NEW ANTI-MISSILE DEFENCE SYSTEM TRIALS IN SOUTH AFRICA

Morné Booij-Liewes reports from Bredasdorp

A REVOLUTIONARY new lightweight civil aircraft missile protection system (CAMPS) is undergoing trials in South Africa to provide civilian aircraft with an integrated, self-protection system against the increasing threat man portable air defence systems (MANPADS) pose to aviation worldwide.

This is a combined initiative between Saab Avitronics, Chemring Countermeasures and South Africa's Naturelink Aviation which have joined forces to enhance the safety of passengers, cargo and flying personnel.

Naturelink Aviation provided the aircraft, an Embraer 120 Brasilia, Saab Avitronics the self-protection system and Chemring Countermeasures the decoys.

The installation was carried out by Naturelink with support from Saab Avitronics. The installed system comprises CAMPS and, as a reference, also Saab Avitronics military airborne dispensing equipment.

During the demonstration at Overberg, flares were used to illustrate the sort of coverage the CAMPS system provides. It differs from traditional flares in being invisible to the naked eye as it operates in the ultra-violet and infra-red spectrums.

The focus of CAMPS is to meet the requirements for civilian, VIP as well as special mission aircraft. This includes system safety, costs and operational aspects of this type of system which are much more pronounced than for the military equipment.

The demonstration which was carried out at the South African Air Force's Test Flight and Development Centre (TFDC) at Bredasdorp, in the Cape, recently was the culmination of a process started three years ago when Naturelink Aviation's CEO, Chris Briers, approached SAAB Avitronics with the view to fitting anti-missile defences to civil aircraft. The company operates in many hostile areas in Africa and the Middle East and its clients, mostly the United Nations, government agencies and NGOs, were increasingly recognising a need to defend against a possible MANPADS threat to its aircraft.

The system will be certified in 2008 and available for fitment to a wide spectrum of aircraft ranging in size from turboprops to large wide-body airliners.

PROLIFERATION

The proliferation of MANPADS shows a frightening number of these weapons. An estimated 150 000 of the 700 000 such systems produced since the 1970s, are believed to be in the hands of so-called "non-state" organisations, and available for sale on the market from as little as $5 000 per unit.

They range in complexity from the first generation systems such as the ubiquitous SA-7 *Strela* to the latest third generation systems such as the SA-18S *Igla-S*, albeit the latter in limited numbers. →

It is therefore no wonder that there have been some 35 attempts at shooting down civil aircraft in the past 10 years resulting in the loss of 24 machines and about 500 lives. Currently, the greatest threat posed is in Iraq where insurgents are targeting aviation assets – be they civil or military – as part of their armed uprising.

The most graphic was the attempted shooting down of parcel giant DHL's Airbus A300 freighter. Although the aircraft sustained serious damage to its wing after being hit by at least one shoulder-launched IR missile (thought to be a SA-7) it was a testament to the skill of the crew that they managed to land the aircraft back at Baghdad International Airport.

An earlier attack on an Israeli B757 airliner of Arkia Airways on departure from Kenya's coastal city of Mombasa, although unsuccessful, focussed the world's attention on the new emerging threat – civil aircraft now appear to be "fair game".

The greatest threat to aircraft from MANPADS is during the take-off and landing phases when aircraft are most vulnerable to attack.

It was the attack on the Israeli airliner that focussed the attention of America's Department of Homeland Security (DHS) on funding development of airborne anti-missile countermeasures systems for commercial aircraft and it may mandate the fitment of such systems on all US airliners in due course.

The DHS has already funded a three-year, $140-million programme to test various systems on 12 aircraft and are currently reviewing their performance.

These focus on the use of directable energy infrared counter measures (DIRCM) and laser-based infrared counter measures (LIRCM) systems which direct non-visible, eye-safe laser beams at the seeker head of incoming missiles and disrupting its guidance signals.

The drawback of these systems is their high cost, complexity, weight and current low mean time between failure rates. Multiple units must also be fitted to guard against multiple simultaneous missile attacks as one unit can only engage one missile at a time.

At a time when most US airlines are facing record losses, many criticise the mandatory fitment of such counter MANPADS systems as premature, citing the lack of credible, specific intelligence information about planned MANPADS attacks against US commercial aircraft. The cost is estimated to be in the region of some $7-billion or more.

The executive vice-president of the International Air Transport Association has also urged the DHS to take a close look at lower-cost alternatives. It is in light of such statements that CAMPS, costing at least a third of any competing system, is such an important development as it marries low acquisition costs, lightweight mass and proven performance into one package.

CAMPS DEMONSTRATION

The demonstration of the civil aircraft missile protection system programme which took place at the TDFC Overberg test range recently was part of the system's certification programme. Based on successful trials the system can potentially be operational on Naturelink platforms by the middle of 2008.

CAMPS consists of the MAW 300 ultra-violet spectrum-based missile approach warning unit that typically comprises four sensors for 360^0 coverage of the aircraft, a central electronic unit and what is dubbed the BOA dispensers. The number of dispensers installed is dependant of the aircraft type.

The missile approach warning system uses the UV spectrum to identify the missile's exhaust plume on launch and the IR spectrum to identify the heated surface of the missile as well as its exhaust plume.

The BOA is an electromechanical unit designed to dispense a new, non pyrotechnical type of IR decoy, developed by Chemring, which overcomes all the safety issues associated with

Photo: Frans Dely

pyrotechnical decoys. The new decoy does not require the special handling procedures associated with pyrotechnical decoys. It also does not pose a fire hazard but it merely heats up when exposed to oxygen in the air. This solution provides an airline-friendly countermeasures system.

During the demonstration at Overberg, flares were used to demonstrate the sort of coverage the system provides, but when the actual use of the equipment was demonstrated, all that could be seen was a small puff of black smoke which appeared behind the aircraft.

The MANPADS threat and the challenge to designers of countermeasures systems is that there is only about three to four seconds from launch of the missile to it entering the lethal engagement envelope. The systems must, in these scant few seconds, detect the launch, establish the missile's trajectory and dispense countermeasures in an appropriate and timely manner to ensure survival from an attack, failing which the aircraft may be shot down.

The photographs on these two pages show the positioning of the system's yellow-painted sensors and dispensers on the nose and rear fuselage of the Embraer 120 aircraft

NEW DECOYS

The system employs a revolutionary new pyrophoric, covert decoy designed and manufactured by the Chemring Group, a world leader in advanced countermeasures technology.

It differs from traditional flares in being invisible to the naked eye (operating in the UV and IR spectrum used by missile-seeker heads) and no pyrotechnic. Instead, it is referred to as a combustible area decoy (CAD) which is a non-explosive, non-pyrotechnic and burns at a relatively low temperature.

It is therefore safe to load and unload and requires no special training or protective measures to handle it.

The CAD material burns out completely leaving no solid matter residue and can safely be dispensed in sensitive areas such as those surrounding civilian airports as no burning material reaches the ground.

The electro-mechanical dispensers are inherently safe as no pyrotechnic squibs are used to light or eject the flares, while they are also non-explosive. The electro-mechanical dispenser is also silent and installed flush with the skin of the aircraft, minimising drag.

The lightweight CADs have a low dispensing velocity of some 1-2m^{-1} and have a low burn temperature. Invisible to the naked eye when burning, the decoys are contained in sealed packages and activated only after dispensed into a fast airstream which is needed to open the decoy pack.

This is in response to the great reluctance most carriers have to fitting flare-based anti-missile defences to aircraft as this brings with it a host of challenges, not least of which the volatile, explosive nature of flares used in similar military systems. These pose a fire hazard and are banned from civilian airfields. ✈