zedasasset

Comprehensive
asset management
for rail vehicle fleets

zedas

Challenges in asset management for vehicle fleets – a specialised solution from ZEDAS

Market situation in fleet management

Cost savings and increased efficiency are more important than ever before in the management of vehicle fleets. Vehicle availability, reliability and safety must be guaranteed at all times.
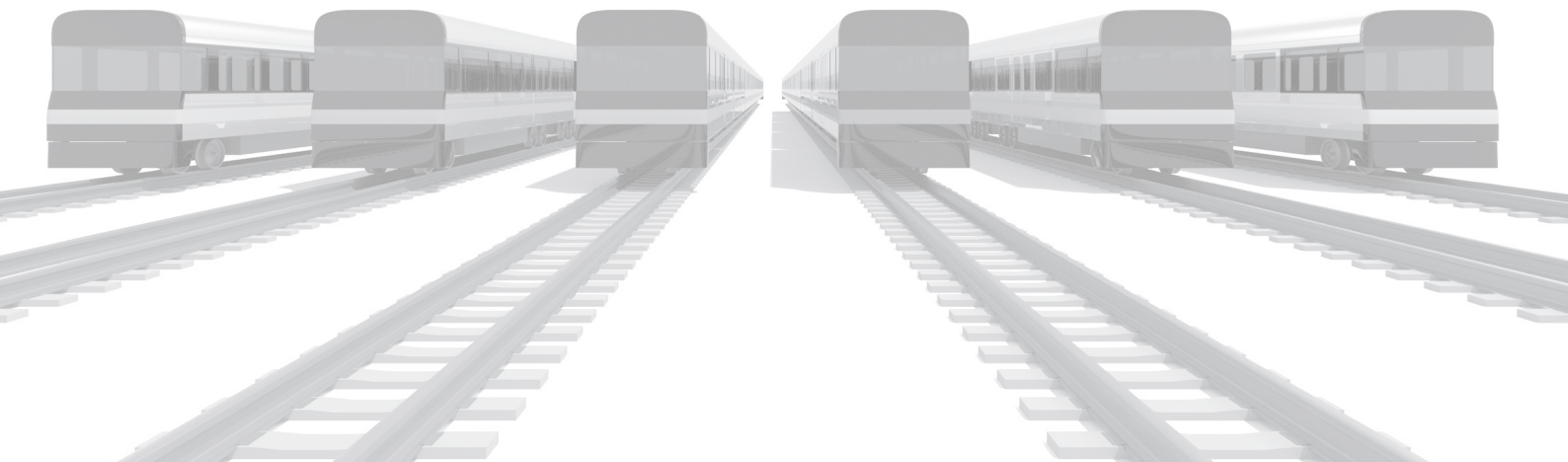
Challenges in everyday business:

» How do you detect vehicle issues at an early stage?

» How can you minimise out-of-service time and idle time caused by technical failures?

» How do you provide operating data or diagnostic data recorded on mobile devices for maintenance planning?

» How do you set the right maintenance strategies?

» How do you plan and optimise your workshop procedures?

» How do you develop long-term investment planning?

» How do you calculate LCC and RAMS indicators?

» How do you record compliance with safety regulations (ECM)?

» How do you ensure a complete flow of information from the manufacturer to the maintenance team?

zedas®asset: the asset management solution

Monitor the condition of your fleet and efficiently control the use of service and maintenance resources. zedas®asset records condition data in vehicle operation, evaluates this data and enables you to predict vehicle behaviour. The results go straight into maintenance planning. This solution supports your continuous improvement process and your investment decisions.

zedas®asset

6 Forecasting

Forecast the future vehicle condition on the basis of current and historical data, and plan maintenance on that basis.

Increase the reliability and availability of your vehicle fleet.

1 Data collection

Access condition data straight from the vehicle OBU. Record measuring data (wheel set data) during maintenance and load/stress data (oil pressure, mileage and temperature) during operation.

Keep up-to-date with vehicle status and condition during operation.
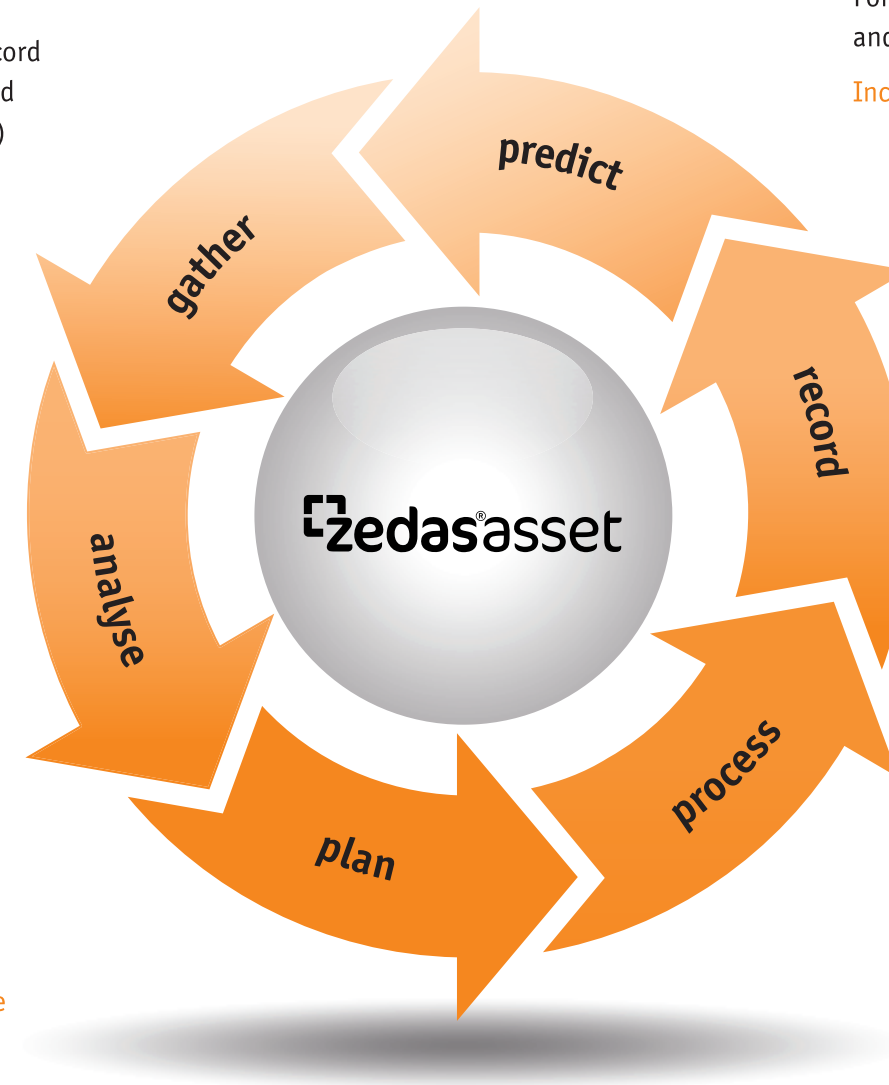
5 Documentation

Document vehicle condition information, component changes and the use of resources.

Ensure ECM-compliant workshop documentation. Check your planning and efficiency using variance analyses. Monitor the warranties for vehicles and components.

2 Analysis

Analyse condition information to detect any critical issues.

Automatically generate detailed fault messages using the standardised error list and detect production defects and weak points on this basis.

predict

gather

record

analyse

zedas®asset

plan

process

4 Processing

Use checklists and work packs to process your maintenance jobs.

Avoid idle time in the workshop and vehicle out-of-service time. The best possible use of resources is ensured in line with qualifications, skills and availability.

3 Planning

Plan corrective and preventive maintenance.

Improve workshop efficiency by working out what jobs are coming up, forward-planning and creating the best possible resource availability.

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zedas®asset - solutions for individual requirements for every stakeholder group, above and beyond standard service

Manufacturers	Operators	Maintainer	Leasing Companies
documentation of commissioning and LCC/RAMS evaluations	monitoring for vehicle conditions and costs	planning and documentation of maintenance work	lease and invoice display

Mapping all processes:
simple – consistent – up-to-date

zedas®asset

condition monitoring

operating log

resource planning

reporting

mobile maintenance

The key **functions:**

lease management

time logging

job management

fault management

maintenance planning

wheel set data management
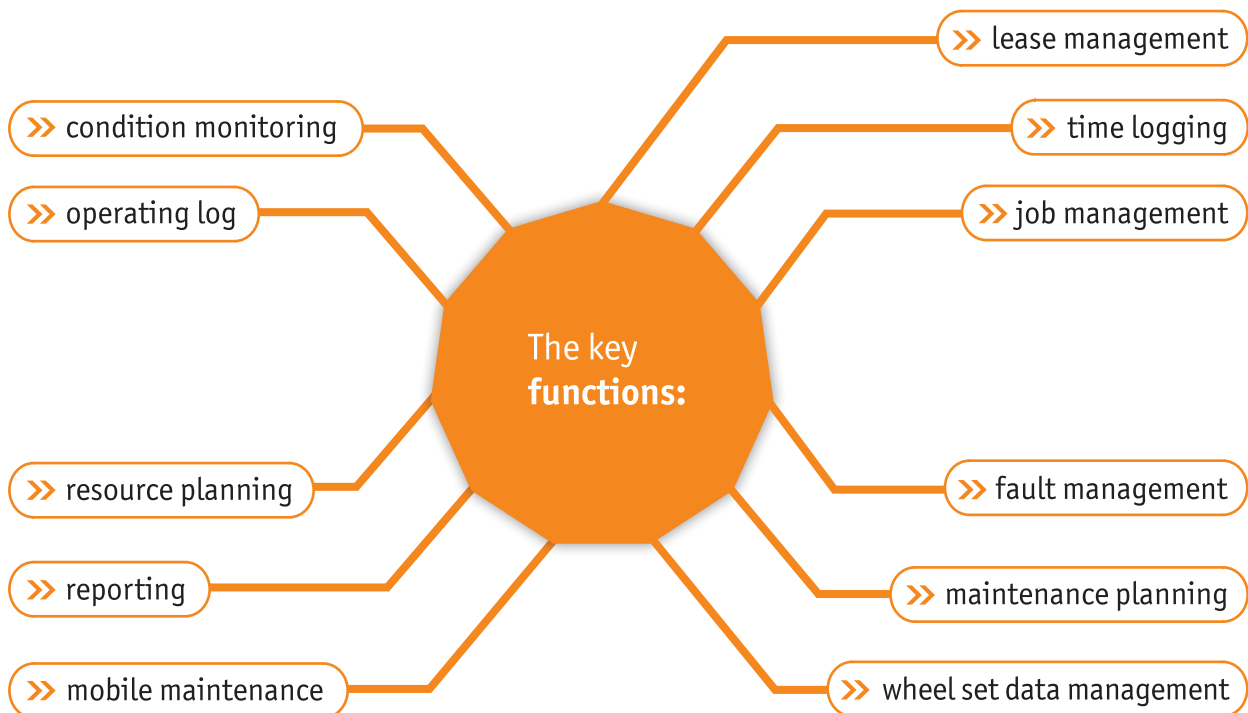
The **benefits** of zedas®asset:

>> overview of the current condition of the vehicle fleet

>> automation of workshop procedures

>> comprehensive documentation of maintenance history

>> component-specific monitoring of warranty terms and warranty entitlements

>> location-specific analysis of weak points and production defects

>> ECM-compliant workshop documentation

>> excellent integration into existing system environments thanks to standardised interfaces (ERP, wheel set measuring equipment, underfloor lathe, RSRD²)

About ZEDAS GmbH

ZEDAS GmbH develops software products for the maintenance management of vehicle fleets and technical systems and for the logistical management of rail traffic. With more than 25 years of experience and a specialised, powerful network, we support professional customers worldwide.

Our standard solutions offer administrative and operative support for process management in specific sectors. Our customers have access to experienced consultants who provide excellent expertise for the complete implementation of their projects.

A 24/7 support and update service ensures reliable operation and guarantees you a state-of-the-art product for the long term with high investment security.

Our expertise in the rail market and our many years of experience guarantee that your project will be implemented successfully.

Current information at
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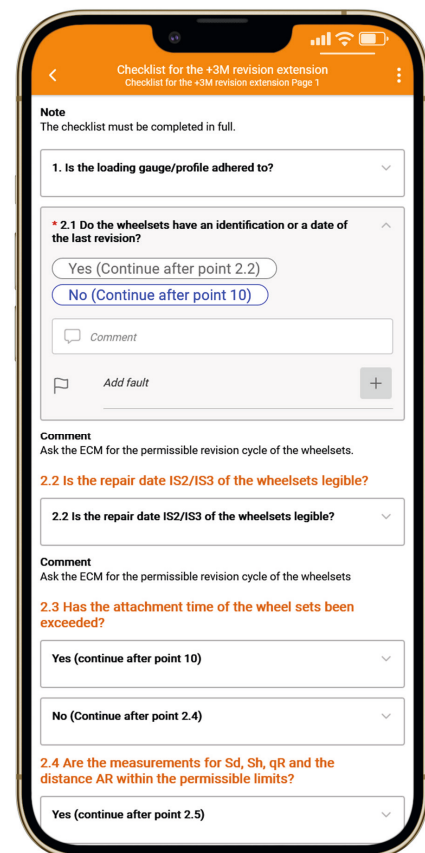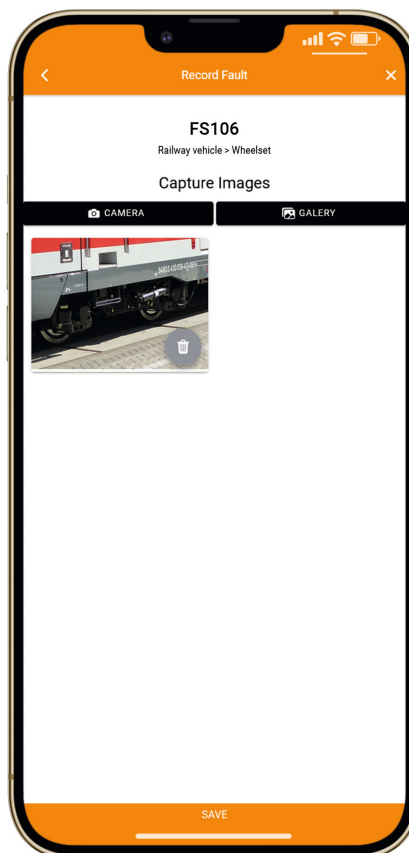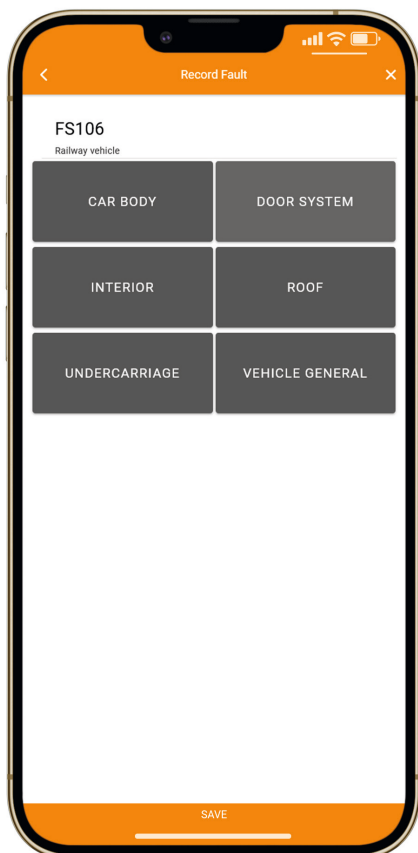fax: +49 (35 73) 70 75-19
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product video

zedas®asset Smart
Record, document and report faults

Highlights

- Structured and simple fault and error recording based on assemblies
- Standardised work steps and flexible adaptation to company workflows
- Clear display of recorded faults avoids duplicate entries
- Defect-related checklists and repair instructions
- No media breaks due to complete integration into the entire maintenance process
- On- and offline functionality ensures self-sufficient work even without a stable network connection
- Photo documentation

Smart Maintenance

With the zedas®asset Smart app, defects and faults on the vehicle are quickly recorded, processed and documented directly on site. Photos of the damage can be stored for maintenance purposes. All data is available in real time for condition assessments and forecasts of rail vehicles. This eliminates duplicate entries, media discontinuities and sources of error. Checklists and maintenance instructions in the app make it easier for employees to process orders.

The responsible persons maintain a permanent overview of the status of the recorded defects and can prove all processes in an audit-proof manner.

zedas®asset Smart is the interface to your mobile employees, such as train conductors, train drivers, mobile service teams and workshop employees.

Functionality & Features

- Recording faults, measured values and meter readings on site
- Processing of maintenance orders and checklists
- User-specific provision of the various App functions
- Documentation and feedback of performance times and materials
- Access to counter values and maintenance history
- Platform-independent (iOS, Android, Windows)
- Easy identification of all objects (barcode, QR code, RFID)
- Voice input

Mobile Maintenance

With the help of zedas®asset Smart, maintenance staff have access to all relevant data of their vehicles and their components. Faults are quickly recorded and classified by means of a stored fault catalogue (including the assignment of photos). Repairs carried out directly on site can be processed and documented without an order if required.

All data recorded in the app is automatically synchronised with the zedas®asset asset management system. This increases the transparency of current faults and their effect on the availability of the vehicles.

All responsible persons get an overview of the current status of the jobs - open, started, completed.

Simple handling

With the help of the daily updated to-do list, the mobile workers are quickly ready for action. The modern operating concept and intelligent assembly filters facilitate the quick selection of objects. The wizard mode guides the user step-by-step and proactively through the predefined work sequences for fault recording and order feedback. Workflows for the individual work steps are configurable. Minimal input effort due to defined standard texts, codes and voice inputs support the user in simple and fast documentation.

The integrated offline functionality means that no permanent data connection is required for use.

zedas®asset ECM

ECM-compliant railway processes and documentation

ECM 4
Maintenance Delivery
Function

ECM 2
Maintenance Development
Function

ECM 3
Fleet Management Function

Highlights

- automated, legally compliant handling of the ECM process within the various roles
- Creation of a complete CV history of rail vehicles and components (condition, operating and measurement data, installation history of components, maintenance activities)
- Definition and management of safety-critical components
- Carrying out decommissioning, operational release and recommissioning
- Creation of all required protocols and documents for verification purposes
- Versioning of maintenance specifications by means of checklists
- Management of personnel, operating resources, skills, if necessary with time-limited validity
- Monitoring the certification of commissioned workshops

The right solution for ECM 2 to ECM 4

With zedas®asset you are well equipped to meet the ECM specifications - whether compliance with the processes, the documentation relating to the vehicle or the central filing of maintenance strategies and maintenance specifications.

zedas®asset guarantees a structured and standardised maintenance process and ensures that rail vehicles are sent for maintenance in good time.

In doing so, all ECM roles benefit from a comprehensive and consistent CV history of the rail vehicles and components through zedas®asset.

zedas®asset integrates all process participants, increases the safety of rail vehicles and supports companies in complying with the ECM regulation.
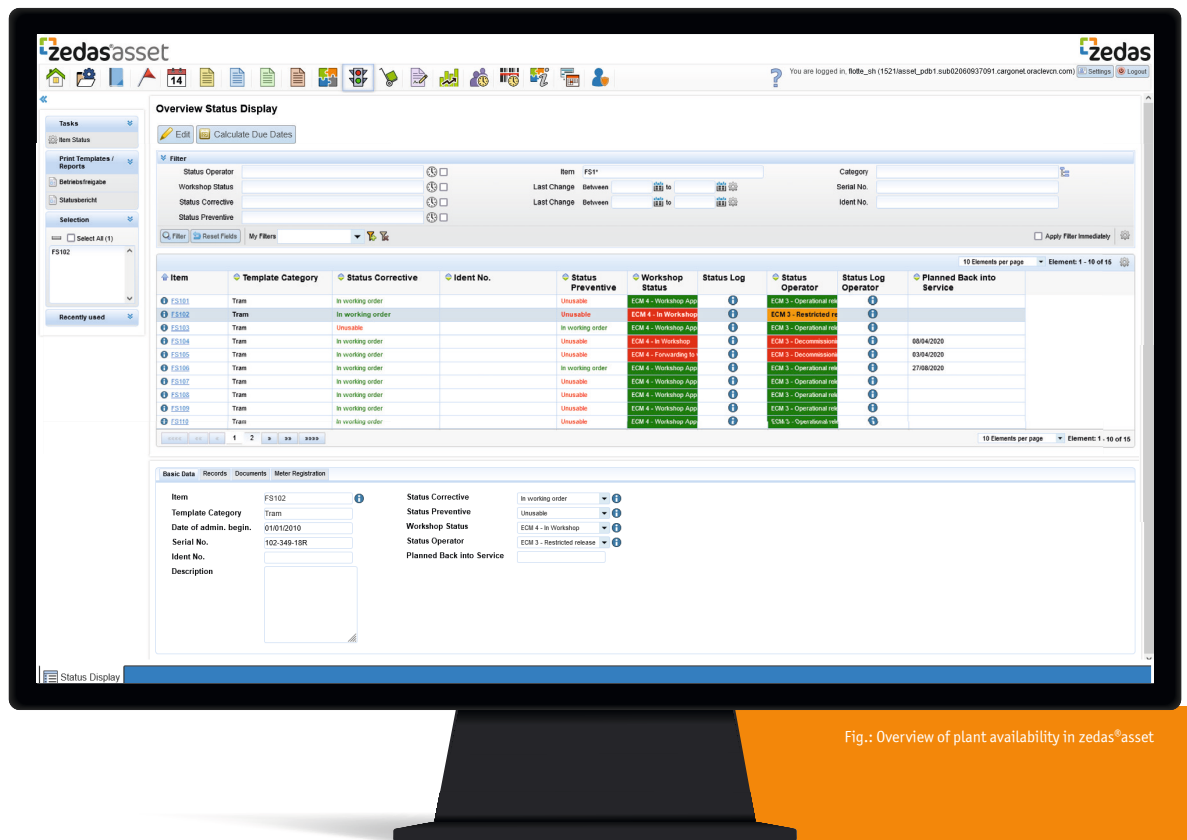
ECM 2 - Maintenance Development Function

With zedas®asset, all maintenance specifications can be stored, versioned and transferred to the responsible departments for the planning and implementation of maintenance activities.

For the continuous review and further development of the maintenance specifications, all necessary data is available in the CV history of the vehicle and the components. ECM 2 managers benefit from comprehensive and consistent documentation.

2

✓ Storage and versioning of maintenance specifications

✓ Definition of safety-critical components

✓ Further development of the specifications basis of the CV history

ECM 3 - Fleet Management Function

zedas®asset clearly displays defects and due dates and reminds you to have rail vehicles serviced in good time. Maintenance plans (operations, required resources, checklists) with defined calculation algorithms can be stored for this purpose. With zedas®asset, ECM 3 managers monitor the certification of the contracted workshops. All important information can be passed on to ECM 2 and ECM 4 at the push of a button.

3

✓ Decommissioning & Recommissioning

✓ Ensuring timely delivery to the workshop

✓ Complete traceability of all maintenance measures

ECM 4 Maintenance Delivery Function

zedas®asset guarantees a structured and standardised maintenance process for rail vehicles and components - in accordance with the underlying specifications of ECM 2.

zedas®asset supports ECM 4 managers in the planning, implementation and documentation of all maintenance activities, taking into account the necessary certificates and qualifications for equipment and personnel.

This ensures that the work task is carried out by an authorised employee and that approved equipment is used.

4

✓ Carrying out all repair Observance of valid specifications

✓ Preparation of the operating release and all required documents

✓ Management and monitoring of skills, certificates and qualifications

Fault and maintenance information are recorded via app.

DIGITALISATION MAKES WHEELSET WEAR CALCULABLE

## WHEELSETS OF RAIL VEHICLES MUST STAND HIGH LOADS AND WEAR UNEVENLY.

Wear depends on environmental conditions, the forces acting during braking, gradients and bends, weather respectively season and the rail profile.

The frequency of reprofiling has an enormous influence on the diameter of the tread and the service life of the wheelsets. Due to uneven wear and different intervals of the reprofiling, the end of the service life can only be determined very late, often even only shortly before having reached the end of service life.

In addition to that, wheelsets are subject to high safety standards, precisely because defects result in serious train accidents. Therefore, each wheel set, consisting of one axle and two wheels, must be regularly serviced and measured. This costs a lot of time and the measuring intervals cannot be predicted optimally. Above all, because the actual work steps to be carried out during repair are not known until the inspection.

This could be easily mapped with an asset management system such as zedas®asset and used for further analyses. If the wheelsets no longer comply with the safety guidelines, this would result in unscheduled failures. If wheelsets have to be replaced unexpectedly, problems can arise due to the long delivery times. In addition, there is a lack of short-term availability of workshop tracks and specialized staff. If the reprofiling and changing of wheelsets is planned for the long term, all resources can be allocated. The wheelset and material will have been delivered, a place in the workshop reserved and the vehicle will be ready for operation until the last day before the due date in the workshop. Forward-looking planning also has the advantage that it bundles orders and can thus lead to favourable purchase prices. Unnecessarily high stock levels are avoided and repeat orders are accelerated.

It is indeed possible to analyze the measurement data of the wheelset measuring device manually or semi-automatically. However, there is no comprehensive evaluation for all persons involved (such as workshop employees, maintenance coordinators, purchasing).

Radsatzmessdaten
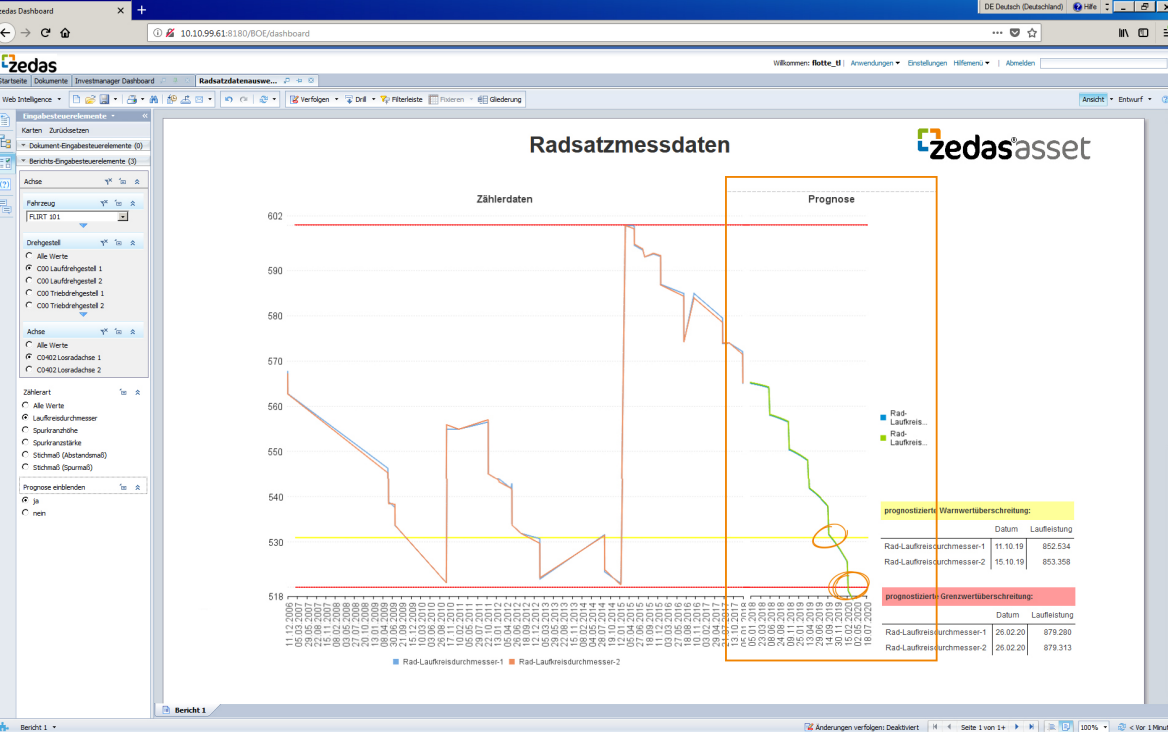
Fault and maintenance information are recorded via app.

Without any software support, the effort involved is disproportionately high and the end of the remaining service life of wheel sets can only be precisely determined at a very late stage. This often leads to the situation that many wheelsets have to be replaced at the same time. This leads to order peaks and idle times in the workshops.

What is the current consequence? In peak situations, wheelsets, workshop capacities, personnel or vehicles are purchased at short notice at high costs. Sometimes penalties have to be paid because transport contracts cannot be adhered to. In addition to economic damage, this also results in unsatisfied customers.

PREDICTIVE MAINTENANCE

In the age of digitalisation, the workshop is now also being digitalised. Using intelligent data diagnosis and analysis, the availability of systems and vehicles can be significantly increased. The measurement data of the wheelsets, which would otherwise have to be entered manually in an Excel spreadsheet, are imported into a central system via interfaces. All measurement, fault and repair data is available in a digital form and can be retrieved at any place. In this way, the responsible person always receives up-to-date status information and maintenance recommendations.

In the zedas®asset Dashboard, the wear of the wheelsets can not only be visualised, but also the optimum time for reprofiling or wheel set replacement can be determined long time in advance. If the monitoring is a permanently accompanying process, the system derives the parameters of the wear function from the measured data history for driving behavior, route profile, season, etc. independently and with increasing accuracy. Over time, the forecast is compared with the actual data and further specified. Among other things, operation, workshop and load data are included here. This means that wheelsets are used to their full technical capacity and unplanned workshop visits can be avoided.

As a digital assistant, the zedas®asset asset management system keeps an eye on deadlines, automatically notifies responsible persons of impending limit value exceedances or undershoots, monitors stock levels and submit order suggestions. Consequently minimum quantities of material are always available in the warehouse so that planned maintenance and repairs can be carried out. The smart assistant also considers delivery times, which are often quite long. Workshop times can now be announced well in advance, as the date for changing or servicing wheelsets is fixed for the long term. All parties involved are now well prepared for this. Material has been ordered at a favorable price without express delivery. In addition, the duty roster is written so that sufficient personnel are available. An additional advantage is that a complete ECM-compliant documentation is created during the entire maintenance process, as requested by law. In addition, the documentation is not only assigned to a vehicle, but is component specific. This means that, if, for example, a wheelset is exchanged, the wheelset always takes its digital history file with it. If a wheelset is installed in another vehicle, the component-specific history of mileage, installation data and maintenance measures is still traceable and verifiable.

CONCLUSION

Using intelligent, digital assistants, the maintenance of wheelsets becomes more economical and much easier to plan, the ideal time for wheelset replacement or reprofiling and the life cycle of rail vehicles can be precisely determined.
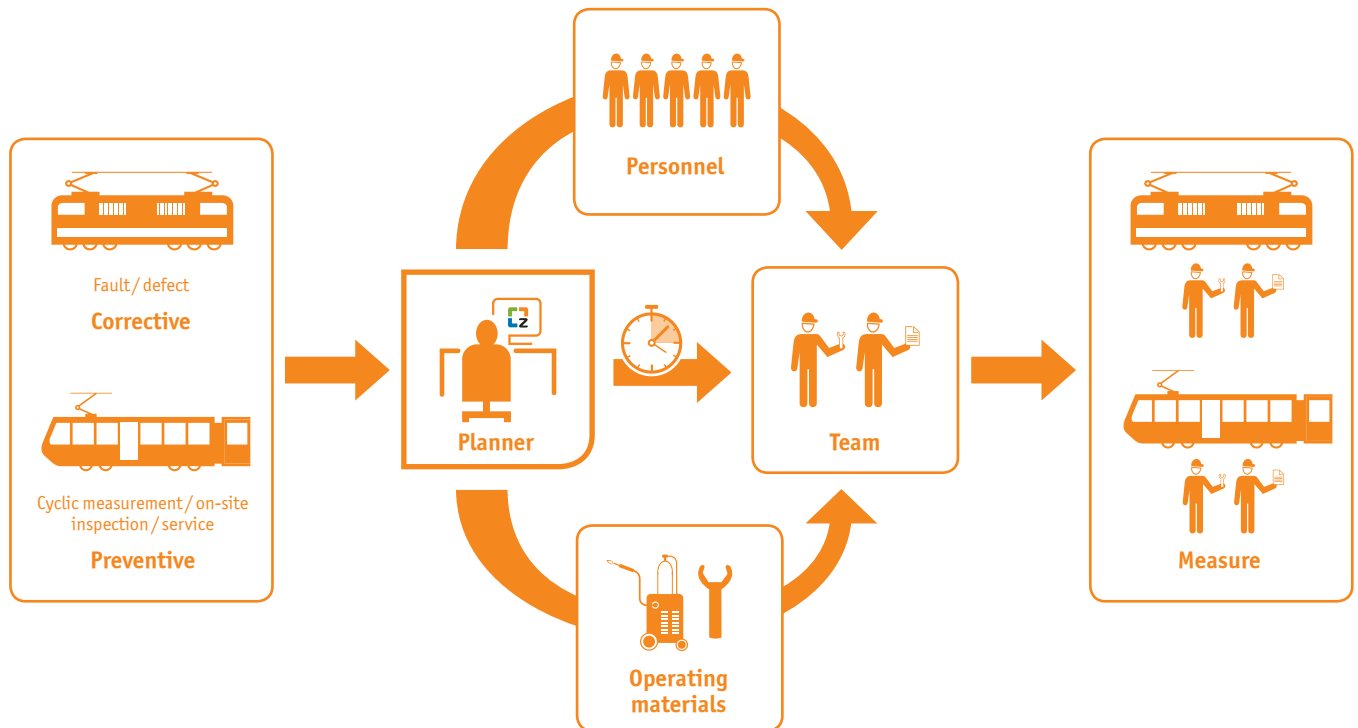
THOMAS LANDSKRON

Since 2006 in sales and consulting and took over the management of the zedas®asset sales department at ZEDAS GmbH in 2011.

zedas®asset

zedas®asset Resource Manager
Effective use and efficient planning of resources


Highlights

- supports your workshop and service team in the optimal planning of pending jobs

- creates cross-department and cross-organisation transparency for linked processes

- visualises savings potential and improves resource utilisation

- guarantees the deployment of the workshop and service team as required and for the best quality

- allows for monitoring of skills and qualifications

- ensures readiness for use, shows weaknesses and reserves

- optimises the use of resources on the basis of stored variable working time models

Targeted use of resources – the key to greater efficiency

Having a complete overview of a workshop/service team's jobs is a prerequisite for optimal processes in an efficient organisation. Up-to-date information, transparency and security in planning are an important guarantor for high-quality and standardised services and ultimately generate high customer satisfaction.

Create an overview and make use of free resources!
Resource Manager provides more insight into maintenance and service organisation's jobs. All processes can be planned quickly and easily, free resources are shown and bottlenecks are detected early – long before they can have an effect.
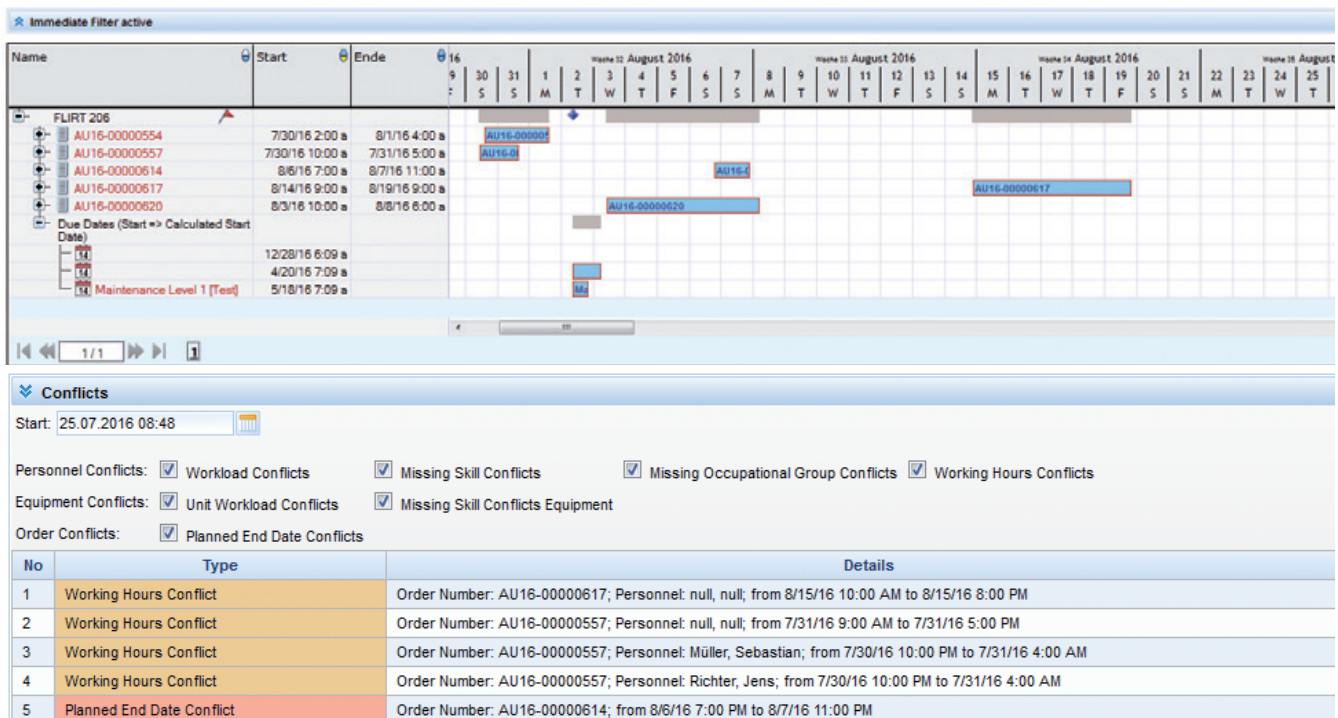
zedas®asset Resource Manager: Jobs in vehicle view and conflict overview

Definition of skills for proper maintenance

Through the assignment of work schedules and skills to resources, both availability and suitability can be checked during planning. As a result, it is possible to achieve not only optimal utilisation but also documentation of the qualifications required for these work steps.

The skills on file for operating resources and personnel, such as additional qualifications and licenses are constantly checked for their validity period.

Detecting planning conflicts

The planned deadline and the implementation period are shown for workshop jobs. Missed deadlines are visually highlighted.

Job planning for outstanding deadlines and outstanding faults is possible directly from the Gantt view, whereby planning conflicts can be seen at a glance. Resources which are not available or only have limited availability are identified immediately.

For a better overview, all availability, skills and deadline conflicts are shown in a special view. The planner is therefore effectively supported in processing the jobs quicker and with no errors.

Easy and intuitive operation through graphical user interface

Resource Manager fundamentally supports the planning process through preselection of the available resources. Thanks to the userfriendly navigation, it is possible to make assignments to maintenance jobs quickly and easily. Helpful additional data in the info window supplements the information for the user.

The individual processes are shown on a timeline. Jobs can be positioned and coordinated quickly and effectively in the Gantt chart using drag & drop. Dependencies between the maintenance jobs, such as simultaneous use of operating materials, are also shown just as transparently as complex job packages.

The Resource Manager, as part of the asset management system zedas®asset, is a tool with which you can plan scarce resources efficiently, avoid waiting time in the workshop and optimise vehicle availability.

For other questions, please contact us!

zedas®asset Invest Manager

IT specialist combines know-how about forward-looking investment planning for transport companies

The planning of requirements and investments for systems maintenance and replacement over the next 20 to 30 years plays an increasingly important role in railway undertakings and railway infrastructure companies. ZEDAS GmbH, the specialist in maintenance and systems management for railway companies, will support its customers in the planning of the necessary investments with the new Invest Manager module in the zedas®asset product suite.

Railway undertakings (RU's) requirements for flexibility, security and performance are increasing. This affects the effective use of the RU's available resources. In a well-managed transport operation and service business, there is plenty of expertise available. What could be more appropriate than using this knowledge for optimal planning of future investments? But until now, companies have been lacking a simple solution which combines this knowledge with maintenance data and allows the user to generate planning variants based on a variety of scenarios. The new zedas®asset Invest Manager module allows for a forecast based on real data. This leads to detailed, punctual and well-founded budget planning, as a result of which the company's competitiveness increases.

Generation of planning scenarios

The system-specific maintenance history, with master, cost and condition data, and the preventive measures preview in the asset management system zedas®asset provide an excellent basis for the determination of requirements for the future. The user can vary the aggregated annual data for each system in accordance with their expectations.

The use of freely selectable factors to easily modify the planned costs helps to model and forecast the future influences on the investments as objectively as possible. Comparative consideration and simplified decision-making can be realised through the generation of multiple planning scenarios. Comprehensive reporting helps the user to evaluate the results. Selected data from a finalised planning scenario, for example data concerning future renewals and replacements, can be applied in the existing zedas®asset planning of measures.
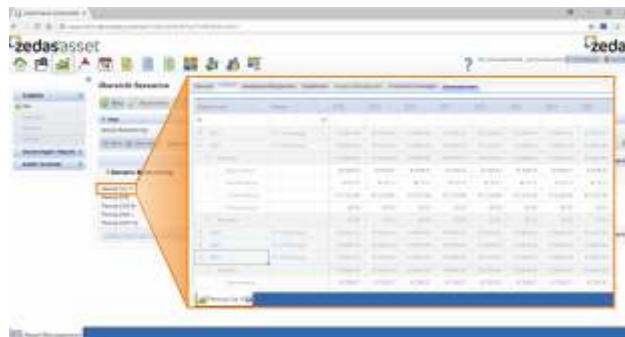

Figure: Creation of planning scenarios in zedas®asset Invest Manager

The planning of measures for system maintenance and procurement can now easily be done effectively, with time savings and with a well-founded database. It is possible to react quickly and precisely to changes, e.g. new regulations for transport service or availability. Planning staff and controllers, as well as the companies service units such as workshops, particularly benefit from the new functions.

zedas®asset Touch
Digital assistant for the railway workshop

Fig.: zedas®asset Touch in the workshop

zedas®asset Touch helps to digitise the previous paper-based maintenance documentation in the workshop. The processing of repair and maintenance orders can be documented in an ECM-compliant manner using a tablet in the workshop.

During the development of zedas®asset Touch, care was taken to avoid keyboard input for the workshop employee as far as possible and to create alternative functionalities instead. For example, it is possible to easily document material consumption by scanning a QR code.

The intuitive user interface, assistance-based workflows and checklists make it easy for even inexperienced workshop employees to record all the necessary data without errors.

The aim is to digitise maintenance documentation in simple steps right from the beginning. The inputs are in real time in the asset management system zedas®asset and are available for follow-up orders or operational releases. There are no media discontinuities or duplicate work and no congestion during order feedback.
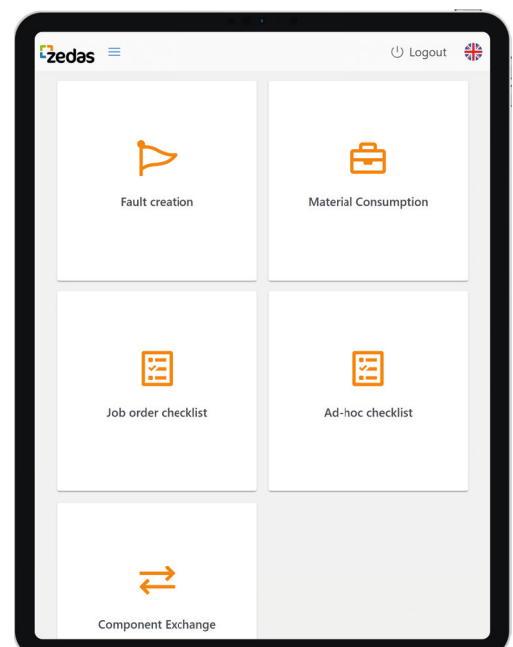

Fig.: Start screen of the zedas®asset Touch application

zedas®**asset**

Benefit from the paperless workshop

Mobile working with digital assistant

Continuous, digital maintenance process

Audit-proof documentation according to ECM standards

Real-time data for all stakeholders

Functions of zedas®asset Touch

Component change detection
- intuitive component change via drag&drop
- intelligent component pre-selection and validation of the installation position
- Automatic, complete documentation in the CV file

Completion and processing of checklists
- Individually configured checklists (e.g. with checkboxes, selection lists, text fields, counter recording, document upload) are available to the employee for the specific application
- User and timestamp are stored in a document-safe manner for each checkpoint
- Recording of meter readings - the information is written directly to the meter history of the corresponding object

Simplified recording of faults and defects based on predefined function groups

Stand-alone checklists for documentation of ad-hoc activities

Recording of material consumption
- Input of storage location, materials and quantities
- Change of a material booking in case of over- or under-consumption

Advantages for the management

✓ Establishment of an efficient, digital process chain
✓ Complete and consistent database as the basis for meaningful forecasts
✓ Increase in employee satisfaction based on simplification of processes
✓ Low training effort due to assistance-based workflows and intuitive operation
✓ Low administrative effort thanks to simple call-up in the browser

Advantages for workshop employees

✓ Optimised range of functions specially adapted to activities in the workshop
✓ Simple, intuitive touch operation - keyboard inputs are avoided
✓ Real-time access to current data at all times
✓ Simultaneous editing of the checklist by several users
✓ ECM-compliant, digital documentation
✓ One-time, digital documentation - no double data input

![zedas®asset logo]

zedas®asset Assistant
Augmented Reality in the railway workshop

In the image (tablet screen):
Wagon Messe   1234567890
Visual inspection undercarriage

Wheel disc visual inspection

Info   Resources   Video   Checklist

- Partial overrolling/singular flattenings
- Circumferential overrolling
- Measure and record overlaps
- Material separation below the running surface
- Damage to the chamfer
- Damage to the inner wheel flange face and wheel flange back face

✓ **Mark as completed**

2/3

In a joint research project with BLG RailTec GmbH and BTU Cottbus-Senftenberg, ZEDAS GmbH is working on an Augmented Reality (AR) application for the data glasses and tablet.

With the AR application zedas®asset Assistant, the maintenance technician in the workshop receives a better guidance through the maintenance process.

The aim of zedas®asset Assistant is to display information to the user depending on the situation: Directly in the field of vision and on the object concerned.

Existing Job orders, Faults and Checkpoints are displayed throught AR directly over the screen section with the wagon symbol. This way, the maintenance worker knows immediately which components include Job orders.

As a further support for the step-by-step instructions, the application displays measured values, limit values or circuit diagrams that belong to the component being worked on. In addition, the workshop employee gets access to drawings, documents, photos and videos that are related to the maintenance process.

The digital assistance system also guarantees that the maintenance technician is specifically alerted by safety-relevant components in order to match the high safety standards that apply in the railway industry. zedas®asset Assistant helps to improve the quality of work and reduces the risk of errors.

Highlights at a glance:

- Clearly defined workflows provide the maintenance staff with the sequence of work steps
- Automated ECM-compliant documentation
- Component-related safety instructions
- Additional information such as history data or circuit diagrams are displayed at the right time on the right component
- Large knowledge repository that can be accessed by new, long-term and external employees