DITEN
Department of Electrical, Electronic, Telecommunications Engineering and Naval Architecture
Polytechnic School, University of Genoa

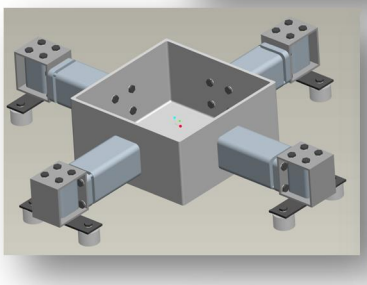
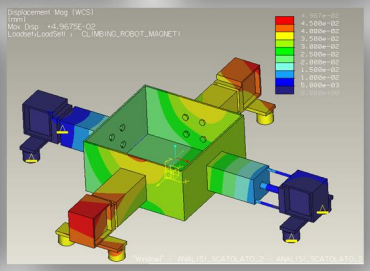
Laboratory of Drives and Experimental Automation for Marine Systems

Prof. Enrico Ravina ,
DITEN, Polytechnic School, University of Genoa (Italy)
Phone: 0039-010-3532848; E-mail: enrico.ravina@unige.it

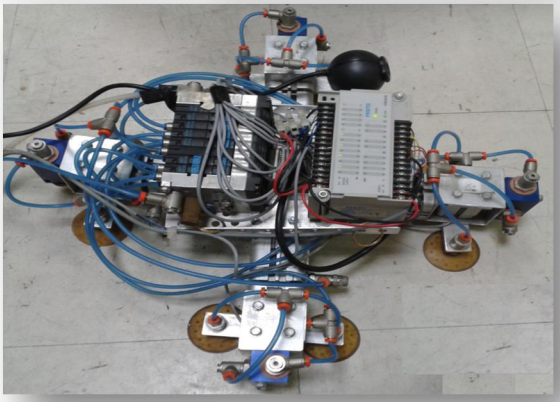
Marine Advanced Testing & Sea Trials

LOW COST SELF MOVING UNIT FOR MARINE INSPECTION TASKS

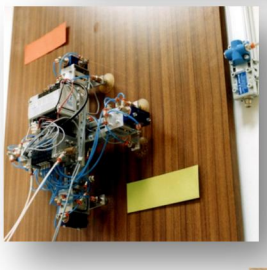
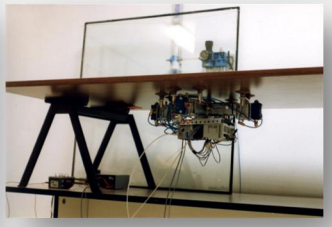
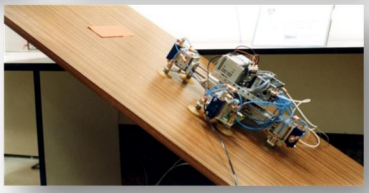


The prototype is designed to support marine surveys , traditionally performed with human operator .
The peculiar characteristics of this unit are mainly low cost, simplicity of construction , reliability , lightness and modularity . The system essentially consists of four self-propelled pneumatic actuators, cross-arranged. At the ends four short-stroke pneumatic cylinders are able to cyclically move coupling devices to the wall or to the surface to be inspected. Connections with pneumatic suction cups (as shown) or with electro- magnets are foreseen.



The unit integrates on board a programmable logic controller that automatically manages all the operations of the command, including the actuation of the miniaturized valves group and ejectors governing the control of the suction cups .
The system is able of programmable autonomous movements in hostile environments , potentially dangerous or otherwise critical for human operator . Motion on inclined and vertical walls in various geometries is performed: it is also possible to operate in "top -down" configuration .
The possible applications concern the inspection within bulks by means video web or thermo cameras , the handling of sensors detecting wall thickness, the handling and actuation of small hand tools for scraping and brushing operations . Typical application concerns the Ultrasonic Thickness Measurement (UTM), with automation of the measurement procedure and automatic storage of acquisition points .
The energy needs are limited to 24 V DC power supply and to compressed air supply with pressure up to 8 bar.

The module performs self-propelled fully programmable handling steps in two orthogonal directions . In the current prototype release the single step is 100 mm and the average speed of the drive (considering dwells between actions) is 0.05 m/s.
Taking into account the priorities in ship industry a direct remote control rather than a pre-programmed path and much more speed can be provided. In addition further versions oriented to the inspection on corrugated bulkhead and able to step over structures can implemented.