## **Delta SubSea**

Laser Based Hydrate Remediation Technology



Subsea laser technologies are well known for measurements, scanning, and inspection.

Delta SubSea and ZerLux are partnering to explore the high potential of laser technology in innovative applications like Hydrate Remediation. The current feasibility of laser applications is driven by the evolution of fiber and diode laser efficiency, reliability, and a large drop in laser costs.

## **Benefits**

Compared with competing technologies for hydrate remediation lasers benefit from precise thermal management, compactness and efficiency. Subsea Laser applications offer distinct benefits:

- ▲ Higher efficiency as lasers heat pip surface directly
- ▲ It is completely carried by the ROV and operable up to 3,000m
- A Modular: same base modules, different applications for pipelines, flowlines, risers etc.
- ▲ Unique in the market





## **Hydrate Remdiation**

Laser Based Hydrate Remediation Technology consists of controlled and focused warming to create a relief path for pressure equalization and chemical flow across the length of the hydrate plug. Controlled pressure equalization is extremely important during Hydrate remedial operations. Controlled depressurization keeps the plug in place and prevents the hydrate plug from detachment and uncontrollable movement.

Similarly, by creating a path for chemical flow across the length of the hydrate plug, the ZerLux & Delta laser ROV application enhances dramatically the effectiveness of the hydrate remediation methods based on chemical inhibitors, allowing the media to attack the plug on both sides. The tool is comprised of a string of laser heads that apply localized and controlled thermal energy to the subsea structure. Depending on the application a long string can be composed of several laser heads, from a few units for short sections up to extended sections of pipeline. The string is mounted on a ROV deployable frame equipped with syntactic foam for buoyancy and thermal insulation. The tool clamps on the pipe with hydraulic cylinders, and is electro-hydraulically connected to the ROV. The tool is modular and can be adapted to pipelines, risers, joints and also BOP and trees. The tool will be part of the DSS Hydrate Remediation Kit. As further development, for very localized blockages, a portable system operated by the ROV arm that generates a laser beam can be used to controllably heat the infrastructure and melt the plug remotely.



## Hydrate Localization

Lasers offer the potential of localizing hydrate plugs. ZerLux has performed experiments and preliminary results seem to show that melting hydrates produce a characteristic noise signature like a sizzling sound. Delta is performing some tests offshore using the recorded noise and a hydrophone mounted on the ROV trying to assess the detectability of this noise for quick and controlled remediation by a laser-equipped ROV.



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