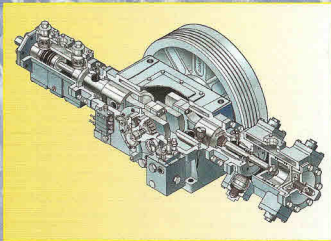


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■ EnDyn made major modifications to meet PetroTech's specifications. Shown are Units 2 and 3 in the repackaging process.



## PERUVIAN PROJECT PROVES PRACTICAL FOR PETROTECH

*EnDyn and Partners Made it Possible to Successfully Meet Tight Schedule under Challenging Conditions*

By Ellen Hopkins

Through the combined efforts of five companies — three in Texas, U.S.A., and two in Peru — three complete Superior engine/compressor packages were shipped to a new Petrotech compressor station near Talara, on the northern coast of Peru, South America. Energy Dynamics (EnDyn) Ltd. in Alice, Texas, U.S.A., coordinated and shipped the customized packages that cost \$2.85 million, and in the process met Petrotech's tight delivery schedule. Unique considerations of the project included a low suction pressure, a discharge pressure of 2000 psi (138 bar) and a flow rate of 38 MMcf/d (1.08 x 10<sup>6</sup> m<sup>3</sup>/d).

A total of 7950 hp (5930 kW) at 2650 hp (1980 kW) per unit was supplied. The Superior driver is a model 16-SGT natural gas-fired turbocharged engine. The reciprocating compressor is a separable six-cylinder Superior model MW-66. Reaching the flow requirements was easier using Superior six-throw compressors said Kevin Downes, EnDyn's project liaison and director of sales and marketing. EnDyn specializes in parts and service for Superior and Ajax engines and compressors.

"These are three- and four-stage units with a low suction pressure. We

were able to achieve the desired flow rate using fewer Superior units than any other type," said Downes. "We could have achieved the same result using more horsepower and more units of Waukesha, Ajax or another brand to perform this service. But given the customer's requirement for re-engineered horsepower, that would have potentially increased the customer's capital expenditure for the size of the compressor station as well as future maintenance dollars."

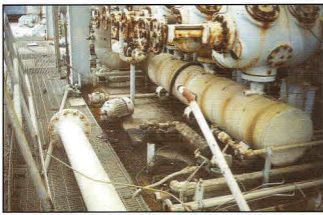
Altronic Controls in Garland, Texas, and Universal Compression in Houston, Texas, also contributed to the Petrotech project. EnDyn was initially notified of Petrotech's compression needs through its Peruvian agent, Abax Energy Services, a division of GTJ International, a PowerParts distributor located in Lima. PowerParts is the brand name of EnDyn's product line.

"This is the first time that we have done any significant business with Petrotech to speak of," said Jack McMonagle, EnDyn's vice president of operations. "EnDyn has agents or distributors located in various marketplaces worldwide, and [since 1995] we have had an agreement with Abax/GTJ

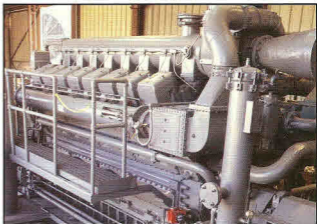
to represent EnDyn's products, so that's how we came to be considered for the project.

"It's always a challenge working in the international arena, coordinating with our agent, with a project of this magnitude, and accomplishing all that for a relatively new EnDyn customer," McMonagle added. "So on the front side there was a great deal of time and effort on the part of all players — EnDyn, the agent and the customer — in developing the specifications for the project. We needed a clear understanding of what Petrotech wanted and expected, and it in turn got a clear understanding of what EnDyn would provide. Accomplishing that overseas is always quite demanding but this project was fairly consistent with others EnDyn has handled over the last 15 to 20 years in locations from Canada to South America and the Middle East."

Regarding financing for projects of this magnitude, McMonagle said EnDyn might work out progressive payment terms based on percent of project completion by certain dates, pending the customer's on-site inspection. This doesn't always fit a cus-



■ Unit 1 package "as delivered" from customer. The unit had been idle offshore Louisiana and unprotected from the elements. Shown in this photo are compressor cylinders, pulsation bottles and miscellaneous piping.



■ Remanufactured Superior 16SGT-MW66 package (Unit 1) customized for Petrotech plant requirements, which includes standard offshore skid design and customized piping.

tomor's situation, he said, but this type of arrangement was done on a number of items in the Petrotech project.

Downes said the location, equipment procurement and the weather were specific challenges on this project. The Pena Negra Compressor Station, located near the city of Talara and within a stone's throw of the Pacific Ocean, serves a dual purpose. Gas is taken from a cryogenic plant and compressed for injection of secondary recovery crude. Also, the gas is sold to a local power plant for electric power generation.

The compressor station was designed in concert with the cryogenic plant and the need for injection, which takes place on an offshore platform. The gas is transported, stripped in the cryogenic plant, and the dry gas is sent to the compressor station for reinjection and for gas sales. This area of Peru is very arid and the desert sand and salt in the air present unusually demanding maintenance challenges.

"The elements were taken into consideration during the construction phase," said Downes. "EnDyn consulted during design and through construction and recommended specific piping configurations and other ideas, including an overhead structure to protect the units. Although the units are not fully enclosed, an overhead crane is in the building for maintenance."

Petrotech contracted EnDyn to begin the project in the spring 2003. By late fall that same year, the units had been delivered and EnDyn subsequently began the commissioning. Unique project considerations included accomplishing the suction to discharge pressure in three stages on one unit and in four stages on the other two units, which EnDyn was able to find on the used equipment market.

"These particular engines require air-

to-fuel ratio controllers," said Downes. "We're utilizing the latest in technology to achieve this — the Altronic EPC 200c electronic/digital controller. This controller works in concert with the other control panel equipment such as the CPU 95 electronic ignition as well as the annunciator and gauges.

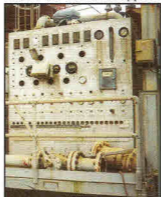
"In order to put the lowest cost alternative package together for the end-user," continued Downes, "one of the units for the Petrotech project was customer provided and we refurbished it. The other two units we found on the market and actually partnered with Universal Compression's revamp shop in Houston. Universal had these in their excess inventory, so we purchased them and repackaged them to meet Petrotech's requirements."

McMonagle said EnDyn has worked very closely with Universal Compression for a number of years, both in providing replacement parts for Superior and Ajax equipment and in partnering with them on projects of this magnitude.

The customer had a tight delivery schedule and that's why partnering with Universal was advantageous added Downes. He further explained that for the customer-supplied

equipment, very little could be utilized other than the major components such as the engine and compressor, some cylinders, one scrubber and a couple of the pulsation bottles.

"The customer-supplied unit had been used offshore Louisiana and needed quite a bit of refurbishment," said Downes. "Also, it had a large footprint, meaning the skid was of a size that you would find on a typical offshore platform. We performed a zero-hour overhaul, which means we completely tore the package down from the bottles and scrubbers to disassembling all pieces including the crankshafts, blocks and frames. Then we rebuilt all the components to 'as-new' specifications, fabricated new piping and vessels where required, then x-rayed and pressure tested. We transferred all the equipment to a standard offshore skid, which changed the associated layout, piping and so forth. To ensure a quality rebuild, the engines were load tested on our in-house dynamometer, while the pack-



■ A view of the fully pneumatic control panel as delivered from customer (left). The remanufactured Superior 16SGT-MW66 package (right) was customized with a fully electronic Altronic EPC 200c digital control system and a one-year "new unit" warranty.

■ Repackaging of Superior unit in process.



ages were no-load run tested on the shop floor."

McMonagle said EnDyn was awarded the project on the basis of its ability to find replacement equipment in the surplus market or within its own inventory.

"We can then quote a used, reconditioned — what we call zero-hour — package comparable to new, with new unit warranty for about 60% of the cost of new," said McMonagle. "On the front side customers, find these packages very attractive."

Tracy Little, EnDyn's president, said his company has been specializing in the aftermarket for the Superior and Ajax product lines for over 27 years, and the industry and the players are constantly changing. Companies like Petrotech are interested in quality, quick deliveries and reduced costs. He said that the 40% savings comparison of remanufactured versus new is appealing, and it gives EnDyn the opportunity to place surplus Superior horsepower back into service.

"We're finding in the U.S. and Canada that the number of surplus units continues to increase due to gas depletions or EPA requirements for clean-burn or low-emission engines. Some customers elect to purchase new units, while others elect to upgrade their existing units to meet the emissions requirements," said Little.

"In markets such as Peru, there are no current government regulations requiring clean-burn engines. Customers have the option of purchasing remanufactured packages for new installations or expanding their capabilities with identical types of units in their existing fleet," said Little. "Their personnel already have the experience so they can utilize existing inventories, which results in lowering actual operating costs compared to operating low-emission equipment."

But Little emphasized that international customers comparing a clean-burn unit vs. a remanufactured unit

■ The EnDyn Team worked two 12-hour shifts daily during the 18-week project duration to ensure "fast-track" delivery.

compare more than emissions. They also realize the control system is more sophisticated on a newer model, and will require more attention and possibly additional training. For this project, EnDyn sent two service representatives to Petrotech's compressor site to assist in commissioning the three units. While EnDyn's representatives were there, the customer took advantage of their time for "hands-on" training.

"Based on our international experience, we recognize that there are unique challenges working on overseas overhauls and start-ups," Little added. "These jobs often require more time because we count on delays. For example, we may find that there is a part the customer needs that may not be readily available in remote locations and has to be shipped from the U.S. It's not like driving across town on a domestic job and bringing the part back that same afternoon.

Although it has been a challenge, it's one that EnDyn is accustomed to because of its experience. EnDyn has done significant work in several South American countries, including Venezuela, Colombia, Ecuador, Argentina and Chile. Some projects required parts, service and training, and in other cases EnDyn packaged and sold new units.

EnDyn Ltd. manufactures a complete line of new parts, known as PowerParts, for Superior and Ajax engines and compressors. EnDyn provides field-service, in-house overhaul and repair, machining, compressor packaging, remanufactured parts and has a lease compressor fleet. ■



■ Installation of three Superior 16SGT-MW66 packages during construction of Petrotech's gas plant near Talara, Peru.

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