Operator Training Simulator of Olefins Plant

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Introduction

The purpose of this paper is to describe the design and implementation of an Operator Training Simulator (OTS) of olefins plant.
Introduction

OTS assist the operator for better understanding of the process, operational principles and is able to support the optimization of operating technologies.
Introduction

The OTS is centered on modeling and simulation, which integrates all the process units, plants, and subdivisions of the plant.

This paper also provided the way to build the dynamic mechanism model for gasoline hydrogenation. The model validation test shows that the steady-state error is lower than 5%.
2.1 System architecture

- Operator Workstation
- OPC Station
- FCS Emulation Station
- Engineering Station
- Instruct Station 1
- Instruct Station 2
- ESD and FACP Emulation
- Simulation & Modeling Station

- Ethernet 1#
- Ethernet 2#

DCS System
Training Simulator System
Simulator Function

- Normal operation
- Specific operation
- Trouble shooting
- alarm
Mechanism dynamic Mathematical model

- Mass balance equations
- Heat balance equations
- The kinetic equations
- ...
Table 1 Comparison between field and simulation

<table>
<thead>
<tr>
<th>temp</th>
<th>component mol%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>H$_2$ C$_4$ C$_5$H$_6$ C$<em>5$H$</em>{10}$ C$<em>5$H$</em>{12}$ C$<em>6$H$</em>{10}$ C$<em>6$H$</em>{12}$ C$<em>6$H$</em>{14}$ Benzene Toluene C$<em>8$H$</em>{10}$ C$_8$H$_8$ Total C</td>
</tr>
<tr>
<td>Inlet data</td>
<td>60 20.1 1.49 5.28 17.25 2.10 0.55 4.14 1.66 28.23 5.14 1.62 0.54 0.63</td>
</tr>
<tr>
<td>Outlet data</td>
<td>120 6.41 1.70 0 21.05 3.04 0 5.05 2.41 33.21 6.04 2.45 0.04 0.94</td>
</tr>
<tr>
<td>Simulation data</td>
<td>121 7.03 1.70 0.05 20.49 3.16 0.11 4.84 2.30 34.58 6.42 2.33 0.03 0.91</td>
</tr>
</tbody>
</table>
Conclusions

**main advantages**

- **Timely**
- **Realism**

Solve problem: lack of experienced personnel
Decrease the risk of wrong treatment

Solve problem: lack of instructor
Decrease the loss of problem of the control logic and ESD
Thank You!