One-fits-all vs tailor made: user-centered workstations for field assembly with an application in aircraft parts manufacturing

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BMVIT-endowed chair for Industry 4.0
Any associations?
Diverse workforce
- Different background
- Various psychological and physiological preconditions
- Distinctive needs

Demographic change
- Aging population → aging workforce
- Heterogeneous age of personnel
- Scarcity of qualified employees → keep them longer employed
- Age-appropriate tasks and processes

Employees with handicap or special needs

etc.

→ Necessity for “individualizable” work systems/ stations!

Images: DPA/ Der Tagesspiegel, WEKA, Proscie, Süddeutsche Zeitung
What parameters of a workstation can be “individualized“?
One-fits-all vs. tailor-made
Individualization of workstations: goals, dimensions and challenges

Goals:
- Increased productivity
- Robust to demographic changes
- Higher attractiveness

Design dimensions:
- Working height
- Range of vision, gripping area, handedness
- Lighting
- Ventilation and air conditioning
- Acoustic situation
- Use of information and assistance systems
- Further aspects

Challenges:
- User specific implementation
- Economic feasibility
- Confidentiality with respect to personal data, etc.

Initial Situation:

- Work systems are standardized and designed according to a “percentile logic“

Research Question:

- How and in what aspects can assembly work stations be adjusted to specific user characteristics?

Goal:

- Experimental design of assembly work stations (single work station, flow line, field assembly)
- Multi criteria evaluation (productivity, ergonomics, user acceptance, etc.)
- Generally applicable design rules and combinations of characteristics
- (use of digital assistance systems)

→ Special focus: workstations for field assembly

“Field assembly (a.k.a. site assembly) means that a large product is assembled in a stationary setting and the assembly personnel, as well as components and tools are transported to the product”

One-fits-all vs. tailor-made
Workstation design for field assembly: vision and project

1) Capturing of working environment and worker
2) Dynamic projection of individualized work related information
3) Individualized/context adaptive provision of material, tools, components
4) Individualized/context adaptive adjustment of height and angle of the working area
5) Individualized/context adaptive climate, temperature and acoustic tuning
6) Individualized/context adaptive lights

Individualizable design of workstations for industrial field assembly due to digital networking.
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