IEQ in Transportation

IA2008 Sessions

Th10T3; Th13T3; Th15T3

Forum Fr10F8

Summary by D.P.Wyon, A.Melikov

Transportation type:

- Road vehicles: 13
- Rail and subway: 5
- Ships: 1
- All of the above: 1
- Airplanes: 17

- 46% airplane cabins, 54% surface transport

Topic of papers:

- Thermal conditions: 12
- Air quality: 25

  (of which 3 on health, 1 on wine)

- 32% Thermal, 68% IAQ

Origin of the papers:

- Asian countries: 18
- Europe 9
- USA 7
- South America 2
- Australia 1

NB: Many papers from USA, Europe were by Asian authors working abroad

Health

- **Coleman & Nazaroff** show intake of ozone oxidation products reach levels of concern in airplane cabins (20 micrograms)
- **Xi Chen & Qingyan Chen** identified the most effective way to decontaminate an airplane cabin (by blowing in air and disinfectant chemicals through the front doors and out through the rear doors)

Health

- **Wan, Chao & colleagues** used a compressed-air sneeze simulator to examine the dispersal of sneeze droplets in an airplane cabin (60-70% onto seats, floor)
- **Bhangar & Nazaroff** calculated *iF*, the proportion of pollutants released that are inhaled, as 2% for pathogens in airplanes

  (Ozone 1%, Non-reactive pollutants 3%)

Bad news

- **Maneerat Ongwandee** found pollution levels in public transport in Bangkok (in buses, rail cars, river boats) were worse than corresponding values published for Hong Kong, Guangzhou, Mexico City or Detroit
- **Sun-Sook Kim and colleagues** found pollution levels very high in a Korean bulk chemical transporter ship

Good news

- **Sun-Sook Kim & colleagues** found pollution levels in a Korean passenger ship would be acceptable on land
- **Conceicao & colleagues** found pollutant levels in an Embraer passenger airplane were satisfactory during revenue flights

Old news

- **Macgregor & Myers** measured in-flight cabin conditions in the on-going ACER-Battelle study for ASHRAE 1272-RP (averaging 25°C, 11%RH, 2000m pressure), and found much lower ozone levels in the cabin air than in the intake air, indicating that oxidation reactions are taking place

New solutions

- **Young-min Cho & colleagues** reported on a new air-cleaning unit for rail cars that removes CO2 as well as particles, and on a seat-cover catalyst that reduces emissions
- **Zhang Yufeng & colleagues** reported that active control of seat contact surface temperatures can increase the thermal comfort range

Methodology described for:

• Gas-Phase pollutants	in 12 papers
• CFD analyses	8
• Thermal conditions	8
• Thermal comfort	6
• Airborne particles	5
• Air velocities	3
• Wine tasting	1

Value added

- These 3 sessions have reported more and more practically useful research on IEQ in Transportation Environments than in previous Indoor Air conferences
- The authors are to be congratulated