SMD’s mining business stream is committed to developing solutions for the submerged mining industry. As the world’s leading subsea trenching equipment supplier SMD can provide unrivalled engineering experience to an emerging industry, having already designed, manufactured and tested submerged mining technology. SMD’s mining business stream has the capability to supply remotely controlled mining equipment, associated deck or minesite launch and recovery systems (LARS), and control systems for offshore and onshore submerged mineral extraction.

SUBSEA RESOURCES

It is well known that approximately 70% of the earth is covered by oceans. Consequently 70% of the earth’s minerals can be found in the oceans. On average, subsea ore grades are much higher as the vast resources are untapped and have not necessarily been subjected to weathering or erosion. At shallow depths and in calm water environments, the subsea mining industry has already emerged. Tin, ilmenite and magnetite mining has been undertaken for many years. Recent developments have added alluvial diamonds and gold to the list albeit on a relatively small scale. The dredging industry has developed methods using simple suction devices for soft sediments, cutter-suction dredgers for weaker rocks, and has mined towards depths of 300m from ocean-going vessels.

Improvements in riser technology from the oil & gas industry and advances in cutting technology from the mining industry have now paved the way for the targeting of deeper reserves. Exploration and prototype testing has now taken place for both Polymetallic Nodule and Seafloor Massive Sulphide (SMS) deposits in much deeper water. Strong and competent rocks under high hyperbaric pressure are not accessible using standard dredging techniques and need the world’s best heavy duty cutting technology to achieve sustainable production rates and efficient cutting which minimises pick-wear. With proven experience in the design and manufacture of successful subsea trenching equipment, the expansion to subsea mining activities is safely underpinned. SMD has already employed heavy duty cutting equipment in design and construction of mining equipment for SMS deposits to a depth of 2500m and has close ties with the major manufacturers of leading edge land-based cutting equipment, having marinised the technology successfully already for subsea use. SMD is also a world leader in the design of remotely operated subsea power and control systems as well as a designer and manufacturer of LARS for subsea equipment.
INLAND DEPOSITS

In addition to vast untapped subsea resources (diamonds, sulphides, phosphates, cap-rocks, poly-metallic nodules, mineral rich rare earths and tin, ilmenite, magnetite sands), SMD’s submerged mining technology is suitable for inland use. Most open pit mines that have reached their economical depth are left to flood. In some cases high-wall mining or underground block caving with vertical ore-bodies follows. The technology SMD offer poses a compelling question: If the stripping ratio has become a limitation, or the costs of setting up an underground mine are prohibitive and the rock is cuttable at productive rates – why not continue extraction of the orebody using submerged mining machines?

POTENTIAL ADVANTAGES

SMD’s submerged mining technology vs subsea and/or conventional open pit and underground mining:

- Environmental licence and mining permit already in place, only slight modifications required
- Transportation, power and communication infrastructure already in place
- Mineral processing facilities already in place
- Expensive tunnelling, trunk roads and other underground systems not required
- Steeper pit slopes available due to flooding of the pit – ultra low low stripping ratio
- No people in danger in the pit
- Massive reduction in hydrological and mine water management costs
- Compared to subsea mining, more basic pit-wall LARS can be employed (no heave compensation required)
- Inexpensive, relatively dumb barge required as opposed to expensive sea-going vessel
- Avoidance of heavy fuel oil use for vessel power

Conventional mining requires high dewatering and treatment costs

Mineralised Zone

Overburden

Economic boundary for conventional opencast mining

Steeper side walls and ultra-low stripping ratio possible with submerged mining

Conventional mining requires removal of large waste volumes

Remaining ore body accessible by submerged mining methods. Material is pumped to surface as slurry

Water Table

0 200m 400m
SMD MINING CAPABILITY

SMD’s mining business stream offers design and fabrication of bespoke remotely controlled submerged extraction machines on a stand-alone basis or as an unrivalled total solution in partnership with Damen Dredging.

SMD also offers training (including simulation), maintenance planning and comprehensive spares and aftersales support from worldwide facilities. Training modules can be tailored to suit individual customer requirements, and can take place at SMD’s world class facilities or at customer specified sites as required.

SMD can offer the right mix of mining, geotechnical, rock mechanics, subsea engineering, environmental, quality and integration skills and experience to provide expert advice, consultancy services and produce bankable feasibility studies. SMD is committed to providing submerged solutions and systems that enable submerged mining to be achieved in an environmentally acceptable, sustainable and economically viable manner.
SMD’s world-leading subsea vehicle design and manufacture status was recognised with the award of the contract to design and build the first deep-sea mining tools by Nautilus Minerals at the end of 2007, with three vehicles designed to operate in depths of up to 2,500m on SMS deposits. The contract included three subsea mining machines with weights up to 310t, vessel-based power and control systems, pilot consoles, umbilical systems and launch and recovery systems (LARS).

Following on from the work on the Nautilus Project, SMD has worked on a range of special projects for a variety of clients. These include:

- submerged volcanogenic gold,
- alluvial tin, and
- deep-sea polymetallic nodules

SMD is also an active participant in the development of regulatory frameworks and research into sustainable management of the EU’s subsea resources.
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