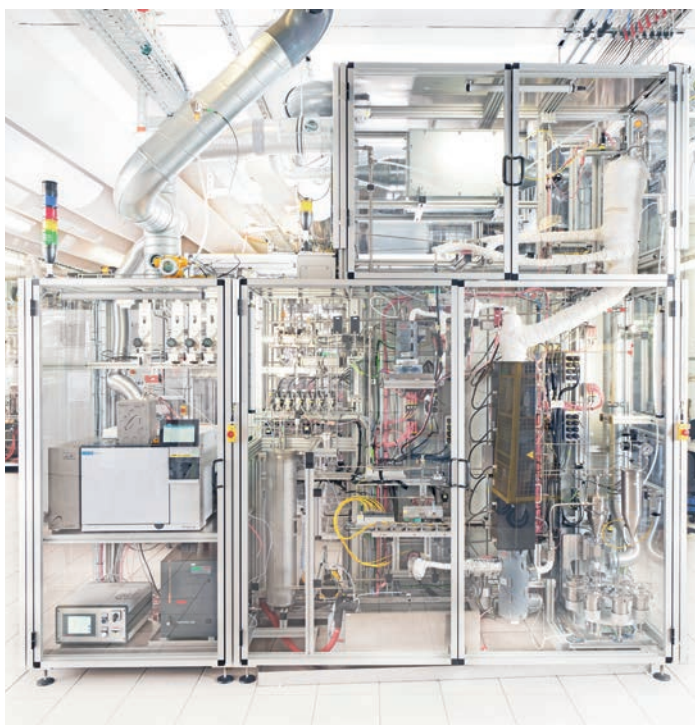# DOWNFLOW TECHNOLOGY FOR REFINERIES

hte

THE HIGH THROUGHPUT
EXPERIMENTATION
COMPANY

Test catalysts and feeds for Fluid Catalytic Cracking (FCC) under relevant process conditions but with laboratory scale budgets


hte's downflow technology

- **offers an entrained flow concept analogous to the commercial process.**
- **allows experiments at catalyst reactor residence times / contact times comparable to riser reactors.**
- **adjusts the same pressures as employed in commercial FCCUs.**
- **is capable of processing high severity protocols (high cat-to-oil ratio).**
- **covers size and operating expenditures in the range of laboratory methods.**

YOUR BENEFITS

- Since catalyst and feed move in the direction of gravity back-mixing is low
- Entrained flow reactor as commercial FCCU
- Pressures typical for an FCCU or a riser can be adjusted
- Cost-efficient (operation, catalyst, feedstock)
- Fully automated lab system
- 5 crackings per 8 hour shift with optional increase to 12 crackings per day

- Mass balances 98 +/- 2%
- Reproducible results matching well with circulating riser units
- Flexible and broad parameter range
- Variety of feedstocks possible: VGO, high resid VGO, light cut naphtha, pyrolysis oils, biogenic feeds and full crude oil
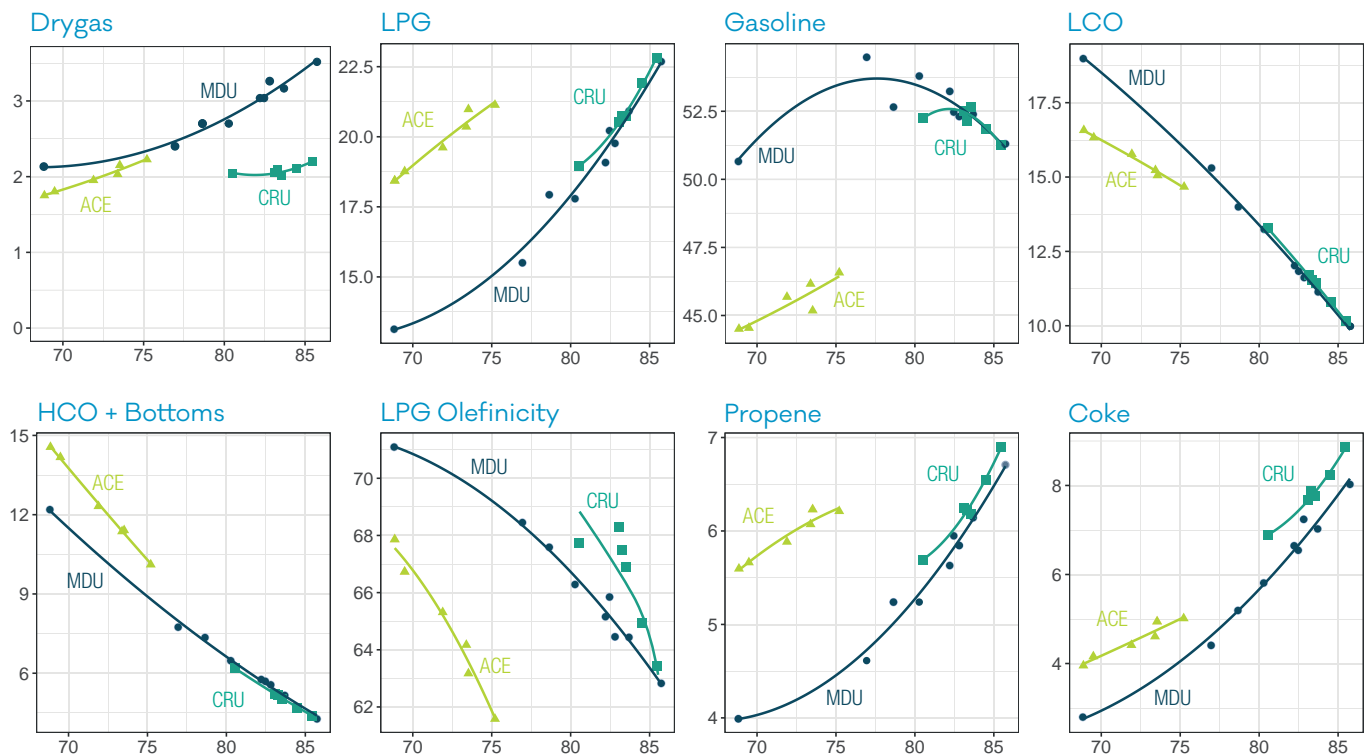- Feedstocks with CRC's 0-10 % can be processed

REACTOR SET-UP
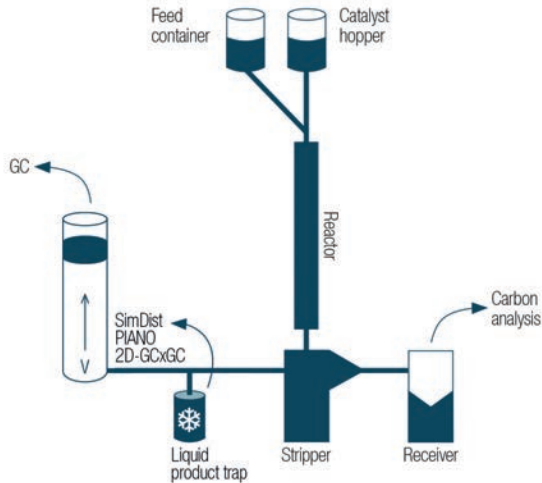
TYPICAL PROCESS PARAMETERS

Operating pressure	0.2 - 3.5 barg
Reactor temperature	up to 700° C
Catalyst inlet temperature	up to 750 °C
Oil pre-heat	up to 250 °C
Oil feed rate	3 - 12 g/min
Cat-to-oil ratio	3 - 50
Experiment duration	1 min (can be adjusted)

COMPARISON OF YIELDS VS. CONVERSION FOR ACE-CRU-MDU

ACE - Advanced Cracking Evaluation   CRU - Pilot Circulating Riser Unit   MDU - Micro Downflow Unit

INFRASTRUCTURE REQUIREMENTS

Laboratory:
- Typical footprint (WxDxH): 3.3m x 1.25m x 3.1m plus room for GC and PC workplace
- Connection to lab exhaust system required (1300m³/h)

Gas Supply:
- N_2: 10 barg/100 barg
- Synthetic air: 10 barg
- House air: 10 barg
- GC gases: H_2, He, N_2, Ar, CDA

Power Supply:
- 400 VAC/50 hz
- Stationary power 7,5 kW

APPEARANCE AND FOOTPRINT OF THE DOWNFLOW UNIT DELIVERED MAY DIFFER FROM THE UNIT DISPLAYED.