



December-2009 to January-2010

## Vacation work for Engineering students at Element Six

During 2009-December to 2010-January the Diamond Research laboratory (DRL) of Element Six hosted two mechanical engineering students **Miss Mathapelo Makgoba** and **Mr Sibusiso Nkosi** from Witwatersrand University and one electrical engineering student **Mr Mlungisi Dlamini** from University of Johannesburg for their vacation work.

The vacation work is part of the industrial training requirement by their respective institutions. The students were working in different plants of Element Six for a period of five weeks during which they were introduced to various engineering works/designs, different machines and techniques.

The aim was to give students hands on experience in their field of study and it is ideal for the students to work at Element Six during their vacation as it hosts a variety of engineering equipment and performs different processes across its different plants.

For an example, hundreds of cups are manufactured per day and they are used in assembling diamond products. In each of the plants, accuracy and conformation to spec is very important for the production chain to function efficiently. This demonstrated to the students the practical application of their field of studies in everyday engineering. We are glad to give these students the opportunity to gain hands on experience in their respective fields and we hope that the students found this opportunity beneficial.

Below is a weekly summary the students' activities during their time in Element Six.

### Week 1

The three students arrived at Element Six on the 7<sup>th</sup> Dec 2009 where they went through the induction processes and medical testing. Thereafter they signed their contracts and code of ethics. On their second day they were then taken around in the DRL and introduced to various departments and staff members. The students were each given personal protective equipments (PPE) which allowed them to enter the workshops and press shops.

They were placed in the Group Engineering and Design (GED) and High Pressure Temperature (HPT) sections where they were reporting on a daily basis. In the GED/HPT, the students were briefed about the purpose of this section in the DRL and in Element Six as a company and what was expected of them.

They were introduced to CAD software and given tasks to complete drawings. The mechanical engineering students were given a report and book to read about material compaction while the electrical engineering student was given a task to read about thermocouples and their applications in temperature measurements.

### Week 2

The two mechanical engineering students were assigned to a technician (**Mr Ben Mandlevu**) to introduce them to high synthesis presses which are used for sintering synthetic diamond at high pressure and high temperature. These presses operate at very high pressure and hence the students were never left alone at the press. They had their PPE on at all time while in the press shop. The students were given a task of assembling capsules used in a press and together with the technician they made about 95 runs over a week to produce a particular diamond product.

The electrical engineering student was assigned to an electrical technician who was re-wiring one of the synthesis presses. The student was introduced to reading electrical drawings and testing of the continuity of the electrical circuits.

The student was later introduced to the application and theory of thermocouples. He was given temperature data from a press acquired using the thermocouples to analyse with help of a scientist (**Dr. T. Sono**). He then went on to see how an instrumentation run was conducted during sintering of the diamond. He was assigned to an electrical engineer (**Mr Branko Matic**) working on conditioning and data acquisition in an old press.



### **Week 3-5**

The two mechanical engineering students were assigned to the engineering department where they learned about different types of welding and production of cups which included processes of making tools used during cup drawing. They rotated between the two tasks on a weekly basis for two weeks. The electrical engineering student was working with an electrical engineer who introduced logic controller programming to him.

In the last few days of week 5 the students returned to the DRL to write their report.