



Israel's IAS emphasises urban ops

Major Ram Rotbart, Deputy Programme Manager, Israeli Advanced Soldier provides an update on the programme

"For the IDF, the battalion is the basic unit," explained Major Ram Rotbart, Deputy Programmer Manager for the Israel Defence Force's (IDF) Israeli Advanced Soldier (IAS) programme. "New technology brings new opportunities. You always want to increase [capabilities] at the battalion level but we do that by systems engineering, empowering those individual soldiers. The programme is driven by lessons learned from the Second Lebanon War and the ongoing conflict in Gaza."

The systems first spiral development mainly focussed development on C4I; mainly for commanders, headquarters and specialists in the company. In Spiral 2, this is being built on to create a more expansive capability, enhancing C4I capabilities and integrating additional sensors and weapon systems.

Major Rotbart said "The IAS programme really integrates a systems engineering approach. We always use a top down, bottom up approach. In Spiral 2 we are focussed on the progress of systems that work with C4I. In the second phase, we are also completing the C4I components – we think it is the core force multiplier that will give us the leap in capabilities that we want for the infantry. It is the core to which afterwards, everything will be connected."

C4I

"From the applications side of the C4I system, we take care of all three phases of the mission, from mission preparation, during mission and after mission," explained Major Rotbart.

"We are very focussed regarding mission preparation, planning the orders, full terrain analysis, line of sight – how the enemy sees you and how you see the enemy."

Integration between the C4I suite and weapons system is the key to all IDF programmes within the overarching Digital Army Programme. Major Rotbart is emphatic that no weapon systems will be brought into the IAS without integration into the C4I suite.

The C4I systems encompasses several elements, including the Personal Digital Unit (PDU) terminal, 8" display, joystick eye piece, headset vest, power pack Fire Control System, target acquisition and navigation system. In communications terms, two radios are used, the VHF/UHF PRC710MB for inter-unit communications and the PNR500 for intra-squad communications.

At the heart of the systems is the IAS' modular computer. Output is via a high-glare resistant 8" LCD display with 800x600 resolution, with dimensions of 15cmx12cmx3cm and weighing 700g excluding battery pack.

The interfaces offered on the modular computer comprise two 10/100 Ethernet LAN, five USB 2.0 including On-The-Go functionality, which allows the USB based device to undertake both master and slave roles. There is also an RS232 serial port for analogue video, audio in and out and a VoIP capable CODEC with fibre LAN docking interface.

Discussing the Soldier Navigation system, Major Rotbart said, "We think that for radio BFT and integrated acquisition, GPS is not enough we want to operate in doors and outdoor and we always want to have the location for the soldier."

Hardware development is complete on the navigation module. Major Rotbart said, "We are now completing the algorithms which are under advanced development." The algorithms includes step detection and classification, stride estimation, direction estimation and position calculation.

The systems is designed to support operation without GPS for up to three hours with high accuracy, position deviation being one to two percent of distance travelled and keeping within less than one degree of walking direction.

"It was a lot of work for our testing guys. We did lots of tests, walking, running, jogging, jumping and firing with different soldiers, different terrain. With its multi-dimensional mapping it is something that is really unique for us."

Internally the system comprises three MEMS gyros, three MEMS accelerometers, a magnetometer triad and altimeter. All in, the system weighs 150g and has dimensions of 90x60x20mm.

In lethality terms the IAS has opted for the seven member TAVOR small arms family whose rear centre of gravity, bullpup design integrates a 46cm barrel in a 72cm weapon. For the IAS programme, adaptations have been made improve its ergonomic structure, with integral reflex sight and ease of use features for both left and right handed users.

A key lethality enhancement for IAS is the Fire Control System for Snipers (FCSS). "A highlight of the IAS is the FCS," said Major Rotbart. "We think it is a technological breakthrough. Its ability to calculate the wind speed between sniper and target is something

IAS Timeline**2004****November:** Combat Lab Experiment**2005****February:** Individual Combat Tests
March: Battalion Field Test in Urban Scenarios**2006-8**

Full Scale Development

2008**October 2008:** Company Field test**2009****March 2009:** Battalion Evaluation**July 2009:** Production**2009-10**Lab Experiment
Battalion Field Test

attached to a target wall via a tripod before firing. Major Rotbart said, "It is a two phase principle, the warhead first creates a hole in the wall, then, the main warhead goes through the hole and detonates behind the wall."

The shoulder launched Matador Anti-Structure Munition uses a similar tandem warhead and is designed to produce two stage effect, single room clearance and to create a man sized hole in a wall. The weapon can also be fired from enclosure and has a range of 400m.

Both weapons are designed to neutralise a single room. The next step up in the IAS's anti-structure capability is the Urban Cannon, a tripod launched system which can be used from up to several hundred metres away and uses a tandem warhead to neutralise occupants in a single floor of an apartment.

ROBOTICS

Unmanned Ground Vehicles (UGV) are fully integrated into the IAS' C4I System. Two solutions are used, the Viper and the Eye Drive. Both are carried by individual soldiers. Major Rotbart said, "The infantry can run, crawl in the dust – act like infantry and still have a very good, robotic friend with him."

Six main functions are required of the system; a real time on the spot reconnaissance capability, deployment of sensors, dynamic payloads and special munitions into buildings, bunkers, tunnels and other urban features; access and detection of booby traps, land mines and explosive threats; remotely map buildings, bunkers, tunnels and other urban features and act as a communications relay.

The larger, more capable Viper UGV is tasked with 'to and on-the target operations' and weighs just less than 12kg although Major Rotbart said the weight would drop by 2-2.5kg.

Major Rotbart describes the sub-2kg Eye Drive UGV and being used for "on-the-target operations", with point and go operations allowing the operators to concentrate on the objective. He commented, "It requires no special training and uses a hand held joystick and intuitive remote control monitored with a helmet mounted eyepiece. You focus on the mission, not on the driving."

The Eye Drive weighs less than 2kg and is roughly the size of an A4 piece of paper and has sensors to provide a 360 degree field of view. Roles undertaken by the UGV would include deployment of sensors such as the Eye Ball.

IAS Industry Team

Elbit Systems	Prime Contractor All Domains
Camera	Urban ISTAR
Silynx	Audio ancillaries
ITL	ISTAR
Israel Weapon Industries	Tavor family
ODF	ISTAR
Rafael	Lethality, ISTAR
Plasan	Personal Protection
Optigo	ISTAR
Marom Dolphin	Clothing and protection

Other sensors in the IAS suite include the 415g Smart Arrow, which is fired from a 5.56mm weapon to a range of 20-100m where the head of the projectile impacts on a concrete, brick or cinder block wall and buries into it, when fired from an up to 25 degree angle. This then exposes a reconnaissance sensor design, which transmits real time video to a designated terminal.

Another key sensor is the Xaver 400 used for through wall imaging. The system, which weighs less than 3kg, gives real time information of the number of people and 2D location behind walls using ultra wide band radar.

Major Rotbart explained that the laptop-sized system had thus far been fielded with special units in the IDF and, "so far results are promising."

The IAS's Personal Gun Shot Detection System is in operational evaluation and works by using SWIR to detect small arms within hundreds of meters, with a wide FOV and provides an audible warning to troops and is integrated within the C4I suite, providing a cue on the soldier's weapon sight as to the firer's location. n

Major Rotbart was speaking at Soldier Technology Global.

► unique. If you wait, especially in urban terrain at 1000m there's no second chance."

In trials the IDF has found that the FCSS, extends the effective operational range of snipers to 800m for 7.62mm weapons and for 0.338" weapons, this rose to 1200m. The trials also showed that against a 50cm square target the FCSS increased the probability of first rounds hits by 60 percent.

Aim correction is based on a number of inputs; integral cross wind measurement, laser range finder, ambient temperature, azimuth and inclination, GPS for Coriolis effect, barometric effect and humidity.

In support of the counter sniper role, the IDF is also deploying the two-man portable Muzzle Flash Detection System which operates by using a FLIR to provide range, azimuth and an image of the target and has a 32°x24° Field of View (FOV).

A range of tools are being fielded to enable greater effectiveness in urban terrain for IAS equipped troops. The Simon door breaching munition is a muzzle launched insensitive munition. Above this is the Urban Star, a static follow through charge, designed to clear a single room behind a wall. The Urban Star, which weighs 6kg is