Airline Operations Control

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Airline Operations Control

- **System Operations Control**
  - Real-time coordination of all operations and decisions
  - Aircraft flow management and resource (re-)allocation under irregular operating conditions.
- **Dispatch Control**
  - Flight planning, given ATC preferred routes and company constraints/policies.
- **Station Control**
  - Turnaround management of aircraft arrivals/departures on the ground.

System Operations Control (SOC)

- **Coordinates the daily operations of the airline on a dynamic basis.**
- **Objective is to ensure that all flights are operated as close to the schedule plan as possible.**
- **Subject to additional goals and constraints:**
  - ☐ Safety of passengers, crew and aircraft
  - ☐ On time performance measures
  - ☐ Most economical routings and procedures
  - ☐ Provide aircraft for “swaps”, extra sections and charter operations

Typical SOC Functions

- Corporate Command Center
- Flight Dispatch
- Weight and Balance Planning
- Weather Services
- Navigation Database
- Corporate Complaint Resolution
- Crisis Management
- Crew Scheduling and Tracking
- Cargo Operations

Continental's SOCC Goals

- Ensure a safe, on-time and efficient operation
- Monitor weather conditions worldwide; issue weather alerts
- Implement Severe Weather Action Plan (SWAP) as necessary
- Monitor flight irregularities, implement recovery plans
- Quickly return the schedule to on-time after major disruptions
- Communicate effectively with all entities
- Make notifications to senior management and others in a timely manner
- Use Voice Mail System to broadcast routine operational updates

Major SOC Functional Groups

- **Flight Dispatch**
  - Co-responsible with Captain for flight operations
  - Determines route of flight and fuel required
  - Provides weather briefing to pilots
  - Monitors flight operation from origin to destination; provides en route updates as necessary
- **Weight and Balance (Load) Planning**
  - Develops load plan based on forecast passengers, bags, and cargo
  - Plans payload to optimize center of gravity, reducing fuel burn
  - Provides ideal Takeoff Power Settings (TPS) to crew, reducing engine wear and maintenance costs

Major SOC Functional Groups (cont'd)

- **Weather Services**
  - Monitors weather conditions that might affect operations
  - Develops own forecasts predicting time, location and duration of weather events
- **Navigation Database**
  - Develops alternative feasible routes between city pairs on network
  - Maintains accuracy of thousands of routings in database
- **Crisis Management**
  - Assist individuals affected by incidents involving airline operations
  - Coordinate company-wide response to emergency situations

SOC Automation – Load Planning

- **Decision support system that monitors airport temperature, runways in use, changes to payload and passenger bookings.**
- **Automatic re-calculation of load plan to account for weather and load changes:**
  - ☐ Increases load planner productivity to 45 flights per day
  - ☐ Increases airline revenue from added passengers and/or cargo
  - ☐ Enhances fuel efficiency
  - ☐ Results in more consistent load planning decisions
  - ☐ Provides early warning of potential problems

SOC Automation – Aircraft Tracking

- **Aircraft Situation Display**
  - Visual display of airborne commercial and general aviation traffic
  - Provides position, altitude, speed and route of flight
  - Direct data feed from FAA (excludes military traffic)
- **Global Flight Management System**
  - Global Positioning System (GPS) consists of 24 satellites in orbit around the earth at an altitude of 10,900 NM
  - Developed and controlled by US Defense Department
  - Initially to be used for en route navigation – requires signal reception from minimum of 4 satellites
  - Future use for approach capability

Irregular Operations – Causes

- Weather/ATC/maintenance delays
- Diversions – weather/mechanical/medical
- Weight restrictions
- Planned/unplanned fuel stops
- Civil unrest/strikes
- Fuel shortages/facilities problems
- Capacity constraints/airport configurations

Recovery Considerations (CO)

- Number of customers inconvenienced
- Re-protection for the customers
- Special considerations – air/sea groups, sports groups
- Downline impact on other customers
- Complexity of balancing aircraft rotations and crew routings
- Maintenance requirements (Line and/or Base)
- Market integrity (completion factor, on-time performance)
- ATC slot protection (LGA/ORD/DCA)
- Weather considerations – Severe Weather Action Plan
- Route profitability, all else being equal

Ground Operations (Station Control)

- **Overall objective is to ensure completion of schedule plan within company goals for on-time performance without compromising safety.**
- **Process passengers, baggage and cargo subject to numerous operational constraints:**
  - ☐ Limited number of gates, many with constraints on aircraft size
  - ☐ Airport flow limitations on taxiways and runways
  - ☐ Availability of airport and ground crew resources
  - ☐ Weather (both local and en route) as well as airport field conditions
  - ☐ Air traffic control (ATC) congestion and delays

Station Control Challenges at Airline Hubs

- **Ensuring that passengers and baggage make connecting flights.**
- **Decisions to hold or release flights without connecting passengers and/or bags depend on:**
  - ☐ Number of flights from hub to destination
  - ☐ Seats available on subsequent flights to destination
  - ☐ Aircraft schedule/routing for remainder of the day
  - ☐ Local hotel availability and costs for misconnects
- **Some airlines now use optimization tools to make hub operational decisions.**

Minimum Aircraft Turnaround Time

- **To achieve on-time performance, efficient turnaround of aircraft at stations is essential:**
  - “Minimum Objective Ground Time” (MOGT) sets a standard for minimum time necessary to prepare an arriving aircraft for departure on its next flight.
  - Determined with time studies by industrial engineers, and specified for each aircraft type, perhaps differently by airport.
  - Planned schedules typically exceed MOGT at least periodically to allow for additional buffer in case of unexpected delays, to preserve acceptable average on-time performance.

Aircraft Arrival Activities

- **"Above The Wings"**
  - ☐ Pre-position the jet bridge 5 minutes before planned arrival time
  - ☐ Open door and deplane passengers
  - ☐ Cabin interior cleaning
- **"Below The Wings"**
  - ☐ Ensure aircraft ramp is clear of equipment
  - ☐ Stage required ground equipment (baggage carts given aircraft load)
  - ☐ Direct aircraft to gate
  - ☐ Chock wheels
  - ☐ Position baggage conveyors and carts
  - ☐ Unload bags or containers from aircraft holds
  - ☐ Service aircraft lavatories
  - ☐ Replenish potable water

Aircraft Departure Activities

- **"Above The Wings"**
  - ☐ Check in passengers and perform required security screening
  - ☐ Cater aircraft with food and beverages
  - ☐ Process upgrade and standby requests; board passengers
  - ☐ Perform flight close-out – updates passenger records and loads
- **"Below The Wings"**
  - ☐ Load baggage or containers
  - ☐ Perform "walk-around" (visual check of entire aircraft)
  - ☐ Update load plans given final passenger count and cargo volume
  - ☐ Pushback and start aircraft engines
  - ☐ Stage ground equipment for next arrival