

30 YEARS OF HYDROPROCESSING AT UCT PRAGUE

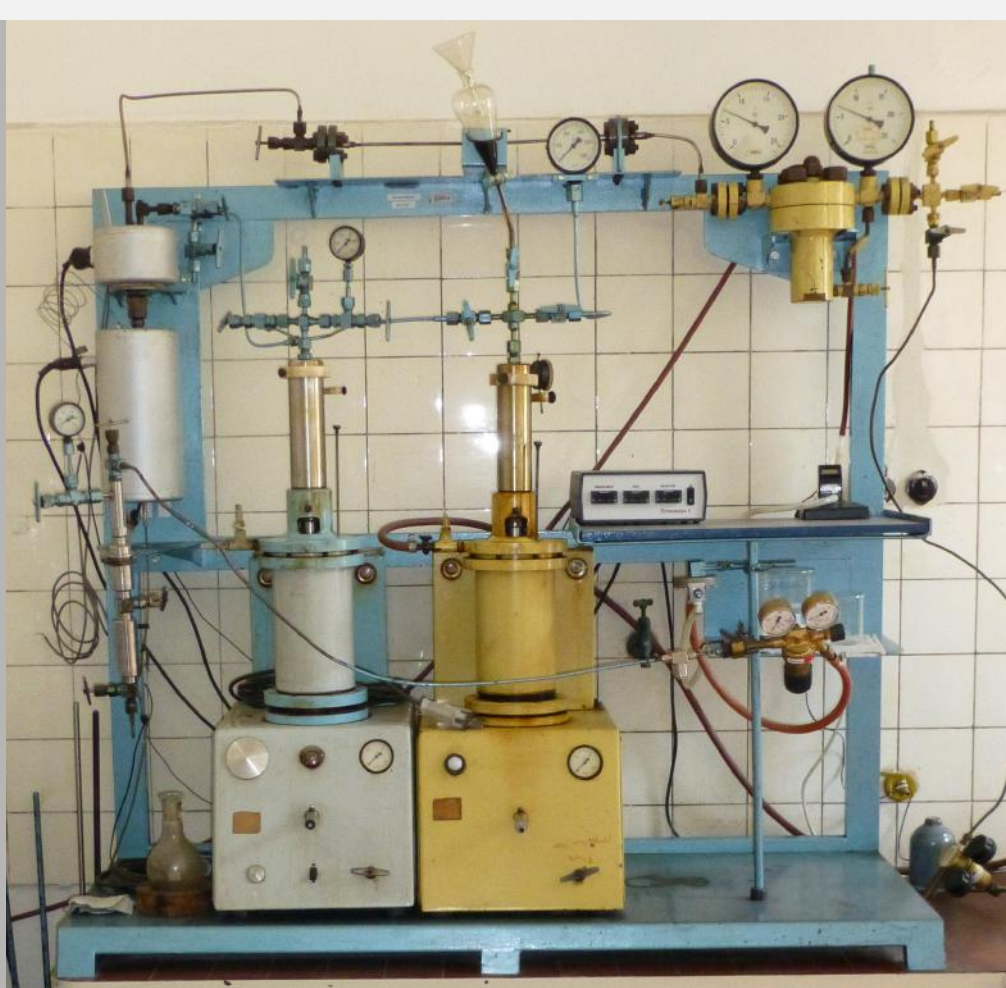
The transition from petroleum feedstocks to bio-oils from HTL and pyrolysis

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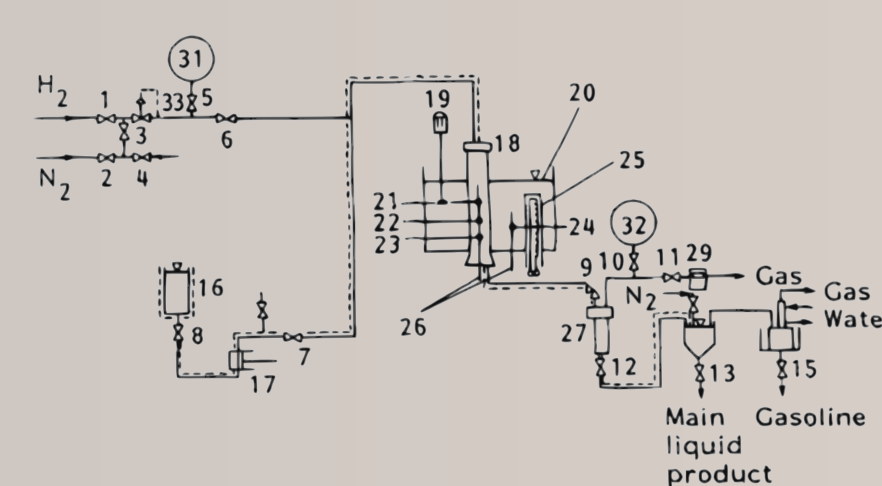


Hydroprocessing including hydrotreating and hydrocracking is a key refinery process commonly used for the upgrading of various petroleum fractions to produce transportation fuels or feedstocks for other processes. Our Department of Petroleum Technology and Alternative Fuels at the University of Chemistry and Technology, Prague investigates hydroprocessing for more than 30 years. Stop for a moment and let's look at our research journey and development of catalytic testing units designing.

1990



We started studying hydroprocessing around 1990. The first hydroprocessing unit was manually operated and equipped with a two-heating zones furnace. A pair of heavy piston pumps was used for the feedstock injection. The unit was not connected to PC and remote control was not, therefore, possible.



The hydrocracking of petroleum vacuum distillates and the hydrotreating of maltenes and asphaltenes were the main research topics.



The rapeseed oil processing was easy. Next unit upgrade was necessary for the following challenges...

We used the unit for HDS of middle petroleum distillates and HDO of rapeseed oils.

The new hydroprocessing unit was built in 2005. It was equipped with electronic hydrogen flow rate and pressure controllers, the diaphragm pump for the feedstock injection, scales for the feedstock flow-rate measurement, and an automatic system for liquid product offtake. The unit was controlled and operated via PC.



2005

The modernization was needed...

2015



During the unit modernization, a four-heating zones furnace was implemented, control software was upgraded, the remote control was allowed, and the feedstock pump was modified for low flow rates and viscous feedstocks. The unit was jacketed and connected to the ventilation.

The unit was used for the hydrotreating HTL and pyrolysis oils from cow manure, straw, cotton, and mixed textiles, hydroprocessing of pyrolysis oils from waste plastics and scrap tires, and dearomatization of kerosenes.



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CACTU Solutions.

The unit was applied for the hydrotreating HTL and pyrolysis oils from water treatment sludge, hydrocracking of Fischer-Tropsch wax, HDO of animal fats, and izomerization of duren-based feedstock.

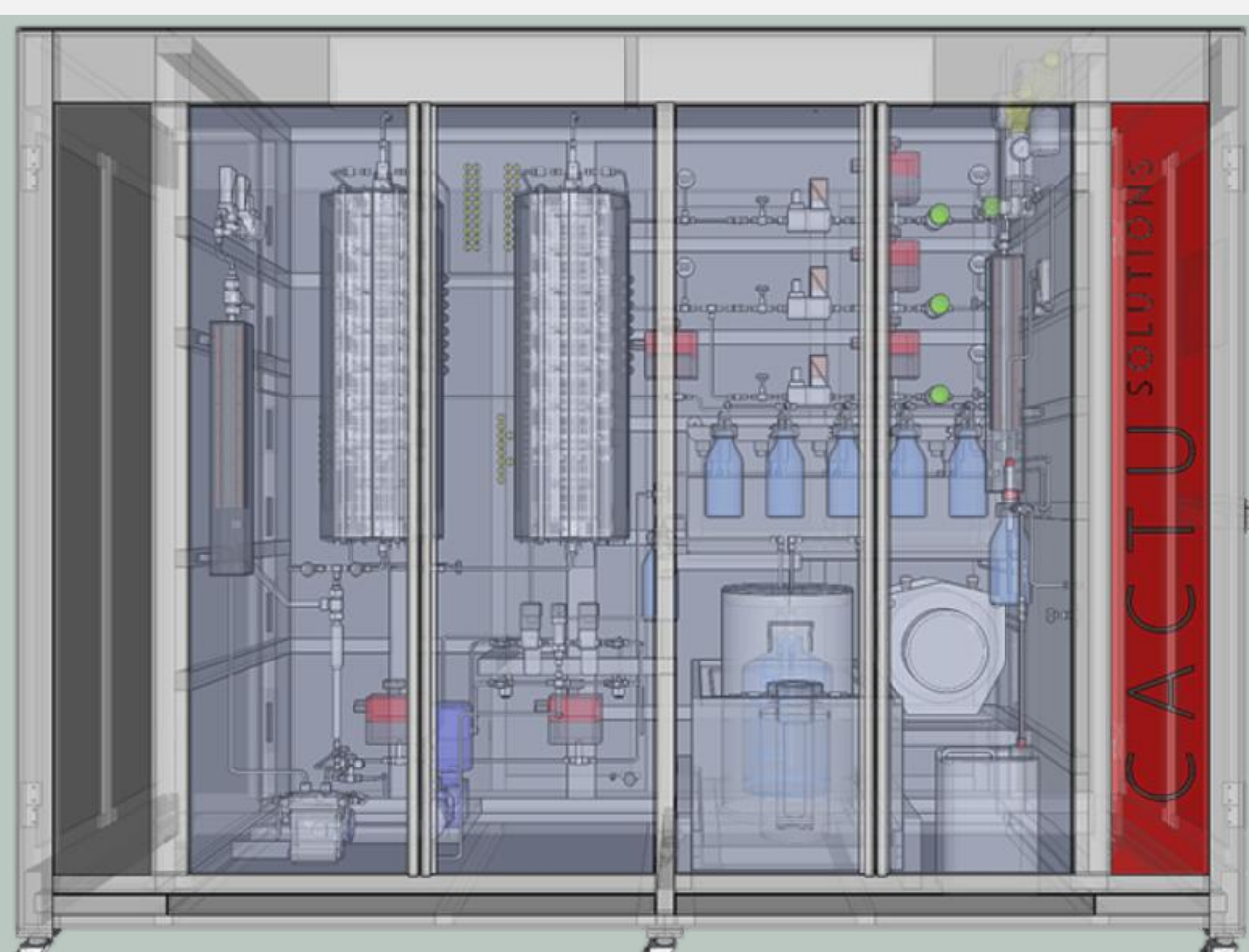
The hydrocracking unit was built in 2020. New construction with a maximum operating pressure of 200 bar was chosen, a six-heating zones furnace was used, two gas inlets were inbuilt, three reactors differing in volume (50-200 ml) were made and control software was created. The feedstock inlet and liquid product outlet are tempered to a temperature up to 120 °C.



2020

Cow manure was another level...

2024



According to our experiences, we formed brand **CACTU Solutions** - the provider of state-of-the-art solutions in operating, designing, and building fixed-bed catalytic testing units. Choose CACTU Solutions today to experience the best in catalyst testing in fixed-bed units.

At present, we are building a new-generation unit characterized by:

- one or two-reactor design for the perfect variability
- in-house made eight-heating zones furnaces
- set of tube reactors with volumes of 30-300 ml
- online off-gas analysis using GC-FID/TCD
- automatic sampling of liquid products
- processing of viscous, unfiltered feedstocks, and even those prone to phases separation, at flow rates 15-300 g/h