

IOCL GUWAHATI - INDMAX

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Sim Infosystems has developed a custom operator training simulator (OTS) for Indian Oil Corporation Ltd for its Guwahati refinery INDMAX plant. The OTS covers many facets of the plant facility the reactor section, fractionator section and Gas concentration section. Attrition rate and graying of workforce in process industries poses major threats in operating complex plants like INDMAX unit.

Context of the INDMAX plant

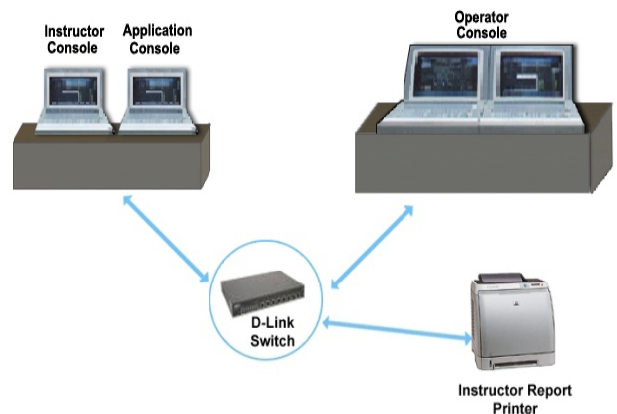
The Guwahati Refinery in North East India - the first Public Sector refinery of the country -- was commissioned in 1962 with a capacity of 0.75 MMTPA, which was subsequently increased to 1.0 MMTPA through debottlenecking projects. In 2003, the refinery installed an INDMAX Unit, a novel technology developed by IOCL's R&D Centre for upgrading heavy ends into LPG, Motor Spirit and Diesel oil.



INDMAX is a high severity catalytic cracking process exclusively developed by IOC, R&D centre to produce very high yield of LPG from various hydrocarbon fractions viz., Naphtha to Resids. The process employs proprietary catalyst formulations having excellent metal tolerance with coke and dry gas selectivity. The operating conditions of the unit are such that the liquid hydrocarbon products are selectively over cracked to LPG containing fractions of C₃ and C₄ olefins without proportionate increase in dry gas and coke.

Scope of OTS:

- ⊙ Simulator hardware
- ⊙ ProSimulator Instructor Station software
- ⊙ ProSimulator Operator Station (Honeywell TDC GUS emulation)
- ⊙ ProSimulator Model development toolkit Custom model for INDMAX unit



The OTS system has all standard training features like snapshot, backtrack, simulation speed, malfunctions, logging, etc. Besides this, OTS system provides state-of-the-art features like performance evaluation, automatic training, monitoring, multi-training session etc. For the purpose of effective training.

The OTS is developed to emulate the actual Honeywell GUS DCS control system for enhanced training. The operator stations are look-alike Honeywell GUS DCS with rack mounted, 22-inch screen CRT and emulated GUS keyboards.

All the field devices are simulated in separate FOP pages accessible easily from DCS graphic pages.

The ESD trip systems are fully simulated and the cause & effect matrix is provided as the operator interface on the operator station.

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PROJECT REFERENCE

INDMAX Plant model scope

- ⊙ Reactor · Regenerator section
 - ◆ Chamber Reactor,
 - ◆ Regenerator,
 - ◆ Catalyst hoppers,
 - ◆ WHR section
- ⊙ Main Fractionator
 - ◆ Feed drum
 - ◆ Main Column
 - ◆ Reflux drum
 - ◆ TCO stripper
- ⊙ Gas Concentration section
 - ◆ Primary Absorber
 - ◆ Sponge Absorber
 - ◆ C2 stripper
 - ◆ Stabilizer
 - ◆ Wet Gas compressor
 - ◆ HP separator
 - ◆ LPG & Gasoline treating
- ⊙ ESD / Trip system
- ⊙ INDField Operation Devices display

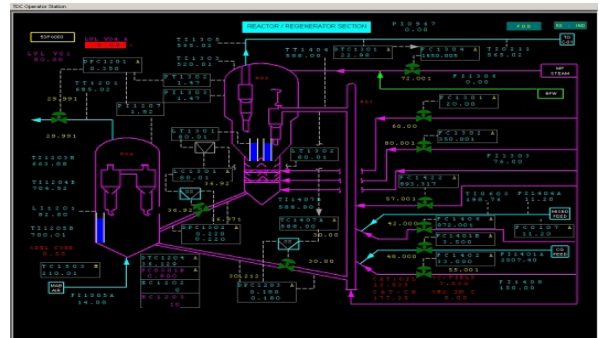
Process models are developed based on "First Principles of Chemical Engineering" (conservation of mass and energy), thermodynamic properties and equipment performance / design data. This approach ensures accurate responses in the operations ranging from start-up to normal operation and shutdown. The high-fidelity models can realize efficient and high-level operation training, which means that the operators can acquire a high level of operational knowledge of the plant.

The reactor model conversion and product yield as a function of:

- ⊙ Reactor temperature.
- ⊙ Catalyst / Oil ratio.
- ⊙ Feed quality (CCR).
- ⊙ Reactor pressure.
- ⊙ Catalyst activity.

The simulator was tested extensively by the client operations, process and instrument engineers and commissioned for the operator training at the control room.

ID	NAME	EFFECT	STATUS	UNIT	UNIT	UNIT	UNIT	UNIT	UNIT	UNIT
1.1	Feed Drum	DRUM								
1.2	Feed Drum	DRUM								
1.3	Feed Drum	DRUM								
1.4	Feed Drum	DRUM								
1.5	Feed Drum	DRUM								
1.6	Feed Drum	DRUM								
1.7	Feed Drum	DRUM								
1.8	Feed Drum	DRUM								
1.9	Feed Drum	DRUM								
1.10	Feed Drum	DRUM								
1.11	Feed Drum	DRUM								
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1.41	Feed Drum	DRUM								
1.42	Feed Drum	DRUM								
1.43	Feed Drum	DRUM								
1.44	Feed Drum	DRUM								
1.45	Feed Drum	DRUM								
1.46	Feed Drum	DRUM								
1.47	Feed Drum	DRUM								
1.48	Feed Drum	DRUM								
1.49	Feed Drum	DRUM								
1.50	Feed Drum	DRUM								



Process Name	Status	Parameter 1	Parameter 2	Parameter 3	Parameter 4
REACTOR	ON	100.00	100.00	100.00	100.00
REGENERATOR	ON	100.00	100.00	100.00	100.00
FRACTIONATOR	ON	100.00	100.00	100.00	100.00
ABSORBER	ON	100.00	100.00	100.00	100.00
STRIPPER	ON	100.00	100.00	100.00	100.00
COMPRESSOR	ON	100.00	100.00	100.00	100.00
SEPARATOR	ON	100.00	100.00	100.00	100.00
TREATING	ON	100.00	100.00	100.00	100.00
ESD	OFF	100.00	100.00	100.00	100.00

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