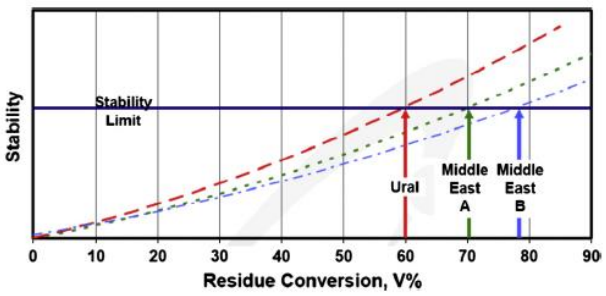
High-Throughput Parallel Pyrolysis Testing

ILS has developed a compact, lab-scale parallel reactor system unit for performing **pyrolysis reactions** in parallel, high-throughput mode with extremely heavy feeds. The unit performs constant-pressure, high-temperature pyrolysis with continuous distillation of products and on-line analysis of gaseous components formed.

The parallel approach allows rapid testing of large numbers of samples and process parameters in the following application areas:

1. Rapid screening of vacuum resid conversion for different bottom-of-the-barrel feedstock mixtures.
2. Rapid polymer pyrolysis testing to determine the effect of polymer type and reaction conditions on conversions and the product fractions formed.



Gragnani A. Understanding and optimization of residue conversion in H-Oil. <http://www.pdfio.com/k-249933.html>.

Fig. 7: 4 x 100ml Thermal Cracking Reactors

Example: Vacuum Residual Oil Thermal Conversion Studies

Proven Technology: A major petrochemical company has been using this unit for over 5 years and has successfully performed over 600 experiments. The 10°C/min heating and cooling rates significantly improve the number of experiments per day, which can be performed and give the user more clearly defined start- and end-points for their thermal cracking experiments.

The unit is a powerful tool for bottom-of-the-barrel (BOB) applications where feedstock quality is the primary factor affecting BOB conversion levels in ebulating bed reactors.

The impact of colloidal stability on BOB conversion and asphaltine conversion to coke are currently studied in this unit using resids from various sources. Higher conversion levels are realized and unnecessary downtime due to fouling in full-scale production units avoided by providing the BOB process operator with a powerful way to pre-screen the feed-quality of various feedstock mixtures.

Example: Plastic Pyrolysis Studies

The unit is ideally suited for companies exploring the possibility to convert used plastic feedstocks to chemicals or transportation fuels.

Operation up to 100bars and 550°C (optionally 650°C) means that extreme pyrolysis conditions can be implemented. The unit can optionally be constructed of Hastalloy for bio-based feedstocks containing corrosive oxygenates.

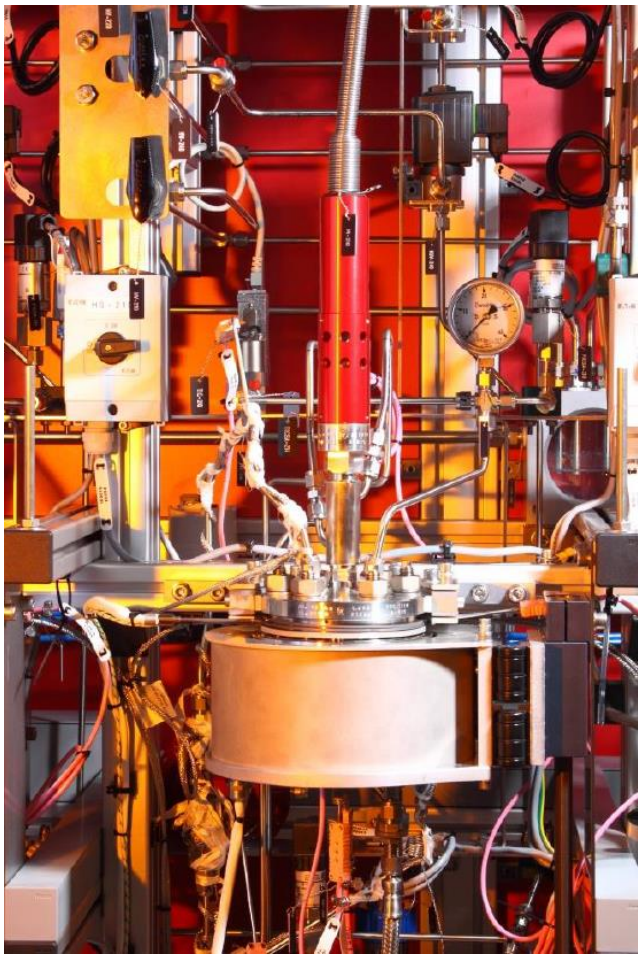
The rapid heating and quenching capability make short- to long residence times at cracking temperatures possible. The effect of residence time and other process-parameters can therefore be quickly evaluated for a wide variety of polymers.

The Unit:

REACTORS: 4 x 100ml (Other sizes available upon request) reactors with electrical heating, overhead stirring and forced cooling are included. Gases are continuously fed and pressure independently controlled during reaction.

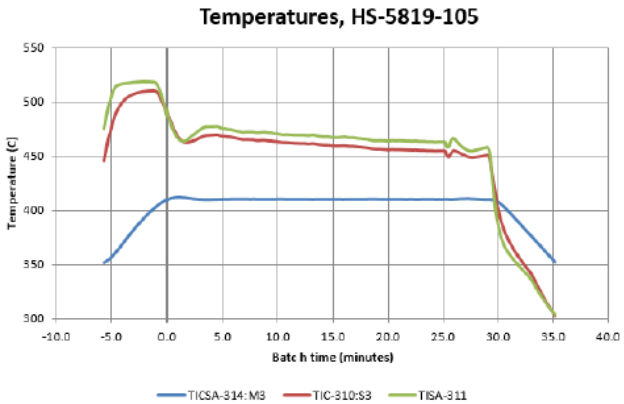
Metal-liners reduce cleaning times for reagents which have a high tendency towards fouling.

High-Temperature/Pressure Batch Reactors



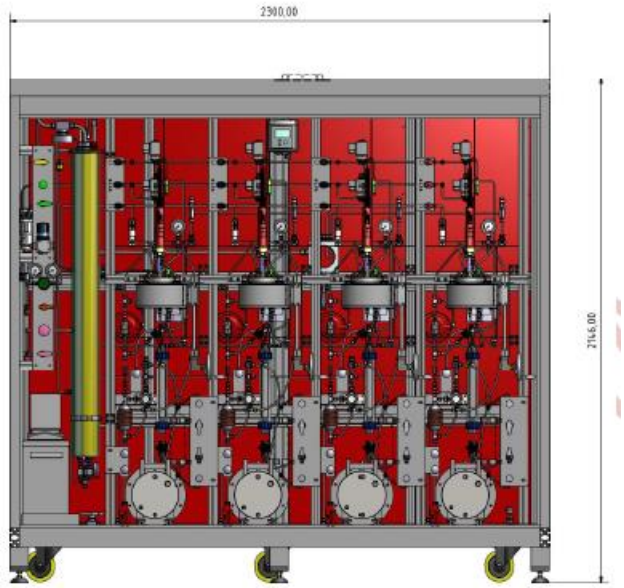
Dynamic Heating/Cooling Jacket

Rapid Heating & Cooling The unit is designed to achieve 10°C/min heating and 15°C/min (water cooling) rates. This provides the ability to accurately and reproducibly study the effect of residence time on system performance.



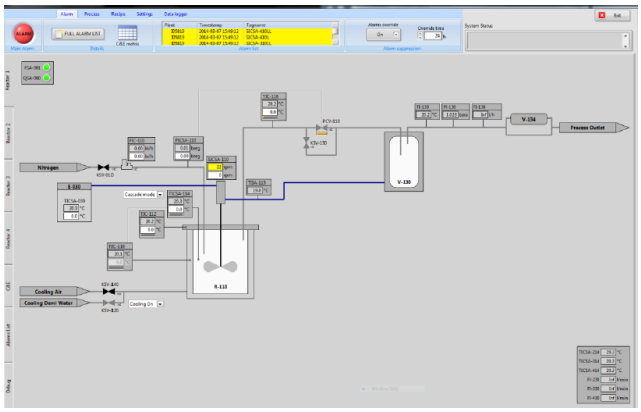
Online Distillation: Single or multi-step direct, continuous distillation is available. The standard unit has a single-step thermostat regulated distillation column included which can be cooled or heated if solid products (paraffins) need be collected.

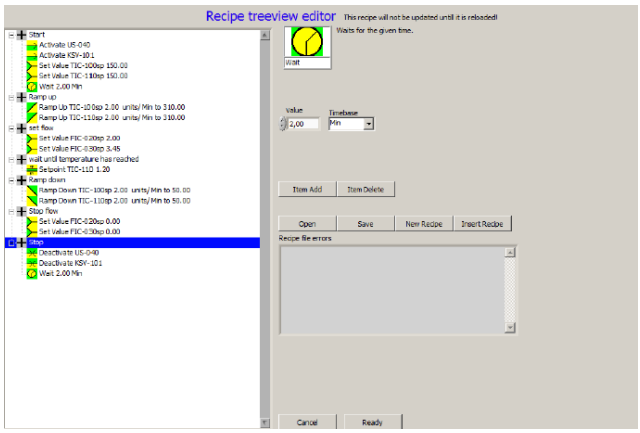
Offgas Flow & Composition Analysis: Ritter gas-flow meters measure the volumetric flow of gas produced during cracking and gas-liquid separators distill cracked products formed. An online GC is optionally included for off-gas compositional analysis.



Compact Size L=2.4m x H=2.2m x D=0,9m

Fully-Automated: The unit is fully-automated. The ILS-Workflow Manager allows the user to pre-program all experimental steps and execute them with a click of a mouse.





Fully Automated: Siemens S7/WinCC

If you would like to learn more….Contact us!!!

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