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A person with narrow vision has a restricted horizon; a person with wide vision has plentiful opportunities

From Mock-Ups to Models: Transforming Design with Digital Human Modelling

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Abstract

Human Factors has long employed the use of prototype modelling as part of design assessment principles. From using real aircraft to demonstrate evacuation behaviours, to producing mock-ups of car chassis to determine maintenance access points, physical models have been used to demonstrate the limitations of design to designers and policy makers. However, large full-scale models are expensive to build, and often rely on a pre-existing design, which means that they are often met with change resistance from engineers who have progressed through multiple design stages with a mental model that has now been physically built.

Here I will introduce the work undertaken using digital human modelling as part of engineering design in the rail industry.

Case Study 1: Demonstrates how digital human modelling was used to prove that cable trays used to secure HV cables in rail tunnels provided sufficient spacing for maintenance activities, demonstrating the space requirements provided by electrical standards were suitable for predictable human activities. This was achieved in the span of one hour by a single person.

Case Study 2: Demonstrates how digital modelling was used to determine the most appropriate distance for a handrail to be placed from the edge of a rail tunnel walkway, accounting for postures adopted by users with reduced mobility. Within a day, a measurement could be provided that would be appropriate for the task, allowing for an early design change.

This method of human digital modelling allows for designs to be checked and adjusted early in their lifecycle – before a designer's mental model has become fixed and change-resistant – while providing a visual aid to demonstrate ergonomic principles to designers. Compared to physical mock-up demonstrations, this method also allows for time and money to be saved on building environments and hiring actors, while still ensuring that human ergonomic requirements are met.