Magellan Project

Location

At the southernmost tip of the Americas, in a land also known as "The End of the World," the Argentine state carried out a major engineering work, the installation of a natural gas pipeline called "Second Crossing of the Strait of Magellan ", in the framework of an expansion of the southern natural gas transportation system.

The Strait of Magellan is the most important natural passage between the Pacific and Atlantic Oceans, and is located between the Grand Island of Tierra del Fuego and the southern South American border. The Magellan Project was developed in this area, across the eastern mouth of the Strait of Magellan.

Background

Argentina is the largest natural gas producer in South America, but in the last 10 years proven natural gas reserves have decreased from 780,000 million cubic meters to 450,000 million cubic meters, in a country whose energy matrix depends on natural gas to cover 54% of its total energy consumption. As a result of such decrease of reserves Argentina has made an agreement with Bolivia to increase natural gas volumes delivered by that country to Argentina, and has built two re-gasification LNG plants located in the ports of Bahia Blanca and Escobar, respectively. As a result of these actions, Argentina has been able to increase natural gas deliveries to meet demand from Power Plants, industries, CNG for vehicles and domestic consumption. However, declining natural gas reserves and increasing demand conditions will continue to worsen unless necessary investments are actually made to carry out oil & gas exploration.

Argentina has four producing Oil & Gas Basins – Neuquina (the most important), Austral, Golfo San Jorge and North, but only Austral, an offshore basin opposite to the Island of Tierra del Fuego, has increased its production in recent years. Therefore, not surprisingly, the new expansion of the natural gas transportation system has been developed from the Island of Tierra de Fuego to Greater Buenos Aires, which is the main consumption area.

The work on the new expansion involved 1,100 km of 30" Nominal Pipe Size (NPS) and 36" Nominal Pipe Size (NPS) distributed in 58 sections of various lengths, which were installed parallel to the main pipeline from Tierra del Fuego to Buenos Aires, and fourteen additional compression units distributed in thirteen existing compression stations, which provided more than 200,000 additional horsepower to the transport System.

The whole project consisted of a new subsea pipeline to be laid across the Strait of Magellan, which included laying 37.7 km pipeline of 24" nominal size diameter pipe, which was carried out under adverse weather conditions in the Strait of Magellan. This pipeline has an 18 MM m3/day nominal capacity; the unused capacity being kept for future expansions.

This new expansion of the Southern Natural Gas System allows around 10.7 MM standard cubic meters per day to be additionally pumped from the Austral and Golfo San Jorge Basins, this amount being equivalent to 7.6% of total consumption in Argentina (140 MM m3/day). From the stage of engineering design onwards, the plan was to implement this expansion in 4 separate stages, by linking new loops and compression stations plant equipment to attain 7 MMm^3/day, 2.4 MMm^3/day and finally 1.3 $MMmm^3$/day partial increases in gas transmission capacity, to reach the committed 10.7 MMm^3/day.

The Strait of Magellan pipeline is a strategic project designed to revert the declining trend in Natural Gas production by increasing the capacity of the natural gas transport system from Tierra del Fuego to Buenos Aires and reducing the amount of natural gas to be imported from Bolivia and other international markets, in the latter case as LNG.

This 37.7 km gas pipeline was laid out under water in the Strait of Magellan, at a maximum 70 meter depth, in an area where weather conditions are the main obstacle for the development of this kind of pipe laying projects.

The undersea pipeline was laid out in two tranches, the first one from Cape Vírgenes, Province of Santa Cruz, to the Province of Tierra del Fuego, and the second one from the coast of Cape Espíritu Santo, Province of Tierra del Fuego, to the Province of Santa Cruz.

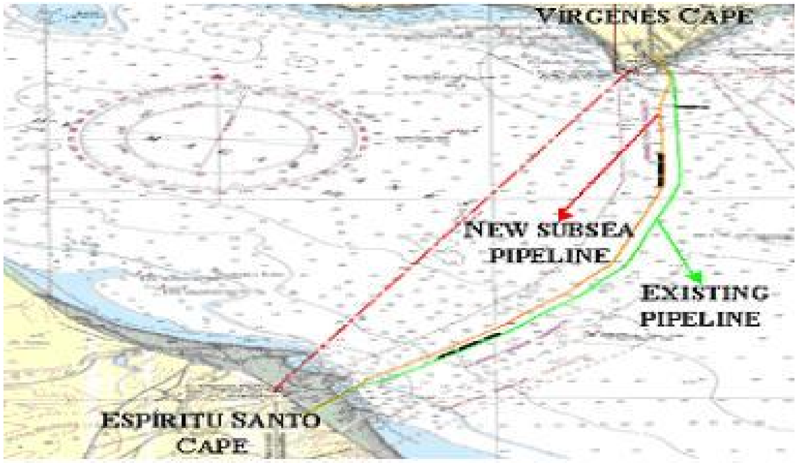
At this first stage the biggest pipe laying vessel in the world, with a 300 meter length, 386 crew members and a 22,000 ton capacity, was used.

Project Description

The project and its engineering design were developed from January 2009 to March 2010. The project involved the construction of a new, strategically important, 24" subsea pipeline across the Strait of Magellan, in Argentina, linking Espíritu Santo Cape (Grand Island of Tierra del Fuego) with Vírgenes Cape (Santa Cruz Province). The Magellan project was carried out in this area, across the eastern mouth of the Strait of Magellan.

The offshore portion of the project was awarded to two well-known Dutch subsea construction companies, while onshore facilities were built by an Argentinian company. The project, including pipes and their transportation from Rio de Janeiro (Brazil) to Punta Quilla Port (Argentina), had a total cost of US$ 328 million, and employed more than 900 workers from all over the world.

This new subsea pipeline runs parallel to the existing pipeline, which was built in 1978, at a distance of 50 meters to the west. The new pipeline will be able to transport a maximum of 18 million cubic meters of gas per day.



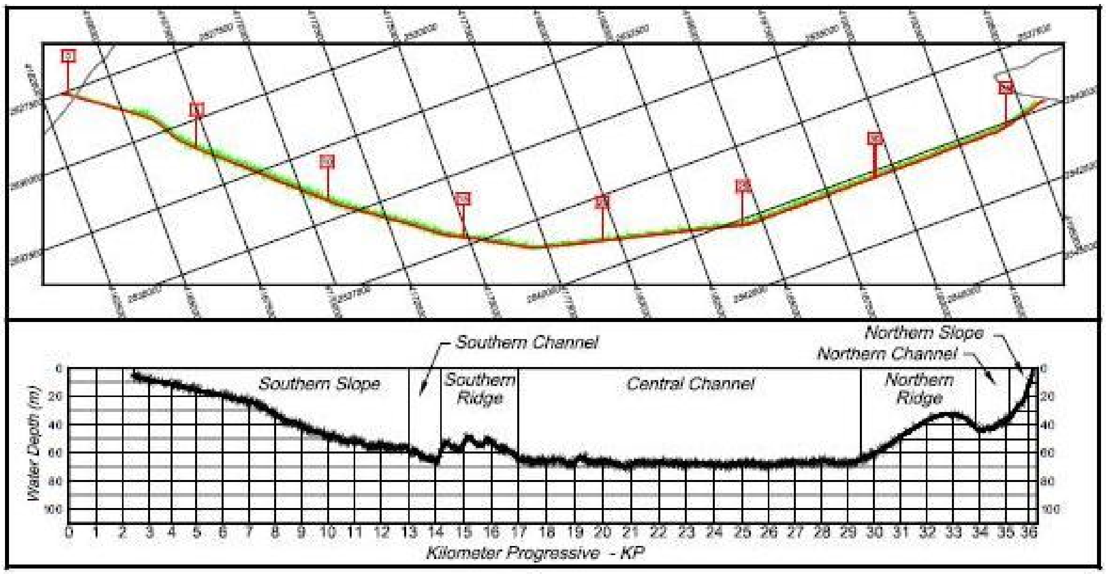
This multidisciplinary project was completed in eight months after the award of the contract. This was exceptionally fast, taking into account its remote location, the limited infrastructure existing in the region, the lack of local facilities, the complexity of the project and extremely hard weather conditions (e.g., waves over 30 feet high, wind speeds typically over 30 knots and sea currents exceeding 3 knots).

Project stages

Bid Process: This process took place from January 2009 to May 2009. During this period we visited a large number of offshore construction companies to present our project and invite them to take part in the bidding process and submit a proposal for the laying of this new offshore pipeline across the Strait of Magellan. Also, we distributed technical and commercial specifications among potential bidders and conducted different surveys that were developed to complete Basic Engineering as part of the information provided to these companies so that they would be able to prepare their technical and economic proposals. Consequently, we carried out the studies detailed below and furnished the results obtained to bidders early in March 2009.

- Analysis of bathymetric data
- Soil survey on both shores
- Speed of ocean currents
- Frequency and range of waves (rogue wave)
- Seabed profile
- Weather conditions at the site of the work
- Survey and identification of interferences present along the new undersea pipeline layout
- Analysis of pipeline stability, in particular on the Northern shore

Pipeline layout: The selected layout of the new gas pipeline was located 50 meters to the west of the existing pipeline, close to the Chilean border. In this regard, based on the knowledge we had gained from the construction of the existing pipeline and on soil type, shore approaches, the space available to enter the ducts on both shores and existing lines in the working area, the desired 50 meter distance between both pipelines was reduced to a minimum of 15 meters on Cape Espiritu Santo shore and 10 meters on Cape Vírgenes shore so as to avoid any interference with other Oil & Gas lines.



In this picture you can see the seabed profile along the selected layout where the pipeline was laid.

Receipt and Analysis of Tenders: The Bid process was completed on April 30th, 2009, when all prospective bidders submitted their technical and commercial proposals for their analysis and the election of the best option. We received 3 offers from Companies from the USA, Italy and The Netherlands. Finally, on May 25th the proposal of the Dutch companies was selected, because it included the best technical proposal and offered the best vessels, the shortest work schedule and the lowest price.

On June 25th we signed the contract for the submarine pipeline laying across the Strait of Magellan. This Contract was signed by the Customer and two Dutch Companies that are leaders in offshore works, such as dredging and pipe laying.

Pipe selection: A preliminary stage of the work involved pipe manufacturing in Brazil, where steel plates were bended and turned into 3,140 pipes of 12 meter length and 24" in diameter, as required by the project. Pipes were welded internally and externally, and then coated with polyethylene and an external concrete gunite lining, which ensures their positioning on the seabed and reduces their buoyancy.


Pipe Manufacturing


Internal and External Welding

The pipe selected was (24"), Nominal Pipe Size, with a 15.87 mm (5 / 8"), thickness, built under API 5L X65 standard. We bought 38,800 meters of pipes, including an additional (2%) amount to cover possible incidents during the work. The pipe was coated with three-layer extruded polyethylene and one of concrete, with two iron nets to obtain negative floating, seabed stability and mechanical protection of the pipe and coating.

The welding joint areas were coated with shrink sleeves and added special seawater resistant mastic up to the concrete thickness on the pipe was reached.

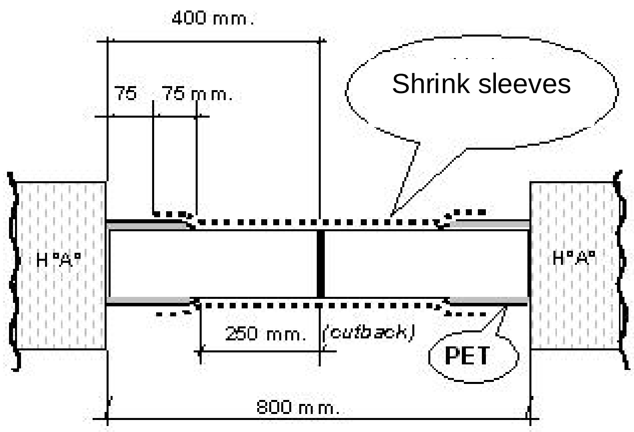
Table: Technical pipe specification

Pipeline		24-inch		
Section		A	B	C
Kp Start [km]		36.361	36	35.681
Kp Finish [km]		36.143	35	35.221
Length [km]		218	4	460
Water depth	Min [m]	18.8		
	Max [m]	27.0		
Outside diameter [mm]		609.6		
Wall thickness [mm]		15.9		
Steel grade [API-5L-X]		65		
SMYS [N/mm2]		448		
Anti-corrosion coating	Type [-]	3L-PE		
	Density [kg/m3]	1100		
	Thickness [mm]	3.5		
Concrete weight coating	Density [kg/m3]	3100		
	Thickness [mm]	70		137
Dry weight in air	Empty [n/m]	7116.6		12586.5
	Flooded [N/m]	9753.7		15223.6
Submerged weight	Empty [n/m]	2595.8		6322.6
	Flooded [N/m]	5232.9		8959.7
Joint weight	Dry [t]	6.5		11.1

Table: Concrete Thickness versus pipe installation depth

PK	Length	Concrete Thickness	Depth		Min. Burial Depth
Km	Km	Mm	Min	Max	m
0 – 0.172	0.172	0	Land	Land	1
0.172 – 1.533	1.361	61	High tide	Low tide	2
1.533 – 4.720	3.187	61	0	15	2
4.720 – 7.000	2.280	98	15	24	1
7.000 – 8.870	1.870	84	24	40	On seabed
8.870 –14.110	5.240	84	40	65	On seabed
14.110 – 16.690	2.580	84	48	60	On seabed
16.690 – 31.170	14.480	61	47	70	On seabed
31.170 – 35.260	4.090	84	33	47	1
35.260 – 35.480	0.220	98	27	33	1
35.480 . 35.750	0.270	118	22	27	2

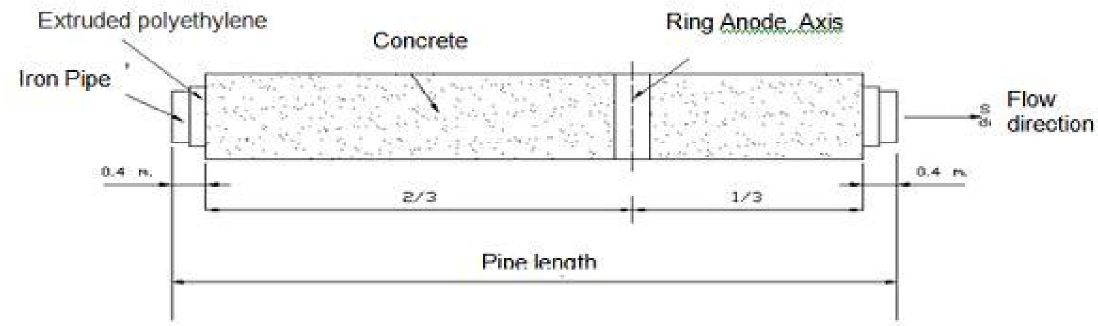
35.750 – 35.940	0.190	118	13	22	2
35.940 – 36.296	0.356	61	Land	13	2
36.296 – 36.402	O.106	61	High tide	Low tide	2
36.402 – 36.620	0.218	0	land	land	1



Welding area conditioning: We applied a cathodic protection system composed of half-ring shaped anodes. The anodes were connected to the pipes by a "thermoweld" process. The table below shows the number of anodes installed on the pipes.

Anode rings (Galvalum ii)	Size and weight					number	"surplus" installed in extra pipes	total (installed)
	concrete thickness (mm)	ring internal diameter (mm)	ring external diameter (mm)	weight(kg)	length (mm)			
Type "1"	61	625	747	150	440	29	2	31
Type "2"	61	625	747	180	526	157	4	161
Type "3"	84	625	793	180	370	157	4	161
Type "4"	98	625	821	180	311	27	2	29
Type "5"	98	625	821	250	432	2	1	3
Type "6"	118	625	861	250	349	5	1	6
Type "7"	163	625	951	250	238	3	1	4
Total anodes						380	15	395

Each group of anodes was installed on the pipes, located at a minimum of 1/3 from the end of each pipe, as shown in the following figure.



Pipe Storage: When pipe manufacturing was completed all the pipes (38,800 m) were transported by ship from Rio de Janeiro Port (Brazil) to Punta Quilla Port (Santa Cruz Province – Argentina) where pipe storage was concentrated, because this port was close to the working area. This was done early in 2009, before the bid process for the selection of the construction company that would take charge of the Magellan Project had been completed.

The pipes stored in Punta Quilla Port were then taken to the Province of Tierra del Fuego – partially by land transport – for which purpose, i.e. the transportation of the 550 pipes required at this stage, more than 200 trips were needed. This task took a month and was completed on November 9, 2009. These pipes were used to perform the pull-out (offshore pulling) operation.

The remaining pipeline was transported by sea from Punta Quilla Port to an area selected because of its depth, sea and weather conditions, as the ideal site to load the pipes from the Pipe Carrier Vessels onto the Pipe laying Vessel, while ensuring pipe integrity and the safety of employees.

Three trips were necessary to complete this task. In the first two trips a total of 22,000 meters of pipes were loaded onto the pipe laying vessel to perform the pull-in, or onshore pulling, operation and part of the subsequent pipe laying up to KP 15.00

The third and last supply trip was made by the Pipe laying Vessel to transport the remaining pipes that were required to complete laying at KP 6.50


Punta Quilla Port


Pipe Download Punta Quilla Port

Environment

Northern Shore: To avoid interfering with the local fauna and mitigate the impact on the ecosystem, the assistance of a professional team from the Provincial Agricultural Board of the Province of Santa Cruz was sought.

In order to prepare the land for the work, part of the 400,000 penguin reserve had to be removed until its completion. The joint work carried out by the rangers in this reserve and the engineers and technical employees in charge of the project ensured that the presence of men and machinery would not affect the normal life of penguins.


Emperor Penguin Colony


Local Fauna

Southern Shore: We had to cut the hillside of a cliff to gain ground in order to carry out pull out operations. All the removed material was deposited near the beach as a new barrier for the protection of an existing fresh water lagoon, to prevent a mix with salt water swells.

Hillside Removed


Protected Lagoon

Pre-trenching north and south shore approaches: On October 2009, before the largest pipe-laying vessel in the world had arrived at the workplace, three trench sections were dredged by Trailing Suction Hopper Dredgers (TSHD) with a combined 17 km length, and seabed actions were performed along the remaining 20 km to prevent spanning. At the tie-in location a 40 m x 45 m target box was dredged and leveled to allow full burial of the tie-in section. Close to the shores, ditches almost 2 meters deep were excavated to install the pipe, avoiding stress concentration points and giving the pipeline the necessary stability.

Trenching: Onshore trenching works included the removal of soil to create a trench at the required location, of a depth and width as required to install the pipeline. Onshore trenching was performed with dry earth moving equipment.

Onshore trenching works were required on both shore approaches of the pipeline. The onshore trench section started at the end point of the offshore trench section that had been dredged by the Trailing Suction Hopper Dredgers. The end point of the onshore trench is the shore tie-in point of the pipeline.
Prior to the start of onshore trenching works the existing pipeline was clearly marked.

Southern Landfall Site: At the Tierra del Fuego shore approach a trench approx. 1,500 meters long and 2 meters deep was excavated. The onshore trench started at the end point of the offshore trench, which had been dredged by a Trailing Suction Hopper Dredger (TSHD). The length of the onshore trench section depended on how far the TSHD was able to dredge the trench in the tidal zone of the shore. It was estimated that the TSHD was able to dredge the trench from KP 15.00, if wind, sea and weather conditions made it possible. Onshore trenching started from KP 15.00.

Northern Landfall Site: At the Santa Cruz shore approach a trench approx. 500 meters long and 2 meters deep was excavated. Similar to the Southern landfall site, the onshore trench started at the end point of the dredged trench. It was estimated that the Trailing Suction Hopper Dredgers were able to dredge the trench up to KP 36.400, if wind, sea and weather conditions made it possible. Onshore trenching started from Kp 36.400.


Southern Trenching


Northern Trenching

Pull-In: Before the pull-in operation could start, several activities were carried out on the landfall site and onboard the Pipe laying vessel.

Landfall site:

- Soil excavation and preparation of the trench.
- Installation of the anchor foundation for the pull-in winch and storage reel.
- Installation of the pull-in winch with storage reel.
- Pulling out 5-inch pull-in wire to waterline beach.
- Testing winch, cable and winch anchorage.
- Installation of 700 m 2½-inch messenger. The 2½-inch messenger wire has a pennant wire with surface buoy attached for easy recovery by Pipe laying vessel in case a direct transfer of the messenger wire from Tug to Pipe laying vessel was not possible.

Onboard pipe laying vessel

- Pipe loading was performed
- Contingency pig was inserted in pull-in head.
- Pull-in head was lined up in beadstall and firing line was filled up with 24-inch pipe.

Pipeline laying began with the operation designated as pull-in or onshore pulling. First, the pipe laying vessel, sitting opposite to the shore at Cape Vírgenes, welded pipes that were then pulled by a pulling winch of over 800 tons strength, located onshore.

This task demanded a continued dredge work to ensure that seabed trenches had the required depth so that the winch pulling wire wouldn't be affected by obstructions or obstacles typically present in sandy soil.

At dawn on November 15 the pull-in head arrived onshore, and this was marked as the first milestone achieved in this great challenge that we had assumed. The pull-in head had to be pulled on until reaching the pull-in operation starting point selected for the installation of the monolithic joint, at approximately 200 meters from the shore, alongside the main tranche of General San Martín Gas Pipeline. This is the point where undersea and land pipe laying operations are split up.

Performance of pull-in operations took a total of 58 hours of work, during which a total number of 87 pipes were welded and pulled onshore along a 1,044 meter distance.

After pull-in actions had been completed, laying operations from the vessel started.


Winch

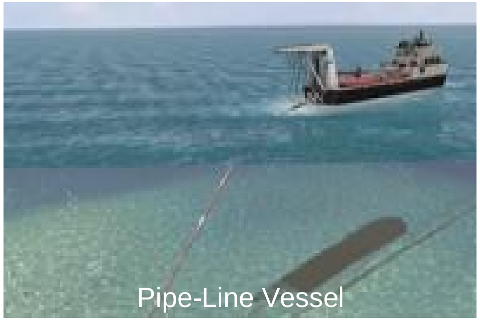

Arrival of Pulling Head

Pipe-laying: After pull-in operations were completed, the pipe laying vessel began its work in mid November 2009, and laid about 30 km of pipe from Cape Vírgenes toward Tierra del Fuego, where the pipeline was laid down at the tie-in area. All these tasks took 19 days, including one pipe load from pipe carriers to the pipe-laying vessel. The place selected for this activity was located near to Ushuaia port (the best sea and weather conditions around the working area).

The end of subsea pipe laying activities performed by the Pipe laying Vessel occurred upon the abandonment of the pipeline. Then, an abandonment and recovery (A&R) head was welded to the end of the pipeline. After the A&R wire was connected, the end of the pipeline was brought down until it rested on the seabed. Finally, a buoy was attached to the end of the A&R wire to mark the exact location of the abandonment point.

After the pipe laying vessel had replenished its pipe supply and been positioned over the abandonment point, the A&R head was recovered. Once the pipeline end had been placed on the "launching platform", the A&R head was removed and the pipeline end was taken to the welding station so that pipe laying could be continued until completion.

Fortunately, it was not necessary to abandon pipes during pipe laying on account of weather conditions. Works were interrupted for only one day due to weather conditions, and this occurred at the time a pipe recovery operation was being conducted on pipe that had been previously abandoned for vessel restocking purposes.



Pipe-Line Vessel

Pipe-Line Vessel

During pipelay operations on board the pipe laying vessel, the pipe was routed through the double joint factory and the main firing line as follows:

Double joint factory

- Single joints could be transferred to the double joint factory directly from a pipe supply vessel by means of a transverse and longitudinal conveyor system, or from the pipe storage holds to the double joint factory by means of gantry cranes and a longitudinal and transverse conveyor system.
- In the double joint factory the ends were beveled. One end was beveled to double joint welding requirements and the other end was beveled according to firing line welding requirements.
- Following pre-heating, the double joint welding was performed with the Phoenix automatic welding system.
- On completion of the double joint weld, the double joint was moved to the Non Destructive Testing (NDT) station for testing of the weld. After Quality Control (QC) approval of the weld, the double joint was transferred to the firing line ready rack by means of an elevator.

Main firing line: This line included 9 work stations, 4 welding stations, 1 Non Destructive Testing (NDT) station and 4 coating stations.

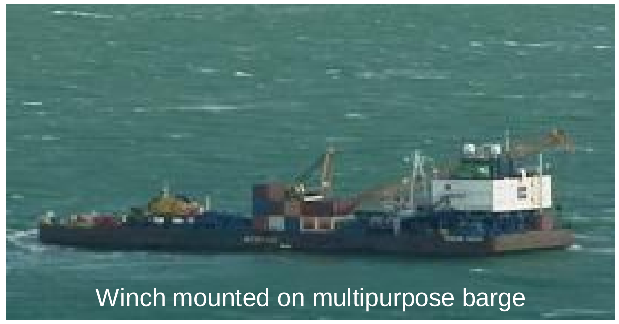
- In the main firing line ready rack the double joint was internally cleaned prior to welding, using pressurized air.
- The double joint ends were pre-heated by induction coils after which the double joint was transferred to the line-up station and welded to the pipe string.
- On completion of all welding activities and arrival in the Non Destructive Testing station the weld was tested, after which the firing line weld could be field joint coated.

Performance of all these tasks the main line took 6 minutes, after which 24 meter pipes were placed on the ocean floor.

Pull-Out: The operation designated as pull-out (offshore pulling) was carried out from Cape Espíritu Santo, on the coast of the Province of Tierra del Fuego.

To perform this operation, the same pulling winch that had been used for the pull-in operation was used. This winch had to be dismantled and transported by land to Punta Quilla Port, where it was loaded, assembled and mounted on the multipurpose barge that was used as base for this operation.

Winch is moved


Winch mounted on multipurpose barge

After the winch had been mounted and correctly positioned on the barge, the barge took a position facing the coast at Cape Espíritu Santo, in the Province of Tierra del Fuego, where this operation took place.

The pipelines were ready, parallel to the shore at Espiritu Santo, lined up in 12 columns of 46 pipes each that had been previously welded, coated and examined, making up a total of 6,624 meters as required for this stage of the work.


Pipe alignment and welding


Welded columns

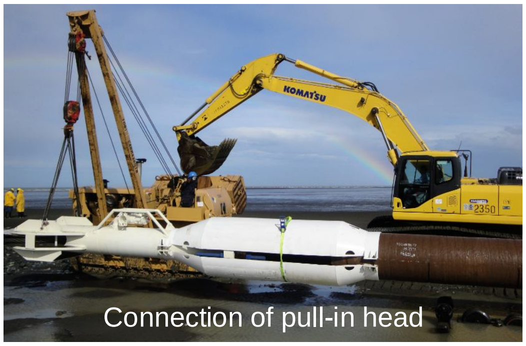
The pipes, which had been previously welded on shore, were pulled in from the multipurpose barge. The winch mounted on the barge smoothly moved the 550 meters of pipeline tranches from Cape Espíritu Santo shore toward the seabed. In order to extend the operating window and reduce pipeline friction on the ground, 40 rollers were installed along over 1 km of beach during high tide. In addition to, this made it possible to better protect the pipeline during the pull-in operation and reduce the force of the winch on the multipurpose barge.

Also, to protect pipes from corrosion and strong sea currents and to ensure their proper positioning on the seabed, pipes were coated with reinforced concrete by a procedure known as gunite lining, which increases 5 times the weight of each pipe. For this reason, to increase buoyancy, make the pull-in process easier and protect pipes from friction with the ocean floor, over 300 floaters were placed, which added around 1,500 tons of buoyancy to the pipeline.


Rollers are installed


Floaters are added

After the winch wire had been connected to the pull-in head, the pull-out process began. From this time on activity was constant 550 meter tranches of pipeline were welded and the welded joints were coated as the pull-out operation moved forward without interruption, 24 hours a day.



Connection of pull-in head


Welded columns are moved forward

During the pull-out process involving the second 550 meters tranche of pipeline, pipe pull-in from the barge stopped. The winch strength was not enough. Specialized engineers conducted various studies to determine possible causes and solutions. Finally, it was found that the loss of winch strength was due to an inadequate anchor positioning, which made anchors unable to hold steady on the seabed and keep the multipurpose barge stable. This produced a reaction force equivalent to the force exerted by the winch. Three days of hard work were required to revert this condition and solve the problem involved; subsequently, tasks were recommenced at the former pace of work.

Finally, this highly-valued objective was achieved and the southern tranche of the gas pipeline got near to the northern tranche. The end of southern tranche was 20 meter deep and at a 25 meter distance from the northern end.

The pull-out stage involved laying out a total of 552 pipes in a period of 14 days of work. This operation was completed on December 31, 2009.

Subsea tie-in (spool piece): The culminating stage in the construction of this undersea gas pipeline occurred when both pipeline (northern and southern) ends came together and became one pipeline.

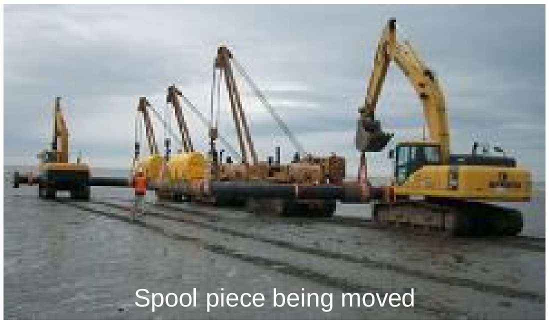
The junction was performed by placing a special, S-shaped piece called spool piece.

The installation of the spool piece demanded sixteen divers, who went down several times to determine the exact position of both pipeline ends. After several immersions the exact distance and angle of separation of both pipeline ends (northern and southern) could be determined. Thus the geometric configuration of both pipeline ends was established.

On the basis of the valuable information gathered, the shape of the spool piece was determined and the piece was designed. The piece was finally assembled and welded on the shore beach at Cape Espíritu Santo. Here, after the piece had been prefabricated and during low tide, two towing cranes were used to move it to the water's edge. The spool piece, fitted with floaters, awaited the return of high tide, which would make it easier for the multipurpose barge to get near and take the spool piece to tow it afloat up to the area where the pipeline ends to be connected were located.

The piece was placed between the two pipeline ends, on the floor of the Strait of Magellan, at a depth over 20 meters.

Under the water, the divers aligned the piece with both pipeline ends. Assisted by pneumatic tools, they placed the bolts and adjusted the mounting ring to seal them. Subsequently, they assembled the headless screws and nuts for the final adjustment of flange joints.



Spool piece being moved

Installation of spool piece

This connection procedure is one of the major differences with the Strait of Magellan crossing built in 1978 by the State Owned Company Gas del Estado, where both pipeline ends were connected by hyperbaric welding.

Alignment and Measurements: The diving team used a metrology jig of the taut wire type to measure the actual lay-down positions of the two pipelines to be connected. As a contingency option, a prefabricated measuring device was used to measure any misalignment. In the event any pipeline misalignment exceeded project specifications, the pipelines were to be shifted and aligned.

Hydro testing: The pipeline was hydrotested at holding 160 kg/cm2m (68% SMYS), purged, cleaned, dried and internally inspected by a smart pig.

After both pipeline ends had been laid down and prior to their connection through the spool piece, with the aid of a pump mounted on the multipurpose barge both pipelines were filled with seawater that had been previously treated with a corrosion inhibitor.

Then, prior to installing the spool piece, the filling heads at both ends had to be cut off. For better control, coloring bars were placed while adjusting the flanges of the connecting piece so as to promptly detect any leakages.

The spool piece having been installed, the pipeline filling was to be completed. For this purpose, fresh water stored in a tanker was used. Basically, the amount of water had to compensate for the increased pipe volume, water compressibility and the water volume lost when cutting off the filling heads and installing the heads required to perform the test.

After the hydraulic test was completed, pigs were brought to empty of water, dry and calibrate the pipeline. The pipeline was dried by injecting air from north to south. The dehydration machine was installed at Cape Vírgenes, Province of Santa Cruz.

The water used in the test was carried by a duct to a pool used as a buffer on the southern shore. After its composition was analyzed to ensure the absence of any possible impact on the ecosystem, this water was gradually released into the sea.

Backfilling of trenches: After a final survey the trenches and target box (tie-in area) were backfilled by a TSHD.

Trench backfilling involved burying the pipeline and restoring the onshore pipeline route to the near original situation. Both on the Northern and the Southern shore approaches the backfilling operation was started after completion of the pipe pull and Client approval.

The onshore sections of the pipeline will be backfilled to the original bottom surface level.

Backfill material: The sidecasted material previously excavated from the trench was used as backfill material.
At pipe sections not provided with a concrete coating, previously excavated soil was selected by removing any stones and other elements that could damage the anticorrosive coating. This selected material was used for backfilling until a minimum 10 centimeter level on top of the pipe.

Backfilling method: The trench was backfilled using excavators and bulldozers. A bulldozer shoved the sidecasted excavated material back in, or close to the trench. An excavator operating from the side of the trench spread and leveled the material, restoring the ground level to the near original situation.

A 1 meter stand-off distance to the pipe was maintained to ensure that the pipe wouldn't be damaged by the excavator bucket.

Conclusions

We are very proud to have been part of this Project, which was completed as planned without accidents, in compliance with all standing regulations and recommendations from the environmental impact assessment, on time and under budget.

The Magellan Project will make it possible, after it is put into service on March 15, 2010, to make use of the existing incremental natural gas production capacity offshore Tierra del Fuego, reduce natural gas imports from Bolivia and liquefied natural gas purchases from different world markets, and consequently to enhance Argentine competitiveness in the world, as a result of the incidence of Natural Gas in the Argentine energy matrix (54%).

The installation of the Second Magellan Gas Pipeline has undoubtedly been the most significant work carried out in the last 30 years in the natural gas industry in Argentina.

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