

CDT-UP Newsletter

Centre for Doctoral Training in Ultra Precision Engineering

August 2016

Industrial Tour 2016

On the 20th, 21st and 22nd of June, the MRes cohort enjoyed industrial tours to local and national companies. The group visited Oxford Instruments, M-Solv and Integration Technology Europe on the first day. Oxford Instruments gave a tour of their X-ray source, AFM and SEM technologies. M-Solv presented an interesting overview of their inkjet and laser technologies. UV Curing was the order of the day for Integration Technology Europe.

Renishaw and Rutherford Appleton Laboratory were visited on the second day. Renishaw began with a tour of their new product display, including their recent venture into medical technology. This was followed by a New Product Integration and Small Batch tour. A fascinating tour of the ISIS pulsed neutron and muon source at RAL followed.

Locally-based firms Carl Zeiss and Michell Instruments were on the agenda for the 22nd. The Zeiss tour began with a comprehensive talk on the theory underpinning electron microscopy, followed by a tour of their SEM assembly line and a product demonstration. A tour of the Michell Instruments factory and stimulating presentation and discussion ended the final day of the industrial tours.

We would like to thank all the Industrial Collaborators who allowed the students to tour their facilities and for making this a very enjoyable experience for them all.

EUSPEN 2016

EUSPEN 2016 was definitely a positive experience for the CDT Ultra Precision cohort. Out of three awards for the PhD poster presentations, two were claimed by Cambridge CDT students, first prize went to Tianqi Dong and third prize to Jason Ten. One of the keynote speakers for Plasma Physics was also a 2nd year CDT PhD student, Adam Bennett. As always, it was an event for great networking possibilities, hundreds of exhibits, and a spectacular dinner at Colwick Hall.

EPSRC Photography Competition 2016

CDT PhD student Jon Parkins has been awarded first prize in the category of 'Innovation' in the 2016 EPSRC Photography Competition. The contest was open to EPSRC funded researchers all across the country, with winners announced in March 2016. His winning entry, 'Where there is light, there is shadow', featured fellow PhD student Karen Yu using the CIM-UP funded ultra-precise laser processing system to process glass with an ultrafast laser. The laser process is very bright due to plasma formation in the glass, which inspired the idea of the laser interaction as the main light source in the image.



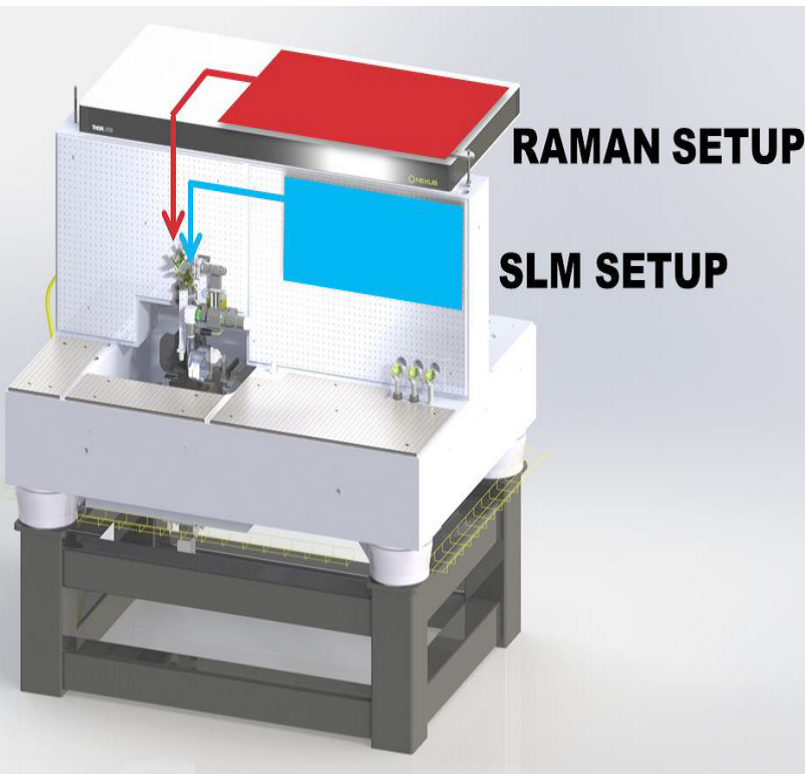
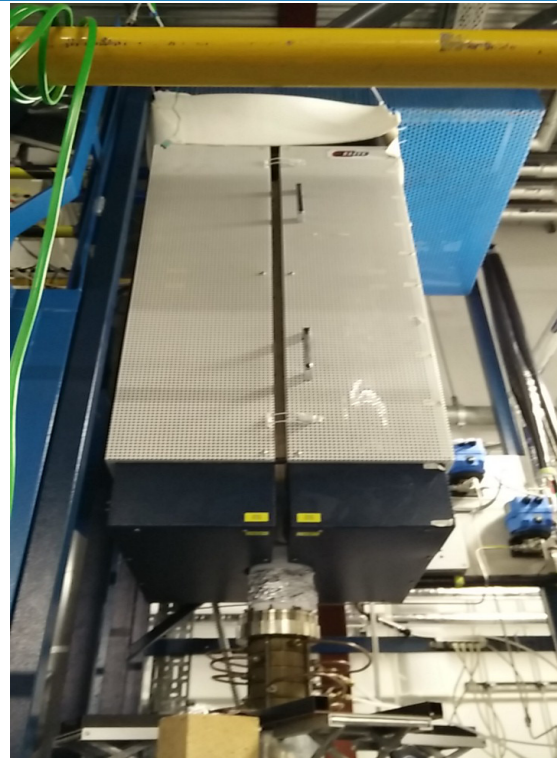
CDT MRes Group Projects

The five 2015/16 MRes students were split into 2 groups for their 2.5 month long group projects. The students were allocated the projects by the course leaders, taking into account the students backgrounds. The students submitted a written report on the outcomes of their projects, along with mid-term and final oral presentations.

Carbon Nanotube Furnace Tower Group Project - Lily Delimata, Will Fowler & James Ryley

Carbon nanotubes are an exciting new class of materials that have been the focus of intense study since the 1990s for their extreme mechanical and electrical properties. Although many techniques exist to produce them, large scale fibre production is challenging and has been the focus of the Macromolecular Materials Research Group at the Department of Materials and Metallurgy for more than a decade. The group has developed a furnace tower for continuous 'floating catalyst deposition' formation and winding of nanotube fibres as threads or sheets.

This project focused on three areas: monitoring catalyst input flows, air jet positioning of the fibre in place as it is wound out and simultaneous diameter measurement. Optical absorption measurement of the gas flow has yielded promising results, however thickness measurement has been difficult to apply without fibre positioning already in place, and may be beyond current commercially available technologies due to the extreme thinness of the drawn fibre. Fibre positioning is challenging as the drawn fibre may break and need to be re-inserted, which limits the holding techniques that may be used.



Implementation of Beam Shaping and Parallel Processing, and Feedback Control using Raman Microscopy - Nadeem Gabbani & Katjana Lange

The laser processing platform was designed to provide a low cost, flexible alternative to traditional fabrication techniques such as photolithography, which are only cost effective at large scales. This project was concerned with enhancing the capabilities of the platform through implementation of dynamic beam shaping, parallel processing and Raman microscopy. Additional care was taken to ensure each standalone system was capable of operating through the same scanning objective without interfering with existing feedback and control systems (OCT and DHM) or each other, and as a result the group component was necessary from the beginning. Considerations included mounting positions, hardware and software interfaces and compatibility of optics. This figure shows the intended mounting positions of the Raman and SLM systems on the laser processing platform.

Ultra Precision - Video Competition

Congratulations to our CDT-UP PhD students who submitted some fanatastic videos for this competition. The 2 minute videos outlined the aims of each student's project, the scientific backgrounds and key results to date and were judged by the Ultra Precision management committee. First prize went to 1st year student, Daniel Gortat, second prize to Jason Ten and third prize to Karen Yu. The link to the winning vidoes along with all the other submissions can be found here - www.cdt-up.eng.cam.ac.uk/PhD-Years/Projectvideos

Save the Date:

The Future of Precision Engineering, 26 October 2016 - 41 Portland Place, London

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