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CHANGING THE PARADIGM ON SPACE VEHICLE LAUNCH – MODERN HIGHER TECHNOLOGY LAUNCH PADS – A NECESSITY FOR THE DEMANDS OF HIGHER CADENCE LAUNCH

Abstract

74 years ago humanity first launched into space. The level and rate of development at that time was truly amazing. Globally, 992 successful sub-orbital and orbital launches, including several moon missions were conducted in the two decades prior to 1970.

By the end of this year over 1,050 launches will have occurred in the first 4 years of this decade and we are in an 85

Access to space and current spaceport congestion is a major concern due to inadequate numbers of spaceports and the efficiency and capacity of spaceports to effectively service demand.

It is time for a paradigm shift in space port operations, technology and management if the sector is to continue to grow and thrive.

The reliance on traditional space launch systems, approaches and capabilities will hinder progress of the commercial space sector. SpaceX and the growing Chinese space programs predicted this and have adopted new approaches to launch pads and launch operations with efficiency, reliability/safety and speed of operation as primary drivers.

This paper/presentation will examine the Space X and Chinese programs from a launch efficiency perspective as well as focusing on the research, development and design of Equatorial Launch Australia's (ELA) Arnhem Space Centre Advanced Launch Pad (ASCALP), and the use of innovative and novel technology, using advance analysis and materials for acoustic, thermal and support service applications, enabling any rocket to seamlessly mate with the pivot base of the spaceport's launch pads.

Using the ASCALP design process this paper highlights the revolutionary concept of design to allow customised, flexible, multiuser, high cadence launch operations, with increased safety and efficiency.

The paper will detail design consideration and target, scientific research and analysis tools and results, and the evolution of the ASCALP design and its comparison to Space X and Chinese launch design in particular to: • Thermal dispersion (plume) and damage reduction - heat resistant concrete - ablative steel deflectors - Water deluge system

- Acoustic damage minimisation and reduction techniques
- Failsafe no chatter hydraulics design
- Propellant/oxidizer consolidation and manifold control
- Rocket loading efficacy measure – interface plate design
- Multi-rocket accommodation – platform design aspects
- Hydraulic erection platform with semi-uniform interface platform
- ISO and universal connectors for mating with umbilicals