Statistical Evaluation of the Security Chain for Airports

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Abstract
The analysis of the Probability of Detection (PoD) was originally developed for inspection systems of gas
turbine engines and has been applied to describe the response of security check points of airports for detection of
threats. As an essential tool for evaluation of the dependability and efficiency of security checks the receiver
operating characteristic (ROC) was applied, which was introduced by US military for determination of the
dependability of detection systems and non-destructive testing procedures. It is based on evaluation of the PoD
and the measurement of the Probability of False alarms (PoF).
The PoD depends on object parameters, as e.g size and geometry. Airport security check consists of multiple
stages of inspection, which are used in parallel or sequentially. After the first inspection stage the alarm can be a
true positive indication or a false alarm. A following step inspects all objects (redundant) or only the objects that
gave an alarm (sequential) in the previous stage. Reducing the false alarm rate yields a rise in missed detections
while the other way round increasing the sensitivity results in a higher false alarm rate. A numeric tool was
developed to determine the overall PoD and ROC of combined technologies for threat detection. The false alarm
rate is the main factor that influences the costs for a security system. The PoD and ROC data are calculated for
single stages and for the complete chain of the security check point.

Keywords: PoD, ROC, PoF, security, airport, civil aviation, baggage inspection