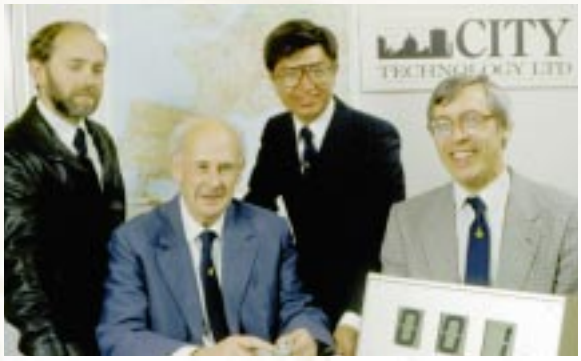
City Technology Limited

September/October 1999

TECHNICAL BULLETIN

end of an era

As the official curtain finally came down on John & Bryan's illustrious careers at City Technology, here are some glimpses of the night of celebration, aboard the HMS Warrior, the first iron-hulled ship, at her berth in Portsmouth's historic dockyard. The night was enjoyed by all those who attended, with faces from the past and present, joining together to show their appreciation of the achievements of John & Bryan. Both paid warm tributes to their fellow-founders, Tony Tantrum & Robert Chan-Henry, (pictured) for their invaluable contributions to the success of City Technology, and thanked all customers and employees who had made it all possible.



The changing faces of City Technology

John & Bryan enjoying a well earned drink

Officially John and Bryan will both retire at the end of October but Bryan will continue to work as a part-time consultant, supporting the Group with its research, technical and intellectual property activities.

"Now that the curtain is coming down my special thanks to Bryan for doing all the difficult jobs that I tried to avoid, leaving me free to do the fun things" ... John Finbow

"The end of an era marks the beginning of a new one. It's a privilege to have been associated with such a robustly successful enterprise as CTL & our best wishes go to those continuing with the company" ... Bryan Hobbs

Technical Titbit

How do I test my circuit?

3 electrode and 4-electrode CiTiceLs are designed to run in a special circuit called a potentiostat. The purpose of this circuit is to allow the potential of the Sensing (and auxiliary) electrode to be controlled relative to the reference electrode whilst amplifying the current flowing into or out of it. The potentiostat circuit can be easily checked using the following method:

- Remove the sensor
- Connect a short circuit between the reference and counter terminals
- Measure the potential of the sensing (and auxiliary) terminal relative to the shorted reference-counter terminals. The value measured should be zero (±1mV) for unbiased sensors or equal to the recommended bias voltage for biased sensors.
- Connect a current source between the sensing (or auxiliary) terminal and the reference-counter terminal and confirm the voltage output is as expected.

The above steps will confirm the circuit is working correctly in most cases. The sensor may now be replaced and allowed to stabilise. The voltage measured between the sensing and reference terminals now should again be zero for unbiased sensors or equal to the recommended bias voltage for biased sensors.

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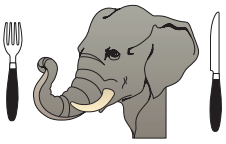
How Do You Eat an Elephant?



A question our Engineering department is not normally asked to solve, but a good adage all the same to the challenges faced in the development and manufacturing of our products. The problem with 'one-bite-at-a-time', is where do you start and how long will it take. The need to produce a higher quality product, more finely tuned to customer requirements and an ever shortening time-to-market, has led to the adoption of experimental design techniques, commonly referred to as Taguchi's Design of Experiments (DOE), within our development and engineering departments.

The technique builds a mathematical model of the process/product by methodically studying changes in the output parameters, following purposeful changes to the input variables. The resulting model independently determines the effects of each variable and importantly, identifies interactions between them. The model is then used to aid the design, development and then manufacture of a 'robust' product. e.g. perform its intended function regardless of the environment imposed by customer, manufacturing variability, degradation of product over life and vendor induced piece-part variation.

This technique is not the whole answer, but only a tool for studying specific areas or problems. The introduction of Failure Modes and Effects Analysis (FMEA) is another tool being integrated into the product development cycle. The FMEA gives structure to the thoughts and concerns of a project team and allows quantitative evaluation of both the intended design and manufacturing method, prior to product launch. This is done by recognising and scoring the effects of potential failure modes arising from the design and manufacture on the function of the finished product. Solutions such as component fool-proofing, machine alarms and additional inspection can then be added as required.

DOEs & FMEAs in action

A team was organised to systematically study the parts and assembly processes involved in the manufacture of 2F0 Oxygen CiTiceLs® to fully understand them and where possible make improvements to them.

As a direct result of the study, several new processes have been introduced including automatic pin insertion, redesigned ultrasonic welding equipment and lead formation presses to ensure consistency from batch to batch, along with a tightly controlled heat cycling programme to verify the weld integrity of each sensor.

All these new processes and pieces of equipment have been incorporated into our quality and existing planned maintenance schedule in line with our ISO9002 accreditation.

Tom Van den Burgh - 2F0 Manufacturing Cell Leader says...

"We have an on-going policy of continual improvement but by directly involving production personnel in the FMEA/DOE study, noticeable improvements in the quality of this product have been achieved, illustrated by higher yields and lower scrap rates. This has enabled us to provide a product we have even greater confidence in and to offer our customers even shorter lead times as a direct consequence".

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