4 Circular Economy and Sustainability

Adhesive bonding technology makes a key contribution to repairability, service life extension, resource efficiency, and functional integration. It enables lightweight construction, extends product life cycles, and supports repair and recycling strategies.

Scientific studies show that, when properly designed and implemented, adhesive bonding technology can make a significant contribution to recyclable and circular product concepts. It is therefore an important module for sustainable product concepts in the sense of “circularity by design.”

4 Long recognized at the expert level – underestimated politically and administratively

The AIF – Alliance for Industry and Research e. V., as well as important scientific committees such as DECHEMA, DVS, FOSTA, and iVTH, and industry organizations such as IVK and FEICA, have for years clearly identified adhesive bonding technology as a key technology for transformation, lightweight construction, and sustainability.

International certification organizations such as ICCAP and ECARV also clearly classify adhesive bonding as a technology of the future. Universities, colleges, and applied research and development institutions support this classification and classify adhesives, sealants, and adhesive tapes as “advanced materials.”

5 Conclusion

Germany's high-tech agenda needs adhesive bonding technology—not as a peripheral element, but at its core. Without this key technology, central goals such as technological sovereignty, climate-neutral mobility, modern energy infrastructure, and industrial innovation will be virtually impossible to achieve.

The technological foundations of adhesive bonding technology are in place and capable. Its full potential will be realized when it is made visible as an enabler technology and systematically incorporated into strategic programs, funding lines, and innovation initiatives.

Therefore, adhesive bonding technology must be explicitly mentioned in the context of national strategies such as the high-tech agenda, the industrial strategy, and the circular economy agenda. Adhesives, sealants, and adhesive tapes should be classified as “key enabling technologies” in order to highlight their technological significance and enable targeted research and innovation funding.

Anyone who is serious about industrial innovation, sustainability, and technological sovereignty must actively consider adhesive bonding technology as a key technology. Failure to do so jeopardizes the development of tomorrow's industrial and technological location.