2009 Oxford Materials Tour to Beijing.

15th – 24th March 09.

Our first visit was to Tsinghua University, the top-ranked Chinese University. The Tsinghua College was originally founded in 1911 on the grounds of a former royal family garden where it was a boarding school for China's most intelligent and gifted teenagers. Since then it has grown and expanded into the university recognised today. We were met at the University by Dr Godfrey and some of the materials science students. The students showed us around the grounds and we learnt of the differences between our courses and countries (they were astonished to find many of us wearing shorts and t-shirts on what they considered a cool spring day).
One of the most startling things we found out was that the students could have lectures scheduled at any time between 9:00am-9:30pm, needless to say this requires both students and lectures living within close proximity of lecture halls and departments. The University has effectively become its own city, with shops, hospitals and schools for all levels. The degree course in China is much longer than the English equivalent; this meant that there was an age difference between our undergraduates and the Tsinghua students. After the tour of the university we spent the rest of the evening getting to know the students further over a game of ten pin bowling and a meal at a local restaurant.

On 18th March 2009 at 10am the group departed by coach to the Innova Superconductor Technology Company (InnoST), one of China's leading companies for high temperature superconductors (HTS) which is located in Beijing's Economic and Technological Development Area (BDA). The visit commenced with a presentation about the company, its wire processing method and product applications. The company produces High Temperature Superconducting (HTS) wires through a special powder-in-tube (PIT) method. The main advantage of using such wires is that it is well suited to applications where a high current is needed and it has now been integrated as part of China's power network HTS cables system. The group was shown the different production stages involved which included pre-treatment, wire

drawing, rolling and sintering. Following the InnoST visit the group took a short walk to Innopower, China's first High Temperature Superconductor power cable manufacturer. The main purpose of the company is to develop HTS cables and to produce superconductive fault current limiters (SFCL) which are devices that reduce the fault current level when a short-circuit takes place in a power network.

On the fourth day of the tour we visited Baoling Casting which is a small investment casting company located on the outskirts of Tianjin (one of the largest cities in China after Beijing). Although Tianjin city centre has a very western feel to it with its equivalent to the London eye, Baoling was in a very rundown area with little infrastructure in what might be the suburbs in a western city.

At first glance, Baoling is a collection of rooms surrounding a central courtyard, with a simple design whereby the products progress through each room taking them to the next stage and finally to completion. The business strategy of Baoling is to receive designs for small components such as car door hinges and then cheaply turn these designs into cast products through the lost wax process. This way, lots of components with very precise dimensions can be cast in a relatively short timescale. In Europe the lost wax process is only used for our most expensive, tolerance critical applications, such as jet engine blade manufacture.

In the first room there were 15 machines, 4 of which had workers working at. We were reminded of the stark differences between western and eastern working practices when we saw that none of the employees wore any sort of safety clothes such as masks or eye protection.

We had the opportunity to visit the Beijing Institute for Aeronautical Materials (BIAM) on the outskirts of the city. The members of the institute were very welcoming and invited us into their very plush conference room, where we were told a little about the Institute's history and their aims for the future of Chinese aerospace, especially in terms of materials development and innovation.
BIAM was founded in 1956 and is the only national resource for R&D of aeronautical materials in China. It employs around 2000 scientists and engineers and aims to become a global leader in both commercial and national defence aerospace.
We had a few short lectures on the importance of composite materials in modern aircraft and on BIAM's research into casting of Titanium superalloys. The Institute is steadily increasing its capability to impact on the design of modern aircraft and it was very interesting to see some of the materials innovations they were developing.
Then we were shown the vast array of mechanical testing and computer modelling equipment on the site. BIAM is the number one mechanical testing facility in China and produces a huge amount of data which it hopes to apply to the next generation of Chinese aircraft. Lastly we were given a very informative guided tour of some of the institutes casting equipment, including a large spray forming plant and an electron beam melting furnace.

Our last industrial visit was to the Institute of Physics CAS, which had just celebrated its 80th anniversary in 2008, consisting of over 1000 employees and 600 graduates from various universities. Their research areas vary from Superconductivity to Solid State Materials to Molecular Materials and devices. Based in the Zhongguan Cun area, the institute is able to draw on talent from nearby universities like Tsinghua University and Peking University.
We were taken to a selection of their laboratories where we were shown some of their current research and the tools they use, such as the UHV-STM, the superconducting laboratories and an integrated unit of the TEM and STM.

Whilst on tour we took the opportunity to visit some of the more touristy attractions including the Great Wall, the forbidden city, Tiananmen Square and the new Olympic stadiums.

We also took the time to immerse ourselves in a bit of Chinese culture, visiting the famous silk and pearl markets, dining at Beijing's most popular duck restaurant and checking out the acrobatics and Peking opera at an a local tea-house.

Many thanks to all the people who made this tour possible, including thanks to the following institutions for their generous sponsorship

Department of Materials
The worshipful company of Armourers and Brasiers
The worshipful company of founders
The worshipful company of Ironmongers
Morgan Advanced Ceramics.

We asked the students who participated, to give us some feedback about their experiences and thoughts on the tour. We have included a selection of quotes from all aspects of the visit:

“I thoroughly enjoyed the trip to Beijing. It was interesting to visit some industrial sites and see how processes and the way in which they were conducted differed to those in England, and to hear about how industry in China is rapidly developing. I really enjoyed experiencing a new culture, trying new food and the fun to be had with rotating tables at meal times... I thought the Summer Palace and Temple of Heaven were amazing and I loved just exploring the city. Overall it was a fantastic trip, and it was great to make some new friends!”

"a first world city with some elements of the third world, but definitely an experience"

David Lloyd