Abstract

**Robotic Non Destructive Testing Of Safety Critical Structures**

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Reliable Non Destructive Testing (NDT) is vital to the integrity and performance management of capital assets in safety critical industries such as aerospace, transportation, pipelines, petro-chemical processing, and power generation [[[1]](#footnote-1)]. The structures that are to be inspected are usually very large and located in remote and hazardous environments. The NDT system has to be deployed by first providing very expensive access, requiring the erection of scaffolding and lengthy preparation before NDT can start. In addition the system must be capable of finding and characterizing component and structural defects to a high probability of detection thereby decreasing the probability of failure. Another priority is to reduce outage time as the cost of loss of production runs into millions.

This presentation describes recent developments in mobile wall climbing, swimming and pipe crawling robots that provide the means to perform NDT on difficult to access structures and provide the possibility of carrying out the NDT in-service thus preventing costly outages. In confined and hazardous environments they are the only means to reach a test site and perform the NDT.

Our research, funded by the European Commission and Industry, is developing mobile NDT Robots to go inside petro-chemical storage tanks (while full of product) to inspect floors for pitting and corrosion [[[2]](#footnote-2) ], to climb on the hulls of steel ships to inspect hundreds of kilometres of weld [[[3]](#footnote-3)], to inspect mooring chains securing off-shore oil and gas platforms in both air and underwater, to inspect the walls of petro-chemical storage tanks for corrosion and weld integrity, to inspect nozzle welds inside nuclear pressure vessels, to inspect concrete structures such as dams and buildings, to internally inspect buried pipelines that are currently not reachable by intelligent pigs, to climb up off-shore wind turbine towers to inspect the blades[[[4]](#footnote-4)], and to climb on aircraft wings and fuselage to detect for cracks and loose rivets.

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3. Jianzhong Shang, Bryan Bridge, Tariq Sattar, Shyamal Mondal and Alina Brenner (2008) Development of a climbing robot for the NDT of long weld lines, Industrial Robot: An international Journal, Volume 35 Issue 3, 2008, Emerald Group Publishing Ltd., ISSN 0143-991X [↑](#footnote-ref-3)
4. Sattar , Tariq, Leon Rodriguez, Hernando and Bridge, Bryan (2009) “Climbing Ring Robot for inspection of off-shore wind turbines”, Industrial Robot: The international journal of industrial and service robotics, Number 4 Mobile robots + CLAWAR, Vol. 36 No. 4, 2009, pp 326-330Emerald Group Publishing Limited, ISSN 0143-991X [↑](#footnote-ref-4)