FACT SHEET

Visit http://www.mindef.gov.sg for more news and information about MINDEF and the SAF

Date of issue: 25 Oct 2019

Defence Technology Prize 2019 Team (Engineering) Award Winner

Hunter Armoured Fighting Vehicle Team
Defence Science and Technology Agency, Singapore Army, and ST Engineering

CITATION

The Hunter Armoured Fighting Vehicle (AFV) Team, comprising members from DSTA, the Singapore Army (Army) and ST Engineering, designed and developed the Army's first fully digitalised fighting platform. Replacing the Army's fleet of Ultra M113 AFVs, the Hunter AFV provides Singapore's armoured forces with enhanced lethality, protection, mobility and networked warfighting capabilities.

The team adopted new design approaches to incorporate latest technologies and operational concepts for the Hunter AFV. For example, model-based systems engineering and design innovation were used extensively to design the first-of-its-kind Integrated Combat Cockpit, which would enable the Hunter AFV's crew to collaborate effectively with one another and rapidly engage targets. The cockpit is powered by the Army Tactical Engagement and Information System, or ARTEMIS – the Army's next-generation tactical command and control system which provides digitalised mission planning, networked warfighting capabilities and vehicle health status monitoring. In recognition of their significant achievements, the Hunter AFV team is awarded the DTP 2019 Team Engineering Award.

ABOUT THE HUNTER AFV TEAM

The team comprises members from DSTA, the Army and ST Engineering with areas of expertise that include land combat systems design and integration, vehicle engineering, software engineering, systems architecting and cybersecurity. DSTA provided its multi-disciplinary expertise in spearheading new design concepts, and managed the overall development of the Hunter AFV. The Army provided key operational insights and integrated requirements across the various formations of the Army to ensure that the programme would establish the core of the Army's next-generation capabilities. ST Engineering was involved in the conceptualisation and design of the platform during the full-scale development phase,

MINDEF Communications Organisation
Public Communications Directorate
MINDEF Building, 303 Gombak Drive, #01-26 Singapore 669645 Tel: 9228 6190 Fax: 6769 5139

and harnessed automation in its production and assembly for greater quality and productivity.

TECHNICAL INNOVATION AND OPERATIONAL IMPACT

The team adopted new design principles and innovative technologies to meet the design Hunter AFV design objectives, such as the requirement to engineer flexibility for integration of new capabilities, the ability to operate with decreased manpower, the need to keep operating costs manageable and the need to transform how systems engineering and integration is done to cope with the increased complexity of the project. These include:

a) User-Centred Design for Intuitive and Smart War-fighting

The Design Innovation approach was adopted to ensure that the Hunter AFV would be intuitive to operate and train. The Integrated Combat Cockpit allows the crew to collaborate effectively with one another and provides enhanced situation awareness through the use of augmented reality to overlay tactical information onto the sighting systems. Coupled with the "Touch-to-Slew" feature that automatically finds the optimal aim point and tracks a target with a single touch of the screen, target engagement time is significantly reduced. In addition, smart planning features such as area-of-sight analysis and auto-routing reduce the cognitive load on operators and facilitate better decision-making.

b) Design for Growth for Capability Insertion

The team established an open and modular vehicle electronic architecture to facilitate insertion of future technologies at minimal integration risk and cost so that the Hunter AFV can remain relevant and adaptable to the evolving operational environment. In addition, the ARTEMIS App Store was developed to serve as an open platform for third party apps to tap on a common repository of services. The Hunter AFV was also designed to be capable of integrating with unmanned platforms in future to gather reconnaissance and surveillance information.

c) Design to Cost and Data-Enabled by Design to Enhance Maintenance

The supportability needs for the Hunter AFV were considered upfront in the platform's design to enhance maintainability and reduce maintenance costs. Maintainability demands were reduced by designing for higher equipment reliability, pursuing hardware commonality and designing components to be producible by 3D printing. With the Hunter AFV being fully digitalised, on-board systems can report health, utilisation, faults and events data, allowing operators to be alerted to any fault and be guided by step-by-step instructions to rectify them. Together with the Health and Utilisation Monitoring System, the collected data can be used for fault trend analysis and to enable condition-based and predictive maintenance, which would drive down maintenance costs. In addition, augmented reality was adopted for maintenance training to enable self-directed learning with fewer instructors, while virtual reality was used to reduce training duration for recovery operations. With these initiatives, the Hunter AFV's maintenance cost is lower compared to other armoured vehicles despite having more capabilities.

d) Transforming Systems Engineering

The team pushed the boundaries of systems engineering to introduce a host of capabilities to the Hunter AFV. Model-based systems engineering was adopted to assess mechanical integration, leveraging 3D modelling and simulation in the design and integration phases of the programme. The use of 3D models also enabled the team to experiment with the integration of new technologies into the platform in a cost-effective way, without the need to produce physical prototypes. Systems Integration Labs were established for progressive systems validation and to allow users to experiment with new workflows and operating concepts. The labs also incorporated automated testing tools to expedite testing while employing fewer resources, thereby shortening the overall time needed to field new capabilities.

PROFILE OF TEAM LEADER

Name	William Peh Boon Pin
Appointment	Programme Director (Land Systems)
Organisation	Defence Science and Technology Agency
Age	34

###