



Fast Reader

Turck's BL ident RFID system reduces the reading time for the tool turret of a CNC machine from 130 to 10 seconds

Intelligent RFID systems for tool identification can considerably boost the production efficiency of CNC machines

The requirements of more flexible production are increasing the demand for automated solutions for tool management. Cutting tools are changed more frequently today than ever before. As a result, it has become more difficult for conventional visual identification methods using serial numbers and manual data maintenance to manage the tasks involved. These methods are prone to errors, the tool life cycle can only be managed with considerable effort and tool data is often disorganized. A growing number of processing and manufacturing companies are consequently seeking to improve existing tool management methods. Through efficient tool management, they intend to considerably increase tool performance and

lifespan, lowering production costs while boosting machining quality.

The requirements placed on tool management systems are constantly increasing

Tool management systems are required to process different operations, such as different types of supplies, huge quantities and frequent check-out and check-in operations. Without a reliable identification technology, these kinds of management systems can easily become disorganized. Additionally, a poor environment or improper operation can lead to disorganization and loss of data. If this happens frequently during tool usage, this will significantly impact on production



Cutting tool holder with embedded RFID tag



The RFID read/write head is fitted to the back of the tool turret and reliably detects the tag in the tool holder thanks to its extended range through the paneling

efficiency and may even give rise to quality issues, such as products being rejected or returned. As machining continues to develop, particularly when it comes to the mass use of CNC machine tools and machining centers, machining accessories have also become more complex. The requirements placed on production and machining have increased to the extent that previous tool management methods are no longer satisfactory.

Past solutions in need of improvement

Conventional tool management systems have primarily used optical identification technologies such as laser engraving in order to record tool data. This method laser engraves tool-related data onto the cutting tool surface. Whilst this method allows for more long-term recording of data and more efficient tool management, there are obvious disadvantages. The data that can be engraved on the surface of a cutting tool is limited. In the worst case, laser engraving may damage the structure of the cutting tool, impacting its product lifetime. Additionally, the procurement of most engraving equipment comes at a higher cost. Wireless RFID technology is another possibility for identification

solutions. The first systems of this kind are already in use, although they are not yet really efficient. Conventional systems of this kind use a read/write head on a cylinder, which moves it back and forth to read data

QUICK READ

Barcodes and laser engraving have for a long time no longer met the identification requirements of cutting tools in CNC machines. Although wireless RFID systems are already used, the short range of the existing solutions require time consuming compromises in practical applications. Together with Turck, a Chinese manufacturer of CNC machines has now implemented an RFID solution for tool management that is Industry 4.0 compliant. Thanks to the extended read/write range, the read time for a tool turret is reduced from 130 to 10 seconds, thus considerably increasing production efficiency for the end customer.

»Turck's modular design makes selecting the right RFID system easy and straightforward. If the required protocol is Profinet, Ethernet/IP or Modbus TCP, a single multiprotocol gateway is all that is needed to support all three.«

Gao Xianghui | project manager at Qingdao Mesnac



Tool turret with cutting tools

from the RFID tag on the tool. The tag is embedded in the tool holder. To identify or change a tool, the tool turret with the relevant tool first has to move to the lowest position. The cylinder with the read/write head has to move the entire way to the turret and back again. This increases the total read time for a single cutting tool to 6.5 seconds. It would take more than two minutes to identify all 20 cutting tools of a turret on a single CNC machine. The production efficiency of the CNC machine would thus be significantly lowered. Frequent mechanical operation also results in wear and tear on the device. If the read/write head cannot promptly retract due to cylinder malfunction or for another reason, this may lead to the read/write head colliding against the cutting tool, which will impair machining accuracy.

Optimized tool identification with Turck's RFID system

Turck's BL ident RFID solution tackles this problem precisely: Read/write heads with an extended detection range can be mounted directly on the back plate of the tool turret. Data from the RFID tags on the tool holder can be read directly through the non-metal backplate, without the need for a cylinder which moves the head forward and backward. One simple rotation of the turret is all that is needed to identify all of the cutting tools on a CNC machine tool. All of the information related to the cutting tools can be read in around just ten seconds. Turck's read/write heads have a protection rating of IP69K, and the RFID tags have a protection rating of IP68. This makes the system resistant to moisture and water, making them also suitable for use in damp environments. The tags have a freely usable 128 byte memory. This enables large amounts of data to be stored, virtually turning the tool into a mobile database.

BL ident with an impressive modular design

»Turck's modular design makes selection of the RFID system easy and convenient. All you need to do for different protocols is change the gateway. If the required protocol is Profinet, Ethernet/IP or Modbus TCP, a single multiprotocol gateway is all that is needed

to support all three,» says Gao Xianghui, project manager at Qingdao Mesnac, the Chinese system integrator, about Turck's BL ident system.

»The straightforward design of the RFID modules simplifies program development, eliminating the need for function blocks. Read/write operations can be controlled directly via the I/O points.« The 44-millimeter detection range meets the on-site installation requirements and prevents read/write heads from sustaining damage due to collisions. The in-metal tags have a protection rating of IP68 so they are ideal for the installation requirements of tool management systems.

Conclusion

The implementation of RFID technology in the HF range fully capitalizes on its benefits for tool identification and management: rapid identification, solid anti-interference capabilities and tags that offer high storage capacity. Adding RFID read/write heads to automated tool-changing systems allows for rapid reading of data from RFID tags on tool holders, making features such as automated tool identification, automated mounting, and total life cycle tracking a reality.

This, in turn, boosts production efficiency and tool utilization while lowering production costs and product rejection rates. As RFID technology continues to be perfected and become more popular worldwide, RFID tool management systems that incorporate Internet technology will increasingly become the system of choice for processing and manufacturing companies.

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