Optimisation of Rocket Motor Radiographic Surveillance

Federico Lorenzin[1], *James Whitehead*[2], *Glen Coppock*[3], *Sam Hobbs*[3]

[1]Weapons and Combat Systems Division
Defence Science & Technology Group

[2]Defence Contractor, YTEK Pty. Ltd.

[3]Joint Proof & Experimental Establishment Unit
Joint Capabilities Group

Email: federico.lorenzin@dst.defence.gov.au

Defects in rocket motors can lead to performance variability and, in the worst case, loss of life or platform. Current rocket motor safety assessment best practice involves conducting a combination of non-destructive and destructive surveillance tests on the rocket fleet. Radiographic inspection has the advantage that it's non-destructive and can be performed a number of times throughout the life of a rocket and for each round in the fleet. In practice, whole of fleet radiographic surveillance is impractical, as current radiographic inspection practices are highly labour intensive. Furthermore, radiographic shot-to-shot spatial variation; insufficient contrast at key structural regions within the rocket and; the following of generic radiographic standards not developed for the specific article being assessed, can all complicate the assessment of changes in features observed in radiographs taken years apart or across different rounds. To address the cited deficiencies, DST in collaboration with JPEU and CASG selected a batch of rocket motors for a proof of concept study to demonstrate the benefits of optimising the radiographic surveillance of rocket motors. Through a combination of tailor made hardware and an optimised radiographic procedure, improvements were made in radiographic image quality, consistency and throughput, bringing whole of fleet radiographic inspection one step closer to reality.

Presenter Biography:

Federico Lorenzin has worked in the Defence Science and Technology Group (DST) for 22 years. He initially joined the Engineering Support Division of DST where he worked for 14 years as a design authority developing hardware to support scientific trials. Federico led projects involving the design and manufacture of wide variety of equipment such as transonic wind tunnel models, an aircraft pod, a rocket motor static firing stand and an explosive chamber to name a few. As far as Federico can remember he always had a keen interest in rockets and in 2011 he joined what is now the DST Missile and Space Propulsion group, to lead its research activities into the safety and performance of in-service rocket motors. Federico's current research focus is developing technology and methods for the non-destructive detection and assessment of rocket motor defects. Federico Lorenzin was awarded Honours in Mechanical Engineering, and a Bachelor of Mathematical and Computer Sciences from the University of Adelaide.