



# XCU-19C FO System – the System at the Heart of our UCV Cameras

## Introduction

XCAM specialises in building custom cameras for use in extremely clean vacuum systems for science experiments or industrial applications and is continuously updating and developing its systems.

Over the last 4 years, we have developed a new system which is particularly suitable for use in our vacuum cameras. This new electronics consists of proximity electronics which is inside the camera head comprising (preamplification, ADC, local generation of clocks) and then the remaining electronics is in a remote controller housed outside the vacuum system.

### The First Stage – Development of Proximity Electronics – a Triple Stack



Figure 1 shows the first stage of development. One stack of 3 boards drives each detector, with each stack the width of the detector. The picture above shows two detector stacks, each one capable of driving a CCD230-42 (or other detectors with re-configuration). The boards are, from the bottom going upwards: CCD drive board, centre analogue board, left digital board.



### The Move to Fibre Optic Interfaces

One of the challenges of making a super-clean vacuum compatible camera is taking control signals to and from the camera system and image data back out of the camera. Conventional cables are made of materials which are undesirable in almost all classes of vacuum and completely banned at the highest classes such as UCV (Ultra Clean Vacuum) systems. Conventional dielectrics such as ePTFE (expanded PTFE) which are used for Cameralink cables contain millions of bubbles which represent a perpetual leak in a vacuum system.

Furthermore, noise immunity and grounding issues need to be taken into consideration when building cameras into larger pieces of equipment.

For these reasons, XCAM has developed a truly fibre optic camera system which enables us to provide cameras which have only a power cable to the camera and all control and image data cables are constructed of super-clean fibre optics. The conversion to fibre optic has been made by revising the top board of the stack to incorporate an XCAM proprietary design of fibre optic transceiver based on an FPGA.



Figure 2 above the 'CHI' board (Camera Head Interface) which replaces the digital board in the stack making our vacuum cameras truly 'fibre optic'

The fibre optic stack, will shortly undergo further miniaturisation to enable it to be close butted for multiple detectors in array.

A separate standalone fibre optic transceiver unit which we call the FGA unit (Frame Grabber Adapter) has also been produced which is used at the controller currently but can be used in diverse applications.

Figure 3 below – the FGA board which can be used as a fibre optic transceiver for many applications.

