Hydro-Lek's deep ocean sampling and observation system used in discovery of worl

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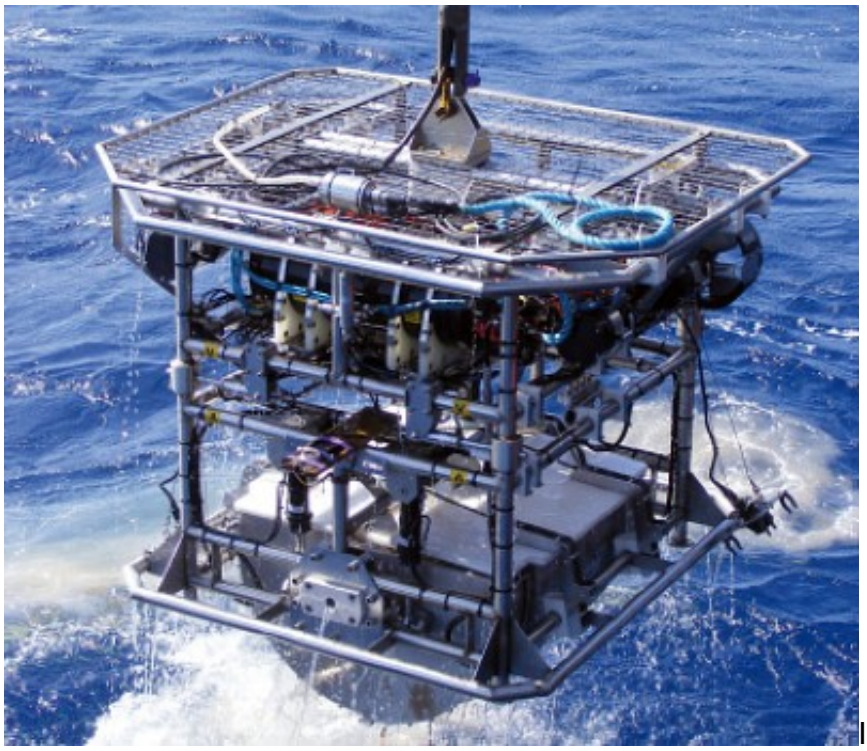
Berkshire-based remote handling specialists, Hydro-Lek Ltd, have partnered with National Oceanography Centre in Southampton to develop HyBIS, the deep ocean sampling/observation system. HyBIS was deployed this month by a British scientific expedition to discover and film for the first time the world's deepest undersea volcanic vents located 5000m (3.1 miles) down in the Cayman Trough in the Caribbean.

HyBIS, a mnemonic for Hydraulic Benthic Interactive Sampler, enables seabed sampling at extreme depths and conditions together with video instrumentation observation. Highly robust, flexible and inexpensive, HyBIS is designed to operate in conjunction with existing deck handling and cable systems used on extended towed sonar arrays, thereby eliminating the need for additional and costly ROV deck handling equipment. It also enables sonar surveys to be followed up with localised observation and sampling during the same voyage.

HyBIS measures 1.5m x 1.4m x 1.8m high and comprises two subsea modules: an upper module which houses hydraulic and electric power modules with thrusters, release mechanism, video and lighting, and fibre-optic telemetry for instruments and sensors; and a lower module which houses a detachable sampling grab, automatic closing covers and hydraulic drive cylinders. Hydro-Lek has used corrosion resistant materials throughout the manufacture of HyBIS and it is designed to withstand the high pressures and harsh environment found at depth. Indeed, the pressure 3 miles deep at the bottom of the Trough is 500 times the normal atmospheric pressure – this is equivalent to the weight of a large family car pushing down on every square inch of the seabed. Electrically-driven thrusters enable the vehicle to be manoeuvred above the seabed under its own power.

Simple effective hydraulic and electric power module

 In operation, the HyBIS acts as an ROV which is controlled at depth via the umbilical winch. All other functions are self-generated using the on-board electrical services. The system is operated from maximum 7Kw 220-240V single phase power source at the surface via the umbilical cable. All 3 phase power and control voltages for lighting and instrumentation are contained in 6000 metre rated pods. The control of HyBIS from the surface is via a hand held control box. This contains the command telemetry for remote operation of all hydraulic and electrical functions including remote switching for power to lights, cameras, and other demands for ancillary equipment. This is transmitted through an RS 232 link via the optical fibre to the subsea instrumentation pod. This then controls a range of driver and relay boards to control all subsea systems. The system comprises two 3 phase power packs and two 4-way valve packs which provide power for all hydraulic functions. The HyBIS has two reversible thrusters, one fitted each side of the vehicle which allows manoeuvrability about the umbilical. Each thruster can produce 40 kg of thrust from the 1.5 Kw motors. This allows HyBIS to manoeuvre around a radius of one hundred metres from the surface ship and survey the sea floor at a speed of 0.5kts.

Highly flexible robust instrumentation

The sampling module on the lower section of the HyBIS comprises a 900 x 800 mm clam-shell grab capable of picking up to 0.3 cu metres of soft sediment, shingle and loose material which can be hydraulically ejected remotely in an emergency. The HyBIS is also fitted with one camera and two lights working horizontally for steering and observation, and one camera fitted vertically for observation during descent and monitoring of grab contents during ascent. This is supplemented by three additional vertical lights. For its deep-vent mission, HyBIS also carries a dedicated HD video and stills camera, with real-time video feeds to the surface.

"Our close collaboration with Hydro-Lek in the development of HyBIS ensured the successful

transition from concept to an efficient working system," said Dr Bramley Murton, Scientist at the NOC, who piloted the HyBIS around the world's deepest volcanic vents for the first time.

Multi-purpose system

HyBIS allows alternative subsea equipment such as manipulators, core samplers, seismic instruments and data logging devices to be fitted efficiently and economically. In addition to its primary function of sampling and observation, HyBIS has succeeded in recovering a valuable scientific 'lander' where the acoustic release had failed, leaving it marooned deep on the seabed. The potential for HyBIS to recover similar lost equipment in the ocean is far-reaching.

Hydro-Lek is currently developing concepts for tracked subsea crawlers which will enable precise, closer inspection of material in localised deep ocean areas.