

Thermal Acoustic Insulation Contamination

Cologne
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Thermal Acoustic Insulation Contamination

This presentation summarises some of the work carried out to investigate the threat that might exist from contaminated Thermal Acoustic Insulation materials and the initiatives that have been taken to mitigate that threat

Thermal Acoustic Insulation Contamination

- ❖ *In-flight fire Occurrences*
- ❖ *Contaminants experienced in Service*
- ❖ *Testing*
- ❖ *Industry Initiatives*
- ❖ *Strategies for mitigation of the contaminant threat*

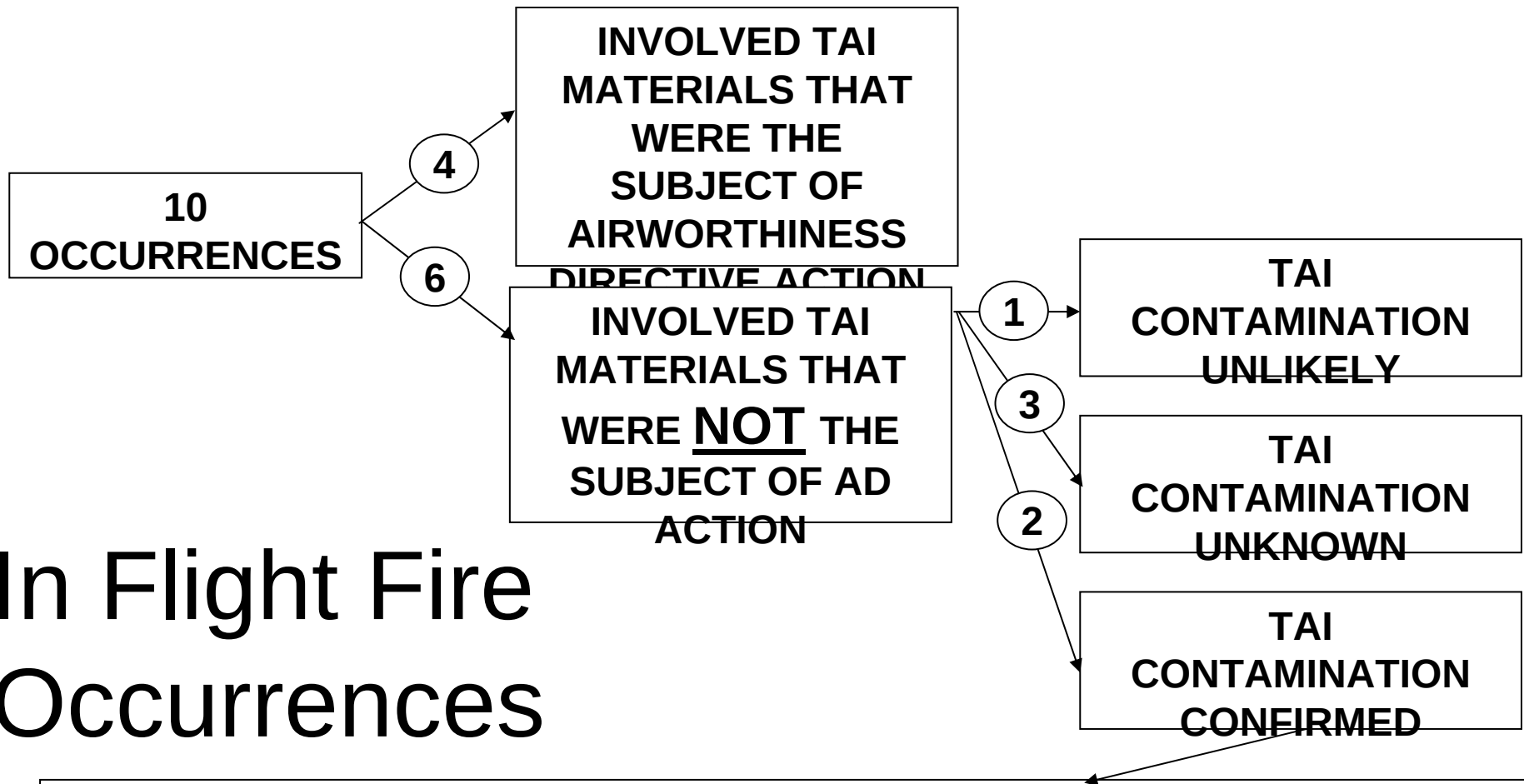
•Boeing 767 May 2002



In Flight Fire Occurrences

- ❖ *However, positive identification that contaminants played a part in the other most significant in-flight hidden fires that occurred over the period 1991 to 2004 cannot be confirmed.*

Date	Aircraft Type	Contamination Involvement	Occurrence Involved Material which was subsequently the subject of AD action
10-Aug-02	B747-436	environmental dust, fibres and corrosion inhibiting compound	NO
13-May-02	B767-300	<i>Paper, candy wrappers, Styrofoam packing peanuts, small polyethylene beads, rubber powder from a PDU and isoparaffin solvent.</i>	NO
29-Nov-00	MD-80	UNLIKELY	YES
29-Nov-00	DC-9-32	UNKNOWN	NO
15-Nov-00	B757-236	UNLIKELY	NO
08-Aug-00	DC-9-32	UNKNOWN	NO
17-Sep-99	MD-88	UNLIKELY	YES
05-Sep-93	B727-200	UNKNOWN	NO
02-Sep-98	MD-11	UNKNOWN	YES
24-Nov-93	MD-87	UNKNOWN	YES



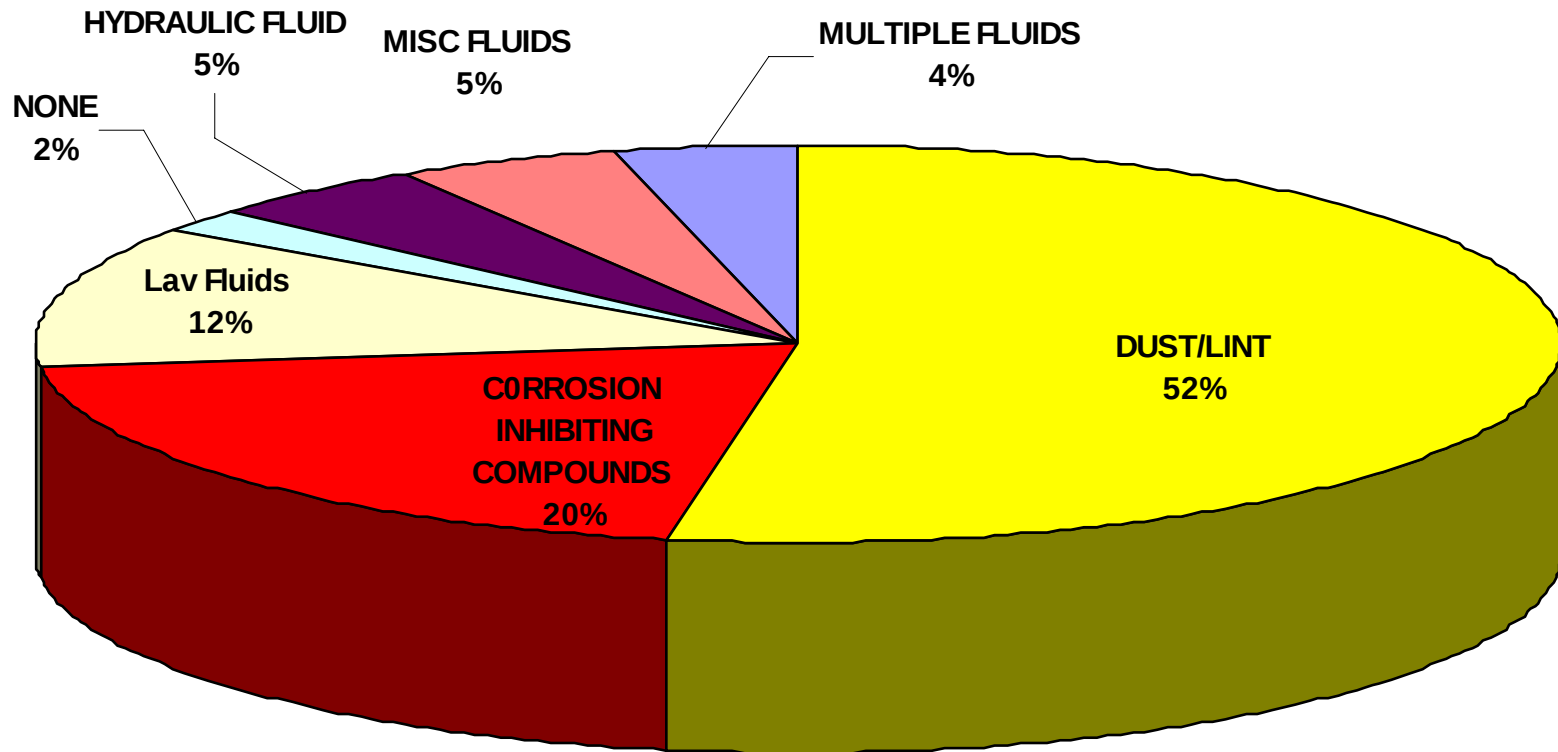
In Flight Fire Occurrences

- ❖ DUST
- ❖ CORROSION INHIBITING COMPOUNDS
- ❖ DEBRIS
- ❖ ISOPARAFFIN (POSSIBLE CLEANING FLUID OR INSECTICIDE)

Contaminants experienced in service

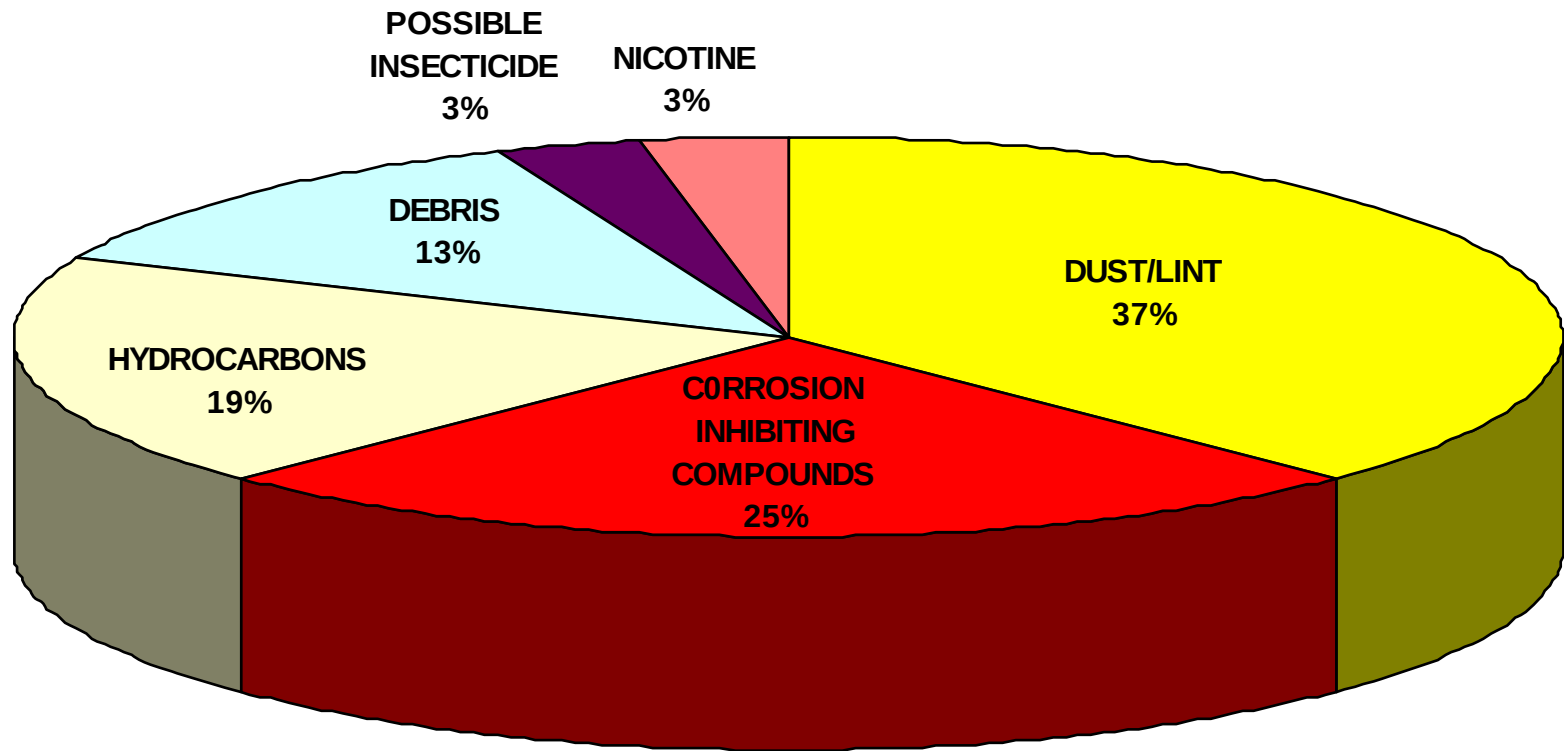
- ❖ *Approximately two thirds of the contaminants found on Thermal Acoustic Insulation Blankets are Dust/Lint and Corrosion Inhibitors. The remainder are largely miscellaneous fluids predominantly hydraulic fluids, oil, grease and lavatory fluids.*

Contaminants experienced in service

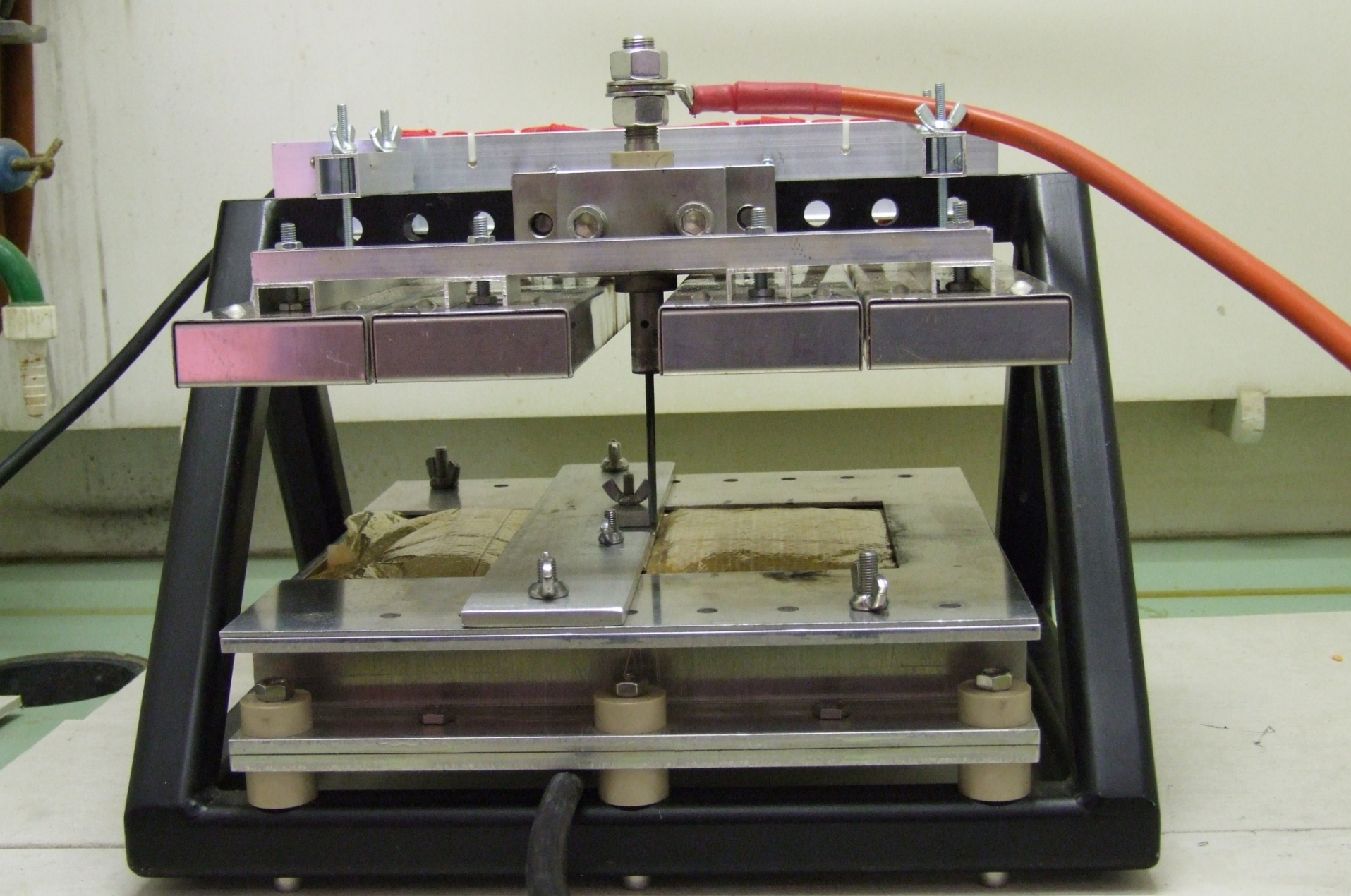


BOEING SURVEY RESULTS

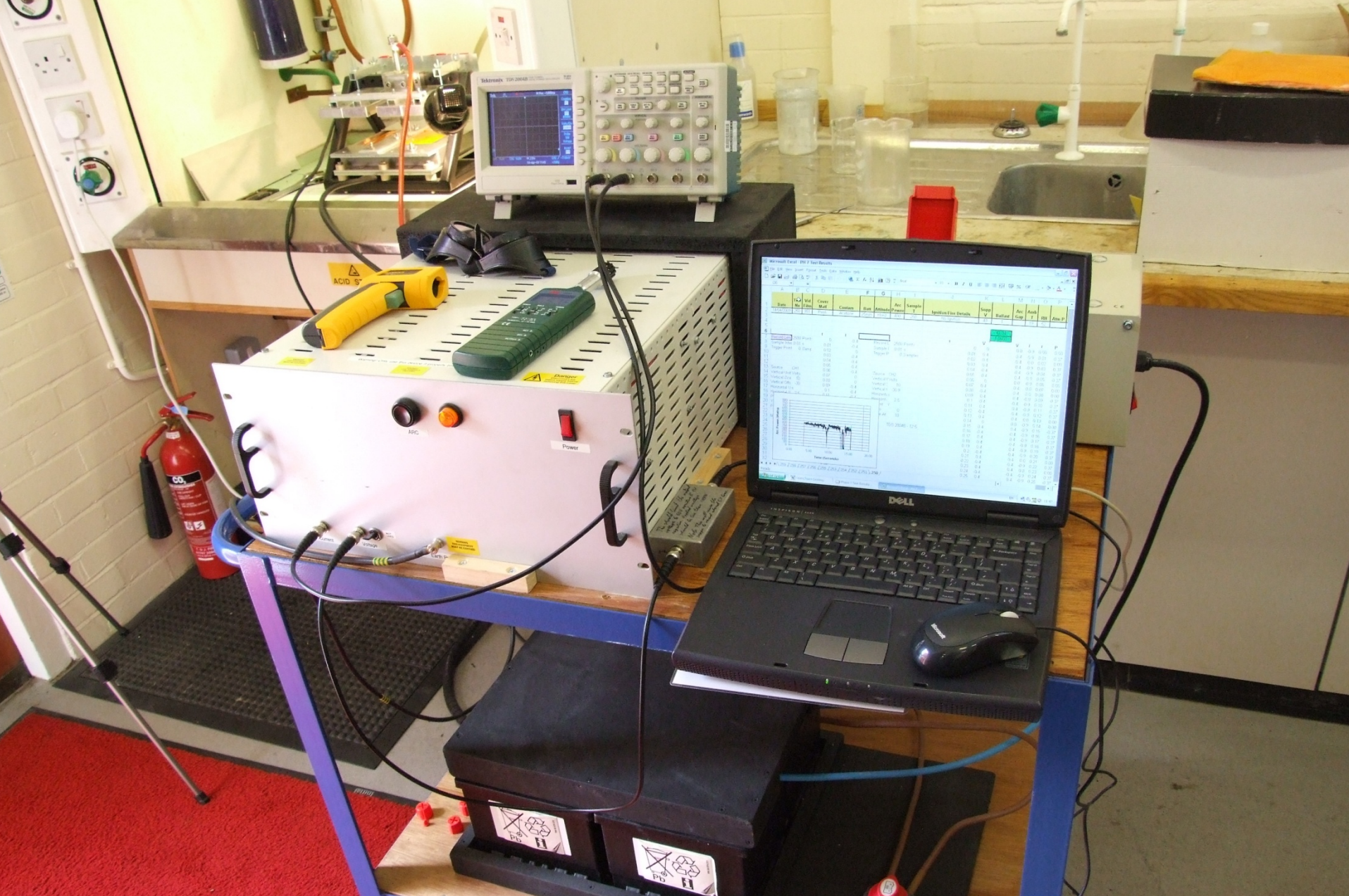
Contaminants experienced in service



IN-SERVICE HIDDEN FIRE OCCURRENCES



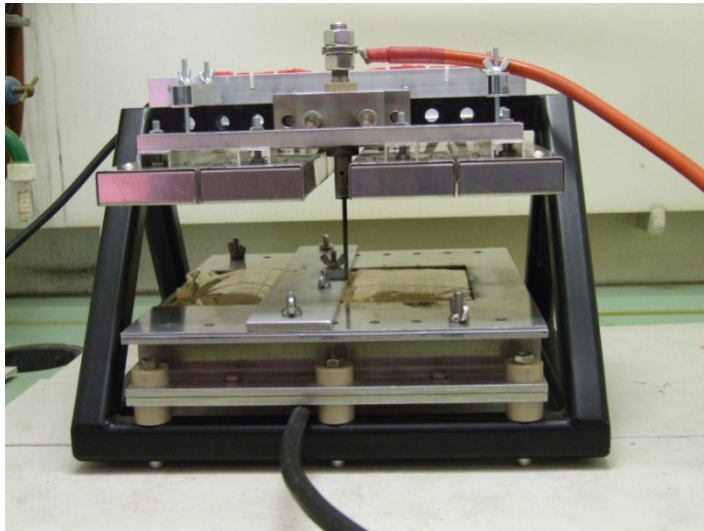
Transport Canada – Arc Fault Test Rig



Transport Canada – Arc Fault Test Rig

Testing

- ❖ *There is reasonably good correlation between the test results from the Radiant Panel and those obtained from the Transport Canada Arc Fault Test Rig at ambient temperatures of 200° C.*



Testing

TAI LINER MATERIAL	ARC FAULT TEST RIG			RADIANT PANEL	
	Ambient	100° C	200° C	Boeing	Airbus
Polyimide	P	P	F	F	
PET	P	P	F	F	
MPVF	P	P	P	P	
PEEK	P	P	F		
PEKK	P	P	F		

Corrosion Prevention Compounds – Non-Waxy

Testing

TAI LINER MATERIAL	ARC FAULT TEST RIG			RADIANT PANEL	
	Ambient	100° C	200° C	Boeing	Airbus
Polyimide	P	P	F		
PET	P	P	F		
MPVF	P	P	P		
PEEK	P	P	F		
PEKK	P	P	F		

Corrosion Prevention Compounds - Waxy

Testing

TAI LINER MATERIAL	ARC FAULT TEST RIG			RADIANT PANEL	
	Ambient	100° C	200° C	Boeing	Airbus
Polyimide	P		P		P
PET	P		P		
MPVF	P		P	P	F/P
PEEK	P		P		
PEKK	P		P	F	

Cleaning Fluids - Acetone

Testing

TAI LINER MATERIAL	ARC FAULT TEST RIG			RADIANT PANEL	
	Ambient	100° C	200° C	Boeing	Airbus
Polyimide	P				
PET	P				
MPVF	P			P	
PEEK	P				
PEKK	P			P	

Cleaning Fluids – Isopropyl Alcohol

Testing

TAI LINER MATERIAL	ARC FAULT TEST RIG			RADIANT PANEL	
	Ambient	100° C	200° C	Boeing	Airbus
Polyimide					
PET					
MPVF				P	
PEEK					
PEKK				F	

Cleaning Fluids – Citra-Safe

Testing

TAI LINER MATERIAL	ARC FAULT TEST RIG			RADIANT PANEL	
	Ambient	100° C	200° C	Boeing	Airbus
Polyimide		P	P		
PET		P	P		
MPVF		P	P		
PEEK		P	P		
PEKK		P	P		

Hydraulic Fluids – Skydrol LD-4

Testing - Conclusions

- ❖ *Of the contaminants tested Corrosion Inhibiting Compounds appear to perform least well in terms of flammability (It should be noted that the fire threat they might present is likely to be a function of the extent of the contamination – representative levels of contamination on in-service aircraft are unknown)*
- ❖ *Further Testing is required on Cleaning Fluids*

Industry Initiatives

- ❖ *Much work has already been carried out by the industry in providing guidance to aircraft operators on the maintenance practices to be adopted to reduce any fire threat from contaminated Thermal Acoustic Insulation.*
- ❖ *The industry initiatives introduced under the Enhanced Zonal Analysis Procedures would seem to provide a practical solution to mitigating the threat from contaminated Thermal Acoustic Insulation materials.*

Strategies for Mitigation of the Contaminant Threat

Suggested Mitigation

- ❖ *Dust, Lint, Debris, grease, oils, hydraulic fluids, insecticides, etc. – DIRECTED CLEANING TASKS*
- ❖ *Corrosion Inhibiting Compounds & Cleaning Fluids - FURTHER TESTING TO DETERMINE THEIR RELATIVE FLAMMABILITY.*

Recommendations

- ❖ *the industry groups responsible for developing maintenance practices should be provided with the test results carried out under the auspices of the IAMFTWG Task Group so that they may be used to provide guidance in assessing the potential for combustible materials being present in each of the aircraft zones.*

Recommendations

- ❖ *the FAA should be requested to extend the guidance given in AC 25-27 regarding contamination by Corrosion Inhibiting Compounds of electrical wiring systems to also address Thermal Acoustic Insulation Materials.*