

VADE: A Virtual Assembly Design Environment

ABSTRACT: The Virtual Assembly Design Environment (VADE) is a Virtual Reality (VR) based engineering application that allows engineers to plan, evaluate, and verify the assembly of mechanical systems. This system focuses on utilizing an immersive virtual environment tightly coupled with commercial Computer Aided Design (CAD) systems. Salient features of VADE include: 1) data integration (two-way) with a parametric CAD system, 2) realistic interaction of the user with parts in the virtual environment, 3) realistic assembly environment, 4) creation of valued design information in the virtual environment, 5) use of engineer's assembly design intent in the virtual environment, 6) parametric design modifications in the virtual environment, 7) collision detection, 8) inclusion of assembly tools, and 9) physically-based modeling. This paper describes the functionality and applications of VADE. A discussion of the limitations of virtual assembly and a comparison with automated assembly planning systems are presented. Experiments conducted using real-world engineering models are also described. The relationship of VADE with efforts at NIST to define standards for assembly representations (OpenADE) is also described.