

The background of the entire page is a blue-tinted photograph of an industrial plant. It features several tall, vertical cylindrical towers or distillation columns, interconnected by a complex network of pipes and metal walkways with railings. In the lower-left foreground, two men wearing white hard hats and safety glasses are looking towards the right. The hard hats have the 'HYtech' logo on them. The overall scene is industrial and technical.

HYtech

Smart ideas, reliable solutions.

SOLUTIONS FOR PROCESS INDUSTRY

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Miguel Wegner
CEO, Hytech



"We are aware of the social added value provided by engineering"

Hytech was founded in 1990 after the introduction of HYSIM simulator in Latin America in 1986. Since then, Hytech has grown from a small firm pioneered in the use of software tools to a company that provides integrated engineering solutions, with international presence and covering a wide range of process industries. At present, we are an organization committed to provide specific and creative solutions based on international standards. Hytech is well recognized not only by our esteemed customers but also by our respected competitors.

Our employees are committed collaborators and very proud of their work as part of Hytech team, which generates one of the lowest rotations in the market. Our staff of senior professionals, has been in average in the company for ten years, and they reached their experience working in different projects over the years.

Based on our experience, we are convinced that every project must fulfill customer's requirements and expectations during every stage from conceptual idea, simulation, basic and detailed engineering, to manufacturing, construction and startup. This can only be achieved with the collaboration and support of operating engineers to incorporate their particular practical experience and that of their companies.

Regardless the scope of our work, in Hytech we are responsible for our designs, and for this important reason we need to review construction drawings, supervise equipment manufacturing, and supervise construction and start up to ensure that our engineering is carried out as planned and designed without any inconvenient.

We are committed to design safe, clean, efficient and low maintenance plants. At the same time, these plants must be simple, flexible and reliable.

Engineering alternatives proposal to our customers is our real value. When analyzing each alternative advantages and disadvantages and considering the design bases for each case together with the client, we can identify the best solution.

The best engineering alternative depends also on client's market perspective, which means that many times it may differ from the best solution from the process design point of view.

We are aware of the social added value provided by engineering and the contribution to our customers. For this reason, we are pleased to share our experience and know how with our customers and other companies involved as a team in our projects.

We think that our challenge is to maintain this achieved recognition from our customers for our distinguished engineering, no matter where around the world our services are required.

I am more than pleased to share Hytech's profile and experience and to show you some of our recent projects and design solutions, willing to continue being part of your challenges and needs and to renew our daily commitment to engineering and to you.



Our Core Business



Rigorous Simulation and Equipment design

Simulation of different process conditions, based on historical specific data and test run data. Vast experience in design and supply of process equipment and internals for towers, separators and reactors. Elaboration of mechanical drawings and construction in associated workshops. Performance guarantee, providing support during all stages of the project until com, precom and start up.



eFEED® for new plants or revamps

We develop Conceptual, Basic and Detailed Engineering, integrating process engineering with disciplines (mechanical, civil, instrumentation and electricity) during the different stages of the project. We start with a blank sheet of paper and we work together with the client. Hytech's eFEED® scope includes detailed equipment design and selection of instruments and rotary equipment. This extended scope determines defined, detailed and comparable offers for procurement and construction.



Process units Revamps

Our revamps are planned minimizing the duration of plant shut down, considering process solutions specially developed and designed by Hytech. This includes new equipment internals with no welding requirement when possible and new equipment start up by using additional valves and well planned tie-ins.



Integrated engineering development

Engineering development is integrated during the different stages of the project, optimizing the overall duration and providing with eFEED® scope the required engineering for the purchase of "Long Lead Items". As an example, vessels mechanical drawings are provided during the first 60 days of the project, allowing to begin with the final detail engineering.



Hytech EPC joint ventures

Hytech participates in EPCs in association with well known construction companies. Because of this special joint ventures, we offer full guarantee for these projects.



Hytech in numbers

Projects

Hytech develops highly complex engineering projects where the required solutions are not standard and need to be tailored.



Projects

- + 25 years in the industry
- + 60 major global clients
- + 40 projects executed per year
- + 30 countries

Capabilities

- + 150 professionals in our headquarters
- + 50 industrial processes
- + 300 process equipment units designed and manufactured with our detailed drawings per year
- + 100 equipment internals manufactured per year

Presence

Locations in **Argentina, Bolivia, USA & EUA**

Shareholder in plants designed by Hytech (Edible Oil Crushing plant and Natural Gas / Cryogenic plant)

Own associated Workshop for internals production

Designed Processes

Oil & Gas Treatment



Our designs range from small facilities for isolated locations in the Argentinean Patagonia to the complete, fast track design of one of the three largest cryogenic LPG production plants in Latin America.

- LTS Plants: Refrigeration Units, ME Glycol, Gasoline Stabilization
- LPG Cryogenic Turbo-expansion Plants
- LPG Absorption Plants
- LPG Fractioning, Transport and Storage
- Adsorption with Silicagel, Alumina or Molecular Sieves
- TEGlycol Drying
- Removal of CO₂ and SH₂ with Amines or Membranes
- Mercury Removal
- Gas Compression and Pipeline Transport
- Crude oil Treatment: Heaters, FWKOs, Wash Tanks, Thermal Treaters, Electrostatic Desalters
- Oil Pumping and Pipeline Transport
- Field Units: Topping, Gasoline Stabilization, etc.
- Water Treatment: De-oxygenating Columns, Skimmers, CPIs, Flotation Units, Filters, liquid-liquid Coalescent Filters, Re-injection

Pipeline & Flow Assurance



Hytech provides design and pipeline assessment services for different transport requirements (gas, crude oil, water, and multiphase transmission). Our company employs a team of specialized professionals trained in the Flow Assurance discipline by using of the OLGA model. This allows to predict and ensure the correct design and adequate functioning in stable operation as well as during transient conditions along the pipeline lifetime.

- Visualization, Conceptual Selection and Design of the Appropriate Flow System
- Flow System Evolution. Definition of Safe Operating Windows
- Flow Assurance Philosophy and Strategy
- Prediction and Control of Hydrates and Paraffin Formation/Deposition
- Corrosion Inhibitor Injection Studies
- Slugs Prediction. Sizing of New Slug Catchers. Verification of Existing Slug Catchers
- Pressurization and Initial Startup
- Alternatives for Pigging Procedures
- Scheduled and Emergency Shutdown
- Cool Down. Determination of "No-touch time"
- Packing and Despressuring
- Slug Generation. Slug Catcher Response

Crude Oil Refining



Our vast experience in new crude oil refining units and revamp of existing ones for capacity increase, allows our clients to obtain maximum return on their investment. For complex process units where specific technology is needed, we work together with the different technologists in order to develop the required engineering. For existing units, we carry out a plant performance evaluation, analyzing plant characteristics and existing restrictions to determine the best applicable engineering solutions and to identify unique revamp opportunities.

- Atmospheric and Vacuum Distillation Units
- Process Fired Heaters
- Absorption/adsorption (Sieves, Silicagel, Alumina)
- Naphtha and Solvent Distillation
- Hydrogenation, Reforming and Isomerization
- Hydrocracking
- Oxidized Asphalt
- Sour Water Treatment
- Caustic Soda Desulphurization
- Spent Caustic Treatment

Petrochemical



We offer engineering solutions for a wide range of petrochemical processes and operations, such as olefins, aromatics, and ammonia producing plants. For petrochemical units that require the use of catalysts, as well as for crude oil refining units, only the catalyst basic operating conditions are required from vendors. Hytech simulates the chemical reactions involved, designing the required reactors (vessels), and designing and supplying their internals (distributors and supporting grids).

- BTX Extraction and Fractionation
- Sulphuric Acid
- Synthesis and Fractionation of Methanol, Ethanol, Isopropyl Alcohol
- Synthesis and Fractionation of Ethylene, Propylene and Butenes
- Synthesis and Fractionation of Butadiene and Styrene
- Maleic Anhydride Synthesis
- TDI Synthesis

Equipment

Design and provision



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The purpose of our engineering designs is to maximize each equipment and overall plant efficiency. Also, when providing equipment designed by Hytech, we can guarantee adequate performance. We design for each specific case, analyzing optimal temperature and pressure conditions. As a consequence, utilities consumption is reduced, the number of equipment required is minimized and piping flow diagrams are simplified.

Hytech usually provides the following equipment:

- Separators
- Heat Exchangers / Aircoolers
- Coalescent / Particle Filters
- Columns (Liquid-Vapor, Liquid-Liquid-Vapor, Liquid-Liquid)
- Reactors
- Others

Internals

Design and provision



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The purpose of Hytech internals provision is to offer full guarantee of performance for the complete engineering package. When equipment or internals suppliers companies are considered, this becomes a shared responsibility.

Hytech can identify and develop modifications to existing internals to achieve the desired performance.

Hytech's internals can be designed with no welding requirement, allowing their installation in a very short period of time.

Hytech manufactures its own internals in an associated workshop (Argentina, South America):

- Sieve, Valve or Bubble Caps Type Distillation Trays
- Grids, Distributors and Tower Packing
- Double Pocket Vane Packs
- Tank and Vessel Internals (Wash Tanks, Skimmers, Settlers, etc.)
- Liquid/Liquid Coalescer Plate Packs
- Distributors and Grids for Reactor Vessels
- Hydrocyclones



Project Fact Sheet

3 MONTHS

Were required to validate and complete the basic engineering.

30.000 MAN-HOURS

Were used for engineering and procurement support.

5 LOCATIONS

At a global level were coordinated to carry out the EPC and manage the relationship with the client.

Itau Gas Plant

This EPC project, developed together with Exterran and Kaiser, started with the validation of a previous existing engineering. During this initial stage some required modifications were identified, such as:

- Redesign of the hot oil system for amine protection from degradation temperatures.
- Inlet and cold separators design optimization to prevent liquid carry over (without increasing the final cost of the equipment).

Additionally, as a cost-reducing opportunity example, the gas-gas heat exchangers were redesigned and their weight was reduced from 300 to 240 Ton. Also, transfer area was increased by 8%.

In addition to the plant's engineering scope, Hytech designed and manufactured all the internals for the pressure vessels (25 equipment) including trays for three columns, double pocket vane packs and liquid coalescers for separators.

Plant: Dew point adjustment, mercury removal and amine treatment for 220 MMSCFD (6.0 MMSM3D) of gas.

Client: Petrobras / Total / BG.

Project Type: New Plant, EPC in association with Exterran and Kaiser.

Total investment: U\$S 150 MM+

Given this project characteristics, it was developed coordinating multicultural work teams located in Santa Cruz and Tarija (Bolivia), Buenos Aires (Argentina), Houston (USA), Dubai (EAU) and Aldridge (UK) to successfully develop the project.

This facility is considered as a model in the region, because of its advanced technology, operating flexibility and turndown capacity.

A remarkable fact about this project was the completion of it with less than 10% deviation from the original schedule and within budget.



Project Fact Sheet

25% TURNDOWN

Is the reduced nominal design capacity, both in ethane recovery or rejection mode.

0 FUEL GAS

Is the plant consumption for utilities. Heat recovery devices were used in the turbo machines for obtaining the heating power required by the process.

LLI EARLY PURCHASE

The early purchase of long lead items, allowed time saving and reduction in overall schedule. As a consequence, an early start up of the plant was possible.

Gran Chaco Cryogenic Turbo-expander Plant

The engineering design for this turbo-expander plant consists of two cryogenic trains with a unique fractionation train to achieve the required turndown capacity.

In order to guarantee energy efficiency, turbo compressors and electric turbo generators exhaust gases were used in heat recovery furnaces (WHRU). This allowed heating the regeneration gas for molecular sieves and heating the hot oil used in columns reboilers.

As for its operation, the plant has the capacity to operate in ethane recovery mode (99% recovery of C2) and ethane rejection (99% recovery of C3).

A remarkable point of the project is the acquisition of the turbo compressors and turbo generators prior to the EPC development (close to 200,000 HP installed rated power), which was carried out successfully by YPFB.

The project was completed with the development of market and LPG's logistic studies, CAPEX,

Plant: Turbo-expansion Cryogenic Plant to recover, separate and store LPG. Design capacity 1000 MMSCFD (32 MMSM3D) of gas.

Client: YPFB (Bolivia).

Project Type: New Plant, Extended Basic Engineering (eFEED)

Total investment: U\$S 700 MM

OPEX, studies of environmental and social impact, location, and project economic evaluation.

The result of the extended basic engineering project is a highly energy-efficient plant with high flexibility, and its capacity is within the three largest in Latin America.

The early acquisition strategy and economic studies performed during this phase resulted in a lower final project cost for the client.



Project Fact Sheet

60%
CAPACITY INCREASE

It is the increase in nominal crude processing capacity for both the heavy and light crude.

28%
YIELD INCREASE

It is the increase of gasoil distillate product obtained from the same crude quality. Increase from 20.7% to 26.6% of gasoil on spec, and consequent reduction in vacuum gasoil sent to conversion units.

Campana Refinery Topping and Vacuum Units

This Extended Basic Engineering project started with a previous Conceptual Engineering project developed by Hytech to significantly increase the crude processing capacity of Campana Refinery Topping and Vacuum units. The main premises considered were the reduced additional plot area and the possibility to take advantage of the maximum available capacity of the existing facilities.

The main solution consisted in the modification of the traditional atmospheric distillation column and subsequent vacuum distillation column configuration.

A new preflash vacuum column was added as an intermediate column in the current configuration, to increase gasoil recovery by enhancing the fractionation of the most valuable gasoil in the atmospheric column. This also reduces the gasoil recovery required in the vacuum column.

The additional heat requirement was supplied with a single, new, multiservice, standard design furnace (for crude and reduced crude), that replaced an old furnace which was at the end of its life cycle.

Plant: Atmospheric Topping Unit (APS) and Crude Vacuum Unit (VPS). Capacity Increase from 82 to 130 kbbpd.

Client: Axion Energy (Argentina)

Project Type: Revamp, Conceptual and Extended Basic Engineering (eFEED)

Total investment: US\$ 70 MM

In order to increase both units capacity with minimum changes, three integrated engineering solutions were considered and developed based on client's requirements: installation of a new preflash vacuum column, installation of a new multiservice furnace for crude (replacing an existing one for maintenance reasons) and reduced crude, and new configuration of atmospheric and vacuum columns product distribution.



Project Fact Sheet

6
PLANTS
Are included in Linear Alkyl Benzene Complex.

50.000
MAN-HOURS
Were required to develop this Basic Engineering project.

250+
DESIGNED AND VERIFIED EQUIPMENT
As part of the 8 Bottleneck Studies that were developed as part of the engineering.

Linear Alkyl Benzene Complex

The Linear Alkyl Benzene Complex (LABC) is a YPF production unit located in La Plata Refinery. This complex consists of 6 units in series and some additional auxiliary units (hot oil, acid gas treatment, cooling water and storage).

In the pre-fractionating unit the main cut is obtained (C11-C14) from a kerosene stream, and then hydrotreated in the next unit called Hydrobon.

In Molex unit, linear paraffins are separated from branched paraffins and then fed to Pacol unit where double bonds are generated at the end of linear molecules.

In Define unit, the di-olefins generated in side reactions are converted to mono-olefins, increasing process efficiency.

Finally, benzene and mono-olefins react in the alkylation unit (using fluorhydric acid as catalyst) in order to obtain Linear Alkyl Benzene as final product).

The LABC currently produces 51.5 kTY of LAB and this project was developed to increase production to 72 kTY.

Plant: Linear Alkyl Benzene Complex (LABC) with an increase of production from 51.5 kTY to 72 kTY (40% increase).

Client: YPF Argentina

Project Type: BE revamp by an increase in capacity (eFEED)

Hytech developed this basic engineering based on a previous partial BE by UOP (original design technologist). Each unit of the complex was integrally analyzed, including the auxiliary units, in order to identify the existing bottlenecks. Each equipment was studied (columns, heat exchangers, aircoolers, pumps) as well as control valves and safety valves, to identify the best solution in each case.

Hytech developed the required modifications to solve the different bottlenecks in the most efficient way, considering constructability and cost effective aspects.



Project Fact Sheet

10 FRACTIONATION COLUMNS

With internals modifications required for both plants

43 HEAT EXCHANGERS

Were verified for new operating conditions for both plants.

ADVANCED CONTROL

Was used to minimize fouling in the recovery system, using slurry as heating medium.

Catalytic Crackings Fractionation Luján de Cuyo and La Plata

Basic Engineering projects for catalytic cracking units were developed for both refineries, and also detailed engineering was developed for Luján de Cuyo refinery in order to process the reactor modified outlet stream.

This outlet stream changed after technologist modification of FCC reactors and catalysts. As a consequence, more olefines were obtained and also less heavy fractions, which represented a great challenge for existing fractionation columns.

Hytech analyzed the existing columns and proposed some internals modifications, in order to avoid full internals replacement. These proposals were validated by standard trays and internals suppliers (Koch, Sulzer).

Advanced control solutions were applied in order to avoid flow distribution problems in furnaces and heat recovery systems.

Plant: Catalytic cracking revamp

Client: YPF, La Plata Refinery and Luján de Cuyo Refinery

Project Type: Basic engineering and full detailed engineering revamp (eFEED)

Additionally, energy integration was improved in order to minimize utilities requirement and investment in new equipment.

Hytech's experience in cracking catalytic units allowed saving time in both projects, Lujan de Cuyo and La Plata Refinery.



Project Fact Sheet

25% TURNDOWN

The plant operates at 25% of its design capacity, for gas processing and crude and water treatment.

FULLY MODULARIZED

This plant was design as different modules to be interconnected.

100 km² FIELD AREA

Total area of Aguada Federal block, located in Neuquen province. 95% net area for production.

Shale Oil, Shale Gas and Water Treatment Plant

Wintershall-Argentina (WIAR) is exploring and developing Aguada Federal, a non conventional crude block located in Neuquén.

This project is organized in 4 different stages: Technology, pilot, pre-development and development.

Hytech Designed the EPF unit, considering the required capacity for the next stage. As a consequence, only some additional equipment will be required for the full development stage.

This project scope includes three different areas: wellpads facilities, including inlet flowlines and production and test flowlines; EPF, including inlet separation of crude, gas and water, oil treatment, gas compression and dehydration, utilities and infrastructure; gas export 6" flowline (80 barg) from EPF to gas pipeline interconnecting point.

During the early stage of this project, a CAPEX cost estimate +/-10% was developed according to client's requirement.

Plant: Shale Oil treatment and Shale gas dehydration.

Client: Wintershall

Project Type: New facility. Extended Basic engineering (eFEED).

Processing capacity: 0.25 MMSM3D gas / 250 M3D crude (Development stage).

This extended basic engineering (eFEED) was developed with no previous conceptual engineering project. This means that several definitions and conceptual design aspects were included as part of this engineering stage.

Hytech designed the whole crude treatment plant, including the heater treater, which is the only crude treatment equipment that allows crude stabilization, desalting and dehydration.

Project Fact Sheet



EPF Sierras Blancas / Cruz de Lorena

Sierras Blancas/Cruz de Lorena (EPF SBCDL) is the first SHELL's oil, gas and water treatment unit for shale oil in Argentina. It is located in Añelo, Neuquén Province.

EPF SB/CDL is designed to process the expected production from SB and CDL fields, during the pilot first stage of this Shale oil field (Shell UAU concession) development. Design capacity for this plant is 10.000 bbl/d for crude oil and 10 MMSCFD for gas.

The process designed for this EPF includes dehydration and crude oil stabilization, gas compression and dehydration and water treatment for re-injection.

This project was developed by Hytech and Ingeniería SIMA. Hytech developed the different engineering stages, from conceptual engineering to detailed engineering and also manufactured and provided the all the process equipment.

Plant: Early production facility Sierras Blancas/Cruz de Lorena

Client: Shell Upstream America Un-conventionals (Shell UAU)

Project Type: Conceptual and Basic Engineering + EPC

Total investment: US\$ 40 MM+

During the development of this project, the client requested to reduce even more the plant's turndown, considering possible low production scenarios during the initial stage.

The design proposed, takes into account line sizing and available plot plan area for future installation of storage facilities and process capacity expansion. This design takes into account the future tie ins required, minimizing plant downtime for this purpose.

10%

TURNDOWN

The plant can operate at 10% of its design capacity during the first stage of operation.

10.000

BBL/D

Is the plant crude processing capacity.

25

EQUIPMENT SKID MOUNTED PROVIDED BY HYTECH

Allowed to minimize manhours in field, reducing cost, time and safety risks during construction.

Project Fact Sheet



Tout Lui Faut Refinery

Tout Lui Faut Refinery located in Surinam decided to increase processing capacity in order to achieve 15.000 BPSD. The main objective was to install new gasoline production units to reduce fuel imports in the country.

These new units contemplate:

- New naphtha splitting unit (4100 BPSD)
- New naphtha catalytic reformer (3100 BPSD), fixed bed and regenerative
- Light naphtha isomerization unit (900 BPSD)

Hytech developed the Basic Design and Engineering Package (BDEP), including mechanical drawings for critical equipment.

The main challenges in this project were:

- Synchronization of the reforming unit catalyst regeneration cycle together with gasoil Hydrocracking catalyst cycle.
- High temperature and high pressure operating conditions
- Hydrogen and Chlorhydric acid presence.

Plant: Naphtha splitter, naphtha isomerization and naphtha catalytic reforming.

Client: STAATSOLIE

Project Type: Extended basic engineering for new units.

Processing Capacity: 0.25 MMSM3D Gas / Oil 250 M3D (Development Phase)

Total investment: US\$ 90 MM+

- Sulfur and nitrogen compounds reduction in Naphtha Splitter and Hydrotreating units, to achieve the required characteristics of catalytic reforming inlet stream. This allows to extend catalyst life cycle and guarantee adequate efficiency.

This BDEP was developed together with Grimm Engineering, a US company specialized in Naphtha Hydrotreating, Isomerization and Catalytic Reforming in order to increase naphtha octane number.

As part of this project, CB&I Lummus operated as the owner engineering company.

GLOBAL INTERNATIONAL DEVELOPMENT

Conceptual eng. developed in USA, BDEP developed in Argentina, Engineering verification carried out in The Netherlands and plant installation in Surinam.

100% CAPACITY INCREASE

Crude oil refinery capacity doubled.

3 DESIGNED REACTORS

Data Sheets and drawings developed for cracking catalytic and isomerization reactors.



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