Mixed Reality for Training and Industrial Applications

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Large-scale industrial facilities like coal-fired power stations involve many complex processes that are difficult to understand and explain for new employee trainees. Computational fluid dynamics (CFD) simulations have been conducted and used to produce 3-D models and scientific visualization of the inner processes of a large boiler at a power station for training of employees. This research presents and interacts with these simulations through mixed reality (MR). CFD is being employed to simulate the boiler components and the entire combustion procedure. Simulation results present detailed flow characteristics, and temperature gradients are represented as colored streamlines and contours merged with virtual reality (VR) 3-D models of the facility. Our research combines 3-D printed models of industrial facilities with augmented reality (AR) using a camera to capture the model and show simulation results within the physical model using a projector in real time. This will provide easy access to all the details, which allows presenters to control the display perspective and view the combustion and flow phenomena more intuitively. This process of combining mixed reality technologies with CFD has potential to change the way new employees in industry are trained.

Research advisors Chenn Zhou and John Moreland write, ‘Jichao and Yanghe are exploring new techniques to use mixed reality for industrial training. Their project’s integration of simulation data with 3-D printed models and augmented reality has potential to transform the way engineers and operators interact and communicate with data for training and out in the field.”