BIAS: BIOLOGICALLY INSPIRED ACOUSTIC SYSTEMS

The BIAS group is lead by the NERC British Geological Survey and its membership includes the universities of Edinburgh, Leeds, Leicester, Southampton, Strathclyde, and Fortkey Ltd.

The project will research the phase and magnitude of echo reflected waves for object detection, location, and characterisation using the latest advances in the understanding of the 'sonar' used by bats and dolphins. This is performed over three sites studying high frequency water-borne, low frequency water-borne, and low frequency airborne signals for medical and geological applications.

SYSTEM REQUIREMENTS

To study these signals and their responses, wideband piezocomposite transducers combined with a new family of coded waveforms were commissioned for the project.

To drive the transducers, a flexible arbitrary waveform generator was required with the power to create the necessary wideband chirp signals at 10MS/s with start and stop frequencies ranging from 200kHz to 800kHz.

The measurement of the signal response requires high speed digitisation of the reflected waves at 100MS/s, utilising a deep memory so the full set of multiple reflections can be acquired in the time domain.

For maximum accuracy, the waveform generation and acquisition should be synchronised to minimise phase issues, and to make the system as flexible and powerful as possible, complete integration with existing networked PCs was essential.

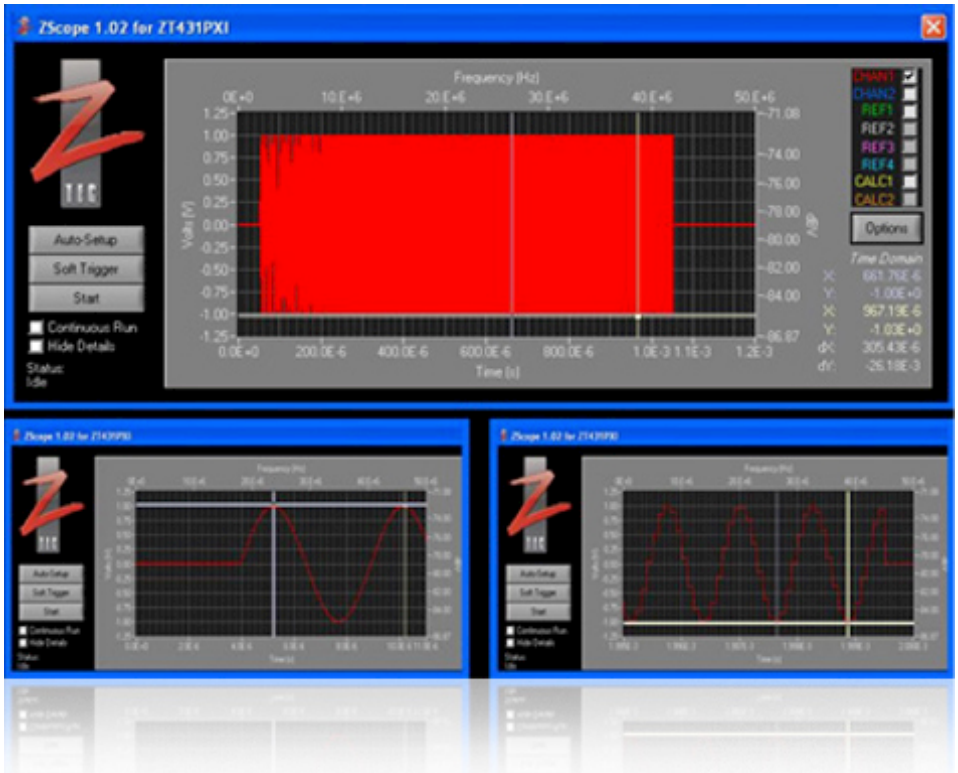
SOLUTION

PXI provides the ideal platform to meet the requirements for:

. High-speed Arbitrary Waveform Generation
. High-speed Deep Memory Oscilloscope Digitisation
. Integration to existing networked PCs.

Initially to provide proof of concept, Amplicon provided their dedicated PXI evaluation system, customised and tested before despatch to ensure the system was ready to use during the evaluation period as quickly and efficiently as possible.

During this five day evaluation, the comprehensive test software, ZWave and ZScope provided confidence in the hardware's capabilities and the software demonstrated the power of the system as a whole.



40000 samples for a 200kHz to 800kHz linear upsweep with tail of trailing zeros;
Lower Left: Start frequency 200kHz; Lower Right: End Frequency 800kHz.

In common with all evaluations, Amplicon Technical Support was available to answer any questions and issues arising, however; this was not needed as the requirements for the equipment had been comprehensively defined before delivery, the evaluation met or exceeded all the requirements of the project.

Once the evaluation had been completed, the final system's specifications were finalised. The supplied hardware comprised of:

- ADLINK PXIS-2506 PXI Chassis
- ZT410PXI-51 Digital Oscilloscope
- ZT530PXI-01 Arbitrary Waveform Generator
- PCI-8570 PCI to PXI extension interface cards with 2 metre link cable.

Once delivered and commissioned, customisation began.

LabVIEW was selected as the programming environment because if its ability to achieve results quickly and with the ZTEC instruments' interface based on the open VISA standard, integration into LabVIEW is straight forward.

During this customisation period, various issues with LabVIEW arose and although not directly related to the supplied system, Amplicon Technical Support were able to talk these through and provide programming solutions for LabVIEW.

Once a successful system was developed, optimisation began and liaising with ZTEC Technical Support, the software to hardware interface was improved utilising Amplicon's experience of working with our suppliers to provide a technical interface between the customer and our suppliers, helping to ease any time zone issues by providing a daytime contact to discuss any aspect of the project.

BIAS now have a complete signal generation and acquisition system with their own tailored software to simulate and study the response of the signals to mimic bats and dolphins and further understand how these animals use their 'sonar' so effectively.

This is with the added advantage of a complete, portable, and rugged PXI system, tested on evaluation and fully supported during the development period.