UPEC-MC – UltraPortable EC Multichannel Tester

Sensima Inspection's UPEC-MC is a very compact and easy-to-use multichannel eddy current tester. The core of the tester is an array of 16 independent EC measurement units developed by Sensima Inspection. These units are so miniaturized that 16 of those can be placed in a 20x10x5 mm^3 box. Each unit is a digital EC measurement system containing all necessary blocks for signal generation, AC current bias, voltage measurement, amplification, demodulation, filtering, digitalization, and communication.

This approach to electronic miniaturization for eddy current NDT sensors is a breakthrough in terms of the concept, component size, packaging and versatility of the system.

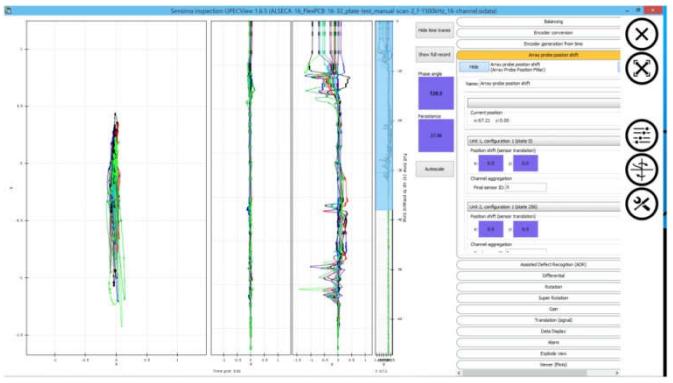
I) A single 2x2 mm unit can now take the place of all the PCB-mounted discrete electronic components that would conventionally be put in a sizeable housing and called an 'eddy current flaw detector'.
2) The unit can even be mounted on the sensor itself, with all-digital communication to the outside world.
3) To control an array of such sensors (for large array scanning), the units can be sensor-mounted or, if the sensors need to be flexible, on a very compact PCB adjacent to the sensor array.
4) A single, small microcontroller (uC) is used to control such an array of sensors and feed the data directly to a PC via a single USB digital connection.
5) This USB connection completely avoids the need for the usual expensive bundle of multi-wire cables between the array and the normally large electronic instrument.
6) The uC also permits the eddy current coils to be used in a multiplicity of configurations with far greater flexibility than ever possible with current analogue connected systems.
7) The ease of connection favours the use of coil arrays directly printed on flexible PCBs - a very versatile solution.
8) Very large scale arrays for large area inspection are a natural consequence of this.

UPEC-MC is the ultimate solution for your high end NDT systems because it:

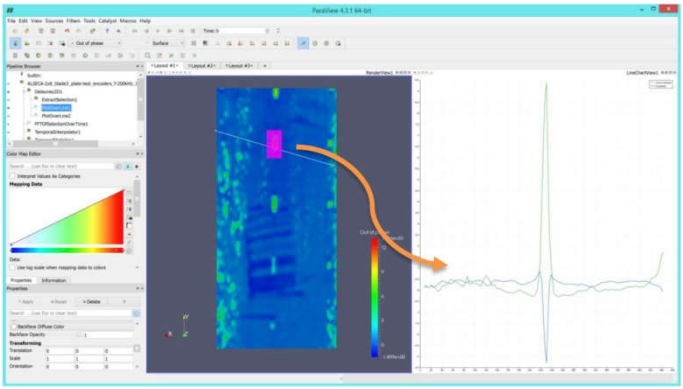
- eliminates the issue of long, multi-wire analog cables;
- enables deep UT and EC co-integration and data fusion;
- facilitates low level interfacing of robotics and NDT systems;
- opens new possibilities for NDT in hostile environments (UW, radiative, confined).

Compact and powerful: Tester board with 16 EC channels (8 on each side), uC, and USB connector. The board is connected to a flexible PCB array probe.

Versatile: Compatible with many array probes. Custom probes, including flex PCBs, on demand.



UPECView: intuitive and easy-to-use software



Postprocessing software: We recommend and customize high end open source solutions for your post processing and analysis tasks.

Sensima Inspection, Mont-Blanc 31, 1196 Gland, Switzerland
T: +41 22 364 49 20
www.sensimainsp.com info@sensimainsp.com

Technical specifications

Type of instrument	General purpose eddy current instrument	
Power supply	5 V USB powered, 500 mA typ. current draw, max 2 A	
Safety	CE, FCC Part 15B, RoHS,	
Technology	Signal proc.:	Analogue preamplification and demodulation Digital outputs and filtering
	Settings:	Manual, remote controlled, stored, preset
	Outputs:	Digital components outputs, optional TTL alarms
	Excitation:	Multi-coil, single frequency (normal array mode) multi-coil, multi-frequency (depending on probe) number of coils x number of frequencies is 16 at maximum
Physical presentation	Weight:	280 g (9.6 oz.)
	Size:	55 x 75 x 18 mm^3 (2.3 x 3.0 x 0.7 in^3)
	Connectors:	USB mini A socket, other connectors customizable
Environmental effects	Warm-up time:	0s for typical use 200s for full precision
	Ingress protection:	IEC 60529 CODE IP67
	Operating temp.:	-40 °C to 60 °C
	EMC compatibility:	Compliant with CE, FCC Part 15B
Generator units	multi-probe, multi-frequency (time multiplexed or simultaneous)	
	Independent generator units:	16
	Frequency range (each generator):	5 kHz – 10 MHz down to 1 Hz with reduced data rate
	Current mode (each generator):	1-10 mA, up to 9 V p-p > 10000 Ω source impedance
	Voltage mode (each generator):	9 V p-p, 90 mA maximum 50 Ω impedance
Input Stage	Number of inputs	16 (32 if multiplexed)
	Input impedance:	100 kΩ
	Max. input voltage:	5V
Balance	Hardware balancing before the vector amplifier Software balancing after A/D conversion	
HF amplification	Gain setting range:	2 – 20 (6 – 26 dB), 2.9 dB steps
	Bandwidth:	10 MHz
	Linear input range:	1.0 V
Demodulation	Bandwidth:	10 MHz
	Wave shape:	square
Vector amplification	Gain setting range:	1 – 100 (0 – 40 dB), 2.7 dB steps
	Software gain range:	0 –∞ (infinity)
LF filtering	Digital filters	
Phase setting	Range:	0 – 360°
	Step size:	<0.001°
Digitized outputs	Data protocol:	USB 2.0 full speed
Digitization	Digitization technique:	Sigma-delta
	Sampling rate:	375 Hz to 3 kHz
	A/D resolution:	13 to 16 bits
	Stage:	After vector amplification and balancing

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