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NBAA Flight Planning Optimization and Fuel Uplift Requirements to Reduce Operational Costs

Agenda

- Optimized Flight Planning:

  Presented by: Marcus Walker, Flight Planning Product Manager, Universal Weather and Aviation, Inc.

- Tankering Analysis:

  Presented by: Omer Majeed, Owner/Engineer, Specific Range Solutions Ltd.

- Making the Decision to Tanker:

  Presented by Chuck Reeves

Optimized Flight Planning

Marcus Walker - Flight Planning Product Manager,

Universal Weather and Aviation

What is an “Optimized Flight Plan”?

What is optimized for Safety?

- Weather
- Reserve requirements
- Runway Analysis, Weight and Balance
- SMS

Compliance

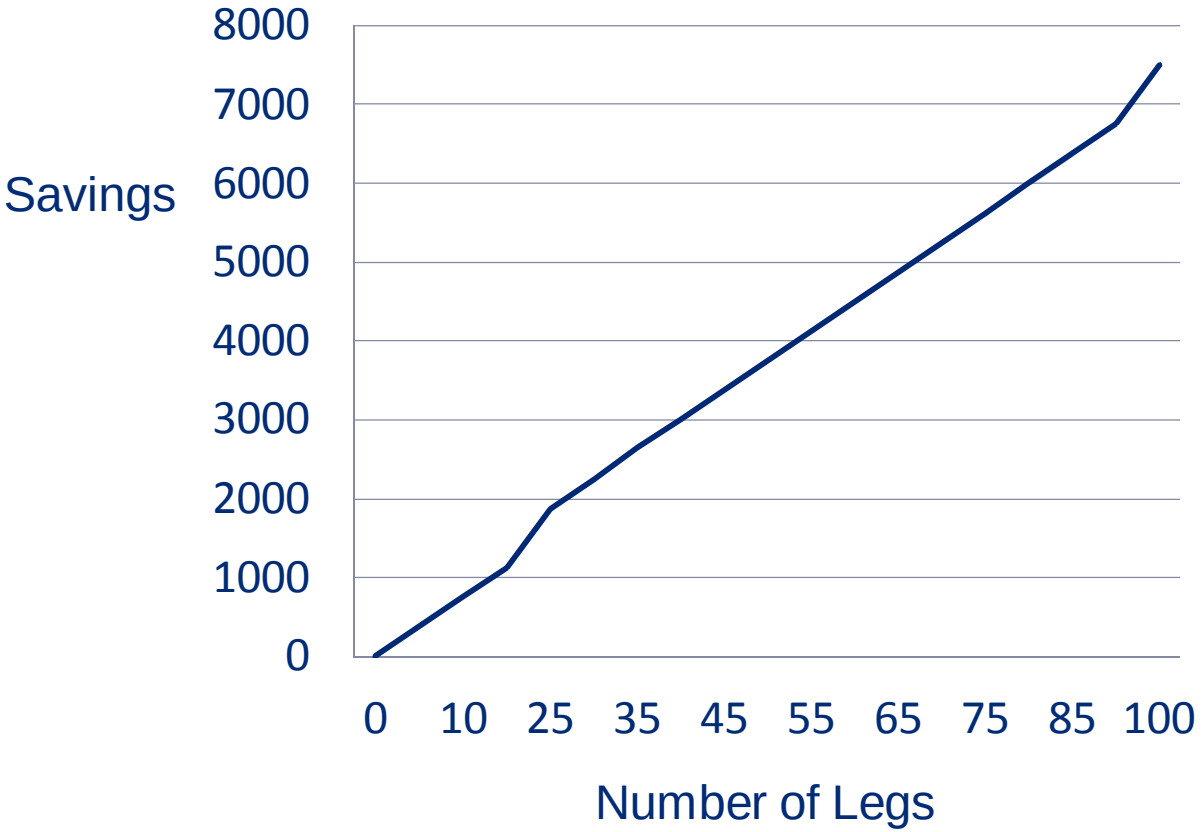
Regulatory

- NOTAMS
- TFRs
- Permits to route on CFP?

Time and Cost

- Accuracy
  - Fuel Burns
  - Time enroute

“Show me the MONEY!”



Next steps

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Fuel Analysis - Tankering?

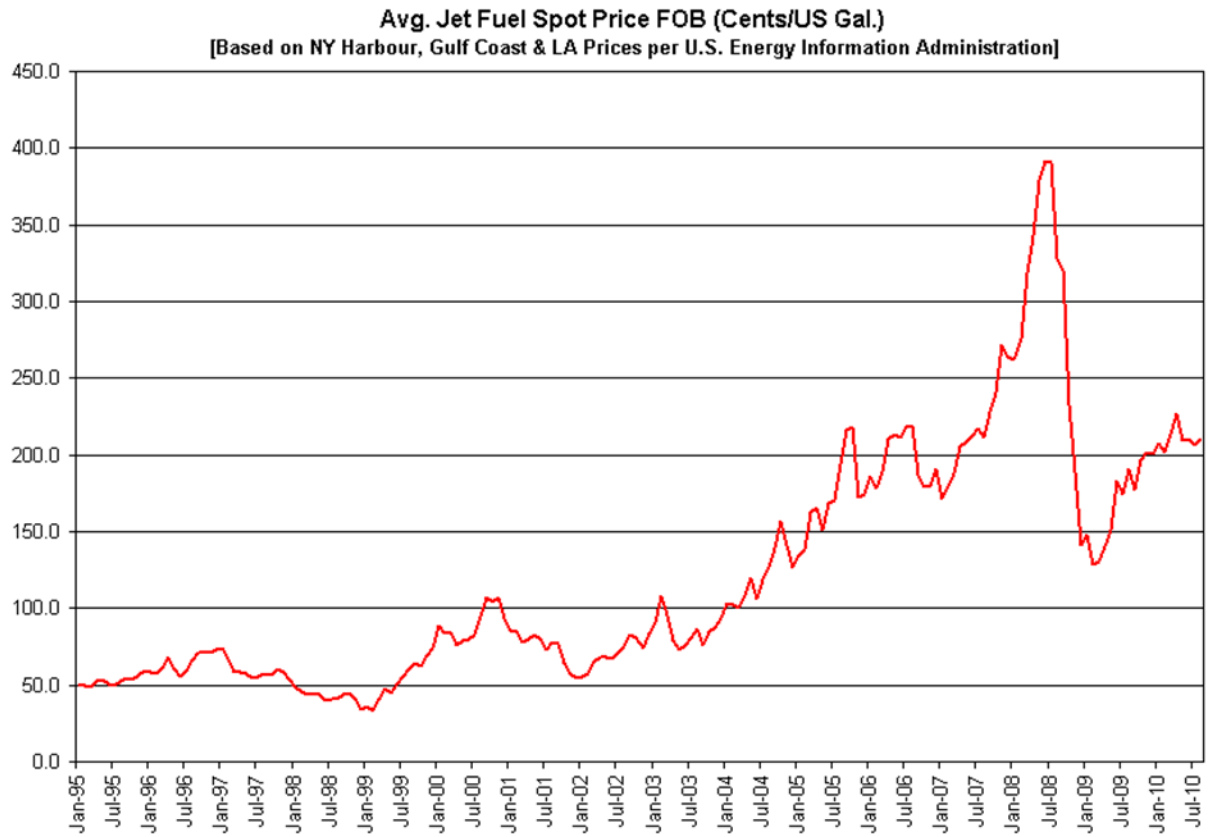
Omer Majeed, Owner/Engineer, Specific Range Solutions Ltd.

Presented at NBAA AM&C Atlanta, GA | October 19-21, 2010

Fuel Tankering - Background

- For more than ten years, fuel prices have been steadily increasing & have also featured considerable volatility.
- Furthermore, there continues to be considerable variation in FBO prices and associated waived facility fee conditions in the U.S.
- Today, fuel represents a significant fraction of operating costs for business aviation operators.
- BA's main value is about maximizing the productivity of its passengers, time is the principal commodity.
- Therefore, getting from A to B safely, but quickly is the typical mission objective. However payload and range remain important flight planning considerations, as well.

Historic U.S. Kerosene /Jet Fuel Price



Source: NY Harbour, Bulf Coast & LA prices per U.S Energy Information Administration

Current Opportunities

- With existing airframes and engines, there are opportunities to save fuel burn and hence costs.
- The IPCC Special Report on Aviation has stated that operational improvements can reduce fuel consumption and associated emissions between 2% and 6%.
- The same report identified 6% to 12% savings in fuel burn through the elimination of constraints in Air Traffic Management (ATM).
- But of the estimated 8% to 18% in total potential fuel burn savings, how much “low hanging fruit” is left?
- Fuel tankering offers the opportunity of immediate fuel cost savings.

Fuel Management Program

- Operators may want to formalize their high-level objectives via a corporate policy document. The scope needs to be commensurate with the needs and the size of their organization.
- The policy could be evolved into a program with control and monitoring performed with a specific data tools.
- Specific guidance via procedures and best practices documents could be developed in each of the four main operational areas:
  - Dispatch/Flight Planning
  - Flight Operations
  - Maintenance
  - Ground Operations
- Fuel tankering would be normally addressed at the flight planning stage, but the flight crew is integral to the process.

Fuel Savings in Operations

- The crew should exercise its discretion where safely possible to reduce unnecessary fuel consumption.
- The challenge for business aviation, compared to scheduled airlines is that SID's, STAR's and routes can often be new (unfamiliar), there are less airport services, often schedules are unpredictable, etc.
- Some suggestions from the airline world:
  - Minimization of APU use on the ground.
  - Use of single engine taxi-out and taxi-in.
  - Maintain a clean wing as long as possible in flight e.g. flaps up as soon as practicable after take-off, avoid use of spoilers in descent.
  - Use Continuous Descent Approaches (CDA) at flight idle from Top of Descent (TOD).
- All actions must be compliant with the AFM and company SOP's.

Fuel Savings in ATM

- High-level objectives of FAA's NextGen strategy are:
  - Make air transportation safer & more reliable.
  - Reduce aviation's impact on the environment i.e. more fuel efficient ops., less emissions and noise.
  - Improve capacity.
- Transformational Programs:
  - Automatic Dependent Surveillance Broadcast (ADS-B)
  - System Wide Information Management (SWIM)
  - Data Communications (Data Comm)
- Airspace enhancements are underway, new RNAV, RNP and LPV/LP procedures are being developed.
- Initiation of "Trajectory Based Operations" focusing on high-altitude cruise operations in en-route airspace. Clearance-based to trajectory-based ops. taking into account operator preferences and optimal airspace system performance.
- For operators, there will be equipage decisions to make.

Fuel Tankering – Rule of Thumb

- Payload burns the equivalent of 2.5% to 5% of its weight in fuel per flight hour depending on the aircraft and the flight conditions. 4% of fuel burn / flight hour is a convenient reference. The payload % fuel burn is therefore purely a function of time.
- To carry 1,000 lb of fuel for 2.0 hr. flight, it will cost (4% / hr * 2.0 hr) = 8% in carried fuel, or 80 lb.
- Therefore, the fuel at the arrival airport must less than 8% cheaper than the price of the payload fuel to justify tankering in the fuel.
- Per the above formula, tankering favours shorter legs as opposed to longer ones.
- The facility and other fees must also be taken into consideration in the price analysis.

Fuel Tankering – Operational Considerations

- The PIC has the ultimate responsibility for deciding to tanker fuel or not based on the specific requirements and conditions of the flight.
- All things being equal, tankered fuel is payload and thus increases the aircraft take-off and landing weights, which in turn impacts performance e.g. the take-off balanced field length and landing distance. External factors such as altitude, temperature, wind, runway gradient, runway condition (dry, wet or contaminated) must also be considered when deciding to carry additional weight.
- If engine thrust needs to be increased due to higher payload weight to safely take-off, there will be a more engine wear and therefore higher engine maintenance costs.
- Finally additional fuel in the tanks can contribute to the extent of non-environmental icing i.e. wing frost at the destination airport depending on the cold soak, as well as ground temperature and dew point.
- The above points are not to discourage fuel tankering, but rather to be considered by both dispatch and the crew in the flight planning process.

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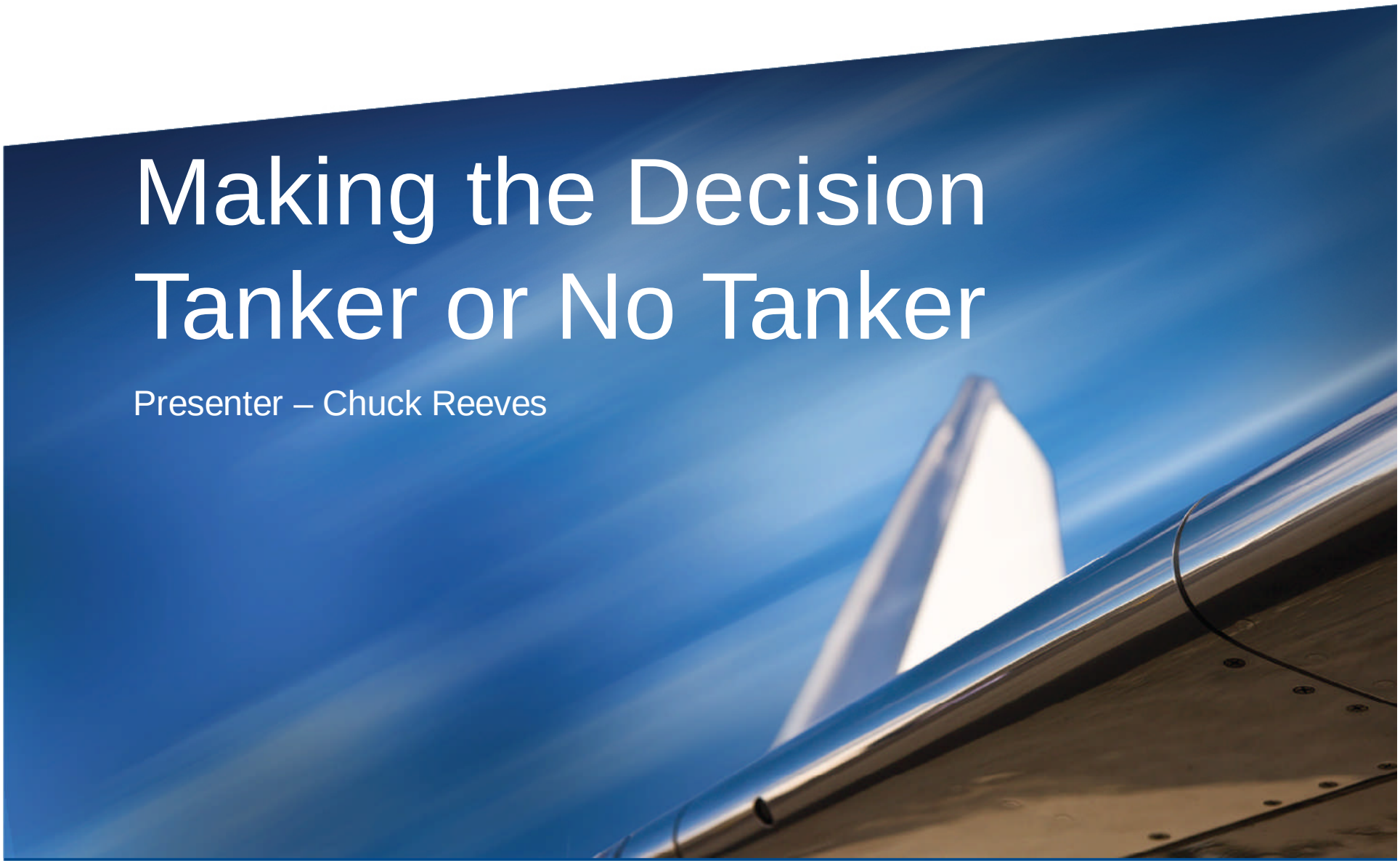
Making the Decision Tanker or No Tanker

Presenter – Chuck Reeves



Fuel Analysis – Worth the effort?

Consider all of your costs

- FBO vs. Contract fuel suppliers
- Cost of fuel at departure
- Cost of fuel at destination
- Cost to tanker the extra fuel
- Cost of the destination facility fee if no fuel purchased
- Amount of fuel upload required to waive the facility fee
- Cost of fuel at the next destination

Fuel Pricing Analysis - Observations

Great opportunity to save big $$

- Potential wide variation in fuel prices between FBO's and fuel suppliers
- Small savings per gallon can offset many other costs
- Even a few minutes of research can save significant $$
- Negotiate with FBO for best fuel pricing
- Don't be afraid to tanker because of perceived costs
- Tankering saves $$ even for shorter trips
- Consider all options available from suppliers and fuel management services.

Compile pricing – analyze by supplier

Location KABC – Airport 1 –Hour from home base FBO: Top Line Services

Facility Fee:$700 + $15 fee (not waivable)
Minimum gallons to waive facility fee: 610
Home base price $3.32

Quantity	Vendor A	Vendor B	Vendor C	Vendor D
1+	5.98	5.97	5.95	5.76
301+	5.87	5.86	5.84	5.65
501+	5.70	5.70	5.68	5.49
1001+	5.59	5.57	5.54	5.38
1501+	5.43	5.42	5.40	5.21

Fuel Suggestion: Tanker and plan to pay the facility and security fees with XXX Card

Source: Flight department compilation

Determine cost to tanker – multiple plans

No Tanker

Flight Plan	Fuel Burn
Optimized	3135
Great Circle	3400
Manual Routing	3300

Tanker

Flight Plan	Fuel Burn
Optimized	3235
Great Circle	3600
Manual Routing	3400

Source: Amounts are examples only

Perform Tanker Analysis – Excel Spreadsheet

Tanker and Facility Fee Analysis

Departure price ($/gal)	$3.18	Taxi fuel (lbs)	400
Destination price ($/gal)	$5.49	Reserve fuel (lbs)	5,000
Next stop price ($/gal)	$3.18	Tanker for next stop (lbs)	3,500
Tanker - NO		**Tanker - YES**	
Trip fuel burn (lbs)	3,169	Trip fuel burn (lbs)	3,235
Departure fuel load (lbs)	8,569	Departure fuel load (lbs)	12,535
Trip fuel cost ($)	$1,694	Trip fuel cost ($)	$1,725
Landing fuel (lbs)	5,000	Landing fuel (lbs)	8,900
		Fuel to be tankered (gals)	582
Destination facility fee ($)	$720	Cost to Tanker ($)	$31
Required to waive fee (gals)	610	Tanker savings (before fee)	$1,313
Take minimum if need > (gals) (Otherwise, pay facility fee.)	298	Net tanker savings (after fee)	$593

Source: Flight department analysis spreadsheet

Questions?

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