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## FEATURE PROJECTS – MAIN DESCRIPTIONS

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### **PIONEER / EFS Midstream LLC (Eagle Ford, USA) – Conceptual Engineering for revamp Area 71 Central Gathering Point.**

South Texas Gas Treating & Stabilization Plants - Debottlenecking and Capacity Expansion  
Conceptual engineering for the debottlenecking and 15% capacity expansion of two 150 MMSCFD gas treating (acid gas removal and dehydration) and condensate stabilization facilities located in South Texas (Eagle Ford). The engineering modifications introduced eliminated the production of undesired off-spec Y-grade.

### **AXION ENERGY (Campana, Argentina) – Atmospheric and Vacuum Distillation units Upgrade**

Axion requested a challenging design that would allow them to execute the revamp with minimum downtime and limited investment. It was also requested an EPC implementation strategy that would minimize the plant startup time.

Hytech proposed a solution that did not include replacement or major interventions to the Topping and Vacuum columns and the existing heat exchange train. The solution was achieved using a pre-flash vacuum column, a new heat exchange train that would be added to the existent, and the installation of a larger topping furnace, replacing a unit that had hit its lifetime end. The engineering schedule was prepared to allow the purchase of long lead items, before the EPC tender would have been awarded.

The revamp engineering was successfully finished, achieving minimal interventions on existing facilities and thus allowing the interconnection of old and new systems with reduced downtimes. The plant capacity was increased from 80 kbpd to 130 kbpd.

### **PETROBRAS BOLIVIA SA (Tarija Bolivia) - ITAU Gas plant - EPC (Partners: Exterran and Kaiser)**

Engineering review and plant erection supervision. Gas processing plant for 200 MMSCFD, including removal of CO<sub>2</sub> and SH<sub>2</sub> with amine, and water and HC dew point adjustment (mechanical cooling), gasoline stabilization and pipeline injection. Prime contractor for Itau Gas Plant EPC is Exterran Energy Solutions, an American equipment and compressor plant supplier with overseas operations. Exterran operates, among others, a large scale shop (Belleli) in Dubai, where almost every skid for the Itau Gas Plant was manufactured and the detailed engineering for them was carried out. This company also owns Aldridge shop (UK) which participated in the construction of some of equipment too. Compressors and generators were assembled in Exterran's workshops near Houston. A high level construction company, Bolivia-based Kaiser, was included in the partnership.

HYtech was responsible not only for the basic engineering validation, but for the detail engineering of all offskid plant area as well. This included the interconnection with existing facilities and migration of the control system to a single unified system. HYtech was responsible for engineering supervision in Dubai, technical support of purchase in Houston, customer relationship management in Santa Cruz de la Sierra and technical assistance for construction and plant assembly in Tarija. Additionally, HYtech had in charge all field survey work and interference detection, and, last but not least, the design, manufacture and supply of all internals, including trays for three towers, and vane packs and liquid-liquid coalescers for other 15 piece of equipment. The big challenge was the project schedule, since the engineering phase kicked off in December 2011, and the startup took place in 2013.

## **YACIMIENTOS PETROLÍFEROS FISCALES BOLIVIANOS (Gran Chaco – Tarija, Bolivia) – Complete eFEED, preliminary Detailed Engineering for a new 1000 MMSCFD cryogenic plant**

Hytech developed all local and international market studies jointly with Gas Meridional company, finding the most profitable and feasible implementation options. All alternatives were backed by conceptual engineering designs, investment estimates and negotiating proposals, market alternatives, and logistics for LPG and Gasoline, as well as environmental impact assessments and microlocalization studies.

Also involved were companies Bolpegas and PCA, both from Bolivia, in field studies and environmental and social impact studies, respectively.

Once the best alternative was chosen, Hytech formed part of the group that introduced the proposal to the board and to national and local government officers.

Hytech then moved forward with the completion of Full Basic and preliminary Detailed Engineering for the plant that would process 1100 MMSCFD; LPG and gasoline storage; pipelines and pipeline interconnection; residual gas compression; LPG, isopentane and gasoline pumping and cargo stations; equipment mechanical design; OPEX, CAPEX, and economic and financial analysis in detail.

Also, the company prepared the technical specifications for international ordering, always assisting customer, managers and client's president in each event or meeting where required.

At present, this plant is under construction, with an estimated investment of USD 800MM during two years.

## **YPF (Ensenada – Buenos Aires, Argentina) – Atmospheric & Distillation Units' Upgrade**

eFEED for the capacity increase (30% overall, 87.500 bbl/d final capacity) of one existing topping unit. Crude slate had been modified, now prevailing light, shale oil. Hence a new naphtha preflash column was proposed and designed to alleviate the atmospheric column and increase its capacity. Also the Naphtha Stabilizer column was revamped to handle the extra flow of this specific cut. The project included engineering and verification of the crude desalters, crude furnace, pumps, vapor recovery unit, flare and utilities.

## **GAS MEDANITO / C3PLUS (Catriel - Río Negro, Argentina) - New 35 MMSCFD Cryogenic plant – EPC (Partner: SIMA)**

C3Plus proposed Medanito S.A. the construction and installation of a LPG separation and treatment plant. With the idea of segregating plant liquids in a facility that, until then, only dehydrated and sweetened gas, the project comprised Supply, Construction and Installation of the LPG production plant.

Using and adapting a decommissioned American plant, the project involved the execution of diagnostic works, dismantling, land and sea shipping, adaptation, redesign and expansion of the unit itself and its systems and associated services.

Hytech designed an innovative system to heat and dry regeneration gas, leaving aside the use of complex salt furnaces and furnaces using hot oil; this was replaced by a simple combustor that eliminates or reduces cleaning hassles, downtime and safety problems that traditional systems normally present. And it also reduces implementation costs.

The design of the new plant was carried out without disturbing the normal operation of other facilities. Additional pipelines were incorporated; they were designed and assembled under the supervision of national regulated fiscal metering units. Existing services were adapted without significant modifications. The company actively participated in the entire purchasing process, skids shop fabrication and field assembly.

Hytech also participated and advised on the overhead lifting and transportation processes, designed firefighting systems, atmospheric and cathodic protection, and sketched the entire plant, designing each equipment and structure under the constraints of the absence of certain special materials due to market shortages.



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The company supplied the internals for the deethanizer and debutanizer / depropanizer columns, their assembly and performance testing.

Hytech also participated in the capacity expansions that followed in the next five years.

### **YACIMIENTOS PETROLÍFEROS FISCALES BOLIVIANOS (Río Grande, Bolivia) – Survey of FEED and EPC for a 200 MMSCFD cryogenic plant.**

HYtech has surveyed the complete Basic Engineering, Detailed Engineering, Construction and Building of an LPG Turboexpansion separation unit with a capacity of 200 MMSCFD.

This contract comprises the provision of resources for all disciplines that are involved in the survey of the different stages of the Project; i.e.: Engineering, construction and assembly of the new LPG and Gasoline separation unit. (Engineering and Construction by Third Parties).

### **REFINADORA NEUQUINA S.A. / PETROLERA ARGENTINA (Plaza Huincul – Neuquén, Argentina) – Basic and Detailed Engineering Design for a new naphtha Hydrotreating, Isomerization and Reforming plant.**

Complete Basic and Detailed Engineering Design. Equipment construction blueprints, including reactors internals. Design and fabrication of the splitter column 70 trays and the isomerate stabilizer 32 trays.

Petrolera Argentina brought from Illinois, USA a decommissioned plant with the intention of adapting it to a new facility in the province of Neuquén, Argentina.

An American technology company, Grimm Engineering Inc., performed all conceptual adaptation studies. However, upon delivery in Argentina, the client found that the feed conditions had changed and that the plant output would not meet fuel regulations in force. The engineering needed almost to be redone. Hytech Engineering was hired to, with the aid of a construction company, make that possible.

Hytech was in charge of the basic engineering for the new operating conditions, agreed simulations and parameters with previous technologist, developed the rest of the engineering as a function of the new variables. Every equipment, every engine, each control valve was studied in order to take advantage of every element already available. Alternative solutions were given to each known issue, different supply voltages, frequencies, communications technologies, control systems, etc.

There were significant differences between U.S. rules and laws and local and national requirements, for example access roads clearances, resistivity, soil allowable stresses, earthquake zones, wind and design standards, which conditioned structures, foundations, equipment and systems.

Hytech developed, with the support local company Ciar, all necessary engineering for supports, pipe rack optimization and piping 3D model. The firm provided equipment construction drawings, including reactor internals, and customer procurement support and technical meeting with vendors assistance. Precommissioning and construction assistance was supplied too.

Hytech also designed and fabricated naphtha splitter column and isomerate stabilizer internals (70 and 32 trays, respectively).

### **STAATSOLIE (Tout Lui Faut, Surinam) – FEED and preliminary Detailed Engineering Design for a new Naphtha Hydrotreating, Isomerization and Reforming plant.**

New gasoline complex in Tout Lui Faut Refinery, Wanica District, Suriname: new units Naphtha Splitter, Naphtha Isomerization and Naphtha Catalytic Reforming.

Staatsolie Maatschappij Suriname NV required to expand its local refinery to process 15,000 BPSD of crude oil and include new units to produce gasoline and gain independence from imported fuel needed for local transportation.

Hytech developed a Process Design Package including a new Naphtha Splitter Unit (4100 BPSD), a semi-regenerative fixed bed Naphtha Catalytic Reformer (3100 BPSD) and a Light Naphtha Isomerization Unit (900 BPSD). The motor gasoline blending resulting from these units had to pass 95 RONC and the catalyst cycle between regenerations had to coincide with the gasoil hydrocracking unit cycle, where the naphtha feed was coming from.

In conclusion, Hytech designed the new naphtha units tailored to the requirements of Staatsolie. The vast experience in the design, manufacture, operation and optimization of these units yielded a superior design and a plant of long-term operability.

### **PANAMERICAN ENERGY (Salta, Argentina) - Plant revamping of Dew Point and Amine CO<sub>2</sub> removal plant from 106 to 177 MMSCFD – Piquirenda-San Pedrito**

HYtech supplied the Basic and complete Detailed Engineering, Procurement, Construction and start-up assistance to expand plant capacity. The project included gas pre-treatment, dew point, amine treatment, compression, propane refrigeration, gasoline stabilization and sale gas pipeline.

### **REPSOL – YPF (Malargüe – Divisadero / Loma de la Mina / Cargamento, Argentina)**

Extended FEED for a new crude treating plant and a water treating plant for reinjection. Capital cost estimation.

Extended Basic engineering development for 2 new oil treatment plants (one for oil received from pipeline and another for oil received by truck, including unloading and measurement facilities), a water treatment unit (for water re-injection), and an oil pipeline for product delivery.

Extended Basic engineering development for a new gas treatment plant (H<sub>2</sub>S removal and dew point adjustment) and a pipeline for gas delivery.

Extended Basic engineering development for new oil and water treatment plants (water for re-injection) and a treatment plant for oil delivered by trucks.

Extended Basic engineering development for new oil and water treatment plants (water for re-injection) and a treatment plant for oil delivered by trucks.

### **REFINOR SA (Campo Durán Refinery – Salta) – Engineering Design and Capital Expenditure Estimation for a new vacuum, lateral cut, Hydrocracking plant.**

Predesign of the entire Hydrocracking plant, including the revamping of the existent vacuum column, reactors, columns, fired heater and auxiliary equipment.

### **PETROBRAS BOLIVIA S.A. (Tarija, Bolivia)– Extended FEED for the Revamp of Sábalo Gas Plant.**

Two production trains, 200 MMSCFD each. Extended FEED for a 15% capacity expansion. The scope included equipment design, plant shutdown scheduling, equipment fabrication assistance, design and supply of separator internals (double-pocket vane packs and parallel-plate coalescers).

### **PHOENIX PARK PROCESSORS LTD (Point Fortin, Trinidad & Tobago)**

Analysis and optimization of a Turboexpander plant for LPG separation and production in accordance with new conditions. Partnering with Grimm Engineering.

### **PLUSPETROL (Centenario – Neuquén, Argentina) – Basic and Detailed Engineering Design for the new PC-3 Compressor Station (in partnership with SIMA).**

Basic and Detailed Engineering Design. Design and fabrication of separators´ double pocket vane packs. Process design and mechanical blueprints of shell and tube heat exchangers and separators. Engineering development with 3D model as per final client needs, and scheduled as a function of short delivery terms. This required a continuous and precise adjustment of the detailed schedule, working along the contractor. Engineering supervision during Construction and Installation & Precommissioning; supplier supervision & follow up.

### **PIONEER N.R. (Neuquén, Argentina) - New LPG fractionation plant (Loma Negra) (EPC by SIMA; intermediate clients CBI – Howe Baker)**

Pioneer, having acquired the company Chauvco Resources and expanding its assets, decided to enhance the capabilities of the treatment plant, which until then boasted only dew point adjustment. CBI proposed PNR to provide a cryogenic plant for separating LPG with technological contribution of Howe Baker (later owned by CBI) for the FEED; contribution of Hytech for the detailed engineering, the basic engineering for pipelines, services, compression, all OSBL, and local and field studies; and SIMA participation in the construction, procurement and assembly. The main equipment were sourced from the United States. Four months into the project phase, PNR, due to a business opportunity and considering a strategic proposal from Hytech, accepts the inclusion of a fractionation plant as part of the expansion, giving the responsibility of the design and assembly to the consortium. Hytech developed the FEED, the detail engineering, the necessary modifications and scope changes; it increased storage capacity and services and spaces. Equipment supply for this fractionation plant was sourced locally, thus making the original startup date of the original plant. Hytech supplied all columns sieve trays. Also a major cost reduction was achieved, yielding an excellent performance in a completely fast track project. Duct laying works were performed with local workforce, fiscal metering stations, pig launchers/receivers, new control room, fire & gas room, motor control centers. New residual gas and feed compressors were commissioned, and a dual system was implemented for product: delivery via pipeline and truck loaders. Gasoline stabilization plants, slug catchers and separators were upgraded. The consortium built and expanded plant access roads and built an office, reception, and truck driveway. Beaconing was performed due to airport proximity, getting permits from national and local regulatory agencies. Hytech actively participated in each project activity, such as supervision, material selection, warehousing and storage, monitoring of all processes, and in the final stages of commissioning, performance testing and startup with media coverage and national authorities presence.

Two years after the inauguration of the cryogenic and fractionation plant, PNR decides to increase its plant capacity by almost 50%. This time PNR manages equipment procurement; SIMA completes procurement, manages logistics and construction; and Hytech performs the engineering, provides technical assistance and supervision.