

ProAuthent

Integrated Protection against Counterfeiting in Mechanical Engineering through Marking and Authenticating Critical Components

**Dipl.-Wi.-Ing.
Dominik Stockenberger**

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fml - Lehrstuhl für Fördertechnik Materialfluss Logistik
Prof. Dr.-Ing. Dipl.-Wi.-Ing. W. A. Günthner
Technische Universität München

1 Product Piracy in Mechanical Engineering

2 Integrated Protection System

2.1 At-Risk Components

2.2 Fraud-Resistant Features and Originality Check

2.3 Check Results and Documentation

3 Summary

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Global Impact

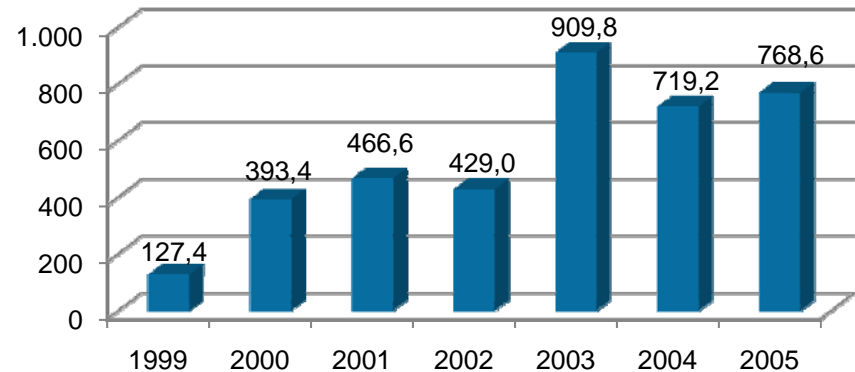
- **International trade with fake and illicitly copied products 2005: \$200 billion per year**

Containing only goods of cross-border trading, no fakes/copies in national trade or internet distributed products

- **Actual volume could equate to several hundred billion US\$ more**

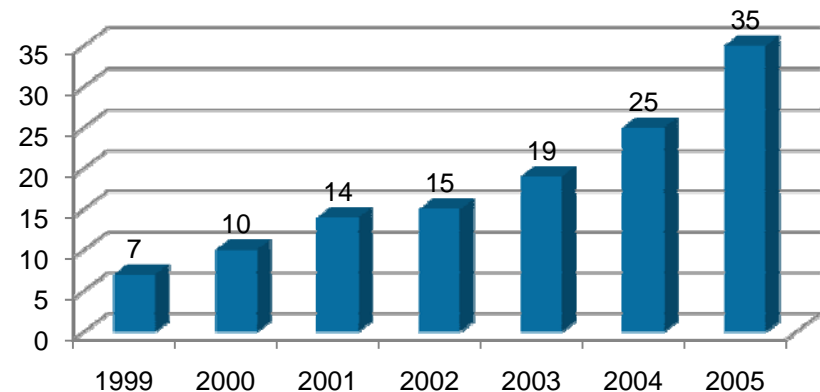
Source: [OECD-08]

Volume of Goods assured by Customs [Mio US \$]



Source: [OECD-08] p.57

Number of Countries Reporting to the OECD



Source: [OECD-08] p.57

Impact on Mechanical Engineering in Germany

- **Economical damage due to product piracy:**
€7 billion per year
- **68% of German mechanical engineering enterprises are affected**

Source: [VDMA-08]

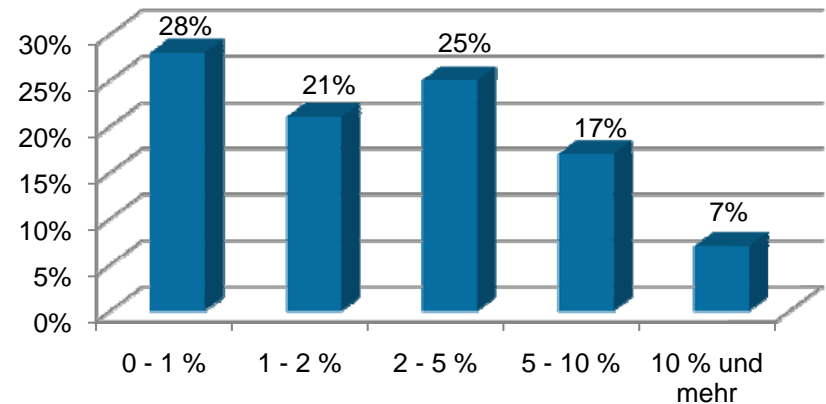
Direct economical damages

- Loss of sales and profit
- Expenses for protection measures, registration and assertion of trademark rights and patents

Indirect economical damages

- Damage to reputation
- Sinking price level
- Product liability
- Loss of know-how

Estimated Loss in Sales at Affected Companies 2007



Source: [VDMA-08]

Distinguishing between Originals and Counterfeits

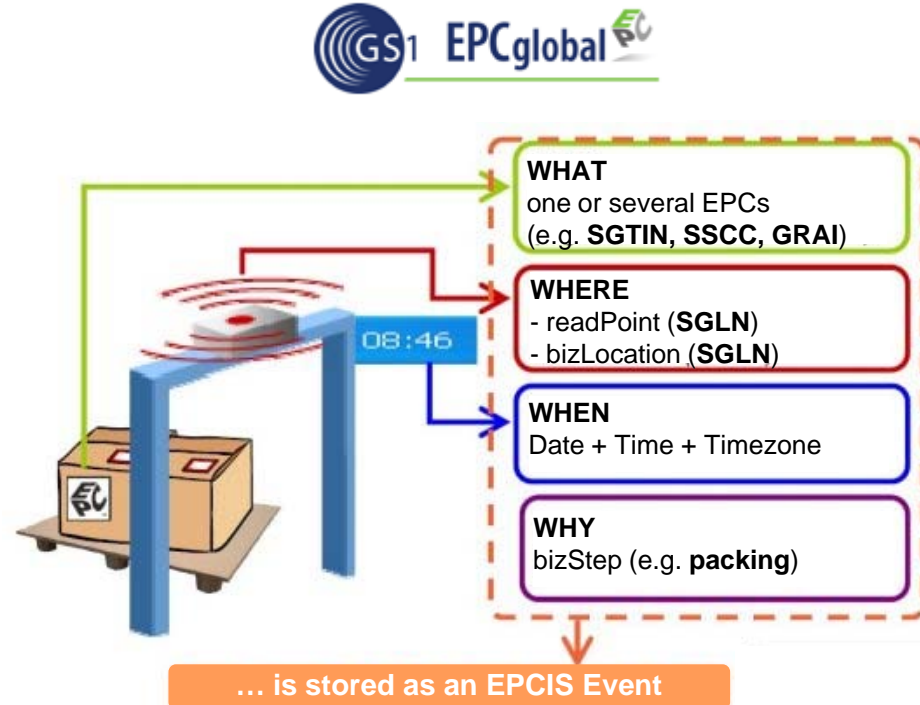
- **High product quality – no longer a measure for product authenticity:**
Differences between original product and counterfeits are often hardly noticeable for customers
 - **Meaning to expanded supply chains and sales networks:**
Challenge of communicating to all participants differentiating features
- ➔ **Trademark protection approach:**
Product protection by marking with fraud resistant features for sustainable (manual) authentication



Source: Aktionskreis gegen Produkt- und Markenpiraterie e.V. (APM)

Supply Chain Surveillance

- **Simple supply and logistics structures** become complex supply and logistic networks
- **Tracing one's own products** along the supply chain and discovering counterfeits, illicit sales etc. becomes uncontrollable without qualified systems

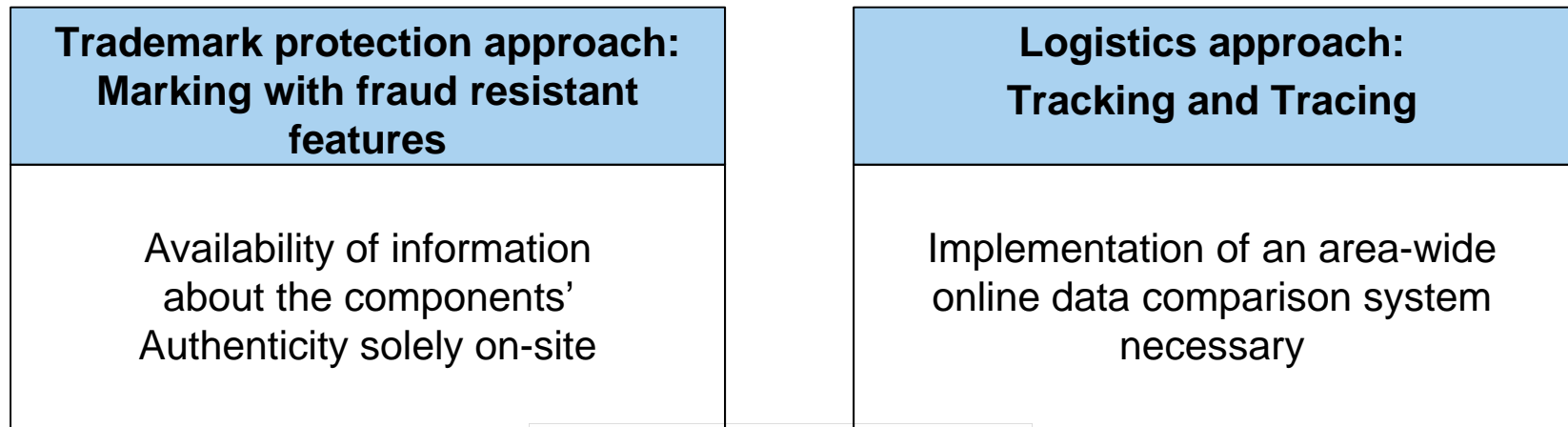


Source: [GS1-10]

➔ Logistics approach:

Applying tracking and tracing functions based on databases which store information about the serialized product's progress through the logistics chain

Anti-Counterfeiting for Components and Spare Parts in Mechanical Engineering



**Efficient protection system against product
piracy for mechanical engineering?**



Research project **ProAuthent** funded by The
Federal Ministry of Education and Research
(Bundesministerium für Bildung und Forschung)

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2.1 At-Risk Components

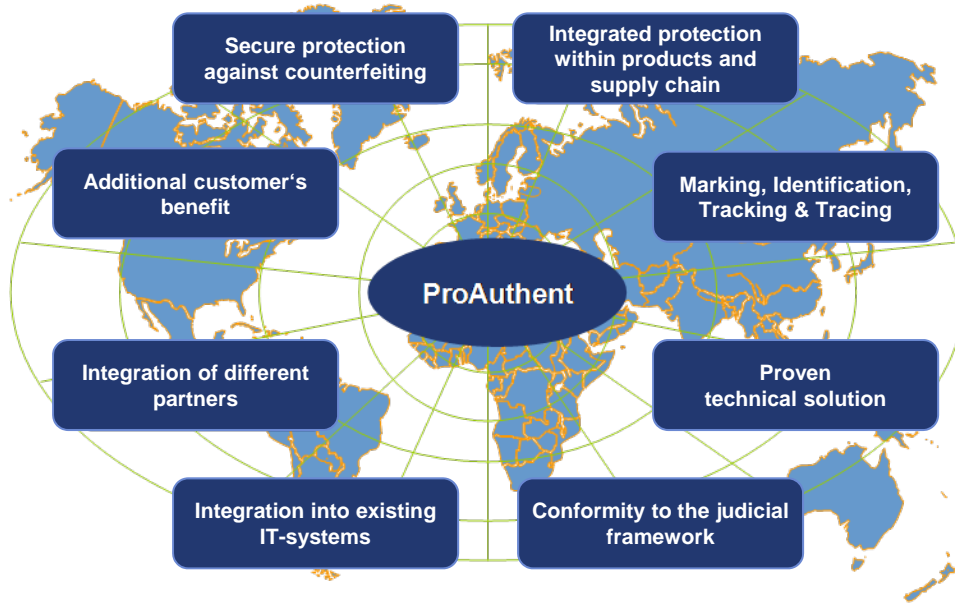
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Research project ProAuthent

ProAuthent



Technische Universität München



MÜLLER MARTINI



GEFÖRDERT VOM



Bundesministerium für Bildung und Forschung

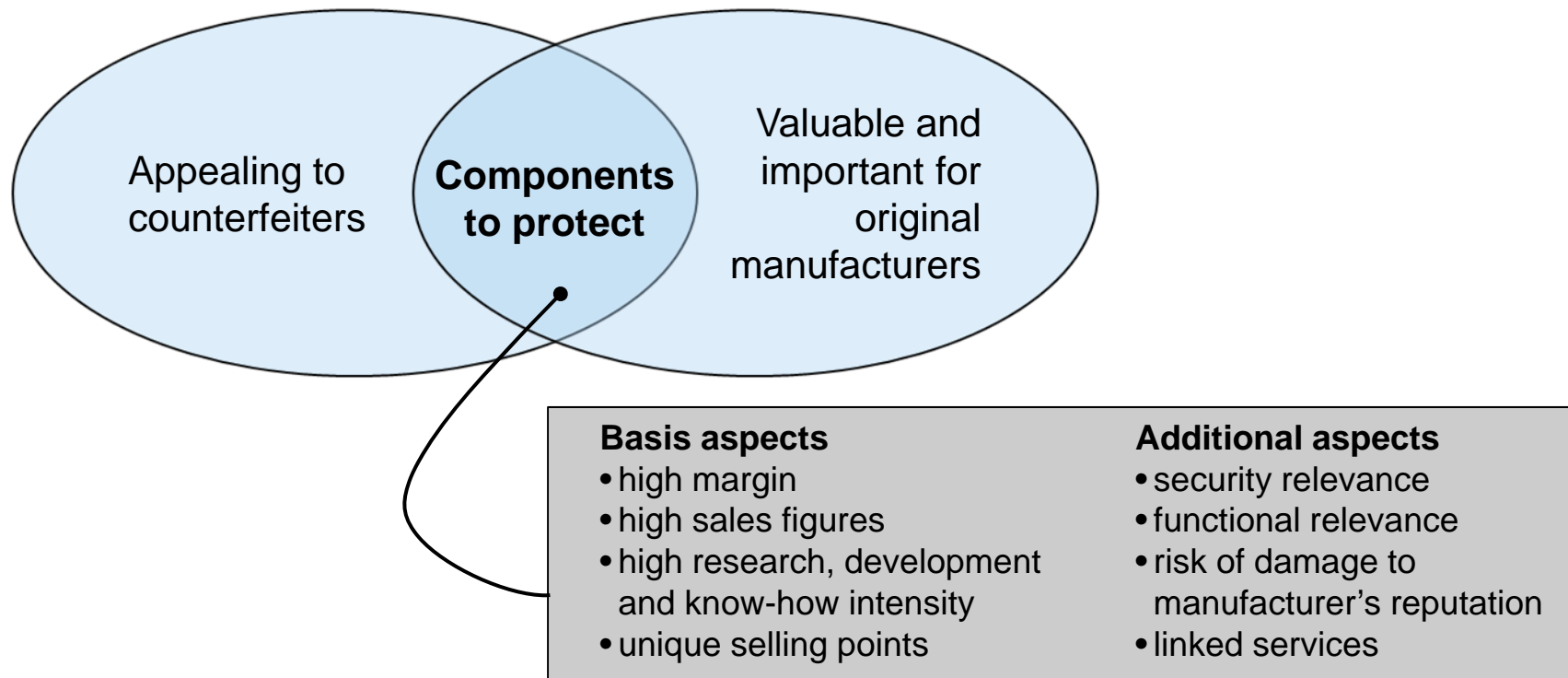
BETREUT VOM



PTKA Projektträger Karlsruhe im Karlsruher Institut für Technologie

- Marking every component with fraud resistant features and to checking authenticity is cumbersome
- Cost-benefit ratio prohibits marking every component

→ **Criteria for the selection of components to protect must be developed**



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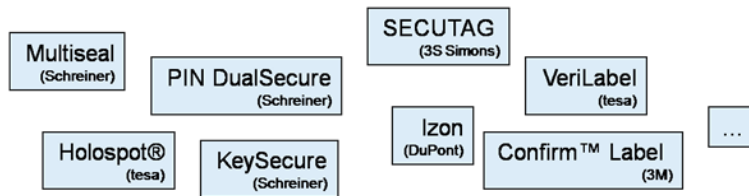
2.2 **Fraud-Resistant Features and Originality Check**

2.3 Check Results and Documentation

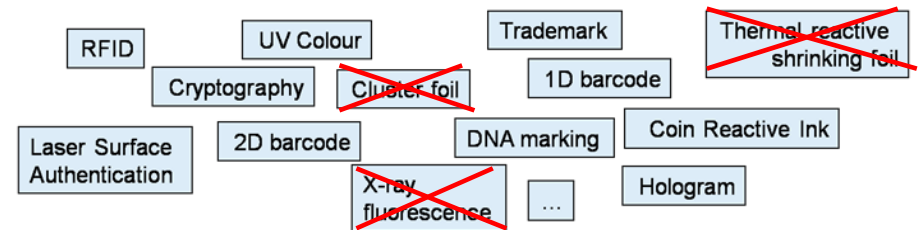
3 Summary

Analysis of the trademark protection market

More than 15 companies with more than 80 security products



22 marking technologies out of 40 usable in mechanical engineering



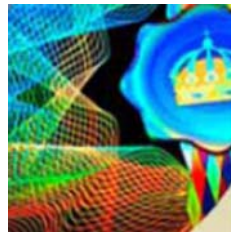
Choice of security marks

Selection criteria

- Information stored inside the marking feature
- Accessibility for checking
- Acceptable complexity and cost for checking
- Required automation level of the checking procedure
- Available infrastructure

Selected marking technologies

The following four marking technologies are realized in a demonstration system and will be realized in industrial pilot installations



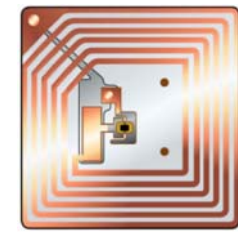
Hologram



IR color pigments



Copy detection pattern

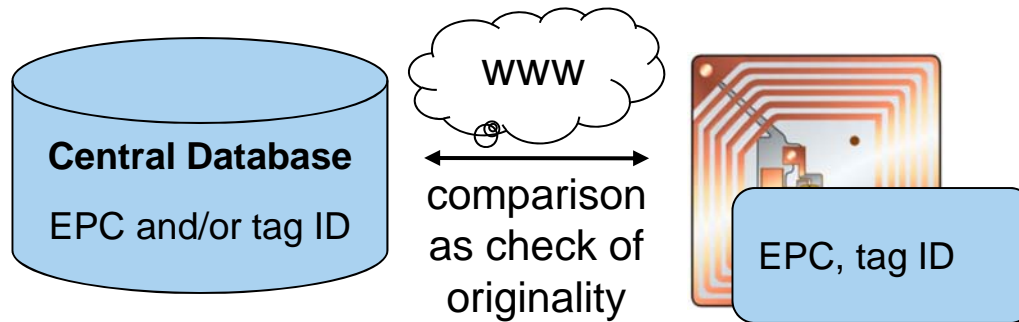


RFID

Secure on-site authentication (offline)				Not with simple hardware
Information transfer in central data base for transparency along the SC	Via manual input			

RFID: Authentication Mechanism with Cryptographic Signature for Offline-Authentication

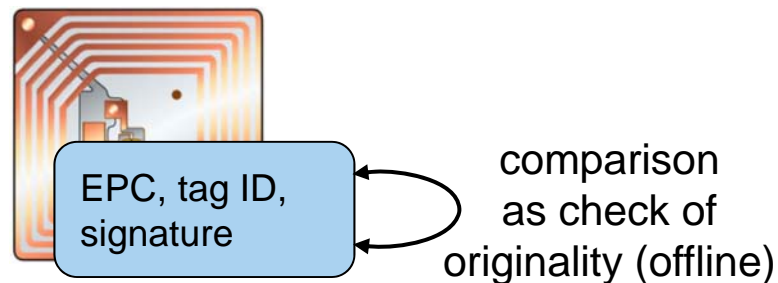
Online-Authentication



- Electronic Product Code (EPC): easily reproducible
 - Unique tag ID (UID): written in the read-only-memory of the chip, reproduction very expensive and complex
- Security level using UID is very high

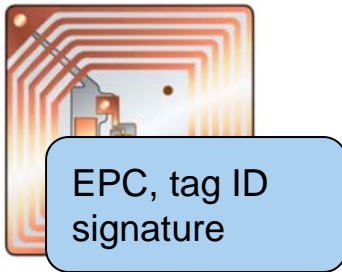
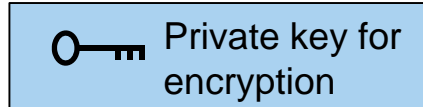
Offline-Authentication

- EPC + UID are signed by the manufacturer
 - EPC and signature of a tag can only be copied to transponders with same UID
- Secure mechanism applicable in mechanical engineering



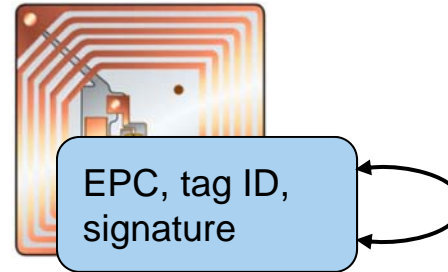
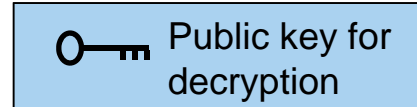
RFID: Authentication Mechanism with Cryptographic Signature for Offline-Authentication

Manufacturer

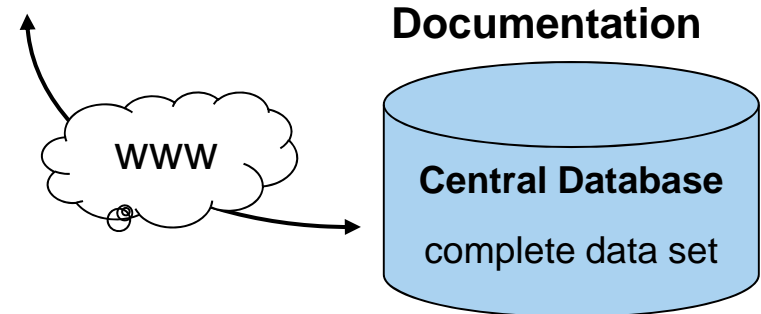


- Generation of the signature on the basis of EPC and UID

Point of Authentication



- Decryption of the signature
- Comparison with EPC and tag ID for originality check



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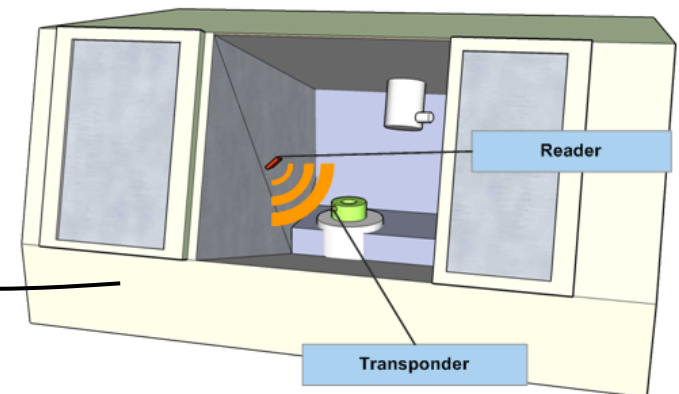
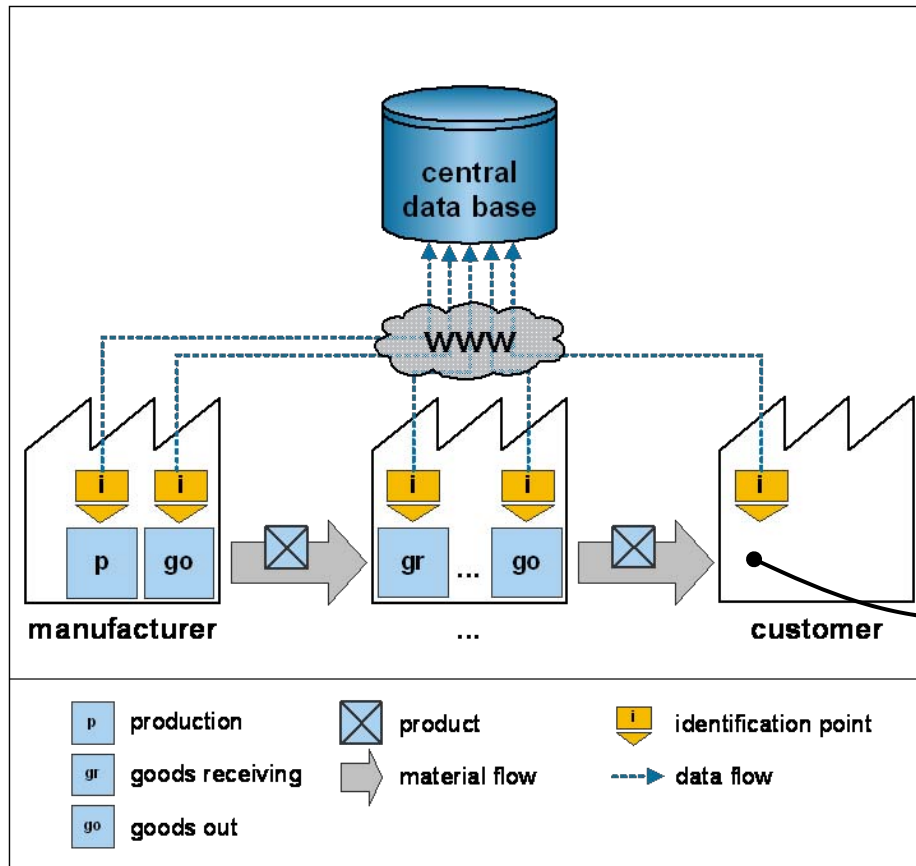
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Data Transfer from every Point of Authentication to Central Database

Offers customers, retailers and manufacturers various possibilities for data analysis and additional benefits (condition monitoring, customers classification etc.)



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Functions of the ProAuthent-System

Basic Functions:

- ✓ Marking of “at-risk” parts and components with fraud resistant features to distinguish between originals and counterfeits
- ✓ Possibility of a secure on-site authentication (offline) for different marking technologies to be sure of the originality
- ✓ Possibility to transfer checking results to the central data base

Functions of tracking and tracing:

- ✓ Tracing of products along the supply chain with different authentication points to protect it against counterfeits
- ✓ Protection of machines
- ✓ Increasing the transparency along the SC
- ✓ Documentation in the central database for subsequent traceability

**Thanks a lot!
Questions?**

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