

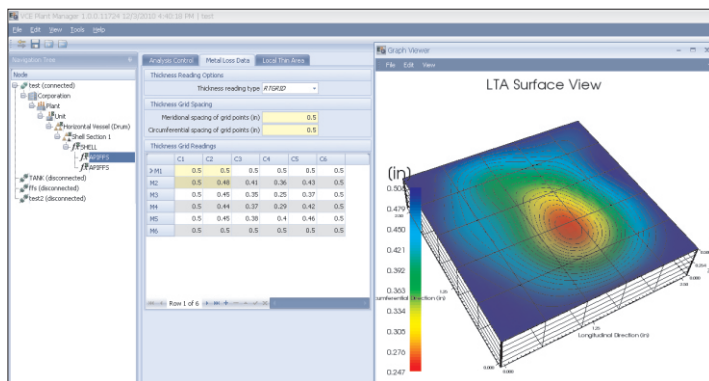
# E<sup>2</sup>G Tools for Inspectors

## VCESage Inspector

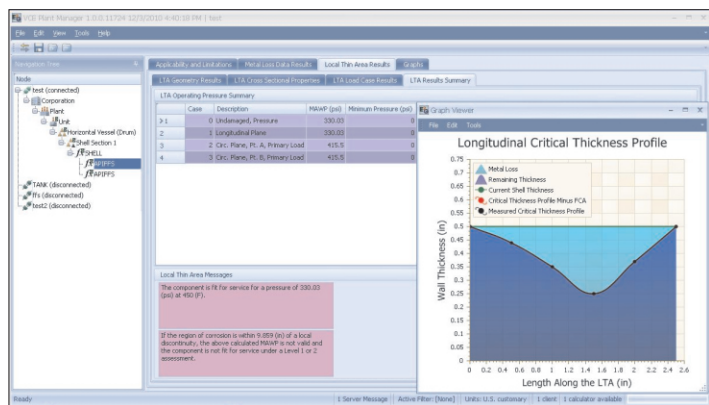
VCESage Inspector is a collection of VCESage modules geared towards code calculations and Fitness-For-Service (FFS) evaluations of Piping, Pressure Vessels, and Storage Tanks. VCESage Inspector includes the VCESage modules APIPE, SHELL and TANK, which perform ASME and API code (and re-rating) calculations for piping, vessels and tanks. The package includes the new VCESage module APIFFS-1, which performs API 579-1/ASME FFS-1 Level 1 Fitness-For-Service calculations on these same fixed equipment items. The package can also be upgraded to include Level 2 FFS capabilities. TANKSETT is another new module in VCESage Inspector. TANK SETT can be used to evaluate tank shell and bottom settlement in accordance with API 653. The VCESage Inspector package can be used standalone or integrated with the latest version of API RBI Software on the VCEPlant Manager platform. Here are two examples which show how it can be used:

### Evaluation of Metal Loss

API 579-1/ASME FFS-1 assessments of metal loss on a pressure boundary component can be performed using the VCESage Inspector Package. Both general and local metal loss (and pitting) can be evaluated; general metal loss can also be calculated using thickness averaging found in other standards, such as API 510. The graphic below shows typical thickness reading data required for a VCESage Inspector metal loss assessment.

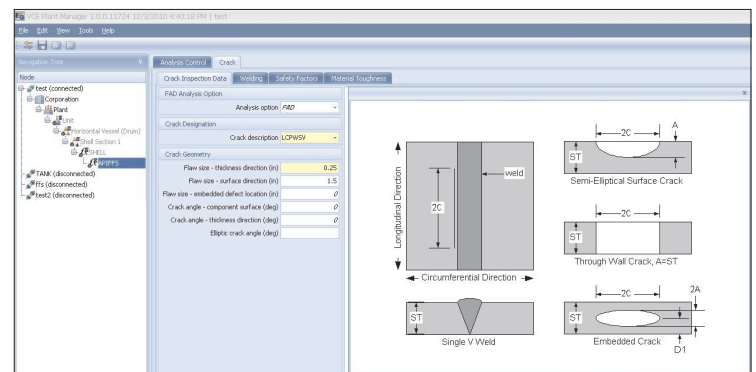


The results (below) show the component in this assessment is fit for service at 330 psig (and the assessment temperature of 450°F).

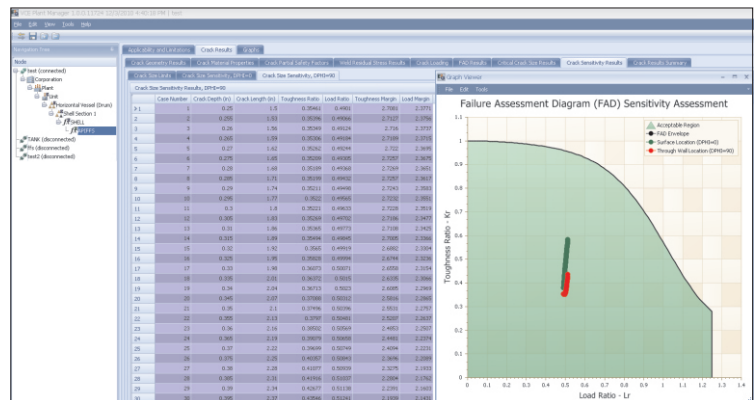


### Evaluation of Crack-Like Flaws

A crack assessment of a pressure component can be performed per API 579-1/ASME FFS-1 Part 9. Typical input is shown below.



Sensitivity of the crack-like flaw to changes in the crack size can be performed automatically. Below is example output of crack size sensitivity for the above flaw.



These are just two examples of the many types of Fitness-For-Service assessments that can be performed using VCESage Inspector.

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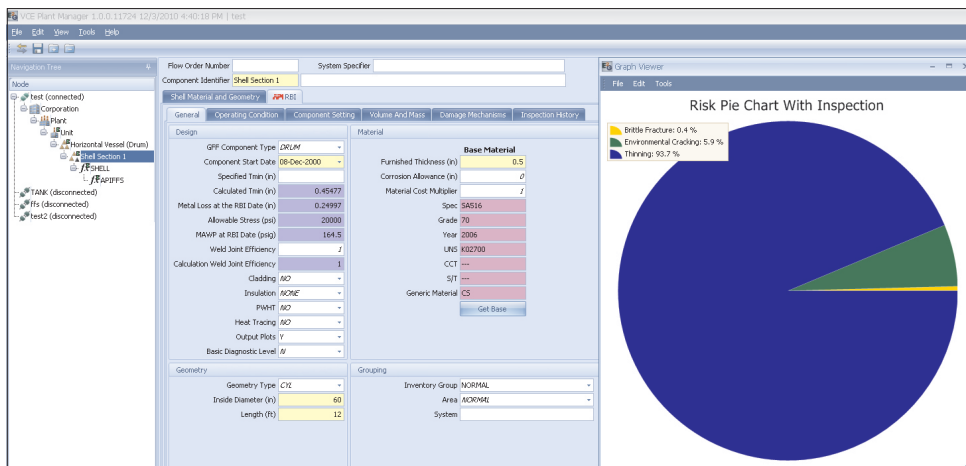
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## NEW API RBI Software links to VCEInspector

The newest version of API RBI software is integrated with VCESage Inspector on the Plant Manager platform, so now it's easy for API RBI users to make a Level 1 Fitness-For-Service assessment part of an inspection planning program.

API RBI technology and software are the industry-wide standard for performing RBI in the refining, petrochemical, and chemical industries. Developed within an API-sponsored Joint Industry Project by members from the major refining and petrochemical companies, the technology is fully documented in API 581 Risk-Based Inspection Technology, and vetted and standardized through the API consensus balloting process. An overview of the capabilities of the API RBI technology and software are provided below:

- Equipment specific risk-based procedures based on equipment type, including pressure vessels and piping, tanks, heat exchanger bundles and pressure relief devices
- Advanced Probability of Failure modeling on a wide array of damage mechanisms; ASME Code  $t_{min}$  calculations for vessel components and piping; and an ASME material specification database covering allowable stresses and engineering properties of base and overlay/clad materials
- State-of-the art consequence modeler with direct event tree solution using an embedded cloud dispersion modeler
- Inspection planning based on risk derived from the Probability of Failure and consequence models



For more information on the integrated Plant Manager platform, please contact [gcalvarado@equityeng.com](mailto:gcalvarado@equityeng.com)

## VCEDamage Software

Designed for inspectors and maintenance personnel, VCEDamage software is a quick reference guide for identifying and understanding the potential damage mechanisms that can cause costly fixed equipment failure. It is the only software created specifically to help streamline the process of pinpointing damage mechanisms and potential areas of risk.

With a technical basis in API RP 571 and WRC 489, this easy-to-use software provides:

- Guidance through the damage mechanism selection process
- Help in selecting the best inspection method for each type of damage
- Simplified Process Flow Diagrams (PFDs) that show where damage is likely to occur in a process unit

A demo version of the software can be downloaded from [www.equityeng.com](http://www.equityeng.com). Both corporate and individual licenses are available.

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