



SOUTH RESEARCH CENTRE



Eni's South Research Centre is located in Milazzo (Sicily). Since 1997 it has been running pilot plants that simulate refining and biorefining processes for the conversion and fractionating of distillates, residues and biofeedstock. It specialises in evaluating oil and vegetable feedstocks for various processes, catalyst screening and process-parameter optimisation.

The South Research Centre's skills and competencies are in step with energy transition: co-feeding pilot experiments were carried out at the Centre prior to the production of SAF (Sustainable Aviation Fuel) at the Eni refinery in Taranto, obtained by co-feeding conventional plants with UCO (Used Cooking Oil) and also pilot scale simulation of the Ecofining™ process, developed by Eni and Honeywell UOP, for the production of pure HVO (Hydrogenated Vegetable Oil) using vegetable feedstock. The Centre can perform screening tests in order to select deoxygenation and isomerisation catalysts for biofuel production and is engaged in developing new vegetable oil purification technology for use in sustainable mobility. A modern, fully-equipped laboratory accredited to ISO 17025 (1044L) performs feedstock and product-quality analysis.

OUR PILOT PLANTS



HYDROTREATING & HYDROCRACKING

Ebullated Bed

Performance evaluation of varying feedstocks and operating conditions (yield, hydrogen consumption, semi-finished product quality, etc.), as well as different catalysts.

- 2 or 3 reactors in series
- Max. capacity 2.0 kg/h



Two-stage hydrocracking

This customisable modular unit can have one or two reactors in the first stage and one in the second, recirculating gas with a dedicated compressor and offering the possibility of removing H₂S through a scrubber. The downstream fractionation section is equipped with 2 distillation columns and 2 strippers. The unit can be adapted to replicate any industrial setup in order to assess catalyst performance, feedstock reactivity and the effects of operating conditions.

- Max. 18.0 MPa and 450°C
- Max. capacity 1.0 kg/h



Fixed Bed

Hydrotreating and hydrocracking processes are reproduced to assess catalyst performance, feedstock reactivity and influence on operating conditions

- Max. 18.0 MPa and 450°C
- Max. catalyst volume 1.5 l/reactor
- Max. capacity 1.5 kg/h



Micro-reactors

Series or parallel configuration reactors can reproduce hydrocracking, hydrotreating, hydrofinishing, reforming, isomerisation and vegetable oil deoxygenation and isomerization for catalyst performance evaluation, feedstock reactivity testing and influence on operating conditions.

- Max 18.0 MPa and 460°C (550°C for reforming)
- Max catalyst volume 0.28 l/reactor
- Max capacity 0.4 l



Eni Slurry Technology (EST) Pilot Unit

Eni has developed the proprietary Slurry Hydrocracking Technology for heavy feedstock conversion. Since 2001 this pilot plant has been performing feedstock reactivity evaluation and process parameter and product yield optimisation. This pilot plant, unique in the world, offers potential customers valuable information about EST products.

FLUID CATALYTIC CRACKING (FCC)

The Center is equipped with various units for improved reproduction of industrial performance, to assist customers with catalyst and additive screening, for feedstock reactivity evaluation and product yield optimisation:

Davison Circulating Riser (DCR) Pilot Plant, Grace-developed plant comprising riser, reactor, regenerator, stripper, stabilizer column and flue gas (O_2 and CO_2) continuous emission monitoring system.

- Catalyst inventory 1.5-3.5 kg/h
- Typical feed rate 1.0 kg/h



Advanced Cracking Evaluation (ACE) Bench Scale Plant, Kayser Technology-developed, it comprises fluidized bed reactor, 6 hoppers to automatically feed catalyst samples into the reactor, 6 product receivers, on-line gas analysis and coke calculation.

- Catalyst load 6-12 g
- Constant feed mass 1.5 g



Cyclic Propylene Steaming (CPS) Deactivation Units, available in both lab scale and pilot scale. The fresh FCC catalyst need to be deactivated to mimic E-cat performance before testing. The CPS procedure applies sequences of alternating reducing and oxidizing cycles to simulate the FCC riser/regenerator cycles. The reducing atmosphere is provided by propylene in nitrogen and the oxidizing atmosphere by air + SO_2 .

- Lab batch 200 g
- Pilot batch 5 kg

OUR ADDITIONAL PILOT PLANTS

Delayed Coking

This test unit studies the correlations between feedstock and product yield and quality for optimisation purposes.

- Max. capacity 10 l/h



Visbreaking

Feedstock/bitumen stability correlations are studied.

- Max. capacity 10 l/h



MEK lab scale simulation

Paraffinic component removal is performed through MEK solvent extraction in order to improve lube base properties at low temperature.

- Max. capacity 1 l /batch



Distillation Columns

Different units are available to perform separation by distillation: a continuous vacuum distillation column and a batch distillation unit. The batch distillation unit is designed to fractionate crude oil, residue oil and light fractions such as diesel.

Batch distillation unit:

- Atmospheric and vacuum pressure
- Max capacity: 85 l / batch



Furfural Extraction Column

Polycyclic Aromatics are removed from vacuum gas oils and deasphalted oils as part of the lube cycle for the production of lubricant bases.

- Column capacity 10 l



OUR LABORATORIES

The center has a full complement of specialist laboratories with state-of-the-art analytical equipment for all activities carried out in our pilot and bench scale units, promptly providing our customers with reliable information in accordance with all international standards. Since 1997 the Center has accrued a high level of know-how and provides a vital contribution to the continuous improvement and modernization of the Eni industrial setup.



CERTIFICATION

Since 2007 our laboratories have been ACCREDIA-accredited to UNI CEI EN ISO/IEC 17025 (<https://services.accredia.it/> - No. 1044L Branch E), in particular, for tests to assist refineries and biorefineries in implementing Emissions Trading requirements. Subsequently, their accreditation has been extended to include the analyses required for Pilot Plant tests to guarantee the quality of the results that the Laboratories perform.



LAB N°1044L

CUSTOMER CENTRICITY



With a view to providing customer satisfaction and "continuous improvement", the Center has adopted its own Service Charter in order to ensure objectivity, impartiality and total confidentiality. The Center guarantees the best technological, organizational and procedural solutions for the intended purpose, employing continuous customer dialogue to receive feedback on the quality of service provided. Furthermore, the Center allows customers to specify their requirements and exercise control over the efficiency and quality of the services provided.

Our Health, Safety and Environment policy

People are a key element for the company with their dedication and professionalism representing crucial values and conditions for achieving our goals. In line with Eni policies and guidelines, the Center has adopted its own Health, Safety, Environment and Major Accident Prevention Policy and developed a management system. With a view to continuously improving its environmental performance, the Center applied for ISO 14001 certification and this was awarded on December 5th 2006. The Center is also certified to ISO 45001 (Occupational Health and Safety).





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