MUI,TII'(JNCTION AUTOMATER CRAWI,ER - INSPFC1'1ON MODUI,E (MAC-1M) -- ADAPTATION OF SPACE TECHNOI,OGY TO AIRCRAFT NDE

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ABSTRACT

The down side of wide spread usc of composite materials as structural members of aircraft is that prime aircraft structures require on-aircraft inspection and cannot economical l y be removed from the aircraft and bc taken to a facility for inspection. Detection of defects in composite materials differs from detection of defects in standard metallic aircraft materials and the inspections arc very labor intensive. This limitations of NDE created a need for a portable, user friendly system that can rapidly scan large areas of complex contoured composite structures and locate al l the detrimental material conditions. To address this need, JP1, took recent] y an initiative to adapt its space technology to this critical area, which requires multi-disciplinary approach that implements" Telerobotics, NDE, neural networks, advanced materials science, imbedded computing and automated control. Such technology that is used in projects such as the Mars Rover were integrated into the Multi-function Automated Crawler (MAC). MAC was designed to scan an aircraft structure while staying attached to its surface using suction caps and it serves as a carrier for any desired need. The required functionality is implemented in modules. These modules can bc configured to handle such tasks as NDE inspection, paint removal and others. The crawler has an on-board computer, video imaging capability and its inspection module can hosts a variety of miniature NDE instruments, including eddy current imager, ultrasonics, tap-taster, visual inspector and many others.