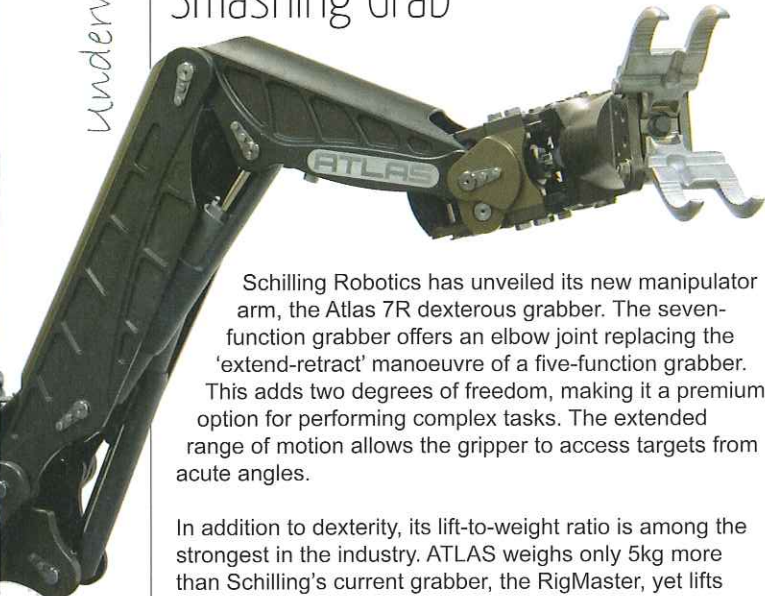


UNDERWATER Vehicles

Smashing Grab

The dextrous grabber



Schilling Robotics has unveiled its new manipulator arm, the Atlas 7R dextrous grabber. The seven-function grabber offers an elbow joint replacing the 'extend-retract' manoeuvre of a five-function grabber. This adds two degrees of freedom, making it a premium option for performing complex tasks. The extended range of motion allows the gripper to access targets from acute angles.

In addition to dexterity, its lift-to-weight ratio is among the strongest in the industry. ATLAS weighs only 5kg more than Schilling's current grabber, the RigMaster, yet lifts

250kg of weight at its full extension of 65in compared to 54in for the RigMaster. The additional joints allow it to withstand extreme loads through an overpressure protection feature in the valve manifold allowing the joints to absorb forces in two additional planes.

The grabber has been undergoing field trials since December, which have proven that Schilling's attention to kinematics, finite element analysis and reliability are paying dividends in customer productivity.

"The enhancements to customer productivity are proven in extremely heavy-lift work encountered during anchor handling operations," said Tim Ranstrom, manipulator product manager for Schilling Robotics.

"The Atlas is also optimised for construction work such as manipulating saws and grinders, and to position the tools accurately and repeatedly. Its dexterity makes it very effective at rigging operations, where it's slender profile allows unobstructed views of the tooling."

Digital digits

Buoyed with the successful launch of its all-electric manipulator arm, CSIP is making a number of design modifications in response to the requirements of specific clients. These include different gearing ratios and force feedback.

"We had planned to introduce the basic arm to our potential clients and then find out how to best to tailor it to their needs while the design was still at a fluid stage, rather than to bring out a final design and make subsequent changes," said Simon Gilligan, Managing Director at CSIP.

Almost all manipulators are currently hydraulic. These require a pump and valve pack to be hosted on the ROV to provide power for the arms. By removing these items in the all-electric system, it decreases the weight of the vehicle while removing the possibility of hydraulic fluid leaking out in the case of an accident.

The principal advantage of electric arms is that they are considerably more controllable, and this is what has appealed to users such as those in subsea archaeology, oceanography offshore operations and defence fields. The digital positioning of the

actuators can achieve an accuracy of typically around 0.5mm in stroke position. The computer control electronics know where the arm is at all times, and its exact position can be displayed in three dimensions on screen.

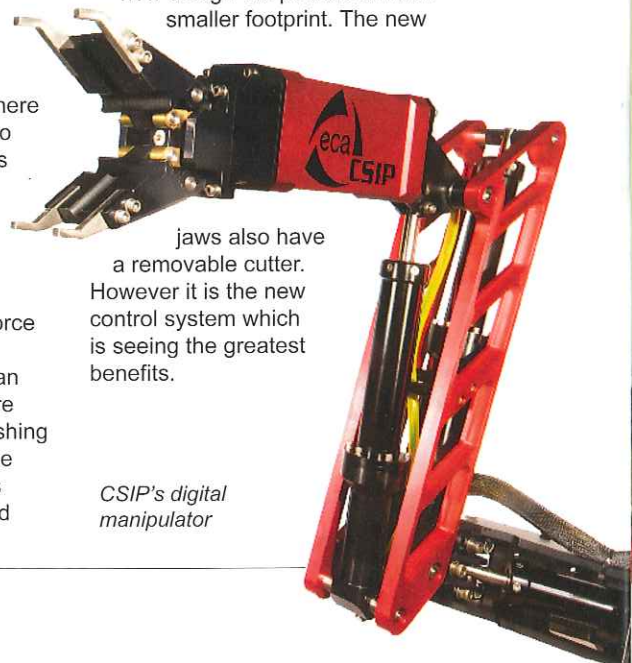
Being digital, it is possible to programme the arm to carry out a specific task or select a task from a function register in the control software. The arm will then automatically perform that operation. It also has a learning capacity.

Since the control system knows where the arm is, it is possible to have two arms working together and enables greater accuracy. The computer can also set a zone of exclusion to prevent one arm from hitting the other.

"We are currently fine-tuning our force feedback mechanism built into the jaws," said Simon Gilligan. "This can measure any resistance to pressure and prevent over-gripping and crushing the object to be moved. It should be possible to pick up fragile artefacts by imparting minimal and controlled pressure on the jaws."

"We have also changed the gearing in response to client comments. The original arm was very quick but at a cost of sacrificing power. The latest iteration is slower but can pick up a weight of 65kg in water, although in practice, we wouldn't really want to approach this limit as it could exceed the lifting capacity of the entire ROV."

CSIP's designers have also modified the way the arms are stored on the ROV while it is travelling to site. The new design will provide a much smaller footprint. The new



jaws also have a removable cutter. However it is the new control system which is seeing the greatest benefits.

CSIP's digital manipulator