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UNCOMPROMISING DETECTION

Ningbo Tianlong achieves flawless press-fit pins with vision inspection systems from Kistler

Ningbo Tianlong

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At Ningbo Tianlong's request, Kistler integrated a cleaning step for the stamped strip ahead of its optical inspection within the KVC 621 vision inspection system.

To ensure the highest quality in the production of press-fit pins (eye-of-needle, EON) – stamped contacts widely used in automotive electronics for printed circuit boards – the Chinese supplier Ningbo Tianlong Electronics Co., Ltd. chooses KVC 621 vision inspection systems from Kistler. This optical inspection system for continuously produced stamped and hybrid parts provides 100-percent inspection of every single component.

Leading suppliers: actively facing the change of vehicle electrification

Advanced automotive technologies such as driving assistance systems, the cross-functional integration of components and systems, and the progression toward autonomous driving have led to the ongoing electrification of vehicles. The demand for high-quality electronic components is growing rapidly. To remain competitive, Chinese vehicle manufacturers and suppliers are increasingly investing in localization, product diversification, and technological independence.

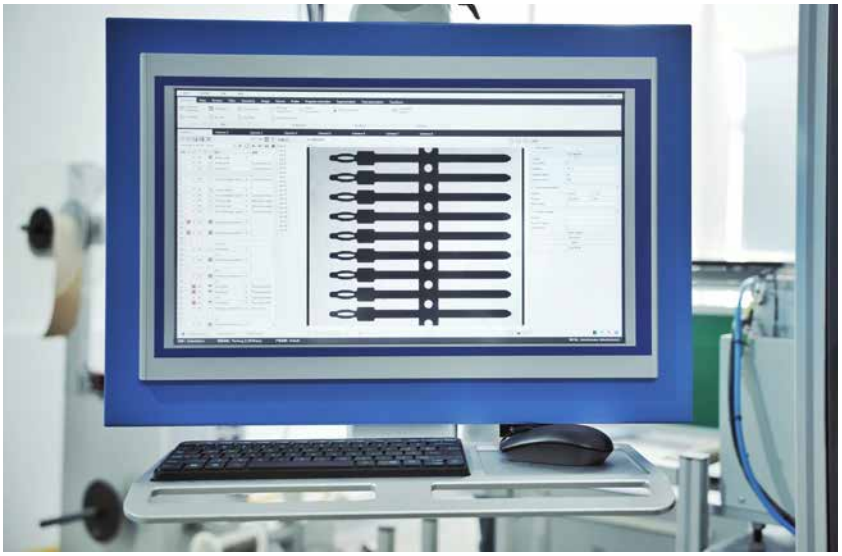
A pioneer in this transformation is **Ningbo Tianlong Electronics Co., Ltd.**, based in the Hangzhou Bay New District – a hub of China's electric vehicle industry. Since 2023, Tianlong has started independently developing and manufacturing eye-of-needle press-fit pins, which are considered a core component of automotive connectors – as an innovative interconnection method, it provides an efficient technology that requires no soldering or welding.

Founded in 2000 and publicly listed since 2017, the Chinese automotive supplier specializes in injection molding (including toolmaking), stamping technology, and automated assembly solutions. The company also delivers electronic components, connectors and subsystems, for example, for climate control and thermal management. Ningbo Tianlong supplies the majority of automakers and suppliers active in the Chinese market. With 13 locations and production facilities in and outside of China, Ningbo Tianlong generated more than RMB 1.3 billion in revenue in 2023.

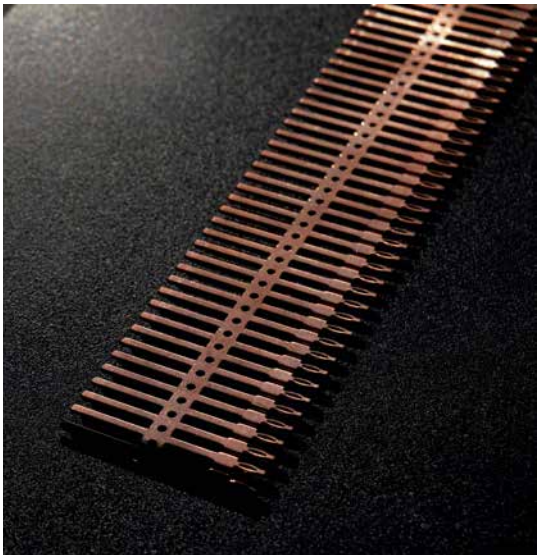
Press-fit-pins: fully automated optical inspection for the best quality assurance

Vehicle electrification, which means the combination of components and systems, is moving from mechanical connection towards electronic communication data exchanges and signal transmissions occur in milliseconds per unit of time. The stability and safety of the connection between the connector terminals and the circuit board becomes a top priority. In 2023, Ningbo Tianlong successfully developed a manufacturing process for press-fit pins – offering superior stability, efficiency, and sustainability compared to soldered contacts – in just six months. Today, the company offers a broad portfolio of patented eye-of-needle press-fit pins in various

The headquarters of Ningbo Tianlong Electronics Co., Ltd. is located southeast of the city of Ningbo near the East China Sea.



Optical inspection of continuously stamped press-fit pins: Measurement tolerances, test sequence and other parameters can be individually configured via the large touchscreen display on the KVC 621 vision inspection system from Kistler.



So-called eye-of-needle press-fit pins have proven to be an advantageous interconnection technology in automotive electronics and have been produced in series by Ningbo Tianlong since 2023.

diameters and lengths. All specifications strictly follow European standards of 100% product quality and reliability in sensitive automotive applications – key criteria include insertion force, temperature and vibration resistance, and, of course, dimensional accuracy. To meet the extremely high requirements for precision and consistency, Tianlong relies on automated image processing technology and vision inspection solutions from Kistler.

A core element of Ningbo Tianlong's production line is Kistler's KVC 621 optical inspection system for continuously manufactured stamped parts. This high-precision measurement and sorting machine, equipped with advanced camera technology and industrial image processing, ensures 100-percent inspection of all stamped components. A unique feature: the stamped strip passes through the inspection cell at a variable cycle – feed speed is automatically adjusted via upstream optical sensors and the KiVision software from Kistler.

Telecentric lenses with large depth of field and minimal aberration, combined with telecentric backlighting (exposure time 15 ms), enable high-speed, high-accuracy inspection: up to 1,200 parts per minute can be checked for dimensional conformity and surface defects. Tolerance limits are as tight as 0.04 mm, with an optical measurement accuracy of 2 µm. Kistler configures each inspection system in close consultation with the customer. Kistler vision inspection systems such as the KVC 621 are modular in design and can be equipped with tailored camera setups, feeding and handling solutions, and additional automation components. Optimal integration into the stamping or production line is also a key factor – considering cycle time, throughput, reject part separation, and other criteria.

Vision inspection: custom configuration and process optimization
Kistler is committed to providing seamless support for its advanced measurement solutions throughout the entire product lifecycle, and to driving innovation together with its customers – from initial consulting to installation, maintenance, and potential upgrades. The same applied here: at the suggestion of Ningbo Tianlong's Technology Center, Kistler integrated a cleaning process for the material feed. Dust, oil, and residues are automatically removed before entering the KVC 621 vision inspection system, boosting both inspection efficiency and overall production performance. In doing so, the pins can now seamlessly enter Tianlong's internal production and supply chain system. With that, the following production of the connectors, including injection molded parts and press-fit pins, can benefit from the entire development process: from design, validation and high-volume series production up to ongoing product improvement.

Therefore, Ningbo Tianlong is ideally positioned to meet the needs of automotive manufacturers, especially in the e-mobility sector, with high-quality, lightweight, sustainable and cost-efficient components.

By producing and optically inspecting its own press-fit pins with Kistler technology, Ningbo Tianlong can now tap into new customers and market shares in automotive electronics.

Zero defect thanks to 100 percent optical inspection
With fully automated vision inspection systems (inline or standalone) from Kistler, series and mass-produced parts can be inspected seamlessly and efficiently for quality.

Benefits include:
- Feasibility analysis of inspection tasks in the image processing laboratory
- High throughput and fast cycle times
- Increased process reliability and optimized process efficiency
- Comprehensive quality data acquisition and transfer
- Reduction of quality costs

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