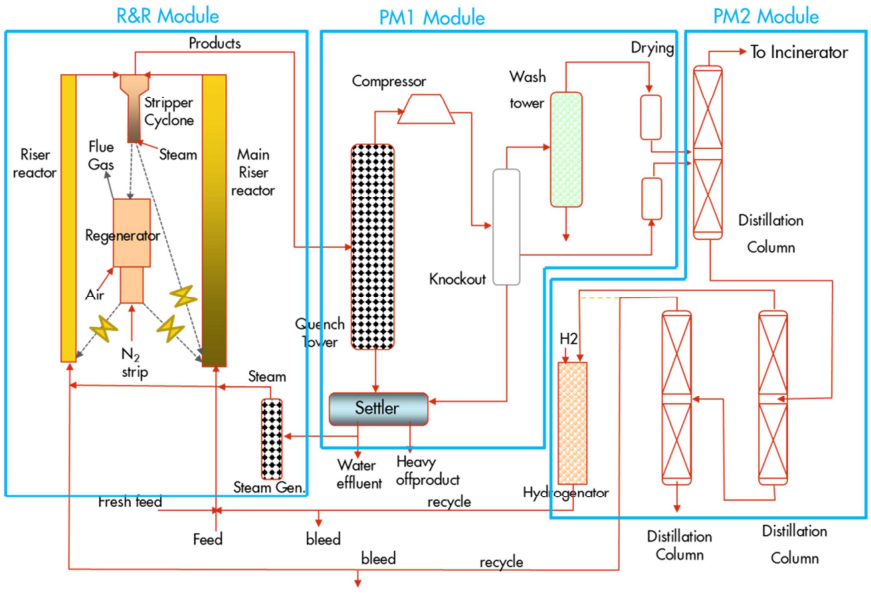
FRIMACH

Oil & Gas and Chemical
Special equipment re-sell & auction

Re-sell of OMO (pilot) plant



GENERAL PLANT INFORMATION

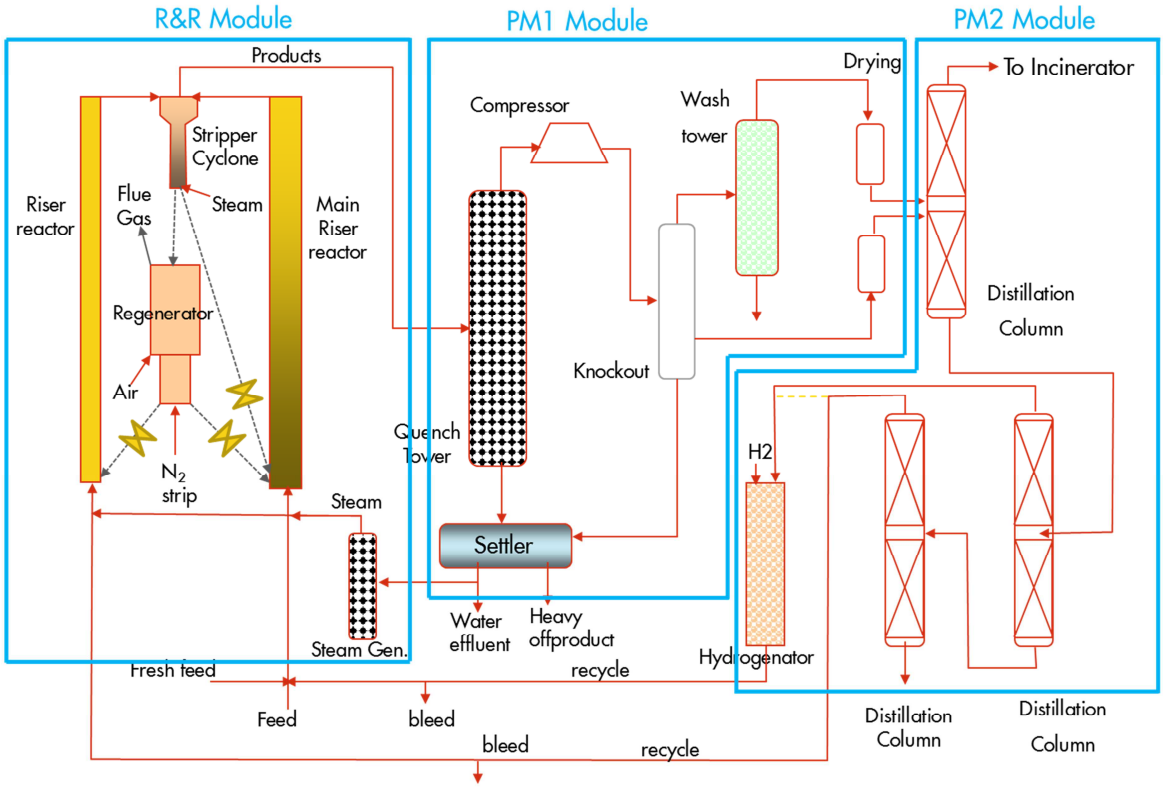
The process facility (further called pilot plant) was built in 2013 and intended to be used as a demonstration unit for the production of **Olefins from Methanol (3 tpd)**. Being an integrated pilot plant with all various process steps fit together in one unit, its main purpose was to de-risk the commercial process and to demonstrate that the required product quality can be achieved at a pilot plant scale.

Due to changed environments and internal strategy, further development on this process has been stopped during actual startup of the integrated pilot plant and the unit has been put under nitrogen atmosphere since 2015. The pilot plant was never fully commissioned and thus could not demonstrate to be able to produce on-spec material.

Decommissioning will be completed in Q2/3 2019.

<u>The pilot plant is built up from 4 process modules and an incinerator</u>

1. Feed and Reactor and Regeneration unit - R&R (section 2000);
2. Catalyst handling - CH (section 2500);
3. Process module 1 – PM1 (section 3000, 4000, 4500);
4. Process module 2 – PM2 (section 5000 and 6000);
5. Incinerator (section 9000);



1. Feed and Reactor and Regeneration unit (R&R)

This process module consists of a feed preparation and the reactor and regeneration section.
The reactor, comprising a fluidized bed of catalyst, was intended to convert a feed stream to a mixture of lower olefins (ethylene and propylene), higher olefins (butenes, pentenes, etc.), water (the main by product) and minor by-products as well as coke, which is deposited on the catalyst.
The coke should be removed from the catalyst by circulating the catalyst to a regenerator vessel where the coke is removed by hot combustion in air. Regenerated catalyst is returned to the reactor, the flue gas stream containing combustion products is sent to the incinerator. Main equipment items in this module are the large reactor and the catalyst regenerator.

2. Catalyst Handling (CH)

This module was used for the handling off fresh and spent fluidized catalyst. Its main equipment consists of a storage vessel for the fresh catalyst, a catalyst addition vessel and a vessel for the spent catalyst.

3. Process Module 1 (PM1)

Reactor product from the reactor section is fed to a quench tower where heavier (C6+) hydrocarbons were intended to be removed via a water quench and leave at the bottom of the quench tower from which they are further separated and cleaned. A two-stage compressor is employed to compress the gaseous overhead stream of the reactor. Thereafter, a washing section is installed to further clean and dry the gaseous stream. In a distillation column, the gas stream is further intended to be split into lighter and heavier components.

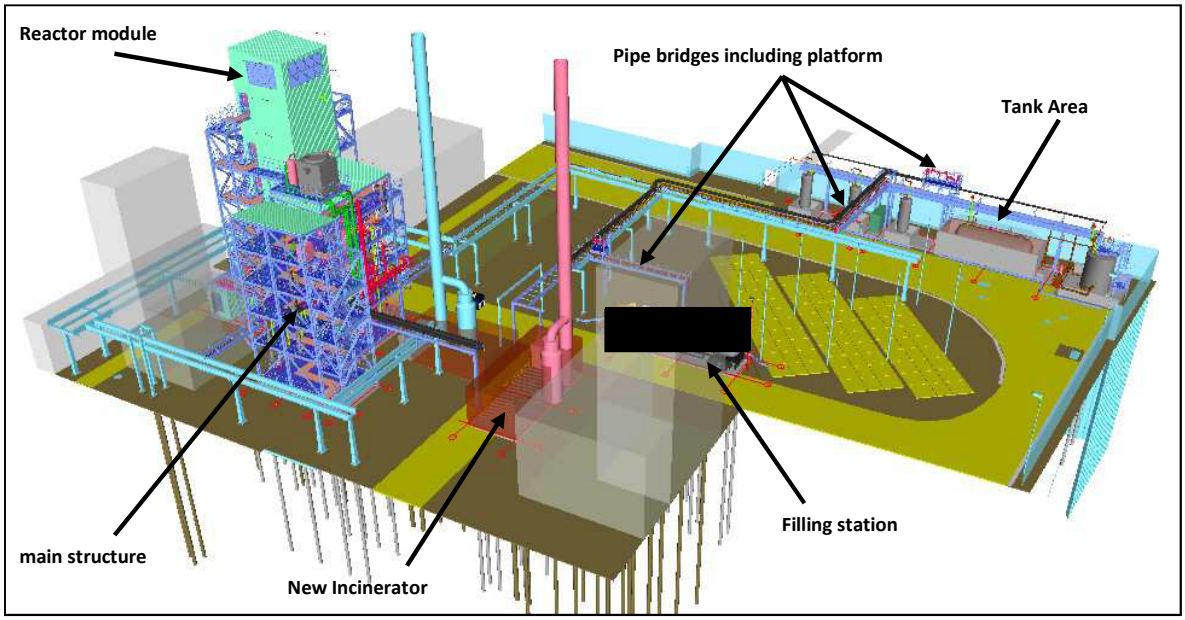
4. Process Module 2 (PM 2)

In this process module the products are further cleaned and separated by employing distillation towers. Main equipment items of this module are a distillation section and a hydrogenation reactor. The hydrogenation reactor is a fixed bed reactor which contained heterogeneous catalyst.

PLANT OVERVIEW

Currently, the OMO Integrated Pilot Plant is located at Shell Technology Center Amsterdam (STCA) and mainly consists of:

- ~~Tank area and filling station~~ (demolished and cleared end of 2018);
- Reactor unit (section 2000);
- Catalyst handling(section 2500);
- Process module 1(section 3000, 4000, 4500);
- Process module 2(section 5000 and 6000);
- Incinerator (section 9000);



The piperacks that connected the pilot plant with the utilities and handled feed and product streams for the above mentioned pilot plant as well as the Electrical Switching Cabinet will not make-up as part of the re-sale.

RE-SELL BACKGROUND

The OMO plant had been mothballed since 2015 relative shortly after commissioning of the plant. Decision to sell and remove the plant was made to make way for new projects in the outside plot of STCA.

Work on dismantling is planned to commence in Q2/3 2019 and is expected to be completed by end of Q4 2019. The main structures /modules and associated equipment and piping are expected to be removed from site. Piperacks specific to OMO will also be removed without affecting other piping for units in proximity.

The olefin-assisted Methanol to Olefins (OMO) process is being developed by Shell to enable the conversion of methanol to ethylene and propylene. Ethylene and propylene are bulk chemicals that can be turned into various high value derivatives. As the missing link in a gas-to-derivatives value chain, OMO enables the monetization of natural gas through the production of these derivates.

The OMO IPP was built back in 2013 to de-risk the commercial process, an integrated pilot plant (IPP) as required to demonstrate that the various parts of the process fit together (i.e. by closing recycles) and that the required product quality can be obtained.

The IPP process line-up was designed to reflect those parts of the commercial line-up (at a considerably smaller scale) required to resolve potential issues with the OMO process developed to date.

<u>The main focus was on:</u>

- Closing the C4 recycle
- Providing a continuous reactor-regenerator system
- Enabling scale up of the reactor to commercial scale
- Inclusion of other critical product process steps such as the bisulphite wash and C4 hydrogenation

The plant was in operation for almost a year or so before decision was taken to mothball the unit on commercial grounds

ALTERNATIVE APPLICATION OPERTUNITIES

<u>Universal pilot plant with several opportunities for process development:</u>

- Wide flexibility in parameter adjustment
- Designed for flexibility and easy modification
- Detailed process sensor and data acquisition

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RE-SELL CONDITIONS

Condition:

"as-is", loaded on barge, Amsterdam, The Netherlands.

Timing:

Directly from site:	Q2/3-2019
Indirectly through Frimach premises:	flexible

Documentation:

High level:

- *Process single line*
- *PEFS*
- *Equipment list*
- *General arrangement drawing*

Low level:

Detailed documentation available on request.

SPECIFICATIONS:

Capacity:	**3 tpd** of liquid/vapor feed
Main specifications:	see attached documentation

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ADDITIONAL PICTURES

Outside overview

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Panorama view inside

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Miscellaneous 1

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Miscellaneous 2