BechtFFS Software

The Becht Difference

Becht Engineering is a specialty engineering provider for the refinery, petrochemical, and chemical industries. Becht has provided Fitness for Service evaluations to many clients in the past. Becht personnel, most with over 25 years of experience, had long term careers within Owner Organizations and, as a result, ***approach a project with an owners' perspective*** of quality, cost and schedule.

The benefits of BechtFFS Software

Immediate access from any internet-enabled device

Developed by leading industry FFS experts

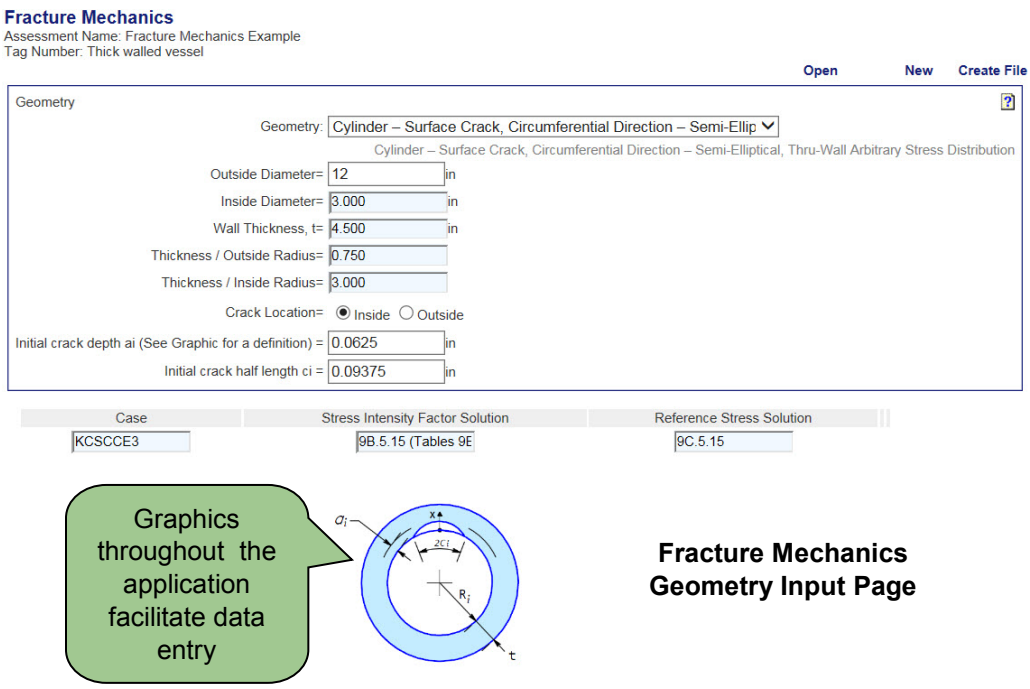
User-friendly format

Quick Support from FFS Subject Matter Experts

Overview of the BechtFFS Software

The BechtFFS is an API 579-1/ASME FFS-1 compliant, web-based software designed to assist operators/owners in evaluating equipment items which have developed defects in service. The quantitative calculations performed in BechtFFS assess the structural integrity of the flawed component and ultimately provide a recommendation whether the component should be taken out of service and retired or repaired, or is fit for continued service.

The software's calculation methodology was developed by Becht's API 579-1/ASME FFS-1 experts. Our FFS experts include contributors to the API 579-1/ASME FFS-1 guideline document. A number of our FFS experts are current or past members of the API 579-1/ASME FFS-1 committee, including several committee vice-chairs.



Graphics throughout the application facilitate data entry

Fracture Mechanics Geometry Input Page

The BechtFFS software is easy to use, with a paged format that provides logical input

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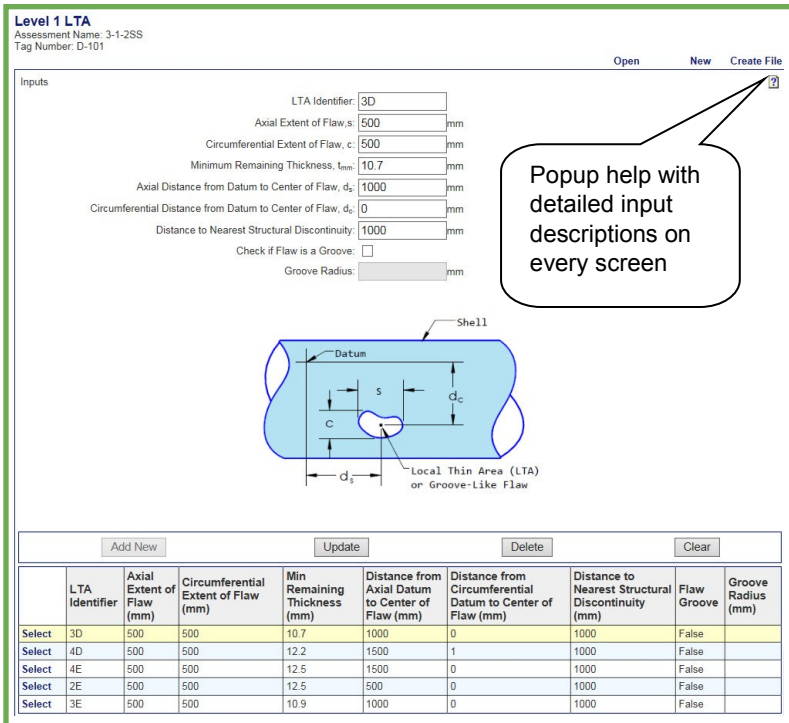
Becht Engineering

We Solve Problems…



Level 1 LTA Data Input Screen

The software is compatible with mobile devices. Finally, the web-based format ensures that users are always working with the most up-to-date version of the software.

Paid-for-FFS consultation is also available from the software's dashboard, so that you can quickly connect with one of our FFS experts. ***We guarantee a quick response!***

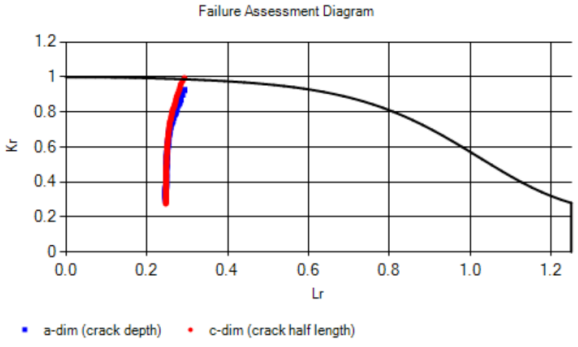
The software allows easy sharing of FFS assessment data with other BechtFFS users. The application gives you the option of either storing your FFS assessment data on your local network or on our server.

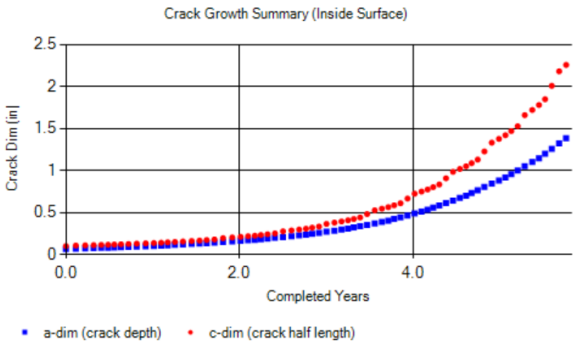
The software generates a series of reports for each assessment module, from summary to detailed reports documenting the outcome of the assessment. The user can select the format of the report from HTML, Excel, Word and PDF.

sequences and comprehensive pop-up help for all input pages.

The web-based format allows users to begin using it immediately once logon credentials are approved. The software can be used from any device with an Internet connection.

Fracture Mechanics Failure Assessment Diagram (FAD) and Crack Growth Chart





Becht Engineering Code Expertise

Becht Engineering holds over 40 positions in ASME, API, and ASTM Codes and Standards Committees, and has chaired many of them. Bob Sims was one of the original developers of the API 579-1/ASME FFS-1 guideline document. A number of our experts are current or past members of the API 579-1/ASME FFS-1 committee, including several committee vice-chairs.

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Architecture

BechtFFS is a web-based software application service custom-built on Microsoft's Windows Server, Internet information services (IIS), ASP.NET, and SQL Server technologies.

Reports are generated using SQL Server Reporting Services and are available in HTML, MS-Excel, PDF, or MS-Word format.

Local Metal Loss Level 2 Input Page

Legend		
	t >= F * trd	t >= 0.2 in
	F * trd > t >= F * tc	N/A
	F * tc > t >= 0.1in + FCA	0.2 in > t >= 0.1 in
	t < 0.1in + FCA	t < 0.1 in
	Anomalous	t <= 0 or non-numeric

Longitudinal Extent (in)

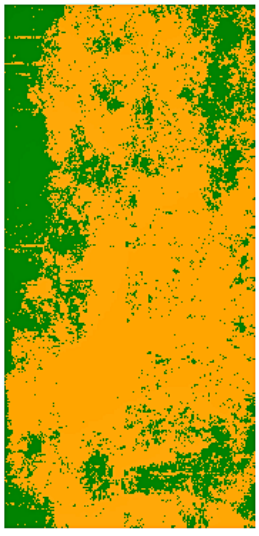
Circumferential Extent (in)

	0.000	0.100	0.200	0.300	0.400	0.500	0.600	0.700	0.800	0.900	1.000	1.100	1.200	1.300	1.400	1.500	1.600	1.700	1.800	1.900	2.000	2.100	2.200	2.300
0.000	0.261	0.268	0.256	0.261	0.258	0.256	0.260	0.248	0.252	0.249	0.247	0.257	0.242	0.244	0.254	0.256	0.246	0.239	0.235	0.234	0.234	0.234	0.241	0.234
0.100	0.259	0.260	0.254	0.259	0.257	0.255	0.243	0.246	0.110	0.252	0.255	0.257	0.241	0.247	0.239	0.245	0.233	0.236	0.236	0.235	0.235	0.233	0.229	0.239
0.200	0.271	0.261	0.247	0.248	0.247	0.249	0.252	0.248	0.246	0.246	0.264	0.253	0.253	0.254	0.247	0.260	0.255	0.247	0.236	0.240	0.237	0.110	0.238	0.239
0.300	0.259	0.248	0.256	0.261	0.252	0.253	0.257	0.247	0.245	0.247	0.267	0.247	0.254	0.245	0.236	0.245	0.251	0.238	0.236	0.233	0.231	0.235	0.232	0.234
0.400	0.274	0.258	0.248	0.252	0.252	0.253	0.248	0.247	0.249	0.253	0.254	0.244	0.260	0.247	0.247	0.248	0.252	0.232	0.247	0.241	0.241	0.239	0.244	0.241
0.500	0.261	0.252	0.261	0.252	0.258	0.249	0.245	0.255	0.264	0.245	0.241	0.239	0.244	0.259	0.239	0.241	0.233	0.232	0.235	0.245	0.249	0.241	0.235	0.247
0.600	0.256	0.264	0.246	0.251	0.252	0.247	0.251	0.247	0.261	0.264	0.248	0.241	0.238	0.256	0.238	0.264	0.241	0.239	0.236	0.236	0.245	0.241	0.251	0.228
0.700	0.252	0.251	0.252	0.248	0.248	0.241	0.245	0.254	0.261	0.241	0.248	0.246	0.242	0.256	0.246	0.264	0.251	0.234	0.232	0.239	0.247	0.239	0.239	0.232
0.800	0.256	0.254	0.254	0.251	0.246	0.242	0.244	0.246	0.257	0.249	0.248	0.243	0.245	0.240	0.236	0.236	0.236	0.239	0.235	0.234	0.255	0.241	0.131	0.231
0.900	0.257	0.257	0.257	0.248	0.248	0.242	0.248	0.241	0.261	0.259	0.248	0.244	0.246	0.244	0.240	0.254	0.248	0.236	0.248	0.235	0.245	0.238	0.247	0.239
1.000	0.265	0.263	0.259	0.258	0.257	0.251	0.249	0.247	0.251	0.247	0.247	0.251	0.244	0.239	0.249	0.253	0.253	0.242	0.236	0.245	0.249	0.253	0.241	0.226
1.100	0.261	0.260	0.254	0.248	0.248	0.244	0.252	0.252	0.245	0.244	0.244	0.256	0.239	0.246	0.236	0.254	0.244	0.236	0.236	0.236	0.246	0.234	0.246	0.231
1.200	0.279	0.267	0.259	0.258	0.261	0.248	0.254	0.257	0.245	0.252	0.249	0.245	0.244	0.239	0.247	0.240	0.242	0.247	0.245	0.247	0.252	0.244	0.241	0.227
1.300	0.266	0.261	0.254	0.260	0.255	0.257	0.243	0.246	0.259	0.249	0.247	0.245	0.258	0.244	0.241	0.244	0.245	0.249	0.244	0.258	0.252	0.246	0.249	0.241
1.400	0.267	0.266	0.271	0.264	0.257	0.251	0.252	0.247	0.252	0.249	0.248	0.242	0.242	0.242	0.246	0.256	0.251	0.241	0.247	0.247	0.240	0.244	0.251	0.244	0.242
1.500	0.261	0.259	0.264	0.257	0.254	0.251	0.2																	
1.600	0.264	0.259	0.258	0.261	0.258	0.252	0.24																	
1.700	0.256	0.256	0.253	0.252	0.255	0.249	0.2																	
1.800	0.276	0.267	0.256	0.263	0.248	0.246	0.2																	
1.900	0.257	0.259	0.255	0.249	0.244	0.246	0.2																	
2.000	0.264	0.268	0.260	0.257	0.252	0.255	0.2																	
2.100	0.261	0.256	0.256	0.252	0.253	0.254	0.2																	

Graphical View:

Longitudinal Extent 19.000 in →

Circumferential Extent 45.900 in ↓



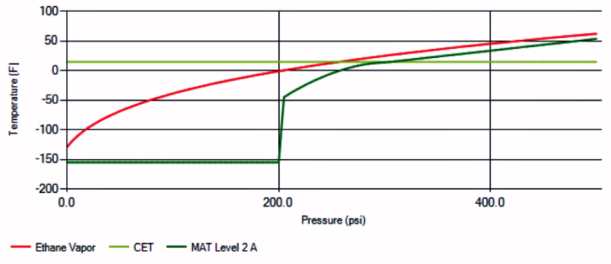
Brittle Fracture MAT Plot and Component Summary

Brittle Fracture
Assessment Name: MAT Evaluation
Tag Number: 2606.30-76 A/B

Open New Create Fil

Results

Fail Level 2. The maximum differences between selected fluid vapor and user fluid vapor pressure curves are:
CET= 38.8 Deg F;
Minimum acceptable (coldest) temperature when the pressure is at the full design value (MAWP) is 53.8 Deg F
Maximum permitted pressure when the temperature is at -155.0 Deg F is 200.0 psi



Assessment Notes:
Applicability and limitations of the assessment procedure should be checked prior to conducting a FFS assessment
Assessment procedure is limited to vessels for which loads are pressure-based.
SA 212-B was removed from the ASME VIII Code in 1967

Component	Connection Type	Material	Exemption Curve	tnom (in)	tgov (in)	tmin (in)	P Number	Charpy Impact (F)	Joint Eff	PWHT	PWHT Credit Applied	MAT (F)
Top Head	Top Head (Formed Head) @ Shell (Cylinder)	SA-212 B Firebox	A	1.3750	1.3750	N/A	P1 Gr. 1	N/A	1.000	Yes	Yes	53.84
Shell	Shell (Cylinder) @ Bottom Head (Formed Head)	SA-212 B Firebox	A	1.3750	1.3750	N/A	P1 Gr. 1	N/A	1.000	Yes	Yes	53.84
Shell	Shell (Cylinder) @ Fill Connection (8") (Nozzle)	SA-212 B Firebox	A	1.3750	0.5000	N/A	P1 Gr. 1	N/A	1.000	Yes	Yes	1.62
Shell	Shell (Cylinder) @ R.PAD on Fill Connection (8") (ReinforcingPad)	SA-212 B Firebox	A	1.3750	1.3750	N/A	P1 Gr. 1	N/A	1.000	Yes	Yes	53.84

BechtFFS Web-based Software Features
Brittle Fracture per API 579-1/ASME FFS-1 Part 3, Levels 1, 2A, 2B and 2C
Level 2 Method A uses stress ratio thickness basis
Output is envelope of allowable operating temperatures as a function of pressure (0 to design pressure)
User Entered and Vapor Pressure (autorefrigeration) library of curves selectable for inclusion in MAT plot
Analyzes interconnected (welded, bolted) assemblies
Fracture Mechanics per API 579-1/ASME FFS-1 Part 9 & ASME VIII, Div 3, Article KD-4
20 Annex C and Annex D stress intensity and reference stress geometries
FAD Stability Assessment including FAD diagram
Crack growth and Cycles to Failure including crack growth profile plots
Library of crack growth rate factors from Table KD430
Multiple Load Cases
Stress Profiles included cycling loads, primary only, secondary only and weld residual.
User Input Secondary stress profile
User Input Weld residual stress profile
Hydrogen Environment crack growth parameters
Simultaneous simulation of 2 sets of FEA stress profiles
General Metal Loss per API 579-1/ASME FFS-1 Part 4, Levels 1 and 2
Point Thickness Reading (PTR) assessment
Critical Thickness Profile (CTP) assessment
Accommodates large scanned dataset and software color codes the grid, and identifies and analyzes individual LTAs (CTP)
Local Metal Loss per API 579-1/ASME FFS-1 Part 5 and B31G, Levels 1 and 2
Color coding
Maximum External Pressure
Accommodates large scanned dataset and software color codes the grid, and identifies and analyzes individual LTAs (Level 2)
Pitting per API 579-1/ASME FFS-1 Part 6, Level 1
Display pitting charts 6.3 through 6.9
Upload damage image for comparison with pitting charts and inclusion in report
Weld Misalignment per API 579-1/ASME FFS-1 Part 8, Level 2
Flat plate, cylindrical, and spherical geometries
Centerline offset and/or angular misalignment
Additional
MAWP/tmin calculations (where appropriate) for ASME Section VII, Div 1 Shells, B31.3 and API 650.