

4D SIMULATIONS OF WORKSTATIONS: OPTIMISATION IN VIRTUAL SPACE BECOMES REALITY

Employees working in warehouses and logistics are subjected to physical strain and repetitive movement on a daily basis, which presents a challenge for both the body and the mind in terms of motivation. It is important to design workplaces that are ergonomic, healthy and attractive, especially in times when staff are difficult to find. In the long term, companies can depend on the commitment of experienced employees in particular as well as significantly increasing performance in warehousing and logistics.

Results for the optimisation of manual activities in logistics have so far mainly been determined on the basis of test setups and subjective evaluations according to the experience of individual employees involved in the test. This brings with it a high risk that subsequent improvements will have to be integrated into current logistics systems in a complex and predominantly costly man-

ner. "If a workstation isn't optimally equipped employees often come up with very creative solutions themselves", says Henrik Baltzer, Project Manager at Pierau Planung. "However that cannot and must not be the solution. Nowadays, ergonomics must have the same value as performance and cost effectiveness."

3D Representations Become (Virtual) Reality

The Hamburg Planning and Consulting team used state-of-the-art technology for the expansion of a logistics centre for a customer as part of its project: The Possibilities of Virtual Reality (VR).

With the aid of the innovative VR simulation model from the French company AF'ergo Conseil, new packing workstations were projected three-dimensionally into an actual walk-in room in original size. With



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VR glasses and equipped with a variety of sensors, employees can move in this combination of real and virtual space in the same way they would at their future actual workstation. The smallest movement made by the employees, together with the loads acting on them are immediately registered in the 3D room and in the software presentation.

The basis of the VR simulation was generated by using 3D representations of existing packing workstations created in the graphics department at Pierau Planung. Right from the initial set-up, technical draughtsmen/women have to create the various elements of the 3D representations in such a way that later, during the simulation, they can be moved as individual objects and



The avatar on the righthand monitor shows the movements of the real employee. The stress-affected parts of the body turn red.

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adapted as required. The simulation software takes the dimensions of the workstation directly from the drawings and generates a VR projection from them. “The real employee puts on 3D glasses and enters virtual reality,” explains Henrik Baltzer. “Simulation software captures all their movements using sensors attached to neuralgic points. These interact with the simulated workstation and the data obtained is transferred by the software to an avatar in real time.” This avatar represents the actual workload of the real employee. If the avatar turns green, nothing is incorrect or overloaded. The more stressed the musculo-skeletal structure becomes; the more the affected parts of the body turn red.

Objective evaluation thanks to ‘RULA’

The extent of exposure to RULA (Rapid Upper Limb Assessment) can be quantified. RULA is an objective evaluation system based on points,

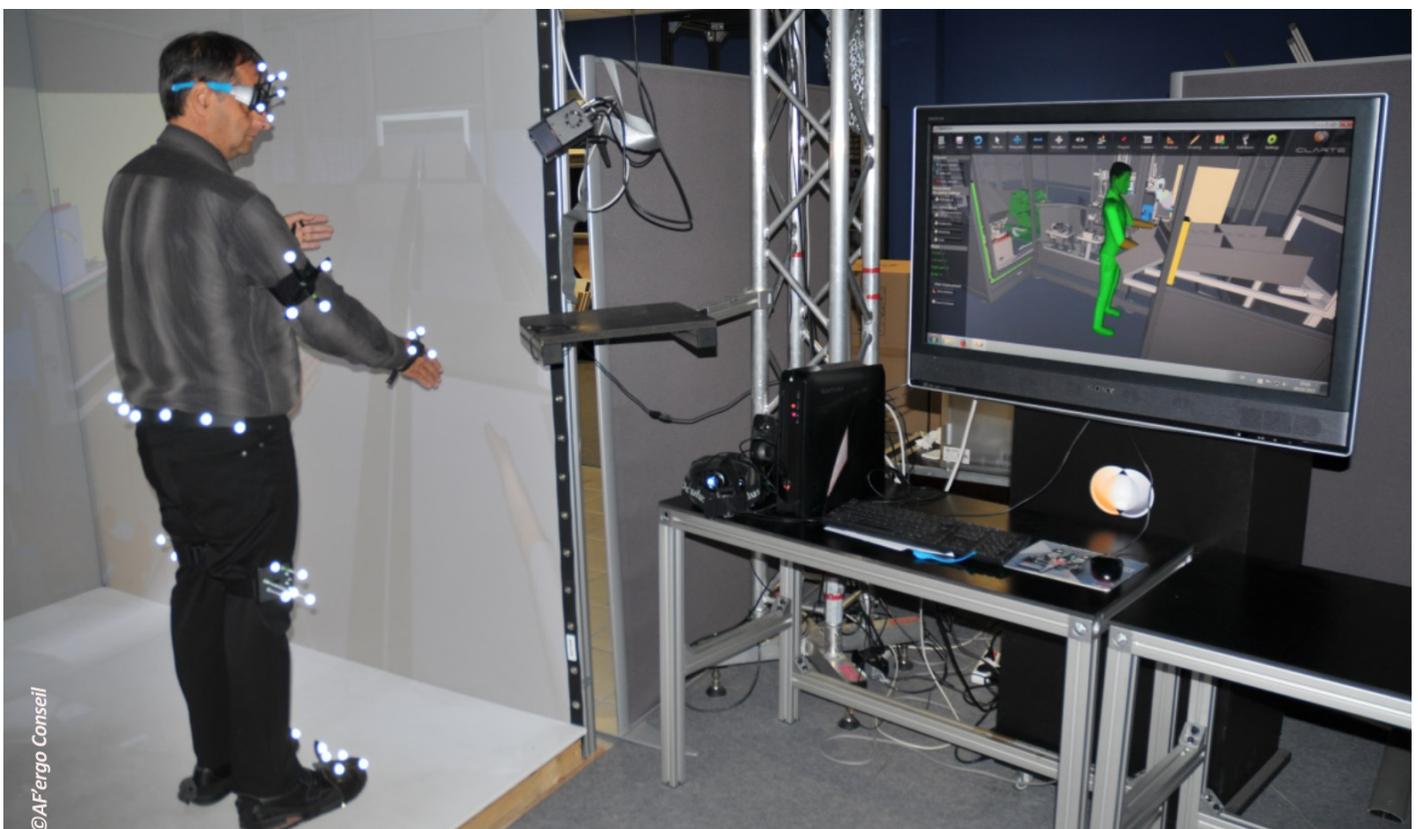
developed by McAtamney and Corlett, for the ergonomic assessment of workstations. The results provide information on the degree of stress and the need for further analysis and ergonomic changes to the workstation. The total number of points determines the procedure to be followed: from 1 to 2 = ‘acceptable conditions, no further action needed’ to 7 = ‘immediate initiation of measures required’.

The advantages of this method are clear: even before commissioning and real implementation, fine adjustments can be made in simulated ‘ongoing operations’ with regard to dimensions and arrangement of the workstation. Box weights and dimensions can also be set beforehand and adjusted as required or according to the expected simulation target. The effect of the adjustments can be read directly from the avatar.

The results of the VR simulation show that often only small adjustments have to be made in order to achieve significantly more efficient

processes. Henrik Baltzer: “Our customer has also gained important insights into the processes at packing stations on the basis of the simulation evaluation. Various measures were implemented to make employees’ work easier and more productive in the long term. Among other things, we have optimised the positioning of the packaging material, eliminated the sideways steps previously required by employees and added an additional incline on the conveyor system for storage of pre-packed shipments, thereby making it unnecessary to lift the packages up. Small measures with big impact.”

Ergonomics must be a fixed planning parameter in modern logistics. The well being of employees is vital and the increase in performance that can be achieved is an additional and very welcome benefit. <<



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The real employee’s movements are recorded by software via sensors on the body and transferred to the avatar.