BE A FIELD OPERATOR IN HYSYS-BASED OTS AND OCULUS RIFT VIRTUAL REALITY

JoseMaria Ferrer (Inprocess)
20 years ago I completed my M.Sc. Electrical Engineer degree and entered to Dow Chemical as a process control engineer.

During the first months of my job I asked one thing to the Plant Manager:

*Can I move the office air conditioning control system to the DCS of the plant?*

Plant manager answer was: *NO!*

During the first months I also realized the there were many practical things from Field that nobody taught me in the University, so I asked to the plant manager:

*Can I be a Field Operator for 3 months?*

Answer: *NO!*

Field Operators are more than half of the Operation Staff in a typical process plant.

In green field projects, when physical plant is being built, they need to be educated and trained with all Operating Procedures in combination with the Control Room Operators.

Communication between the field operator and the control room operator is vital for successful operation in the process industry.
Field actions in operator training simulators (OTS) are not available in the control room operator displays. They need to be executed by the Instructor or by the Field Operator:

- Start-up/Shutdown procedures with manual valves
- Certain pumps/equipments are started/shutdown at field
- Compressors/Turbines packages use local operation panels
- Special operating procedures require manual by-passes
- ESD valves/pumps need to be re-armed at field
- Inspection of equipments and field instruments reads
- Isolation procedures for equipment maintenance
Typical OTS Architecture with FOD

- **Instructor Station:**
  - Aspen HYSYS Dynamic plant models
  - Inprocess Instructor Station (IIS)

- **Field Operator panel:**
  - Inprocess Field Operating Devices (FOD)

- **Operator Stations:**

- **Critical Action Panel:**

- **DCS & SIS Emulation Server:**

- **Printer:**
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**Field Operator3D:**
- Inprocess Field Operating Devices in 3D (FOD-3D)
NEW VIRTUAL REALITY TECHNOLOGY

Oculus VR, Inc has created new technology to fully immerse the user in the virtual world.

<table>
<thead>
<tr>
<th>VR Device</th>
<th>Oculus DK1</th>
<th>Oculus DK2</th>
<th>Oculus CV1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Release Date</td>
<td>March 2013</td>
<td>July 2014</td>
<td>Q1 2016</td>
</tr>
<tr>
<td>Screen Resolution:</td>
<td>1280 x 800</td>
<td>1920 x 1080</td>
<td>2160x1200</td>
</tr>
<tr>
<td>Field of View</td>
<td>110º</td>
<td>100º</td>
<td>110º</td>
</tr>
<tr>
<td>Latency</td>
<td>50ms – 60ms</td>
<td>20ms – 40ms</td>
<td>&lt;20ms</td>
</tr>
<tr>
<td>Refresh Rate</td>
<td>60 Hz</td>
<td>75 Hz</td>
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<tr>
<td>Orientation Tracking</td>
<td>YES</td>
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<td>YES</td>
</tr>
<tr>
<td>Positional Tracking</td>
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<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>3D view</td>
<td>Stereoscopic</td>
<td>Stereoscopic</td>
<td>Stereoscopic</td>
</tr>
<tr>
<td>3D audio</td>
<td>independent</td>
<td>independent</td>
<td>integrated</td>
</tr>
<tr>
<td>Units sold</td>
<td>75000</td>
<td>100000</td>
<td></td>
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</tbody>
</table>
Operating companies have found advantages in:

– Deeper involvement of field staff in understanding the process
– The full operations team can practice critical events such as startups, shutdowns and emergency responses in a fully realistic manner
– “Best field practices” can be designed and communicated to all staff
– Field Operator performance can be fully tracked and documented, for evaluation and compliance purposes
– This type of learning is extremely motivating
– Reduce travel and living costs associated with on-the-job training
All previous page reasons could be summarized in one word:

SAFETY
You are allowed to manipulate any field device or manual valve with Xbox controller.
Offshore DK2 demo: Field Operator View

You are brought by an helicopter to an offshore. Then you can explore the platform.
With the LeapMotion device mounted in the DK2 you can use your own hands to manipulate valves, buttons, panel, etc.
Available Demos for You

1. Oculus demo + HYSYS Dynamics simulation + Inprocess Instructor Station
2. Oculus demo (Refinery)
3. Oculus + Leap Motion demo (Offshore)
   https://www.youtube.com/watch?v=zYyFrWXQmz4

Note: The purpose of these short demos is to show the current state of the VR technology and how it can be integrated with a HYSYS-based OTS. If you are interested in them we can make them available to you.