

## Multi-Modal Visualization of Working Instructions for Assembly Operations

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**Abstract :** Growing individualization and higher numbers of variants in industrial assembly products raise the complexity of manufacturing processes. Technical assistance systems considering both procedural and human factors allow for an increase in product quality and a decrease in required learning times by supporting workers with precise working instructions. Due to varying needs of workers, the presentation of working instructions leads to several challenges. This paper presents an approach for a multi-modal visualization application to support assembly work of complex parts. Our approach is integrated within an interconnected assistance system network and supports the presentation of cloud-streamed textual instructions, images, videos, 3D animations and audio files along with multi-modal user interaction, customizable UI, multi-platform support (e.g. tablet-PC, TV screen, smartphone or Augmented Reality devices), automated text translation and speech synthesis. The worker benefits from more accessible and up-to-date instructions presented in an easy-to-read way.

**Keywords :** assembly, assistive technologies, augmented reality, manufacturing, visualization

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