

DFS Deutsche Flugsicherung GmbH

German Air Navigation Services

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Technical Solutions for Preventing Runway Incursions

Aerodrome Controllers Perspective

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DFS Deutsche Flugsicherung



Basic Role of Controller and Flightcrew in Aerodrome Control

Visual acquisition of traffic on the manoeuvring area from control tower and flight deck.



Technical Systems to be used in Aerodrome Control

To be installed to:

- Assist the controller in performing his duties in low visibility
- Support controllers in decision making process
- Increase situational awareness of the controller
- Increase aerodrome throughput
- Reduce runway related incidents
- Alert the controller in case of separation infringements

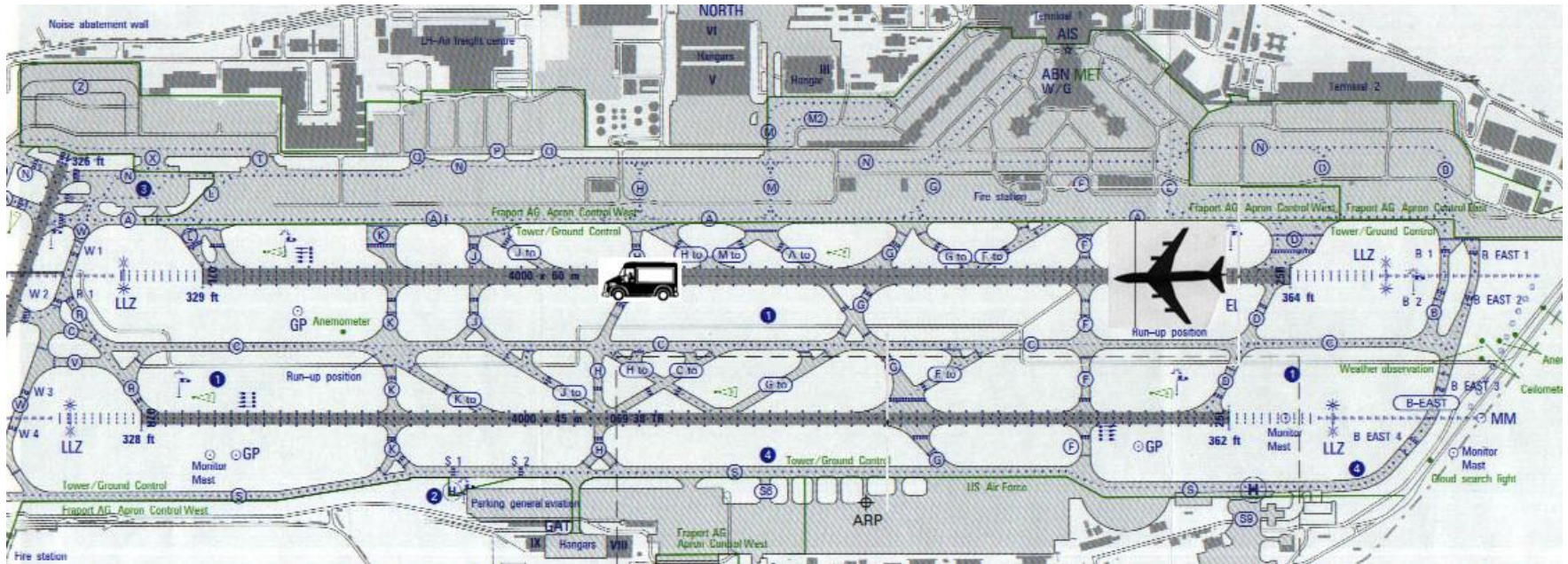
Examples of Technical Systems available for Aerodrome Control

- Lighting systems like stopbars, runway guard lights
- Electronic systems using inductive loop technology
- Primary surface movement radar
- A-SMGCS
- Multilateration
- 75 MHz Sensor technology
- Methods to show an occupied runway

A-SMGCS Requirements of the Aerodrome Controller

- Accurate display of all traffic on the manoeuvring area
- Monitoring system for traffic on the manoeuvring area
- Confirmation of pilots reports
- Confirmation of compliance to issued ATC-clearances
- Reliable alerting device
- Last resort safety tool

Runway Accident Frankfurt / Germany 30 Years ago



Inspection car cleared onto the runway (600 m visibility), forgotten by the controller, subsequently cleared a 747 for take-off.

Consequence



Lessons learned:

Introduce SMR, all vehicles on the runway on VHF TWR-frequency.

25 Years later, Munich Intl. Airport / Germany

LUFTFAHRT-HANDBUCH DEUTSCHLAND
AIP GERMANY

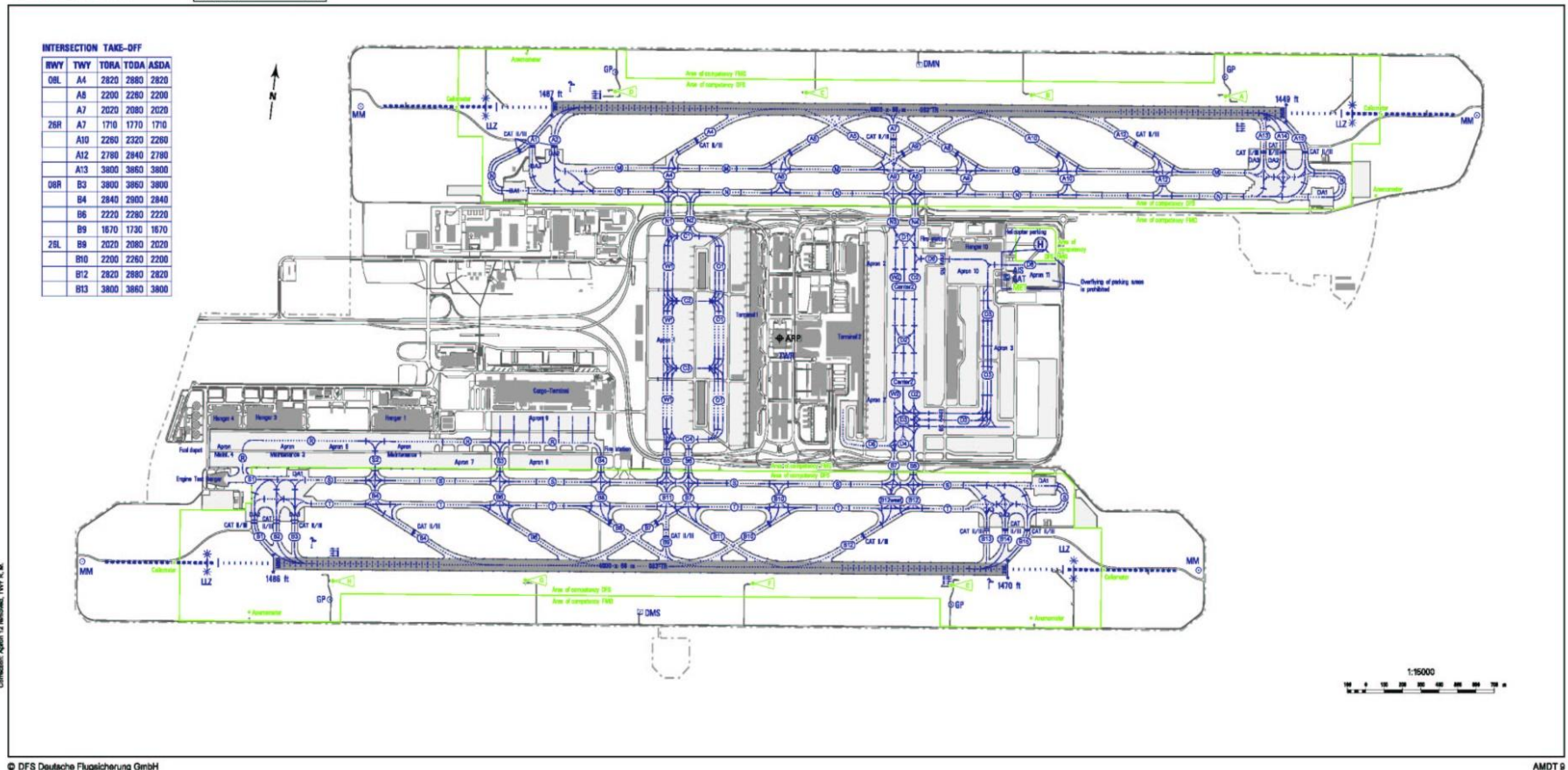
FLUGPLATZKARTE - ICAO
AERODROME CHART - ICAO

ARP 1470 ft
N 48° 21' 13.52"
E 011° 47' 08.91"

AERODROME
ELEVATION
1487 ft

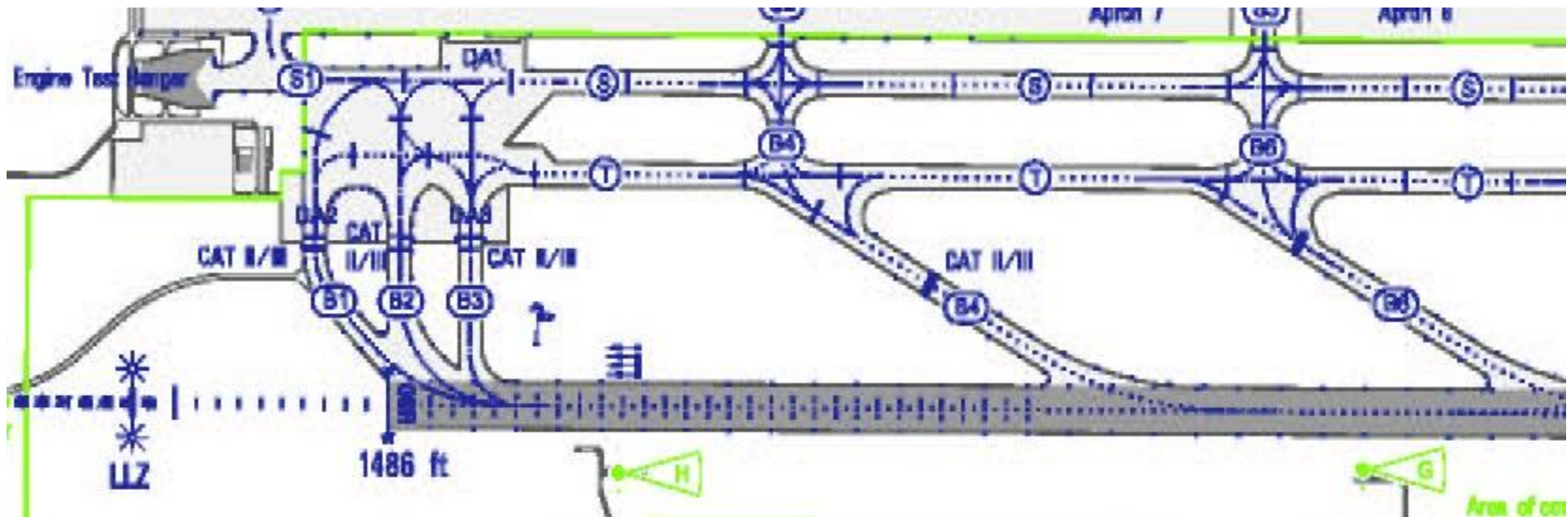
AD 2 EDDM 2-6
2 SEP 2004

MÜNCHEN



Munich Runway 08R

- Modern airport independent parallel operations
- > 350.000 movements / year (>90/h)
- Tower equipped with A-SMGCS
- Including runway incursion monitoring and alerting device



Traffic Situation on 3rd of May 2004

- Night time, excellent visual conditions
- Boeing B737-300 established ILS RWY08R on short final,
- ATR42-500, CAT-I holding point taxiway B4
- A321, departing on runway 08R in front of the approaching B737-300



A-SMGCS Pictures

AT45 holding at CAT I holdingpoint having received conditional clearance for line-up, 18 seconds left to closest proximity



AT45 commencing taxi for line-up, whilst B733 is on landing flare, 5 s left

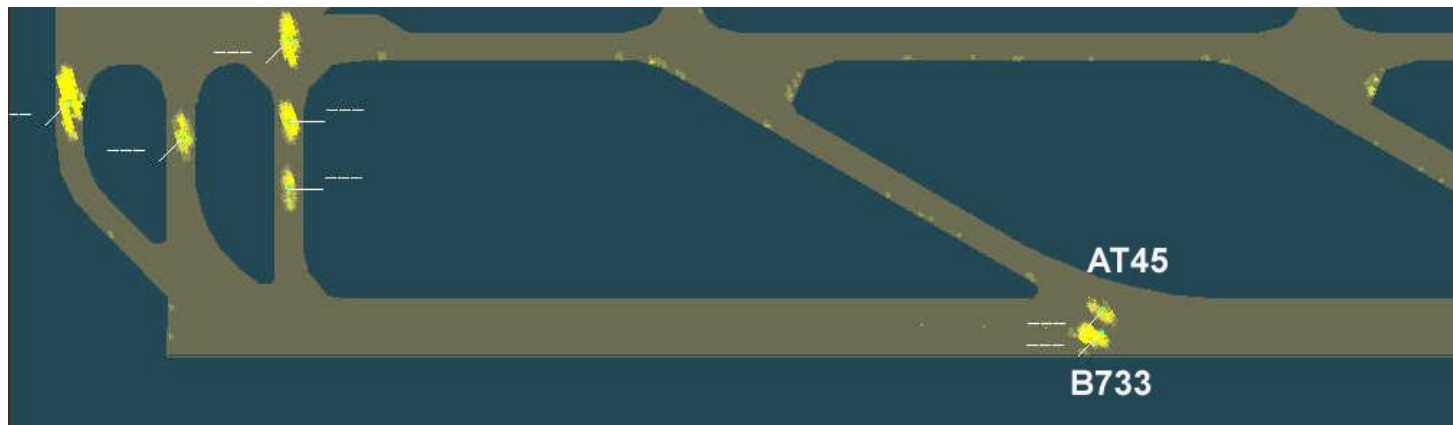


A-SMGCS-Pictures of the Severe Incident

Crew of the AT45 mistook the departing A321 as the landing B733.



Both aircraft passed each other at a distance of less than 10 meters at a speed of approximately 110 knots.



A-SMGCS Alerting Function



- Runway Incursion and Monitoring device was installed
- All functions had been deactivated because of:
 - Inaccurate display of targets in the past
 - Ghost targets
 - Unacceptable number of nuisance alerts
 - Lack of controllers trust and confidence in the system

Audible and Visible Alerts generated by the A-SMGCS



- 2 alerts were generated within a second but not visible or audible
- 1 alert between the departing A321 and the taxiing AT45
- 1 alert between the approaching B733 and the AT45
- Because of other traffic the controller did not monitor the ASMR

Conclusions and Findings (Short Summary)

- The alerting function was switched off
- All attempts to calibrate the system failed
- Procedures for the use of A-SMGCS in aerodrome control were missing
- If the alerting device would have been available, 18 sec. would have been left for a controllers reaction

Reduction of Runway Incursions (General Recommendations)

- Strict adherence to the recommendations published in ICAO DOC9870 and EAPPRI 2.0
- Establishment of Local Runway Safety Teams
- Implementation of systems that meet the specific aerodrome need by supporting aerodrome control procedures
- Operational evaluation prior to live operations
- Continuous observation and assessment of performance through safety management and investigation processes

Thank You !