



- 1 Casting with integrated UHF RFID transponder.
- 2 RFID transponder antenna
(© Cake78/Fotolia).
- 3 Die casting with integrated LF RFID transponder.

CAST^{TRONICS}[®]

RFID MARKING FOR METAL CASTINGS

Until now the marking of castings has been limited to conventional methods such as barcode or data matrix code (DMC). At Fraunhofer IFAM, RFID transponders are integrated into castings, enabling an electronic, radio-based marking and identification of cast products. The transponders can be embedded into the casting both after and during casting using the patented **CAST^{TRONICS}[®]** process.

RFID – contact-free and robust part marking

The established RFID technology offers an electronic, contact-free and smart identification of products and components (RFID = Radio Frequency Identification) and is regarded as a logical further development of the marking methods used to date.

The RFID transponder has a globally unique

serial number and can also be expanded to include customized codes in order to ensure unambiguous marking. RFID functions by radio, requires no visual contact, is reliable and practically invisible – and thus offers benefits for industrial applications:

- | Electronic encoding without optical marking features
- | Simultaneous identification of several castings possible
- | Resistant to rough industrial environments as well as soiling or damage to the surface of the casting
- | Higher security of the data integrity and scanning quota
- | Encryption of information possible
- | Counterfeit protection for castings
- | VDA-conformant encoding

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CAST^{TRONICS}[®] technology

The RFID transponder can be attached to the surface of existing castings or embedded mechanically. The patented CAST^{TRONICS}[®] technology also offers the option of casting the RFID transponder into the part directly during the casting process. The transponder is thereby protected against damage from the aluminum melt by a special heat-resistant insulating capsule.

Complete traceability of castings

The casting is unambiguously marked on removal from the mold and can no longer be confused. Counterfeiting is also no longer possible. The CAST^{TRONICS}[®] technology protects the encoding of the casting against damage, loss or manipulation. By contrast with visual marking methods, parts with an integrated transponder are still clearly identifiable even after surface treatment, e. g. due to coating, blasting or soiling.

VDA recommendation for the RFID marking of parts

The course for the future is already being set today. The VDA has recommended RFID several times for the marking of parts and products, i.e. for the traceability of vehicle parts and identification of their technical design (VDA 5005), for the tracing of parts and components during vehicle develop-

ment (VDA 5509) as well as for the tracing of parts and assemblies in the automotive industry (VDA 5510). In addition to standardization in accordance with VDA, the electronic product code EPC is regarded as the international encryption and encoding system in accordance with GS1 for the unambiguous global marking of products.

Counterfeit protection

Integrating the transponder into the casting allows not only for identification, but it is also an innovative solution as an electronic seal of authenticity against product piracy and confusion. Once integrated, the chip can no longer be removed without visible damage to the casting, and replacement is not possible.

Looking ahead

Fraunhofer IFAM supports the casting industry with its proactive early adoption of RFID technology. If a few centimeters of scanning range are sufficient, the robust system frequency 125 kHz (LF) predominant in the metal industry to date is used. The technology to the next step is now being taken by using 868 MHz (UHF) frequency, which increases the scanning range for castings with integrated RFID transponder to up to one meter.

Our offer

The Casting Technology department at Fraunhofer IFAM offers the whole development chain for the marking of castings using RFID, from later application to casting integration:

- Brainstorming and project consultancy
- Choice of suitable RFID transponders and scanners
- Development for subsequent application of the transponder
- Application of CAST^{TRONICS}[®] technology
- Design of insulating material and capsule geometry
- Concept development for positioning and fixing the RFID in the mold
- Casting trial series
- X-ray screening and computer tomography

Further information can be found on our website

www.casttronics.de

- 4 Belt conveyor with UHF RFID scanning system for identification of castings in a fully automated production and assembly line.
- 5 Conveyor track
(© Vaclav Janousek/Fotolia).
- 6 RFID transponder for integration into castings for LF and UHF RFID systems.