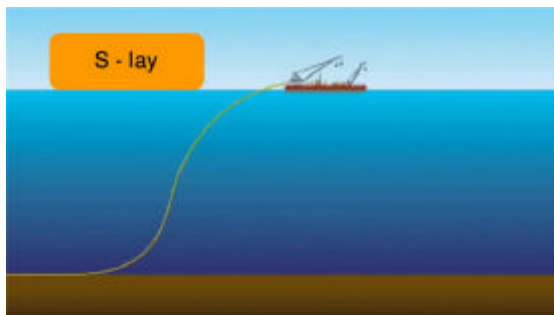


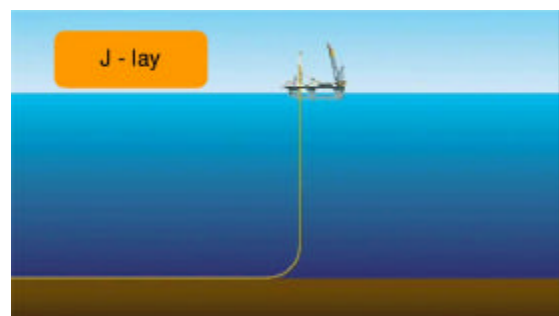
## CONSTRUCTION OF A SUBMARINE GAS PIPELINE

### Laying of offshore pipeline



Pipe lay Barge system will be used to build the offshore portion of the pipeline, which consists of a mobile platform or barge where the pipeline is welded before being laid on the seabed in a continuous fashion.

Two pipe lay methods are commonly used for this type of installation: the S-lay method and J-lay method. The S-lay method is suitable for use both in shallow and deepwater areas (up to 2500 meters water depth depending on pipe diameter) and involves welding the pipe sections horizontally, and continuously 'feeding' the jointed sections over the barge's pipelay stinger in such a way that the pipeline forms an "S" shape from the barge's exit point up to the touchdown point on the seafloor. In the J-lay method, the pipes are assembled and welded in a vertical mode in a tower erected on the centre or side of the barge and as the platform moves forward, the jointed pipeline is lowered near vertically in a J-shape from the launching point down to the bottom of the sea. J-lay method is considered to be suitable for 400 m. to 3500 m. water depth depending on pipeline diameter. As the search for hydrocarbons moves into ever deeper waters, technologists are developing new construction methods to meet the industry needs. MEDGAZ will be able to use either of the pipe lay methods for building the proposed gas pipeline in such ultra-deep waters. Below is a description of the "J-lay" process.



## Pipeline supply



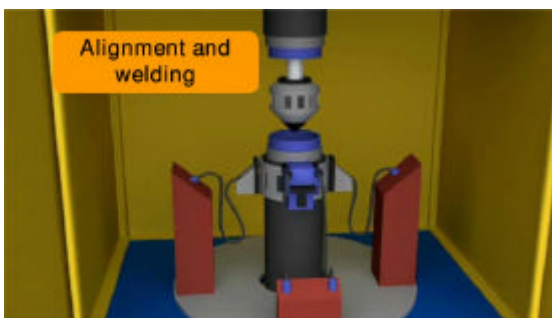
Each pipe section for Medgaz pipeline is normally **12 meters** long, with a **24-inch (610 mm)** diameter. For mechanical protection and corrosion resistance, these pipes are to be manufactured with a triple-layer coating: first layer consisting of epoxy resins, a second made out of adhesive material and a third made of polypropylene for anti-abrasion properties. For shallower water depth areas, a concrete coating will also be added to give increased protection from fishing gears.

## Transfer to the welding tower



The pipe sections are placed in the middle of the platform and using grippers and rollers raised up to the welding tower, where they are to be welded together at the girth joint using submerged arc welding equipment.

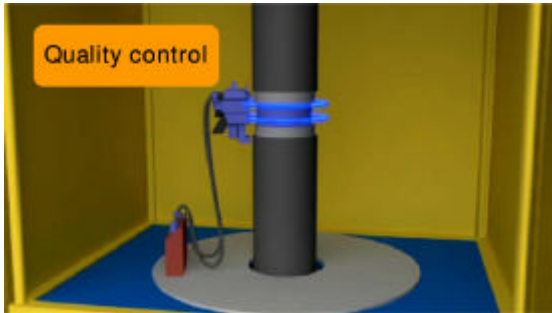
## Alignment and welding



The pipes are aligned in the tower and welded by automated welding machineries. In order to do so, the platform holds tight the part of the submerged pipeline being welded onto, while at the top, new pipe sections arrive that are then joined by welding and undergo the following quality control and finishing processes.

Afterwards, they are lowered into the sea in a controlled manner as the platform moves forward.

## Quality control



Each welded joint is individually tested by non destructive techniques (NDT) and verified by inspectors using advanced quality control techniques before being certified to be fit for subsequent finishing processes.

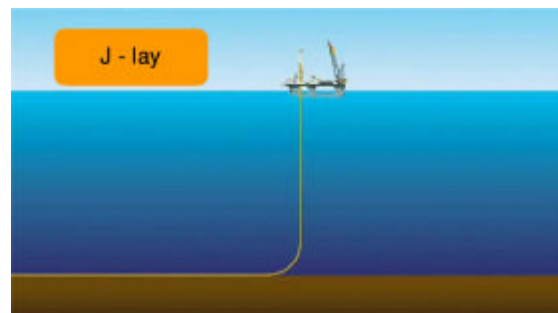
## Joint coating



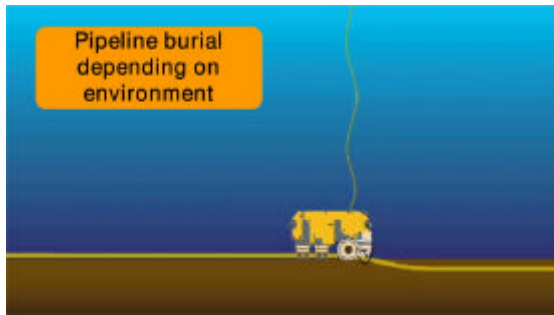
During this finishing procedure, the exposed welded joints are coated with two layers, one made of epoxy resin and the other of polypropylene to maintain continuity with the rest of the pipe.

## Laying of the pipeline

While the operations described above are taking place, the vessel slowly lays the pipeline on top of the seabed. The average velocity of construction is three kilometers per day.



## Pipeline burial depending on environment



Deep sea pipelines are normally laid on top of the seabed allowing it to embed in the seabed under its own weight, except in near-shore areas, where it is physically buried in order to minimize the effects of human activity and protect the pipeline from sea currents and storms. An automated robotic trenching machine lifts the laid pipe, digs the trench where the pipeline is to be lowered, and refills it with a layer of excavated soil/rock and sand after the pipeline burial.