Vehicle equipped with rotary encoders on the wheels, steering potentiometers and / or inertial guidance do not necessarily require continuous track guidance. In this case it is sufficient to set electromagnetic reference marks in certain patterns (e.g. 3 map part). These reference marks can be either electromagnetic reference transponders. Whenever the antenna crosses a reference mark, it recognizes its lateral displacement to either side of an axis line with reference to the center of the reading antenna. This reference enables correction of any deviation from the ideal course. A navigation Laser Scanner allows positioning / navigation independent of the environment. Its transponders are activated by an electromagnetic field from the reading antenna. These transponders then transmit their code to the reading antenna, which then transmits it to the interpreter for decoding and evaluation. This is a significant advantage when compared to inductive transponders.

Inductive transponders are activated by an electromagnetic field from the reading antenna. These transponders then transmit their code to the reading antenna, which then transmits it to the interpreter for decoding and evaluation. This is a significant advantage when compared to inductive transponders. Electromagnetic reference marks may be used for track guiding vehicles (two-dimensionally) as well as for rail-mounted systems (one-dimensionally or overhead). It is therefore possible to achieve highly accurate positioning.

Positioning / Navigation

Electromagnetic Reference Marks

Inductive transponders are activated by an electromagnetic field from the reading antenna. These transponders then transmit their code to the reading antenna, which then transmits it to the interpreter for decoding and evaluation. This is a significant advantage when compared to inductive transponders.

Optical systems are extremely well suited to applications in clean environment. For track guiding vehicles, the systems are of special interest here. Today’s cameras and image recognition techniques allow processing of more complex marks and reference patterns. The Laser Scanner is probably one of the most important – least known being the barcode scanner which has achieved the highest circulation. When used for navigation, the Scanhead typically scans at a vertical angle of 60°. It rotates per second. The emitted laser is reflected by reference marks and measured by the scanner. The angle between the scanner’s line of sight and the reference mark’s position is then determined and allows triangulation calculation of the vehicle’s position.

A navigation Laser Scanner allows independent navigation of an indoor AGV.

References:

- Electromagnetic Reference Marks
- Optical Systems
- Satellite Navigation
For continuous transport, AGVs, busses and container carriers; any system which is bound to a specific track

- Safe track guiding (People Mover)
- Extremely high accuracy (lateral y)
- Not influenced by ice, snow, dirt, concrete, etc.
- Longitudinal Information (x) only in combination with additional sensors

Possibly influenced by metal in the ground (such as steel reinforcement)

- Extremely effective: Inductive track guiding of in-company transport
- Highly reliable: Wire guided busses are appropriate for public environments (more flexible than trams/trolleys)
- As safe as if on rails: Automatically guided people mover in the service tube of the Eurotunnel

Generator HG 575
Interpreter HG 73xx0
Reading Antenna HG 19510

Guide Wire and Metal Bands

Electromagnetic Guidelines:

1 dimensional:
- Precise track following with predefined path
- No influence of weather, ice, snow, docks, etc.
- High accuracy in control and positioning
- Longitudinal Information (x) only in combination with additional sensors
- Requires costly installation of guide wire
- Not influenced by metal in the ground

2 dimensional:
- Track guiding AGV, container carriers
- + Not influenced by ice, snow, dirt, concrete, etc.
- + High accuracy in x (and y) directions
- – Relatively high cost installation of transponders
- – Antenna can sometimes be rather large
- – Weak signals, thus easily influenced by "man made noise"

1 dimensional system with small antenna

1 dimensional positioning with transponders for railbound transport (shown: Overhead Monorail positioning with vehicle identification)

2 dimensional positioning and track guiding using transponders for taking strain off the drivers (shown: Rubber Tired Gantry Crane RTG)

Security in logistics:
- Positioning and track guiding using transponders (on the chassis and within the bridge; for identification of vehicles (e.g. trucks))

Interpretation HG 393
Antenna HG 714
Transponder HG 713

Transponders and Magnets

Electromagnetic Reference Marks:

Navigation of Automated Guided Vehicles (AGV); mainly indoor

++ Extremely flexible
+ High accuracy
Low cost infrastructure installation

Reflecting marks / guidance lines have to be "visible" to the scanner

Inappropriate in dusty, dirty, foggy, snowy environments etc.

Optical track guiding using colored tape fixed to the ground suitable for low-cost or temporary installations (e.g. vehicle crashes)

1 dimensional system with small antenna

Flexible navigation is essential for service vehicles (e.g. optical pattern and obstacle recognition)

µC Laser Scanner HG 434-B

Laser, Line and Pattern Recognition

Optical Systems:

Receiver
Sender

GPS, GLONASS, GNSS

Satellite Navigation:

Allows rough positioning of cars, trucks, tractors, busses or trains. Accuracy of up to ± 3 cm for track guidance and leveling work in civil engineering

GPS Antenna
Radio Modem HG 761

GPS Receiver HG 65761

Controller HG 43100

GPS, GLONASS, GNSS

Positioning and navigation systems:

Knowing the vehicle’s position at any time:
- Private and public transport, logistics, service, off-road applications
- Locating people in danger zones
- Highly accurate track guiding for outdoor vehicles

Satellite positioning for logistics: No containers lost

In co-operation with our partners we provide:
- General contractor services anywhere in the world
- Plant and vehicle engineering
- Wireless data communication systems
- Logistics & EDI
- Servicing

Your competent partner for positioning and navigation.