

NEW FEATURES

RESOLVED ISSUES

- [SFFS-29] – Correct units for fracture toughness as a function of temperature
- [SFFS-39] - Charpy upper-shelf not available for temp dependent properties
- [SFFS-40] - Known flaw - Charpy toughness - KIC curve - improve error trapping for a a=T surface crack
- [SFFS-43] - Add cyclic stress histogram table to the report generator
- [SFFS-51] – Clean up saving parametric results to Excel
- [SFFS-53] - Update labels for linear stress
- [SFFS-54] - Save As .xls type saves .xml not Excel
- [SFFS-57] - Parametric: fracture inputs
- [SFFS-59] - Parametric: Start data at row 1
- [SFFS-100] - Improve info message when crack shape changes
- [SFFS-129] - Toughness master curve percentile not loaded from saved file
- [SFFS-135] - Parametric analysis requiring YS, UTS entry on Materials page also
- [SFFS-137] - Correct unit labels in Materials section of Input Data for Grow to Cycles
- [SFFS-138] - Reactivate Level 1 pitting for spherical shells
- [SFFS-143] - Add Reference Temp calculator for use with Master Curve
- [SFFS-144] - Improve result message for Local Metal Loss result with RSF>RSFa
- [SFFS-178] - Fix crash after selecting pipe and design code 'Other'
- [SFFS-179] - Fix erratic limiting flaw plot
- [SFFS-180] - Correct thermal stress relieved residual stress for spherical shells
- [SFFS-181] - Fix Exception when saving Single analysis after running a Parametric analysis
- [SFFS-182] - LML Elbow picture is truncated
- [SFFS-183] - Hide unused Rt cutoff plot for elbow
- [SFFS-184] – Creep Dimensions page should not prompt for inputs except for tube geometry choices
- [SFFS-185] - LTA thickness contour plot is not shown in report
- [SFFS-186] - Plot images aren't shown in reports when filenames contain diacritic symbols
- [SFFS-187] - Version numbers on reports not updated
- [SFFS-188] - Report thickness for supplemental loads with label for GML.
- [SFFS-189] - GML incorrect MAWPr for supplemental load
- [SFFS-190] - Incorrect reference stress value in the Calculators form for API 579 2016
- [SFFS-192] – Add LML supplemental loads additional inputs
- [SFFS-193] - Local Metal Loss incorrect pass/fail message
- [SFFS-194] - Display multiline "Project Info" in report
- [SFFS-196] - Hide stress range and binned cycles for limiting flaw analysis in report
- [SFFS-202] - Hydrogen damage passes Level 1 but indicates crack analysis needed in Level 2
- [SFFS-195] - Add Auto Calculate MAOP for Pipe LML with Design Code "Other"
- [SFFS-198] - Remove torque and shear force options for supplemental loads

- [SFFS-199] - Add Primary and Secondary supplemental load components for tsl calculation
- [SFFS-200] - Report supplemental thickness for General Metal Loss
- [SFFS-201] - Correct label for parametric supplemental loads
- [SFFS-203] - Add SMYS input field to B31.8 pipe laminations

VERSION 5.1.0.4, LICENSE VERSION 2018.0312

NEW FEATURES

RESOLVED ISSUES

- [SFFS-147] - Fatigue crack growth reports results in cycles although time is requested.
- [SFFS-161] - Check for thin wall elbow
- [SFFS-163] - Add long./circ. extent of flaw to parametric Local Metal Loss
- [SFFS-168] - Restore pitting in head shapes
- [SFFS-170] - Fix flag for supplemental loads for HIC assessment
- [SFFS-172] - Update thickness fields for GML at a nozzle connection
- [SFFS-174] – Add option for reporting parametric fatigue cases that error
- [SFFS-176] - Organize result messages for cracking analysis
- [SFFS-177] - Flaw depth not accepted in Level 2 FAD assessment

VERSION 5.1.0.3, LICENSE VERSION 2018.0207

NEW FEATURES

RESOLVED ISSUES

- [SFFS-175] – Fix crash that occurred while saving report in PDF format.

VERSION 5.1.0.2, LICENSE VERSION 2018.0129

NEW FEATURES

RESOLVED ISSUES

- [SFFS-173] – Prevent crash for Design Code “Other” with Equipment “Pipe”
- [SFFS-169] – Add master curve toughness calculation for API 579 2016

VERSION 5.1.0.1, LICENSE VERSION 2017.1214

NEW FEATURES

RESOLVED ISSUES

- [SFFS-159] - Parametric reporting error for Pmax-Pmin
- [SFFS-160] - Aspect ratio table not updating correctly for user-defined ratios

- [SFFS-165] - Fix index error toggling between Parent Metal/HAZ in crack growth analysis
- [SFFS-166] - Add case number to parametric fatigue to track case errors
- [SFFS-167] - Fix toggling issue with Parent/HAZ selection and loads visibility

VERSION 5.1.0, LICENSE VERSION 2017.1030

NEW FEATURES

- [SFFS-10] - Add default residual stress for cylinder through crack
- [SFFS-14] - K calculator run fatigue when crack length is empty
- [SFFS-22] - Add API 530 curves for creep rupture (WRC 541)
- [SFFS-23] - Reactivate temperature for parametric analyses
- [SFFS-25] - Add WRC 541 creep constants for fired heater tubes
- [SFFS-65] - File Format Changes
- [SFFS-82] - For parametric fatigue crack growth, add Final Flaw Length and Final Flaw Depth
- [SFFS-85] - For Pipe analysis, ask for OD instead of ID and convert to ID for calculations
- [SFFS-118] - Add import file functionality to thickness grids
- [SFFS-141] - Update charting tools for improved performance and functionality
- [SFFS-153] - Added summary columns for Parametric analysis
- [SFFS-157] - For API 579 2016 we can hide the Component Type selection in the Welds section
- [SFFS-77] - Improve description of hoop and axial stress calcs for tube under pressure
- [SFFS-122] - Parametric known flaw with duplicate output
- [SFFS-126] - Add 2016 plasticity interaction factor
- [SFFS-128] - Improve calculation of creep rupture when using corrosion rates.

RESOLVED ISSUES

- [SFFS-116] - Correct message for GML missing tmin for "Other" design code
- [SFFS-124] - Stabilize visibility of default residual stress
- [SFFS-125] - Edited crack dimensions after "Save As"
- [SFFS-131] - Check that Example file 5-9 is encrypted so it can be opened in demo mode
- [SFFS-132] - Fix saving of Mk weld length value
- [SFFS-133] - Omega coefficients not updating when using 2007 API 579 Methodology

- [SFFS-136] - Swap Smax-Smin labels for parametric analysis
- [SFFS-139] - Fix crash when using pipe with design code "other"
- [SFFS-145] - Improve reporting
- [SFFS-146] - Fix manual data entry in histogram
- [SFFS-148] - Fix error in pipe elbow for circumferential minimum thickness
- [SFFS-149] - Verify calculation of fr2 in nozzle area reinforcement
- [SFFS-151] - Supplemental loads no longer showing for Groove, Pitting and Pitting with LTA
- [SFFS-152] - Fix consistency of supplemental loads and external pressure check boxes.
- [SFFS-154] - Parametric fatigue results repeated in output messages

VERSION 5.0.8, LICENSE VERSION 2017.0622

RESOLVED ISSUES

- [SFFS-121] - Fix for a stability issue in cracking and crack growth.

VERSION 5.0.7, LICENSE VERSION 2017.0530

NEW FEATURES

- [SFFS-113] - Fix selection option for default secondary stress for surface cracks
- [SFFS-115] - Allow assessment of dents with gouges for B31.4 and B31.8 piping

RESOLVED ISSUES

- [SFFS-89] – Add external pressure calculation for API 579 2016

VERSION 5.0.6, LICENSE VERSION 2017.0503

NEW FEATURES

- [SFFS-108] – Fixed Fortran dependency for build
- [SFFS-109] - Fixed out of memory error in Monte Carlo analysis

VERSION 5.0.5, LICENSE VERSION 2017.0425

NEW FEATURES

- [SFFS-88] – Improved performance of weight function calculation

RESOLVED ISSUES

- [SFFS-1] - Incorrect Level 1 Cracking Inside/Outside result
- [SFFS-2] - Minimum measured thickness incorrect for pipes with General Metal Loss
- [SFFS-3] - Incorrect results for Local Metal Loss analysis
- [SFFS-4] - LML rectangular grid. Improved message in Results Summary
- [SFFS-5] - GML message in Result Summary and handle SMYS > 70ksi exception
- [SFFS-6] - Fix Intrados/Extrados updating for pipe bends
- [SFFS-70] - Turn off default secondary stress for certain crack shapes
- [SFFS-71] - K calculator requires non 0 primary stress
- [SFFS-73] - Cyclic stress refresh issue
- [SFFS-74] - Change API 2016 methodology text
- [SFFS-75] - Remove v3 to v4 conversion VB files
- [SFFS-76] - Criteria, Eqn. 5.35 fails but no result summary shown
- [SFFS-78] - Fix GUI inconsistencies in Pitting with Thinning
- [SFFS-79] - Error in Dent-Gouge case
- [SFFS-80] - Miscellaneous fixes
- [SFFS-84] - Austenitic/Ferritic/Neither in 2016 default residual stress calculation
- [SFFS-91] - Missing RT Cutoff Curve in Result Charts

VERSION 5.0.4, LICENSE VERSION 2016.1115

RESOLVED ISSUES

- Fixed visibility issue with plots for cracking analysis reports.

VERSION 5.0.3, LICENSE VERSION 2016.1110

RESOLVED ISSUES

- Fixed the auto update feature.
- Corrected reporting of MAWPr for Level 2 General Metal Loss in Results Summary.
- Edited the order of criteria evaluations and reporting for a parametric General Metal Loss.
- Adjusted the required minimum measured thickness to be 0.05 inches for General Metal Loss in a pipe.

VERSION 5.0.2, LICENSE VERSION 2016.1102

RESOLVED ISSUES

- Fixed the minimum thickness requirement Local Metal Loss assessment for pipes in a parametric analysis.
- Reordered the assessment criteria for a parametric General Metal Loss assessment.

VERSION 5.0.1, LICENSE VERSION 2016.1021

RESOLVED ISSUES

- Corrected implementation of custom allowable stress for corrosion analyses.

- Fixed hidden units for Charpy V notch correlation for fracture toughness.
- Improved axis scaling for charts in Level 1 cracking.
- Cleared previous analyses when an existing file is loaded and the analysis type is changed.

VERSION 5.0, LICENSE VERSION 2016.0929

NEW FEATURES

- [4983, 8762] Updates to include 2016 publication of API 579/ASME FFS-1. Many of the updates include changes to equations shared by more than one analysis type.
 - [10503] Default methodology is now API 579/ASME FFS-1 2016
 - [10502] Message to user to update previous files to 2016 methodology upon file loading
 - [9385] Updates to Part 3 Brittle Fracture
 - [9384, 10847, 10903] Updates to Part 4 General Metal Loss
 - [9421, 10845, 10873] Updates to Part 5 Local Metal Loss
 - [9400, 10849] Updates to Part 6 Pitting and Pitting plus Local Thinning
 - [9390] Updates to Part 7 Hydrogen Damage
 - [9245, 10714] Updates to Part 9 and Annex 9D (Residual Stresses)
 - [10510] Updates to Part 10 Creep and Creep Crack Growth
 - [9391] Updates to Part 12 Dents, Gouges and Dent Gouge Combinations
 - [9387] Updates to Part 13 Laminations
- [4513, 4262, 8993] Improved functionality for assessing metal loss at nozzles and piping branch connections including populating the material fields for welds, nozzle necks, piping branches and reinforcing pads.
- [10536] Improved tooltips for creep crack growth
- [2656] Material database for API 620 and API 659 Atmospheric storage tanks added.
- [5611] Stress intensity K_c written to Input Data Summary when other fracture toughness type is used.
- [9459, 7989, 10831, 10649, 4612, 10844, 10910, 10897] Improved Input Data Summary reporting to reflect all input parameters used.
- [10526] Improved Input Data Summary reporting for parametric analysis.
- [10570] Added Omega parameters in SI units for Creep Damage/Rupture and Creep Crack Growth.
- [2702] Added Figure 12.4 to dent + gouge results.
- [4661] Modifications to the supplemental load entries for pipes and piping.
- [5820] Implemented pitting analysis for B31.4 pipes and piping.
- [10634] Moved material fields for assessment of general metal loss at nozzles and piping branches.
- [10760] Improved artwork for buried crack analysis.
- [9346] Added Bailey-Norton creep properties reference equations to Materials page.
- [10716] Remove external pressure option for corrosion analyses as the standard now refers to the relevant design code. Functionality will be added in future releases.
- [10872] Improved automatic calculation of stress from fill height for brittle fracture analysis of tanks.
- [10870] Edited general primary stress calculation from pressure for brittle fracture.
- [10843] Improved calculation of allowable stress for B31.4 and B31.8 piping analyses.
- [10878] Added error trapping on required distances for assessment of blisters and laminations.
- [10876] Improved error trapping for input fields for brittle fracture assessment.
- [10881, 10880] Corrected stress input fields for creep crack growth analysis.

- [10890] Disabled analysis of dents on atmospheric storage tanks to comply with R/t limit.
- [10905] Improved logic for display of error and warning messages.
- [10906] Added error trapping on Charpy impact energy for dent with gouge analysis.
- [10900] Added error trapping on pit depth input field.
- [2319, 10871] Improved logic for larger display settings.

RESOLVED ISSUES

- [9479] Fixed unit label for applied supplemental loads.
- [2211] Updated example problem 6.5 with new input values.
- [9382] Fixed unit label for random thickness readings.
- [9237] Corrected conversion of polynomial stress for reference stress calculator.
- [9258] Corrected calculation of MFH for storage tanks for general metal loss.
- [9441, 10813] Added error trapping, correction to plots for parametric and fatigue crack growth when an error occurs during the analysis.
- [10609] Updated dent analysis to include B31.8 piping.
- [10710] Corrected end condition for carbon steel cylinders with dents.
- [10717] Fixed formatting of creep charts in report.
- [10534] Added error trapping on allowable stress limits for Level 1 cracking.
- [5809] Added error trapping on heat input calculator for welding residual stresses.
- [8052] Corrected flag for secondary stress for buried crack analysis.
- [2651] Added equations for computing MAWP and MAOP for lamination analysis.
- [8756] Fixed calculation of RSF due to small pit pair spacing.
- [8759]
- [9475] Fixed stress distribution for reference stress calculator.
- [9124, 10610, 10664] Adjusted MAOP and tmin calculations for B31.8 to use current version of standard.
- [10684] Corrected parametric cyclic stress option.
- [9207] Fixed logic to compare computed MAWPr with design pressure for Level 1 pitting.
- [10860] Deactivate supplemental load options for Hydrogen Damage analysis.
- [10861] Correct spelling on Creep Rupture Dimensions page.
- [4630] Improved handling of supplemental loads for local metal loss.
- [10705] Included Mb term in calculation of K for through wall crack with membrane and bending stress.
- [10840] Corrected calculation of Sigma 1 in analysis of pitting with thinning.
- [10833] Corrected area reinforcement calculations to assume E=1.0.
- [10883] Fixed exception error for parametric pitting analysis.
- [10908] Corrected Monte Carlo probabilistic analysis to vary primary and secondary stresses.

VERSION 4.2.1, LICENSE VERSION 2016.0315

RESOLVED ISSUES

- [NA] Fixed an issue with the dent analysis to allow the continuation of the computations.

VERSION 4.1.1, LICENSE VERSION 2016.0113

RESOLVED ISSUES

- [case 9274] Updated creep crack growth module to match API 579 2007. Added improved logic for initial time increment.

VERSION 4.1, LICENSE VERSION 2015.0825

RESOLVED ISSUES

- [case 2015] Fixed primary arbitrary stress table causing index out of range exception.
- [case 2155] Corrected application of triangular distribution in Monte Carlo analysis.
- [case 5283] Adjusted reporting format for Creep Rupture Life vs Time plot in creep rupture analysis.
- [case 5583] Fixed column labeling and implementation for cyclic load distribution in a parametric crack growth analysis.
- [case 5762] Improved the "Info" message for the buried crack with default tabular secondary stress.
- [case 8242] Fixed input field swapping for linear stress distributions in crack analysis.
- [case 8492] Fixed Rts calculation for a pipe in a brittle fracture assessment.
- [case 8510] Corrected form for visibility of groove and gouge input fields for nozzle.
- [case 8511] Corrected result message for HIC damage Level 2.
- [case 8757] Corrected default residual stress profiles for flat plates with post weld heat treatment.
- [case 8896] Creep damage analysis with the corrosion option runs much quicker.
- [case 8852] "Infer from pressure" load option default stress distribution to compute the reference stress has been corrected to give the correct uniform stress term; the reference stress is used to compute the FAD Lr value; the fix increases the Lr value on the order of 10%.
- [case 9074] Fixed Rts calculation for a pressure vessel in a brittle fracture assessment.
- [case 9081] Corrected result message for a Level 1 assessment if notch is present.
- [case 8487] Corrected the Jc and CTOD fracture toughness conversion to Kc in the ductile tearing analysis
- [case 5762] Improved the "Info" message for the buried crack with default tabular secondary stress
- [case 8896] Creep damage analysis with the corrosion option runs much quicker.
- [case 8852] "Infer from pressure" load option default stress distribution to compute the reference stress has been corrected to give the correct uniform stress term; the reference stress is used to compute the FAD Lr value; the fix increases the Lr value on the order of 10%.

NEW FEATURES

- [case 4289] Implemented 360 degree local metal loss functionality.
- [case 9083] Activated custom material parameters for a Larson-Miller creep damage/rupture assessment.
- [case 4984] Update crack-like flaw analysis to be compatible with BS 7910:2013. Includes new FAD types and Kr plasticity interaction effects.
- [case 1506] Added functionality to apply magnification (Mk) factors in a Level 2 and 3 FAD analysis and crack growth analysis.

VERSION 4.0, LICENSE VERSION 2014.1215

RESOLVED ISSUES

- [case 8134] Removed tank related input fields for non-tank equipment type analyses.
- [case 8492] Corrected stress basis ratio calculation to use applied pressure for brittle fracture in pipes.

- [case 7908] Improved the fatigue analysis grow to final depth end point logic for reducing the crack depth increment size to gain better convergence and to help avoid non-converging analysis.
- [case 4663] Corrected MAWP calculation for torispherical, conical and hemi-spherical heads as well as a calculation for supplemental loads.
- Improved integration for calculation of Psafe using the Effective Area method for general and local metal loss in pipes and pipelines.

VERSION 4.0, LICENSE VERSION 2014.0717

RESOLVED ISSUES

- [Ticket 649, Case 5731] Added error trapping for invalid K table array sizes when the tabular stress data is very large.
- [Case 5742] Fixed a problem with the color scale option when the thickness grid is empty (no data entered).
- [Case 5733] General Metal Loss Level 1 reporting incorrect result.
- [Case 5754] When using Master Toughness Curve the reference temperature does not save.
- [Case 5760] Fracture toughness from master curve does not seem to match API 579 equations.
- [Case 5775] Save as dialog shows the current file name.
- [Case 5777] Storage tank weld properties not hooked up for Level 2 FAD.
- [Case 5792] Internal 360 crack initial crack size error.
- [Case 5809] Added error trapping on heat input calculators.
- [Case 5819] Level 2 pitting in pipe not working when elbow selected.
- [Case 2319] Groove like flaw not displaying correctly for 125% display.
- [Case 5350] Material specific FAD curve option now working.
- [Case 5262] Fig 5.6 not displaying in report for nozzle analysis.
- [Case 5332] Fixed flickering on LTA dimensions page.
- [Case 4327] Pmax-Pmin labels for parametric analysis are incorrect.

VERSION 4.0, LICENSE VERSION 2014.0516

RESOLVED ISSUES

- [Ticket 623] Corrected MAWP calculation for flaws located in the non-spherical portion of an elliptical head.
- [Ticket 597] Added remaining nozzle thickness check to the step-by-step results for a metal loss assessment at a nozzle.
- [Ticket 618] Added crack size and model information to the interpolation warning message for the infinite long and 360-deg crack when using the tabular stress input
- [Ticket 632] Improved user-defined tabular FAD interpolation when $L_r = L_{r_max}$ at the FAD cutoff; use the last L_r value in the user-defined tabular FAD as the L_{r_max} cutoff

VERSION 4.0, LICENSE VERSION 2014.0324

RESOLVED ISSUES

- [5481] Extended the plasticity interaction factor to include the plasticity correction calculation when the L_r from secondary stress is greater than 4; also added an internal stress linearization to tabular secondary stress to improve the calculation.
- [5479, 4577] Added the “deterministic” and “random” options to select how the histogram stress range values are used during the cycle-by-cycle fatigue analysis.
- [5485] Corrected the Tools/Program Options/Analysis values for the maximum number of data points (max points for results tables like the fatigue results) and the result compacting option to not save to the model file so that these options are obtained only from the options form.
- [5552] Fixed a problem with calculations after the limiting flaw size analysis
- Fixed “error CS0103: The name ‘NaN’ does not exist in the current context”.
- [5492] Manually entered T_{min} values overridden for a pipe in General Metal Loss.

VERSION 4.0, LICENSE VERSION 2014.0219

RESOLVED ISSUES

- [5225] For cracking, the Design/Welds/Vessel Type menu is set correctly when loading a saved model file.
- Added a check on the Δ_N increment in the fatigue analysis; some input data can cause Δ_N to get computed as non-a-number (NaN); detect the problem and exit with an error message.
- [5208] Removed the “Select by Metal Only” check box option from the Cracking/Materials page since it was not used by the NASGRO fatigue database.
- Combined the message set during a fatigue analysis with the endpoint FAD failure message to report more information about the analysis; such as when a surface crack grows through the thickness: $a > T$.
- [5416] Corrected the limiting flaw size calculation for the MN-m-MPa units and a through thickness crack; avoids the incorrect $a > T$ error message and returns results.
- [2700] Updated screen resolution compatibility to include 125% zoom settings.
- [5415] Adjusted logic to include default residual stresses for flat plates with through wall cracks in the HAZ or weld.
- [5417] Updated flaw location options for grow to size fatigue analysis as secondary stresses are not applicable in grow to crack depth, grow to crack length or grow to number of cycles type end conditions.
- [5468] Corrected reporting for parametric brittle fracture assessment.
- [4519] Implemented tolerance bound computations for fracture toughness master curve.
- Improved the plasticity interaction factor to higher secondary stress cases; when $L_{r_secondary} > 4$ the plasticity correction equations are used from 2007 API 579 Section 9.4.3 step 11; use a uniform linear, or polynomial secondary stress; the tabular secondary stress is not yet supported.

VERSION 4.0, LICENSE VERSION 2013.0927

RESOLVED ISSUES

- Added warning or error messages and partial results to the `fatigue_summary.log` file so that incomplete cases in a parametric analysis can be investigated.
- Added more logic so that the `K_table_info.log` file is not opened when the log output level is set to “no logging”; added error trapping when the file opens.
- Reverted to .NET 4.0 for XP compatibility.

VERSION 4.0, LICENSE VERSION 2013.0805

RESOLVED ISSUES

- [3004] – Updated the auto-updater routine load the latest customer builds from the Quest Integrity Web site.
- [4508] – Updated the automatically calculated t_{min} calculation for brittle fracture, general metal loss, local metal loss, groove-like flaw, pitting and pitting with local thinning assessments. If the units system is changed while inputting assessments values, the ‘Automatically calculate Min Required Thickness’ checkbox will need to be de-selected and then re-selected to have the minimum thickness values calculate correctly for display.
- [4815, 4817] – Updated the Loads page images for the plate with edge crack or through-wall crack load distributions and linear stress equations.
- [4976] – Fixed calculations for the “infer from internal pressure” load option for thick-wall cylinders, which use the weight function method to generate a custom K table.
- Improved the error checking and error messages for the Ramberg-Osgood values used for a material specific FAD curve
- [4997] – Fixed the plate through wall crack polynomial stress distribution to correctly combine the computed crack front stress intensity K from each polynomial term.

VERSION 4.0, LICENSE VERSION 2013.0503

RESOLVED ISSUES

- [4643] – Fixed calculations for the thickness grid interpolation for a general metal loss assessment.
- [4644] – Removed checks to stop the assessment in step 1 of Level 1 and Level 2 of a local thinning assessment. Step 1 output is informational at this time.
- [4663] – For a general metal assessment checks were removed from step 7 that halted the assessment. All calculations for this step are displayed in the output. Updated the logic to display the MAWPC and MAWPI calculations only if they apply to the current assessment location.

NEW FUNCTIONALITY AND IMPROVEMENTS

- Added a reference stress calculator to the existing stress intensity calculator found in the cracking assessments.

VERSION 4.0, LICENSE VERSION 2013.0415

RESOLVED ISSUES

- Updates made to fix the stress versus distance curve for the secondary stress for a cylinder and sphere. For a fault in the parent metal the stress is set to zero. For a fault in the heat affected zone or the weld metal the default stress is a fraction of the yield strength if the metal is post-weld heat treated. Otherwise, the through thickness stress values must be calculated.
- Updates made for axisymmetric discontinuities to display the correct graphical figure associated with the discontinuity and to save input values correctly.
- Updates made to the calculations for the heat input for the final weld pass for cracking assessments.

VERSION 4.0, LICENSE VERSION 2013.0208

RESOLVED ISSUES

- [2640] – Updated the input fields displayed for the ‘Materials’ tab for all non-cracking assessments. In multiple cases unneeded inputs were being displayed to the user.

VERSION 4.0, LICENSE VERSION 2013.0129

RESOLVED ISSUES

- [3015] – Updated the calculations for the Kc value based on the master curve settings, the assessment temperature, and crack shape. The master curve cutoff value is updated with each change of the unit system selection.
- [3134, 3135, 3136] – Multiple updates to fix problems with the ‘Discontinuities’ section of the ‘Materials’ tab. Materials selections are now enabled. Weld material selections were removed. These updates apply to non-cracking assessments.
- [4213] – The number of hours parameter was not being used correctly for environmental crack growth assessments.
- General re-write of the routines sending information to the ‘Data’ tab. Information was either missing or erroneous information was being reported.
- [2935] – Added ligament depth information to the ‘Data’ tab along with a ligament depth versus time chart to the ‘Charts’ tab for assessments using buried cracks.
- [3120] – Updated all chart processing so copy, print preview, and print operations function correctly.
- [4299] – Updated the processing of the reference and cyclic stress coefficients to accept negative and scientific notation values.
- [2963] – The creep rupture module was extensively re-worked. Level 1 has updates to handle the screening curves correctly. Level 2 creep rupture now utilizes the material properties for yield strength as a function of temperature. The material parameters are available for user modification. Also displayed is the yield strength as a function of temperature graph based on the material properties. The fired heater tube has been added as an equipment type to creep rupture assessments.

VERSION 4.0, LICENSE VERSION 2012.0727

RESOLVED ISSUES

- Error found in Larson-Miller remaining life calculation. Fixed calculation for 2007 API 579 equation 10.21.
- [2822] – The summary page has been removed for now until the processing of this tab can be fixed.
- [2805] – The maximum operating discharge pressure input field was not displaying correctly for a local metal loss assessment.
- Updated input forms to show only the input choices for the PRCI MAT-8 methodology. For example, deactivate the FAD menu since only a single critical J value is entered in the Materials form, limited the fracture assessment to limiting flaw or limiting crack size, limited the fatigue analysis endpoint to grow to failure.
- Added the B31.1 design code for pipe assessments.

VERSION 4.0, LICENSE VERSION 2012.0629

RESOLVED ISSUES

- [2335] – Updated and corrected the infer from pressure load option for cylinders and spheres. With the primary stress set to infer from internal pressure and the reference stress set to the same as the primary stress the crack face pressure has been removed from the calculation of the default reference stress distribution.

VERSION 4.0, LICENSE VERSION 2012.0604

RESOLVED ISSUES

- [2384] – Added updates to perform regression analysis options of measured dimension on the 'Loads' tab. This completes the implementation of all the options on the 'Corrosion Coefficients' pull-down menu.
- [2667] – Updates to restrict the flaw location combo list for a threaded bolt to the parent metal choice only for a level 2 and 3 FAD assessment and a crack growth assessment.
- [2382] – For a creep rupture assessment if Omega creep properties are selected and weld metal is selected the creep strength slider bar is set to -0.5 and disabled on the 'Materials' tab. This forces the setting per API 579, Section 10.
- [2627] – For a cylindrical shell and the loads are inferred from the internal pressure, updated the primary loads chart to use the correct membrane, bending, quadratic, and cubic factors for the graph display.

NEW FUNCTIONALITY AND IMPROVEMENTS

- Completed the functionality of the creep rupture assessment. Thickness reading using regression analysis is now available as a creep rupture option.

VERSION 4.0, LICENSE VERSION 2012.0427

RESOLVED ISSUES

- [2518] – For a known flaw using membrane and bending primary stresses, test cases for a single version 4.0 assessment and a single version 4.0 parametric assessment where not matching. The single version 4.0 example needed updates to the 'Operating Conditions Input' section to print the correct membrane and bending values. The single parametric test required setting the P0 and P1 linear stress coefficient values correctly before the execution of the parametric test.
- [2500] - Limiting flaw analysis algorithm was improved to confirm converged points on the FAD and to switch to an incremental method when the shooting method does not converge.
- Updated the cylinder external circumferential surface crack K table values for $a/T=1.0$ so that the $\phi=90$ (crack depth) table values match the $\phi=0$ (crack tip) values. Minor changes to the sphere surface crack K table coefficient values.
- [2419], [2438], [2439], [2440] – Created unit conversion tests for creep crack growth for 2.25Cr-1.0Mo material. Tests produced matching results for each unit system.

VERSION 4.0, LICENSE VERSION 2012.0404

RESOLVED ISSUES

- [2678] Corrected the orientation of the default secondary stress calculation for a cylinder and sphere .

- [2679] Corrected the operation of the check box selections for the fatigue coefficient choices in a parametric analysis.

VERSION 4.0, LICENSE VERSION 2012.0323

RESOLVED ISSUES

- [2629] Added additional check for blank input fields for blisters and lamination assessments. All input fields are not required and the user is warned if certain calculations are not executed.

VERSION 4.0, LICENSE VERSION 2012.0319

NEW FUNCTIONALITY AND IMPROVEMENTS

- Enhanced parametric reporting added.
- For a limiting flaw assessment when moving from the weld metal to parent metal and back again the toughness values and settings are saved. Previously the toughness was re-set to Kc toughness.
- K calculator functionality added.
- Added additional checks for a buried crack in a fatigue analysis to catch cases where the buried crack transitions to a surface crack and the FAD solution does not converge.

RESOLVED ISSUES

- [2518] Fixed the calculations needed for the thickness and inside diameter for a cylinder and sphere when these values are used in a parametric assessment.

VERSION 4.0, LICENSE VERSION 2012.0217

NEW FUNCTIONALITY AND IMPROVEMENTS

- Added chart of Rt versus lambda to a local metal loss using minimum thickness readings.
- Changed the line plots for a creep rupture analysis to a plateau line format.

VERSION 4.0, LICENSE VERSION 2012.0113

RESOLVED ISSUES

- Corrected the reference stress calculation for a surface crack with an elliptical shaped crack.

VERSION 4.0, LICENSE VERSION 2012.0106

NEW FUNCTIONALITY AND IMPROVEMENTS

- Creep rupture analysis validated for each available case: uniaxial, multiaxial, and tube under pressure.

RESOLVED ISSUES

- [2363] For creep crack growth updated the 'Materials' tab to utilize Omega, Larson-Miller, and Bailey-Norton creep properties. For creep rupture, Omega and Larson-Miller properties are available.
- [2380] For a creep rupture assessment added checks for the 'Run to strain limit' and 'Run to rupture' selections. The output reports are terminated if the limits are exceeded and a time value is calculated when the limit was passed.
- [2370] The default residual stress is now being applied for flaws in the heat-affected zone of a metal. Previously, the residual stress was only being calculated if the flaw was in the weld metal.

VERSION 4.0, LICENSE VERSION 2011.1118

NEW FUNCTIONALITY AND IMPROVEMENTS

- For a creep rupture analysis the operating conditions data grid has been updated to handle the pasting of new values.

VERSION 4.0, LICENSE VERSION 2011.1111

NEW FUNCTIONALITY AND IMPROVEMENTS

- Modified the handling of the user inputs to obtain faster processing for Level 2 and 3 crack growth assessments.

RESOLVED ISSUES

- [2328] Fixed errors in a fatigue assessment with parametric inputs.
- [2342] Corrected the automatic calculation of the allowable stress on the 'Materials' tab for a metal loss analysis.

VERSION 4.0, LICENSE VERSION 2011.1017

NEW FUNCTIONALITY AND IMPROVEMENTS

- [2320] Auto Update functionality added to program. Signal FFS will automatically check the number of specified hours for new updates. This is configurable from Tools->Program Options->General tab.
- [2288] Switching between assessment types has been sped up.

RESOLVED ISSUES

- [2294] Navigating between cells caused Summary tab to crash program.
- [2301, 2317] Various issues with creep rupture analysis
- [2305] Infer from internal pressure option was not showing for Cylinder in Crack Growth assessment
- [2306] Default constraint factor for CTOD type toughness data changed to 1.4 per API579 Annex F.

VERSION 4.0, LICENSE VERSION 2011.0913

UPGRADING FROM VERSION 3.0

Signal FFS Version 4.0 can be run side-by-side with version 3.0. This means that you do not need to first uninstall Signal Version 3.0. By default, Signal 4.0 will install into a different directory on your computer than Version 3.0.

NOTE: you should **NOT** install Signal 4.0 into the same directory as version 3.0.

Notes on upgrading files:

1. To upgrade Signal 3.0 .ffs files, simply open the files into Version 4.0. Signal will automatically append a ".v4" to the file name. You can use "Save As..." to save the file to a different file name.
 - a. Upgrading Fracture Graphics files directly into version 4.0 is not supported. First load the file to Signal 3.0.
 - b. Version 3.0 to 4.0 input file conversions do not work completely for brittle fracture and environmental crack growth assessments. You may need to re-enter parameters in Version 4.0 directly and resave the file.
2. If you have issues upgrading, please contact support@questintegrity.com and provide a copy of the .ffs file that you are trying to upgrade.

You will need to contact support@questintegrity.com to request a new license file for Version 4.0.

NEW FUNCTIONALITY AND IMPROVEMENTS

Some of the numerous features and improvements in Version 4.0 include:

- Updated user interface with easy navigation.
- Integrated on-screen tooltips and help.
- Validation of required user inputs.
- Parametric capabilities for all analysis types.
- Expanded materials database and temperature dependent allowable stress tables.
- Customizable materials database.

- Numerous new report formats including, PDF, Microsoft Word® document, and HTML.
- Improved and expanded reporting follows API procedures step-by-step and shows all relevant input data used in the assessment.
- Customizable report formatting.
- Added B31G calculations for corrosion metal loss in pipes and pipelines.
- Expanded design code library for pipes and pipelines including B31.3, B31.4, B31.8.
- Updated reporting including 3D plots.
- Assessment procedures for Dents, Blisters and Laminations and Hydrogen Induced Cracking as well as all procedures from Signal FFS Version 3.0.
- Updated procedures to match the 2007 API 579/ASME FFS-1 Errata.
- Exceptionally faster computational speed for complex analyses.

KNOWN ISSUES

1. Not all the distribution types work for a Monte Carlo analysis.
2. Temperature dependent material properties are not available in cracking.
3. When converting a Signal 3.0 input file, a default secondary stress in Signal 3.0 becomes a user specified secondary stress in the Version 4.0 inputs.
4. Weight function for a plate with a through-wall crack has been removed because it was discovered the K solution values were incorrect in version 3.0.
5. External pressure calculations are not complete for pitting and blisters and laminations assessments.

NEW EDITIONS

Signal Fitness-For-Service is now available in two Editions: Professional and Standard

- Professional includes all the functionality of Signal FFS 3.0, plus many new and improved features.
- Standard includes a more limited set of analyses geared towards inspection and engineering professionals who are new to fitness-for-service.

Contact Quest Integrity for more information about the two available Editions or view the Data Sheet at <http://www.questintegrity.com/products/signal-fitness-for-service/>