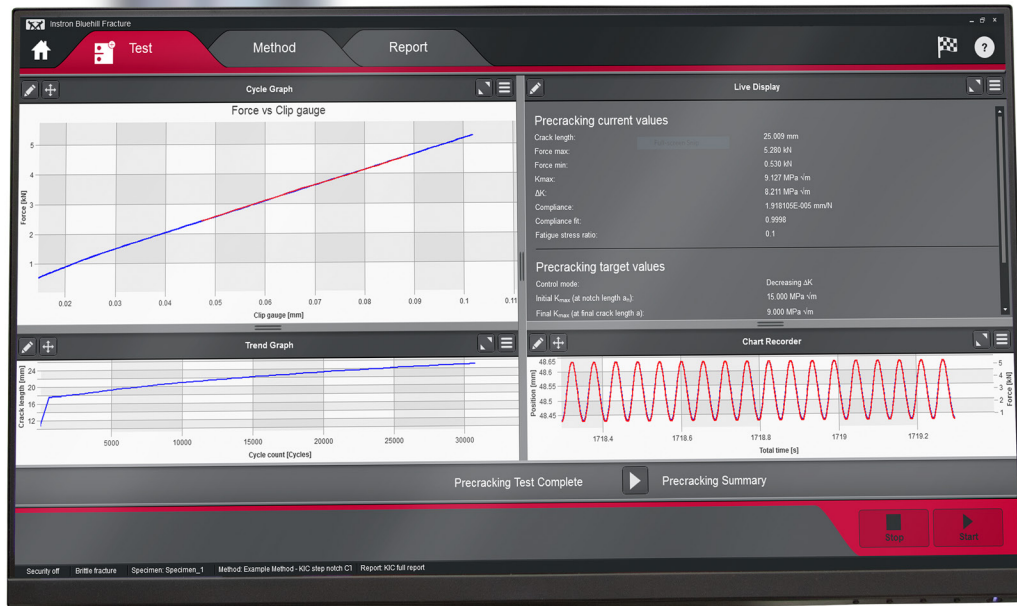


Bluehill® Fracture

Simplify your Fracture Testing, Analysis and Reporting





Bluehill® Fracture
Simplify your Fracture Testing,
Analysis and Reporting



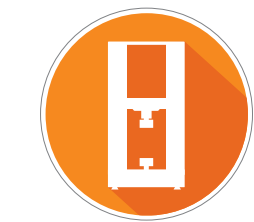
For over **75 YEARS** the Instron® brand has been widely recognized for producing some of the most advanced mechanical testing systems in the world. Our systems are designed by industry experts, vetted by active members of major standards organizations, and supported by a global network of skilled and experienced service technicians. This comprehensive approach allows us to back each Instron system with an unmatched level of industry and application expertise designed to support it throughout its lifetime.



1500+ employees
A highly-educated,
experienced, and
diverse workforce



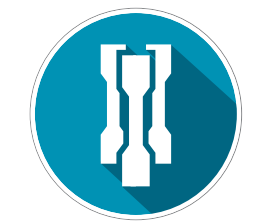
Representing **160 countries**, speaking
40+ languages



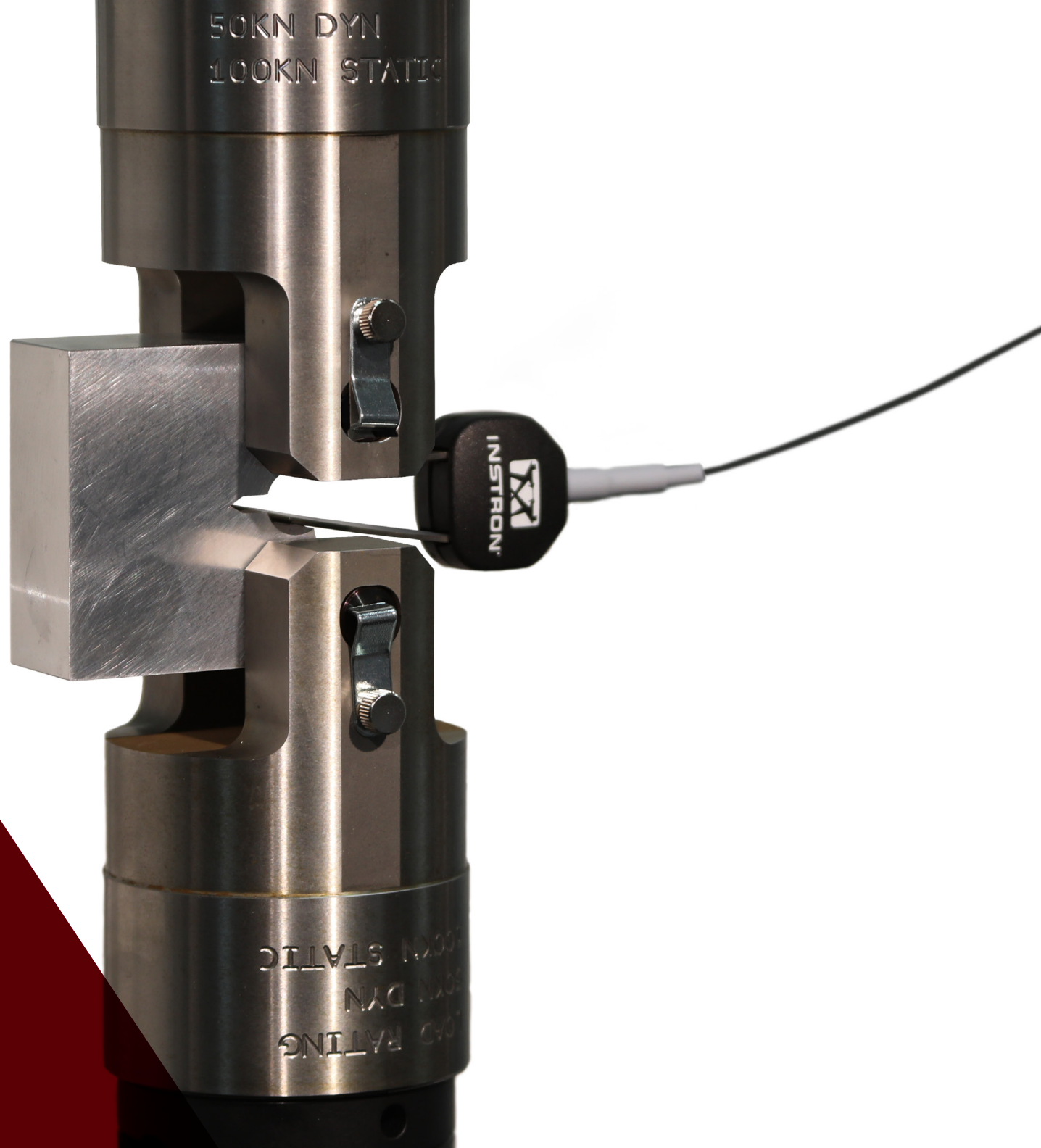
50,000+ systems
installed worldwide



75+ years of engineering
and manufacturing
testing systems



Diverse product range
for nearly all global
markets and industries



BLUEHILL FRACTURE

Simplify Your Fracture Testing, Analysis and Reporting

As a leading supplier of testing equipment for crack propagation and fracture toughness, Instron are aware of the challenges users face in reducing both the complexity and time taken to produce accurate, repeatable results. The Bluehill Fracture software package addresses these challenges.

Customizable test flows guide the user through the steps needed to produce their final results, saving time by minimizing data entry at each step. Comprehensive on-screen user guidance along with automatic post-test analysis and reporting tools also reduce the skills and training required. Additionally, the layout, terminology and test progression is common to other Instron software packages, such as Bluehill Universal.

Bluehill Fracture modules support all common test standards (ASTM, ISO and BS) for crack propagation, ductile and brittle fracture, crack length measurements and specimen geometries. Users can test to predefined standards (e.g. ASTM E399, ASTM E1820, ISO 12135).



KEY TAKEAWAYS



Save Time with Minimized Data Entry



Jump Straight into Testing



Run a Test, Guided at Every Step



Review Results



Automatic Validity Checking



Produce a Report



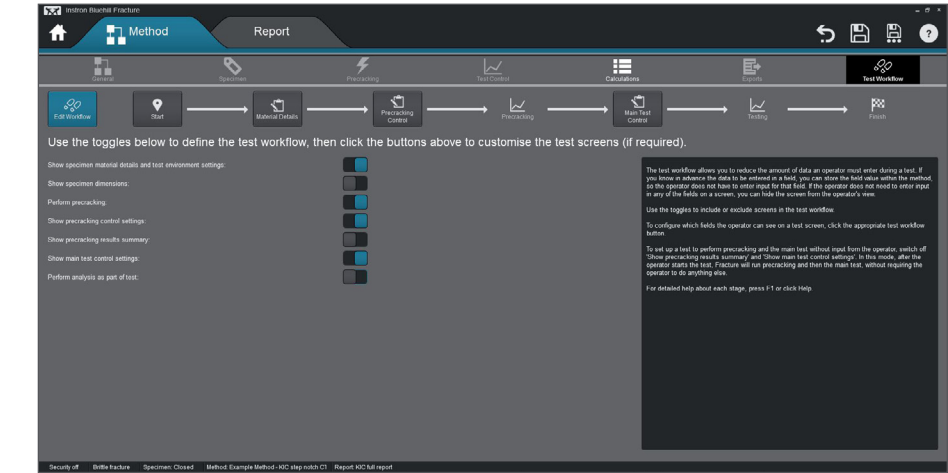
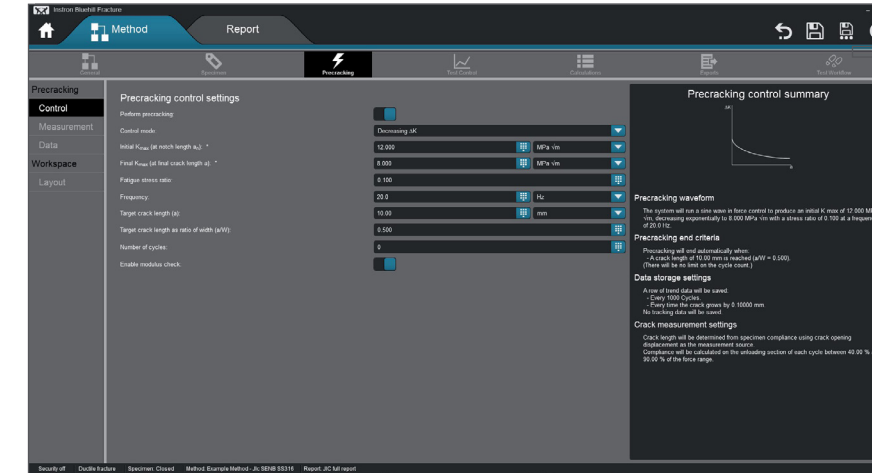
METHOD DEFINITION

Spend Less Time Setting Up Tests

Whether you are designing your own test or creating a method to be run by an operator, Bluehill Fracture comes with the tools to create the procedure you need.

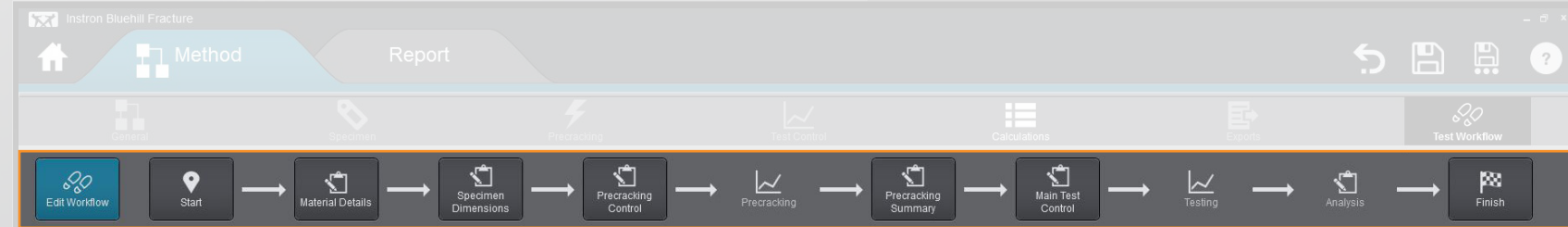
Bluehill Fracture's unique test workflow definition breaks the test into a logical series of steps, enabling the test designer to control the process of data entry before, during and after the test. A reduction in entering the same data for each test saves time and minimizes data entry errors. Parameters for each stage can either be pre-populated prior to the test, imported automatically from a LIMS system or entered manually every time a test is run.

Every parameter from specimen details, test control, data logging and the real time test run graph layout can be customized and is stored with each test method. User account settings control who in the laboratory can change and update test methods.



- Create a method from basic templates
- Switch between standards, units or specimen geometries
- Predefine specimen and test parameters as required

- Customizable method steps streamline the work flow
- Only show the data required by the operator, saving time and reducing errors



Use the toggles below to define the test workflow, then click the buttons above to customise the test screens (if required).

Show specimen material details and test environment settings.

Show specimen dimensions.

Perform precracking.

Show precracking control settings.

Show precracking results summary.

Show main test control settings.

Perform analysis as part of test.

Show export options before finishing.

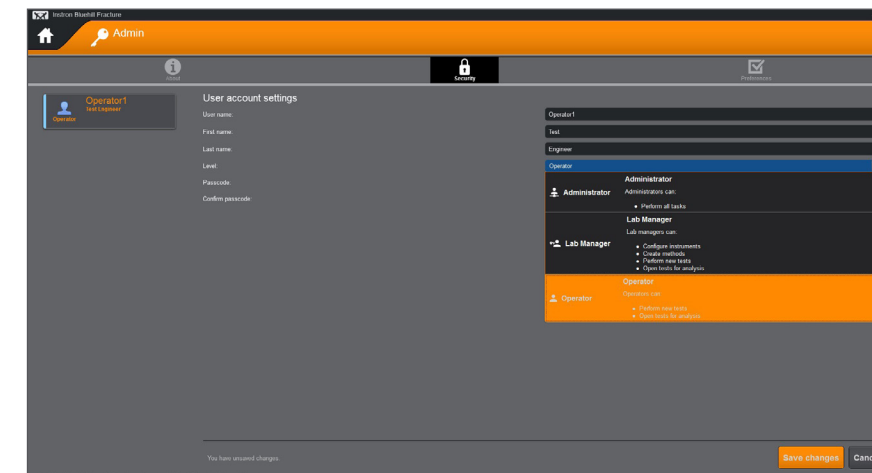
The test workflow allows you to reduce the amount of data an operator must enter during a test. If you know in advance the data to be entered in a field, you can store the field value within the method, so the operator does not have to enter input for that field. If the operator does not need to enter input in any of the fields on a screen, you can hide the screen from the operator's view.

Use the toggles to include or exclude screens in the test workflow.

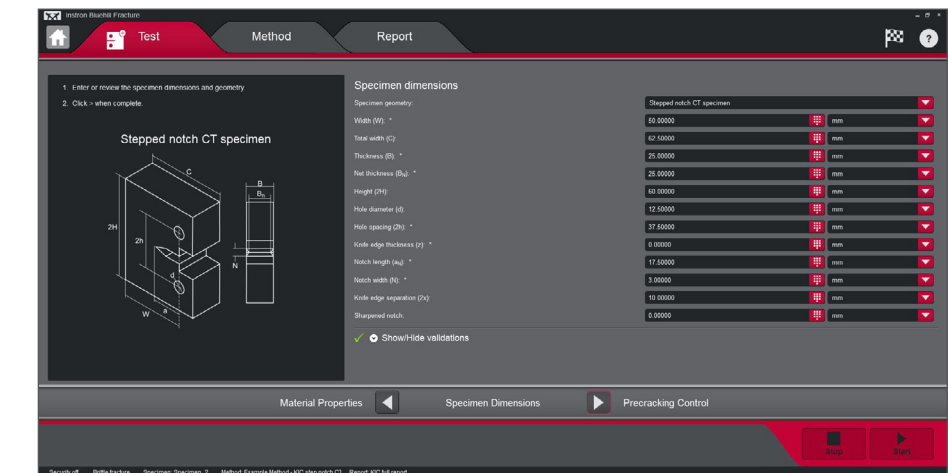
To configure which fields the operator can see on a test screen, click the appropriate test workflow button.

To set up a test to perform precracking and the main test without input from the operator, switch off 'Show precracking results summary' and 'Show main test control settings'. In this mode, after the operator starts the test, Fracture will run precracking and then the main test, without requiring the operator to do anything else.

For detailed help about each stage, press F1 or click Help.



- User access control allows advanced users to protect areas of the method
- Operators can run tests without risk of changing critical settings



- Work flow can be clear and simple or fully detailed depending on your need
- Guidance notes can added to aid operators throughout the test

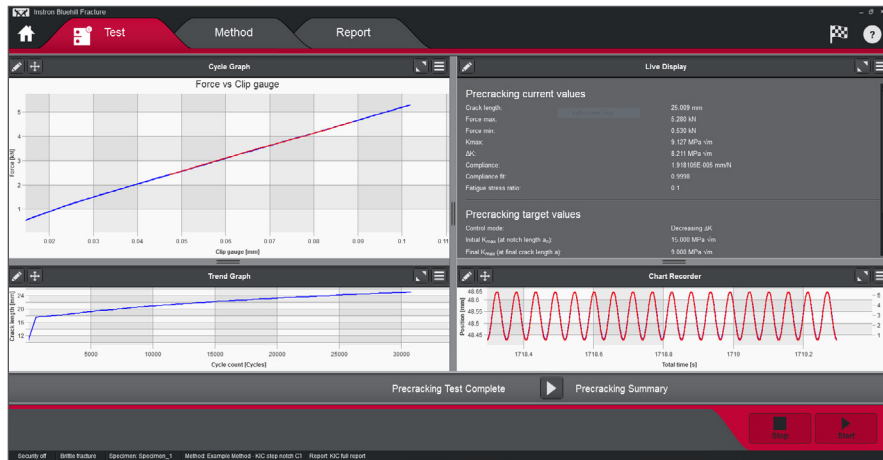


RUN AND ANALYZE TESTS

Produce Results Faster

Performing and analyzing Fracture Toughness tests has never been simpler than with Bluehill Fracture. Select a test method to run, from a pre-defined list or your own customized method, and Bluehill Fracture will step you through the pre-test data entry you define, then when ready, the software will perform pre-cracking gauge (if required) and finally onto the main fracture test.

Analysis of test results is also simplified, with an intuitive post-test analysis and reporting section included as standard. The software guides operators through data input, results plotting, to automated validity checks, report generation and data export. By identifying the reasons and section within the test standard in which a validity check fails, the time and skill required to analyze results is significantly reduced.



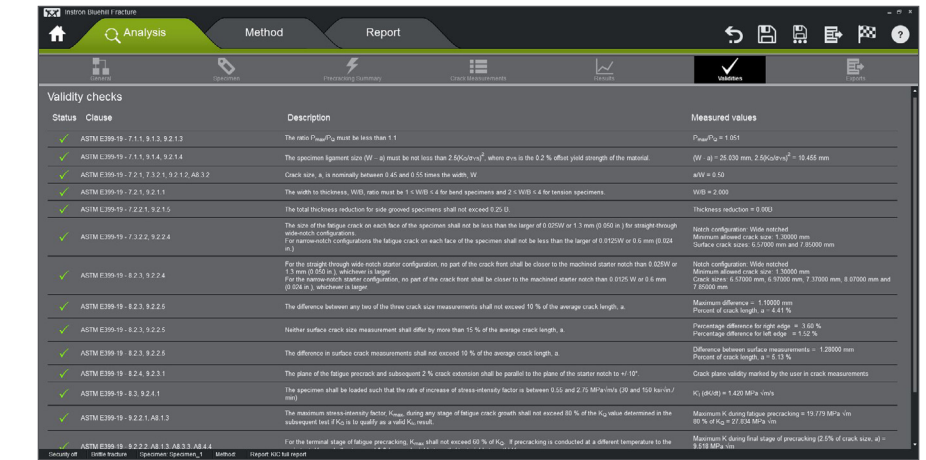
- Pre-configured material properties and pre-cracking targets reduce user input and increase throughput.
- Settings can be reviewed during the test flow, without needing to stop and edit methods.



- Simple data entry is provided for specimen dimensions and crack fronts whilst pre-cracking data is stored automatically.
- The Bluehill Fracture method can import measurements from files generated by a database or automated measurement device.



- The analysis summary shows construction lines on the graph with simple interface for interaction.
- For complex analyzes (such as J1c R-curve from unloading compliance) a specific page is provided to review raw data and sequence calculations.



- Bluehill Fracture provides both a summary check and detailed breakdown of values and reference clauses for auditability.
- Validity checks are itemized and include achieved values and allowable limits.



REPORT GENERATION

Deliver Results Faster

The report and export function within Bluehill Fracture completely automates the process of generating a summary report. This reduces complexity, time and errors by avoiding additional data export and manipulation at the post test reporting stage.

Whether you need a summary in text output format or a fully customized PDF report in your organization's format, Bluehill Fracture has the features to achieve this at the click of mouse button.

The fully customizable report can contain any combination of fields from pre-cracking summary and results plots, to specimen details, crack front measurements and validity checks.

At the end of a test the report can be stored automatically in a local or network location of the users choice.



Your company logo



Test information summary



Analysis curve



Date and time data



Validity checks

XYZ COMPANY

Test standard	ASTM E399-19
Calculation type	K - Plane strain fracture toughness
Batch name	Fracture Demo
Specimen name	Specimen_1
K _{IC}	34.792 MPa √m
b	24.970 mm
K _I (dK/dt)	1.434 MPa √m/s
P _{max} /P _c	1.051
2.5(K _{IC} /σ _{ys}) ²	10.455 mm
P _u	20.173 kN
P _{max}	21.204 kN
P(a/W)	9.641

Test date and time:
03 February 2020 14:14

Analysis date and time:
03 February 2020 14:40

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XYZ COMPANY

Maximum K during fatigue precracking	19.77905 MPa √m
Maximum K during final stage of precracking (2.5% of crack size, a)	9.51782 MPa √m
Maximum delta K during final stage of precracking (2.5% of crack size, a)	8.56602 MPa √m
Cycles taken for final 2.5% of crack growth	4020.00000 Cycles
Fatigue stress ratio	0.10000
Precracking environment different to main test	False
Notes	
Main test environment	
Test temperature	23.00000 °C
Relative humidity	50.00000 %
Precracking environment different to main test	False
Fatigue precrack measurements	
Measured values	
1 - Left edge	24.07000 mm
2 - 25%	24.47000 mm
3 - Centre line	24.87000 mm
4 - 75%	25.57000 mm
5 - Right edge	25.35000 mm
Calculated values	
Maximum crack measurement	25.57000 mm
Minimum crack measurement	24.47000 mm
Average crack measurement	24.97000 mm
Acceptable crack plane	True
Crack plane comments	
Specimen geometry	Straight notch CT specimen
Width (W)	50.00000 mm
Total width (C)	62.50000 mm
Thickness (B)	25.00000 mm
Net thickness (B _n)	25.00000 mm
Height (Z _h)	66.00000 mm
Hole diameter (d)	12.50000 mm
Hole spacing (2h)	37.50000 mm
Knife edge thickness (z)	0.00000 mm
Notch length (a _n)	17.50000 mm
Notch width (h)	3.00000 mm
Knife edge separation (Z _k)	10.00000 mm
Sharpened notch	0.00000 mm
Material properties	
Material name	Aluminium 7075
Material composition	
Material form	
Heat treatment	
Crack-plane orientation	L-T
Offset yield strength	538.00000 MPa
Ultimate tensile strength	572.00000 MPa
Modulus of elasticity	114320.01717 MPa
Poisson's ratio	0.30000
Precracking environment different to main test	False

03 February 2020 Page 2 of 4



Pre-cracking information



Crack front details



Specimen dimensions



Raw Materials properties



Pictures of test or sample

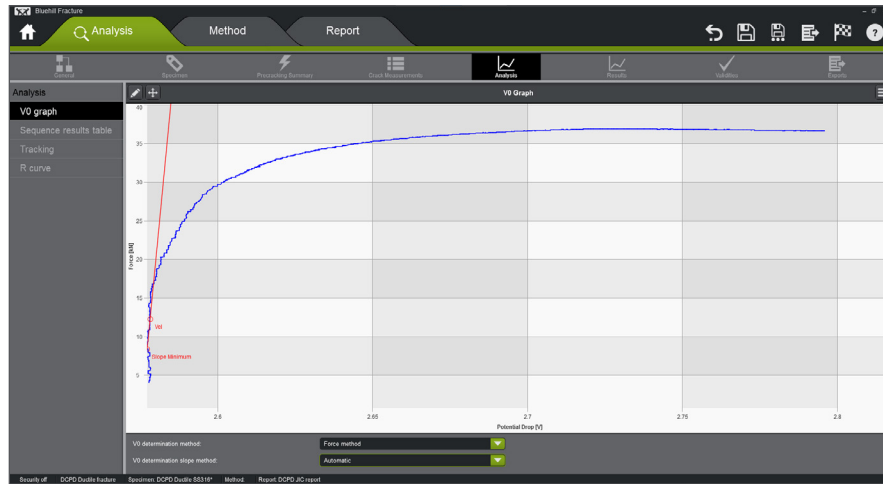


ADVANCED TESTS USING DCPD

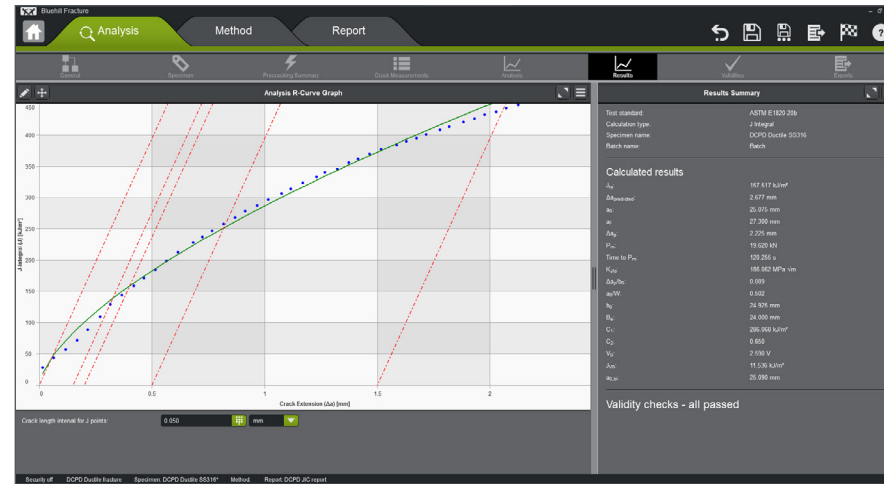
Work With Challenging Test Conditions

Measurements based on mechanical compliance are very well established and reliable, but some work requires more complex measurement solutions. Direct current potential drop (DCPD) measurement is the most popular approach to remove the need for moving mechanical contact with the specimen. DCPD is often the preferred option for users who specialise in very high temperature testing, high precision fatigue crack growth studies, or miniature specimens.

Bluehill Fracture brings the same level of usability and convenience to working with DCPD data as it offers for more common analyses. For routine use, native calculations are provided according to the recommendations of ASTM E647 and E1820. In specific applications local requirements or modelling may provide a more accurate formula, which can be added as user-defined relationship which is then applied during test and analysis. Bluehill fracture makes it easy to visualise and apply the analytical requirements of ASTM E1820 consistently and to include the necessary compliance corrections for an accurate determination of J-integral.



- Accepts X or X/Y from any conditioning system as scaled 0-10V transducer input
- Live calculation of crack length for precracking and fatigue crack growth experiments



- Automatic setting of reference voltage during test
- User-defined voltage - crack length relationships
- Post-test analysis for J_{1c} according to E1820 annex 18



FRACTURE MECHANICS TESTS AT TEMPERATURE

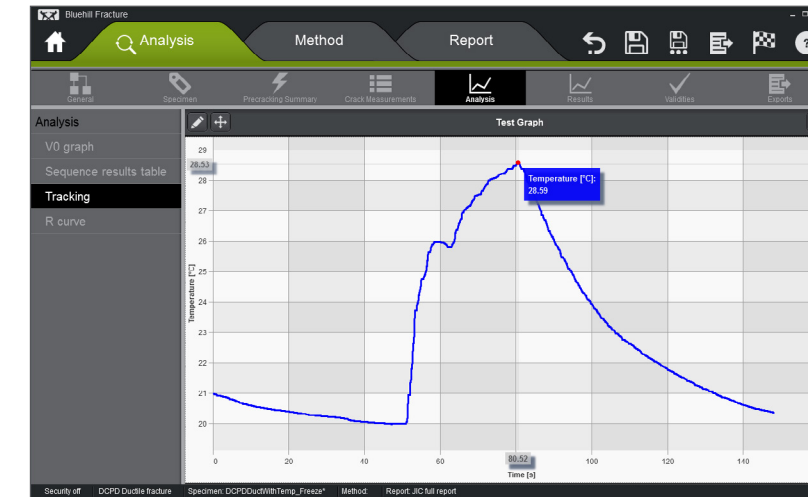
Supporting Non-Ambient Test

Testing at elevated temperature is often an important reason for choosing to move to DCPD crack length measurement, but is also achievable with standard or specialised C.O.D. gauges over a more limited range.

Bluehill Fracture supports temperature recording from Instron Furnace Controller software and from Eurotherm temperature controllers and monitors used on our other temperature chamber products.

Temperature can be automatically recorded throughout any fracture toughness or crack growth test. For standard analyses, average and variation data are automatically determined and checked against the permitted range for validity.

Automatic temperature setting is not supported, but a digital TTL output from the 8800MT controller is available to signal end of test and trigger cool-down of heating systems.



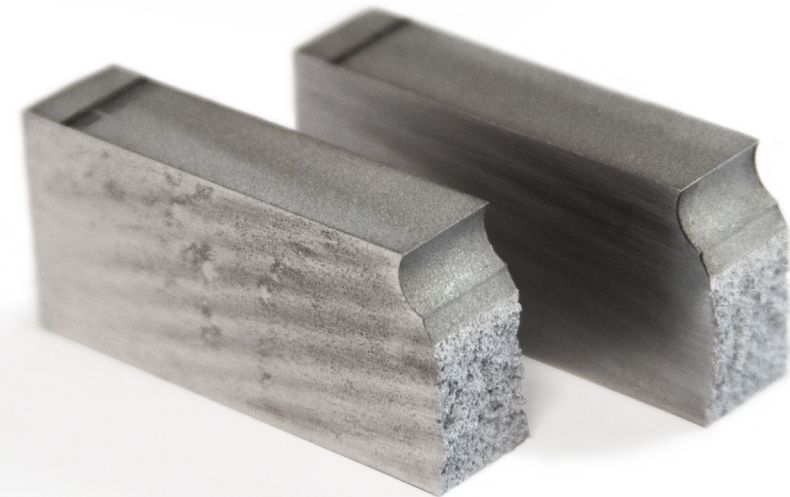
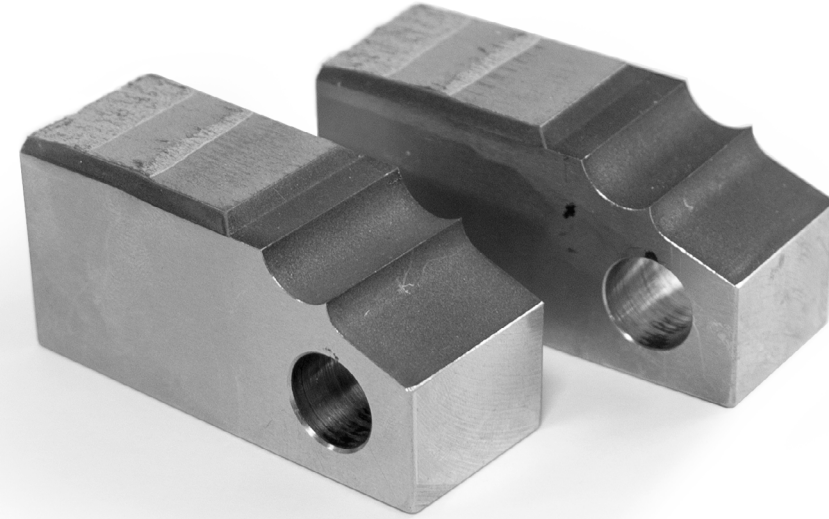


STANDARDS COMPLIANCE

Stay Up To Date

International Standards are under constant review, with new revisions being published every few years. It is important for laboratories to stay abreast of these changes and ensure their test procedures, methods and analysis are kept up to date.

Instron's Bluehill Fracture makes this very simple to achieve by utilizing a separate standards library. When new standards become available you can simply update the library rather than the entire software package enabling you to test, analyze and generate reports to the latest standard version. Access to the older revisions is still available, providing the option of testing to a previous version if required.



There is no need to uninstall your existing software and reinstall another version just to update to the latest standards meaning less expense and down time. Customize settings for user access, test reports and preferences all remain the same.



HOW CAN I UPGRADE TO BLUEHILL FRACTURE?

System Requirements

BLUEHILL FRACTURE is available with new ElectroPuls® and Servohydraulic systems, as well as any existing dynamic testing system with an 8800 or 8800MT controller running Windows 7 or 10.

Contact your Instron representative for more information.





THE WORLD STANDARD

We stake our reputation on the integrity of data. From the measurement of primary test data to result generation, we design and manufacture the full data integrity chain (e.g. load cells, sensor conditioning, and software). Additionally, we calibrate more than 90,000 of these sensors annually with the lowest accumulated uncertainty.

30,000+

We service and calibrate more than 30,000 Instron systems in active use worldwide every year.

96%

96% of the Fortune 100 list of the world's largest manufacturing companies use Instron test systems.

18,000+

Instron systems have been cited in more than 18,000 patents since 1975.
