PRESSEINFORMATION

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Bureaucracy and regulatory dirigisme vs. innovation and development – a completely unnecessary area of tension for adhesive bonding technology in the 21st century

The design options available to industry and handicrafts are constantly changing due to the constantly changing technical, social and legal framework conditions. This particularly affects adhesive bonding technology, which is now an indispensable joining technology in almost all areas and industries. 'The versatility of adhesive bonding technology is based on its unique ability to join similar and dissimilar materials permanently, securely and without impairing the material-relevant properties of the adherends, and to integrate additional functions into the adhesively bonded product,' explains Professor Dr Andreas Groß, head of the 'Training and Technology Transfer' department at Fraunhofer IFAM (Bremen). Adhesive bonding technology has the necessary technological, ecological and economic potential to become the leading joining technology of the 21st century. However, this realisation must finally be taken on board at the political level.

Schlößer (IVK): What does adhesive bonding technology need in the 21st century?

Groß: That's an interesting question! May I turn it around and ask: What does the 21st century actually need adhesive bonding technology for?

Ok, so let me rephrase that: Do we need adhesive bonding technology in the 21st century?

Let's take a look beyond joining technology, including adhesive bonding. The continuous change in our world is accelerating. It affects all essential areas of the present and the future. Product developments are becoming more and more demanding due to increasing customer

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expectations: better product quality, higher functionality, lower weight, modern design, etc. This is achieved not only by functional or constructive changes, but also by the rapid development and advancement of materials that are more and more specific to requirements. This means that materials are a decisive factor in meeting current and future requirements in the major fields of the future, such as energy, climate and environmental protection, conservation of resources, mobility, health, safety and communication. This applies to metal alloys, plastics, ceramics and glass. In order to develop technologically superior, ecologically compatible and economically balanced products, the development of materials will therefore continue to advance permanently in the 21st century, or rather, it will have to advance permanently.

So in the 21st century, the primary focus is first of all on materials?

Exactly! Without their new and further development, continuous progress in areas such as mechanical engineering, transport engineering, the aviation industry, the chemical industry, medical technology, energy technology or environmental protection is inconceivable.

And what follows from this?

The variety and number of materials will inevitably continue to increase. At the same time, the complexity of the requirements is also increasing. As a result, a single material is generally no longer able to meet this complexity. This can only be achieved if materials can be joined with themselves or other materials in the product or in the component, with the prerequisite of maintaining the material properties.

So you consider materials development to be just as important as the development of joining technology?

That's right! Future products will also consist of material compounds. Therefore, to meet product requirements, material development and the development of a suitable joining technology that maintains the material's properties must be considered equally important.

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I see. The properties of the materials used determine the properties of a product, but materials and joining technology go hand in hand. Now, adhesive bonding technology is just one of many joining technologies. I'm thinking of screwing, riveting, welding, soldering, etc.

All of them are, without doubt, excellent joining technologies! In the 19th century, riveting was the No. 1 joining technology, and in the 20th century, it was welding. And just think of what welders have achieved! At the beginning of the 20th century, the image of welding techniques was disastrous. But welders have managed to change this image completely and make it a positive one. Chapeau!

Would this not make adhesive bonding technology just another joining technology?

No, it isn't! Adhesive bonding is much more than 'just another joining technology'. As already mentioned, materials and joining technology must be compatible in order to make innovations possible at all. The challenge for joining technology in the 21st century in terms of this 'compatibility' is the constantly increasing number of materials. And the task of joining technology in the 21st century is to maintain the properties of the respective materials in the joint, in the product, in order to meet the increasing product requirements. In concrete terms, this means: no material-damaging hole drilling, as with screws and rivets, or no property-changing heat loads, as with welding or brazing. And only adhesive bonding technology fulfils precisely this task. That is its essential unique selling point! Adhesive bonding is the only joining technology that makes it possible to join any material to itself or to other materials in a way that is long-term stable and secure and then – and this is decisive! – without changing the material, i.e. while retaining its material properties. This is how you achieve the desired properties in a product.

Can you illustrate this unique selling point with an example?

There are countless examples! The fact is that we would not be able to live our lives as we do

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today without adhesives. There is hardly an area today in which adhesive bonding technology is not used or has to be used. Adhesively bonded components range from cars to dental crowns, from micro to macro, under water, on the water, on land and high in the sky, all the way to outer space. And adhesive bonding also supports other goals that are currently in the focus of sustainable product design.

Let me give you an example, the development of alternative energy sources: Adhesive bonding is an enabler for the targeted energy transition. The rotor blades of wind turbines, for example, are purely adhesively bonded constructions made of glass-fibre reinforced plastics, so-called GFRP. Given the high mechanical and abrasive stresses during the utilisation phase – we are talking about rotational speeds of up to 390 km/h – any other joining technology would minimise the energy yield to such an extent that wind energy would no longer be an option. Welding is not an option either. The GFRP used is not weldable. Bolted connections – ditto riveting or nailing – of the rotor blade half-shells are also out of the question. These point-by-point joining technologies would generate high stresses at the connection points during utilisation, i.e. where the GFRP is destroyed by 'holes'. The rotor blade walls would have to be heavily thickened to reduce these stresses. The construction would be much too heavy and therefore far too inefficient for energy generation. In addition, to mitigate the high abrasion loads, a protective layer is adhesively bonded to the particularly loaded leading edges during the rotor blade manufacturing process. The surfaces protected by adhesive bonding permanently produce a smooth and therefore aerodynamically favourable surface for the extreme offshore conditions. The use of adhesive bonding technology also optimises energy yield. In fact, the development of alternative energy sources without adhesive bonding technology is inconceivable with today's state of the art. In the field of electromobility, adhesives and sealants are essential for the assembly of magnetic cores, for sealing battery cells and for the thermal management of batteries. Fuel cells also have to be hermetically sealed and the bipolar plates have to be joined in a way that is both long-term stable and secure – both using adhesives.

Matching materials and joining technology, no damage to the material caused by

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the joining technology, preservation of the material properties in the product to fulfil product requirements: it all sounds logical. How do you assess the place value of adhesive bonding technology today?

Let me first define the term 'place value' more precisely. The facts are: Germany is the global leader in adhesive bonding technology, both in terms of tonnage and sales. Germany is also the world's number 1 in adhesive bonding research and development, in both the industrial and institutional sectors. And Germany is also an international pioneer in adhesive bonding quality assurance. Under German leadership, this quality management has been turned inside out in the last 20 years and has long since become a global success story. Germany is also the founder and world market leader of extra-occupational, personnel-certifying training for adhesive bonding experts. This personnel qualification, which makes an essential contribution to the above-mentioned quality assurance, has become an international industry standard. It is now harmonised throughout Europe and is being implemented worldwide. The fact is: Germany is not just a leader in adhesive bonding technology, it is the leader.

That sounds good. Adhesive bonding technology is worldwide essential in the 21st century and Germany has the leadership role.

I agree with you that sounds good, and it is good. The leading positions mentioned have been painstakingly achieved and must not only be maintained with hard work, but also further expanded.

Nevertheless, I would now like to return to my opening question: What does adhesive bonding technology need in the 21st century?

Even if it is hard to believe, at the political decision-making level, adhesive bonding technology has, to put it diplomatically and politically correctly, a somewhat limited image. An holistic assessment of adhesive bonding does not

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take place there.

Why is that?

Adhesive bonding is inherently complex. This makes a holistic assessment that takes into account all the relevant factors anything but simple. And so, as is so alarmingly often the case in the political and regulatory spheres, the easier route is preferred. This easier route focuses on seemingly manageable individual aspects. These individual aspects are placed in a 'big picture' without an impact assessment. And this image, i.e. the opposite of a 'big picture', is then used as a basis for decision-making and evaluation. This approach is reinforced by a now completely misguided bureaucracy. This is because this bureaucracy has been developed step by step by politicians and public authorities into an unmanageable, completely counterproductive bureaucratism in the sense of hypercomplexity on a small scale. This hyper-complexity not only lacks any meaningful content, it has long since made it impossible to gain an important and realistic overview. However, such an overview is the absolutely essential basis for setting a meaningful course. One consequence of this misguided development is that companies regard the many obligations, requirements and prohibitions as the biggest obstacle to investment – even more so than artificially inflated energy prices.

The next level of bureaucracy and regulation will then be shifted from the national to the European level. One example is the EU's 'chemicals strategy'. We already have the highest safety standards in the world, which serve as an example internationally. And yet people think these standards need to be tightened even further. I will try to explain what this means for adhesive bonding technology in a nutshell: if the same bureaucracy and regulatory control had been in place at the beginning of the 20th century as we have today, the great success story of welding techniques in the 20th century would never have happened!

So the success story of adhesive bonding technology would be set to continue in the 21st century...

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...in theory, yes! Every technology has its time. The development of conventional joining technologies is now largely complete.

In contrast, the end of the development phase for adhesive bonding technology is not in sight, neither in research and development nor in application. All those involved in adhesive bonding – and that includes, of course, not only the adhesive manufacturers – have long since repeatedly verified their innovative strength and creativity. Furthermore, there is no alternative to adhesive bonding technology when it comes to meeting the needs of the 21st century. Adhesive bonding is a necessary condition for the technological transformations that are required today and will be required in the future. Adhesive bonding is a driver of innovation and sustainability.

And practically speaking? What is standing in the way of the success story in the national and European context?

In the national and European context, the political decision-making levels responsible for bureaucracy and regulatory dirigisme must realise four things:

1. *The success story of adhesive bonding technology as a joining technique is unstoppable – whether in Brussels or Berlin. Adhesive bonding technology and its applications will continue to develop in any case, because, as I have tried to show, both are necessary from a materials point of view to meet future requirements.*
2. *The European and national bureaucracy and regulatory dirigisme mentioned above will almost certainly prevent the development and ´the success story of adhesive bonding technology in Europe, but certainly never ever in a global context.*
3. *A technology is completely indifferent to who is driving it forward and where, that is, on which continent it is being driven forward. That is why it needs to be clarified in Brussels and Berlin what a national or European leadership role is actually still worth.*
4. *Issues that need to be considered in a complex and holistic way cannot be treated as simple ones. This is common sense. Those who do not take these matters seriously should confine themselves to regulating things that are easy to regulate.*

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What demands arise from this?

I expect that we will quickly move out of today's impasse. I expect that the political decision-makers will be clear about these four points. I expect that they will put at least the same creativity into the innovation-requiring exnovation, i.e. the abolition and withdrawal of bureaucracy and regulatory dirigisme, that they have spent on their innovation-preventing development. If this does not happen, Germany and Europe will lose their global, creative leadership in adhesive bonding technology, as in other areas, and will also lag behind in terms of innovative developments in this area in the future!

Therefore, without any ifs or buts: politics must refocus on the utilisation of what is internationally technically possible and necessary. And by 'necessary', I also mean the responsible handling of chemicals (link to the 'guinea pig' interview No 1). At the level of political decision-makers, adhesive bonding technology must finally be accorded the technological esteem it deserves in the national and European context as the key joining technology of the 21st century.

Thank you for the interview, Professor Dr Groß.

Further information: www.klebstoffe.com, www.klebstoffe.com/presse

About the German Adhesive Association (Industrieverband Klebstoffe e. V. - IVK):
The German Adhesives Association (Industrieverband Klebstoffe – IVK) represents the economic and technical interests of the German adhesives industry in relation to the public, authorities, consumers and scientific institutions. The IVK has more than 155 member companies, including manufacturers of adhesives, adhesive tapes, sealants and adhesive raw materials, as well as scientific institutes and system partners. The German adhesives industry employs around 18,000 people.

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Picture_01: Aktenstapel

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Picture_02: Prof. Dr. Andreas Groß

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