

CSIR-CSIO Transfers Technology of Military Aviation Head Up Display Test Platform (MAHTP) Meant For Air Force, Navy to BEL



Central Scientific Instruments Organisation (CSIO) transferred its technology of Military Aviation Head Up Display Test Platform (MAHTP) to Bharat Electronics Limited (BEL) Ministry of Defence, Panchkula on December 16, 2017 for its licensed production.

This technology is meant for Air Force and aviation wings of Navy and Army at intermediate level, operator level and depot level for Airforce base station, aircraft manufacturing agency and manufacturing agency's site, respectively. The comprehensive aviation test platform provides visual inspection, system health monitoring through communication, automated testing, fault debugging, repair and maintenance at system level, semi-automated evaluation of optical parameters.

Due to the flexibility in design of the aviation cockpit display validation platform, which is essentially a ground equipment meant for the usage by Air Force, Army and Navy, the design can be customized to any aircraft platform. Further, there are various innovative features that have been embedded in the technology making this strategically relevant to Indian Air Force, aviation wings of Navy and Army, production agencies and the maintenance staff.

The Bore Sighting System (BSS), an opto-mechatronic aircraft ground equipment which has been certified by the Regional Centre for Military Airworthiness Chandigarh (a body of DRDO – Centre for Military Airworthiness & Certification), is used to install and harmonize head up displays, optical displays and cockpit displays at the desired position in the aircraft cockpit.

Its indigenization has saved several crores of foreign currency and its modular configuration provides an option to customize the design further for any aircraft platform. Its technology is under licensed production at BEL, Ministry of Defence, Panchkula.

The key advantage of BSS technology is the accuracy for a target distance of 60m, which implies the target positioning through head up display and optical display units would be within 10 feet for a distance of 10km.

The scientists at the CSIO feel the development of this technology package will also help in establishing self-reliance in strategic sector and is in line with the 'Make in India' and 'Innovate in India' initiatives. Each aircraft squadron would require one set of MAHP and BSS and hence an estimated Forex saving of around Rs 50 Crores per aircraft type is estimated.

Chandigarh (Face2News)

CSIR-CSIO has been pioneer in design and development of aircraft displays with variants of Head Up Displays (HUD), the prime flight display responsible for displaying aircraft, flight, navigation, target and weapon information to the aircraft pilot in forward view superimposed on the forward scene viewed by the pilot, developed namely HUD Mk1, HUD Mk1N, HUD Mk1-NP, HUD H Series for Light Combat Aircraft (LCA) Air Force, Tejas Navy, Naval LCA Prototype and the Intermediate Jet Trainer Aircrafts, respectively. Development of these vital equipment has been an achievement placing India in select list of countries capable of such a complex technology.



Now the CSIR's Chandigarh based National Laboratory CSIR-CSIO has come up with the Indigenisation of "Aviation Cockpit Display Validation Platform - ACDVP" comprising Bore Sighting System and Military Head Up Display Test Platform (MAHTP), which provides optical harmonization, complete optical and electrical functional testing of Head Up Display Variants, Optical Display Units, Gun Sights, Bore Sighting Tool for Laser Ranger & Marked Target Seeker, etc. for fighter aircrafts (fixed and rotary wing) for pre-flight clearance, post-flight analytics, testing and calibration as well as for military ground based optical displays. It facilitates harmonization of Head Up Display, Optical Sights, Holographic Optical Sights, Gun Sights and Optical Displays

with aircraft or desired axis for harmonization error correction within 1mR. The MAHTP provide pre and post-flight detailed functional checks at Intermediate and Operator Level and post-flight analytics and diagnostics at Depot level.

Due to the flexibility in design and modular configuration of the Aviation Cockpit Display Validation Platform, which is essentially a ground equipment meant for usage by Air Force, Army and Navy, the design can be customized to any aircraft platform. Further, there are various innovative features that have been embedded in the technology making the technology strategically relevant to Indian Airforce, Aviation Wings of Navy and Army, Production Agencies and the Maintenance Staff.

The technology of Military Aviation Head Up Display Test Platform (MAHTP), transferred today to Bharat Electronics Limited, Ministry of Defence, Panchkula for its licensed production, is meant for Air Force and Aviation Wings of Navy and Army at Intermediate Level (I-Level), Operator Level (O Level) and Depot (D) Level for Airforce Base Station, Aircraft Manufacturing Agency and Manufacturing Agency's Site, respectively. The comprehensive aviation test platform provides visual inspection, system health monitoring through communication, automated testing, fault debugging, repair and maintenance at system level, semi-automated evaluation of optical parameters like parallax error, binocular disparity, photometric characteristics, field of view, camera, etc, and calibration.

The Bore Sighting System (BSS), an opto-mechatronic aircraft ground equipment which has been certified by the Regional Centre for Military Airworthiness Chandigarh (a body of DRDO – Centre for Military Airworthiness & Certification), is used to install and harmonize head up displays, optical displays and cockpit displays at the desired position in the aircraft cockpit with reference to the aircraft axis (Fuselage Reference Line) ensuring harmonisation within 1mR. Its indigenization has saved several crores of foreign currency and its modular configuration provides an option to customize the design further for any aircraft platform. Its technology is under licensed production at Bharat Electronics Limited, Ministry of Defence, Panchkula.

The key advantage which the innovative technology of Bore Sighting System provides is the harmonisation accuracy of 1mR for a target distance of 60m achieved through the design of telescope optics, precision mechanical assembly along with fine motorized control and alignment of both axes within 6 secs, meaning thereby that the target positioning through head up display and optical display units would be within 10 feet for a distance of 10 kms. The technology of MAHTP ensures accurate and repeatable parallax measurements within 6 secs for horizontal movement of 200 mm and 100 mm of vertical movement, and Positional accuracy measurements in single setup within 6 secs, Brightness measurements from 2fL to 20000fL for background varying from 0fL to 12000fL achieved through use of neutral density optical filters and customized motorised mounts and thus manage contrast ratio measurements, and Correction of geometric errors within the specified limits achieved through customised test patterns, measurement methodology, precision optical equipment used and the precision mechanical movements and assembly.

Bore Sighting System Military Head Up Display Test Platform

The MAHTP also enables Real time reporting of faults for isolation of faults in real time at components level, User friendly graphical user interface for programmable symbology and test pattern generation at various writing speeds with handshake and Simulation of head motion box achieved through precision x-y-z slide movement. In addition, MAHTP also facilitates pre and post flight analytics, clearance and harmonisation. By its construction and

versatile configurable design, it can also be used to test, validate and calibrate Gun Sights, Bore Sighting Tool for Laser Ranger & Marked Target Seeker (LRMTS) & SPA Payloads, etc. Due to its modular configuration of BSS and MAHTP, the system design can be configured to any aircraft platform with customized specifications based on the end application of the defence forces.

If we compare pre-deployment with post-deployment scenario, the technologies of MAHTP and BSS provide end-to-end solution for a complex technology of HUD, Cockpit and Opto-electronic Displays. Such kind of systems are provided by the International manufacturers customized for each aircraft platform with limited features in terms of optical and electrical testing and calibration. The comparisons of the developed technologies of MAHTP and BSS with other international peers show that presently, the scope of optical evaluation is limited with non-availability of optical measurements like parallax error, binocular disparity, symbol positioning accuracy, linearity, field of view, photometric, line width, ghost images measurements, etc. to Indian Defence Forces. The indigenisation of such complex technological solution not only facilitates automated testing at LRU Level, module and sub-module levels as well as component Level but also created possibility of customization of such technological features at competitive price and with globally competitive features for multiple aircraft platforms and military ground applications. Development of this technology package will also help in establishing self-reliance in strategic sector and is in line with Govt's 'Make in India' and 'Innovate in India' initiative. Each aircraft squadron would require one set of MAHP and BSS and hence an estimated FOREX saving of about Rs50 Crores per aircraft type is estimated and its production will provide ample revenue generating opportunities to the smaller industries.

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