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News For The Ocean Industry

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SubAtlantic's APACHE ROV

Chosen By SubServ Ltd. For
ROV Pilot & Technician Training



Riser VIV Test Program
Datasonics Sonar For AUVs
ROV Competence Assurance
The Florida Keys

Special Feature
ROV Tools
&
Work Systems

ROV

Tools & Work Systems

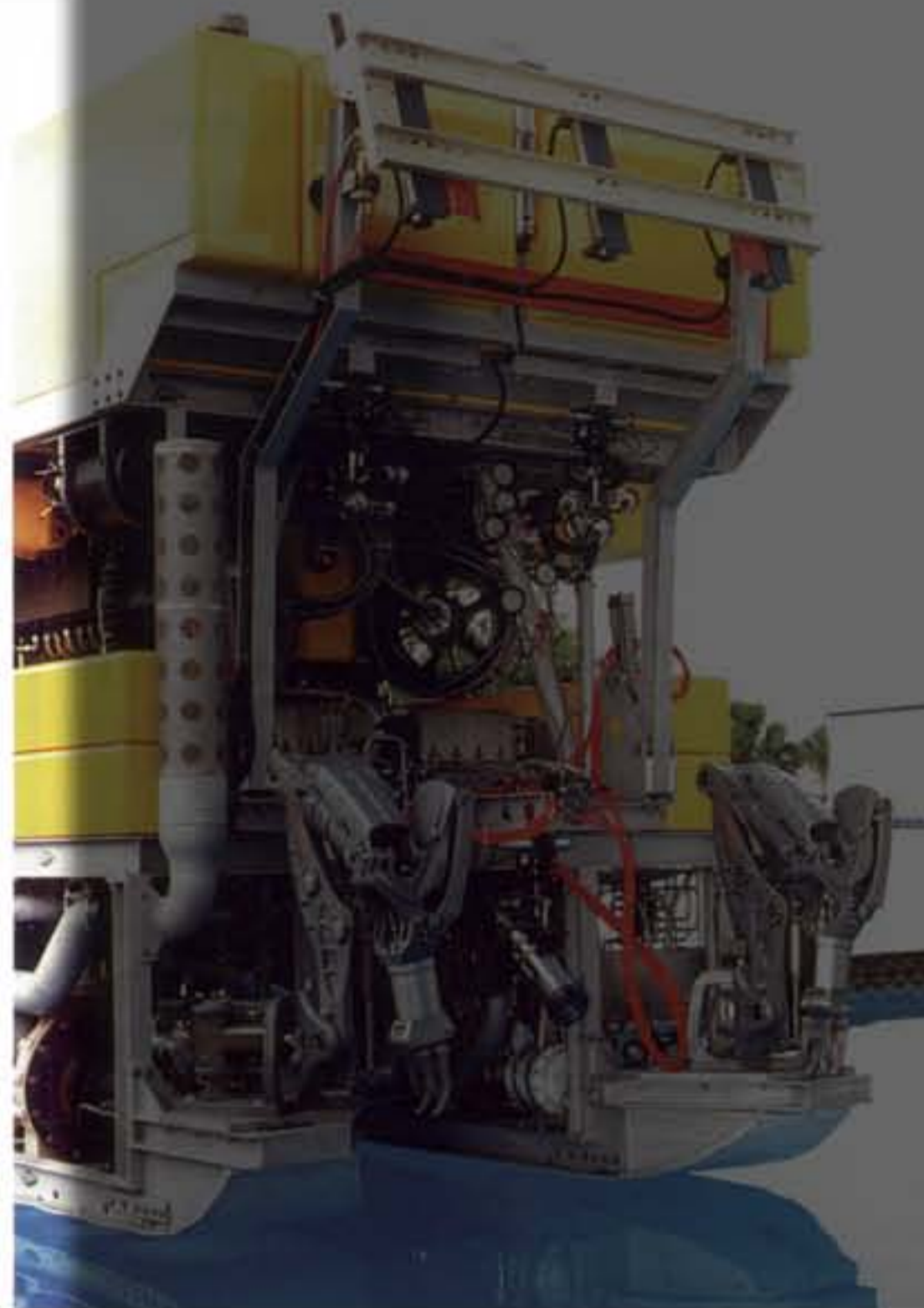
Manipulators

Not much time will be spent with manipulators as most readers are familiar with the commercially available systems of today. Manipulators or "arms" are an essential part of any work ROV. The technology has improved so much that these arms have become both powerful and reliable. Normally, two systems are installed, most commonly, on the front of the vehicle making it the "business end" where work gets done. Manipulators are normally classified as "rate" arms, "spatially correspondent (SC)" arms or "force feedback" arms. These arms normally range from 5-function to 7 function for use on work class ROVs. The primary manufacturers of these heavy work manipulators are Kraft Telerobotics, International Submarine Engineering (ISE), Schilling Robotics and Slingsby Engineering Ltd. (SEL).



Kraft 7-function Raptor SC arm and ISE 7-function Magnum arm on a 10,000 ft. Perry Triton ST

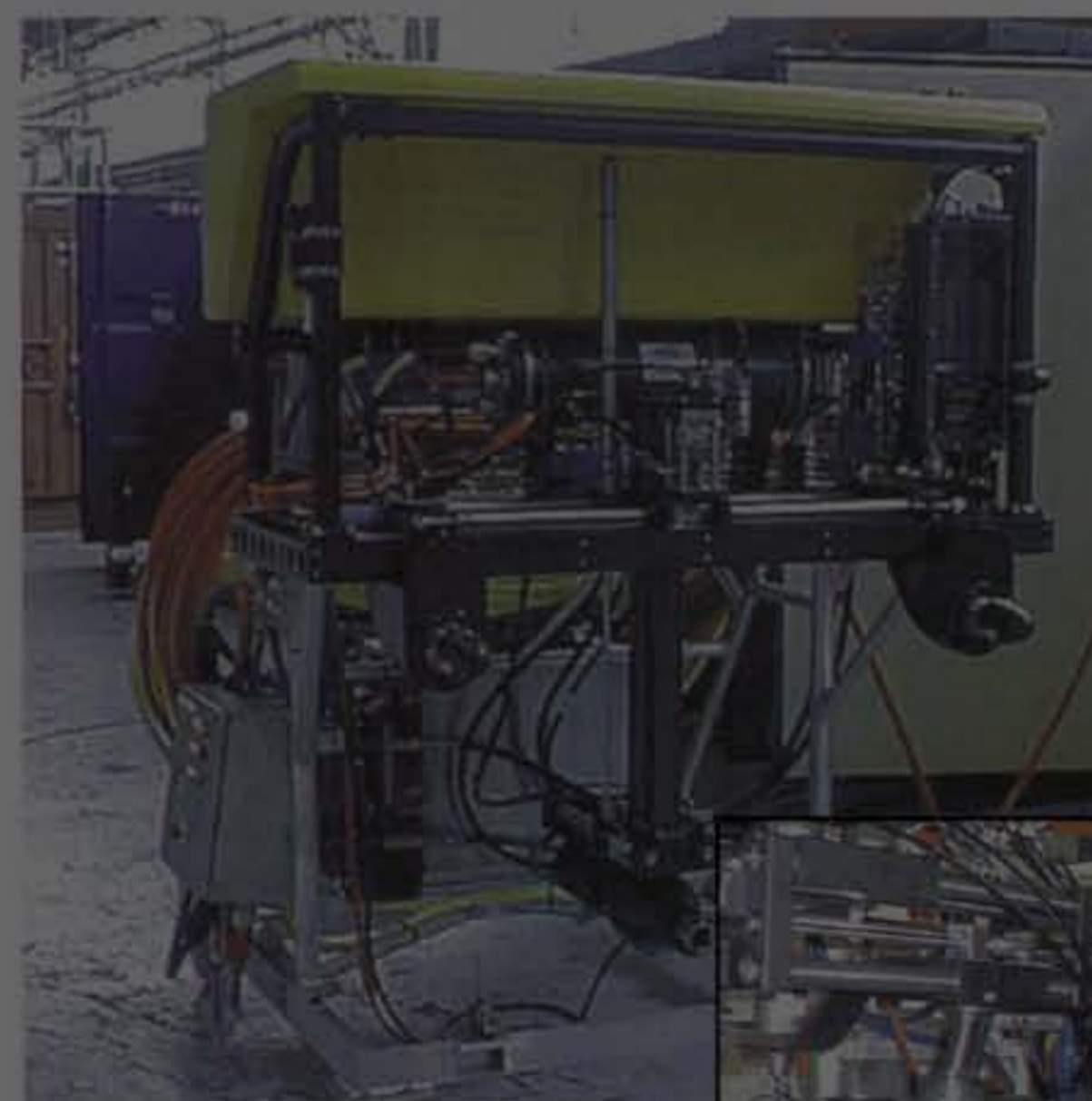
In today's subsea work environment, spatially correspondent arms are required to perform delicate and complex tasks. The rate arm is usually referred to as a "grabber", used to either attach or hold the vehicle to something or to hold the piece or object the vehicle intends to work on. In some cases, additional manipulators are added to the vehicle to hold suction cups for attaching the vehicle to complex nodes on platforms for cleaning and inspection tasks.



Schilling Conan manipulators on a Perry Triton XL

ROV Tools

Volumes of books could be written on the tools that have been adapted or purpose-built for ROV use over the past 20 years. Any tool that could be submerged has probably been put in the gripper of a manipulator in order to accomplish a needed task. It was not uncommon to see diver hand-held tools, such as grinders, brushes, cutters and even chainsaws adapted for use by ROVs. Today these tasks have become



more complex. However, the capability of the ROV and the interfaces that exist on modern ROVs have made the job of integrating tools much easier.

Subsea Offshore Ltd. has chosen to use a Tool Deployment System (TDS) which attaches to the ROV and enables purpose-built tools to be operated in a very precise manner. Not really a manipulator and not really a work package, this 1,000 meter-rated system also allows the vehicle to perform work at higher force and torque than could be possible with a manipulator. Using docking probes, rather than attaching with a grabber or suction pad, the ROV is attached in a known position and stabilized and can then precisely deploy a tool via an XYZ mechanism. The TDU is a neutrally buoyant self-contained device with a dedicated control system. Interface to the ROV is through mounting brackets, two hydraulic lines and one electrical cable. Tools it carries are custom-

built for operating functions on subsea installations. Typical tools used with the TDU are Connector Make Up Tools, Hydraulic Hot Stabs, Valve Position Indicators and Torque Tools.

Torque tools are used for remote operation of subsea production mechanisms that require bi-directional rotary motion, such as valve overrides screw clamp drives and umbilical connectors. Slingsby Engineering Ltd. manufactures

a range of tools with feedback options to measure applied torque, maximum torque setting, turns completed and angular position. All of Slingsby's tools feature a hydraulic motor and torque multiplier with all drive components enclosed in oil compensated housings.



Subsea Offshore's TDU and Connector Make-up Tool

An international standard, ISO TC67/SC4 *Design & Operation of Subsea Production Systems, Part 8-Design & Operation of ROV Interfaces on Subsea Production Systems*, is currently being developed that will enable the

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