Fuel Conservation

IATA Fuel Efficiency Gap Analysis

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717 737 747 757 767 777 MD11 MD80 MD90

IATA Fuel Efficiency Gap Analysis

Individual on-site assessments NOT an audit !

- IATA experts from Flight Operations, Dispatch, Engineering and Maintenance
- Detailed joint analyses of airline procedures and practices
- Comprehensive recommendation report including potential calculation for each action

Fuel Efficiency Calculator

- Flight Operations fuel budget
- Develop the cost of weight

			XXX Fuel Initiative Calculator					
Aircraft Types		US$/gal	US$/kg	Gal	Kg	Liter	Lb	Total Budget
		$1.975	$0.65	$0.000	£0.000	£0.000	£0.000	$1,003,601,943
								£0
Fuel Budget	#	A/C	Flt Hrs	Burn	Kg/Yr	Fuel	Budget	
	A/C	Hrs/Yr	Hrs/Yr	Hr		Price		
xxx	16	4.874	77,984	8,750	682,360,000	$0.650	$443,601,382	
xxx	6	4.204	25,224	6,750	170,262,000	$0.650	$110,687,113	
xxx	13	5.171	67,223	10,000	672,230,000	$0.650	$437,015,882	
Taxi Fuel					5,339,988	$0.650	$3,471,519	
APU Burn			170,431		13,576,469	$0.650	$8,826,046	
							£0	
Total A/C	35		340,862		1,543,768,457		$1,003,601,943	
							£0	

Cost of Weight

- How much does it cost me to carry?
- Newspapers
- Magazines
- New seats
- Fly away kit

Aircraft Type	Cost of Weight	C of W 100 kg
xxx	$2,028	$202,789
xxx	$656	$65,592
xxx	$1,748	$174,806
	$4,432	$443,188

APU - Air Conditioning

- Optimize use of APU
- Single pack
- No packs

APU Single Pack Present Utilization	# A/C	Savings 1 Pack Kg	Act APU Hrs	Tgt Sav kg	Fuel Price	Tgt Sav US$	Target Improvement	Final Savings
xxx	15	65	17,520	1,138,800	$0.650	$740,332	50%	$370,166
xxx	6	35	11,049	386,716	$0.650	$251,404	50%	$125,702
xxx	13	65	31,026	2,016,690	$0.650	$1,311,048	50%	$655,524
	34		59,595	3,542,206		$2,302,784		$1,151,392

Route Optimization

- Legacy Flight Planning Systems
- Enroute navigation charges
- Proper fuel, cost, time optimization

Route Optimization Long Range Flights		A/C	Flt Hrs	Average	Saving	Pot Sav	Target	Final
		Hrs/Yr	Hrs/Yr	Cycle	Per Flight	US$	Improvement	Savings
xxx	16	4,874	77,984	11.22	$500	$3,475,223	50.0%	$1,737,611
xxx	6	4,204	25,224	8.15	$500	$1,547,485	50.0%	$773,742
xxx	13	5,171	67,223	6.5	$500	$5,171,000	50.0%	$2,585,500
	35	14, 249	170,431				$10,193,707	$5,096,854

Idle Reverse Thrust

- Less fuel
- Less noise
- Reduced brake wear
- Better passenger comfort

Idle Reverse on Landing	A/C Hrs	Fuel Flow Full Reverse	Rev Time Sec	Fuel Used kg	Kg/Yr	Fuel Price	Pot Sav US$	Target Improvement	Total Savings
xxx	16	8,750	25	61	422,336	$0.650	$274,560	50.0%	$137,280.09
xxx	6	6,750	25	47	145,077	$0.650	$94,314	50.0%	$47,157.09
xxx	13	10,000	25	69	718,194	$0.650	$466,897	50.0%	$233,448.65
	35				1,285,607		$835,772		$417,886

Flap Settings

- Less fuel
- Less noise
- Better passenger comfort

Reduced Flap Landing	A/C Hrs	Saving per approach	Kg/Yr	Fuel Price	Pot Sav US$	Target Improvement	Total Savings
xxx	16	60	417,027	$0.650	$271,109	0.0%	$0
xxx	6	40	123,799	$0.650	$80,481	50.0%	$40,241
xxx	13	70	723,940	$0.650	$470,632	50.0%	$235,316
	35		1,264,766		$822,222		$275,557

Total *Potential* Savings

- Usually in the region of between 4% - 8% of fuel budget
- Identify high priority items
- Quick wins
- There is no overnight solution
- The alternative is no fun!

Cost Index

- Cost Index can offer an airline a unique **flight path** optimization solution which can save money by achieving more efficient flight operations

- Cost Index systems will enable an airline to achieve:
  - **Minimum cost operations** (Normal Ops) by optimizing the fuel/block time tradeoff
  - **Absolute maximum range** from the aircraft for actual flight conditions (Minimum Burn Ops)
  - **Absolute minimum flight time** for actual flight conditions (Minimum Time Ops)

- In short, Cost Index flying will enable an airline to provide better passenger service and improve the bottom line!

Cost Index (continued)

- The Cost Index is a ratio between the costs of **time** versus the cost of **fuel**
- For instance, operating at very high relative Mach (**High Cost** Index) will increase the fuel cost but the time cost is lower
- Conversely, at lower Mach (**Low Cost** Index), the fuel cost is reduced but time cost increases
- So how are these costs balanced

Cost Index (continued)

- Cost Index = Time Cost/Fuel cost
- The time costs include any item where the flight time has a direct impact on cost such as crew cost, incremental maintenance costs, etc. It is normally expressed in $/min
- Example:
  - Crew cost $ 7.10/min
  - Incremental maintenance $15.70/min
  - Total time cost $22.80/min
  - The cost of fuel is expressed in $/Kg e.g.: $0.60/kg (Metric)
- So the Cost Index should be $22.80/min divided by $0.60/Kg = a Cost Index of 38
- Note: English system: $/hour over cents/pound
  - Or Metric value x 1.33

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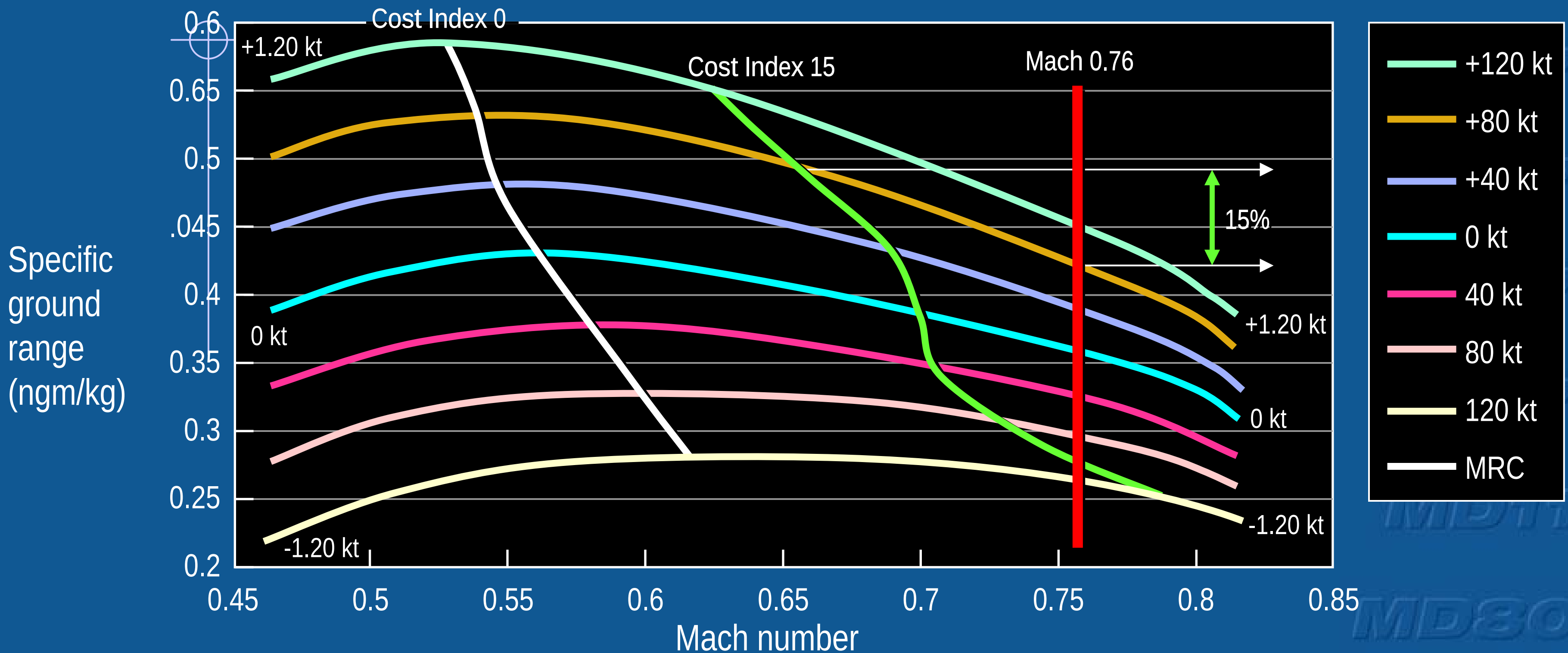
Cost Index (CI)

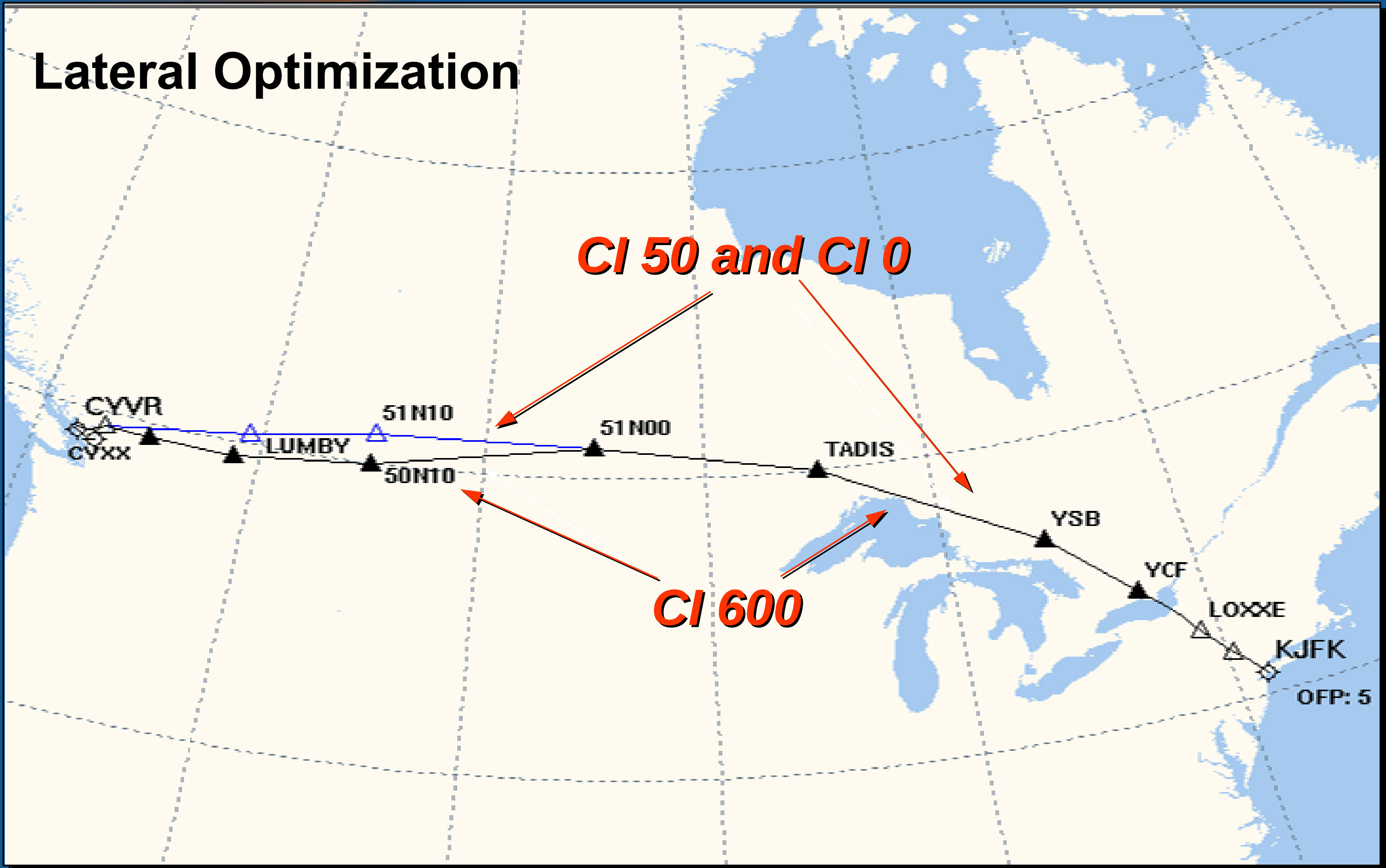
CI solutions for CI=0 and CI=15 versus Mach 0.76
Generic Regional Jet – 42,000 lb – FL290
Specific Ground Range Data



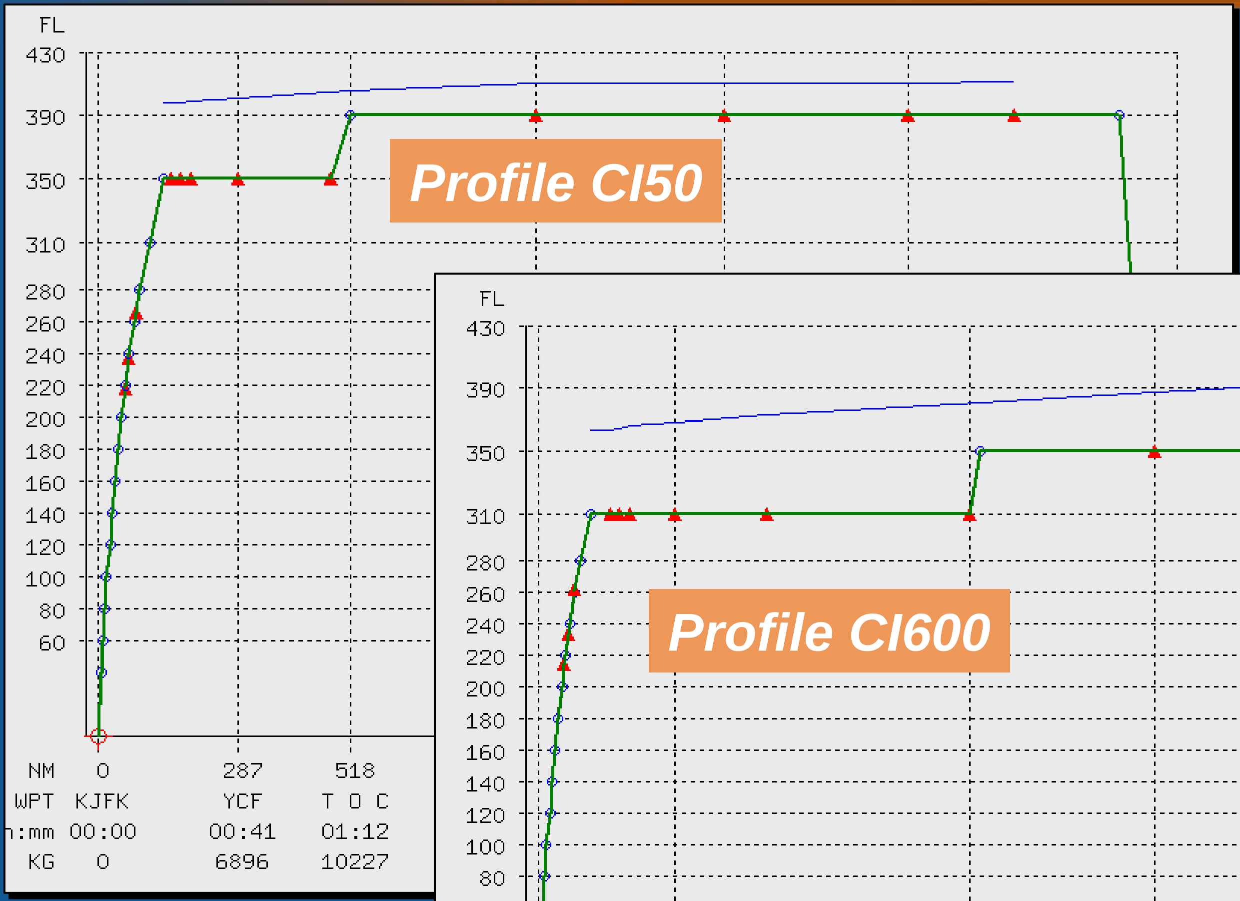
AASI CMC Electonics

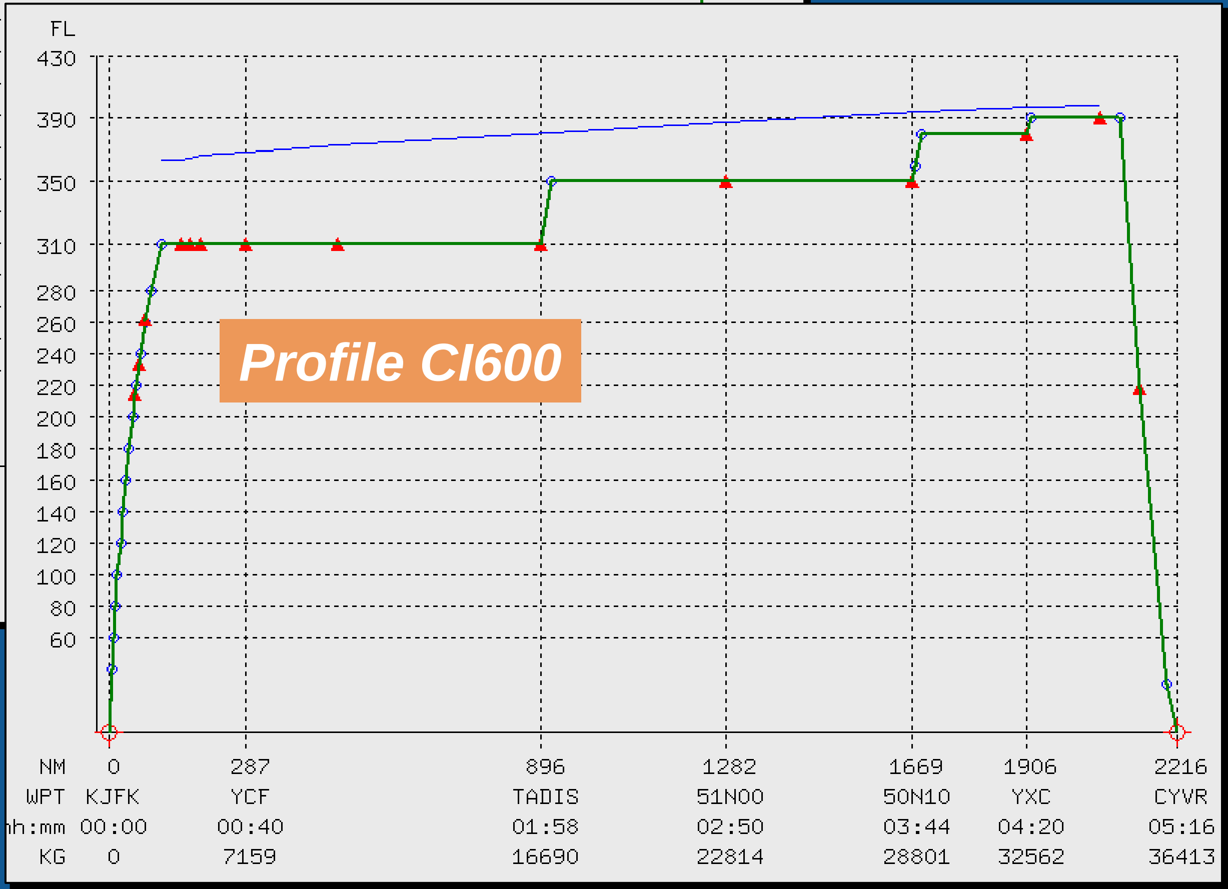
RAA Flight Technical Committee
Cost Index Operations
Melbourne, FL August 19, 2004

Cost Index Profiles



Impact of Cost Index on Vertical Optimization





Cost Index Profile

- As can be seen, airlines that have low time cost structure and high fuel prices should operate at low CI and consequently lower speeds and visa versa
- Since the price of fuel is different at every airport, it would be reasonable to adjust the CI to be route specific
- An efficient flight planning system should have the full range of CI planning capability with appropriate vertical and lateral optimization

Cost Index Calculator

AIR XXX COST INDEX CALCULATOR							
US$/G	US$/kg	US$/Litre	Time	Fuel	Cost Index	CI	
$2.150	$0.708	$0.566	Cost	Cost	Metric	Present	
			$18.59	$0.708	26	90	
A/C Type	Pilots	F/A	Ttl Crew	MTC	Ttl Cost	Total Time	
	Cost	Cost	Cost	Cost		Cost	
	$/Hr		$/Hr	US$/Hr	US$/Hr	US$/Min	
XXX	$439.20	390.22	$829.42	$286.00	$1,115	$18.59	
		Pilots					MTC
Ave	Ave	Ave	Ave	Ave			Avg
Month	Month	Month	Monthly	Hourly			xxx
Pay	Pay	Pay	Hard Hrs	Pay			Pool
Capt	F/O	Cruiser				xxx	$286.00
$15,000.00	$8,300.00	$4,150.00	62.5	$439.20			
		Flt Att.					
		Ave Mth	Total	Total	Total	Avg Hr	
		Hard Hrs	Flt Att	Salary	Salary	Pay	
Purser	Flt Att	In-Flt	On Board	Flt Att	Crew	Crew	
$3,500	$2,050	56.25	9	$18,450	$21,950	$390	

Challenge?

- The biggest challenge most airlines face is managing the subjective additional fuel uplift
- Why do some airlines have it under control?
- They collect and analyze fuel data
- For an airline to be fuel efficient it must track it's use of fuel

Challenge? (continued)

- Additional fuel added over and above the minimum should become a **Company Decision**
- Fuel management becomes corporate policy
- It is added during the planning process

A Statistical Approach

Statistical approach to flight planning is essential:

- To reduce the amount of extra fuel carried above regulatory requirements on certain routes
- To minimized the boarding of ad hoc fuel additives by dispatchers and pilots
- To board the correct taxi fuel and develop correct taxi times
- To monitor gate holds and their fuel costs

A Statistical Approach (continued)

Collect and analyze planned versus actual data

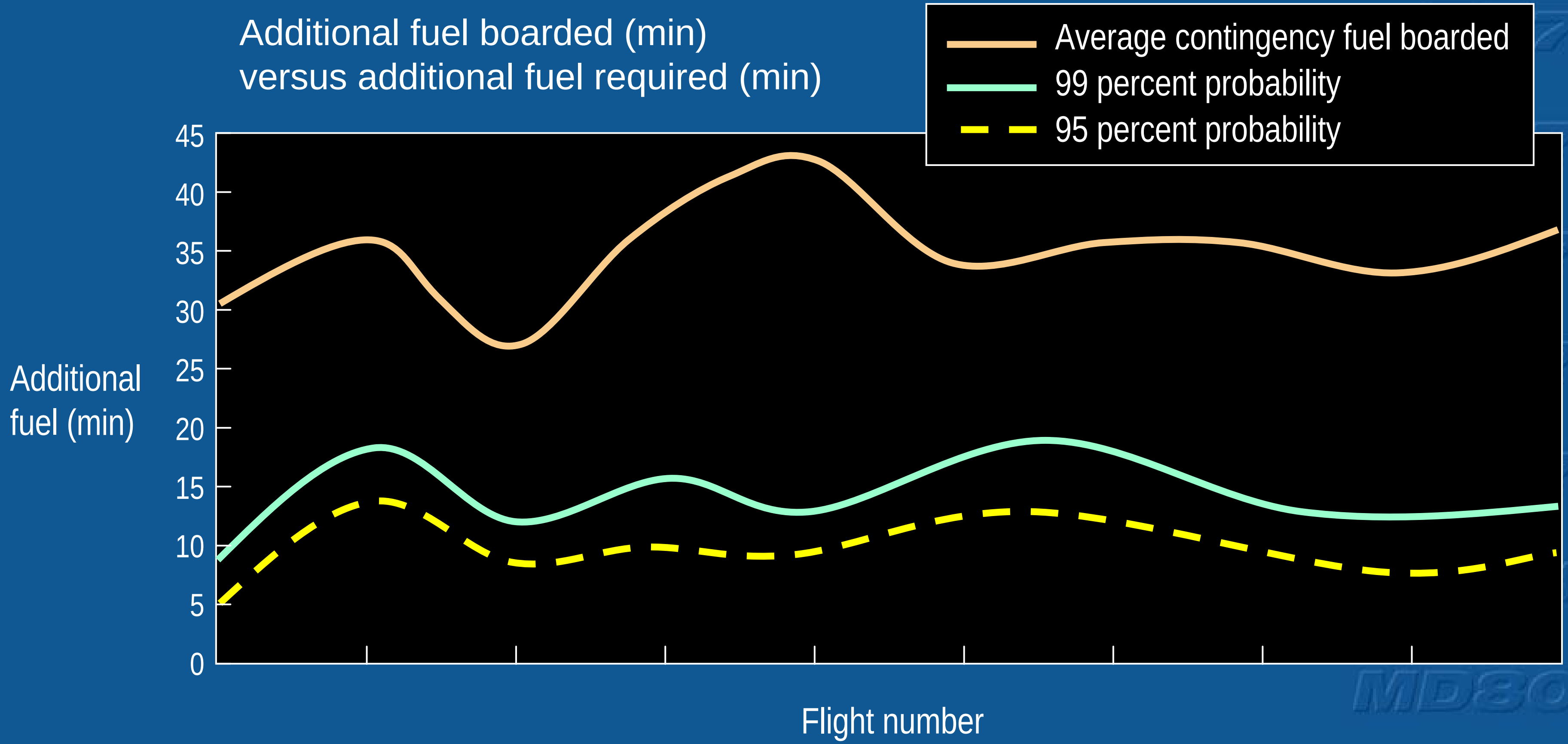
- Ensures consistency
- Will result in less fuel being boarded
- More efficient

Manage what you measure

Measure what you manage

How Much Fuel Do We Need?

Fuel Stats for Airport: LAX



Fuel Policy

Regulations too conservative?

or

Airlines too conservative?

Fuel Policy (continued)

Alternates

- How often do you divert for weather ?
- Do you have a risk management based alternate policy?
  - What is the real risk of a diversion?
- No Alternate IFR ?
  - Europe versus North America

Fuel Policy (continued)

Contingency Fuel

- Some airlines flying with as little as 1% or 2 %
- Some still flying with 10%
- Don't always blame the regulator!
- Be proactive

Fuel Management Information

Many departments will be able to use the information

- Flight Operations
- Flight Dispatch
- Finance
- Scheduling
- Maintenance and Engineering
- Ground Operations

Some benefits from a Fuel Management Information system are:

- Accuracy of the Flight Planning System
- Monitoring landing fuels
- Accuracy of fuel biases
- Use of alternates
- Statistical taxi times
- Statistical fuel planning
- Efficiency of pilots and dispatchers

This will enable you to measure the benefits of any change of the fuel policy

A Coordinated Approach

Break Down the Silo's

A Coordinated Approach (continued)

- A fuel conservation committee/task force should be developed with **cross departmental involvement**
- Include outside agencies
- Airport, ATC, fuel company
- Chaired by a “Fuel Manager”

A Coordinated Approach (continued)

Requirements

- High level support
- Budget
- IT support
- Goals and visions

Fuel Task Force/Committee

- The group should include staff from but not be limited to;
  - Flight Operations
  - Flight Dispatch
  - Maintenance and Engineering
  - Finance
  - Scheduling/Network
  - Ground Operations
  - Safety Management
- This will ensure coordinated training and implementation of new policies and procedures

Fuel Task Force/Committee (continued)

Mission Statement

- Reduce fuel consumption
- Benefit the environment
- Reduce costs/increase profits
- Eliminate waste

Simple Solutions!

A clean flying airplane saves money at little expense

Simple Solutions! (continued)

What's wrong with the picture!

Eight Steps to Fuel Conservation

1. Establish a sense of urgency
   - Identify and prioritize major opportunities
2. Form a fuel task force/committee
   - Work together as a team
3. Create a vision, provide direction
   - Mission statement, eliminate waste
4. Communicate the vision
   - Train and sensitize all staff

Eight Steps to Fuel Conservation (continued)

5. Remove the obstacles
   – Change management
6. Plan for short term quick wins
   – Helps build confidence
7. Track fuel usage
   – Collect and analyze data
8. Measure and manage your success
   – Articulate the results

A Simple Pragmatic Approach

Thank you !

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