



MHC - 5000 Series Sensors

- Frequency Domain FFT Capability
- Structure Analysis for Cracks & Corrosion
- Portable Wireless AE Investigation Tools

MHC-5000 Series Sensors

Compact dynamic envelope AE sensors for frequency domain (FFT), structural analysis and research.

MHC 5000 Series sensors provide a simple route for Acoustic Emission (AE) detection to be included in Holroyd or third party remote monitoring and diagnostic systems. Even with no previous experience of AE you'll be amazed at how easy it is to get useable signals in an industrial environment.

MHC 5000 Series sensors and Ultraspan Pro Software give you time and frequency domain plots using AE in just the same way as traditional vibration analysis.

MHC-Ultraspan sensors come in two versions:

- Ultraspan Wireless – blue tooth enabled, stand alone dynamic AE envelope sensor in either magnetic or tab mounted form.
- Ultraspan MP – permanent mount dynamic AE envelope sensor physically identical to the MHC-Smart and MHC-Sigma range of sensors but without the additional data processing capability.



Ultraspan/Wireless



It's so convenient to get results in the field. Simply mount the sensor where you want to monitor, activate and establish communications with your laptop PC running Ultraspan-View software. Ultraspan will continuously stream the log dynamic envelope of the detected AE signal to your PC where you can display it (like an oscilloscope) capture, replay & export for detailed analysis.

A Built in statistical compression mode characterises the detected activity as Max, Min and Mean over a user defined number of waveform samples. Long term monitoring can be performed without making great demands on PC memory. Monitor the waveform from one machine, process or structure, move the sensor to another. It couldn't be easier or quicker - its compact and there are no trailing wires.



Magnetic LR stud mounts
Ultraspan wireless sensors

Ultraspan/MP



Ultraspan MP is a complete single channel AE detection system housed within a miniature sensor housing. Its an integration of transducer, amplification, filter and enveloping elements that have been proven on the industrial shop floor over many years. All the elements within Ultraspan/MP are designed to continuously respond over an 86 dB dynamic range. Very wide applicability and no set up.

Simply mount the sensor where you want to monitor, power up with +24 VDC and the sensor continuously outputs a 0 to +10 V analogue representation of the logarithmically (log) compressed dynamic envelope of the detected AE signal.



Bonded & Tab Mounted Ultraspan/MD Sensors



MHC-5000 Series Sensors

MHC 5000 Series Sensors (portable sensors compatible with MHC portable instrument range) SERIES MODEL VARIANT

Sensors				
5010	Untraspan	/Wireless	/Mag	Wireless dynamic envelope sensor with magnetic mount
5011	Untraspan	/Wireless	/Stud	Wireless dynamic envelope sensor with stud mount
5030	Ultraspan	/MP		Dynamic envelope sensor powered by external 24 VDC
5031	Ultraspan	/MP	/Tab	Tab mounted dynamic envelope sensor powered by external 24 VDC
5032	Ultraspan	/MP	/DP	Dynamic envelope sensor powered by external 24 VDC Dip coated
5033	Ultraspan	/MP	/Tab /DP	Tab mounted dynamic envelope sensor powered by external 24 VDC Dip coated
Software and accessories				
5015	SI	/BV		Bluetooth interface between Ultraspan/Wireless sensor & PC
5016	Recharger			UK style (220-240VAC) mains recharger for Ultraspan/Wireless sensors
5020	Ultraspan View			Sensor setup, record capture and display software for Ultraspan/Wireless sensors
5021	Ultraspan Pro			Analysis software for waveform records from Ultraspan/Wireless sensors

Technical Specifications for MHC-5000 Series Sensors		
MHC Sensor	Ultraspan Wireless	Ultraspan MP
Measurement		
Interval	10,000 samples per second	4500 samples per second
Measurement	Log Dynamic Envelope with 0.5 dB resolution Max, Mean, Min calculated over 2-16384 cycles (adjustable)	Log Dynamic Envelope with 0.5dB resolution.
Dynamic range	0-92 dB or 40,000 : 1	0-86 dB (typical) or 20,000 : 1
Response delay	Delayed by Bluetooth comms.	0.5ms (typical)
Communication	Bluetooth Class 1, liscence free FCC ID:P1401B	0-10VDC scaled at 100mV/dB
Bandwidth	5 kHz	DC-2.2kHz
Signal Range	Up to 100m free space 25m through single wall (typical) >100m with external aerial	n/a - cable
I/O		
Aerial	Built in or factory supplied external	n/a
PC Interface	Ultraspan View or Ultraspan Pro or third party software.	Third party software
Cable	n/a	9 way D-Type pinout.
General		
Sensing element	Piezoelectric 100kHz	
Power Requirement	4.8V NiMH rechargeable Push button LED powercheck External supply 5 VDC 80mA (when transmitting)	24V +/- 10% DC at 50mA when in alarm. EN6100-6-4, EN6100-6-2 or EN6100-4-5 or compliant
Operating Temperatures	-20 to 85 deg.C	-15 to 75 deg.C
Dimensions L x W x H	68x55x58	54x35x19,
Weight	260g	75g inc 1m of cable
Enclosure	Rubber shock resistant	Polyurethane coated mild steel
Attachment	Tab or Magnetic	Tab or Permanent bond Bonded - recommended system - Loctite Structural Adhesive 326 (RS part 496-114) & Activator N Accelerator (RS part 108-716) if bonding to flat metal surfaces

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Ultraspan Software and Data Analysis Package

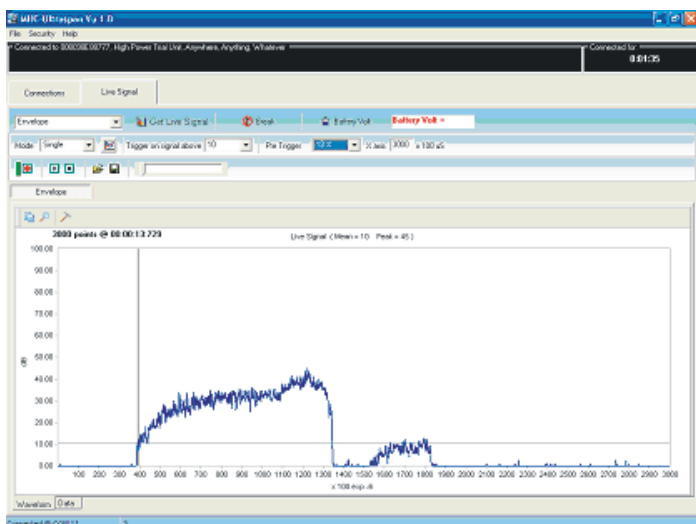
If you thought that you needed Vibration analysis to conduct FFT then think again!

Ultraspan data recording and analysis software comes in two versions:

- Ultraspan View** – designed primarily for use in the field. Data from the Ultraspan Wireless sensor is captured as live signals, displayed and stored on the PC. It allows the naming of sensor in terms of its measurement position (Site, Area, Machine & Point) meaning unambiguous identification of any waveforms recorded at that point.
- Ultraspan Pro** – an upgrade to Ultraspan View, extending capabilities for more detailed analysis of recorded data in time, frequency or audio domain. The software will handle very large data sets, larger than the capability of typical spreadsheets. Such data may occur for example during long term structural monitoring investigations.

Ultraspan - View

Ultraspan-View (supplied with the SI/BV interface) controls the operation of the Ultraspan Wireless sensor. It allows the user to set-up how the signal is captured (e.g. sample rate, continuous or single shot mode, dynamic envelope or statistical MEAN / MAX / MIN etc). Ultraspan View collects the data in your laptop showing a 'live' graphical display or tabulated data format. (When used in conjunction with Ultraspan Pro software this forms the basis for a powerful and easy to use AE based diagnostic analysis package.)

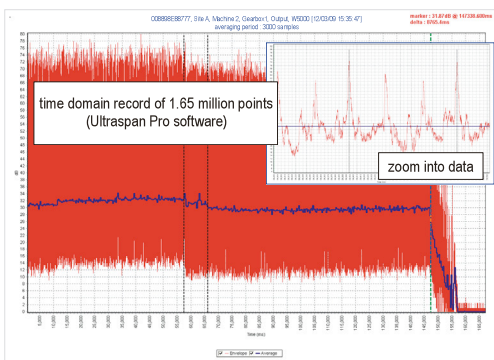


Ultraspan-View software gives you access to the digitised log dynamic envelope values in tabulated form (in addition to its oscilloscope like display). However at 10,000 samples per second such digitised listings soon become too long to be handled by standard spreadsheet programs.

Note

If you are only interested in capturing a transient event then you can operate Ultraspan-View in single shot (rather than continuous) mode being triggered when the signal exceeds a user defined threshold level. By defining an appropriate X-axis period and using the pre-trigger facility the captured file will be much shorter and easier to handle.

Ultraspan Pro



Ultraspan Pro software allows more detailed analysis of recorded Envelope waveforms in the time domain, frequency domain or as an audio file. A very useful attribute of Ultraspan Pro is its ability to deal with very large files (which cannot be handled by a spreadsheet).

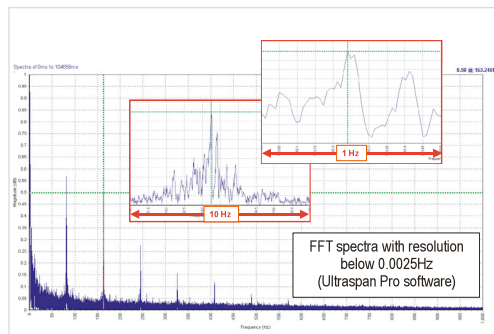
Time domain or FFT waveform

Note - Time Domain Analysis

Ultraspan Pro analysis software will display a time domain waveform of very many points. Large files are generated during recordings of long periods of time (e.g. 10secs = 100,000 measurements). Ultraspan Pro gives you an overview of such large waveforms and lets you zoom into the data to reveal more detail.

Note - FFT Waveform Analysis

Ultraspan Pro makes it easy to clip out part of a very large file and display it either as a time domain waveform or as an FFT frequency spectrum (cursor functions allow you interrogate these displays further).



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Ultraspan Pro

Representation as Audio Output

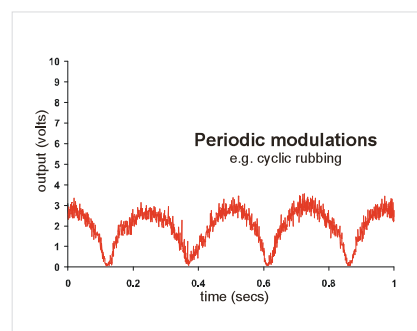
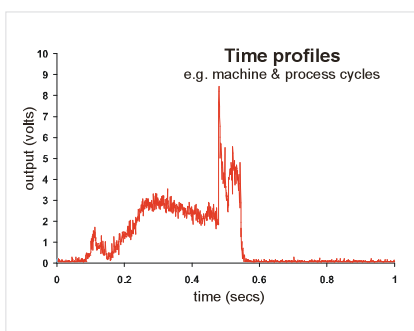
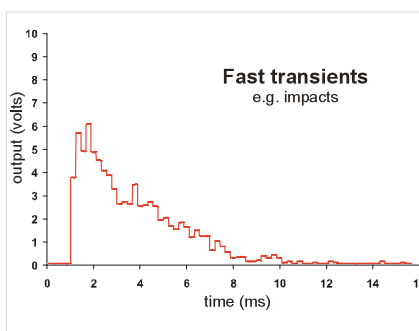
One final feature of Ultraspan Pro is its ability to take the entire digitised Ultraspan-View files and convert and play them as audio as well as export them as .wav files. Let your mind do the data processing!

Statistic data analysis

A statistical mode in which the Ultraspan sensor repeatedly pre-characterises the dynamic envelope signal in terms of its Max, Min and Mean values over a user defined number of signal samples. In this way the rate at which data needs to be stored (and hence ultimate file size) can be very dramatically reduced.

Export to third party systems such as Labview or MathCAD

If you are lucky enough to have a suitably capable third party data analysis package you can copy and paste the data table into it to allow analysis and interpretation.

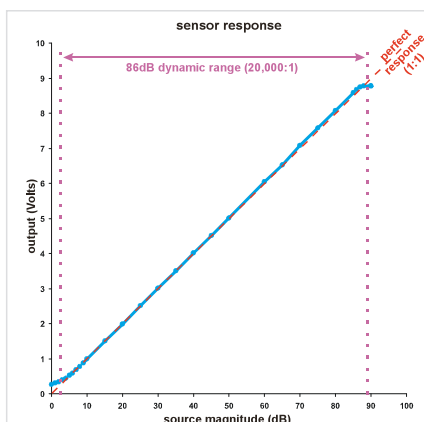


What is Acoustic Emission (AE) ?

The term AE applies to both the physical effect whereby high frequency elastic waves are generated in materials by naturally occurring processes and to the technology that is used to detect and process such signals.

In general, **AE signals** have a **high signal to noise ratio** for the detection of energy loss processes such as impacts, friction, crushing, turbulence etc.. The detection of such signals has found widespread use in machinery and process monitoring. AE methods can also be used to detect structural degradation (crack growth, delamination, corrosion etc.) although this can be complicated by lower signal to noise ratios and the need for multi-channel monitoring in large structures.

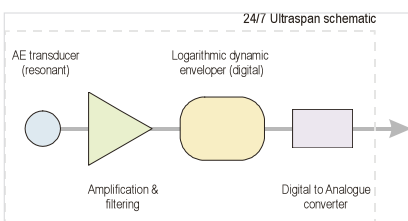
About the dynamic envelope processed AE signal



MHC-Ultraspan is based on a resonant transducer design. This has the effect of improving sensitivity due to the mechanical Q of the piezoelectric transducer element, reducing electronic noise and minimising sensitivity to unwanted low frequency noise and vibration. Unfortunately this high frequency signal is still difficult to handle.

A field proven way around this is to work with the dynamic envelope of the oscillatory signal. A small amount of signal attenuation is accepted in the process, retaining the vast majority despite it having only audio frequency content (DC to 5 kHz). The figure shows the near perfect dynamic envelope response plot for the MHC-Ultraspan MP sensor.

To achieve this, MHC-Ultraspan incorporates a state of the art detection and dynamic enveloping scheme which enables it to faithfully respond to elastic waves over a range up to 40,000 to 1 (i.e. 92 dB : MHC-Ultraspan Wireless) - so there's no need to change the operating range whether signals are big or small.



To make this signal even easier to handle it is logarithmically (log) compressed before being digitised. MHC-Ultraspan streams out these digitised values at the rate of 10,000 every second.

About Kittiwake Holroyd Ltd

Holroyd are part of the Kittiwake Group of companies. If your business is about condition monitoring of machinery, maintenance of industrial fuels and lubricants or monitoring of exhaust gases then Kittiwake operate in your field of expertise. Established in 1993, Kittiwake has grown into a leading global provider of monitoring and testing technology solutions with offices in the UK, Germany, Greece, USA, and Asia. Innovative technology solutions that make a real difference your operations.

Have a look at our information center on www.machinerycondition.com for hints and tips on how to maximize the benefits from your maintenance budget.



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