



DIN 2304 implements logical requirements

It seems that we really can't do without glue. According to the trade association Industrieverband Klebstoffe, 50 % of all products made in Germany make use of adhesives and sealants in some way. This is just one significant reason why gluing is considered the joining technology of the 21st century. The new DIN 2304 standard ushers in a new quality initiative. In this interview, Kai Brune elaborates on exactly what that will mean to adhesive bonding technology users.

Adhesion: Mr. Brune, can zero-error production ever be achieved in applied adhesive bonding technologies?

Kai Brune: Let's consider that this is the goal. In any case, a consistent quality assurance will definitely contribute to a tremendous reduction of errors. However, it remains to be seen whether sustained zero-error production can be achieved.

Is it even possible to prevent all errors in the course of the process?

This is certainly the core idea behind the ISO 9001 standard: if I cannot prove the existence of production errors in some 100% non-destructive way, I'll have to avoid them occurring in the first place. To do so, it is important that one is able to identify such errors and to readjust or optimize the process. However, I can only detect errors if I know what to look for. This means I must be competent in adhesive bonding technologies. Errors that aren't detected early will cause substantial costs, damaged reputations and in extreme cases even the loss of certifications and approvals. Consequent monitoring and targeted quality assurance are indispensable here.

Which production areas are particularly important to the successful deployment of an adhesive bond from a quality perspective?

It's not possible to create a sort of ranking here. In practical applications, adhesive

bonding technologies must always and generally be considered as a holistic system. Errors can occur in all areas of adhesives-based production. Errors are possible from the inspection of incoming goods through the application of the adhesive to the final inspection of the component. Successful application necessitates keeping an eye on everything.

Are there process areas that are more error tolerant?

No! There are no error-tolerant process areas in adhesive bonding technologies. Because the basis of it all is and always will be adhesion: across the globe, across industries, regardless of the individual adhesive, regardless of the product. Some issues may not immediately affect the bond strength but will later return with a vengeance, for example where long-term stability is concerned. Just how 'tolerantly' my bonding process will respond to specific contaminations such as anticorrosive oils or wrong mixing ratios requires discrete observation and, if necessary, the user may have to define his or her own process window.

How laborious is it for adhesive bonding technology users to meet the requirements of the DIN 2304 standard?

The introduction of the DIN 2304 standard will, of course, require users to rethink some things: to comply with the standard,

the user will have to evaluate each of his or her bonds, and classify them, for example according to safety requirements. There may also be increased expenditure during the introductory phase. However, those who are already building on adhesive bonding technology and consider it to be more than just a forced substitute process for welding shouldn't find many problems here. In the end, all that DIN 2304 does is to build on ISO 9001 with a very pragmatic implementation of the logical requirements for adhesive bonding processes. We will notice this when the quality of adhesive-bonded products increases.

And the adhesive itself – in what ways can manufacturers of adhesives and sealants prepare themselves technically for the new standard?

Initially, DIN 2304 will not affect the manufacturers of adhesives directly. The application of DIN 2304 is intended to strengthen adhesive bonding technology as a joining technology and to improve product quality. Any errors that occur are still often blamed on the adhesive. Based on our experience, however, at least 90 % of errors are caused by the user.

What methods are available for process-integrated quality assurance today?

There are methods to be found throughout the entire 'bonding' process. From the monitoring of mixing ration, the position



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of the adhesive bead, position of adherends and their cleanliness, many areas can be covered already. Furthermore, there are already non-destructive testing systems available for process-integrated applications. Today, many systems can be considered state of the art. A lot has happened in recent years including many new developments which will conquer the market in future. However, the fact remains: a 100 % non-destructive testing technology for respective bonding still doesn't exist. Adhesive bonding is and remains a so-called ‘special process’ according to ISO 9001.

Which methods are important to the monitoring of safety-critical adhesive bonds?

For safety-critical adhesive bonds the process window is extremely small in all areas. One should really take full advantage of the whole package. In many cases, established methods are already available that may very well represent the current state of the art. The consequences of trying to save time and money in quality assurance here are nearly impossible to predict.

And which methods are inline capable?

Inline capability has continuously gained

importance over recent years. There are many research ventures going on with good approaches and favorable results. One example is the aerosol wetting test, which monitors the cleanliness of adherend surfaces. Contaminations are easily detected through changes in the wetting behaviour. This inline-capable system is already available on the market under the name bonNDTinspect. Another example would be the detection of oil contaminations on metal parts. Here, laser-induced fluorescence produces very good measuring results, works fast and is available as an inline-capable measuring system. However, these are only examples, and I could add others to the list, such as those concerning incoming goods inspection and the application of the adhesive.

How can businesses that are engaged in adhesive bonding activities work to improve their technical quality assurance?

I think it is mainly important to understand the purpose and the benefits of innovations. In many cases simple experiments can illustrate the effects that process deviations have, for example those caused by contaminations. The route of involving high-ranking committees can also be taken; however, it creates tremendous pressure. It is better to moni-

tor and secure the process early on. As a business location Germany is renowned for innovations, and we won't get around this where technical quality assurance is concerned. First and foremost, DIN 2304 will finally help us not to lose sight of this issue.

Do you think that customers will include technical quality assurance pursuant to DIN 2304 in their requirement specifications when ordering products bonded with adhesives?

The DIN 2304 supports the German industry in expanding its technological market leadership. I am therefore sure that the new methods of technical quality assurance will become established and will be included in suppliers' requirement specifications. We have now circled back to the state of the art, and it is no longer a matter of if and when these methods will be applied; it is merely a question of time. In my opinion, businesses that tackle the introduction of these methods early on will benefit the most.

What is your estimate of the percentage of those, who will be the first to implement the new standard?

Even now, before the official implementation of DIN 2304, we see great interest

when talking with the industry. The reactions are quite positive. These are good conditions for a wide implementation. I wouldn't want to commit to a specific percentage; however, I am also convinced that internationally leading technological industries such as the automotive industry will be the first to tackle a broad implementation. Those suppliers that want to remain competitive in the future will have to be proactive. This step is really just a consistent implementation. What good will it do to a company to be DIN 2304-compliant if the suppliers won't cooperate? It's all or nothing.

Doesn't that mean prices will have to rise substantially?

Why? Of course there will be increased ex-

penditure and additional outlay for businesses at the beginning. But in our experience the deployment of, for example, new inline-capable measuring systems will make economic sense after only a short while. Furthermore, errors will be prevented and improved quality and quality assurance respectively will lead to an improved reputation. This allows the cultivation of new markets and clientele.

Let's dare to look to the future. Are there any new methods in sight that show great potential for application as process-integrated quality assurance measures?

Of course, the research and development of new methods is constantly driving forward. Many methods, for example for the direct monitoring of a mix ratio, or for the

non-destructive testing of component surfaces and bonds, will lead to new innovations in the near future. It is really something to look forward to. We must not stagnate here, but rather press on with innovative ideas. This is the only way to establish adhesive bonding technology still further, and of course it is also a way of strengthening Germany's reputation as an industrial location that is known for high-quality products. //

Interview by Marlene Doobe.



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