

## VE-Suite

VE-Suite is being developed as an open source library of tools that enables the virtual engineering process to take place. As described by Prof. Bryden, "Virtual Engineering is a user-centered process that provides users with access to a collaborative framework that integrates all of the models, data, and decision-support tools needed to enable the user to make an engineering decision. The goal of virtual engineering is to develop a decision making environment that provides a first-person perspective enabling the user to interact with the engineered system in a natural way and provides the user with a wide range of accessible tools." Virtual Engineering applications are typically developed by software experts, using high level languages, but are intended to be used by engineers, managers and decision-makers that are not experts in graphics, programming, or computer usage.

VE-Suite is an extensible software architecture and is composed of several tools, including VE-Builder, VE-Conductor, VE-Xplorer, VE-CE, and VE-Designer. These tools are intended to allow the developer to more readily develop a virtual engineering application. VE-Builder encompasses all the functionality needed to build the virtual engineering environment. VE-Conductor orchestrates the various functions of VE-Suite, includes a tablet-based graphical user interface, and is used to access all the components in VE-Suite. VE-Xplorer permits analysis and interrogation of data. VE-CE is the computational engine that allows the integration and data passing mechanisms for a diverse set of data sources (i.e. experimental data streams, numerical models, algebraic equations, or any other form of data). VE-Designer, which is still under development, will contain engineering design tools that allow the interactive construction and interrogation of virtual models. Currently, VE-Suite can read, display, and combine multiple steady and transient data sets including experimental data, CAD data, and CFD/FEA results in both two and three dimensions.

VE-Suite is an open source software package. Several companies and research groups, including NETL (National Energy Technology Laboratory), REI (Reaction Engineering International), and John Deere are collaborating with VRAC to improve and extend components of VE-Suite. Currently, VE-Suite is in use in several large organizations, John Deere, NETL, and REI. In the past year, Deere started actively using VE-Suite in its design and development process. Within the next year, VE-Suite will also be in use at INEEL (Idaho National Engineering and Environmental Laboratory).