



Curtains down: Aerobatic teams vied for the eyeballs with breathtaking manoeuvres

Lasting impressions of last day, last show

BENGALURU: The last day of Aero India 2017 was a carnival, both inside and outside the Yelahanka Air Force station. Those who had bought passes to the exhibition area saw the planes from up close and visited the various attractions around.

Even those without passes felt that they had got a good deal, viewing the aircraft displays from outside. Children and adults alike were sitting on the compound wall, on the roofs of cars and even standing on motorcycles to catch a glimpse of the fighter planes performing stunts. G Natesh travelled all the way from Ramanagaram district and arrived at the air force station by noon. He couldn't get a pass for the show, but that didn't stop him from enjoying it, perched atop the compound wall. There were many like him who climbed on to anything which would give them a better view. The staircase of an under-construction skywalk was a blessing for the air show enthusiasts. People quarreled for

space and the steps higher up were in great demand. "I have been here since 3 pm and haven't moved an inch from my spot," said 45-year-old Manjula T, who had a prized spot at the top. People gathered in large numbers even at the nearby Hunasamaranahallikere lake since they could get a good view from there too. Rajashekara M, a resident of Yelahanka, was keen on watching the flight displays, but he expected this year's show to be a low-key affair. "I purchased a pass last year and it was very good. This time, from what I heard, I felt that buying a pass wasn't worth it. But I was still curious, so I came to watch the last two hours," he said. Visitors who had bought the cheaper tickets which allowed entry only to the air display viewing area were also happy with their experience. "I have been in Bengaluru for about eight years but I have never come for the air show. Now I wonder why I did not, because the show is brilliant," said Anurag Kumar. **DH News Service**



SIDESHOW: Enthusiasts take the best possible position outside the Yelahanka air force station to watch the air show. **DH PHOTO / CHIRANJEEVI KULKARNI**



(Above) The crowd soaks in the majestic feel of the metal birds on the last day of Aero India on Saturday. (Left) A Scandinavian aircraft performs the unique LLP (led-laser-pyro) show. The show was held for the first time at Aero India. The display is synchronised to music via loudspeakers on the ground. **DH PHOTOS / RANJU P. KISHOR KUMAR BOLAR**

It's now three days of hard work to clean show venue

Chiranjeevi Kulkarni

BENGALURU, DHNS: The crowds left the Yelahanka airbase carrying with them impressions of steel birds that roared in the sky, but 200 housekeeping staff will work for next three days to clear tonnes of garbage they left behind. "It will be 12.30 in the middle of night when we will clear the runway area as the Air Force needs it for immediate operations. But the garbage in the exhibition area and the halls require two or three more days of work," said Satish Kumar who was supervising 200 maintenance workers. Abhishek Gupta, director of Reddonatura, which is converting the food waste into manure during the Aero India, said that the amount of food waste has come down from 10 tonnes during the last air show to 7.5 tonnes in 2017. "But dry waste has remained almost the same at 30 tonnes, and nearly two tonnes of it is plastic," he said, adding that his team will make sure that all kinds of garbage including plastic, is recycled. Many visitors to whom *DH* spoke, expressed satisfaction with the cleanliness of the whole environment in the airbase. The maintenance staff,



As many as 30 tonnes of dry waste is generated during the air show, of which around two tonnes is plastic. **DH PHOTO**

Counting waste

- Total amount of waste **37.5 tonnes**
- Food waste - **7.5 tonnes**
- Dry waste - **28 tonnes**
- Plastic waste - **2 tonnes**

however, said that the last two days of the show that were open for public gave them more work. Venkatesh T, who was hired for cleaning at Rs 400 a day, said he will have two more busy days of work. "There was work for the three days, but today was the busiest," he said. More than 2.5 lakh people visited the airbase on Saturday

and the maintenance staff were not happy with all of them. "There are dustbins everywhere in the arena. But people throw garbage on roads we have just cleaned. Of course, we will clean as many times as it requires. But that doesn't mean everyone can spoil a neat place," said Mutyalamma, who had come from Bettahalasur who worked for Rs 300 per day. Satish said the organisers and his company together conducted awareness among visitors against throwing garbage in public areas. "Programmes like Swachh Bharat will be of no use if people do not correct themselves," he said.

When crowds stepped into Mars!

BENGALURU: The Mars Mission beckoned big crowds at the Aero India 2017. Visitors young and old queued up before a small theatre set up by the Indian Space Research Organisation (Isro) and Hindustan Aeronautics Limited (HAL). The visitors' collective mission was this: To watch a wide spectrum video about the Mars surface, how it looks like and the duration of a Mangalyaan flight to the red planet.



People are glued to a screen showing Martian surface at a small theatre set up by Isro.

screened on a curved screen. The theatre interior was aptly designed to mimic the planet surface. "A huge display of the

Martian surface was outside with an invitation written in bold: "Step into Mars." **DH News Service**

Market for mini-UAVs set for big boom

Easy to launch, they blur military, civilian divide

Rasheed Kappan

BENGALURU, DHNS: Everyone wants an eye in the sky, relaying live videos in clandestine avatars. Blurring the military-civilian divide, the market for mini unmanned aerial vehicles (mini-UAVs) is on the verge of an explosive boom. The just-concluded Aero-India 2017 had enough small drones on display to indicate the impending trend. But pushed by firms — big and small, domestic and foreign —



HAL's mini-UAV displayed at Aero India. **DH PHOTO**

the mini UAVs had a distinct feature — all were fixed-wing, agile and designed for stealth. Unlike the quadcopters sold commercially, the fixed wing could take off silently, rise up to altitudes of one km and quietly relay live feeds of enemy territory. The Defence Research and

Development Organisation (DRDO) had its Indian Eagle on display. This mini-UAV has already been demonstrated to the armed forces and the Central Reserve Police Force (CRPF). But the technology could reach production stage only if a manufacturer, private or government, had orders in hundreds, a DRDO official told *DH*. DRDO's Black Kite, Sly Bird, Pushpak and Golden Hawk were all waiting to be picked up. The simplicity of use is what sets apart the mini-UAVs. A crew of not more than two persons can carry the entire equipment on a backpack and hand-launch the UAV within 10-15 minutes. But heavy winds and bad weather conditions could hamper its operations. Betting big on its own mini UAV, Hindustan Aeronautics Limited (HAL) has completed extensive trials and demonstrated it to the Railways, Forest department and the police. The 8-kg UAV can operate in day/night conditions with infra red cameras and fly non-stop for 90 minutes. Hand-launched, the device is capable of belly-landing. However, unlike the quad-

copters, it cannot take off vertically and hover around a particular area. HAL, said an official, is also working on a rotary-wing based UAV in partnership with the Indian Institute of Technology, Kanpur. Competing with DRDO and HAL, the Israelis had their own third generation mini-UAVs, the Bird Eye 400 and 650 on display. The 400 version, besides providing real-time day/night imagery data for urban operation, could offer "over the hill" intelligence. Typically, the mini-UAVs have their missions defined: reconnaissance, as they can operate under the glare of radars, for counter-terrorism, law enforcement, patrol and convoy escort. Civilian use could spike if the police start using them for traffic and disaster monitoring, a DRDO engineer said.

High on footfall, low on business deals, air show scores on variety



Visitors watch an air display on the final day of Aero India 2017. **DH PHOTOS / RANJU P**

the event, the exhibition at the show saw participation from 549 companies, out of which 270 were Indian and 279 foreign. A five-member Chinese delegation from the People's

Liberation Army Air Force attended the show for the first time. The show turned out be a huge attraction for aviation aficionados who thronged the



A bomb detector developed by the DRDO was on display at the aerospace and defence exhibition on Saturday.

DH PHOTO / KISHOR KUMAR BOLAR

DRDO develops hand-held laser-based explosive detector

Meghana Choukkar

BENGALURU: A handheld explosive detector developed by a laboratory of the Defence Research and Development Organisation (DRDO) could make airports in the country safer for travellers.

The laser science and technology centre (LASTEC) of DRDO, based in New Delhi, has developed the portable device which uses a laser beam to detect explosives in a matter of seconds. A scientist from LASTEC, who was at the centre's stall in Aero India, explained that metal detectors and x-ray scanners were not effective enough to detect explosives which a person could carry in gel, liquid or powder forms, among others. "In civilian airports, people carry all kinds of things like shampoo, medicines, talcum powder and so on. It is difficult to judge whether they are disguised explosives without testing in a forensic lab," the scientist said. The handheld detector can solve this problem because, within 12 seconds, it can tell whether the talcum powder a passenger is carrying is an explosive substance or not. A green laser light is used to 'fingerprint' the explosive based on Raman scattering spectroscopy. "Depending on the kind of particles in the explosive, the wavelength of the laser beam

will shift. The device already has an in-built library of 40 kinds of explosive substances. It will match the result with entries in the library, identify the substance and display the name," he explained. Trinitrotoluene (TNT), nitro glucose and nitrocellulose are some of the explosive substances in the library. Substances which may be harmless by themselves, but can be explosive when mixed with other materials are also included in the database. This laser detection method does not damage the material it inspects and can detect through glass and translucent containers as well. The device is portable, weighing 8 kg, and is powered by rechargeable batteries.

The detector will be supplied to major international airports in the country and to other sensitive areas such as industrial establishments of national interest. "We have demonstrated the device to several organisations such as the Directorate General of Civil Aviation (DGCA), Central Industrial Security Force (CISF) and National Security Guard (NSG). They have approved it and the detectors are now in production," the scientist said. The technology of the detector has been transferred to four Indian companies for production and in four to six months, the detectors will be supplied wherever required, he said. **DH News Service**