



1 Adaptive logistics Fraunhofer off-road navigation system, Graphic: Andreas Wiedemann, Fraunhofer IFF

OFF-ROAD-NAVIGATION

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Straight to Your Destination

Demands exceed the capabilities of conventional navigation systems in many cases - specifically in off-road logistics and business processes. Special demands arise especially when

- off-road areas are not integrated,
- dynamic influences and conditions have to be considered,
- off-road areas are only free at certain times or change qualitatively, quantitatively or structurally at short notice or cyclically and
- specific criteria have to be considered when determining routes.

Developed by the Fraunhofer Institute for Factory Operation and Automation IFF Magdeburg, the adaptive logistics Fraunhofer off-road navigations system or ALFONS is a simple, pragmatic and inexpensive system that facilitates continuous route

guidance from, to and in off-road areas. This enables you to reach your destination even when a common navigation system no longer provides you guidance - when you are »off-road«.

Our off-road navigation system enables users to

- use their own data for continuous navigation,
- factor temporary roads and restrictions into logistical processes and
- meet demands for complete documentation of logistical processes.

Range of Functions

The off-road navigation system can be used as a stand-alone system or as an upgrade of conventional navigation systems on mobile terminals such as laptops, tablets or PDAs. It employs an integrated map



database for onboard routing customized for users and guidance with visual and acoustic cues.

The ALFONS software solution's standard functions can be upgraded with other individual modules, including

- data acquisition and management,
- status message input and transmission,
- fleet management (positioning),
- online map updating and
- custom interfaces.

Interfaces

The navigation system's interfaces, for destinations, POIs and routes, for instance, are based on open standards and are therefore easily connectable with existing inventory control, database and geographic information systems. This covers the supply chain among suppliers, industry and carriers in a closed circuit without format changes.

The most important interface, destination input enables users not only to select a destination directly on a map but also to enter target coordinates in an input mask or to select them from a list of transmitted job order data.

Map Database

A network of roads must exist as a network of attributed nodes and edges in order to calculate a route as a function of specified criteria within it. The nodes form junctions

and the edges the different road segments. These elements are combined with other information, e.g. lane width, clearance and turning restrictions. The mathematical algorithms integrated in ALFONS calculate the optimal route between two points.

The display of additional geographic information, such as bodies of water, buildings and POI's, on the map is recommended for better orientation while navigating. Both vector data (e.g. in shape format) and georeferenced image data (raster maps) are integrated in ALFONS.

Since the inadequate supply and formatting of relevant maps often constitutes an obstacle for off-road routing and navigation, we provide our clients practicable support when

- selecting appropriate geographic data,
- processing and qualifying map material,
- acquiring their own digital road information (auto-mapping),
- generating the requisite routing compatible data structure and
- customizing descriptions and attributes.

Our Services

Marking, identification and positioning technologies help organize logistical processes more efficiently and reliably.

Such technologies will give your company a crucial competitive edge and boost its sustainability. Your specific environment and conditions of use require customized systems with the proper components.

When you are implementing marking, identification and positioning technologies, allow us to assist you in

- selecting and implementing suitable combinations of technologies,
- designing practicable systems and
- developing specific software applications

1 *Route guidance aided by visual and acoustic cues.*

2 *Off-road navigation on mobile terminals, Photos: Viktoria Kühne, Fraunhofer IFF*