

Verity™ in fe-safe™

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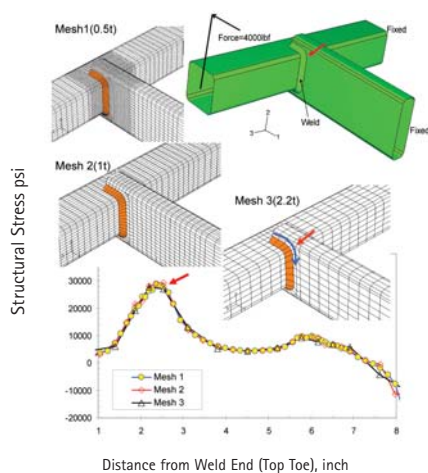


A Major Breakthrough in Fatigue Analysis of Welded Joints

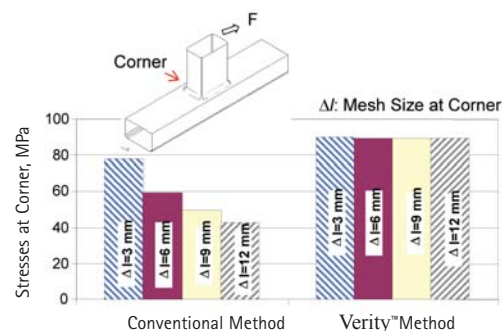
Battelle has licensed the Verity™ structural stress method to **Safe Technology** to create a new module in fe-safe™, the state-of-the-art durability analysis suite for Finite Element models.

The revolutionary new Verity™ mesh insensitive structural stress method developed by Battelle allows engineers to predict failure locations and calculate the fatigue lives of welded joints or structures.

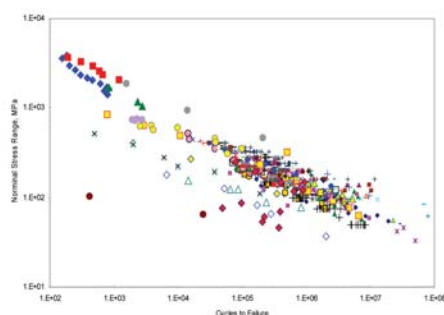
The Battelle method can be applied equally well to welds in thick or thin structures. Seam welds, laser welds and spot welds are analysed using the same procedure.



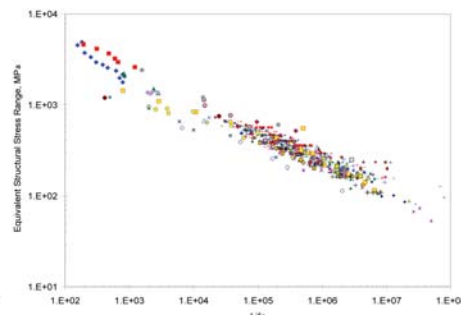
Mesh-Insensitivity Validations for a RHST Joint under complex loading



Comparison of Conventional and Methods Mesh-Size Effects



Conventional Method



Verity™ Method

Verity™

- offers consistent structural stress calculations regardless of mesh sizes, element types, or the FE software used - a critical step to realising 6 sigma in CAE applications
- uses a single master S-N curve, (e.g. for all steel welds), eliminating the need to determine 'weld classification' as required with conventional weld fatigue approaches
- allows the option of further improving the accuracy of fatigue life predictions by allowing the user to formulate their own custom, master S-N curve based on proprietary data
- is available as an add-on capability in fe-safe™ - enabling users to include the effects of complex loading histories, multiaxial fatigue, and other advanced capabilities
- results can be plotted in FEA packages such as ABAQUS, ANSYS, I-deas, MSC.Nastran and NX NASTRAN
- is supported by a tool in HyperMesh™ that automatically identifies and generates the weld definitions required as input to Verity™

Verity™ in fe-safe™ allows companies to reduce or avoid the expense of testing to validate the integrity of designs and avoid the common practice of over-engineering due to the uncertainty of fatigue life

Validation

The Verity™ method has been validated for applications ranging from the automotive to offshore/marine industries, through collaboration with over a dozen leading engineering companies who are members of Battelle's Joint Industry Project (JIP). The effectiveness of the method has been demonstrated by collapsing many thousands of fatigue tests from lab specimens and full scale components, obtained and verified from open literature, into a single curve, referred to the 'master S-N curve'.

The Verity™ method has received many prestigious awards and recognitions which include: TIME Magazine's Math Innovators (2005); Aviation Week and Space Technology's 2004 Laurels Award; and SAE's Henry Ford II Distinguished Award for Excellence in Automotive Engineering. Business Week dubbed the Verity™ method as "A Bolt of Genius in Welding" (Nov, 2004).

Industry experts estimate that the demonstrated effectiveness of Verity™ will save millions - if not billions - of dollars in engineering, testing, and manufacturing costs

fe-safe™

- is a highly effective tool for the fatigue analysis of Finite Element models, for both welded and non-welded components
- calculates fatigue lives at every point on a model, producing contour plots to reveal fatigue lives and crack sites. Critical points need not be missed
- determines how much the stresses must be changed in order to achieve a target design life criteria showing clearly where the component is under designed or, where material and weight can be saved
- estimates warranty claim curves based on the probabilities of failure
- calculates which parts of the service duty are most damaging and which could be omitted from a fatigue test
- identifies non-critical loads at significant points on a model. In prototype testing this means tests using fewer loads with fewer actuators
- not only shows the calculated life but also the rationale behind the calculations. This establishes design expertise which allows new designs to be optimised quickly
- is highly cost-effective, and has been demonstrated to save many times its cost through reduced man-time hours. Additional savings are highly significant if one prototype test can be eliminated, or a premature failure is avoided

Verity™ and fe-safe™ are sold and supported by **Safe Technology**, world renowned for providing leading edge technology, excellent customer support and training.



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