

Relevance of exoskeletons for industrial ergonomics in manufacturing



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Questions to be answered by scientific community

- Why are exoskeletons relevant for **ergonomic design** of workplaces?
- How to consider exoskeletons in the **ergonomic assessment** of workplaces?

Why are exoskeltons relevant for ergonomic design of workplaces?

Typical field of application: Hands above head / Elbow at or above shoulder level



Picture: IAD



Picture: BMW



Picture: Ottobock

Restrictions for ergonomic design of workplaces

- A change in the initial situation is difficult or impossible e.g. because of the specifications of the work object
- The investments to modify a work process are too high to justify ergonomic improvements.
- It might take time to realize an ergonomic design of workplaces (e.g. changing of production lines)

Support from exoskeletons

In those situations, where an ergonomic design is not or not yet possible, the **proper** exoskeleton is one of the feasible and flexible options in the hands of industrial engineers

Furthermore, exoskeletons might support those workers that have physical limitations concerning specific tasks

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Conclusion I:

Exoskeletons are helpful tools for specific conditions and specific user groups to improve ergonomic conditions

How to consider exoskeletons in the ergonomic assessment of workplaces?

Pros and cons of using exoskeletons

Pros

- Reduction of biomechanical loads
- Reduction of strain in certain muscles
- Extension of the tolerable working time
- Reduction of physical limitations

Cons

- Relocation of muscular strain
- Additional weight to carry (should be as low as possible)
- Climate conditions while wearing the exoskeleton (e.g. breathable material is needed)
- Difficult access to workplaces

Integrating the use of exoskeletons in ergonomic assessment of workplaces

Both pros and cons should be considered when assessing the ergonomic quality of a workplace (by using e.g. EAWS)

The aim of empiric studies is to find out the amount of stress reduction (and increase) an exoskeleton can contribute to a workplace assessment.



EXO-EAWS project as an example

Several studies exist, further should be executed. Especially studies in an industrial setting would be helpful.

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Several studies exist, further should be executed. Especially studies in an industrial setting would be helpful.

Conclusion II: Studies are needed to assess the pros and cons of using an exoskeleton in specific situations. Every study in that direction is welcome by the EAWS Scientific Committee.

Thank you for your attention

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