23rd Annual Schedulers & Dispatchers Conference
San Diego, CA – January 15 – 18, 2012

Aircraft Performance
& Flight Deck Basics

Wednesday, January 18  1030-1145 am

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Motta Internacional / AM Aircraft Holdings S.A.
Presentation Overview

Aircraft Performance & Flight Deck Basics

• Flight Deck / Aircraft Basics
  – Basic Aircraft Types and Designs
  – Major Aircraft Systems
  – Aircraft Servicing and Ground Support Equipment

• Aircraft Performance & Limitations
  – Basic components of aircraft performance calculations
  – Adverse affects on performance due to weather, altitude, obstacles, aircraft weight, and mechanical discrepancies
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Basic Business Aircraft Types

• Airplanes – Fixed Wing Aircraft
  – Type of Engine: Piston, Turboprop or Turbojet
  – Number of Engines: Single, Twin or Multi-Engine
  – Cabin Size: Very Light, Light, Mid-Size, Super Mid-Size, Large, Long Range, Ultra-Long Range
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Basic Business Aircraft Types

- Helicopters – Rotorcraft or Rotor Wing
  - Type of Engine: Piston or Turboshaft
  - Number of Engines: Single or Twin
  - Purpose: Personal, Utility, Executive or Medevac
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Basic Aircraft Layout

- Flight Deck / Cockpit / Pilots Office
- Cabin / Galley / Lavatory
- Baggage Areas
- Fuel Storage / Aircraft Mechanical Compartments
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Flight Deck Layout and Equipment

• Avionics / Cockpit Displays
  – Primary Displays
  – Standby Instruments
  – Flight Management Systems
  – Engine Instruments
  – Radios
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Flight Deck Layout and Equipment

- Flight Controls
  - Yoke
  - Engine Throttles / Power Levers
  - Rudder Pedals
  - Brakes
  - Nose Wheel Steering
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Flight Deck Layout and Equipment

- Engine Controls
  - Fuel Cutoff Switches or Handles
  - Propeller Levers
  - Engine Fire Shutoff Switches or Handles
  - Thrust Reverser Controls
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Flight Deck Layout and Equipment

• System Controls
  – Wing Flaps
  – Landing Gear
  – Electrics
  – Hydraulics
  – Air Conditioning
  – Pressurization
  – Anti-Ice
  – Lighting
  – Cabin
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Ground Support Equipment

• Specialized Equipment Needed to Service Aircraft
  – Fuel Trucks
  – Tugs, Lektros, Trucks, Tractors
  – External Power Carts – Electric or Air
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Ground Support Equipment

• Specialized Equipment Needed to Service Aircraft
  – Lavatory Service Carts / Trucks
  – Catering and Potable Water
  – Oxygen Service
  – Deicing Equipment
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Basic Business Aircraft Types

• The Role of the Scheduler in Aircraft Servicing
  – Learn and understand the basic service needs of the aircraft you schedule and/or coordinate
  • The type and quantity of fuel: Avgas or Jet Fuel
  • Frequency of required service: Fuel, Lavatory, Anti-Ice
  • Regularly required support equipment at FBOs
    – Ground Electrical Power Carts: AC or DC power
    – Oxygen Servicing
    – Specialized, Unique, or non-standard Equipment
  • Any additional ground time required to service aircraft
Servicing Complete: Time to Go Fly!

Aircraft Performance

• “I’m confused! We could fly into Aspen yesterday, but not today. What gives?”

• “Why can’t I take 8 people to Jackson Hole in June, but I can take 8 people to Jackson Hole in January?”

• “What do you mean that we have to wait until it stops raining? Your pilots are afraid to get a little wet?”

• “I don’t understand why we can’t take the Gulfstream into the same airport that my buddy flies into with his King Air.”
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Aircraft Performance

• Today – Yes…..Tomorrow – No
  – Basic reasons why aircraft performance, climate, airport construction, and passenger or baggage requirements affect aircraft operations
    • Temperature
    • Density Altitude
    • Precipitation
    • Runway Length
    • Aircraft Operational Limitations
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Aircraft Performance

• Standard Day – International Standard Atmosphere
  – Baseline temperature, altitude, and barometric pressure conditions that are used as a reference point for all aircraft take-off, climb, cruise, descent, and landing performance calculations.
    • Temperature: 59° F / 15° C
    • Altitude: Sea Level
    • Barometric Pressure: 29.92” of HG / 1013 Hectopascals
  – In general terms, aircraft performance is better when:
    • the temperatures are cooler
    • the aircraft is at a lower altitude during take-off and landing
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Aircraft Performance

• Types of Contaminants
  – Water
  – Standing Water
  – Slush
  – Dry Snow
  – Wet Snow
  – Compacted Snow
  – Dry Ice
  – Wet Ice
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Aircraft Performance

• Dry Runway vs. Contaminated Runway Definitions
  – FAA Definition of Runway Conditions
  • Dry Runway
    – A dry runway is neither "wet" nor "contaminated" as defined below.
    – A damp runway, which has a moisture layer that is non reflective, is considered to be dry.
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Aircraft Performance

• Dry Runway vs. Contaminated Runway Definitions
  – FAA Definition of Runway Conditions
    • Wet Runway
      – A wet runway is covered with sufficient moisture to cause it to appear reflective, but is not "contaminated" as defined below.
    • Contaminated Runway
      – A contaminated runway has more than 1/8 inch (3mm) standing water, slush, snow, compacted snow, ice or frost covering more than 25% of the required length and width of its surface.
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Aircraft Performance

• Take-Off Performance Detriments Due to Contaminants on Runway
  – Acceleration Limited Due to Water or Snow Accumulation
  – Aircraft Anti-Icing Systems Required to be On for Take-Off
  – Braking during Rejected Take-Off
  – Aircraft Steering and Directional Control
  – Crosswind Factors
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Aircraft Performance

• Landing Performance Detriments Due to Contaminants on Runway
  – Deceleration on Landing (Possible Benefit due to Accumulation)
  – Braking Friction Significantly Reduced
  – Aircraft Steering and Directional Control
  – Crosswind Factors
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Aircraft Performance

- Runway Condition Report
  - Conditions Reported by Previous Aircraft
    - Aircraft Type Affects Validity of Report: Cessna 172 vs. GV
  - Conditions Reported by Airport Operations Staff
    - Quality of Reports Affected by New Precipitation or Removal

- Airport Management Measurements
  - Equipment
    - Tapley Type Decelerometer
      - Towed behind Automobile / Truck
      - Measurement of Braking Coefficient
    - Continuous Friction Measuring Equipment (CFME)
      - Electronic Measurement of Accelerometer Forces
      - Resulting Report: MU Value
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Aircraft Performance

• Dry Runway vs. Snow Covered Runway Example
  – Aspen Departure – Bombardier Learjet 45

<table>
<thead>
<tr>
<th>Normal Dry Runway Take-Off</th>
<th>Snow Covered Runway Take-Off</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature: 32° F – 0° C</td>
<td>Temperature: 32° F – 0° C</td>
</tr>
<tr>
<td>Maximum Gross Take-Off Weight</td>
<td>Maximum Gross Take-Off Weight</td>
</tr>
<tr>
<td>Anti-Ice Systems Off – Normal Braking Perf</td>
<td>Anti-Ice Systems ON – Reduced Braking Perf</td>
</tr>
<tr>
<td>Runway Required for T/O: 6,346’</td>
<td>Runway Required for T/O: 9,300’</td>
</tr>
<tr>
<td><strong>OK to Depart. No Restrictions.</strong></td>
<td><strong>CANNOT DEPART! MUST REDUCE T/O WEIGHT or WAIT FOR SNOW TO STOP</strong></td>
</tr>
</tbody>
</table>

OK to Depart. No Restrictions.
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Aircraft Performance

• Degraded Aircraft Mechanical Status Negatively Affects Operational Performance
  – Anti-Skid Braking Inop
  – Flaps Inop
  – Thrust Reversers Inop
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Aircraft Performance

• Airport and Obstacle Detriments
  – Airport Facility Conditions
    • Runway construction, taxiway construction, aerial equipment used in on or near airport projects
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Aircraft Performance

- Obstacles in Departure or Arrival Path
  - Mountains, Buildings, Antennas, Other Airport Approach Paths
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Aircraft Performance

• What is the Schedulers role in the GO / NO GO decision making process?
  – Schedulers should be aware of the wide variety of factors and variables that can both positively and negatively impact aircraft performance and flight crew planning considerations
  – Proactive Flight Schedulers should build aircraft performance considerations into their operational situational awareness and safety management system programs
  – Schedulers can be an excellent “first line of awareness and/or defense” for both passengers and crews
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Aircraft Performance

• Turning “Tough Decisions” into “Teachable Moments”.
  – Stress Corporate Safety Culture
  – Explain Your Pro-Active Risk Assessment and Risk Management Practices
  – Continue Providing Stellar Service with Viable Alternatives and Options
  – Under Promise and Over Deliver
  – Remember, Sometimes “NO” is the Best Answer!
Flight Deck / Aircraft Basics

Continuing Education – Professional Development

• In closing, while aircraft operations and performance calculations can be challenging, it is no more difficult than coordinating the myriad of details associated with each individual flight.

• As you have already learned, organization, process development, and performance evaluations are critical to success.

• Just as pilots and maintenance technicians attend initial and recurrent training for their specific job functions, it is critical that flight schedulers and dispatchers also are included in training and development.

• Please review the wide range of PDP and SPDP courses that are offered each year at this and other NBAA events.
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