



# Assessment of physical work loads / risks at assembly work places in the German automotive industry using ergonomics tools

Dr.-Ing. J. Wakula and Dr.-Ing. Kh. Schaub  
([wakula@iad.tu-darmstadt.de](mailto:wakula@iad.tu-darmstadt.de))

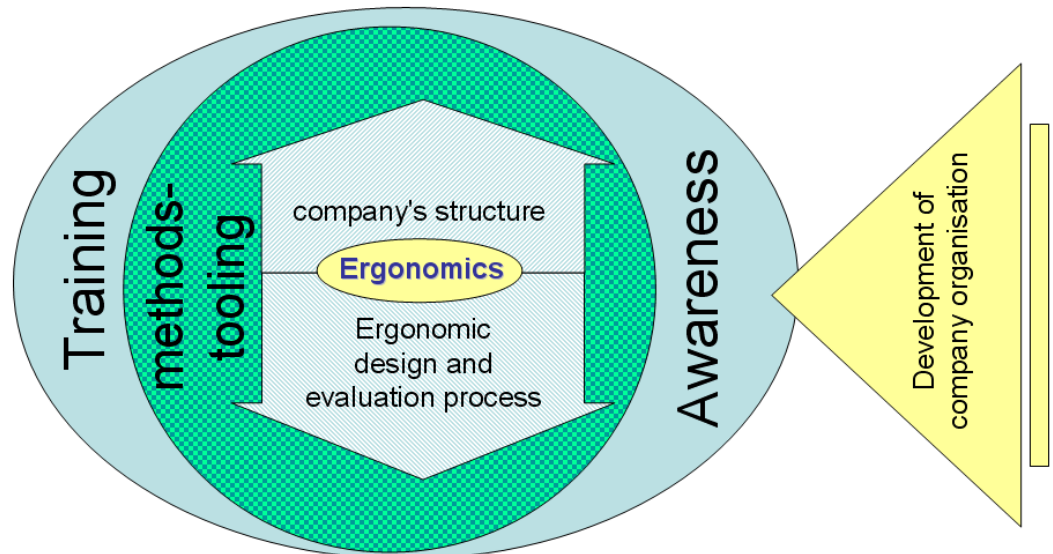
# Management awareness: Ergonomics improves

## ■ Human Aspects

- + reduction of injuries and illness
- + higher motivation of workers
- + improved comfort at work

## ■ Cost aspects

- + higher productivity
- + higher quality
- + improved performance
- + less accidents with sick leave
- + less days of sick leave





# Ergonomic improvements and costs

Chance for  
design

%

**chances for  
Ergonomic design**

**Costs for  
changes**

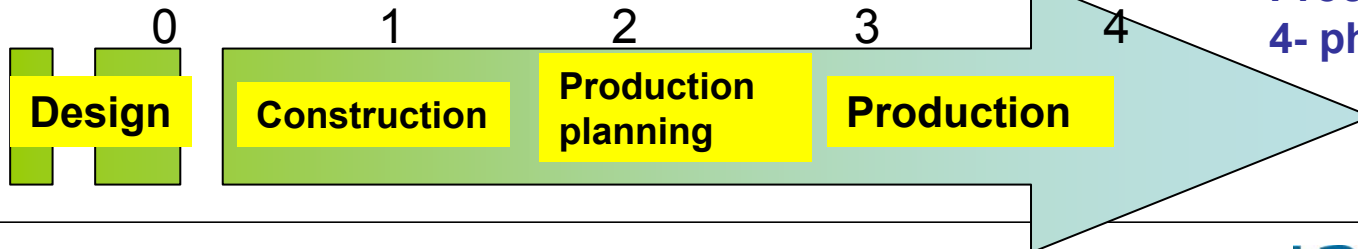
**Prototype  
phase**

Conclusion: Ergonomic  
risk assessment /design  
are most efficient in the  
design prototype phase

**prospektive  
ergonomics**

**corrective  
ergonomics**

**Process time:  
4- phases**



# Darmstadt's concept for Ergonomics Training in Industry



TECHNISCHE  
UNIVERSITÄT  
DARMSTADT

introduction / improvement of  
**evaluation tools**  
**Module 1**

create awareness  
/ define needs

Enlargement of tool usage (increased **penetration of tools**, settlement in company, level of tech. aids)  
**Module 2**

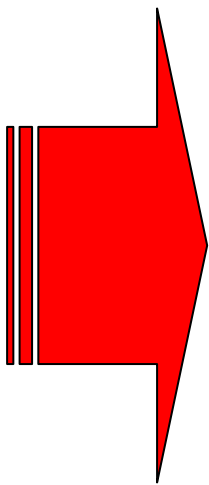
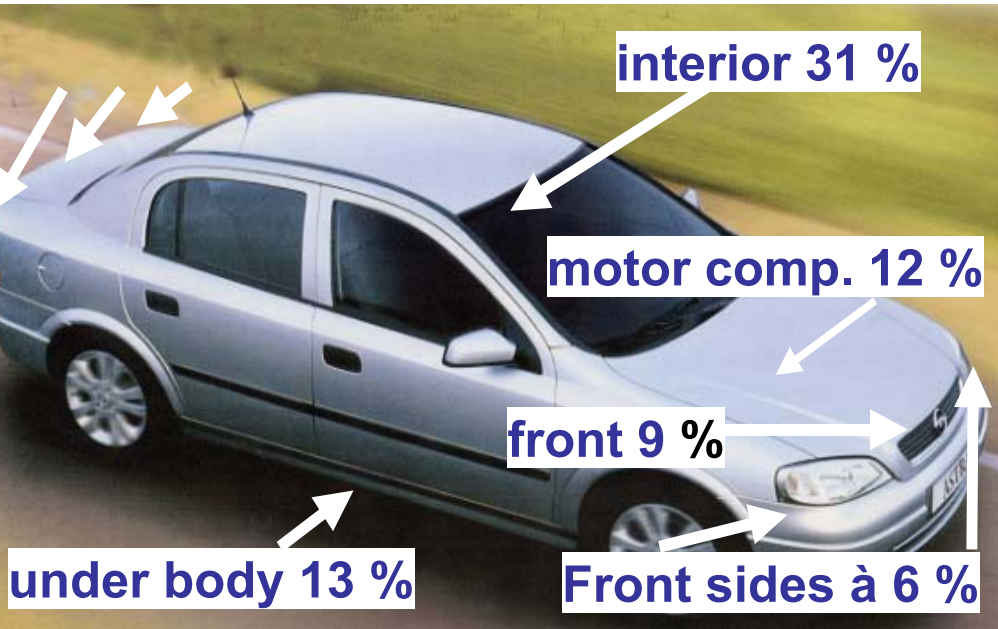
Formalization by an Integration of **ergonomic quality gates**  
in the PDP\* (define roles & responsibilities for ergonomics)  
**Module 3**

Coordinating workstation demands and worker abilities to aim to an  
**„worker ability adapted planning“**  
**Module 4**

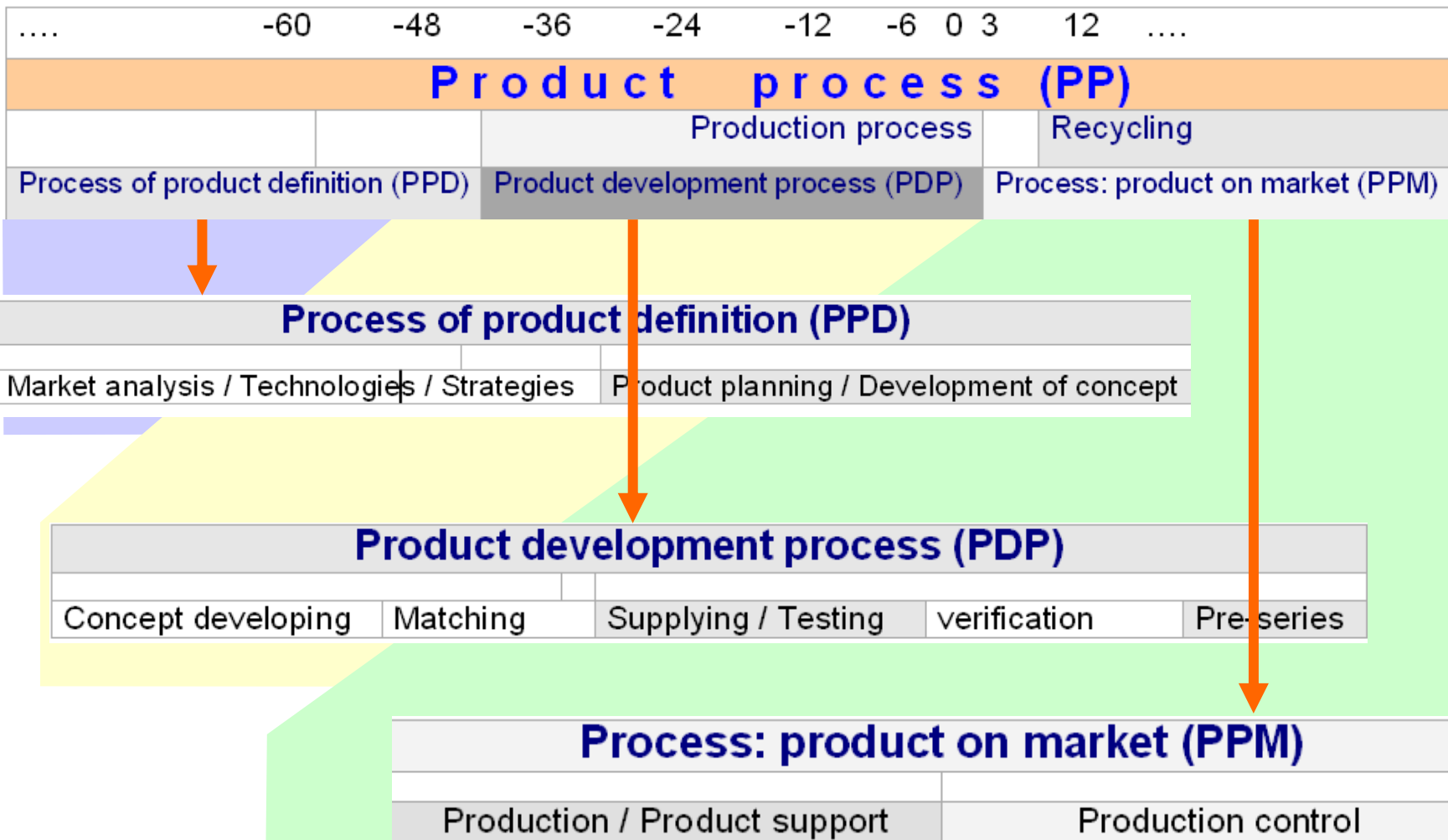
(tools for the) evaluation and controlling of  
ergonomic measures  
**Module 5**

\* PDP = Product Development Process

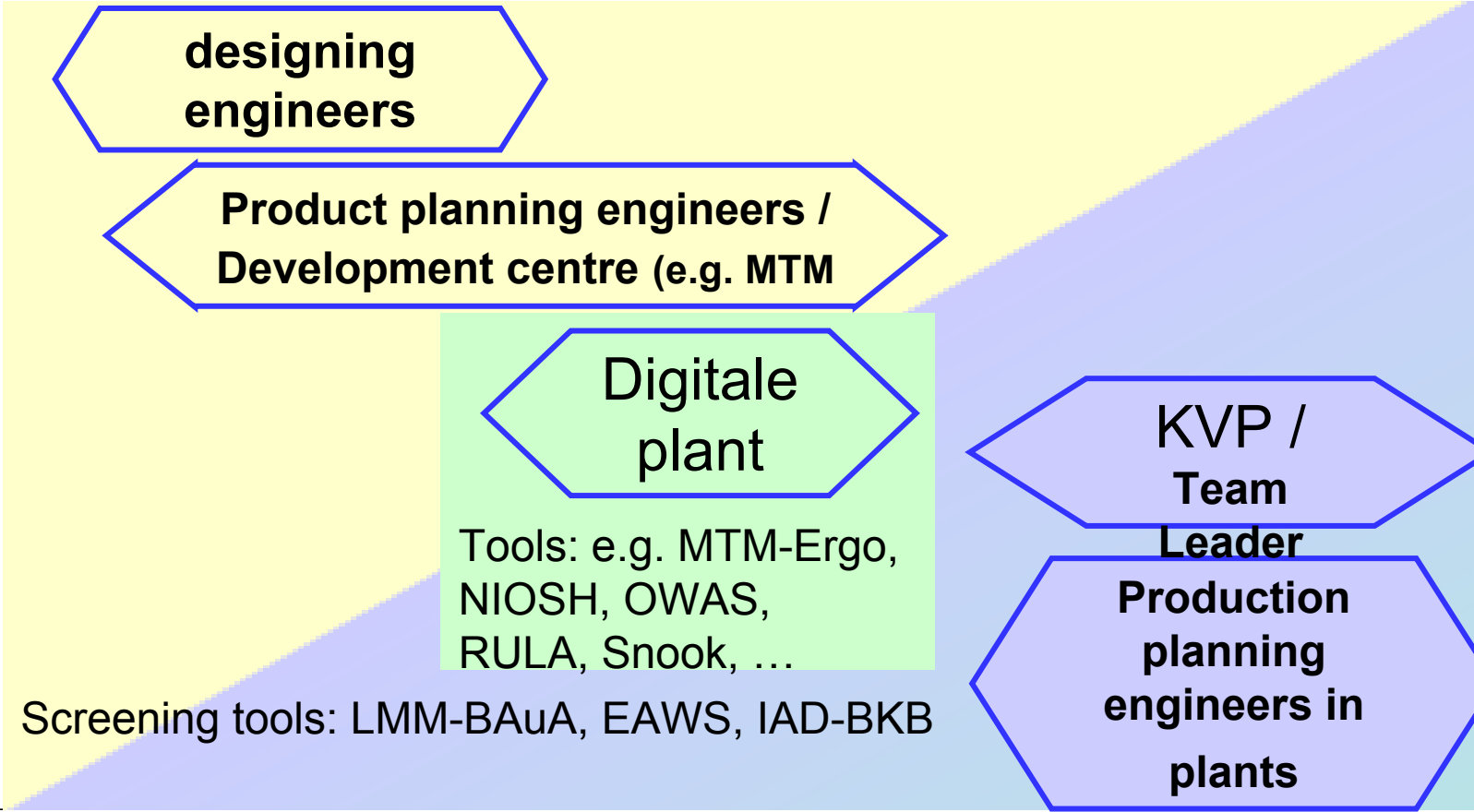
# Awareness for ergonomic problems in the design and process planning phase



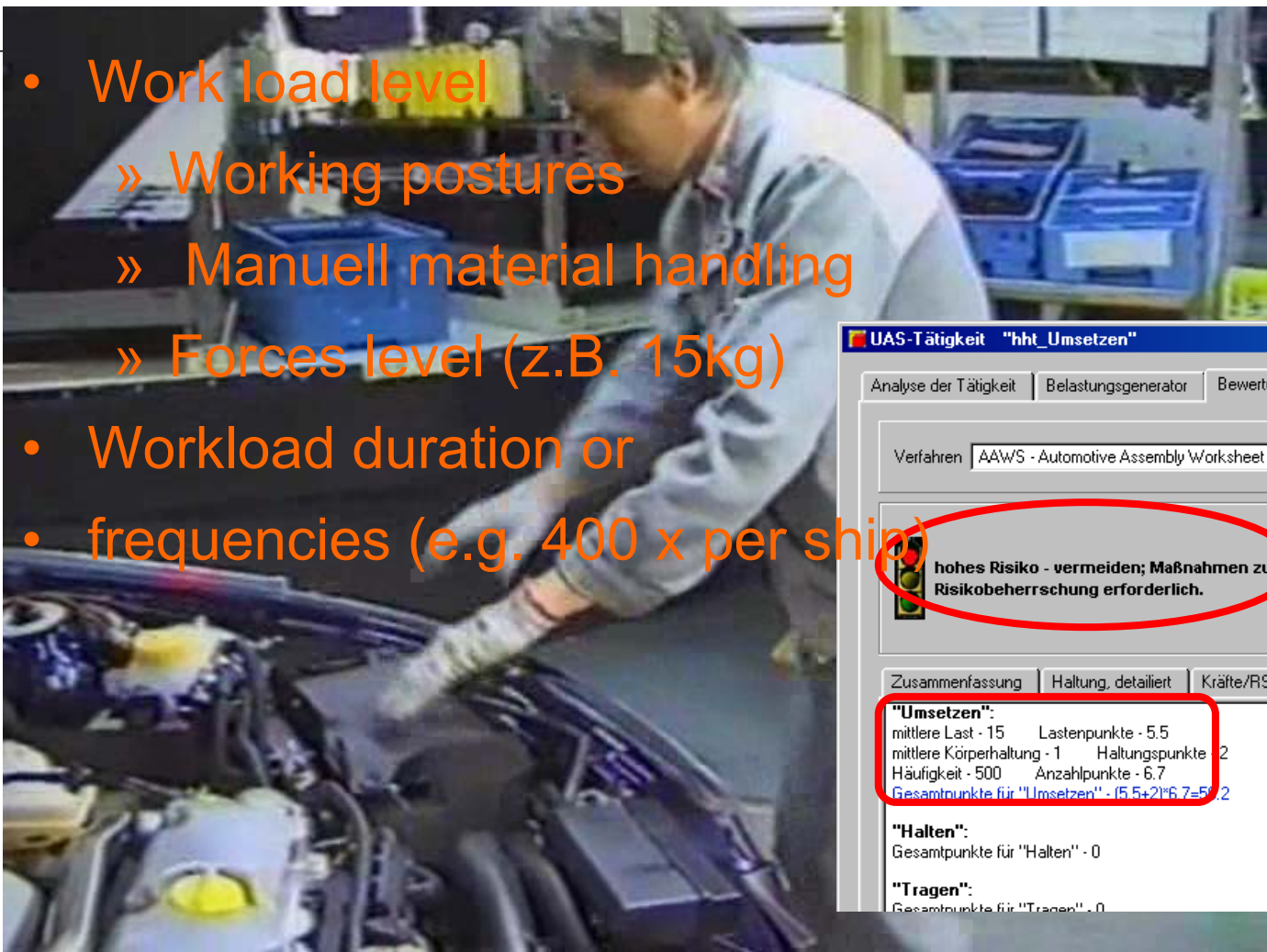
# Product process



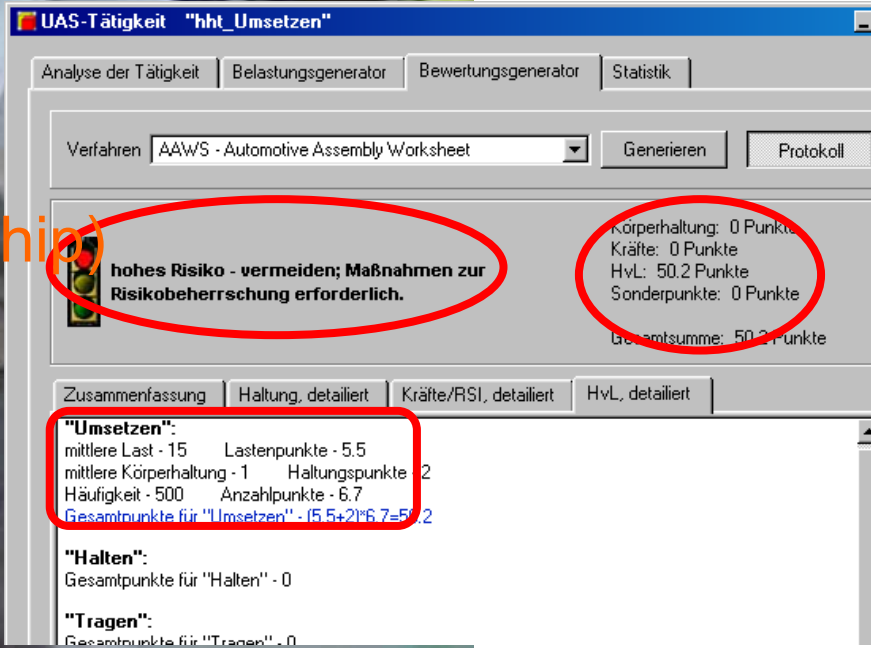
# Specialists involved into product process (PP) & ergonomic tools for analysis / assessment



# Work load /risk assessment at existing work places in automotive production using IAD-AAWS tool



- Work load level
  - » Working postures
  - » Manuell material handling
  - » Forces level (z.B. 15kg)
- Workload duration or
- frequencies (e.g. 400 x per shift)



UAS-Tätigkeit "hht\_Umsetzen"

Analyse der Tätigkeit | Belastungsgenerator | Bewertungsgenerator | Statistik

Verfahren: AAWS - Automotive Assembly Worksheet | Generieren | Protokoll

**hohes Risiko - vermeiden; Maßnahmen zur Risikobeherrschung erforderlich.**

Körperhaltung: 0 Punkte  
Kräfte: 0 Punkte  
HvL: 50.2 Punkte  
Sonderpunkte: 0 Punkte  
Gesamtsumme: 50.2 Punkte

Zusammenfassung | Haltung, detailliert | Kräfte/RSI, detailliert | HvL, detailliert

**"Umsetzen":**  
mittlere Last - 15 Lastenpunkte - 5.5  
mittlere Körperhaltung - 1 Haltungspunkte - 2  
Häufigkeit - 500 Anzahlpunkte - 6.7  
Gesamtpunkte für "Umsetzen" - (5.5+2)\*6.7=51.2

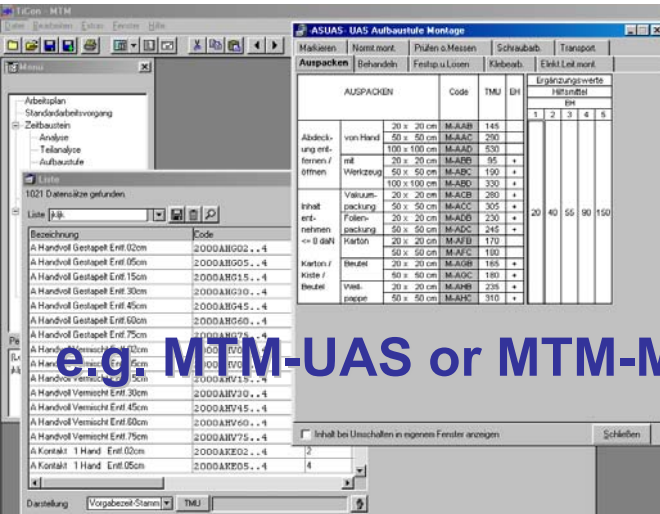
**"Halten":**  
Gesamtpunkte für "Halten" - 0

**"Tragen":**  
Gesamtpunkte für "Tragen" - 0



# MTM-Ergo evaluation process

## Work load / Risk assessments in an early design phase, based on:



**Low risk – recommended**  
No action is needed

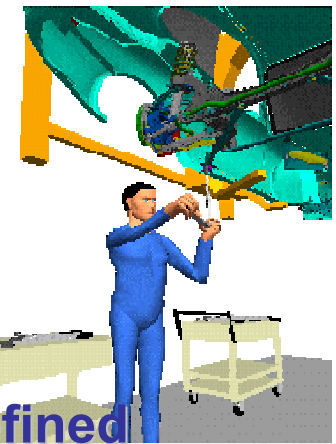
**Possible risk – not recommended**  
Redesign or - if not possible - take other measures to control the risk

**high risk – to be avoided**  
Action to lower the risk is necessary

e.g. MTM-UAS or MTM-MEK code

lead to ergonomic risk assessments according to relevant EU-Directives

... and user defined ergonomics code





Thank you !

wakula@iad.tu-darmstadt.de