Referentienummer: P095007017
Dossiercode; 0950-07-03-35-004

PI Quick Scan PO-11 plant LyondellBasell Maasvlakte

Process:

A Process Intensification Quick Scan session was held December 11th, 2007 during which the POSM (Propylene Oxide/ Styrene Monomer) plant at the Maasvlakte was reviewed. The PI Scan team included external experts and LyondellBasell internal section engineers.

Prior to the scan a document was sent to the external experts with information based on the Maasvlakte plant PFDs: Process Flow Diagrams regarding mass and heat balances, economics, previously implemented PI efforts and structural 'pain points' of this plant.

In the 4 hours total duration of the scan only a part of the POSM plant could be reviewed, including the front end (Oxidation reaction section s100 and EB: Ethyl Benzene concentration s200) and a caustic wash section s300). During the quick scan a lot of additional information was verbally communicated, mostly to expand the understanding of the external experts of the specifics and rationale of why things were designed as they are in this POSM plant.
Since this complex plant has much more information to it than ever can be asked for in a 4 hours period, the meeting was 'limited' to reviewing only part of this plant. Better to get some qualitative recommendations that stand a chance of implementation for part of the plant, than quantitative recommendations on the whole plant that will never get follow-up.

Results

After the 4 hours of questions and answers the meeting was adjourned. The draft report was shortly after sent to LyondellBasell and reviewed by the section engineers. After commenting the final report was issued and distributed internally.

In general the applicability of the short term recommendations is judged 'modest'. However, internal spin-off from this PI Quick Scan by the section engineers has already started. This spin-off was not included in the PI Quick Scan report. The applicability of the medium term / long term recommendations is judged 'average'. This is mostly about a design review of reactor lay-out / internals and a review of distillation tower internals. One specific 'pain point' recommendation (regarding residence time shortening in s300 caustic wash) is judged 'promising'. This is also because of potential direct applicability of a ‘proven’ PI Technology from the database that the external experts were bringing in.

Recommendations from the report are being included on an internal potential projects listing and as such will be screened against internal project standards. Recommendations may get follow-up if ranked high enough. External experts may be contacted for follow-up advice since most recommendations are still conceived 'not specific'.

Referentienummer; P095007018
Dossiercode; 0950-07-03-35-005

PI Quick Scan PO/TBA plant LyondellBasell Botlek

Process:

The process Intensification Quick Scan session of the Botlek PO/TBA process, which took place on November 27th 2007, was based on the DSM Quick Scan method. The scans were performed by two external experts in cooperation with LyondellBasell personnel. Prior to the working session the external experts were given information about the processes such as permits and public literature, as well as a copy of documents used for internal training. The working session took 4 hours during which the processes were reviewed and compared with a list of PI Technologies.

Results

Based on the main opportunities and major constraints selected by LyondellBasell personnel, the experts were identifying possible alternatives. For one reactor, long term improvement is a complete new reactor design; no details were supplied. In a second reaction, lowering the reactor temperature should be considered with intermediate removal of products and byproducts. Alternative is a fluid bed rector or a reactive distillation system. Furthermore, in the third reaction it is recommended to evaluate influence of better mixing and or implement fixed bed catalyst system and or improve purity of the reactor feed stream.

Also, there is a link with a DSTI project in one of the separation sections. A recommendation is to review latest distillation technology and or other separation technologies like adsorption, crystallization and membranes. In a second separation system it is recommended to consider the latest column internals and to reduce residence time of the catalyst.

The chances for Process Intensification are considered ‘high’ for the long term.
Justification is based on improved yields, reduction of byproducts formation and energy usage as well improvement of the site energy balance. These were not quantified.

Referentienummer: P095007027
Dossiercode: 0950-07-03-35-008

PI Quick Scan BDO plant LyondellBasell Botlek

Process:

The process Intensification Quick Scan session of the Botlek BDO process, which took place on December 18th 2007, was based on the DSM Quick Scan method. The scan was performed by two external experts in cooperation with LyondellBasell personnel. Prior to the working session the external experts were given information about the processes such as permits and public literature, as well as a copy of documents used for internal training. The working session took 4 hours during which the processes were reviewed and compared with a list of PI Technologies.

Results

For the BDO plant, two short term activities were identified: one for a reactor with the related separation unit by considering better internals. The second short term idea suggested an improved mixing resulting in more efficient catalyst use.

Additional opportunities were medium and long term projects for new reactor design to reduce residence time (such as Bush Loop systems). The benefits such as yield and energy use improvements were not quantified.