ALUCA

WHITEPAPER

THE MOBILE WAREHOUSE ON WHEELS

– INCREASED EFFICIENCY THROUGH MODULAR VEHICLE RACKING SYSTEMS.



INTRODUCTION:
THE CHALLENGE OF DESIGNING MOBILE WORKPLACES



In an increasingly mobile and service-oriented world, commercial vehicles are no longer mere means of transport, but fully-fledged mobile workplaces. Craft businesses and employees lose several hours per week due to inefficient vehicle organisation. In Germany alone, the economic damage caused by unproductive working time and constant work interruptions amounts to £114 billion annually. Disorganisation is a time-waster and costs valuable working time. The total cost of the time needed to refocus after interruptions amounts to approximately £58 billion annually (Haustec, 2023). Tradespeople waste around 4 hours a week searching for tools. This usually corresponds to 10% of their total working time in a 40-hour week (Handwerks Blatt, 2021).

Particularly affected are:

- Craft businesses with different trades, such as finishing specialists, renovation companies or facility management companies
- Technical service providers with extensive spare parts requirements
- Service technicians in the installation, repair and maintenance environment
- Self-employed persons who serve different working environments

The significance of this challenge is exacerbated by current developments in the labour market. According to the German Confederation of Skilled Crafts (ZDH), there is a shortage of skilled workers, with around 250,000 unfilled positions in the skilled crafts sector, forcing companies to use existing resources more efficiently (ZDH, 2025). At the same time, rising fuel and vehicle maintenance costs are leading to increased cost pressure.
This white paper analyses the challenges of mobile workplace design, identifies potential efficiencies and presents various solutions that can help companies and self-employed people optimise the equipment and use of their service vehicles, thereby achieving significant competitive advantages.

2. CAUSES AND EFFECTS OF INEFFICIENT VEHICLE ORGANISATION

2.1 CORE PROBLEMS OF CONVENTIONAL VEHICLE USE

The causes of inefficiencies in the use of service vehicles are complex and reinforce each other:

Unsystematic use of cargo space

Many service vehicles use an improvised cargo space organisation that has developed over time. This is reflected in the following points:

- Lack of systematic organisation of tools and materials
- Inadequate securing of loads Lack of consideration for ergonomic aspects
- Lack of adaptability to changing operational scenarios
- Inefficient use of space due to unsuitable storage solutions
- Overloading due to lack of space, time constraints or poor vehicle organisation

Search times as a hidden cost factor

According to estimates, service technicians spend an average of 48 minutes per working day searching for tools, materials and spare parts in their vehicles (Handwerks Blatt, 2021). Extrapolated to a working year of 220 days, this corresponds to more than 176 working hours or 22 days per year. This means that an average of 10% of working time is lost that could otherwise have been used for productivity. Additional costs incurred in addition to productivity losses, such as labour costs due to customer losses, additional personnel costs, administrative costs or project delays, are not yet taken into account.

Health challenges & risk factors

The often poor ergonomic design of DIY solutions and conventionally planned vehicle equipment has been proven to lead to increased health risks. For many skilled trades, physical strain is a major issue (AOK, 2024). Common causes are:

- Inadequate accessibility to heavy materials
- Lack of lifting assistance for heavier loads
- Constant bending and stretching due to unergonomic layout in the vehicle
- Increased risk of injury from unsecured objects

2.2 IMPACT ON BUSINESS OPERATIONS

The factors mentioned have a negative impact on operational performance at various levels. There are several cost factors that cause avoidable additional expenses. Not only do necessary search times or sick leave due to physical complaints, which average 12.7 days per year for tradespeople (Handwerksblatt, 2025), but also the overloading of service vehicles result in significantly higher costs.
According to a study, every additional 100 kg of payload can increase fuel consumption by up to 5% (Der Neue Mann, 2023). In terms of fuel consumption, this means up to 0.3 litres per 100 km of additional consumption (ADAC, 2023). This means that a loaded vehicle with, for example, 200 kg more load (e.g. due to materials or vehicle equipment) can consume up to 0.6 litres more fuel per 100 km. At a diesel price of £1.60 per litre, this results in additional costs of £0.96 per 100 km. Based on an annual mileage of 30,000 km, this adds up to additional costs of £288 for this vehicle

Direct economic consequences

The following example shows the costs for one hour of work by a journeyman. In addition to the hourly wage, the price for the hour of work shown on the invoice includes ancillary wage costs (such as social security, paid holidays and public holidays, and continued payment of wages in the event of illness), overheads (such as room, energy, vehicle, communication, maintenance and repair costs, as well as costs for administrative staff). In addition, statutory value added tax of 19% is levied, which the entrepreneur must pay to the tax office.

Cost factor of a tradesperson	Costs
Gross hourly wage	20,00 €
Non-wage labour costs	16,77 €
Overhead costs	24,52 €
Net hourly rate	61,29 €
Net hourly rate	11,65 €
Gross hourly rate	72,94 €

Non-wage labour costs include employer contributions to social security, including pension, health, unemployment and accident insurance, paid holidays and public holidays, Continued payment of wages in the event of illness, paid maternity leave, holiday and Christmas bonuses, contributions to the insolvency fund, severely disabled persons' tax and non-billable hours (Reutlingen Chamber of Crafts, 2025).

If we consider the hourly wage of a tradesperson and equate it with the factors of productivity loss due to the points mentioned in the chapter above, we arrive at the following result:

Cost factor	Jährliche Mehrkosten pro Mitarbeiter im Fahrzeug
Cost factor	20,00 €
Non-wage labour costs	16,77 €
Total	36,77€
Search times	176 h x 36,77 € = 6.471,52 €
Absences due to illness	12,7 Tage x 36,77 € = 3.735,83 €
Increased fuel consumption due to additional weight of 200 kg / 100 km	288 €
Total costs	**10.495,35 €**

2.3 SPECIFIC CHALLENGES BY INDUSTRY SEGMENT



Depending on the industry, there are also specific challenges that are exacerbated by inadequate vehicle equipment:

Plumbing, heating and air conditioning:

- a wide variety of different spare parts and tools depending on the application
- Seasonal fluctuations in material requirements
- Transport of long materials and special equipment, such as installation tools (e.g. press machines, pipe bends, installation boxes, etc.) or measuring and testing devices (e.g. measuring devices for pressure, temperature and voltage, leak detectors, etc.)

Electrical trade:

- High safety requirements for measuring devices
- Need for clear sorting of small components
- Increasing specialisation requires flexible room layout

Security technology – (for building security, alarm and fire alarm systems, data security, traffic safety, occupational safety, etc.):

- Transport of sensitive electronic components
- Valuable special tools with a high risk of theft
- Documentation requirements for safety-related materials

Facility Management:

- Wide range of work equipment for different types of buildings
- Frequent changes between locations with varying requirements
- Combination of cleaning, maintenance and repair equipment
- Increasing generalisation requires a wider range of tools and materials

3. SOLUTIONS FOR OPTIMISED VEHICLE EQUIPMENT

Optimising service vehicles requires a holistic approach that combines various solution strategies. Four key approaches are presented below, each with a different focus, which can be combined depending on individual requirements.

3.1 SYSTEMATIC NEEDS ANALYSIS AND PROCESS OPTIMISATION

Before investing in physical vehicle equipment, a thorough analysis of actual needs and work processes should be carried out. In addition, the potential current variant should be challenged. Even without major investments, this approach offers considerable optimisation potential:

Key elements::

- Documentation of all regularly required tools and materials
- Analysis of frequency of use and prioritisation according to importance
- Recording of typical work processes and movements in the vehicle Identification of superfluous or redundant equipment

Practical implementation using the 5S method:
The 5S method is a proven lean management tool for systematic workplace organisation. Originally from Japan, it aims to reduce waste and make work processes more efficient through clear structures and standards. Especially in the context of mobile workplaces – such as service vehicles with modular furnishing systems – the 5S method offers enormous potential for increasing productivity, safety and order (REFA, 2025).
The five steps of the method – select, systematise, clean, standardise, self-discipline – mesh like gears and form a continuous improvement process. For mobile storage solutions, this means a clear system, targeted use of space and quick access to the materials you need – without wasting time or searching.

1. Seiri (select) – What is really needed?
Storage space and payload are limited, especially in vehicles. This makes it all the more important to only take the items that are really necessary. Tools, spare parts or materials that are rarely or never used take up valuable storage space. Targeted sorting makes the vehicle lighter, clearer and ultimately more economical to use.

2. Seiton (organising) – Everything in its place
A well-thought-out organisation system is at the heart of efficient vehicle equipment. Frequently used tools and materials should be placed ergonomically and clearly labelled. Modular shelving systems, case systems or drawer inserts enable a structured, repeatable arrangement – individually adaptable, but always systematic. Logical positioning saves time and reduces sources of error in everyday work.

3. Seiso (cleaning) – cleanliness creates control
Cleaning is not only about hygiene, but also about inspection. A well-maintained vehicle makes it easier to see whether tools are damaged or materials are faulty. Regular cleaning of storage facilities also prevents malfunctions, prevents material wear and tear and increases the service life of the vehicle equipment.

4. Seiketsu (standardise) – uniformity creates efficiency
Standardised processes and uniform arrangements – such as colour coding for material types, clearly defined loading zones or uniform box systems – enable quick action, even when changing vehicles or teams. Standardisation increases transparency throughout the entire fleet and minimises training times for new employees.

5. Shitsuke (self-discipline) – the key to sustainability
The long-term implementation of the 5S principles requires discipline and a sense of responsibility. Only when all team members live by the standards and continuously review them will the system remain stable and capable of development. Checklists, regular 5S audits and clear responsibilities help to permanently anchor the improvement process

3.2 TAILOR-MADE SOLUTIONS FOR INDUSTRY-SPECIFIC REQUIREMENTS

Customisable system solutions offer maximum flexibility to adapt to the dynamic requirements of different industries and ensure efficient use of available space.

Key features:

- Modular basic structure for adaptation to specific requirements
- Quick modification options for variable application scenarios Industry-specific special solutions (e.g. for hazardous goods, electronics)
- Integration of digital management systems to optimise processes and reduce legal risks
- Reduction in fuel consumption by an average of 0.4-0.7 l/100km Reduction in CO_2 emissions by approximately 10-15g/km

3.3 LIGHTWEIGHT SOLUTIONS FOR INCREASED PAYLOAD AND ECONOMY

The use of modern materials and design principles enables significant weight savings while maintaining high stability and durability

Key elements:

- Use of high-strength aluminium alloy honeycomb materials for shelves and partitions
- Weight-optimised connecting elements
- Structural integration into the vehicle body
- Economic benefits: The use of lightweight solutions can significantly increase the available payload.
- This makes it possible to: Avoid overloading and the associated legal risks
- Reduce fuel consumption by 0.3 l/100 km Reduce CO_2 emissions

3.4 HIGH-QUALITY ALUMINIUM SYSTEMS FOR LONG-TERM EFFICIENCY AND VALUE RETENTION

High-quality complete aluminium systems have established themselves as a premium alternative, particularly in the professional sector, thanks to their durability and precision. This also includes the range offered by ALUCA GmbH.

Core elements of ALUCA solutions:

- Components made entirely of aluminium (ALMG3)
- Crash-tested solutions for all vehicle sizes and variants Individual planning according to operational requirements
- Optional safety systems for transporting dangerous goods

Distinguishing features:

ALUCA GmbH positions itself as a quality leader and offers tailor-made flexibility and sustainable productivity in everyday work:

- Up to 50% lower system weight compared to steel equipment
- Corrosion resistance even under extreme conditions
- Transferability to subsequent vehicles during fleet modernisation
- Proven service life of over 10 years with daily use

4. IMPLEMENTATION AND ECONOMIC FEASIBILITY STUDY

4.1THE PATH TO AN OPTIMAL VEHICLE RACKING SYSTEM

The transition to optimised vehicle equipment should be understood as a strategic process that can be divided into several phases:

Step 1: Analysis and planning

- Recording of the current situation and specific requirements Definition of performance indicators for later measurement of success
- Budget planning and definition of the implementation strategy Selection of suitable system partners and solution concepts

Step 2: Pilot implementation

- Equipping one or more test vehicles Training of the employees concerned Documentation of changes in work processes
- Collecting feedback and identifying areas for adjustment

Step 3: Comprehensive implementation

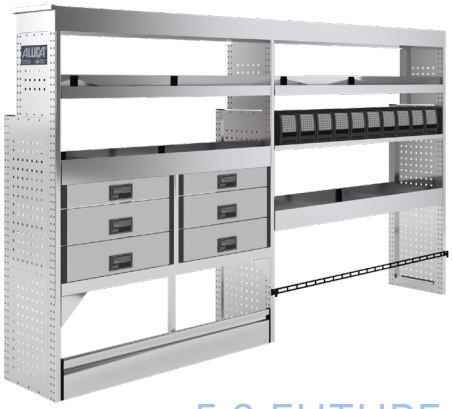
- Gradually equipping the entire fleet Integrating into existing work and maintenance processes
- Continuous optimisation based on practical experience
- Regular performance reviews using defined KPIs

4.2 RETURN ON INVESTMENT (ROI) AND AMORTISATION CALCULATION FOR ALUCA VEHICLE RACKING SYSTEMS

Take, for example, a VW T7 panel van that costs around €40,000 to purchase, with a useful life of five years and a monthly mileage of 2,000 km. The vehicle equipment weighs 200 kg, and we assume that the employee earns an average salary, has an average number of sick days and spends an average amount of time searching for items.

Factors	**Costs for 1 vehicle**	**Costs for 5 vehicle**
Costs due to search times	1.008 €	5.040
Material loss costs	150 €	750 €
Downtime costs Illnesses	480 €	2.400 €
Fuel savings	12 €	60 €
Total costs	1.650 €	8.250 €
Acquisition costs for vehicle equipment	4.000 €	20.000 €
Potential savings with ALUCA	**973,50 €**	**4.867,50 €**
Payback period in years	**2,42**	**4.350 €**
Savings over the vehicle's service life	**4.867,50 €**	**24.337,50 €**

Investing in high-quality vehicle equipment must be carefully evaluated from a business perspective. A detailed ROI calculation enables informed decision-making



5. CONCLUSION AND OUTLOOK

5.1 SUMMARY OF FINDINGS

The systematic optimisation of service vehicles through modular fitting systems offers considerable efficiency potential for craft businesses, technical service providers and mobile service teams. The key findings of this white paper can be summarised as follows:

1. **Economic relevance:** Inefficient vehicle organisation causes billions in annual losses in the UK due to lost working time, increased resource consumption and reduced customer satisfaction. Systematic approach: A thorough needs analysis and process optimisation form the basis for the successful implementation of improved vehicle equipment.
2. **Technological options:** The market offers a wide range of solutions, from low-cost basic variants to high-quality complete systems made of aluminium, which can be selected according to individual requirements.
3. **Cost-effectiveness:** High-quality systems typically pay for themselves within 6-12 months and offer significant cost savings over their entire service life. Holistic view: In addition to the direct economic benefits, optimised vehicle equipment also contributes to improved working conditions, higher employee satisfaction and a professional image

5.2 FUTURE TRENDS AND DEVELOPMENT PROSPECTS

Developments in the field of mobile workplaces will be shaped by several trends in the coming years:

Digital integration: The connection of physical furnishing systems with digital inventory and scheduling solutions will become standard. Systems with RFID tracking, automatic inventory management and predictive material requirements planning will enable a new dimension of efficiency.

Electromobility: The increasing prevalence of electric commercial vehicles is creating new requirements for vehicle equipment. Lightweight construction is becoming even more important in order to compensate for the reduced payload caused by batteries. At the same time, there are opportunities for integrated charging solutions for cordless tools.

Individualisation and flexibility: The trend towards increasingly specific industry solutions will continue. At the same time, there is a growing demand for quickly convertible systems that can cover different application scenarios within a single working day.

Sustainability: Environmental aspects are also becoming increasingly important in vehicle equipment. Durable, recyclable materials and resource-saving production processes are becoming important decision-making criteria. The CO_2 balance over the entire life cycle is coming into focus.



5.3 RECOMMENDATIONS FOR ACTION

For companies looking to optimise their service fleet, the following specific recommendations apply:

1. **Conduct an analysis of the current situation:** Document the current state of your vehicle fleet and identify the biggest inefficiencies and areas of potential.
2. **Launch a pilot project:** Start by optimising a single vehicle to gain experience and validate the benefits for your own business.
3. **Involve employees:** The practical experience and suggestions of users are crucial for the acceptance and success of new equipment systems.
4. **Consider total costs:** Evaluate offers not only on the basis of the purchase price, but also on the basis of the total cost of ownership over the entire service life.
5. **Ensure future viability:** Choose systems that can grow with your company and adapt to changing requirements.

The consistent optimisation of mobile warehouses on wheels represents a decisive competitive advantage in times of skilled labour shortages, rising cost pressure and growing customer demands. Companies that recognise this potential and systematically exploit it will be able to gain significant advantages over less efficient competitors in the coming years

6. LIST OF SOURCES

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