2015

Airport Surface Movement Radar Technology

Airport Perimeter Security

Airport Terminal Surveillance

Intrusion Detection

No-Fly Passenger Pre-Screening

Travel Document Checker

Checked Baggage Screening

Air-Cargo Screening

Command & Control

Air Marshals

Bomb Appraisal Officers

Random Employee Screening

Hardened Cockpit Door

Flight Deck Officers

Cabin CCTV Surveillance

Homeland Security Research Corp.

Airport Surface Movement Radar Technology – 2015

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Washington D.C. 20004, 601 Pennsylvania Ave., NW Suite 900,
Tel: 202-455-0966, info@hsrc.biz, www.homelandsecurityresearch.com

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1.1.1 Airport Surface Movement Radar Technology

❑ Perimeter surveillance radar (PSR) is a class of radar sensors that monitor activity surrounding or on critical infrastructure areas such as airports, seaports, military installations, national Airport perimeters, refineries and other critical industry and the like. Such radars are characterized by their ability to detect movement at ground level of targets such as an individual walking or crawling towards a facility. Such radars typically have ranges of several hundred meters to over 10 kilometers.

❑ Alternate technologies include laser-based systems. These have the potential for very high target position accuracy; however they are less effective in the presence of fog and other obscurants.

❑ Surface Movement Radar (SMR) systems are used by air traffic controllers and the airport security body to detect people and guide aircrafts and vehicles (i.e. baggage carriers, buses, supply trucks, staff cars, etc.) on the ground surface of the airport and thus secure safety. It is the most widely used surveillance system for airport surveillance at present.

Airport Surface Movement Radar Technology Features:

❑ Detecting Land Aerial moving targets

❑ Detection range up to 10 Km

❑ Automatic detection, tracking and classification of targets

❑ Proven FMCW technology

❑ Low probability of detection and interception

❑ Rapid Deployment

❑ Solid state electronics with high MTBF

❑ Independent or networked operation

❑ Integrated with existing sensors

❑ Graphical User Interface

Figure 1 - Airport Surface Movement Radar

Surface Movement Radar (SMR) is the most widely used surveillance system for airport surveillance at the present. SMR refers to primary radars that provide surveillance cover for the maneuvering area, which is defined as that used for the take-off, landing and taxiing of aircraft, excluding aprons.

SMR provides surveillance of all aircrafts and vehicles in an area with a high update rate. SMR antennas are often mounted on a tower which has good visibility of the maneuvering area.

The ground surface environment is quite different from high altitude because of the increased clutter and other physical problems. The quality of surveillance information on the ground is often quite poor and limited by these physical problems.

Use of PSR means that target labelling may not be possible, and hence controllers use visual identification of aircrafts (by looking out of the tower window). This is one of the contributory factors to the reduced capacity of airports in low visibility.

SMR uses a rotating antenna and the scan rate is usually once per second. They usually operate in the: I-, J- and K- Band.

Higher resolution SMR operates between 92 and 96 GHz. Most newer SMR products also interface with other local radars; e.g. to precision approach radar and terminal area SSRs. Data processing capabilities that are offered in conjunction with these radars may include runway incursion and conflict alert, and target identification and labelling.

Existing SMR systems are sometimes known by the acronym ASDE - Airport Surface Detection Equipment.

Figure 2 - Airport Surface Movement Radar Imaging Field

1.1.2   Digital Airport Surveillance Radar (DASR) Technology

❑ The Digital Airport Surveillance Radar (DASR) is a new terminal air traffic control radar system that replaces current analog systems with new digital technology. The DASR system detects aircraft position and weather conditions in the vicinity of civilian and military airfields. The older radars, some up to 20 years old, are being replaced to improve reliability, provide additional weather data, reduce maintenance cost, improve performance, and provide digital data to new digital automation systems for presentation on air traffic control displays.

❑ STARS will be used by controllers at facilities who already have it installed, to provide air traffic control (ATC) services to aircrafts in terminal areas. Typical terminal area ATC services are defined as the area around airports where departing and arriving traffic are served. Functions include aircraft separation, weather advisories, and lower level control of air traffic. The system is designed to accommodate air traffic growth and the introduction of new automation functions which will improve the safety and efficiency of the National Airspace Systems (NAS) as the legacy systems are replaced.

More information can be found at:
Global Airport Security: Technologies, Industry & Markets – 2015-2020