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Improving Quality at Sellafield using MS2 Process Analytics

Sellafield is one of the most complex and compact nuclear sites. Activities are centred around remediation, decommissioning and clean up of the historic legacy. The site is also home to the Thorp and Magnox reprocessing plants, the Sellafield MOX plant and a wide range of waste management and effluent treatment facilities. It is responsible for the operation of the Sellafield Site Contract, on behalf of the Nuclear Decommissioning Agency.



The nuclear industry has invested substantial amounts of money in new plants to treat and package waste from reprocessing operations. High-level waste (HLW) is waste that remains when the uranium and plutonium have been reprocessed. Sellafield Ltd has utilised process data analysis using MS2 software in the 3 vitrification lines that convert concentrate liquid waste arising from reprocessing operations into glass for safe interim storage prior to long term disposal.



AJM Consulting was initially selected to undertake a range of process investigations at the Sellafield site, using the advanced data mining and diagnostics facilities provided by its MS2 Process Diagnostics system. Following this successful activity, Sellafield Ltd purchased their own MS2 system and several senior staff were trained in its use by AJM Consulting. Further staff are now being given access to MS2, and additional consultancy by AJM is focussing on specific areas for further improvement.

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'We approached AJM Consulting initially to evaluate the advantages of using multivariate process analysis. Following a successful trial using the software we were able to demonstrate the business benefit through the knowledge gained. So far the software has provided enough information to support a justification to make changes within our process operations for acceptance of batch composition. It has also made it easier to interrogate non-numerical databases and gain a better understanding in equipment performance and reliability.'

Further work is ongoing to develop the use of multivariate techniques to support continuous improvement activities within the business.'

Dr Carl Steele, Sellafield Ltd

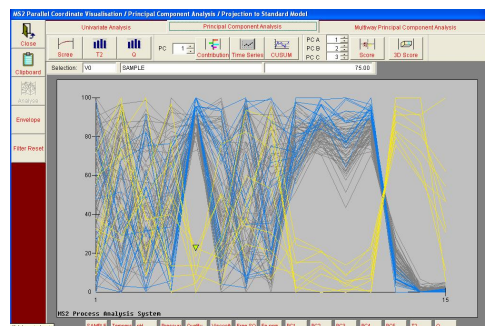
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The MS2 Process Diagnostics System

MS2 is a sophisticated, integrated system which models the production process, either batch or continuous, to help identify the causes of variability which can affect issues such as quality and yield. A wide range of analysis tools and visualisation methods have been developed to pinpoint critical process influences. The system incorporates powerful techniques such as multivariate principal component analysis, Manhattan significant change detection and parallel co-ordinate visualisation.

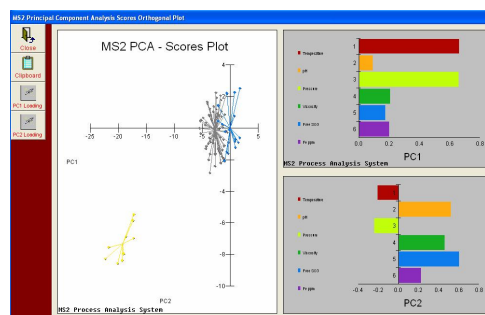
Parallel co-ordinate visualisation

This technique provides a view of relationships between many diverse process variables, for instance quality parameters such as pH and viscosity, process parameters such as maximum pressure and temperature and calculated values such as time to peak exotherm or shift identity.



Principal Component Analysis

The complex multivariate analysis and visualisation tools needed for this powerful technique were developed in conjunction with the world-renowned Centre for Process Analytics and Control Technology (CPACT) at the University of Newcastle. PCA provides a method of reducing the apparent complexity of large data sets to identify the principal causes of variability. It is proven to provide substantial bottom line benefits in major organisations and, through MS2, is now available to all sizes of company.



Ease of Use

The MS2 Process Analysis System was developed by AJM Consulting to bring advanced techniques within the reach of all companies, recognising the need for low ownership cost and limited on-site personnel involvement. Technologies developed for and applied to large organisations are often just too complex and expensive for most process manufacturers and the philosophy behind the MS2 Process Analysis System is to make advanced technologies accessible and affordable with immense potential benefits to competitiveness.

Latest Developments

AJM Consulting was selected to receive European Union funding, to enable it, in conjunction with CPACT, to design and build a unique tool, able to analyse existing data or monitor current production, by integrating to a wide range of process control or data historian systems.



AJM Consulting is working in conjunction with Newcastle University to continue development of the advanced MS2 system

This project is part-funded by the European Union Regional Development Fund

Available at several levels of cost and complexity, and easily upgradeable, MS2 is ideal for all process manufacturers who need better knowledge of their processes to achieve improved production performance and a sustainable future.

AJM Consulting is a member of:

- Institute of Measurement and Control
- Humber Chemical Focus
- Yorkshire Chemical Focus
- North East Process Industry Cluster
- Chemicals NorthWest
- CPACT



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