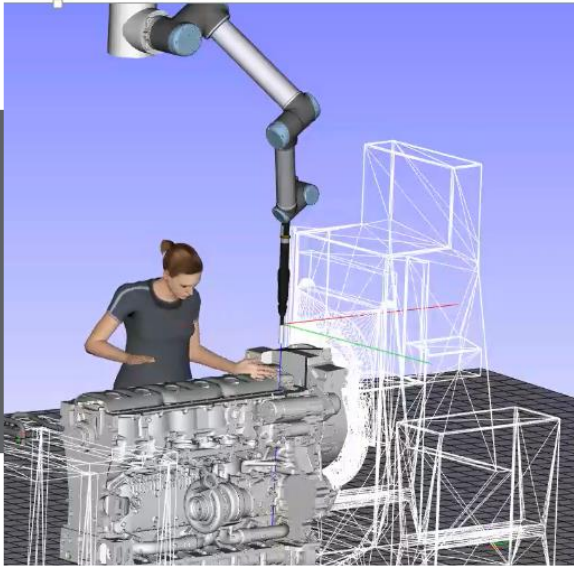




Research group: UCPD

[User Centred Product Design]



‘Human Factors in Engineering Design’



Peter Thorvald

Associate Professor of Product Design Engineering
School of Engineering Science
Department of Product Development and Design

Members of UCPD



→ **Dan Högberg**
Professor of Product Design Engineering



→ **Anna Brolin**
Senior Lecturer in Product Design Engineering



→ **Erik Brolin**
Senior Lecturer in Product Design Engineering



→ **Francisco Garcia Rivera**
PhD Student



→ **Lars Hanson**
Professor of Product Design Engineering



→ **Aitor Iriondo Pascual**
PhD Student Informatics



→ **Ari Kolbeinsson**
Senior Lecturer in Product Design Engineering



→ **Estela Perez Luque**
PhD Student Informatics



→ **Peter Thorvald**
Associate Professor of Product Design Engineering



→ **Andreas Lind**
Industry-employed Doctoral Student



→ **Emmie Fogelberg**
PhD Student Informatics



→ **James Yang**
Visiting Professor



→ **Veeresh Elango**
Industry-employed Doctoral Student

More info about us, publications, running and previous research projects:

<https://www.his.se/en/research/virtual-engineering/user-centred-product-design/>



What do we do? What are we curious of?

Research on methods and tools for supporting engineering design processes, with particular regard to the consideration of human factors in the design of systems, products and workstations.

Key areas:

Engineering Design

- Efficient tools, methods and processes for product realization
- Proactiveness; solve problems (e.g. via digitalization/design in virtual worlds) before they occur in the real world.

Ergonomics (Human Factors)

- Physical ergonomics (anthropometry, biomechanics, risk assessments for disorders...)
- Cognitive ergonomics (perception, memory, reasoning, decision making...)

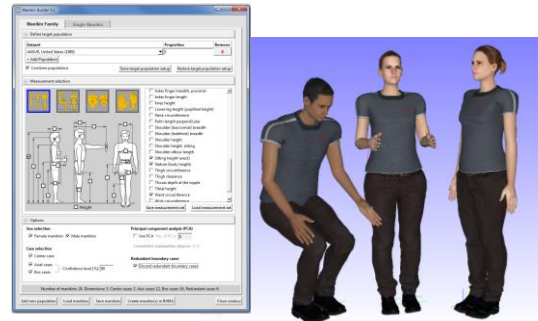
RESEARCH THEMES WITHIN UCPD

VIRTUAL ERGONOMICS DESIGN



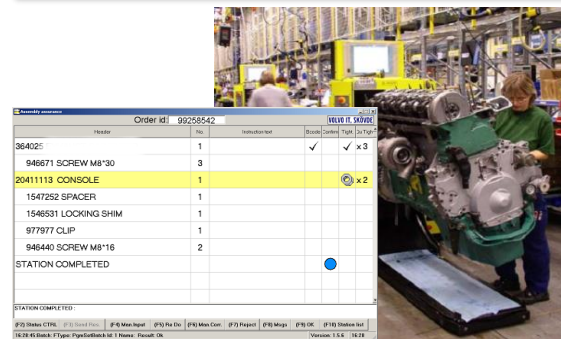
Research about methods and tools to model and simulate human product interactions, for the design of ergonomic products and workstations.

ANTHROPOMETRY



Research related to collection, treatment, use and communication of anthropometric data for the purpose of design.

COGNITIVE ERGONOMICS



Research about work related information, and development of methods for the design of industrial information systems.

SMART TEXTILES – INDUSTRIAL APPLICATIONS



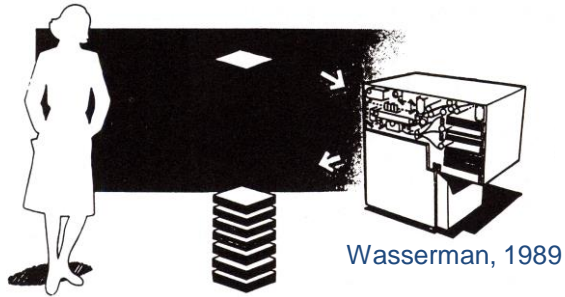
Research about how smart textiles can be applied in industry to improve interaction, ergonomics and productivity.



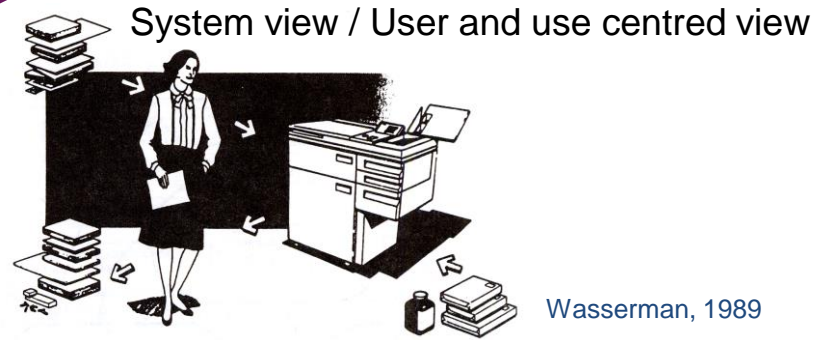
1977
UNIVERSITY
OF SKÖVDE

WHY USER-CENTRED INNOVATION AND DEVELOPMENT?

Machine centred view



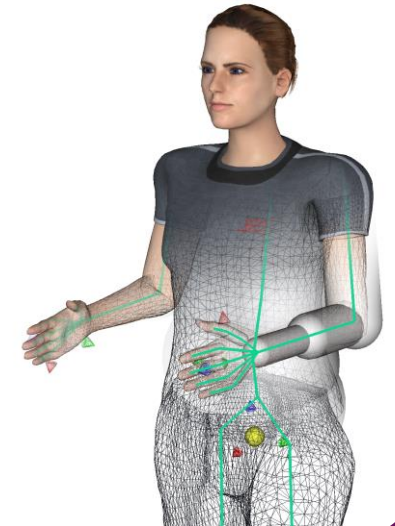
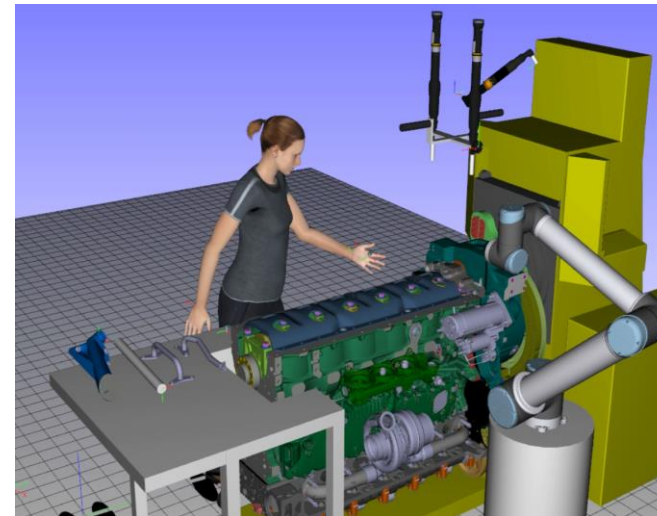
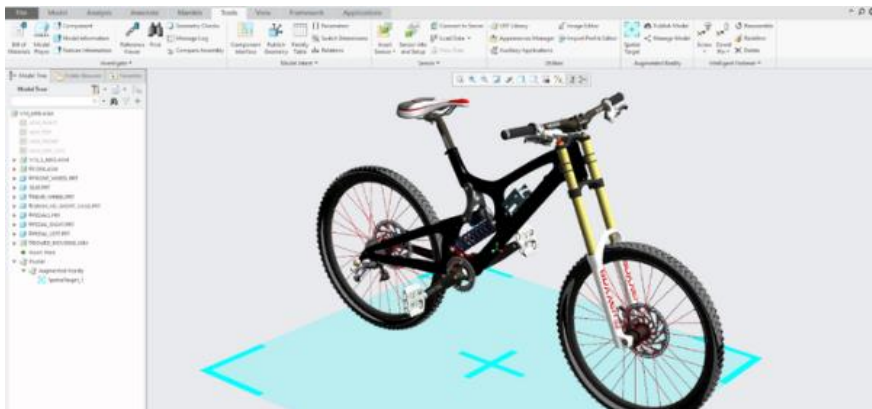
Wasserman, 1989



Wasserman, 1989

CAD/CAE/Simulation tools & Digital Humans & Digitalized Assessment Tools

CAD/CAE/Simulation tools





UNIVERSITY
OF SKÖVDE

EXAMPLE OF VIRTUAL ERGONOMICS DESIGN (DHM SIMULATION) WITH MULTI-OBJECTIVE OPTIMIZATION

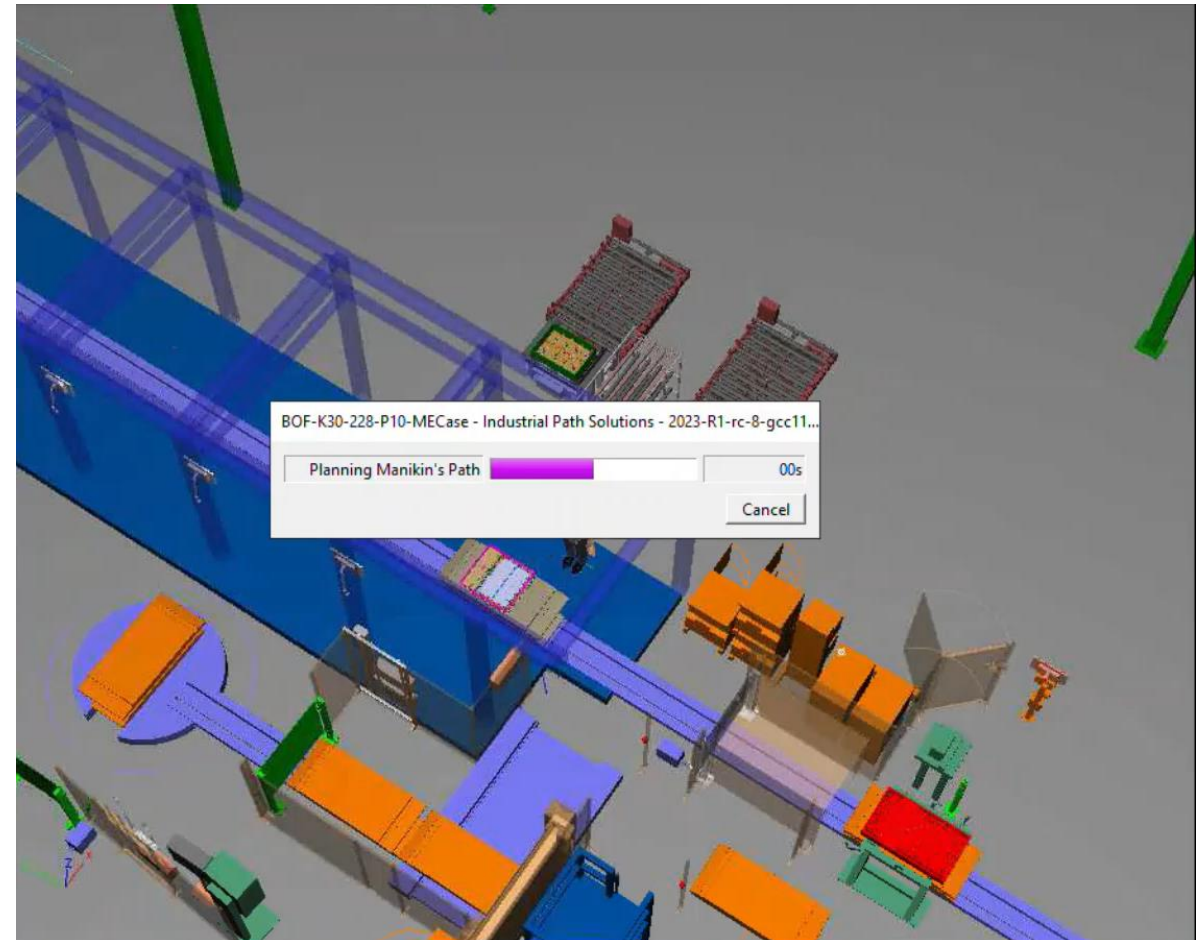
Use case from Andreas Lind, industrial PhD student at Scania, enrolled at University of Skövde.

Task: Find best layout for a manual workstation within battery production with regard to (minimize):

- Area utilization
- Walking distance (spaghetti diagram)
- Ergonomics (risks for work-related musculoskeletal disorders)

Approach: Utilize simulation-based multi-objective optimization as engineering support, to speed up and assist finding the best solution (best balance between objectives). The method also considers size differences among operators (anthropometric diversity). The DHM tool used in this use case is IPS IMMA.

The video shows one alternative of a large number of layout designs, which are automatically generated and assessed using the method (video playback speed = 400%)



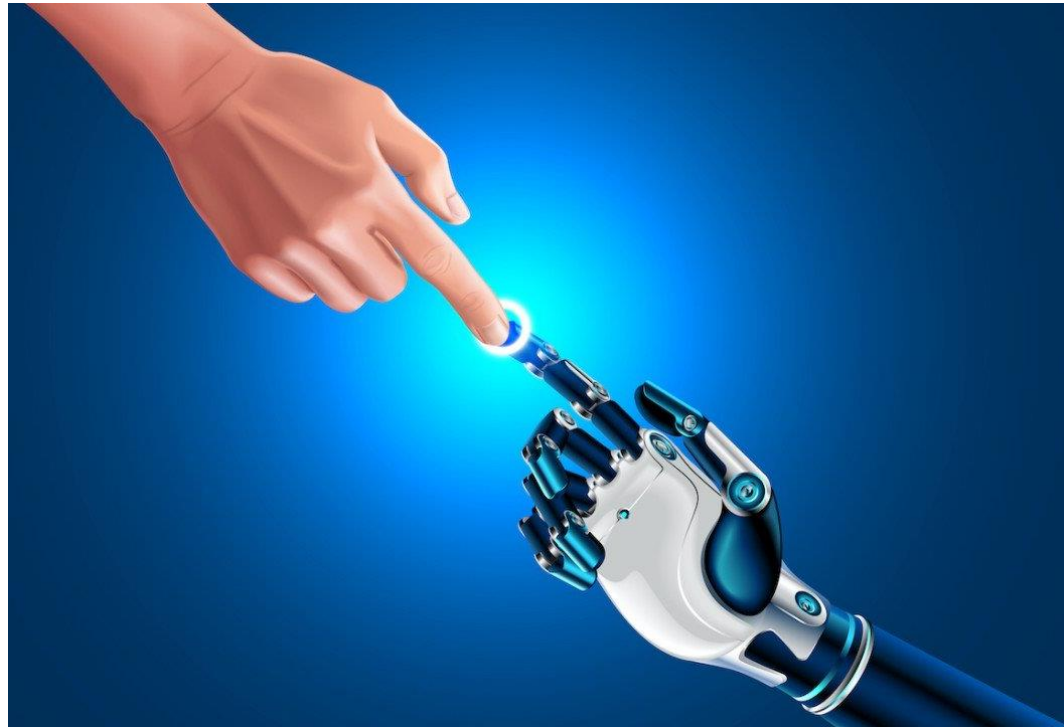


COGNITIVE ERGONOMICS IN MANUFACTURING

Assembly Instruction Customer Logotype

Company	Tel: +46 (0) [redacted]	Date	1/27/17	Edition	2.1	ID No	441-28	Page	1 / 2	
Instrumentidgen. Nr.	Fax: +46 (0) [redacted]	Approved	Michael Berg	Title					Fusion Cone Assembly	
SE-522 94 [redacted]	E-Mail: info@[redacted].com	Issuer	John Svensson							

- Load press fixture** 0m. 09s
Place the washer (310 458-01) with flat surface upwards and O-ring (100 532-02) in fixture according to image.
⚠ Use gloves
- Press gasket and housing** 0m. 13s
The house fills with grease when pressing.
⚠ Two hand control
⬢ Make sure the parts are aligned
- Place housing on pallet** 0m. 04s
If OK put the housing at intended location on the pallet.
⚠ Check pallet number
- Load fixture** 0m. 08s
Place Slide Washer (310 424-01) on the cone. Fit the house between the 4 pins in the fixture.
⬢ Use the correct screw!

A grid of small images showing a worker performing the assembly steps described in the text.



1977
UNIVERSITY
OF SKÖVDE

DRIVER ERGONOMICS

VOLVO



KONTAKT

dan.hogberg@his.se

peter.thorvald@his.se