



1 RFID Tunnel Gates in use at FIEGE Megacenter in Ibbenbüren.
Photo: Dirk Mahler

“RFID TUNNEL GATES” FOR RELIABLE BULK READING

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Scanning Bulk Goods in Production and Logistics

RFID technologies provide many and diverse options to systematically control, monitor and thus more efficiently organize production and logistics processes. They guarantee maximum transparency by:

- clear identification of items throughout the entire transport process,
- transparent and continuous tracking of flows of goods and
- central and distributed data acquisition for quality assurance.

Established identification points are important in supply chains supported by RFID to scan goods and capture data. Inspections of incoming and outgoing bulk goods particularly constitute such critical points.

All of the RFID transponders have to be read reliably. At the same time, reading of unrelated transponders has to be prevented.

To this end, researchers at the Fraunhofer IFF developed the RFID Tunnel Gate, which reliably reads large quantities of transponders.

The RFID Tunnel Gate's Advantages

- RFID transponders are read reliably with low reader power output.
- A shielded read zone eliminates false positive readings.
- Electromagnetic reverberation guarantees RFID transponders are read reliably regardless of their orientation.



Maximum Reliability

The UHF RFID Tunnel Gates developed at the Fraunhofer IFF in Magdeburg assure reliable, automatic reading of single and bulk goods tagged with RFID in the material flow. The Fraunhofer IFF's RFID Tunnel Gate has a more sharply delimited read range with a better read performance than conventional gate systems. This eliminates unintended false positive scans of transponders around the gate. The RFID Tunnel Gate also eliminates the problems that conventional systems have reading RFID tags, which are pointing every possible direction in space.

Working Principle

RFID Tunnel Gate technology is based on the Fraunhofer IFF's patented principle of the electromagnetic reverberation chamber (ERC principle) for RFID applications. The basic electromagnetic conditions in the metallicly shielded read zone are altered continuously by switching among several RFID antennas, thus producing a homogeneous distribution of field strength inside the tunnel. This makes it possible to fully scan large quantities of passive transponders in the entire read zone.

The transponders' orientation in space does not affect the effectiveness of detection. The large multitude of modes generated in the ERC renders the reading independent of polarization. Thus, all of the transponders located in the read zone are detected reliably, regardless of their spatial orientation.

A sharpening of the resonance in the Tunnel Gate additionally produces high field strengths with little input power. Thus, the gate operates with less reader power output than conventional gates.

Field Proven

One example of a very successful application of the Fraunhofer IFF's RFID Tunnel Gate is scanning of incoming and outgoing shipments in the textile industry. Reliable reading of transponders in the Tunnel Gate makes it possible to fully inventory articles of clothing packed very compactly in shipping cartons. Items missing from hand-packed cartons are detected quickly and efficiently at the inspection points in the supply chain – the globally available inventory of goods is updated centrally in the inventory control system in real time.

Versatile

The high technical flexibility of the ERC principle makes RFID Tunnel Gates freely scalable and thus suitable for the widest variety of applications – from small solutions on belt conveyors to automatic inventorying of entire truckloads.

The patented ERC can be transferred to other logistics applications without any problem. The Fraunhofer IFF has already equipped various forms of load carriers on the basis of the ERC principle – for instance, a swap body with a volume of 10 m³ for urban commercial traffic. These smart load carriers use RFID scans and additional sensor systems to document their freight inventory continuously. This technology significantly boosts transparency and security in supply chains for all of transport logistics.

Our Services

Let the Fraunhofer IFF help you organize your logistics processes securely and efficiently with RFID technology. As your development partner, we will analyze every relevant process and all of the ambient conditions in order to modify systems such as the RFID Tunnel Gate for your specific applications and requirements.

We will also use mobile testing and measuring units in technical feasibility studies to examine your requirements and process environments in order to verify the options for using RFID in your applications.

1 *Reliable bulk reading of RFID transponders in the textile industry. Photo: Dirk Mahler*

2 *An RFID Tunnel Gate that scans truckloads. Photo: Martin Kirch*