Outside the Laboratory Walls – The LIMS revolution continues

Laboratory Information Management system (LIMS) is sometimes an imprecise description for a tool which can have its most profound effect well outside the boundaries of the laboratory walls. Indeed the modern application of LIMS is often to link the many disparate parts of very complex organisations where integrated manufacture, quality, accreditation and the test procedures to verify these are more sophisticated, complex, and critical than ever before.

Hepworth Minerals & Chemicals, part of Hepworth PLC are one of the UK's major silica producers. The site at Oakamoor in Staffordshire produces a diverse range of products including sands for recreational use, glass sands, silica flours and cristobalite from quartz calcination. The silica produced at Oakamoor (ripped rather than blasted) is considered to be unique in quality particularly for glass manufacture. There is also a clay body preparation plant at Oakamoor serving the ceramics industry. The prepared clay body is produced from China and Ball Clays fillers and fluxes and sold worldwide into the pottery and sanitaryware industries and into a variety of craft industries. Like all other manufacturing operations in the UK today all procedures require extremely close monitoring and analysis.

The two laboratories at Oakamoor (silica and ceramics) controlled most of the test and procedural analysis with their own bespoke LIMS devised around the Lotus 123 spreadsheet package. This was augmented with macros and their own analysis programs. After several years it became obvious that the system was being stretched far beyond its envisaged capability and the "back end" was becoming difficult to manage. Add to this the increasing dependence on the specialist programming skills of one person and the weight of extra test presentations demanded by customers clearly a new approach was needed. Neil Hemmings quality and systems Manager and his team decided to move to a specialist solution.

Neil Hemmings and Norma Jones look on as Malcolm Brown, a clay-body plant operator, operates the LIMS

"We wanted to build towards a wide area network solution which would provide sophisticated management of historical and live data," said Mr. Hemmings "we wanted a true Windows solution that would evolve with our application and it was extremely important that the system was easy to use, logical and intuitive." Mr. Hemmings had long seen the potential for LIMS expanding into the sites production operations and this was aimed at involving the wide range of plant operators, many of whom had never used a computer.

Several systems were evaluated and after a number of presentations and deliberations the chosen system was WinLIMS™ from QSI. "As well as being a well functioning, true Windows developed system with a clear upgrade path the QSI team clearly understand laboratory practice and terminology " added Norma Jones, Laboratory Manager at Oakamoor. A 10 user system to operate on the LAN was purchased initially, though this is now expanding. The system is now being rolled out across the Hepworth Minerals & Chemicals group as part of

a fully integrated corporate data structure.

Oakamoor decided that there would be no mass transfer of data from the old system to the new. Historical data would be maintained on the old system. All previous data is retrievable and nothing has been lost.

The wet processing control room with Lims at the heart of the operation.

The route to a specialist LIMS is either through a paper based system (still surprisingly widespread throughout UK laboratories) or a custom built DIY LIMS)"Without the Lotus 123 system there would never have been WinLIMS™ in this company" said Mr. Hemmings "we demonstrated what a computerised Management System could achieve and how this could evolve in the future. Not only was capital made available but the will within the company was there to move in this direction. Mr. Hemmings also volunteered that with a clean start onto LIMS certain applications could have been approached differently without any 'hostages' to past practices.

Once the site team had fully specified the system they set up framework LIMS with dummy data and operated that for about three months. They were able to identify required modifications and also satisfy themselves that the system worked properly and did everything that QSI claimed it would. They then set a date to 'go live' and the training and learning process began in earnest.

Oakamoor decided against a major user group training programme. A small group of people learnt the system and became the implementors and trainers. There were however frequent calls to the QSI support line. In one month alone 82 calls were made though this diminished as the site became more familiar. It was the support aspect of QSI's operations that Oakamoor were particularly pleased with: "Not once did QSI fail to take a call or give assistance in solving the problems we had encountered" added Mr. Hemmings.

"Once set up in the laboratories we took the LIMS first of all to the clay body preparation plant " explained Mr. Hemmings, the operation uses over twenty raw materials with a variety of physical parameters. This type of operation demanded much flexibility from the system. Now the site has programmes that the product recipe is entered through a link with a raw materials data table that is maintained independently. The complex calculations are carried out automatically. Far from scepticism and fear the operators were quickly trained into the requirements. The system soon evolved into other process areas and there is now a new input of analytical data. "The system calculates raw materials usage and we know if we are over budget before the accountants tell us! laughed Mr. Hemmings.

What Oakamoor has done is to decentralise much of the basic functionality of LIMS away from the laboratory.

A clay body plant operator at ease with the new technology

Whilst plant operators create data to assist with laboratory test and analysis they also have access to information (including relevant laboratory test results) which brings a level of control which was never there before.

"We used to have a system where the shift Manager would write information on a sheet of paper and distribute along the line now plant operators can log in to see the status of other stages of the process and everyone is involved and feels involved." A quick guided tour around the facility demonstrated widespread acceptance and cheerful familiarity amongst the new 'hard hat' user group who were keying in a wide range of processing data from stock control to production progress linked to test results from various laboratories.

On the milling side Oakamoor once had difficulty, due to the type of process in measuring key production parameters, the obvious answer was to install a load cell system to measure weight and mass with a link to a printer. Oakamoor wanted to take this a stage further and transfer all data into the LIMS thus linking production information with QA data. QSI wrote a special programme and this has helped reduce costs on site whilst keeping an eye on quality. This will continue as more people and their processes are linked to the system.

The impact of LIMS on QA has been equally significant. All of the terminals now on site operate with a document viewing system. QA manuals and associated procedures can be viewed easily at any time. The Staffordshire Area has four ISO registrations which require a number of manuals distributed to a large number of the workforce all of which need to be periodically updated. This function is now accomplished on LIMS and Mr. Hemmings has been able to dispense with the paper manuals across the site. QSI helped to accomplish this through by extending the basic functionality of WinLIMS™ with the development of the document viewer. Throughout the 1990's there has been a trend across industry to devolve responsibilities for raw material testing to suppliers. Often these tests are complex and are required almost instantly. Companies without the capability to provide these are now losing business at an increasing rate. "With the old system it was difficult to adapt the software to include the extra analysis certain customers required Neil had to keep writing new programs or adapting old ones" said Mrs. Jones. It is now much easier to add relevant information through the front end of the system and it is very easy to retrieve whatever data is required.

The basic functionality of WinLIMS™ can be extended, almost without limit, by the incorporation of specialist modules. Hepworth quickly saw the potential of these and ordered several. One was an instrument link module to achieve automatic inputs from balances and also to pull calculations from a sieve grading program into the LIMS. The training module was also purchased.

"Oakamoor are currently having specialist programs written to manage the bagging process, this includes a stock control system. The long term aim is the creation of not just a laboratory management system but a total site information management system with wider access of vital information to more people of all levels than ever before." It must be added that access to any program is controlled dependent on the user from within the LIMS application.

Clive Collier, MD of QSI UK said of the Hepworth System "We are seeing LIMS continuing its migration outside the laboratory walls on many sites now and Hepworths Oakamoor site already had plans to link every facet of their operations with LIMS before we met them. They have been very receptive to our ideas however and together we have been able to construct solutions to a wide range of working practices.

The Oakamoor stockpiles, reflecting the effects of processing