Summary 1:

An integrated working environment using advanced augmented reality techniques

In recent years, more and more elements of VR have been introduced in to assembly processes, starting from the very beginning in product design. All of this was however, limited to a VR environment and could not be carried over to the real world. To bridge this gap, AA (Augmented Assembly) was introduced. AA builds AR directly into the assembly process and enhances the real environment with virtual objects. This would lead to increase in the efficiency and comfort of the assembly process, from design to the actual assembly. Both hardware and software aspects are key components in determining the AR interactivity in such systems. Position of the user is obtained through marker tracking and the content of the display would change correspondingly. The system has a control unit block and input data collection block which process the information, then the AR is applied as a reverse projection on to a transparent reflective surface for view. During manufacturing, visual elements and audio tracks generated from processing the data collected could be used to help designer in the installation process. Other features could also be included to further simplify the assembly process.

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abstract={This paper presents an Augmented Reality (AR) comprehensive assembly system for the multi-interactive creation of assembly processes. The special multimodal interface allows the presentation of not only new types of visual display but also interestingly designed voice instructions and material flow management. The system simulates many-sided and complicated assembly tasks in various areas of manufacturing. We use a half-silvered mirror and a face tracking system to detect the mutual interaction between users and 3D object imaging. The positional sensors of the workbench and the precise tracking of markers allow significant information on the exact position of real assembly components to be harvested. On the basis of continuous monitoring of material flow the system knows how to recognize that the value of the quantity has fallen below the permissible value which is useful for the indirect monitoring of stocks and enables upcoming predictions of low states in storerooms. The paper presents a complex AR system and the interaction techniques for improved productivity of the entire assembly process. The interaction techniques of the AR system have been tested by an industrial company. The test results are explained and show that our AR system gives powerful virtual

tools to create assembly instructions without human error.},
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