

AVIATION OPERATIONAL MEASURES FOR FUEL AND EMISSIONS REDUCTION WORKSHOP

Weight Management

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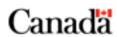


Weight Management



- → Weight effects on fuel and CO₂
- Weight reduction initiatives a few examples
- Tracking weight growth and fuel efficiency
- → Epilogue:
 - ◆To paint, or not to paint that is the question







Conflicts



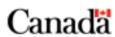
Weight minimisation - easy to see the benefits

BUT....

There are usually conflicts with other policies as well









Why look at weight?









- → A "rule of thumb":
 - → additional fuel requirement:
 - =3-4% of weight increase x hours flown
 - -e.g. extra weight = 500 kg
 - flight time = 10 hours
 - -extra fuel burn = 150-200 kg
 - extra $CO_2 = 470 630 \text{ kg}$
 - ♦For Every Flight!





Fuel cost of Weight









- assuming 5,000 hours/year
 - →extra fuel burn = 87 500 kg
 - \Rightarrow extra $CO_2 = 276 000 \text{ kg}$
 - - and that's just the fuel!
- → Weight control is important







Catering - a lot of weight!















Potable Water



- Aircraft carry potable water in water tanks for use in flight
- Not all are necessarily required, but mostly always filled to capacity











Potable Water



- →Blanking off 1, out of 3 potable water tanks for "medium-haul" B777-200, prevents their use
- → 100kg of water, per flight not loaded
- Annual savings estimated as
 - ♦ 380 tonnes fuel, 1 200 tonnes CO₂









Plastic cutlery



- →Post 11th September 2001
 - Many new measures to improve security
 - ♦ Most add weight
 - One actually reduces weight plastic cutlery











Plastic Cutlery





CCA IATA

- → Using one route as an example
- → Weight reductions (LHR-NY):
 - Concorde 34.26 kg
 - B747-400 32.60 kg
 - B777-200 34.40 kg
 - ♦ Equates to: 52 t/yr fuel (\$ 13k)
 - \diamond 165 t/yr CO₂





Conflicts



BUT THEN WHO LIKES EATING WITH PLASTIC CUTLERY?







Plastic Gin Bottles



- → Duty Free bottles of Gin
 - Opportunity to substitute plastic bottles for glass ones
 - Weight saving approx. 0.5 kg per bottle
 - Average of 12 bottles carried on each Long-haul flight







Plastic Gin Bottles









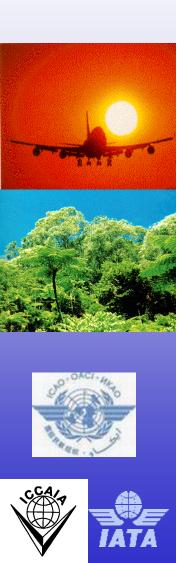
- → Total annual fuel savings for Long-haul flights
 - \Rightarrow B747-200 = 4.7 tonnes
 - \Rightarrow B747-400 = 51.2 tonnes
 - \Rightarrow B777-200 = 39.3 tonnes
- → Total fuel saved = 95.2 tonnes
- \rightarrow Total CO₂ saved = <u>300.3</u> tonnes







No Conflicts?



Gin unaffected!

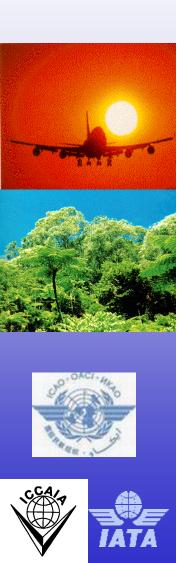
Conclusion:

Help the Environment, Buy Duty Free on board





Modifications



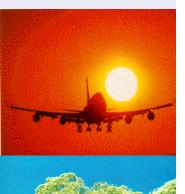


Aircraft Panel Ottawa, 5-6 November 2002





Concorde - weight goes up



- → Additional weight due to:
 - →Fuel tank liners 400 kg
 - ♦ Unusable fuel 200 kg
- → Total extra weight:
 - ♦600 kg per aircraft











Concorde - weight goes down



- → Reduction in weight due to:
 - ♦New cabin interior 350 kg
 - ♦New tyres 164 kg
- → Total weight reduction:
 - ♦514 kg per aircraft











Concorde - weight the same?

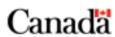


- →Weight change summary:
 - ♦Increase 600 kg
 - →Reduction 514 kg
 - ♦Overall <u>86 kg</u> increase



Modifications can make a difference!







Modifications















Modifications



- Modifications usually <u>add</u> weight
- →Important to ensure that mods are <u>fully</u> removed when no longer required!
- One of the reasons for unaccounted weight growth













Monitoring and Control









measure

- ♦ Modifications (mandatory & other)
- Unaccounted weight growth
- ♦ Tankering of fuel
- ⇒Extra fuel requirement, Emissions
- →Extra expense, less profit!







Monitoring and Control









- \rightarrow
- ♦ track aircraft weight over time
- monitor the actual weight of mods
- Fuel Efficiency Group
 - track aircraft fuel efficiency over time
 - ♦ Allows the use of statistical contingency fuel (worth \$7M per year to BA)
- → Saves fuel/money/Environment







Paint - who needs it?









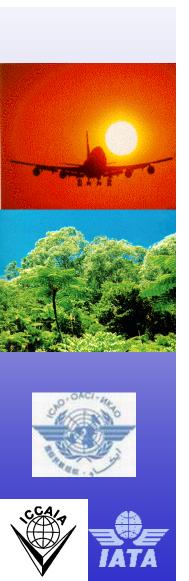
- →Paint weighs a lot!
 - ♦ A320-200, approx. 110 -150 kg
 - ◆B747-400, approx. 410 550 kg
- →But it also provides a service:
 - ♦ Protection helps prevent corrosion
 - ♦ Ensures a smooth surface
 - Provides an identity







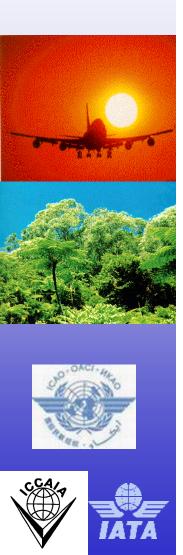
So - who does need paint?











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Thank you!

