

Institut für Arbeitsschutz der Deutschen Gesetzlichen Unfallversicherung

Setting-up a Virtual Reality Simulation for Improving OSH in Standardisation of River Locks

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Introduction **Methods**

- ➤ German network of waterways (about 7400 km, about 450 lock sites) o increase freight transport volume, reduce costs, improve OSH o use of standardised components for river locks
- > How to improve safety and ergonomics through design early on o research project initiated by UVB, collaborators: UVB and WSV
 - o risk assessments and documentation according to EU Directives
 - o recommendations for procedural guidelines





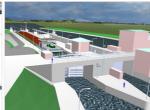
- > Setting-up VR simulations of machinery in the context of use o provide dynamic simulation versus perform assessments o stepwise procedure in 9 steps; iterative, flexible, creative process
- > Generic and specific VR modelling and simulation
 - o improve OSH for components and whole machinery
 - o provide recommendations for component standardisation
 - o facilitate procedure for any other machinery or work system

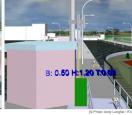
Illustration





















Procedure

- O Clarify and specify purpose of VR model
 - oEU Directives: Machinery (2006/42/EC), Construction Sites (92/57/EEC), OSH Framework (89/391/EEC)
 - o support risk assessments, guidelines
 - o evaluate measures for risk reduction
- 2 Understand and describe context of use odescribe context of use (tasks, user, equipment, environment) oinclude: operational states, modes of
- 3 Define and select scenarios
 - o describe procedures of tasks/activities
 - o storyboards for sequences of events
 - o criteria based selection of scenarios (e.g. tasks, hazards, accidents, operators)

operation, systems design and life cycle

- 4 Identify and select all relevant information select drawings (paper, CAD)
 - oidentify 3D models available, purchase 3D models, (manual) 3D redesign
- **5** Design model components
 - o3D CAD format, level of detail, design requirements for structure and dynamics
 - odesign of 3D CAD solids
 - ovrml format and compatibility
- 6 Human-system interaction in scenarios o sequence of events, dynamics
 - ocontrol of scenarios (model to simulation, complexity, speed, repetition, activities) ocomponents suitable for master model
- ® Evaluate the usability of the VR model o avoid hazards and impairments by VR o suitability of river lock simulation osuitability for risk assessments

Merge all into one VR master model

(position, orientation, size, show/hide)

o compose environment (landscape, sky,

barges, river lock components, sounds)

odatabase and master model

- Application of the VR model
- oVR media, SUTAVE, scenario control, activity log, performing risk assessments
- ointerdisciplinary user group
- documentation and OSH improvements

