The universal software solution for transparent business processes and optimal maintenance

Rail freight companies and railway infrastructure companies (RFC, RIC) as well as workshops are under high cost and competitive pressure. This problem is compounded by challenges due to digitalisation, the shortage of skilled workers and strict requirements regarding documentation and verification.

The use of universal, modular standard software solutions which are specially designed for the requirements of the railway industry is recommended here. These applications form the basis for a consistent pool of data and generally provide information for all key processes in the company. This is exactly where the ZEDAS integrated product concept comes in.

The people in charge of railway and transport companies want to create more transparency in the company through digitalisation, while at the same time establishing more efficient business processes and thus increasing competitiveness. Universal processes without any loss of information are the goal. The zedas® software solution meets precisely these requirements.

The modular structure of the software has the benefit that users can put together functions according to their requirements.

If requested, the following areas can thus be combined:

- Shunting traffic logistics
- Long-haul traffic
- Railway infrastructure maintenance and
- Rolling stock maintenance.

This enables you to successfully link logistics and maintenance processes and coordinate them. The need for internal coordination is significantly reduced.

Thus, for example, the dates for maintenance provided by the maintenance module for vehicles can be optimally taken into account with regard to the trips in the dispatchers' planning processes. Load data from the operating process steers the time planning and fault and/or damage messages are passed from the operating process to maintenance without media discontinuities. Logistics and maintenance are thus perfectly coordinated.

zedas®cargo logistics management system for rail freight traffic

A logistics management system provides a comprehensive solution for rail freight companies (RFC), as well as for connecting railways, works railways and port railways, and allows efficient management, planning, monitoring and billing of all transportation jobs. It universally connects all processes in the value chain, both operationally and commercially, and thus results in significantly improved operation for everyone involved, as well as rapid access to relevant, up-to-date information.

Among others, the process chain includes the following key functions:

- **Calculation:** All service components of railway and shunting traffic can be calculated on the basis of cost rates. As a result, it is possible to work out and compare calculation models quickly and reliably, and to generate attractive and profitable quotes in this manner.

- **Contract:** All information regarding contracts and orders is managed and provided. It forms the basis for the more advanced applications.

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- **Planning:** Planners are supported in the allocation (drag & drop) of suitable and available resources with the help of clear Gantt diagrams. The software automatically checks the applicable working time regulations and collective agreements, as well as employees' qualifications and authorisations. The Opti Planner optimisation module also supports the staff scheduling team and dispatchers if desired. Among other things, employees can thus be automatically assigned to the available services. You benefit from a significant

reduction in time. Resources are used more efficiently and in a more balanced manner.

• **Operational management of rail traffic:** Using a central graphical overview, planners get information about the current task and train movement situation at a glance and operational management is supported in the handling, monitoring and documentation of the train services, e.g. trip and service planning, as well as locomotive planning.
In addition, RFCs can easily inform their customers in real time of where the commissioned cargo is through automated ETA calculation. To this end, the software combines planning data for the entire route and the use of resources such as tracks, vehicles and personnel with actual train running information. The calculation is done automatically and in real time. Disruptions to the operating schedule are immediately taken into account and included in the calculation.

• **Operational management of shunting traffic:** You can keep an eye on train arrivals and train departures, shunting movements, loading points, change-over processes and current track occupancy at all times and can optimally manage the processes. You always have information about the job and wagon status, location, order and technical specifications. Data interfaces also spare the dispatchers the need for time-consuming manual entry and routine work.

1: An overview of zedas®cargo and zedas®asset

2: Automatic brake calculation using the app

• **Billing:** All data which is relevant for billing is collected, automatically recorded in the orders and communicated to billing. Billing of customers and partners is done transparently, quickly and efficiently. Automatically updated staff time accounts make payroll accounting significantly easier. The processed data can be delivered to third-party systems via interfaces.

• **Controlling:** Identification of cost drivers and potential for improvements throughout the value chain is supported. All the information for target/actual comparisons, recalculations, statistics and key figures is available in an automated manner and immediately after the rendering of the service.

Mobile applications are getting zedas®cargo into mobile employees' pockets

Mobile applications for tablets and smartphones are a modular part of the solution. The flow of information and data in a company is significantly improved through the integration of mobile employees. They can complete their tasks promptly on site, independently from the control centre, and the control centre is nevertheless always informed in real time, e.g. train checks can be done paperless directly at the train using the zedas®cargo **Train Check app**. In the event of changes at short notice, the train preparer can easily change the order of the wagons using drag & drop. They can also correct the wagon data in the app as required. Brake calculation takes the requirements for the planned route, such as speed limitations and restrictions on carriage for hazardous goods, into account.

Other examples of use in the field of mobile applications are accessing duty schedules, recording actual times within the service, accessing and reporting shunting jobs or recording damaged wagons.

Rail Hub provides automatic processes in rail freight traffic

The **Rail Hub** module is zedas®cargo's web-based logistics platform for RFCs and their customers. Using the web portal as a universal and central database, efficient interaction between the RFC and its customers is possible. Several applications are available here:

Using the portal, the RFC's customers can electronically enter **transport orders** and the RFC can approve them. An upload function incl. validation for a standardised Excel template is also available.

Customers can view their transport orders, including the respective order status, the current train position and the calculated ETA, in the portal.

The RFC's employees are also integrated into Rail Hub. They can view their duty schedule and details of the staff shift and download them as required. And they can also get information about train handover, the current status of their working hours account, the expiration of the validity of route information or other important information.

3: Information exchange through interfaces with other systems

Customers at shunting locations can access information about the **current wagon location** (wagon intake or track position at the location) in the application, as well as create and approve **delivery and collection orders** for the RFC. The completed shunting orders then in turn form the basis for precise billing of services to the customers.

Automation through interfaces minimises routine work

In order to accelerate processes and manual activities, we rely on a high level of automation using suitable interfaces. These include e. g. data exchange for schedule and route data, train running information, transport order and consignment note data and weighing data in accordance with recognised standards.

Intelligent business management thanks to business intelligence

Large volumes of information are collected, processed and saved in a logistics management system. The user must therefore be provided with appropriate options for using this data. zedas®cargo has a professional tool for generating and accessing individual reports as well as evaluating operational and commercial performance indicators. It is thus possible to evaluate the economic viability of services provided and identify cost drivers at any time. This also applies for statistics and evidence. All documents can be created in a time-controlled manner and sent automatically by email in PDF format. Data export to Microsoft Excel is also part of the standard functionality.

Asset management system for rail vehicle fleets and infrastructure systems with zedas®asset

Every asset must function perfectly, which means they need constant monitoring, maintenance and repair. No easy task in light of the increasing complexity, financial constraints and rapidly changing requirements, as well as statutory regulations. Plans, asset data, spare parts lists, maintenance intervals, current status, need for repair, cost calculation or responsibilities: just the list of the information that system operators need is long.

Correctly prioritising, planning and carrying out all outstanding jobs in a timely manner constitutes a highly complex task considering the constant scarcity of resources.

Intelligent asset management supports the company in ensuring reliable operation of the systems and optimising their availability.

Tracks, switches, rail vehicles in the best condition

zedas®asset supports employees with information regarding the condition, with maintenance recommendations and forecasts. The intelligent analysis of the available measurement and operating data, information regarding maintenance work carried out, resources required, weaknesses and serial defects plays an increasingly important role.

Alongside the acquisition of data from measurement equipment, machine controls and automatic maintenance processes, the acquisition of load data from the documented logistics processes also offers benefits when taking decisions about the maintenance strategy and measures to be implemented.

An automatic alarm and monitoring system monitors components and systems and issues a warning before the possible occurrence of a critical malfunction.

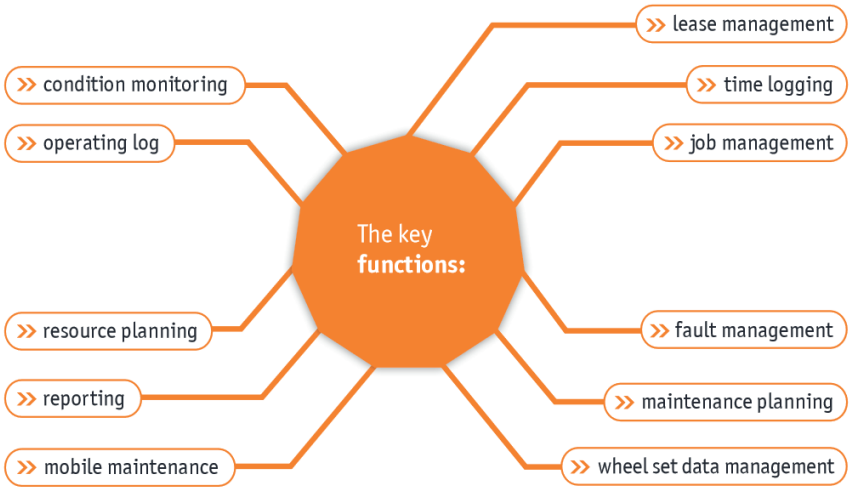
Faults and malfunctions are thus prevented, the service life of the systems is extended and high operational reliability is ensured.

Intelligent data preparation

Measurement and operating data is imported into the system via interfaces, maintenance and condition information is recorded by the employees. Mobile apps, which can function either online or offline, make it possible for both workshop employees and mobile service teams to record data digitally. Interfaces also close the gaps to external maintenance service providers.

The data which is collected throughout the process is analysed, evaluated and thus "brought to life": operating data, master data and corrective and preventive maintenance data are continuously updated and centrally evaluated.

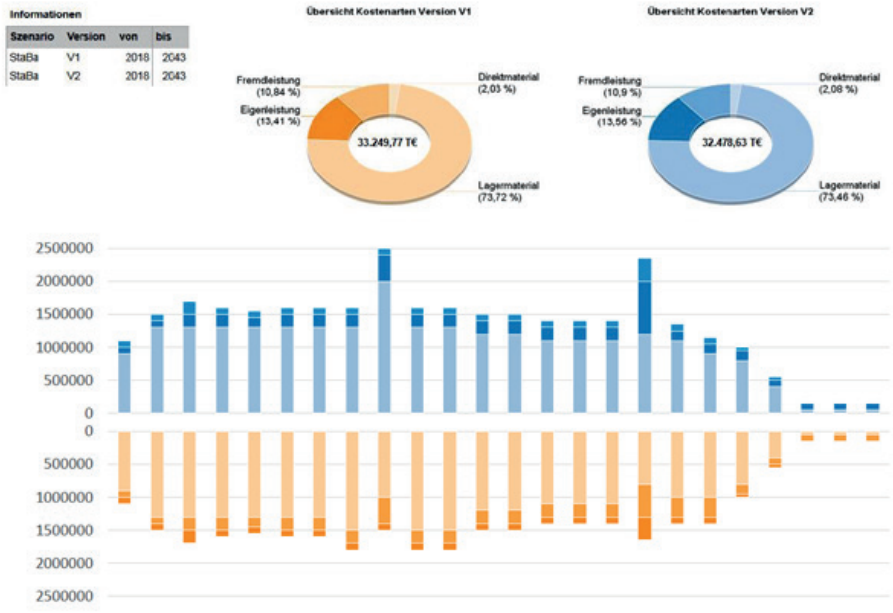
It is only when this central data repo-



4: Overview of maintenance tools

sitory is available that users are given the possibility to examine the relationship between all information in order to get targeted information regarding the condition, as well as maintenance recommendations and forecasts e. g. concerning the asset status, current fault behaviour, necessary maintenance which can be planned and possible malfunctions. Extensive assessments are available in the system for this – from weakness analysis on individual vehicle components and sections of track through to the entire vehicle fleet or track network, from current vehicle status to a forecast condition, from individual work packages to complete workshop events.

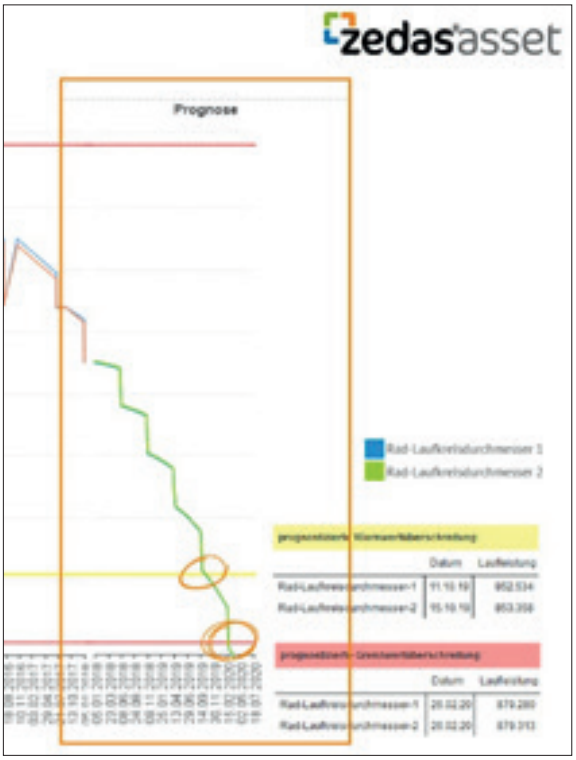
The aim is to provide the best possible transparency and support for the planning and execution throughout the complete maintenance process.



6: Invest Manager Dashboard

Transparency – throughout the entire maintenance process

The integrated dashboard offers user and workplace-specific real-time assessments. Information concerning the condition of the vehicle currently being worked on, the processing status of relevant work packages and the next planned activities can be accessed and displayed at the respective workstation or on the workshop track. The progress of these specific activities and bottlenecks are thus visualised.



5: Screenshot of the Wheelset Analyser dashboard

Having a complete overview of a workshop/service team's tasks is a requirement for optimal processes in an efficient organisation. The **Resource Manager** provides more clarity in maintenance and service organisations' tasks. All processes can be planned quickly and easily, free resources are shown and bottlenecks or conflicts are detected early – long before they can have an effect.

The **Stock Manager** offers the possibility of keeping track of the stock levels in the workshops. With well thought-out ordering suggestions, the system ensures that vehicles and infrastructure do not fail because of a lack of spare parts.

Existing defects and faults are displayed in a mobile manner, new defects or faults are reported and repairs are documented and reported using the App zedas®asset Smart. Employees have access to checklists, maintenance information and error catalogues on site. Precise position determination using GPS and allocation of photos facilitates further planning and complete, paperless documentation.

The **Wheelset Analyser** allows for precise and forward-looking planning of the service life of wheelsets. Wheelset measurement data is imported using interfaces such as underfloor lathes, track scales or mobile measuring devices. The date and mileage in which the limit is expected to be reached is forecasted using approximation of an exponential wear function on the historical measured value progression.

The **Track Analyser** visualises and analyses track conditions with the help of measurement data and maintenance information. Limit violations, defects and faults are shown for defined sections of track. Comparison of the progression of measured values over time and the presentation of calculated performance indicators for track condition is possible, as is the management of 3D measurement data from track measurements. A specialised weakness analysis makes it possible to carry out maintenance before the occurrence of a track failure. Material and manpower can be used in a targeted manner.

Reliable and long-term investment planning

In **Invest Manager**, you can determine which investments and reinvestments will be required in the long term. The module analyses the available asset database, combines the data with flexible parameters such as price increase, influence of ageing and the strain on the maintenance costs and determines a basic cost scenario for the investment requirement for the next 10, 20 or more years. Adjusted scenarios can be compared and transferred into the planning.

The decision on which resources should be used at which place is thus made easier.

CONCLUSION:
quicker analysis, quicker reactions

The benefits of digitalisation are clear: a universal solution can significantly optimise logistics and maintenance processes because it automates commercial, logistical and rail-specific processes.

The use of logistics software minimises time-consuming consultations, records and associated errors. This ensures up-to-date operating data and precise billing information.

Thanks to improved specific predictability of maintenance activities in the asset management system, availability of the assets is increased, use of resources optimised and cost efficiency is improved.