

Project Name: Chemicals - Optimize DA Catalyst Recipe
Project Number: 803

Start Date: 2008-08-01
Completion Date: 2009-12-31

Project Details:

Scientific or Technological Objectives:

Measurement	Current Performance	Objective
Catalyst Efficiency (kgPE/gTi.h)	91	169
Bulk Density (g/cm ³)	0.45	0.45
Powder Morphology (cm ² /g)	4830	4900

- (a) eliminate Lab Scale Reactor testing of catalyst batches by R&D personnel;
 - (b) determine whether a batch is "in control" with respect to parameters of interest; if out of control, the batch will be scrapped;
 - (c) predict the effect of catalyst batch on reactor operation and powder-drying system;
 - (d) develop specific plans for improvements to catalyst fabrication hardware.
- A secondary objective was to successfully deploy a fibre optics probe and commission a new lab-scale reactor.

Technology or Knowledge Base Level:

Benchmarking methods & sources for citations:

- Internet searches: 33 sites / articles -- found 4 articles of interest
- Competitive products or processes: 7 products -- looked at 7 products - all different principles

Field of Science/Technology:

Chemical engineering (plants, products) (2.04.01)

Intended Results:

- Improve existing materials, devices, or products

Work locations:

Research Facility, Commercial Facility

Scientific or Technological Advancement:

Uncertainty #1: Modeling of catalyst fabrication conditions

From a technological point of view, it was not clear which catalyst fabrication conditions would have an impact on the powder properties of interest or if there would be any statistically significant correlation of value for an empirically-based mathematical model.

The most significant underlying key variables are:

zinc concentration (unresolved), metal ratio (unresolved), catalyst efficiency, bulk density, powder morphology

Activity #1-1: Catalyst test trials

Work performed in Fiscal Year 2008:

Methods of experimentation:

- Analysis / simulation: 10 alternatives - Analysis based on results of process trials. A preliminary correlation was developed.
- Process trials: 10 runs / samples - Plant catalyst tested on the new lab scale reactor. Used DOE to set up testing matrix.

Results:

- Catalyst Efficiency: 140 kgPE/gTi.h (62% of objective) -- 60% Met
- Bulk Density: 0.45 g/cm³ (100% of objective) -- Exceeded Goal by 16%

Conclusion:

Results from this project have provided us with a better understanding of which catalyst fabrication conditions (such as metal ratio, zinc concentration, OH/Cl ratio) would have an impact on the powder properties of interest (i.e. Catalyst efficiency, bulk density, and powder morphology).

Project Name: Chemicals - Optimize DA Catalyst Recipe
Project Number: 803

Start Date: 2008-08-01
Completion Date: 2009-12-31

In addition, the preliminary database was used to successfully predict V100 efficiency and powder morphology, which is a significant technology advance within the company. We also learned that coarse lab scale reactor powders often resulted in drying problems within the plant, based on the study which showed correlations between various powder parameters and drying properties.

Key variables resolved: bulk density, catalyst efficiency, powder morphology

Technical Documents:

- Project examples
Chemical Projects Examples for MEUK website.doc -- 172787 bytes
- Technical Document
Technical Document.doc -- 24064 bytes