Roadway Design Models: Streamlining Conversion for Driving Simulation

While providing recognized value in the fields of research and training, driving simulation application in the field of civil engineering roadway design has been slow to gain acceptance in the U.S. due partly to investment cost, long lead time for scenario and content development, and specialized expertise to support that investment.

Within these constraints it becomes necessary to develop a simplified process whereby public Transportation engineers continue to design roadway projects using standard methods, and then integrate those designs into a virtual proving ground simulation – trying the designs in the same fashion the project will ultimately be used – by experiencing it in the four dimensional world of a driving simulator.

This paper presents a project that created an automated software application which generates a driving simulator environment directly from a 3D transportation model. There were two overriding requirements: minimal user interaction, and visualization of the graphical representation of the engineering design. Variability in the design model (2D vs 3D) despite civil design standards was one challenge encountered during converter development. Especially problematic are junction elements that make up the logical road network used by the scenario vehicles to navigate around the model.

The end product is a tool that has been successfully tested on one grade separated freeway interchange design model. Future work for increasing the capabilities of the tool will focus on creating textured surfaces and solids, extending the junction processing to improve curve definition, and supporting multi-level interchanges and more complicated models.