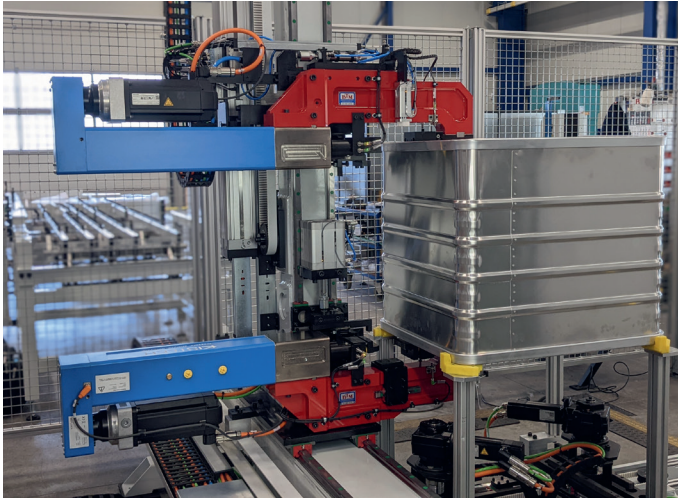


Clinching the deal

BTM puts its trust in highly flexible, weight-optimized joining systems from Kistler

BTM[®]



Two NCFC electromechanical joining systems from Kistler are used for clenching in BTM Europe's machine.



Kevin Rohleder is responsible for system control and circuit layout of the new machines at BTM Europe – here, he is using the maXYmos NC.



Clinching is a joining technology that permanently joins two different layers of material (such as two metal sheets or plates) by means of a force-fit and form-fit connection.

BTM Europe's joining technology experts and specialized machine builders are providing their customer with a complete system that uses clinching technology to manufacture aluminum transport boxes. The new system makes use of the NCFC electromechanical joining module from Kistler, which combines compact dimensions, flexibility and precision – including sensor-based process control and monitoring.

Today's assembly and production engineers can choose from a vast range of fastening or joining methods, each with their own advantages and drawbacks. These techniques include clinching, which is gaining ground in the automotive industry as well as other sectors. Clinching is a method used to join two or more layers of material (such as metal sheets or plates) together by means of a force-fit and form-fit connection, with no need for bonding or welding. Relatively little energy is expended in this process, and it can be used to create high-strength joints between different materials of varying thicknesses. Unlike riveting and bolting, clinching does not require any additional materials – one of the factors that make it a highly cost-efficient method.

This explains why it is used for such a wide spectrum of applications. Vehicle manufacturers were already using clinching as a method for joining fully galvanized steel sheets back in the 1980s, since when it has been increasingly used for aluminum sheets. Typical applications also include electrical parts such as power busbars and pole terminals, as well as components for power sockets. Clinching, in its various forms, is also used to manufacture household appliances, heating and ventilation systems – and even television sets: in principle, the possibilities are virtually unlimited.



BTM Europe operates from three plants in Germany – pictured here is the site of BTM Maschinen- und Steuerungsbau GmbH at Brilon in the Sauerland (North Rhine-Westphalia).

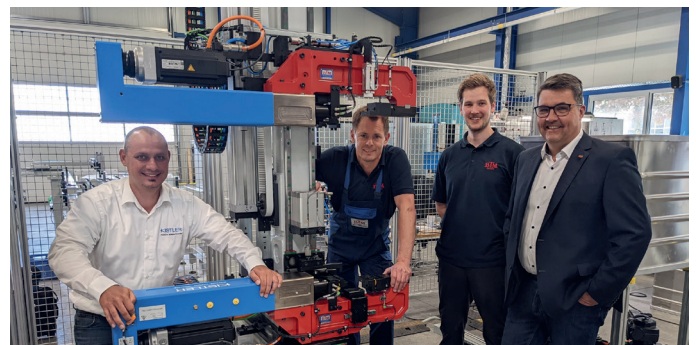
Perfect joints – from automotive engineering to transport boxes

One of the leading companies that specialize in sheet joining technology – with a particular focus on clinching – is BTM Europe Blechverbindungstechnik GmbH. The BTM Corporation – BTM is an abbreviation for "Bending Tools & Manufacturing" – was founded in 1966. Its European offshoot is part of a wide-ranging global network that includes three facilities in Germany, one of which is BTM Maschinen- und Steuerungsbau GmbH based at Brilon in the Sauerland region of North Rhine-Westphalia. Hans-Werner Fisch, CEO at BTM Europe, explains: "We don't just supply the clinching systems – punches and dies, for instance: we also supply the full range of components, from clinching units and semiautomatic stations all the way through to complete automated systems. These include features such as clamping and control technology – so we can really offer a very high level of vertically integrated production."

Not long ago, BTM Europe developed an assembly system for transport containers of different sizes on behalf of a German customer. These aluminum containers are used as trolleys, boxes, crates, baskets or cases – in hospitals, for example.



Hans-Werner Fisch (right), CEO of BTM Europe, and Christian Sitte (left), Head of Sales DACH JSB (Joining System Business) at Kistler, inspect the clinching system.



System acceptance completed successfully: Christian Sitte (Kistler) together with Bernd Terborg, Kevin Rohleder and Hans-Werner Fisch of BTM Europe.

Automated system with servo presses for clinching

For the construction of the new system, BTM is putting its trust in Kistler's NCFC series of servo drives. Two of these electromechanical joining systems (nominal joining force: 80 kN), with integrated sensor technology and process monitoring, are deployed in the new system. It is used to manufacture containers of two different types that will then be used to build trolleys. The top and bottom profiles are joined to the shell. A total of five different sheet thickness combinations are used, including a three-layer joint combination.

"The customer opted for this solution on account of their favorable experience with clinching in the past, and because of the compact, weight-optimized mechanics. And we also achieve very high levels of flexibility and quality with these systems, thanks in part to the new series from Kistler," Hans-Werner Fisch points out. "We do use air-oil and hydraulic drives elsewhere, but the trend is moving very clearly towards electromechanical solutions, simply because of their far greater variability, control options, lower maintenance effort and higher energy efficiency."

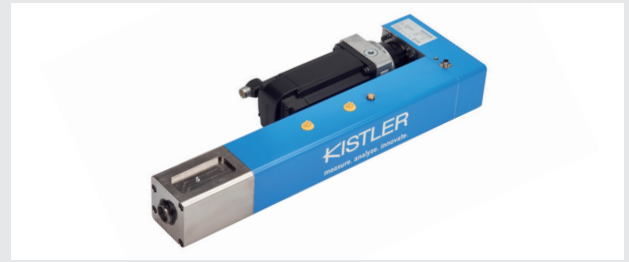
BTM already tested and verified the load capacity of the joints in its laboratory to guarantee the safety and reliability required by the end customer. Kevin Rohleder is the PLC programmer responsible for the new system's circuit layout. He reports: "The main challenges here were the size of the parts, and the automatic calculation of the clinch points. Because this system features end-to-end servo technology, it is designed so that the clinch points can be calculated automatically and set in a 100-mm grid, regardless of product size. This significantly reduces changeover time and increases flexibility as compared to the old system."

High traversing speed is a feature of the electromechanical NC joining systems in Kistler's NCFC series that are used here. "This enables us to achieve short cycle times and individually controlled residual bottom thickness for each pairing of parts," Rohleder adds. As an added benefit of integrated process monitoring with maXYmos NC, information about the machine's condition is available – in case of punch wear or a die breakage, for example. "The teach-in for the clinching unit was very easy, and there were no problems with integrating the Kistler systems into the new machine. The drive already contains the intelligence, so I can regard it and use it as a complete finished module – and before long, I'll even be able to manage without occasional support from Kistler," Rohleder explains with enthusiasm.

Ideal for use with robots

The compact dimensions and low weight of the NCFC make it especially suitable for automation with robots such as those often used in the automotive industry. Another new feature of the NCFC joining modules is single-cable technology, which makes integration even more efficient: energy, signals and data are transmitted via one single hybrid cable for the drive technology. This means that the system offers the additional option of integrating a seventh axis on the robot: while the six-axis robot is moving a vehicle part into position, the Kistler servo drive can already initiate the joining process – thus helping to make the cycle time even shorter.

Precise, energy-efficient press-fit, joining and assembly processes



The very compact and weight optimized NCFC joining module Type 2163A for optimum weight and center of gravity design at the robot arm.

With its electromechanical joining systems, Kistler is a leading provider for the automation of joining processes such as press-fitting, riveting and caulking. The combination of an electromechanical joining module (servo press) and the maXYmos NC process monitoring system ensures force-controlled, quality-assured assembly automation in industries such as the automotive, medical technology and electrical sectors. The portfolio features nominal joining forces ranging from a few newtons up to 700 kN, seven different basic types and application-specific variants, making it possible to implement many different joining processes with sensor support: a key factor in conserving resources. Thanks to decades of experience, systems from Kistler deliver high levels of consistency and integration capability in industrial production environments.



Final words from Hans-Werner Fisch:

"As manufacturers of specialized machinery with a focus on joining technology – and especially clinching – we have found Kistler to be an ideal partner. They can draw on many decades of experience in electromechanics and – just like us – they have an international presence. We've already been using sensor and process monitoring technology from Kistler for a long time – in joining processes with functional elements such as bolts and nuts, for instance. Now, we can offer customers end-to-end solutions: for hybrid joints (to take one example) which require travel profiles that can only be achieved efficiently – and with assured quality – by electromechanical joining systems."

Hans-Werner Fisch, CEO at BTM Europe



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