1. RFID-based baggage-handling system design

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Source: *Sensor Review*, v 30, n 4, p 324-335, 2010; **ISSN:** 02602288; **DOI:** 10.1108/02602281011072215; **Publisher:** Emerald Group Publishing Ltd.
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Abstract: Purpose - The purpose of this paper is to investigate the impact of radio frequency identification (RFID) deployment at an airport baggage-handling system (BHS). Design/methodology/approach - The impact of number of RFID readers at different power levels with varying conveyor (i.e. baggage-handling conveyors) speeds on timely delivery of baggage is studied via simulation. The layout of the BHS at the Hong Kong International Airport and data pertinent to its RFID deployment in 2005 are used to build the simulation model. The RFID read logic is based on the equations defined as a function of the number of tags and the time the tags spend in the interrogation zone for each reader in order to capture possible read-rate issues realistically. Findings - The identification capability of the BHS studied in this paper is a result of its combined ability to identify tags via RFID technology on straight and circulating conveyors, as well as at the manual recovery station for unidentified bags on circulating conveyors. Overall, timely delivery of bags to gates, as a performance metric, increases as the identification capability is improved. The controllable factors that affect the identification capability are the conveyor speed, which determines the time a tag stays in the interrogation zone; the reader antenna power level, which determines the size of the interrogation zone; and the number of reader antennas in the system that increases the likelihood of not missing tags. This paper shows that "the higher the number of reader antennas and the higher the power level on them, the better" approach is not correct. Originality/value - Unlike typical simulation studies related to RFID deployment where read-rate issues are considered to be non-existent, this paper captures read rate in a realistic manner in the simulation model by incorporating the effect of number of RFID tags in the interrogation zone and time that RFID tags spend in the interrogation zone due to baggage conveyor speed. Such a simulation approach can be used as a system design tool in order to investigate the impact of RFID-specific parameters on system-level performance. © 2010 Emerald Group Publishing Limited. All rights reserved. (48 refs)
Main heading: Radio frequency identification (RFID)
Controlled terms: Airport security - Airports - Antennas - Baggage handling - Computer simulation - Conveyors - Plant layout - Radio navigation - Speed
Uncontrolled terms: Baggage conveyors - Design/methodology/approach - Handling systems - Hong Kong International - Airport - Identification - Performance metrices - Power levels - Radio frequencies - Reader antenna - RF-ID tags - RFID readers - RFID Technology - Simulation approach - Simulation model - Simulation studies - System design - System-level performance - Tracking
Classification Code: 931.1 Mechanics - 723.5 Computer Applications - 716.3 Radio Systems and Equipment - 971 Social Sciences - 716 Telecommunication; Radar, Radio and Television - 431.4 Airports - 402.1 Industrial and Agricultural Buildings - 692.1 Conveyors
Database: Compendex

Data Provider: Engineering Village