



## THE SMART AND SAFE WAY TO CHARGE ELECTRIC CARS – NO MATTER WHERE

BGF EnzTech relies on quality assurance by Kistler in its punching process for charger plugs



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At BGF EnzTech, Kistler's KVC 621 optical inspection system - with two camera systems - handles quality assurance for punched parts.

BGF EnzTech has quickly made a name for itself in the electromobility, power feed and temperature monitoring sectors thanks to its precision-manufactured hybrid components and assemblies. Quality assurance by Kistler plays a key part in the production of charger plugs with integrated temperature monitoring. Kistler technology guarantees high quality in the punching process, as well as ensuring protection for valuable machines and tools.

There's no doubt that the future of electromobility depends on two factors: expanding the ranges that vehicles can achieve, and continuing to develop charging infrastructures. But how would it be if all vehicle users could charge their vehicles safely and flexibly themselves? No matter where, no matter when – with smart monitoring and billing functions included? Juice is a Swiss company that has taken this vision as its mission. Their charger plug solutions can replace the classic 'wallbox' home outlet in terms of power – yet they also remain mobile and flexible: depending on the facilities available, they ensure a secure, efficient and controllable charging process with up to 22 kW.

## Value chain for innovative charger plugs built up in just a few years

Most of the technology behind the enterprise originates from a young company named BGF EnzTech, which was established in 2016 at Pforzheim (Germany). "People used to ridicule us back when we founded the company – which was still called E-D-A GmbH in those days. The letters stand for three German words that mean development, design, and automation. Hardly anyone took us seriously," says Julian Bucher, who took over as CEO of this family firm in 2023.



Optical inspection of punched parts uses two camera systems, and can be flexibly programmed via software to meet specific inspection requirements for quality assurance in punching, such as dimensional accuracy.

"Since then, we've been very successful with our power feed and temperature monitoring products – even beyond the electric car sector." Following a development phase of around two years between 2016 and 2018, the company set up a complete production line for Juice. This means BGF EnzTech can now cover the

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Julian Bucher, CEO of family firm BGF EnzTech



The high quality of the charger plugs with temperature monitoring for electric cars is achieved thanks to integrated process monitoring for the punching phase, together with optical inspection using vision systems.



Thanks to ejection control with integrated sensor technology from Kistler, the hybrid punched parts for the charger plugs with temperature monitoring run reliably in the punching strip.



BGF EnzTech GmbH develops and manufactures intricate hybrid components and assemblies for the electromobility, power feed and temperature monitoring sectors at its headquarters in Pforzheim.

entire value chain for the charger plugs with integrated temperature monitoring, from the original idea through to production – with a high level of vertical integration, including toolmaking and other manufacturing equipment. Customers in segments such as electric motor production (for fans, pumps, escalators and more) and also in the aerospace industry appreciate this know-how and the company's high standard of quality: BGF EnzTech customers receive complete modules consisting of complex hybrid components, including seals, assembly and finishing – all from one single source.

## Partnering with Kistler to meet high quality standards in the punching process for charger plugs

When it comes to temperature monitoring for the Juice charger plugs, BGF EnzTech now offers twelve variants of its T2X

## Integrated sensor technology for reliable punching processes

Optical, inductive and piezoelectric sensors from Kistler can be integrated directly into punching tools so malfunctions can be detected at an early stage – a key factor in achieving maximum quality and safety.

#### The benefits:

- High switching frequency insensitive to contamination
- · Compact and rugged design for direct tool integration
- High accuracy and repeatability

Light barriers, analog and digital inductive proximity switches as well as other sensors can detect errors early on in the punching process, so tool breakages (and the costly damage they cause) can be avoided.



Optical sensors and inductive proximity switches for reliable, trouble-free control and monitoring of punching and forming processes



Optical and inductive sensors are integrated in the progressive tool to prevent tool damage and ensure quality assurance.

(Temperature-to-X) product for different countries and power systems. Temperature monitoring ensures that the charging process for electric cars is safe, reliable and optimized: if the charger plug becomes too hot, ithe electronics reduce the charging current in several steps and, if necessary, switch off completely.

After its success in Germany, BGF EnzTech gradually went on to conquer the markets in Italy, Switzerland and the UK, followed by the USA – where conditions are highly dynamic at present, although the power system operated there is entirely different compared to those used in Europe. Bucher continues: "This meant that the outlay was far higher, not only because of the four plug variants that are customary there: we also had to obtain the UL (Underwriters Laboratories) certification that's essential for the US market – for the products themselves, as well as for our entire production." Today, BGF EnzTech is one of only three companies in Germany that meet UL standard 817.

Over the course of just six months, the company set up a dedicated punching line (in addition to the total of four injection molding lines) – equipped with Kistler measurement technology from the outset. "Given our quality standards and the complex nature of our products, it was clear that we weren't going to leave



Kistler's optical test stations feature a modular structure, and they can be expanded flexibly as required – by adding camera systems or laser marking units, for example.



Opting for double quality control by Kistler in the punching process (inline and end-of-line): Michael Kunzmann, Julian Bucher (CEO) and Adrian Gerhardt from BGF EnzTech.

Inline vision inspection for optical quality testing of continuously produced (reel-to-reel) workpieces: "100-percent optical inspection in the punching line"



The optical inspection of components by the KVC 621 optical testing system for 100 percent control of continuous material in the punching process operates autonomously.

The KVC 621 vision system from Kistler for optical inspection is a universal and autonomous optical measurement system for continuously produced punched parts.

#### Benefits of vision inspection with automated test systems:

- 100% testing of series parts
- High-precision external contour inspection of components
- Large production quantities and fast cycle times
- Comprehensive recording and transmission of quality data
- Enhanced process reliability and optimized process efficiency

The vision system for continuous material is available in various sizes including an extra-compact version (for confined spaces) or a version with extended installation space (e.g. to accommodate additional cameras or to integrate a marking laser).



Complete punching line for charger plugs with temperature monitoring – including an integrated testing system for vision inspection.

"Given the varied range of parts we have and the constant flow of new projects, the flexibility of the systems we use is important to us. Thanks to Kistler's training courses, the possibility of remote access and – above all – their close geographical proximity, changeovers are possible at any time." Julian Bucher, CEO of family firm BGF EnzTech

anything to chance here. Kistler is a name that stands for quality, and their geographical proximity to us also made our decision easy," Bucher recalls. In the punching machine, special light barriers and analog inductive sensors from Kistler (such as the PMI-10-10/P/AS10-U-4, PXI-5-5/3-P and ISS-20-30-1-A) ensure that the strip is processed reliably and the tool is not damaged. Functions implemented include double sheet control and feed control, as well as strip lubrication by an oiling system. All sensor functions can be conveniently monitored via the integrated process monitoring system with 24 digital and 12 analog channels; modular expansion via the software is also possible if required.

#### Reliable punching processes - plus optical part inspection

"Given the varied range of parts we have and the constant flow of new projects, the flexibility of the systems we use is important to us," Bucher continues. "Thanks to Kistler's training courses, the possibility of remote access and – above all – their close geographical proximity, changeovers are possible at any time." This also applies to the vision systems that check the finished punched parts or components for quality features. The KVC 621 optical inspection system from Kistler was equipped with two camera systems for BGF EnzTech: each of them checks all the dimensions and performs another special inspection of the component's front area. Two more modules are already planned for integration into the test cell: an additional camera that measures the height of the components from the side, and a laser marking module that automatically marks identified NOK parts so they do not even enter the downstream injection molding process.

Thanks to dual quality assurance in the punching process with mutually complementary Kistler technologies – sensors integrated in the machine or punching tool, plus downstream optical part inspection – BGF EnzTech enjoys a whole range of benefits: high product quality with very high process reliability, plus longterm protection of its costly tools and machines – with rates of up to 400 punched parts per minute. Going forward, a second laser marking cell from Kistler is planned to mark the finished hybrid parts after injection molding (where process monitoring from Kistler is already in operation). This will ensure 100 percent traceability.

## Safe charging for electric cars – whenever, wherever and however you want

Following their relocation, BGF EnzTech's agenda also includes developing new markets. Final words from Julian Bucher: "As well as Australia, we're eying the Asian region for the charger plugs with integrated temperature monitoring. We're mainly interested in projects with high quality standards and a certain degree of complexity, where we can bring our know-how and high-quality production into play."

# Integrated process and quality control for best-in-class stamping processes

With over 50 years' experience, Kistler is at the forefront of monitoring and control for stamping processes. Thanks to our solutions, manufacturers can achieve highest quality for small parts produced continuously in large quantities – in application areas ranging from the automotive and electrical industries to the medtech sector.

## Smart and reliable stamping

Application-specific sensors can be integrated directly into the progressive stamping die. Optical, inductive, or PE (piezoelectric) sensors are used for tool monitoring, depending on the application: examples include double sheet control, feed control, ejection control, and press force monitoring.

## **Inline process control**

We developed our KCA 400T analog controller as a subsystem. It serves as a smart link between the sensor equipment in the stamping die and the tool or process monitoring system. The analog controller is based on the principle of proven double sheet control. With the KCA 400T, users can detect the finest stamping scrap on the stamping strip – and they can also adjust sensor parameters and process tolerances directly on the device.





Optical, inductive and PE (piezoelectric) sensors from Kistler can be integrated directly into stamping dies to detect malfunctions at an early stage and attain maximum levels of quality and safety. By combining our sensor technology with end-of-line vision inspection and laser marking systems, manufacturers can achieve zero-defect, fully traceable stamping production.

The Kistler Group delivers solutions to equip stamping lines with process control, die-integrated sensors, and 100 percent vision inspection – including KiVision image processing software and laser marking-on-the-fly. We also offer modular systems that can be tailored to customer requirements.

### **Vision inspection**

Our autonomous vision systems deliver state-of-the-art optical inspections of continuously produced parts. Even complex assignments can be processed at high speeds: options range from dimension checks and complete contour tracing to surface inspections – and more.

#### Your customer benefits

- Smart, reliable and efficient stamping due to inline process control
- High level of die and machine protection, less downtime, higher Overall Equipment Effectiveness (OEE)
- Specialized sensors for different processes and applications in stamping dies
- Quality control thanks to 100% inspection
- High-speed inline quality control for high volumes
- Complete traceability of each component thanks to laser marking

## Laser marking

With special laser marking systems such as the KLM 621 from Kistler, all stamped parts that are produced can be marked continuously at high throughput rates: this is 'marking-on-the-fly'. These compact cells deliver 100 percent labeling and traceability, even for small stamped parts.



Would you like to learn more about our applications? Explore now:



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