Cluster Conference 2023

Multi-Objective Optimization Platform of Worker Well-Being AND Productivity

UNIVERSITY OF SKÖVDE

Aitor Iriondo Pascual

HELLO!

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- Ph.D. in Multi-Objective Optimization of Worker Well-being and Productivity.
- Create a tool to enable multi-objective optimization of worker well-being and productivity.
- University of Skövde.
- Supervisors: Anna Syberfeldt, Dan Högberg and Erik Brolin.

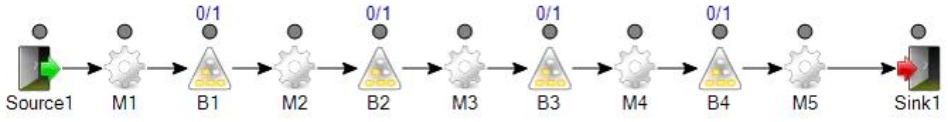
That's me!

Not this one

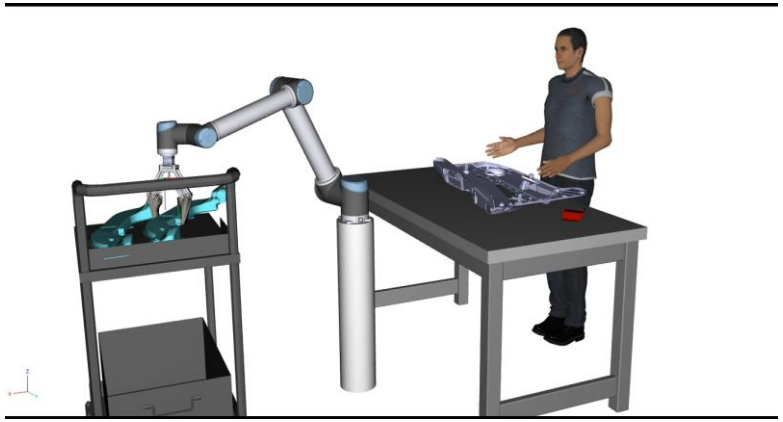
BACKGROUND

- Simulation software is used in industry to simulate production as it allows predicting behaviors.

- Simulations performed to predict production are usually done separately from human simulations performed to evaluate ergonomics.



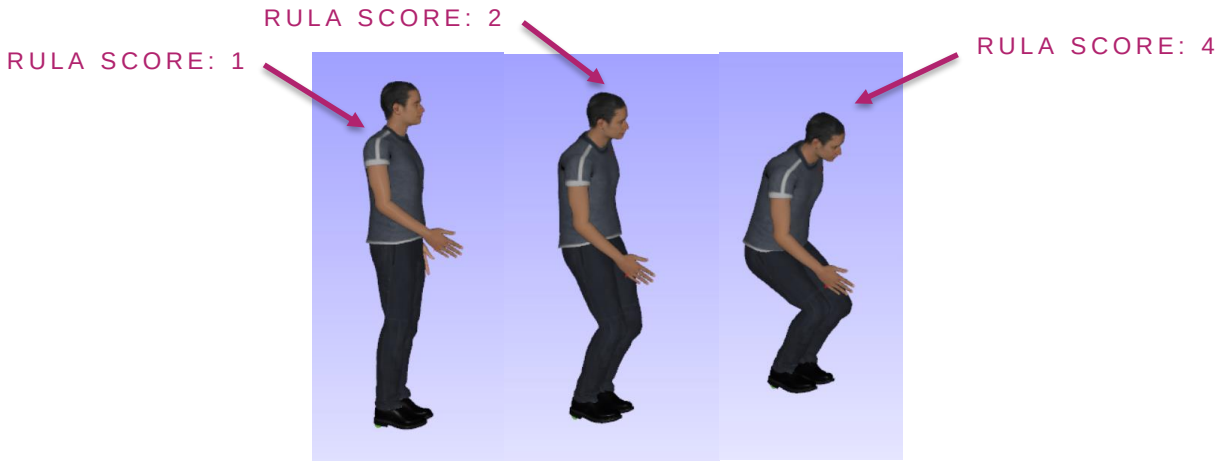
FACTS Analyzer - Production flow simulation software



IPS IMMA – Digital human modelling tool

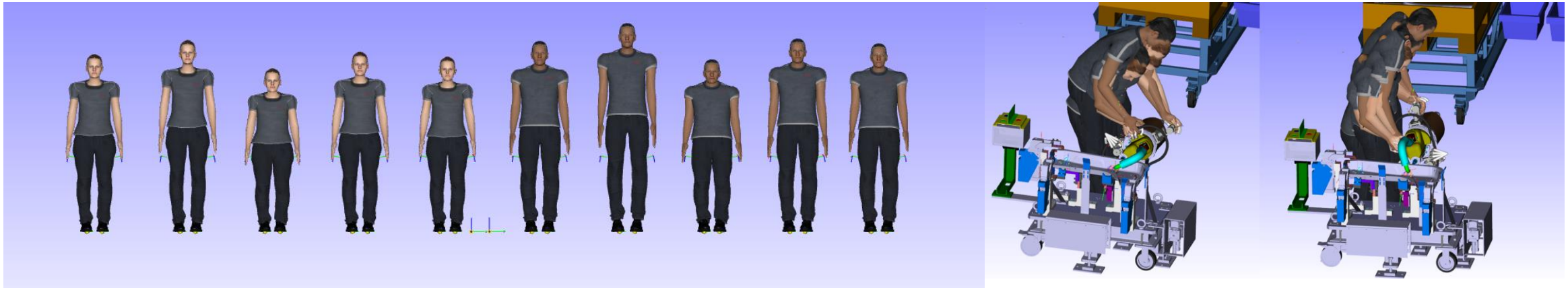
HOW DO WE EVALUATE WORKER WELL-BEING

- Static ergonomic evaluation methods like RULA [1-7].
- Time-based ergonomic evaluation method OWAS with Lundqvist index [100-400].
- The results always indicate risk: the lower the better!



CONSIDERATION OF ANTHROPOMETRIC DIVERSITY

- Simulations with a manikin family to consider body size related variety in the workforce.
- Optimizations must consider each manikin as an objective.



WORKSTATION/PRODUCT DESIGN OPTIMIZATION IN DHM TOOLS

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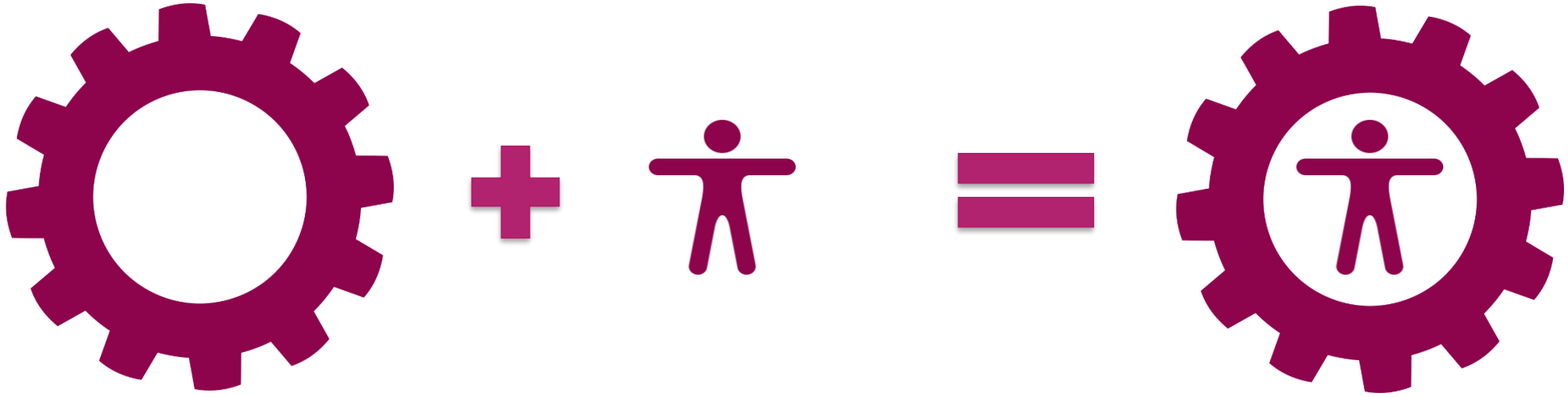
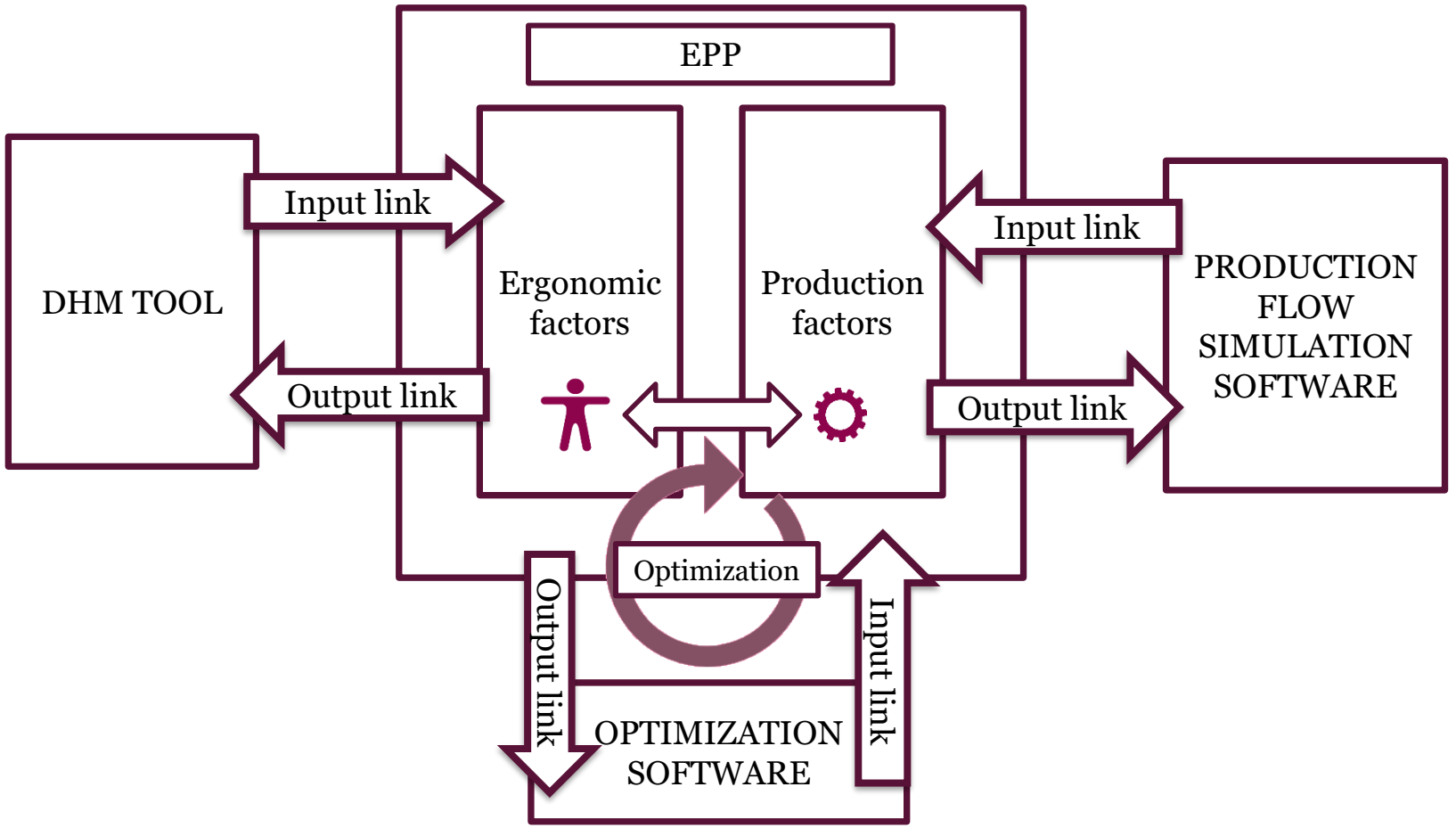
- Not available at the moment in the tools.
- We want to bring together ergonomists and production engineers in design processes.



ERGONOMICS IN PRODUCTION PLATFORM



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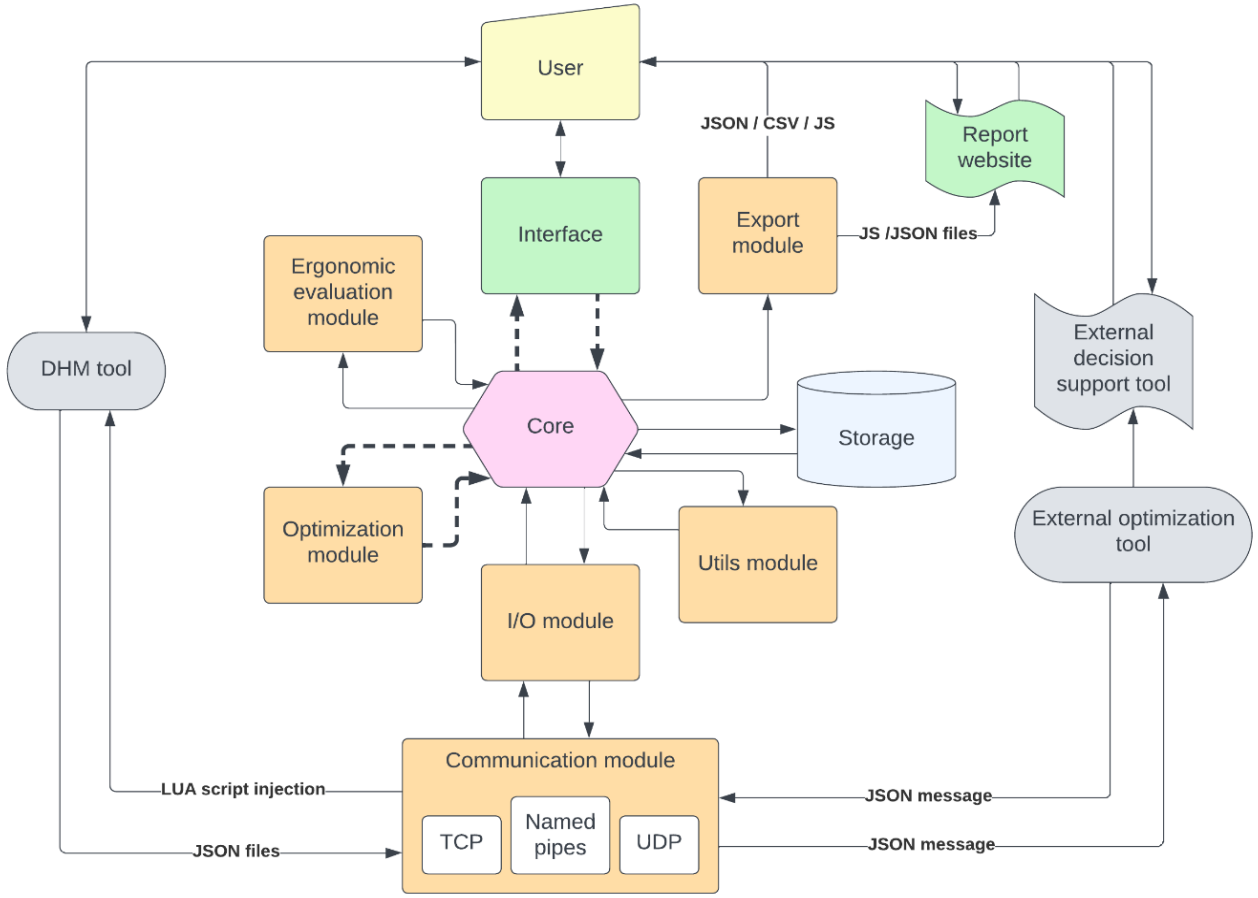

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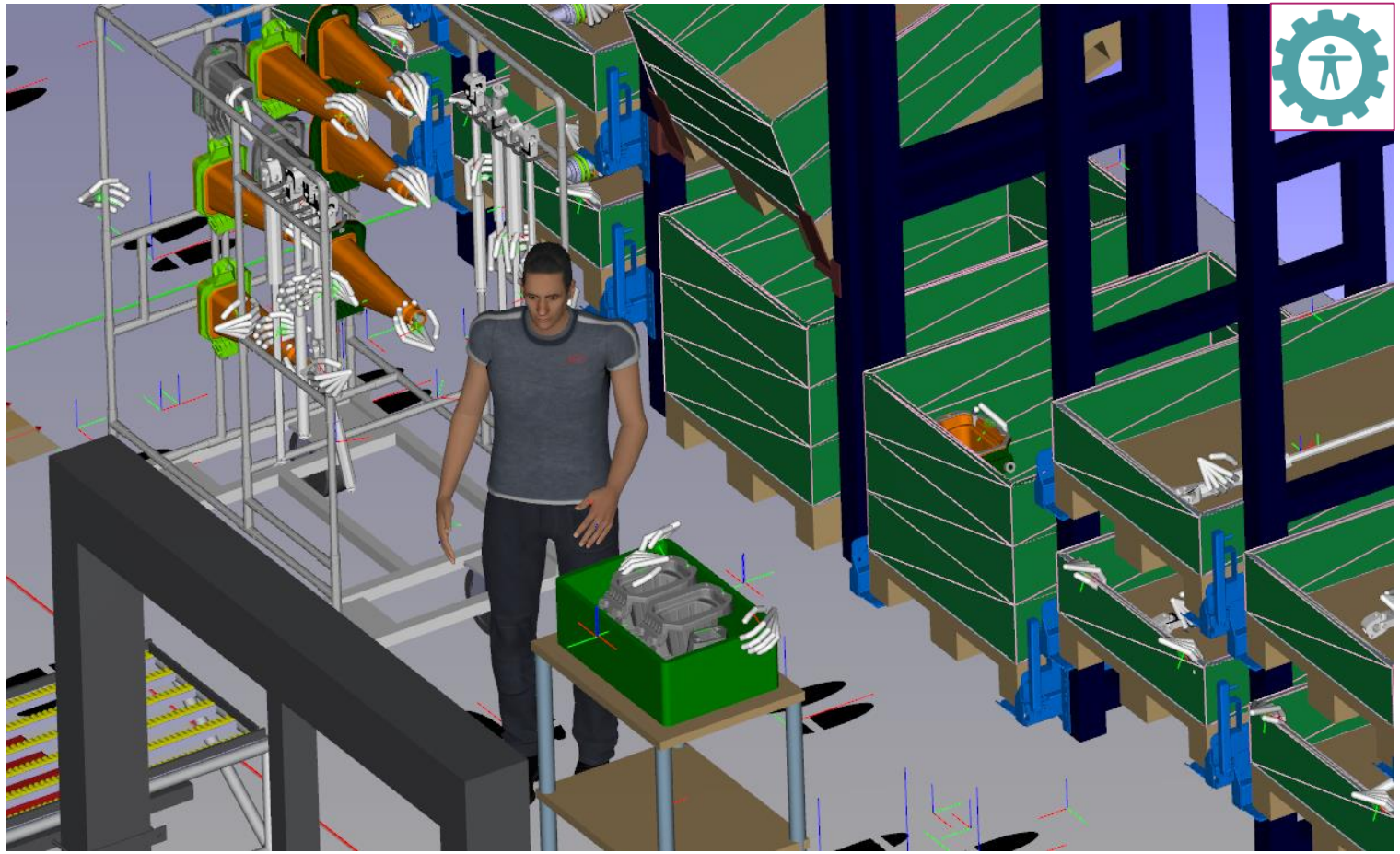

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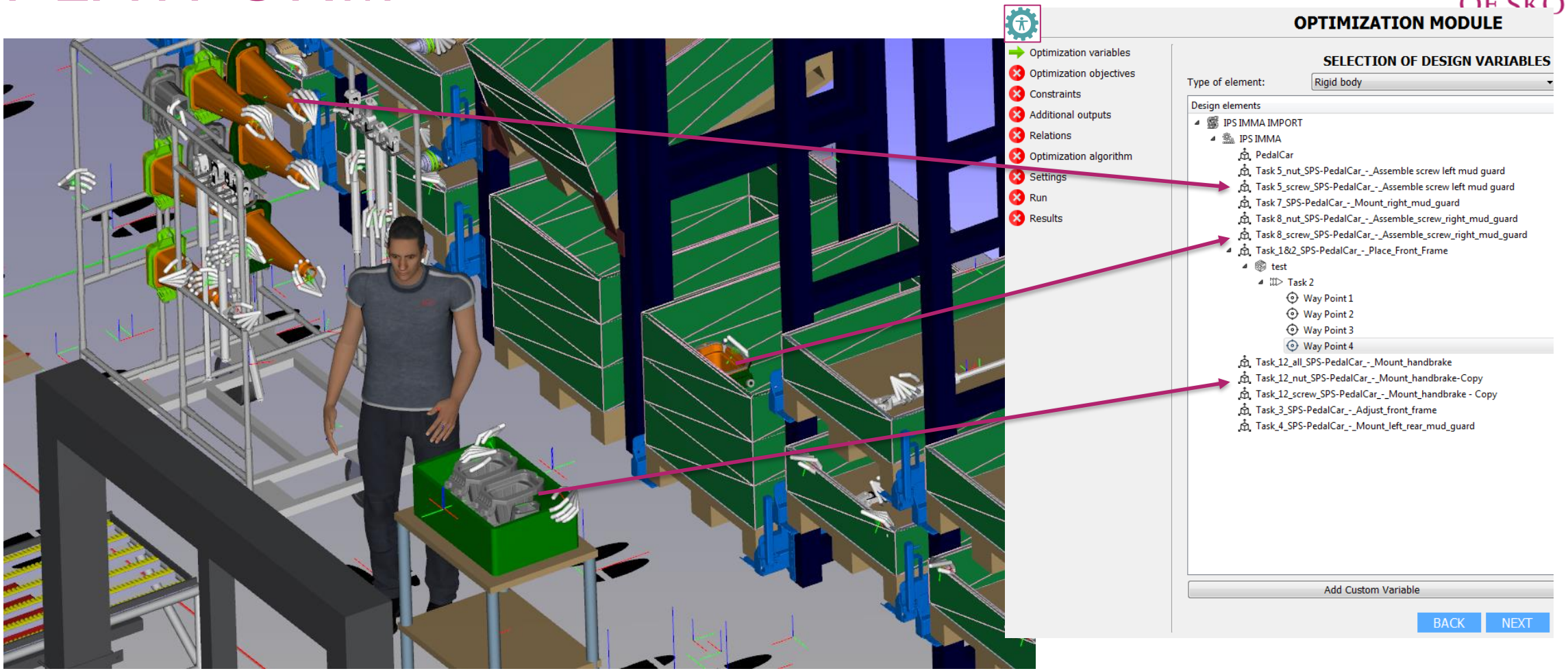

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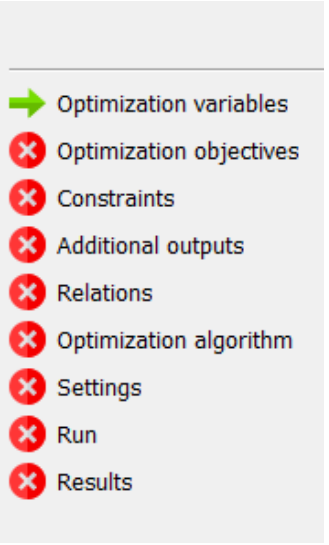
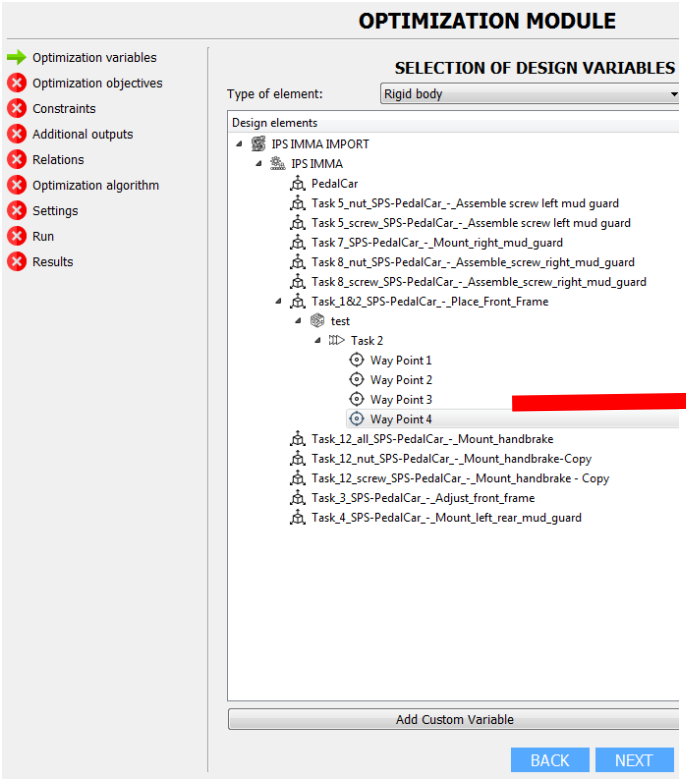
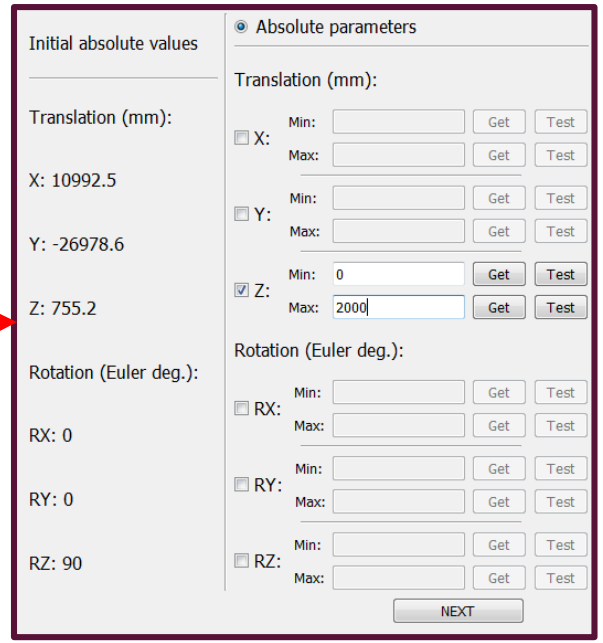
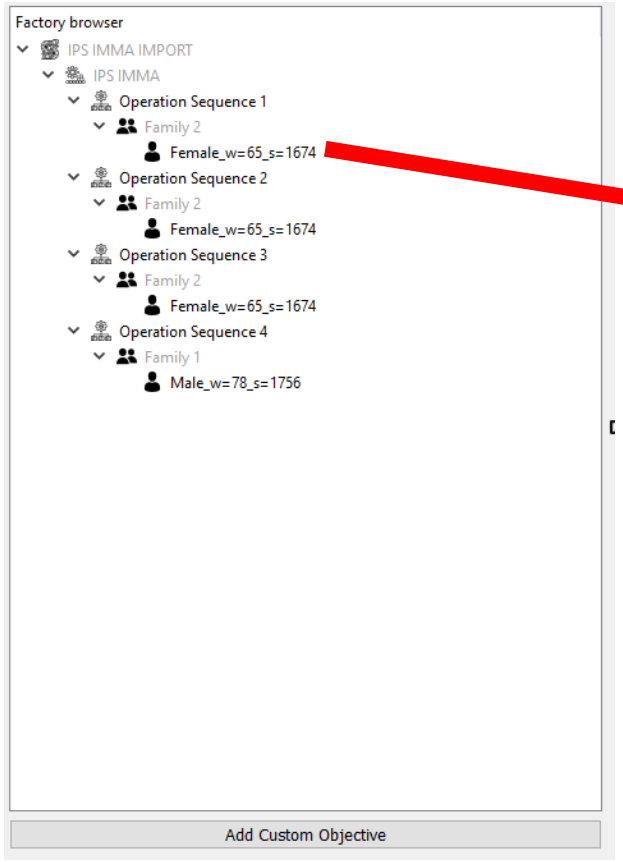


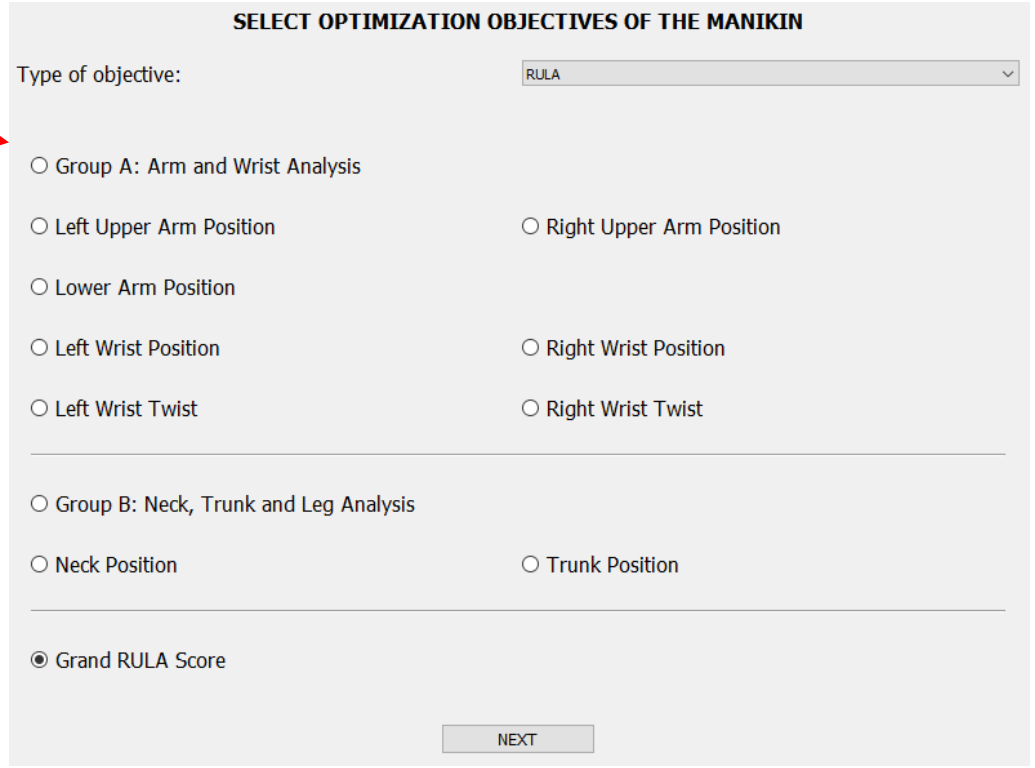




ERGONOMICS IN PRODUCTION PLATFORM

- Optimization variables
- Optimization objectives
- Constraints
- Additional outputs
- Relations
- Optimization algorithm
- Settings
- Run
- Results





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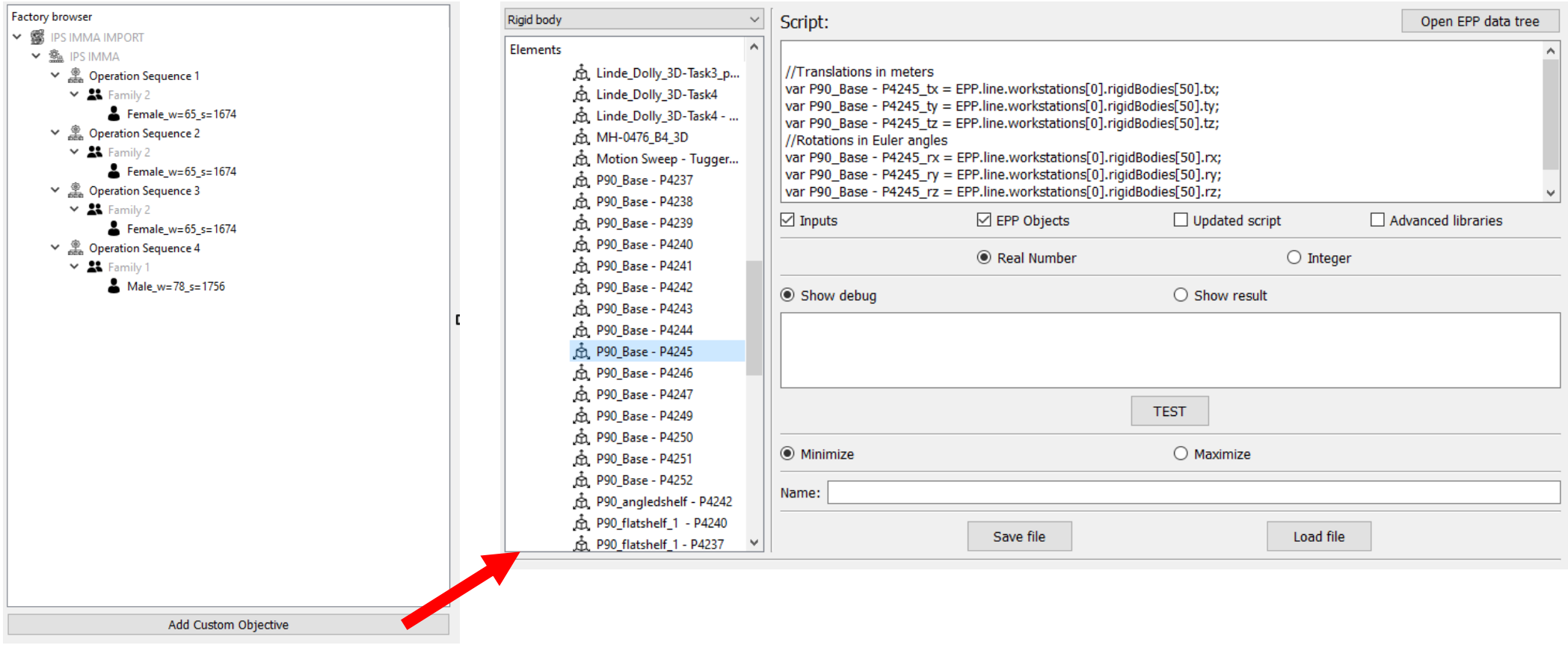

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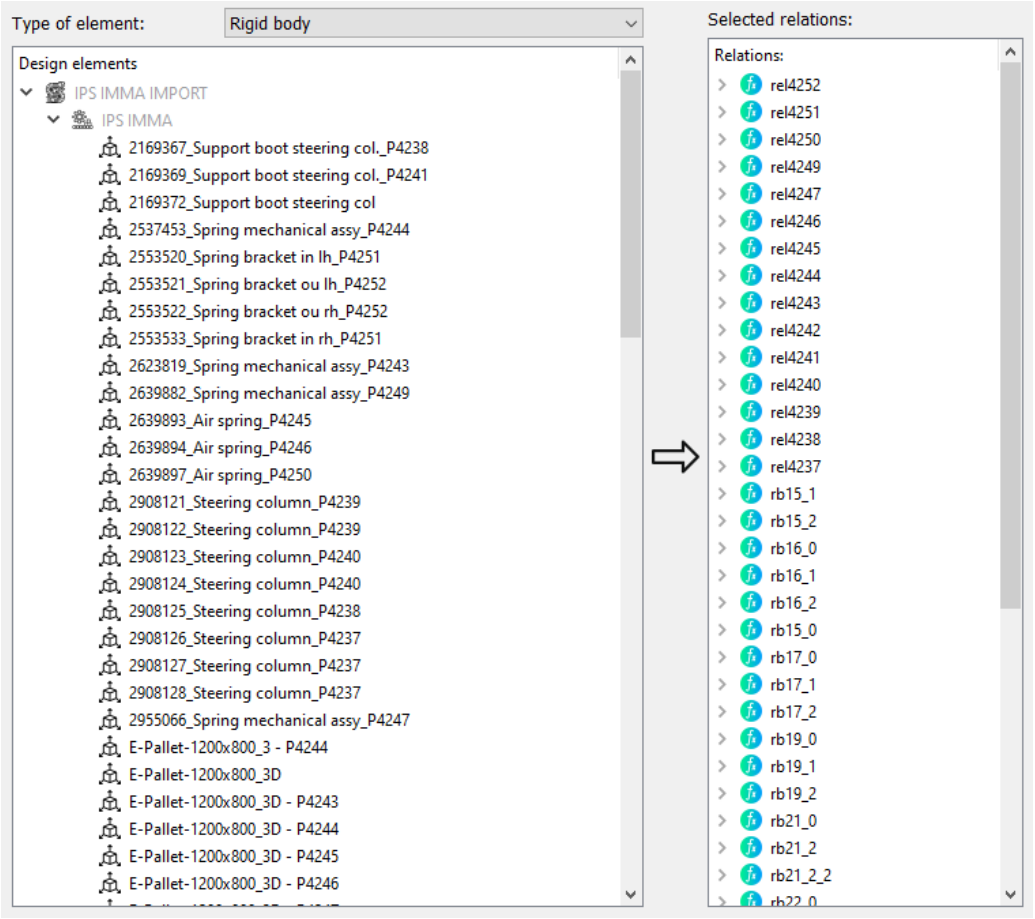

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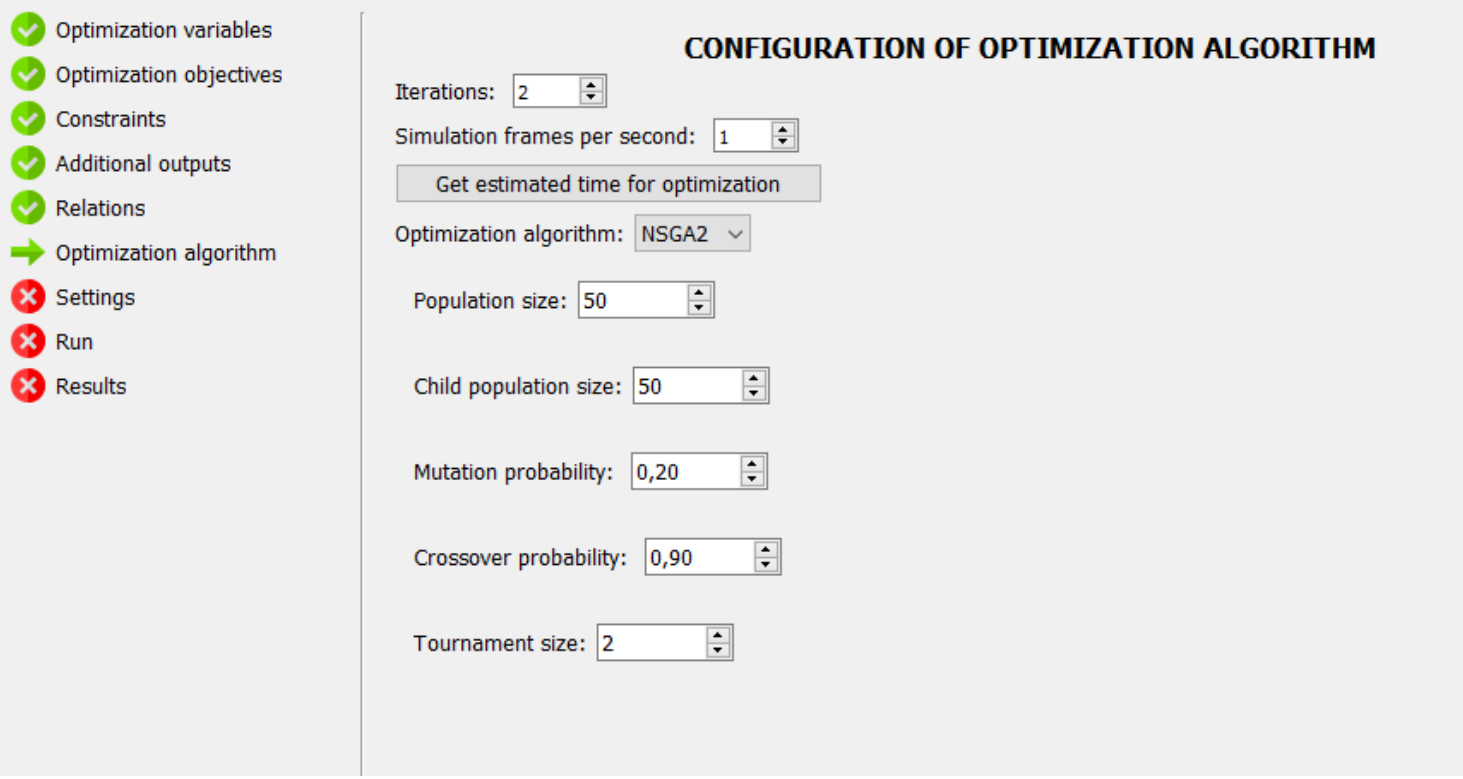

USE CASE – WELDING GUNS

DESIGN OF WORKSTATION FOR MANUAL WELDING

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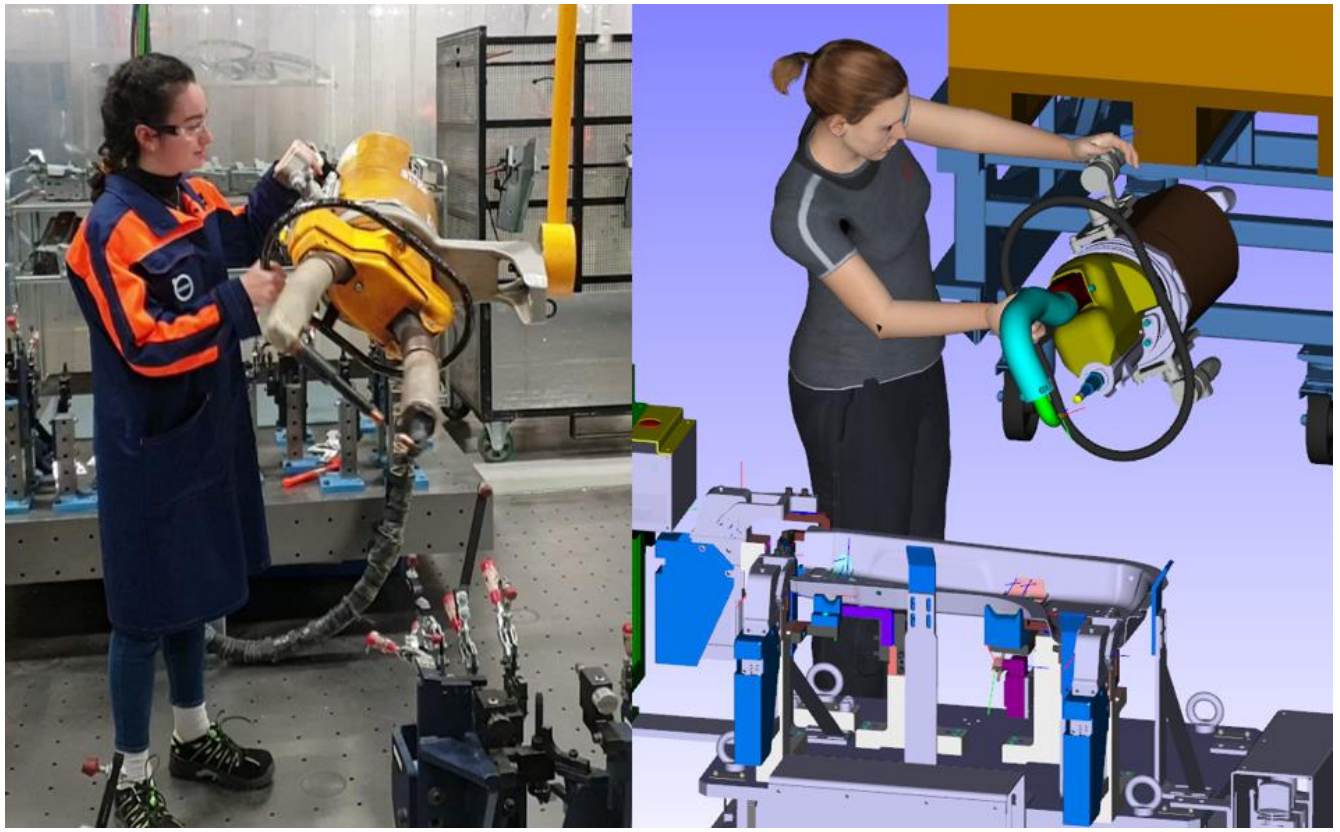

USE CASE – WELDING GUNS

DESIGN OF WORKSTATION FOR MANUAL WELDING

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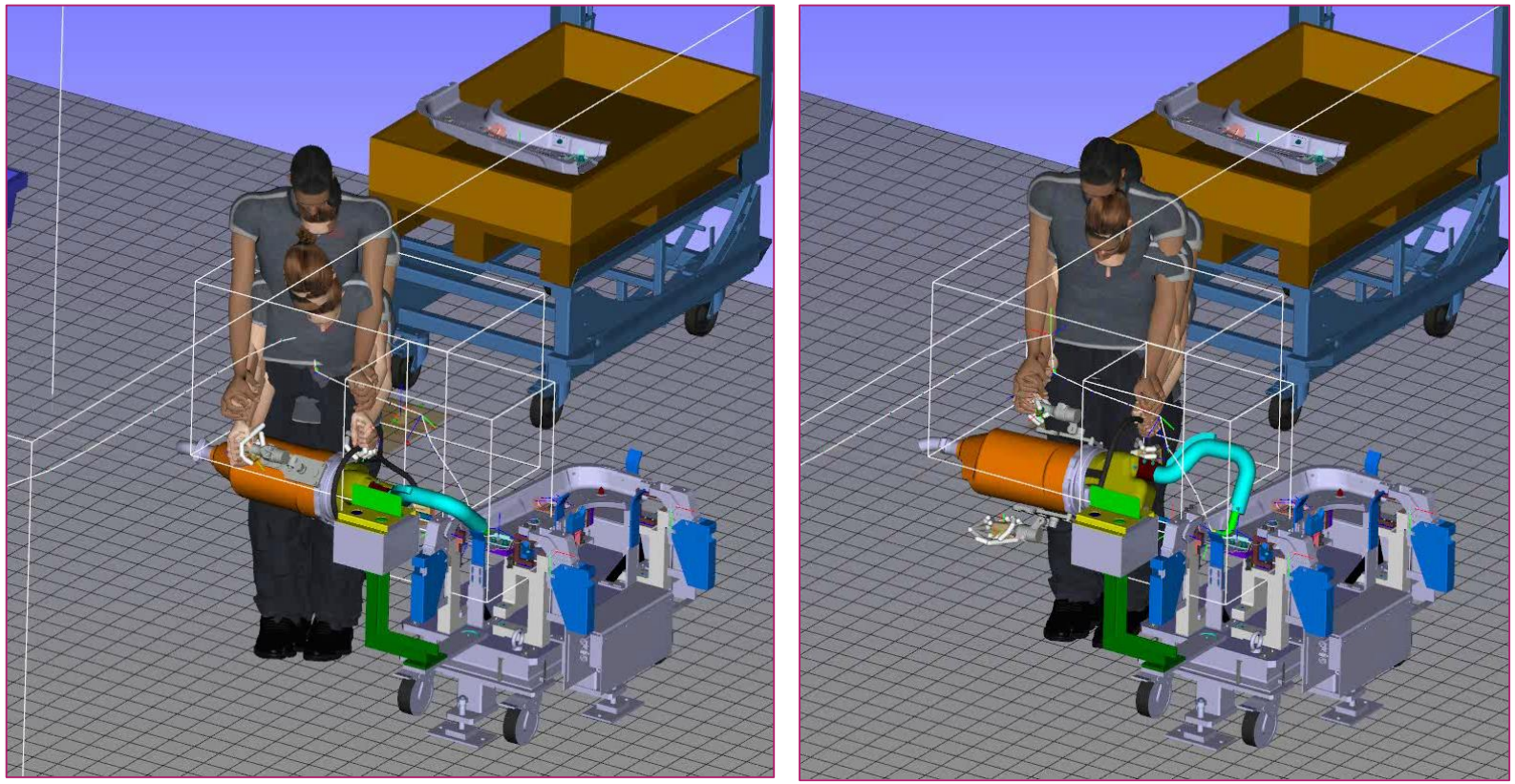
- Welding angle optimization considering anthropometric diversity:



USE CASE – PEDAL CAR LAYOUT

DESIGN OF PEDAL CAR ASSEMBLY LAYOUT

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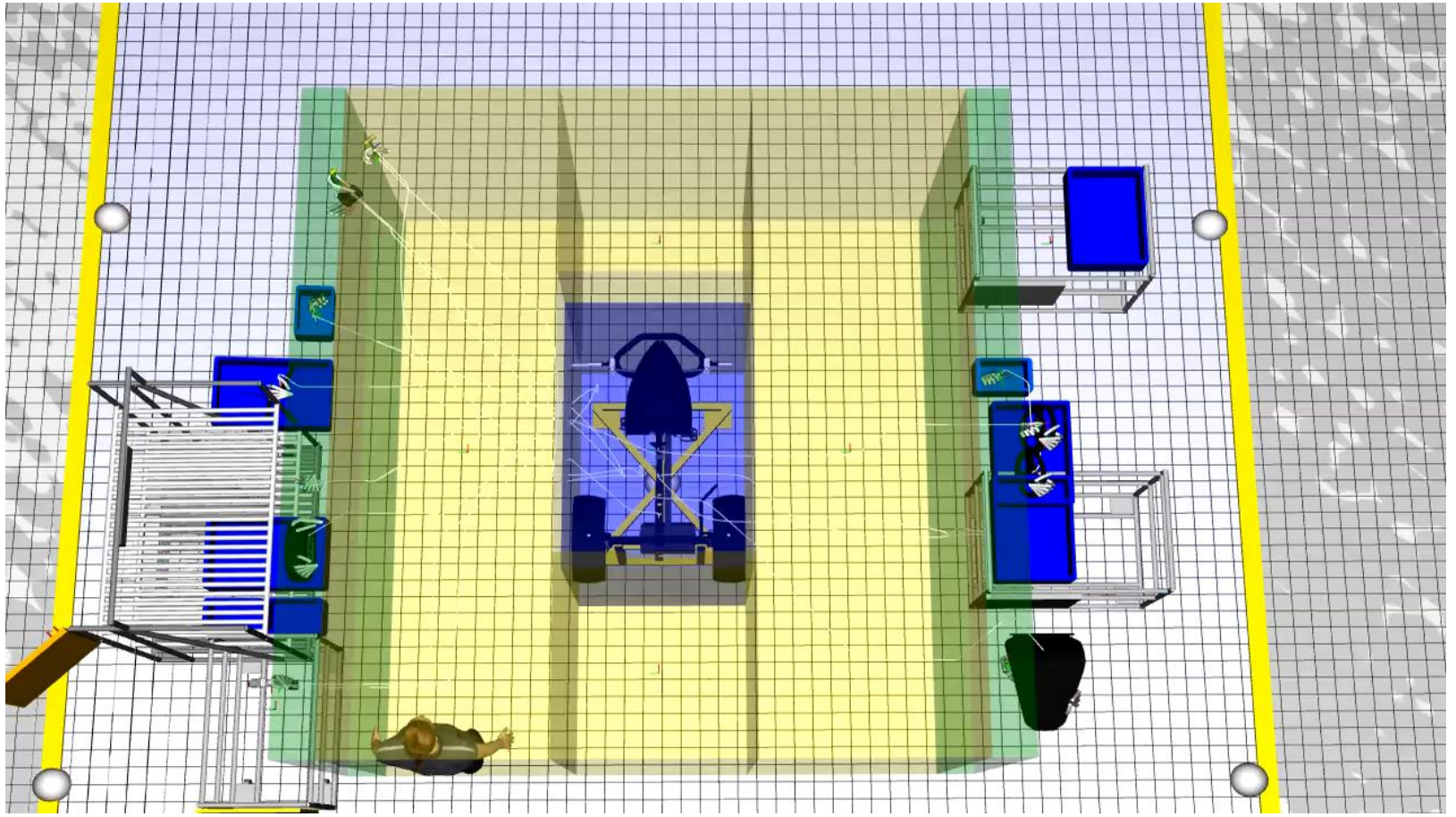

USE CASE – LOGISTICS PLATFORM

DESIGN OF LOGISTICS WORKSTATION LAYOUT

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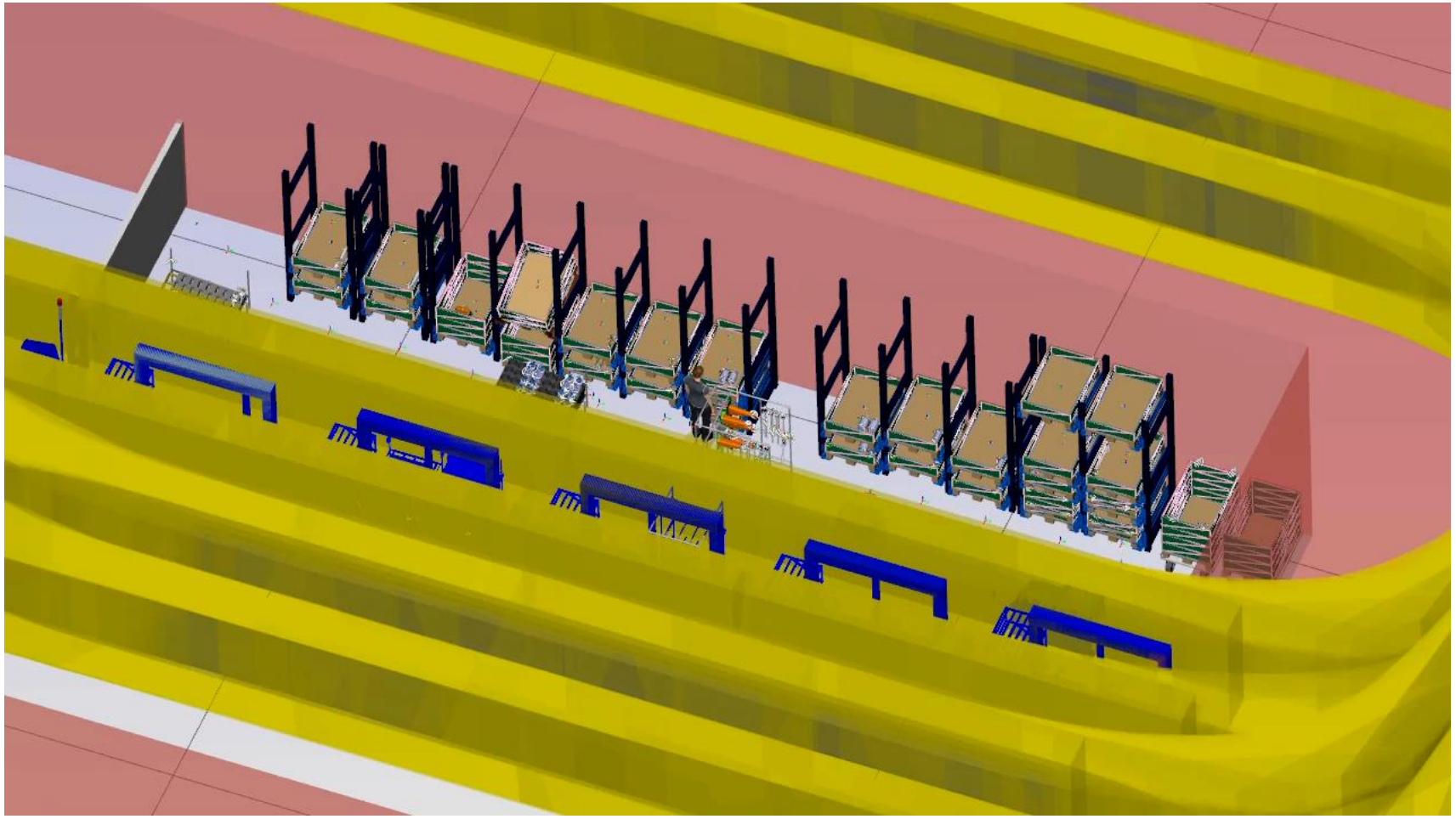

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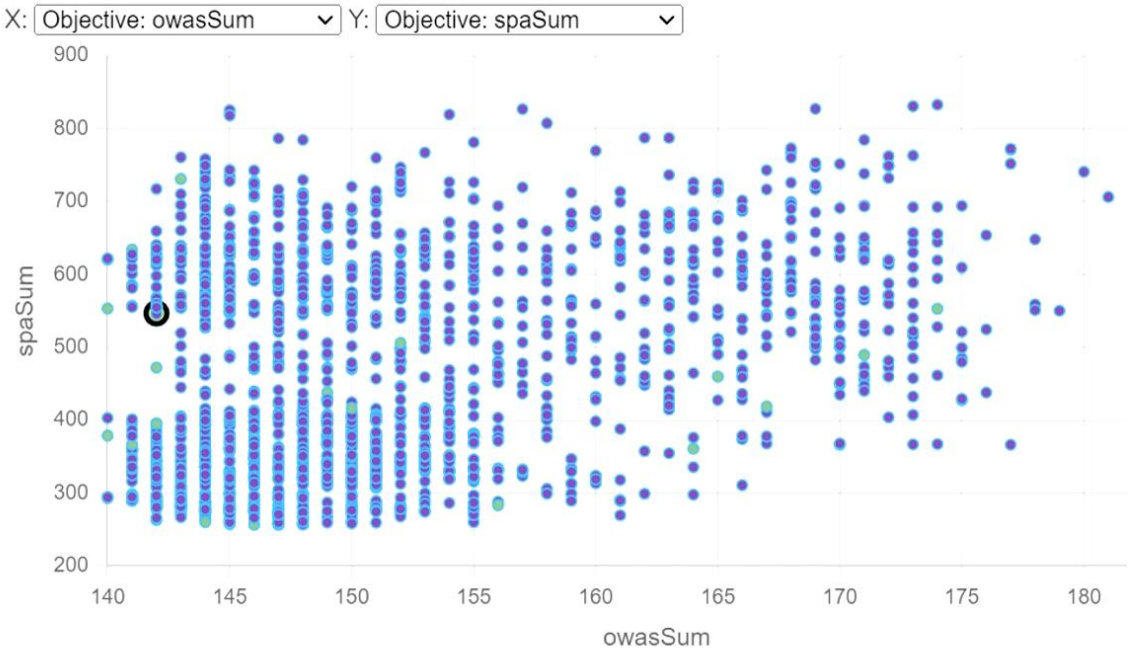

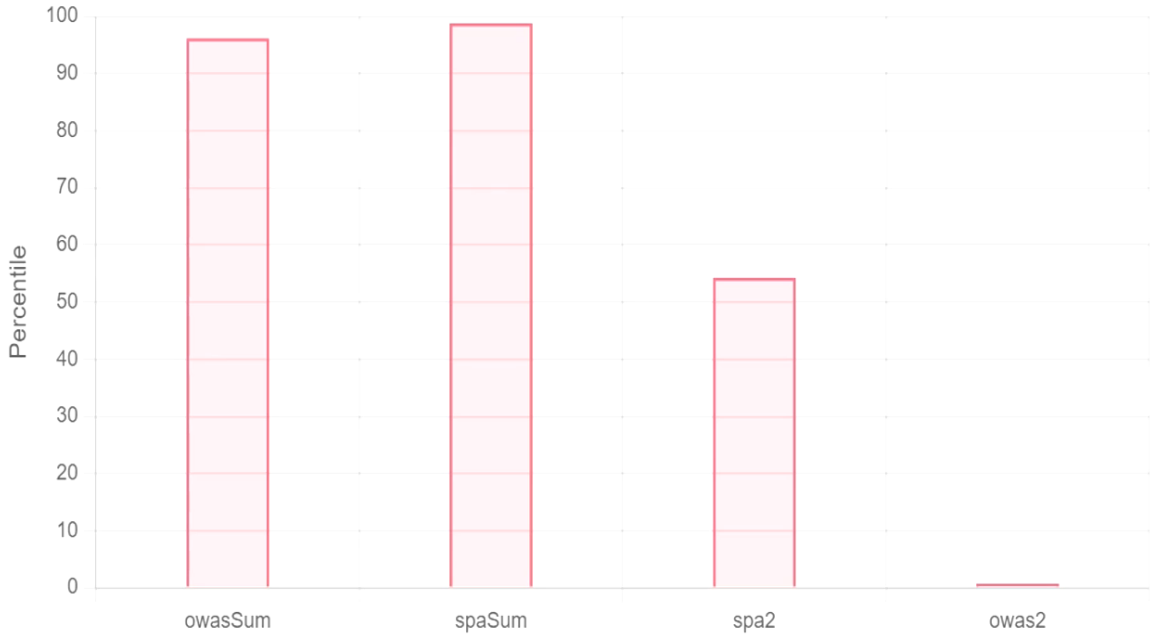

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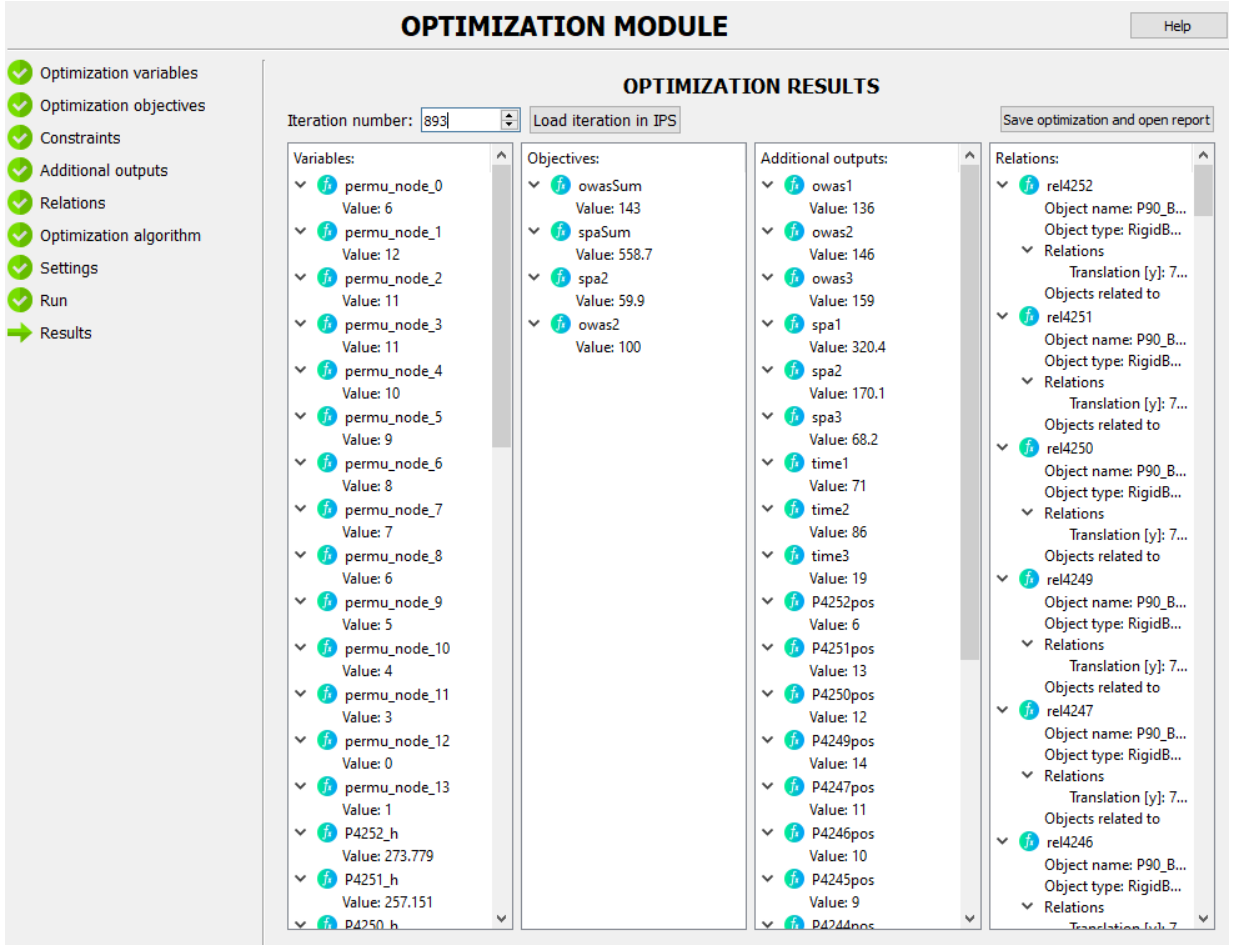

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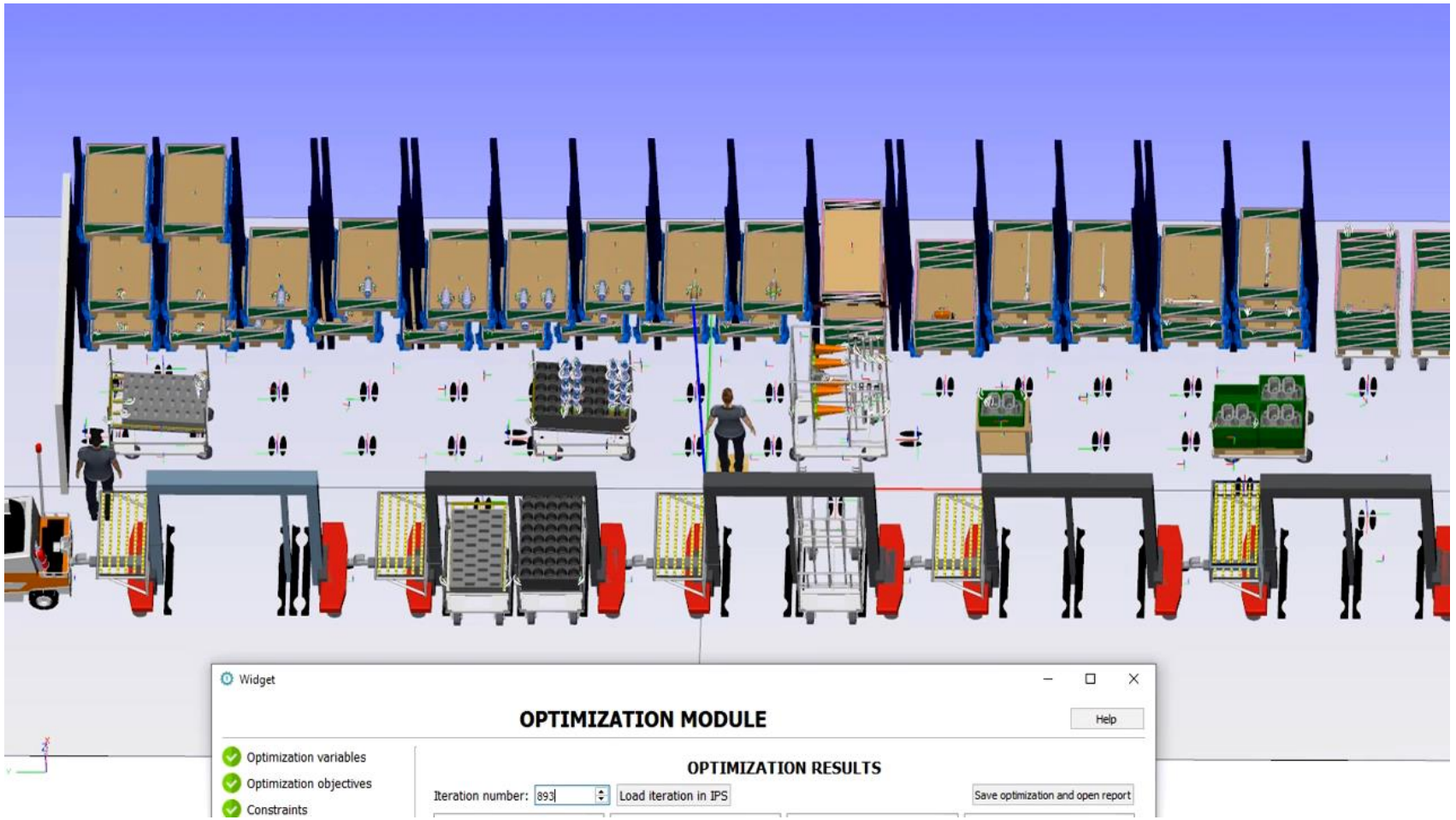

COME TO US!

- If you would like to test it yourselves.
- If you want to give feedback about Ergonomics in Production Platform.
- Possible additional use cases.

Thank you for your attention

Please contact me for any further questions: aitor.iriondo.pascual@his.se