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Abstract

User-centred design methods improve the understanding of user work practices and enable construction of customized and user-friendly products. Applying these methods is, however, challenging since the users must be able to test prototypes which is too time consuming and expensive with real prototypes. This is particularly true in the case of a mobile work machine cabin because the cabin forms an integral part of the machine so that elements need to be prototyped.

The main properties of the cabin are the drivers' visibility, functionality, ergonomics and safety. Virtual environment (VE) offers an effective way to realize prototyping and provides a means to study the drivers' visual field from the cabin. Today's design work is already performed using 3D CAD software. Introducing such models in VE is, however, not without its obstacles, since no native CAD format is supported in VE. Employing a general-purpose 3D graphics format usually destroys the model structure and also visualization parameters such as textures and lighting. When the aim is to have users test the functionality of the cabin, the VE model is unsatisfactory because certain physical parts are also required. First the bench is needed to ensure natural posture of the test driver. Second, the steering wheel and pedals are the objects with which the driver most typically interacts. Third, a set of control panels, including gauges and switches, are also often interacted by the driver.

This study presents a setup for virtual testing of a mobile work machine cabin as a resource for user-centred design. The study focuses on the importance of physical objects in making the test situation realistic for hands-on professionals. The prototypes are tested by cabin design professionals experienced the use of CAD tools and real prototypes. The aim is to obtain designers' evaluations and interpretations of different combinations of virtual and physical objects in prototypes. To achieve this a procedure for user-centred design of mobile work machine cabins is presented. More generally, the study discusses the participation of users in the design process employing VE as a design tool.