

Mallinckrodt**Mallinckrodt Chemicals Quality Advances**

As any quality conscious manufacturer would know, if the specifications aren't being met then the product and the process operation just are not cutting the mustard. In the case of Mallinckrodt Chemicals, Staveley, UK it is 4-amino-phenol that was the main concern. 4-amino-phenol is produced from nitrobenzene and is the base ingredient for paracetamol.

With an objective to produce product consistently within quality specifications as measured by subsequent laboratory analysis, Mallinckrodt Chemicals teamed up with Curvaceous Software Ltd of Gerrards Cross, UK. This partnership, formed in 2001, has since flourished using award winning Geometric Process Control (GPC) technology to reach the challenging goals set. The secondary aim of this Field Trial was to prove the value of the GPC alarms and the quality of the advice on a real process.

During the process analysis stage new operating zones were discovered which had never been utilised before. These were then used with C:Suite Process Modeller (CPM) hi-low alarms which guide the process operation to stay within the Best Operating Zone (BOZ).

The partnership has been fruitful for all parties concerned with Mallinckrodt benefiting from a 30% reduction in refinery loading since the project conception in 2001. With the massive increase in production rates that followed, the refinery is still operating at less than 1998 rates with the 1999 system upgrade being extremely underused.

Another substantial benefit Mallinckrodt noted was the elimination of their anticipated \$1Mill capital expenditure on a refinery expansion project. Product quality has also greatly improved as the BOZ was moved well away from the quality precipice and was itself extended to account for all ranges of good production.

Of course any alarm system is only as good as the operator's confidence in it, which is where GPC excelled as operators generally accepted the advice. All of the advice being generated made physical sense to those who knew the process without explicitly representing any physical/chemical relationships in the model and certainly showing no mathematics.

Product quality became instantaneously predictable using GPC and to everyone's delight the 24hour time lag between laboratory analysis and process operation adjustment is no longer an issue. This allows quality specifications to be monitored, changed and met on time, every time.