



WORKING EQUIPMENT WITH PARALLEL KINEMATIC STRUCTURES FOR MOBILE WORKING MACHINES

Ideas on utilisation

Lifting, digging, gripping, loading - all this is part of the job of mobile machines. With the right work equipment, this job usually works efficiently and productively. The use of Hexapod parallel kinematics results in radically innovative process options.

Within the framework of the BMBF-funded HEXAPOD-MOBIMA project (FKZ: 03FO3182), the potential of a hexapod manipulator for the working equipment of a wheel loader was investigated in the following focal areas:

1. Structural design of drive components and components
2. Development and design of the hydrostatic drive system
3. Development and realization of a real-time capable control and regulation concept.
4. Development of real-time simulation models.
5. Business analysis of a test vehicle



Figure 1: Hexapod wheel loader with the possibility of working movements in six degrees of freedom.

Potential adopters of technology

Manufacturer of mobile working machines with changing devices for different attachments (for example loading buckets, pallet forks, milling heads, demolition hammers ...). These include, in particular, manufacturers of the following machine types:

- Earth-moving machinery, preferably wheel loaders with tool variants
- Vehicles in the field of agricultural system technology with device interfaces (for example tractors, backhoe loaders ...)
- mobile working machines with shielding systems (for example graders)

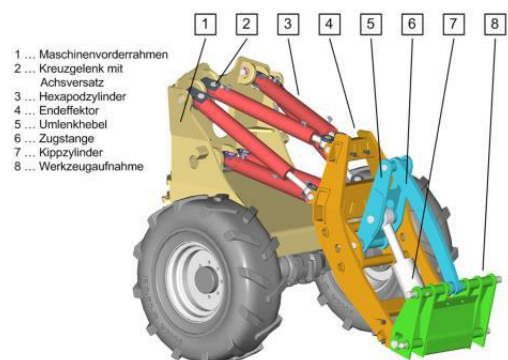


Figure 2: Parallel kinematic work equipment.



Advantages of technology

- Increase of the utility value and thus the competitive advantage
- New possibility of use due to additional degrees of freedom of the attachment
- Easy choice to restrict the degrees of freedom by simple replacement
- active cylinder by passive tension-push rods
- Increased efficiency (temporally through additional and higher-level process functions, energetically by lightweight design and increased technological performance)
- Adaptive vibration and tilt compensation in all degrees of freedom
- Technology for vibration damping of cabs adaptable in all degrees of freedom



Figure 3: Prototypical realization on the wheel loader 3070CX80.

Market and context of technology

- To date, many holistic activities require high investment in different machinery and equipment, resulting in high capital tied up with increased space requirements.
- Use value increase is in compensation for higher production costs of the technology presented.
- The proposed solution is the result of a qualified system with confirmation of successful completion under real conditions.
- The research shows that the technology offers a high degree of potential for change in future work processes in the field of mobile machinery and contains a high potential for further development.
- Further approaches: Research and development on the automation potential and aspects of ergonomic operation and process assistance.

Preconditions in adopting enterprises

- Good machine and process knowledge
- Experience in the field of drive technology and machine control
- Willingness to further develop innovative technologies and/ or process flows