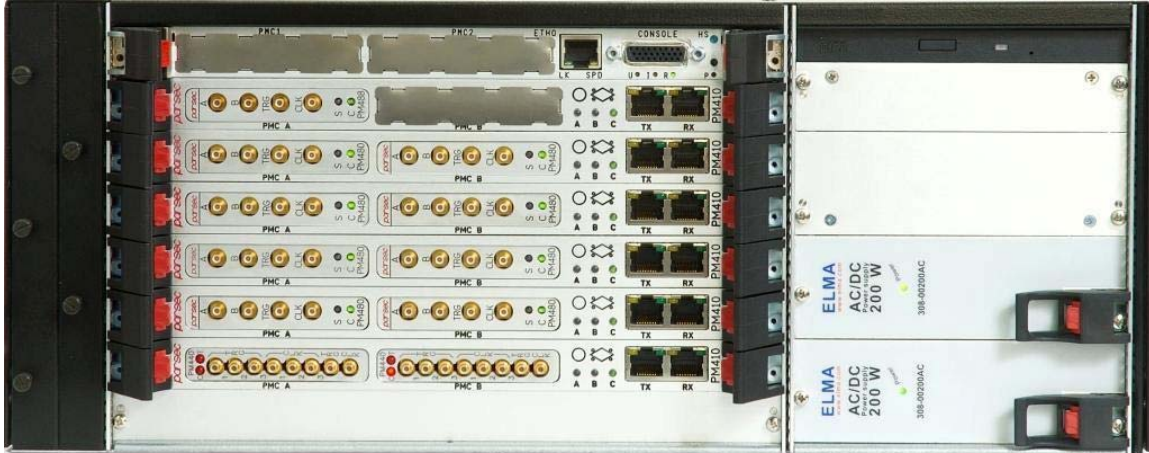


Parsec supplies COTS processing solution for UK Railway measurement system



In 2005 Parsec received an invitation to tender for a measurement instrument with 16-channel simultaneous sampling and fast FFT capability. The instrument is required for the inspection of railway lines by the University of Warwick in the UK who does research on defect measurement techniques. The invitation was triggered by an Application Note on a Wideband IF Recorder system that Parsec had designed and manufactured for another British company. The Wideband IF Recorder system was based on Parsec's commercial-off-the-shelf (COTS) ADC (Analogue to Digital Converter) and FPGA (Field Programmable Gate Array) PMC (PCI Mezzanine Card) modules.

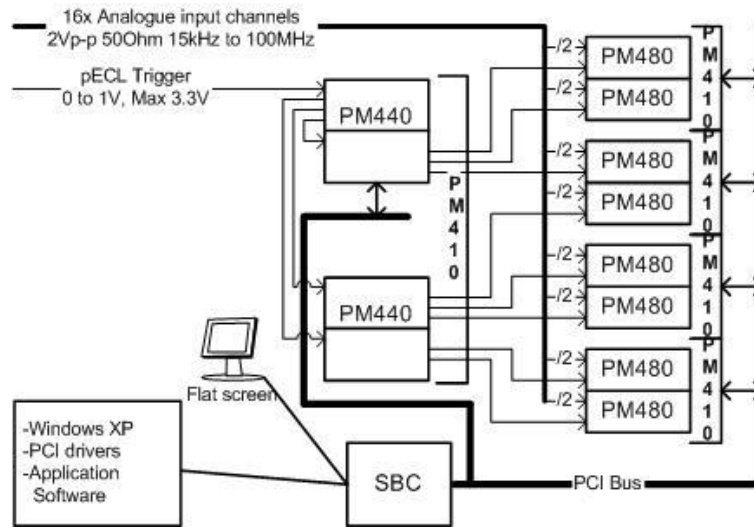
Parsec visited the University of Warwick and through technical discussions with the Ultrasonic's Research Group, determined the operational and system requirements of the measurement instrument. One of Parsec's strengths is its ability to translate user requirements into an effective well balanced solution. The outcome of the visit was a contract signed between the two parties for the initial measurement instrument.

The system consists of an array of electromagnetic acoustic transducers (EMAT) pairs that transmit and receive low frequency Rayleigh waves to and from the rail. The measurement instrument samples the received waves, calculates the frequency content and then performs post-processing on the spectrum to determine if a defect is present. The EMAT sensors were designed by the Ultrasonic's Research Group in the Department of Physics at the University of Warwick in the UK.

In order to detect defects on the railway line while the train is traveling at normal operating speed, the instrument requires simultaneous data sampling and high-speed digital signal processing (DSP) on all 16 channels at a continuous rate. A traditional computer based software processing solution was inadequate, hence the requirement for FPGA processing. The instrument needed required an intuitive user interface and the ability to easily change the processing algorithms during the development phase.

Parsec proposed a COTS based 8U Compact PCI (cPCI) solution consisting of a single board computer (SBC) running Windows XP, two PM440 Clock and Trigger PMCs and

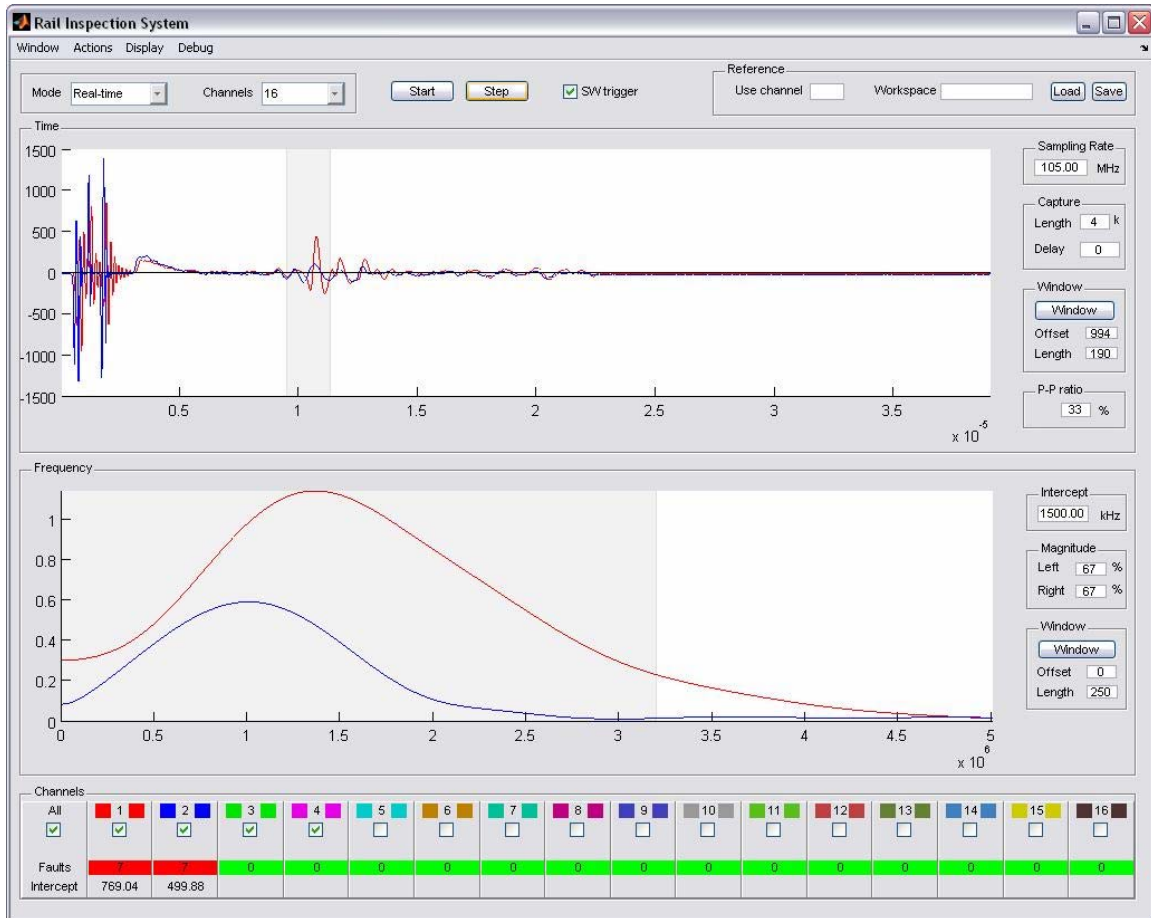
eight PM480 Dual Channel 105MSPS 14-bit ADC PMCs. The PMC modules are hosted on five PM410 StarFabric based cPCI carriers. The StarFabric switched fabric allows expansion to a 32-channel system by simply adding another 8U cPCI rack without a SBC, with a low-cost CAT5e cable connection between the two cPCI racks. A diagram of the system components is shown below.



The PM480 is the cornerstone of the Parsec solution; it combines two 105MSPS 14-bit ADC converters with ALTERA® Stratix® FPGA technology into a single PMC form factor. The EP1S30 ALTERA®Stratix® FPGA provides sufficient logic, DSP and memory resources to implement, in addition to the standard ADC and PCI functionality, the FFT and post-processing functions required by the system. The main advantage of the PM480 is the fact that it allows customized firmware functions like DDC (digital down-conversion), FFT and others to be added to the standard PM480 firmware.

The bulk of the firmware implementation was done using the Mentor Graphics® HDL Designer™ tool, except for the post-processing functions that were implemented with DSP Builder, a Matlab® Simulink® based tool from ALTERA®.

In addition to the design of the custom FFT and post-processing firmware, Parsec engineers also wrote the Matlab based application software that runs on the Windows XP single board computer. A graphical user interface (GUI) allows the user to specify system parameters, view captured and processed data and log detected rail defects for off-line playback.



Parsec's Compact PCI and PMC COTS products were originally designed with typical high-performance military applications like radar, sonar, EW and others in mind. The product range includes dual channel ADC and DAC PMC modules, FPGA processing PMC modules and a switched fabric cPCI carrier that facilitates high-speed point-to-point connections between PMC modules.

This case study therefore illustrates how traditional military COTS technology can be applied to commercial applications that require high-speed data sampling and FFT and other processing functions. Parsec markets itself as a strategic technology partner. This case study is an example of such a partnership, in this case between Parsec and the Physics Department of the University of Warwick.

About Parsec:

Founded in 1993, Parsec is a world class player in the Outsourced Development and Manufacturing market. Based in custom designed facilities located in Highveld Technopark, South Africa, Parsec designs and produces customized electronic sub-systems for clients in the defence/aerospace, telecommunications and industrial market sectors. Parsec's primary objective is to enhance the competitiveness of its clients, which include research institutes, OEMs, product development houses as well as system integrators.

Parsec is an Altera ACAP® Partner with expertise in, amongst others, the EW, radar and video application fields.

About the University of Warwick:

The University of Warwick was founded forty years ago in Coventry in the UK. It has attained the position of one of Britain's leading universities and research institutes.

The University is consistently ranked in the top group for the high quality of its teaching and research. The Ultrasonic's Research Group in the Department of Physics specializes in novel techniques for ultrasonic applications.