Sub-Sea Hydro-Jet Rock Trenching System

The Miah Sub-Sea Hydrojet Rock Trenching System, is a high production trenching system and a dramatic improvement of present conventional methods of excavating rock in the ocean floor for purposes of burring pipelines, submarine electrical cables, fiber optic cables, etc. Present subsurface excavation methods in solid rock include dredging, ripping and blasting, which in many cases extensively disturb the biological environment in which they are utilized.

One major objective in developing The Miah Underwater Trenching System included reducing environmental damage while subsurface work is being accomplished and to be able to restore the ocean.
floor as closely as possible to its natural state. This system has established itself as a very efficient and effective method for trenching hard rock in a variety of seabed conditions.

The rock-trenching sled is comprised of a hydraulically driven cutter assembly mounted on a sturdy steel structured sled which is pulled along the ocean floor during operation by a barge on the surface. Power is supplied by a power unit mounted on the vessel through an umbilical supported by a sturdy steel extension structures to the trencher sled. The sled is equipped with an injector system that removes the overburden on
top of the solid rock strata enabling the sled to sit on the rock surface. The rock trencher excavates down into the rock from the rock surface. The Miah rock trencher is utilized in conjunction with a more conventional water injector unit that will clean the ditch prior to laying the pipe in a separate operation. Water currents will carry sediments into the trench to cover the pipe and keep it in place. The well-defined ditch configuration produced by the trencher will perfectly confine the pipe protecting it from drift, iceberg scouring, dragging anchors and fishing gear. The actual trenching activity will take place within the housing of the sled, which will confine the sediments keeping the surrounding environment from being disturbed.
In a separate operation an injector shoe with HP water is utilized for clearing trench debris. Hydrojet injector technology will fluidize debris within the confines of the trench removing material just prior to laying the cable or pipe. The injector shoe is supported from top side by the barge and lowered into the trench. HP water is supplied from pumps located on the barge. The injector and the barge follow the trench route.
Vertical Injector

Specifications:

- Water Depth: 40m
- Trench Depth: To 7.5 - 10m
- Product Bend Radius: 2m or custom
- Free Clearance: 190mm, 250mm & 275mm
- Seabed: Back Fill, Sand, Overburden, Clay, Mud

MIAH INC.
Manufacturer of Specialized Rock Trenching Systems
SPECIFICATIONS

WEIGHT 45.5 TONNES
WIDTH 3M
LENGTH 4M
HEIGHT 5M
TRENCH DEPTH 4M
TRENCH WIDTH .45M
* Other configurations available
OVERBURDEN 2.5M DEEP

MIAH INC.
MANUFACTURER OF SPECIALIZED ROCK TRENCHING SYSTEMS

HYDRO-JET
SUBSEA ROCK TRENCHER
Sub-Sea Rock Trenching History

In respect to proposing a subsea trenching methodology for consideration to the service protection for pipelines, it is important that the general background of subsea rock trenching is rightly considered.

It is recognized that this is largely a new subject within the Oil & Gas industry, and that a level of historical description with brief analysis may be very useful for the readership to reference.

Seabed rock trenching of any notoriety dates back only to the early 1980’s, where certain power transmission projects came to fruition, in which shore end landing locations could not easily be changed in order to avoid rocky seabeds. A 1984 Singapore Power Limited’s 230 Kv high voltage power cable linking Singapore and Malaysia and the SEA-ME-WEE-1 telephone cable linking Singapore and Indonesia were two of the original deep burial projects. These early projects were performed on a custom build and execute basis, and often provided exponential learning curves for most of the parties who became involved. The supporting wear technology hardware and trenching methodology for these activities grew markedly, even if sometimes the participating marine contractors did not.

The large change came with the international growth of the Telecom industry in the 1990’s and through to the present day. Projects became much more numerous, to the level where the operational challenges have become almost routine, and the quality and longevity of the trenching hardware is a chief success determining factor.

Singapore typifies this more than any other location, due to some unique parameters. Being the key telecom gateway for all Asia, having the worlds largest cable ship vessels routinely anchoring, having almost no flexibility in cable landing location, and having a seabed largely made of sandstone. Singapore has a mandatory 4m seabed burial depth requirement for all international services. To date more than twenty plus deep burial rock trenching operations have been performed there by major marine contractors exclusively using our, Miah Hydro-Jet Rock Subsea Trenchers along with our critical components and the record has been one of 100% service availability. There has been no instance of cable damage on any deep buried system in Singapore. But this has only been achieved at the cost of the specific development of a trenching system that works reliably in this particular situation and has a 30 year track record of success.

The telecom cable requirement has been satisfied with trenches that are usually 450mm
wide in rock, which is plenty for a cable. But no use of course for bigger flexibles such as pipelines. The oil & gas industry in comparison came to rely on dredging and rock dumping for the protection of pipelines in critical locations, really because seabed trenching was not seen as practical or possible for the sizes of trench that would be required.

Where rock could not be avoided post lay trenching has been tried, but has not worked well with pipeline damage a potential problem.

A few wide section marine trenchers have been built, but these have performed poorly in the field. This has been for a variety of factors, but chiefly over extension of original narrow trench cutter designs, too much power requirement for the wide cutter chain leading directly to too much machine weight and size, and also a weak understanding of the dynamics of machine operations in a shallow water environment. Poor wear component design and build has also been a factor.
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