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GPS: The 30,000 Foot Overview of Ground Deployment Opportunities

Immediate: Hub Tower Ops – Automated, Remote GPS Monitoring Augments Visual

Knowing where company and vendor ground service equipment is at all times, and automatically logging and pre-flagging missing GSE enables hub airport ramp control and tower operations to meet the operation's and customers' needs most efficiently.

GPS logging records equipment location and availability in realtime, enabling ops to ensure the right equipment is pre-marshalled, and if not, locate and dispatch it in time to meet operational needs and fulfill servicing requirements, on time, and as efficiently as possible.

GPS logging enables business managers to measure, evaluate and assess the utilization of critical business resources and the performance of providers that can impact the effectiveness of their operation and the quality of services delivered.

GPS tracking reduces need for "just in case" assets, while delivering improved service quality.

Immediate: GPS Fleet and Asset Tracking, Safety, Compliance

Logging and tracking powered and non-powered GSE and maintenance equipment in real-time, 24/7 via the web reduces capital asset requirements, fuel costs, labor costs, increases productivity, improves service response, improves safety and security. Verifies quantitative operational risk profiles: engine run hours, miles driven, actual routes taken and speeds driven.

Provides realtime visibility and insight into the asset base, workforce and usage patterns, with alerting parameters and issuance via chosen means on excessive idle time, stop time, speeding, unauthorized vehicle use, allowing management by exception, with automatic generation of usage and exception reports. Improve efficiency by dispatching the closest vehicle and monitoring traffic conditions through a realtime dashboard interface.

Identify operational procedure/policy changes to maximize operational productivity and reduce fuel, labor, insurance and vehicle maintenance costs, while maximizing safety and policy compliance: speed, idling, travel outside authorized areas, unauthorized use, accurate time reporting for utilization and maintenance planning purposes, fuel shrinkage, missed vehicle maintenance schedules, late arrival on station due to inefficient routing, remote vehicle disablement by authorized control consoles/operators.

Overall, GPS is an affordable, versatile and easily implemented solution.

Longer-term: GPS and ADS-B Enablement

Aircraft and ramp operations can utilize ADS-B IN capabilities to capture out-squitter from GSE equipped with GPS tracking devices. Most FAA Hub towers now use ASDE-X airport surface detection radar, which detects out-squitter from enabled GSE as well as aircraft, combining multiple sources – surface movement radar, multilateration and ADS-B OUT – to create a highly accurate, real-time position and identification information of aircraft and vehicles on the airport surface, day and night, in all weather conditions.

FAA Advisory Circular 150/5220-26 describes the requirements for use of this feature that could be attractive to airlines fully adopting ADS-B IN fleet-wide as a part of NextGen, with enabled GSE as well as surrounding aircraft visible on tower ops as well as flight deck situation displays.

http://www.faa.gov/documentLibrary/media/Advisory_Circular/150_5220_26_consolidated.pdf

Longer-term: GIS Use

Because an airline's assets are all inherently mobile and spatial, airlines and airports have of necessity discovered the power of geographic information systems (GIS), which provides a platform to facilitate greater operational efficiency in both time and space dimensions.

As highly utilized, spatially distributed facilities, airports must operate at high levels of performance and efficiency at all hours, in all types of weather conditions. This means that managers have to respond to a wide range of challenges ranging from sustainability, security, regulatory and environmental compliance and operational efficiency, all the while holding down fixed and variable costs. Increasing numbers of airlines and airports turn to GIS to help them manage these complexities.

GIS facilitates combination of a variety of spatial information – digital orthophotos (photogrammetrically corrected aerial photographs), maps, facilities footprints, infrastructure and utilities, equipment marshalling plans – linked with information about those assets.

GIS allows airlines and airport operators to visualize all of their own and specified vendor assets, whether those assets are terminal/ramp facilities, equipment, geo-fenced or access-limited. This gives airline hub tower operations as well as airport managers a common operational picture of all their own as well as key vendor facilities, and thus greater power to effectively and efficiently monitor and control their own operations, whether the task is security, safety, compliance, supplier response monitoring, maintenance activities, or simply knowing where all GSE is currently located.

Incorporating GIS into the enterprise information systems allows the mining of that information for improved decision-making. GIS helps managers do their jobs better, faster, and more efficiently, with reduced "just in case" asset requirement.

ROI studies conducted by Los Angeles World Airports Authority demonstrated that after an initial investment in establishing the technology, it delivered an annual return in excess of 400%. This study did not consider the financial advantages of being able to visualize all airport assets, but rather focused primarily on specific savings associated with LAWA's capital improvement process, reduced change orders, and greater expense and lease billing recapture.

Phoenix Sky Harbor utilizes GIS for facilities management, but also links data to maintenance management systems, keeping track of all work orders and maintenance activities within the terminal, and on the airside as well. Sky Harbor and numerous other airports integrate lease management and maintenance management systems with GIS, helping track all terminal side costs back to its tenants, track all outstanding work orders, and capture all maintenance activities over time. Because GIS helps to integrate these various systems, it also can integrate with document and records management systems, allowing airport managers easy access to contracts, original design drawings from CAD, change orders and other documents, directly from the GIS interface.

Other gateways – passenger and freight/express – are beginning to use GIS together with GPS and RFID to improve equipment, baggage and package tracking and handling through the airport.

Longer-term: Additional Airside Applications

As airports become more and more congested, operators are looking to integrated technologies to help them achieve greater capacity and throughput from constrained facilities. This has led to GPS-equipage of moveable airside assets (GSE, fuel trucks, catering equipment), logging and monitoring vehicles – along with aircraft – in real time through the GIS.

Munich and Frankfurt airports are experimenting with such real time operational systems, designed to optimize the operational efficiency of all ground support activities, with the goal of reducing ground based flight delays. As capacity issues continue to constrain the busiest airports, these approaches will expand in scope.

Finally, the visualization capabilities of GIS are uniquely positioned to help security, safety and operations managers gain a single, common operational view of the entire facility. With the ability to integrate technologies as closed-circuit television (CCTV), real time asset tracking and monitoring, badge access control and tracking for personnel security systems, among others, GIS has become an integral part of many airline/airport security and incident/emergency command centers. These are just a few of the many ways operations managers have implemented GIS to help them improve efficiency and decision-making, ultimately conferring competitive advantage.

Safety, compliance, ensuring high GSE utilization, and reducing costs (cash and opportunity) are concerns GIS and GPS together can address, just as important as operational factors such as knowing exactly who was driving a vehicle, its speed, location and ancillary connections, such as warning lights, door-open, railing-erected or impact/bump/acceleration sensors (a mini-FDR or vehicle data recorder).

These factors are crucial in reducing vehicle down time, prolonging vehicle longevity, and identifying unsafe/risky operating practices that can lead to aircraft and GSE damage.

Multiple approaches are possible; a GPS device in the vehicle to calculate distance traveled, speeds, accelerations; an external electronic "tolling" or geo-fencing system to record times of vehicle passages and trap speed. In both cases, both the external system as well as an FDR-like black box records and stores data onboard. When a driver parks/refuels/recharges, a built-in RFID chip transmits the data to a reader near the marshalling spot/fuel pump/charger, and the data is associated with the vehicle/time/characteristics.

Longer-term: RFID Asset and Access Management

Many U.S.-based operators are actively experimenting with RFID as a fleet management tool. For instance, Wal-Mart is using RFID to track trucks, forklifts, and other mobile devices in Dallas, and it plans to expand its RFID asset-tracking program. Likewise, United Parcel Service is testing a mix of active and passive RFID to monitor vehicle movement and location in New York and Atlanta vehicle-tracking pilots. UPS installed RFID equipment at gates and entry points at facilities, with RFID tags placed on vehicles to monitor their activity at controlled access points as they entered or exited a facility. Walgreens deployed Wireless Asset Net industrial fleet management systems on a fleet of material handling vehicles at a distribution center in Illinois, Walgreens' third such distribution center equipped.

In another airport access RFID application, the Port Authority of New York and New Jersey tendered for an access control system for inflight caterer vehicle access at JFK. The chosen RFID-based system provides automatic identification, validation and logging of authorized vehicles to improve airside security and safety, and reduces dwell time to access the facility. Automatic alerting and paging is activated on a security breach or unauthorized access attempt.

Longer-term: Active Beacon-based ULD and Demurrage Tracking

For American's growing and highly cargo-capable 777 combination fleet, a longer term opportunity to track ULD usage, location, and invoice for demurrage.

Designed for the combination and all-cargo sectors, a web-based interface provides accurate ULD usage reporting, customized alerts and movement tracking even after the ULD has been unloaded at destination, whether online or interline.