

Leisure Corner 閑情專欄

2nd Door?

By Dr. Ng Tze Chuen

Christmas day 2003, European Space Agency's Beagle 2 Mars lander carrying the HK sampling tool called the "Corer-Grinder" crash-landed onto the surface of the Red Planet. It was supposed to perform the first ever rock coring by mankind in our solar system and to send the cored rock powder for in-situ analysis of C13/C14 isotopes ratio by GCMS for detection of life in extinct or extant form for exobiology. This complex high-precision sampling tool can trace its origin to the design features of the tip of the forceps which I invented for dentistry many years ago.



Dr. Zahi Hawass and Dr. Ng Tze Chuen

The disappointment must have been shared by Her Majesty Queen Elizabeth II during the Christmas dinner at Buckingham Palace and a nobody HK dentist hooked in front of the television, both eagerly waiting for the signals beaming back from Mars. A decade of hard work went down the drain for that few moments of entry, descend and landing.

I dried my tears soon after that heart wrenching experience and started another world class expedition to satisfy my appetite for testing my forceps gripper – this time, on Earth instead and in ancient EGYPT.

The Great Pyramid has three chambers..... the King's Chamber with shafts shooting out the surface, Queen's Chamber with shafts blocked by two doors, and Subterranean Chamber.

The secret chambers behind the so-called 2nd Door extending from the shafts of the Queen's Chamber of the Great Pyramid in Giza is another testing ground. Mars and 2nd Door are similar in the sense of tele-robotic control of lander billions of miles up the sky and rover meters away inside the shaft.

In 1993, a German scientist, Rudolf Ganterbrink, found the 1st Door by sending its robot 'Upuaut 2' up both shafts. In 2002, American iRobot sent its 'Pyramid Rover' to drill through the 1st Door and found another Door 17 cm apart. That expedition was televised live and globally by National Geographic Channel. In 2010, a HK-UK team led by T C Ng and prime contractor Leeds University sent a robot called 'Djedi' to explore the space between the two Doors. Djedi will drill through the 2nd Door to search for the secret chambers in March 2011.

Dr. Zahi Hawass, Secretary General of the Supreme Council of Antiquities of Egypt (SCA) appointed a Chinese dentist for the first time in the history of Egyptian explorations. He called this 3rd attempt "Djedi" because, "He was the magician that Khufu asked to reveal the secret chamber of THOTH (wisdom god), then Khufu built his pyramid".



Dr. Ng inserting the robot into the shaft

Winning the operation rights for the 3rd attempt took me more than a dozen trips knocking on the doors of SCA uninvited. It was a bitter experience in the early stage. I still remember being pushed out of the main gate of SCA for not having a valid appointment. The efforts paid off nicely at the end when Dr. Hawass was convinced that the 3rd attempt would be much more interesting if we could send tethered robotic insects equipped with micro LED lighting and camera clawing inside the secret chamber. This concept was conceived from the tethered Mole subsoil sampling of Beagle 2 Mars mission.

Anyone could imagine breakthrough concepts for world class explorations but how to implement the

ideas, especially by a non-engineer, is another story. How to organize the best team in the world to unlock the mystery behind the 2nd Door is even more challenging but I was able to apply my valuable experience and connection from the space industry.

It was a fair fight as Dr. Hawass appointed six Cairo University engineering professors as judges and custom built a simulated 40° inclined tunnel with the hurdles exactly the same of the real one beside the Great Pyramid in Giza desert. Our team with only a handful of British scientists, worked like Lawrence of Arabia under the burning sun while our competitor, with dozens of engineers dressed in matching T-shirts with the same logo, marched across the desert in military style. We won all episodes with our robot climbing up the shaft to reach the top, drilling through both doors.

The secret in winning the race was simple. We used soft cushion rubber for anchorage against the 4600 years old walls of the shafts to climb up the 39° inclination whereas our competitor used track chain tank belt that would scratch the surface with unerasable markings. The first priority is, of course, to protect the pyramid.

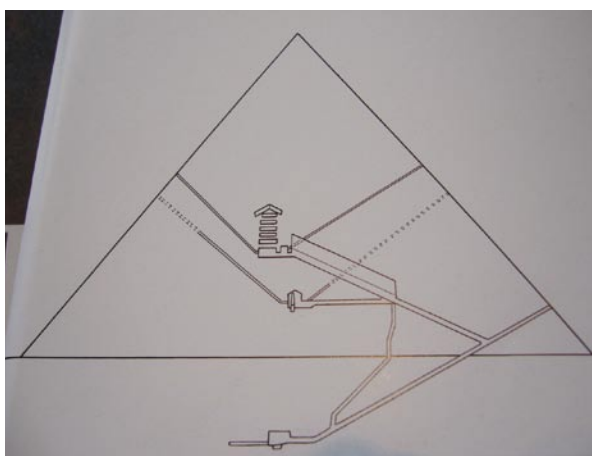
Our British team members are down-to-earth scientists who are interested solely in the science of Egyptology. They are down to the basic in the design and trouble shooting. I could not imagine how they changed the model so many times within a few years to satisfy the specifications of SCA. With their logical and persuasive presentations, they convinced the authority that the job should be done by our team – the Magnificent 7. Each of the 7 is a global expert in his own field of research related to robotic rover. Shaun Whitehead was the chief scientist of Beagle 2 spacecraft, now heading the UK team. Ron Grieve is the pioneer in impact-echo technology, and he is designing the device to measure the thickness of the 2nd Door. Robert Richardson is a mechanical engineering lecturer at Leeds University, the prime contractor for the project. We also have racing car mechanic, software and electronic engineers as support. I am the concept founder, team organizer, and now degraded to tea boy as I have finished all my duties for establishing the 3rd attempt. Actually, I am now acting as a go-between for Dr. Hawass and the British team members!!

The Djedi rover is the most sophisticated tool ever designed in searching for the secret chambers.

Hollowed drill able to drill through two doors with tethered robotic insects clawing forward? Implanted inclinometer to measure the shape of the 220 feet shaft? Impact echo mechanism to measure the thickness of the 2nd Door? Sampling bulldozer to collect the 4600 year old copper pins? Snake camera to search in all directions of hidden pockets? Soft rubber cushions for anchorage? Framework built by plastic and one light weight cable to reduce mass?

Inside the Queen's Chamber: I could see Wayman Dixon banging on the wall with his hammer searching for the hidden shafts two centuries ago! I could see Napoleon was drunk sitting on the floor holding a bottle of french wine! I could imagine Pharaoh Khufu inspecting the shafts pointing at the stars with the magician Djedi! I could imagine Dr. Hawass informing President Obama the mystery will be solved in no time with the help of a HK dentist!

The 4600 years' old Great Pyramid of Khufu is the greatest monument on Earth. Outside is like a geometrical rocky mountain and inside is a mystical puzzle palace. One must visit the greatest civilization of mankind once in his/her lifetime. If there is a time machine, I would meet and tell the architect, "You were the greatest architect of all times. Now, only we can explain to the world how great you were".



Unlocking the mystery behind the 2nd door