

# 1 Technical Specification IM1-P

## 1.1 System

Drop height	Set by mechanical top stop Range variable from 250mm to 1200mm
Drop mass	Fixed, 10Kg Accuracy $\pm 0.5\%$ Range of standard and custom interchangeable strikers
Mass arrest	By pair of self compensating shock absorbers
Velocity range	2.2m/s to 4.85m/s
Energy range	24J to 118J (options to 176J)
Overall dimensions	Free standing on isolation mounts Width 1000mm, Depth 800mm, Height 3000mm
Tower assembly	Enclosed by panels with electro-mechanical interlocked front access door
Specimen area	Anvil and clamp arrangement to ISO6603 Alternative geometries available
Access	Impact resistance polycarbonate doors to front with electro-mechanical interlocks
Drop parameter control	Drop height set by position of top stop cross-bar
Gross Weight	800kg approximately
Control systems	Pneumatic Imatek C3008 (machine interface) ImpAcqt V2 control software (on PC for impact test sequencing)
Release	By pneumatic actuator
Sample stripper	For testing tough ductile specimens to extract the striker after impact
Safety	Safety is compliant with the European CE machinery safety directive (89/392/EEC & 91/368/EEC – machinery safety EN60204-1:1992). Access to sample area protected by solenoid-locked doors when the impact mass is in an unsafe position. Release mechanism electrically and pneumatically isolated when access doors are open. All safety systems dual circuit and fail-safe. No unsafe release of the impact mass possible under any of the following conditions: (a) failure of mains power supply (b) failure of compressed air supply (c) failure of control software



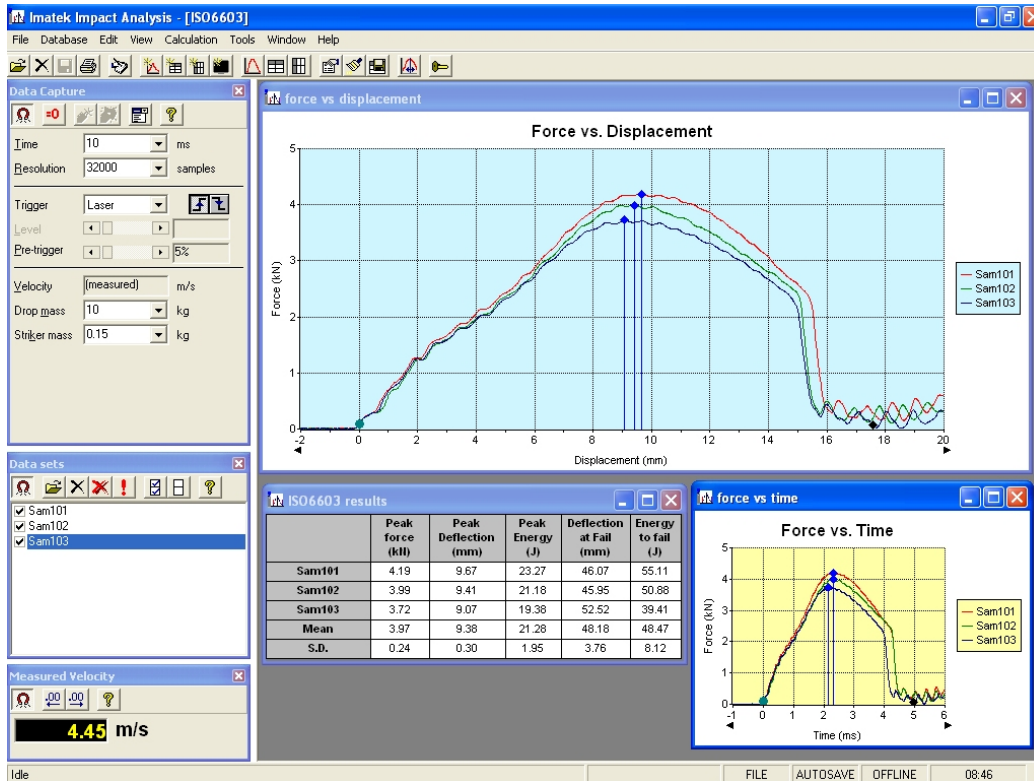
Instrumentation – Force	Impact force measured by Kistler force link, mounted immediately behind striker Dynamic rated capacity: $\pm 20\text{kN}$ . Linearity: $<0.5\%$ of rated output. Hysteresis: $<0.5\%$ of rated output. Operating temperature range: $-20^{\circ}\text{C}$ to $+120^{\circ}\text{C}$ . Safe overload: $\pm 150\%$ .
Signal conditioning – Force	By matched charge amplifier Bandwidth: DC – 50KHz, $-3\text{dB}$ Range: $\pm 100$ to 999,000pC Output voltage: $\pm 10\text{V}$ Linearity: $<\pm 0.1\%$ Accuracy: $\pm 0.5\%$ Auto-zero function: automatic zero of force signal output applied as part of test cycle
Data acquisition – Force	Sample rate: 3,000,000 samples per second. Resolution: 16 bits Data points captured per impact: 50,000 Calibrated accuracy: $\pm 0.1\%$ Timebase accuracy: $\pm 0.01\%$ Triggering: from force signal, laser/photodiode detector or external trigger
Data acquisition – Auxiliary	Three additional channels with the same specification, simultaneously sampled
Instrumentation – Velocity	Impact velocity measured immediately prior to impact Method: time of flight of target through laser/photo-diode detector Timing resolution: 25ns Target dimensions accuracy $<0.1\%$ Overall accuracy: $\pm 0.1\%$
Performance	Overall accuracy of force measurement: $\pm 0.75\%$ Overall accuracy of absorbed energy: $\pm 1.5\%$
Supplies	Electricity: 230VAC $\pm 10\%$ , 5Amp, 50/60Hz $\pm 1\%$ , 1-phase, Neutral and Protective Earth. Air: 0.5Mpa to 0.8Mpa clean non-lubricated air
Emissions	Noise: site dependent Vibration: site dependent Dust: none Radiation: none
Operating environment	Temperature: $+5^{\circ}\text{C}$ to $+30^{\circ}\text{C}$ Humidity: 0% to 90% non-condensing Electrical immunity: to EN 50 082 All main electrical control systems rated at, or housed in enclosures, with protection category IP61 (to EN 60 529/10.91)



## **1-2 Software specification**

Platform	PC running Microsoft Windows 2000 or Microsoft Windows XP Pro Minimum specification of 512MB RAM, 80GB hard drive, CD-R, 17" flat panel display
Environment	Compatible with MS Office 2003 (supports export in native Excel format files, and Windows MetaFiles for graphics)
Purpose	Control of impact testing sequence and analysis of impact data
Access control	Three, password protected levels: (a) limited access, to perform pre-defined impact tests (b) supervisor access, to control the type of test performed and the required documentation information etc (c) engineering access, for sensitive configuration and calibration functions  Access is controlled by passwords. The user ID forms part of the test information that has to be entered
Language	UK English, with easy to use human/machine interface
Data security	All calibration and configuration information is held as data files on the hard drive of the control PC  Password protection of the configuration mechanism provides protection from accidental or malicious modification  Standard operating system features provide integrity checking (CRC checksum)
Test information	As standard, the Impact software allows for configuration of what information is stored with each test

## 1-3 Graphical user interface



The GUI provides both control of the impact test (impact tester and data acquisition parameters) and analysis of the resulting data.

Control	Specimen clamp/unclamp/stripper Mass release Data acquisition parameters (sample rate, sweep length) Impact sequence
Indication	Machine status Current impact mass position
Data capture	Force vs time Initial impact velocity
Calculations	Acceleration Velocity Displacement Energy User-defined curves User-defined numerical results
Units	Fully configurable units for any requirements Default units: SI, cgs and US
Markers	Configurable system of markers to identify specific points on curve, including: <ul style="list-style-type: none"> <li>▪ start of impact</li> <li>▪ yield load</li> </ul>



	<ul style="list-style-type: none"> <li>▪ maximum load</li> <li>▪ initiation of crack propagation</li> <li>▪ end of crack propagation/test</li> </ul>
Data presentation	<p>Graphs of any standard calculated or measured quantity against any other, including user-defined curves.          Appearance of graphs very flexible          Tables of numerical results and documentation information          Hard copy of graphs and tables          User-definable report layout</p>
Other features	<p>Test results database          Automatic save of test results          Three configurable levels of user access          User-configurable documentation fields          Frequency analysis of captured data (FFT) and very flexible filtering (Butterworth, Bessel and FFT filter types)          Configuration back-up restore mechanism for securing apparatus configuration and calibration information          Configurable screen layout          Export of test data to Microsoft Excel, Windows Metafile and "comma separated value" (.CSV) file.</p>

## 1.4 Standard options

Fixed Mass	<p>Fixed, 15Kg (maximum energy 176J)          Accuracy <math>\pm 0.5\%</math></p>
Variable Mass	<p>Range 5kg to 15kg (maximum energy 176J)          Increments 1.0kg          Accuracy <math>\pm 0.5\%</math></p>
Standard Striker Plaque	<p>10mm and 20mm hemispherical. Complies with EN ISO6603-2          Material of contact parts - titanium striker with steel hemispherical tip</p>
Specimen Anvil & clamp Plaque ISO	<p>100mm annular anvil &amp; clamp. Complies with EN ISO6603-2</p>
Specimen Anvil & clamp Plaque ASTM	<p>Various geometries available. Complies with ISO6603, ISO7764, ASTM D1709, ASTM D3763 and ASTM D5628</p>
Dynamic Displacement	<p>Specimen deformation measured directly during impact.</p>