Presented by

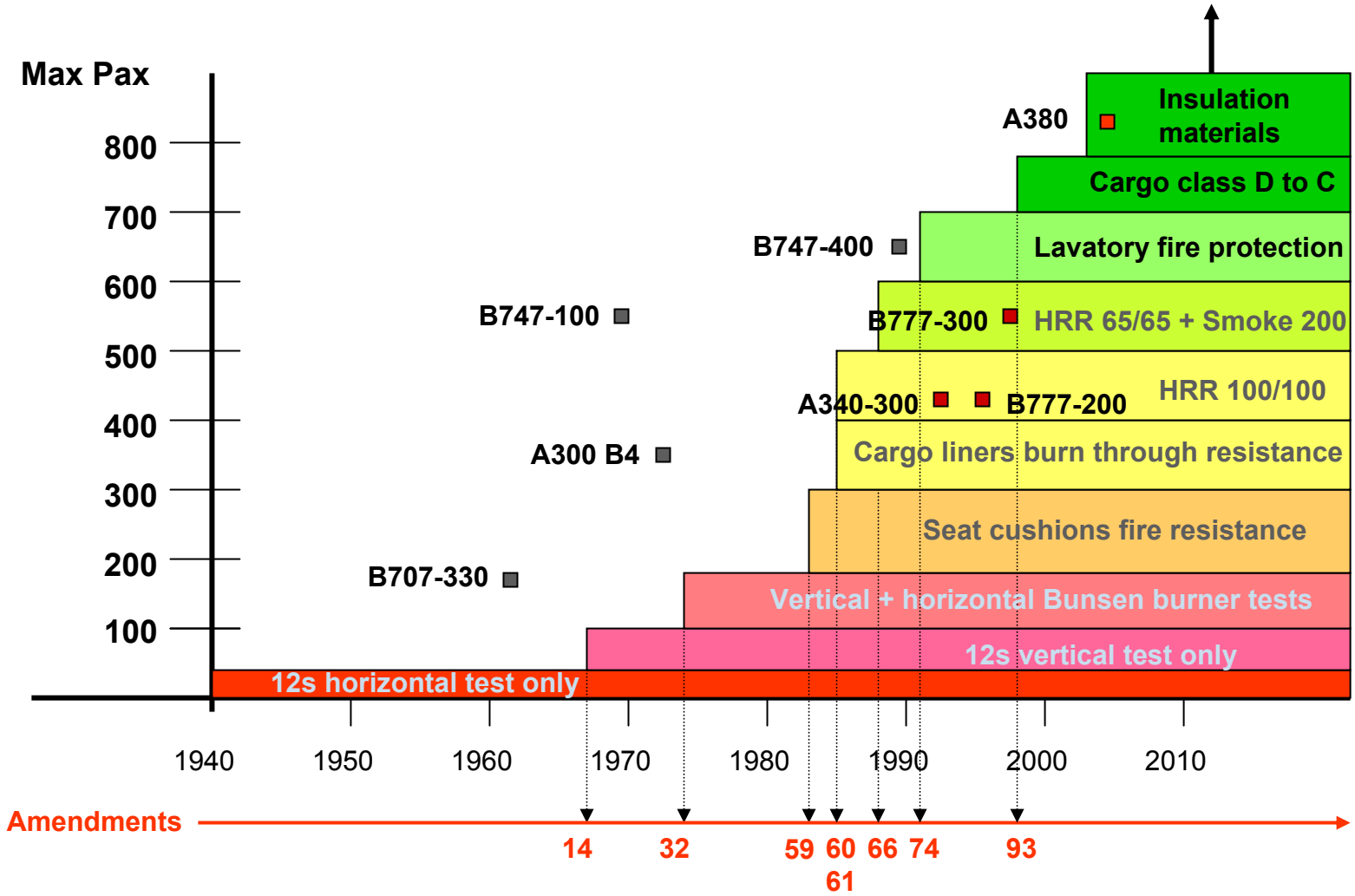
Theo Klems
Airbus

UP-DATE ON AIRBUS FIRE SAFETY RESEARCH AND DEVELOPMENT

Contents

Introduction

A/C Size / Regulation Evolution



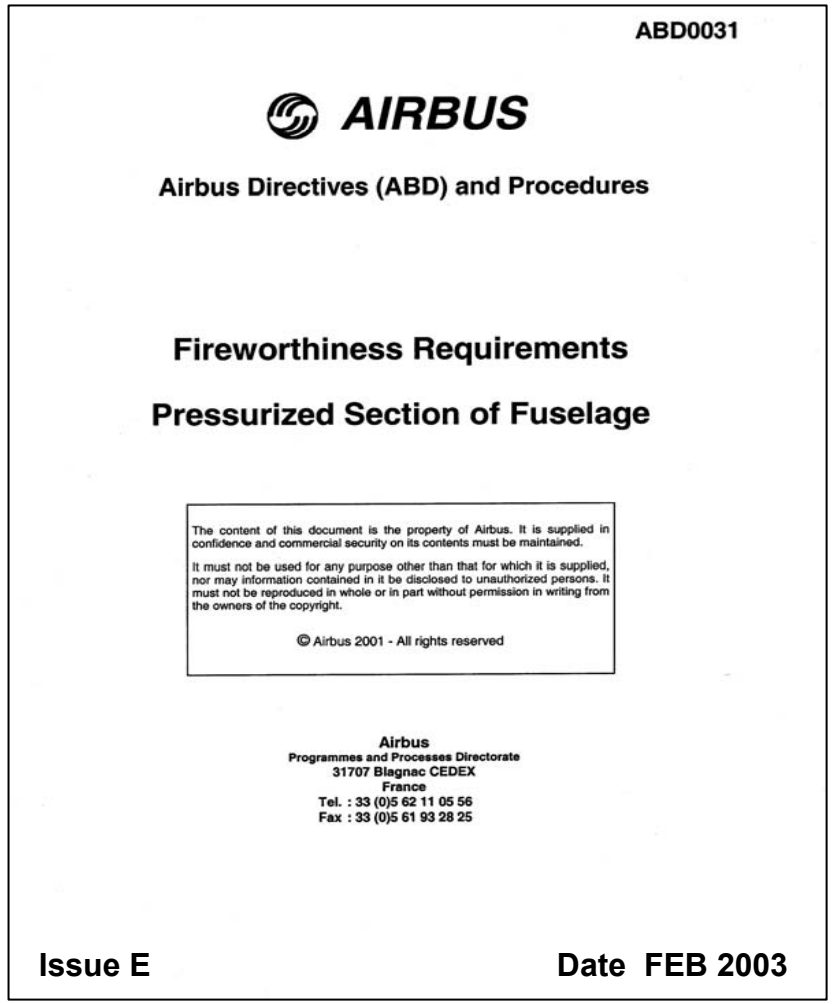
Introduction

Airbus Fire Safety Specification

Airbus Internal FST Requirements

Airbus Directive (ABD 0031) contains fireworthiness design criteria for use inside the press-urized section of the fuselage.

More stringent requirements for smoke emission and toxic gases



ABD0031

AIRBUS

Airbus Directives (ABD) and Procedures

Fireworthiness Requirements

Pressurized Section of Fuselage

Airbus
Programmes and Processes Directorate
31707 Blagnac CEDEX
France
Tel. : 33 (0)5 62 11 05 56
Fax : 33 (0)5 61 93 28 25

Issue E Date FEB 2003

F-S-T Requirements

FAA/EASA

- 60 s Flammability
- Heat Release
- Smoke emission

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Side wall panel

- 60 s Flammability
- Heat Release*)
- Smoke emission *)
- Toxicity

*) **more stringent requirements**

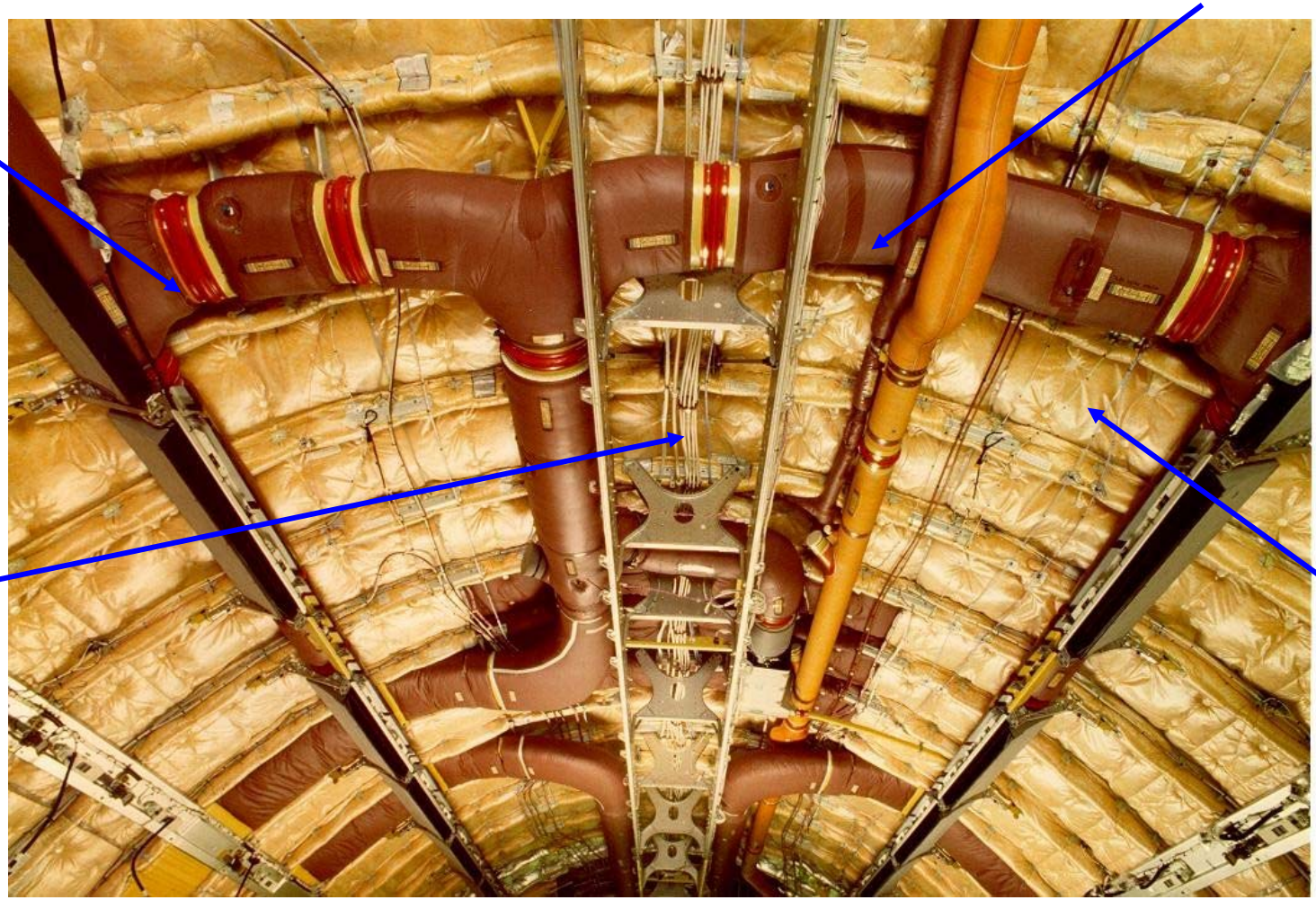
- 60 s Flammability
- Heat Release
- Smoke emission test

Overhead Bin Door

- 60 s Flammability
- Heat Release*)
- Smoke emission*)
- Toxicity

Introduction

Airbus Fire Safety Specification



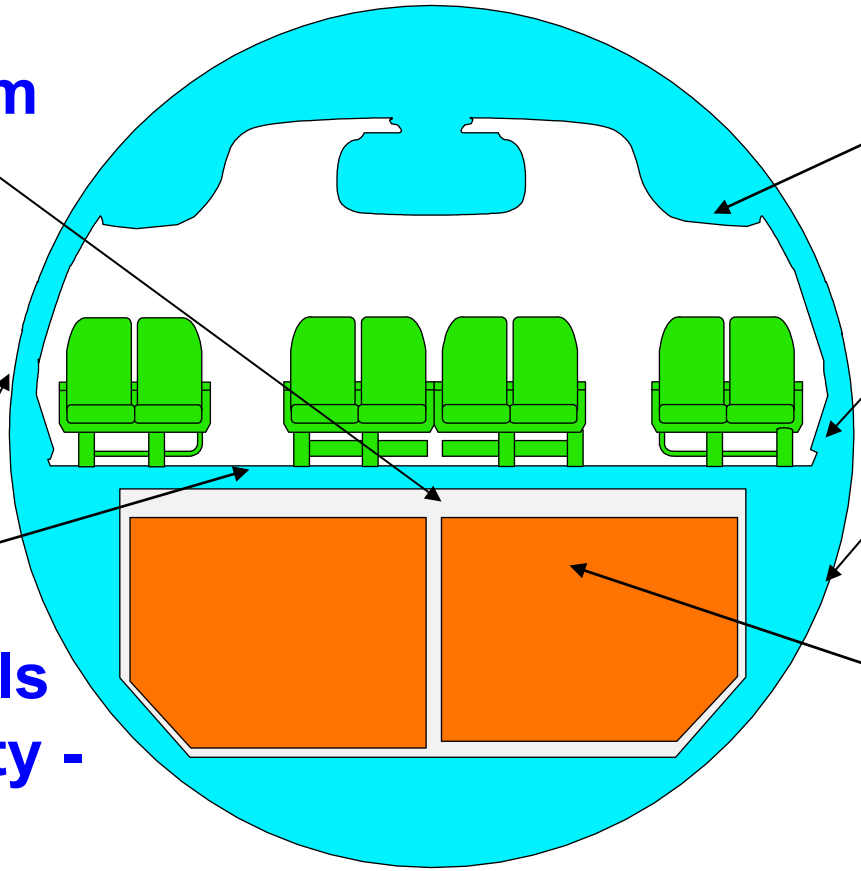
Introduction

- Tremendous improvements in aircraft safety have been introduced since the past 20 years
- Air transportation has become along the years, the safest means of mass transport ever

But

- Further efforts in fire safety research are required in order to keep reducing the risk of accidents

Areas of Current and Future Research



Fuel System Safety

Oxygen

Hidden Areas / Burnthrough - Resistance

Evolution on Materials - Fire Safety -

Smoke/Fire Detection Halon Replacement

Evolution on Material Fire Safety

Cabin Interior 80 years ago

Evolution on Material Fire Safety

Cabin Interior today

Hidden Fire Research

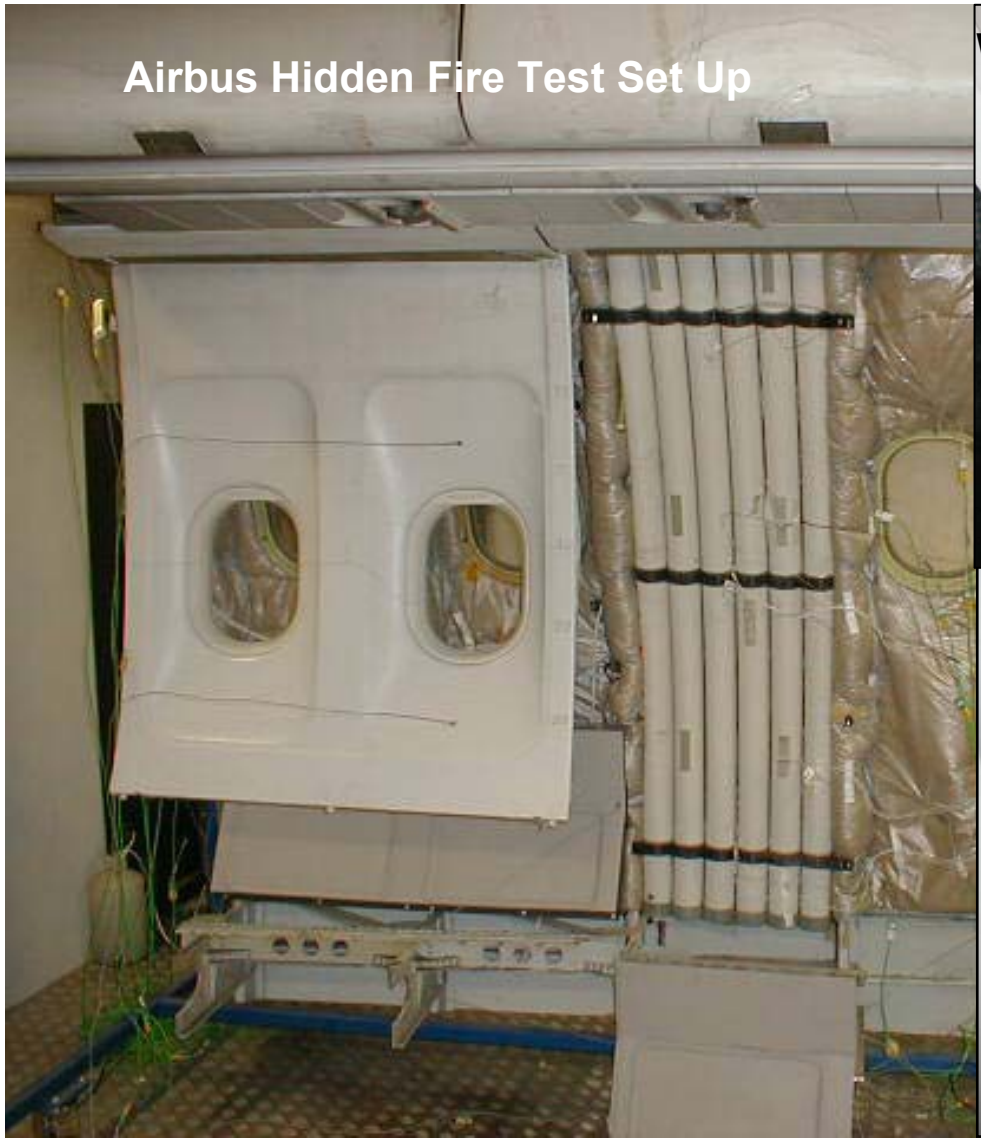
Research Objectives

- Upgrade of materials in hidden areas to the level of fire resistance as proposed for insulation materials
- Develop new Fire Test Method based on “Radiant Panel Test”

Status

- Full scale and radiant panel test program in progress to evaluate the flame propagation behavior of state of the art materials

Hidden Fire Research Full Scale Test



Fuselage Burnthrough Resistance

Research Objectives

- To prolong a safe environment of the passengers inside the cabin in the event of a post crash fire scenario
- To develop adequat materials and designs to improve burnthrough resistance

Status

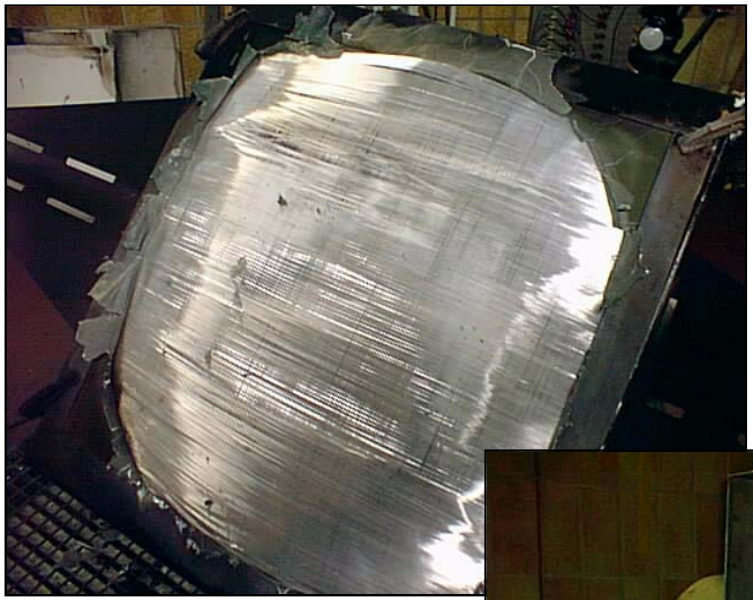
- Various burnthrough configurations tested (e.g. burnthrough between decks)
- Much of upper part of A380 burnthrough protected by GLARE

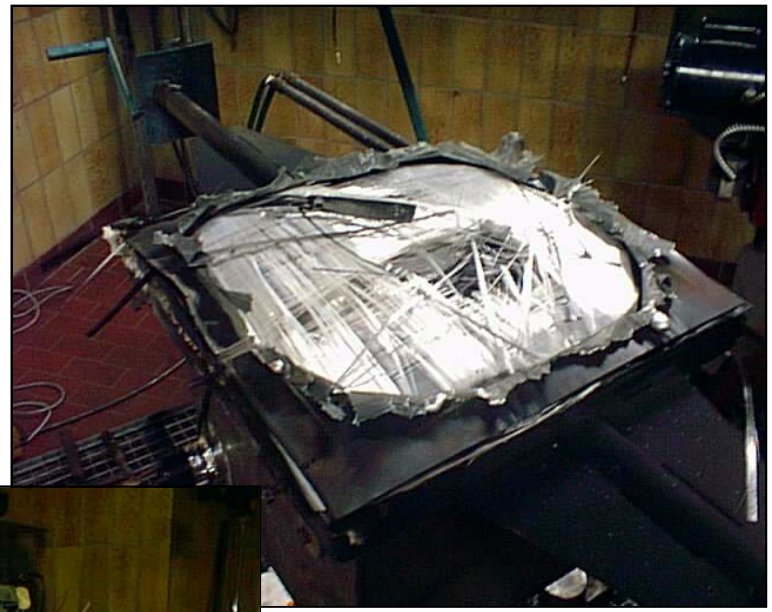
Fuselage Burnthrough Resistance

Fuselage Materials	Burnthrough Time (sec)
Aluminium, 1.8 mm	37
Aluminium, 1.8 mm (incl. insulation + lining)	150
GLARE, 2.4 mm	no flame penetration
CFRP, 3.0 mm	no flame penetration

Fuselage Burnthrough Resistance

GLARE Burnthrough Test Pieces





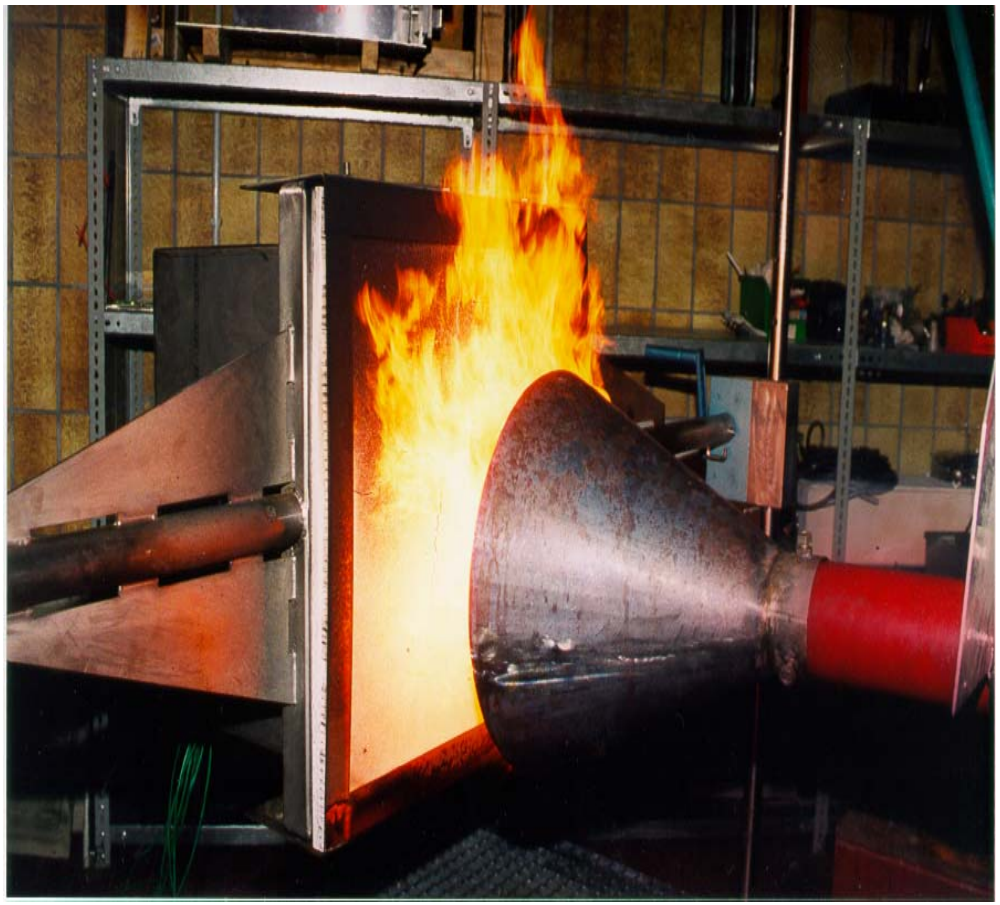
No burnthrough within 7 min

- **Low Smoke**
- **Low Toxicity**

Small Scale Burnthrough Test

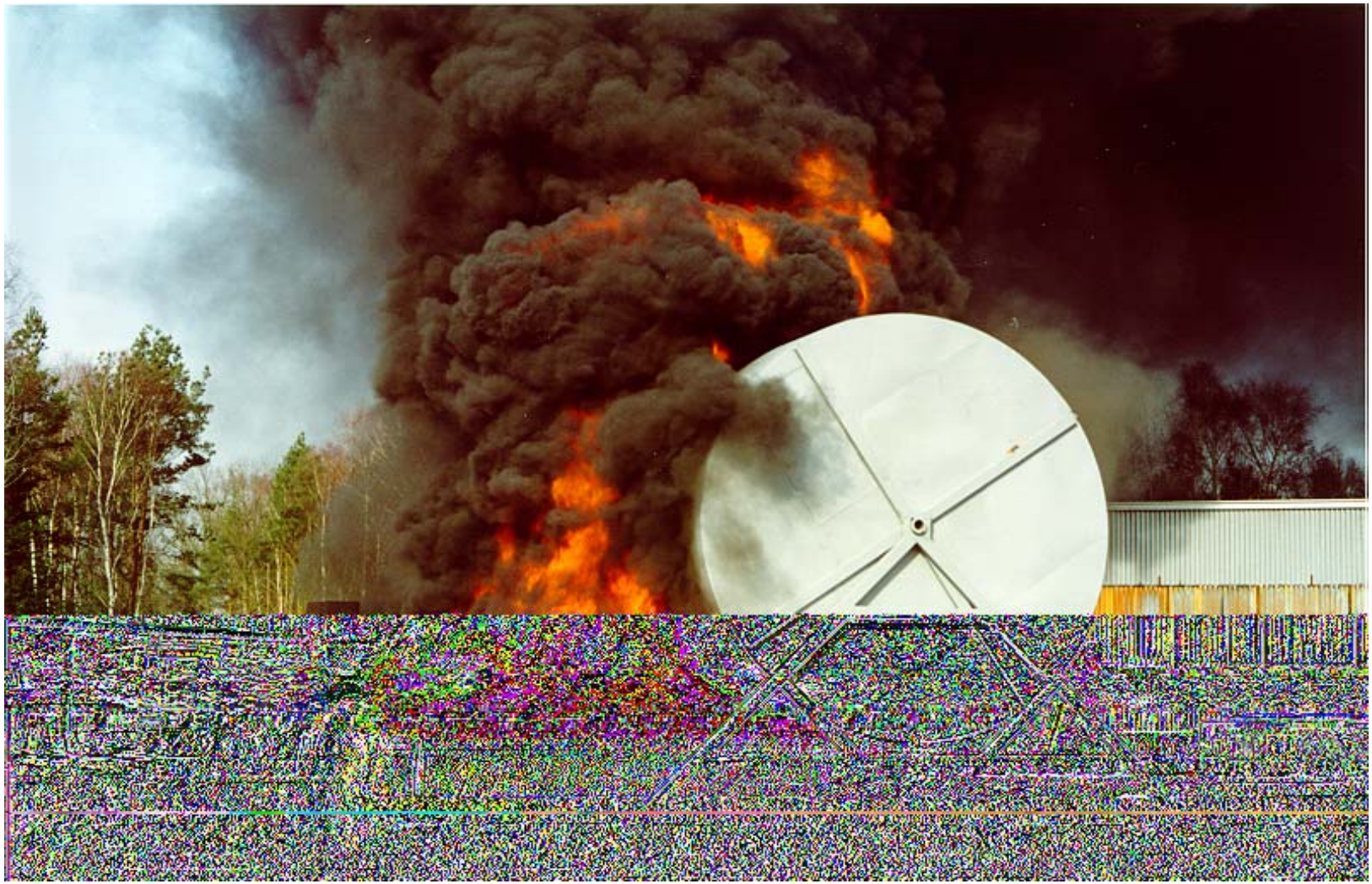
Test method to evaluate burnthrough characteristics of materials / designs

Sample size: 600 x 600 mm



Suitable testmethod for pre-selection of materials and design

Full Scale Burnthrough Test



Smoke/Fire Detection Systems

Research Objectives

- Fire and smoke detection system with drastically reduced false alarm rate
- Multi - Criteria - Smoke Detection System
- Means for visualisation of status inside cargo compartment

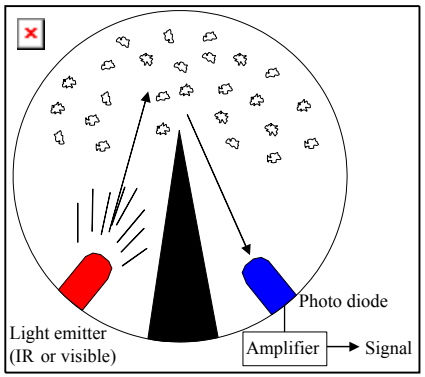
Status

- Multi - Criteria – Smoke Detection System on A380
- Video camera aided fire and / or smoke indication developed

Fire Detection Technology

Particle Sensing

- Photoelectric Sensor
- Laser Particle Sensor
- Light Attenuation Sensor
- Ionisation Sensor

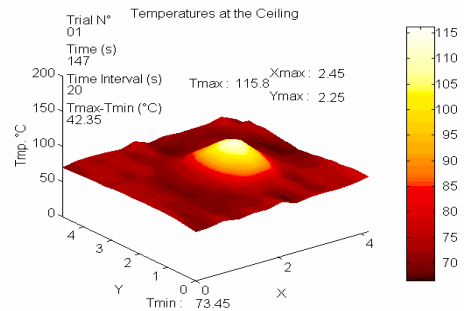


Gas Sensing

- Semicond. Metal Oxide Sensor
- Infra Red Sensor
- Electrochemical Cell

Temperature Sensing

- Metallic Resistors
- Thermistors
- Silicon Semicond. Temp. Sensors
- Thermoelectrical Devices
- Piezoelectrical Devices
- Temperature Radiation Sensing
- Fibre-Optical Cables



Halon Replacement

Research Objectives

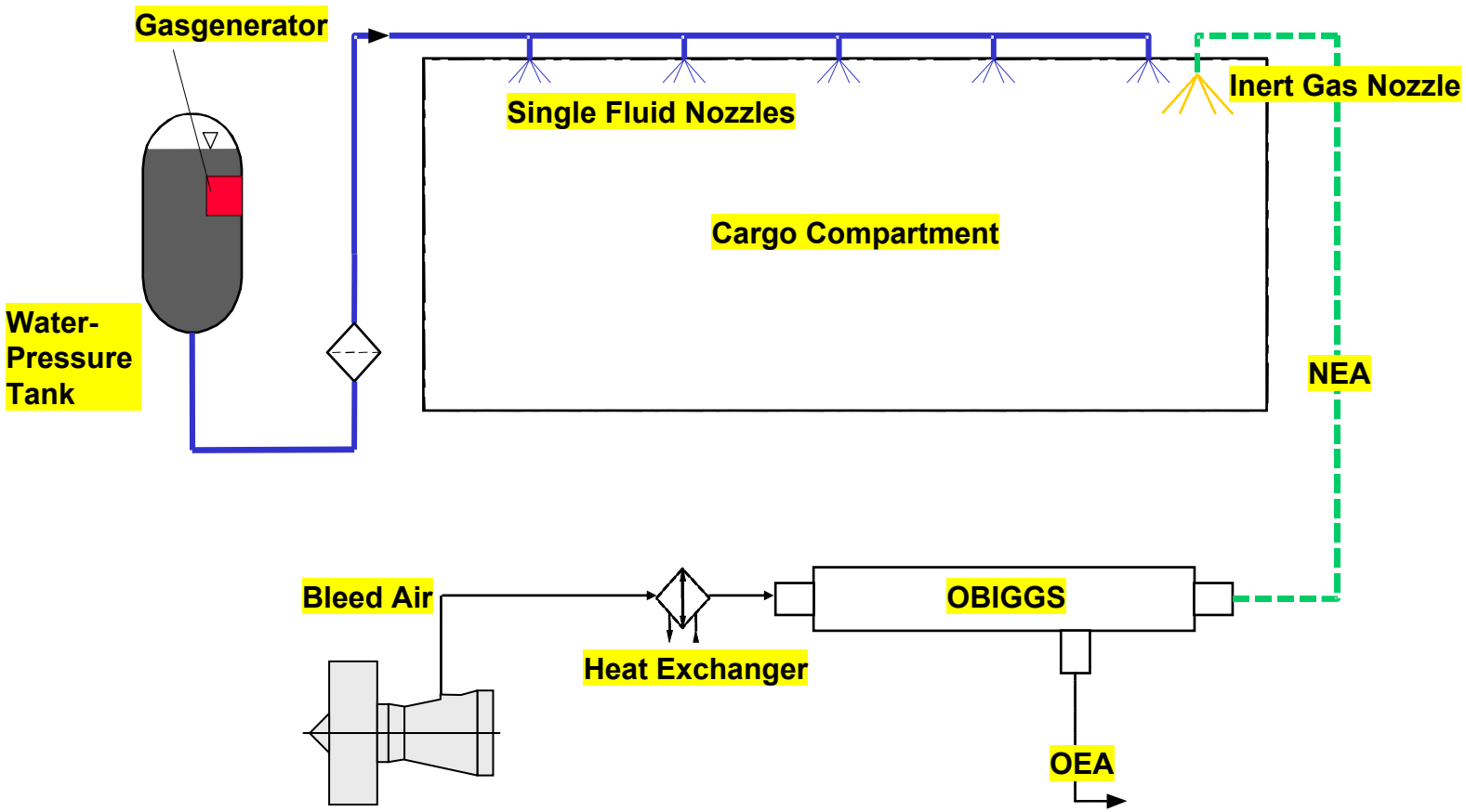
- Environment friendly (non-halon) fire extinguishing system that :
  - provides same level of safety
  - creates limited disbenefits / Halon
  - is fully compatible with the A/C environment

Status

- Halon replacements for cabin fire extinguishing purposes available
- Alternatives for cargo fire suppression system under study

Research on OBIGGS and Water Mist System

OBIGGS: On-Board Inert Gas Generating System



Fuel System Safety

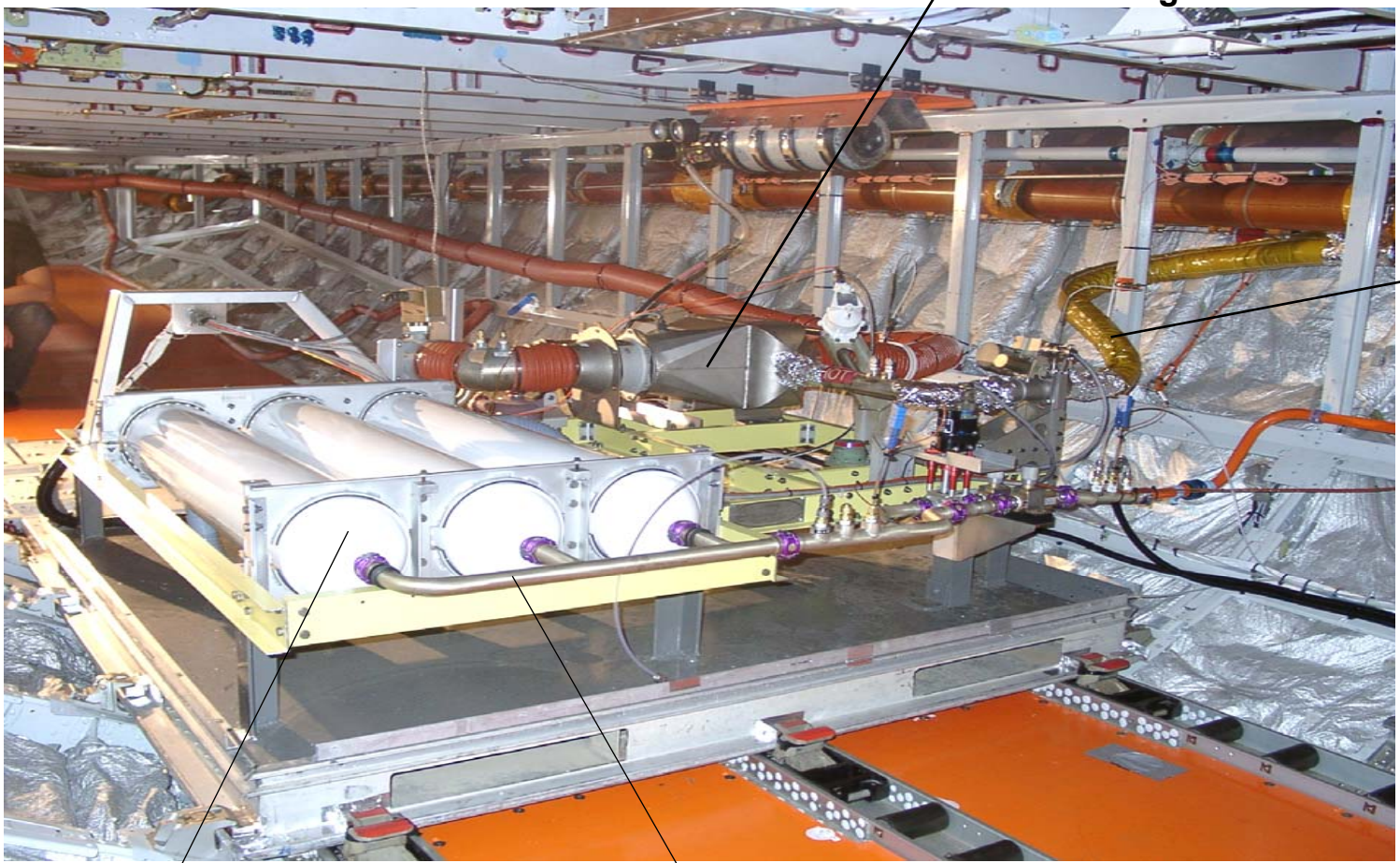
Research Objectives

- Prevention of ignition source within fuel tanks
- Demonstrating functionality of an On-Board Inert Gas Generating System (OBIGGS) on an Airbus A320 (OBIGGS developed by FAA)
- FAA / Airbus joint ground / flight test program

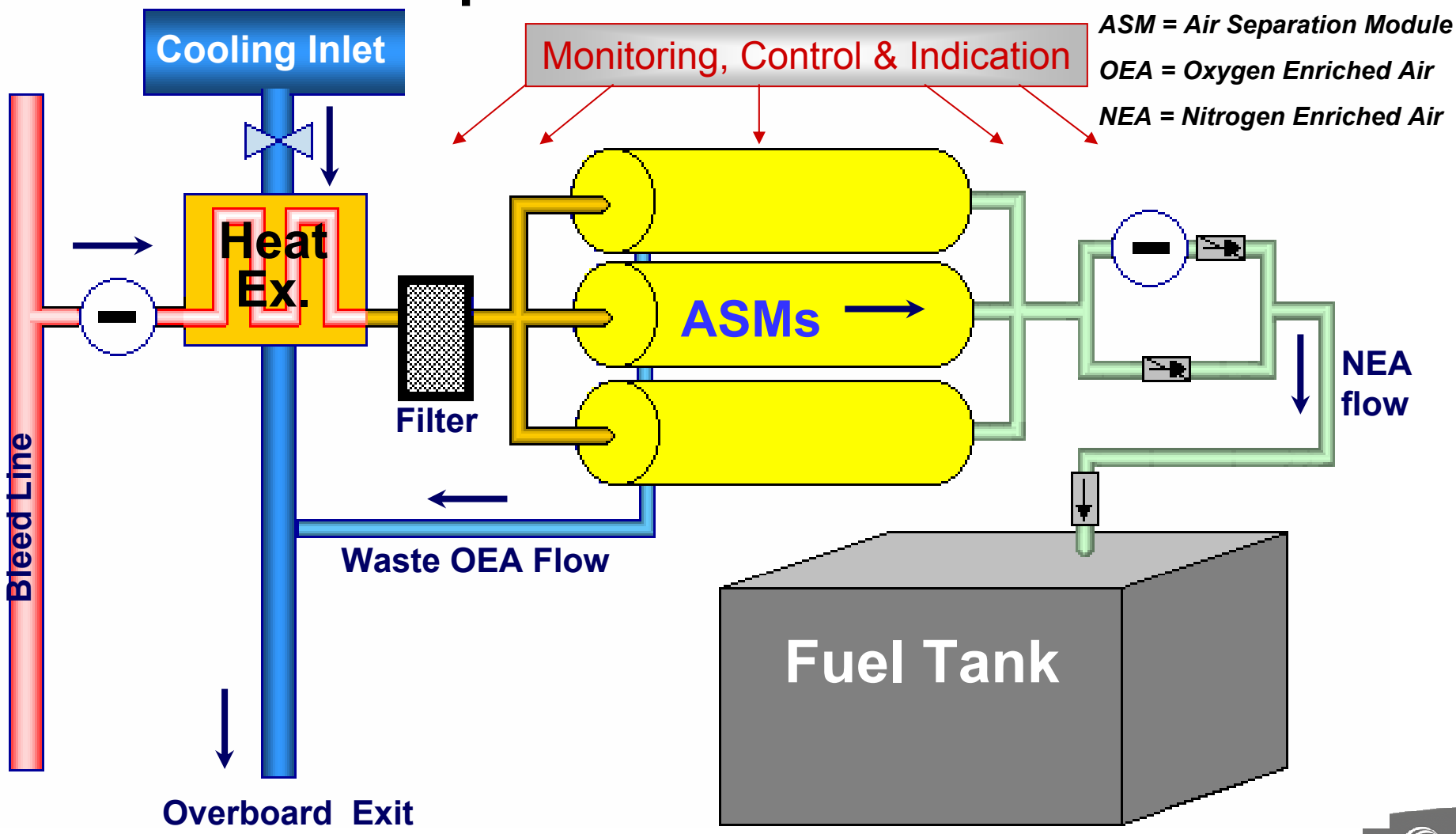
Status

- Ground / Flight tests have demonstrated the functionality of the system

Airbus A320 OBIGGS Flight Test Installation



OBIGGS Principle



Alternative Oxygen on Board

Research Objectives

- To reduce quantity of gaseous oxygen or chemical generators on-board

Status

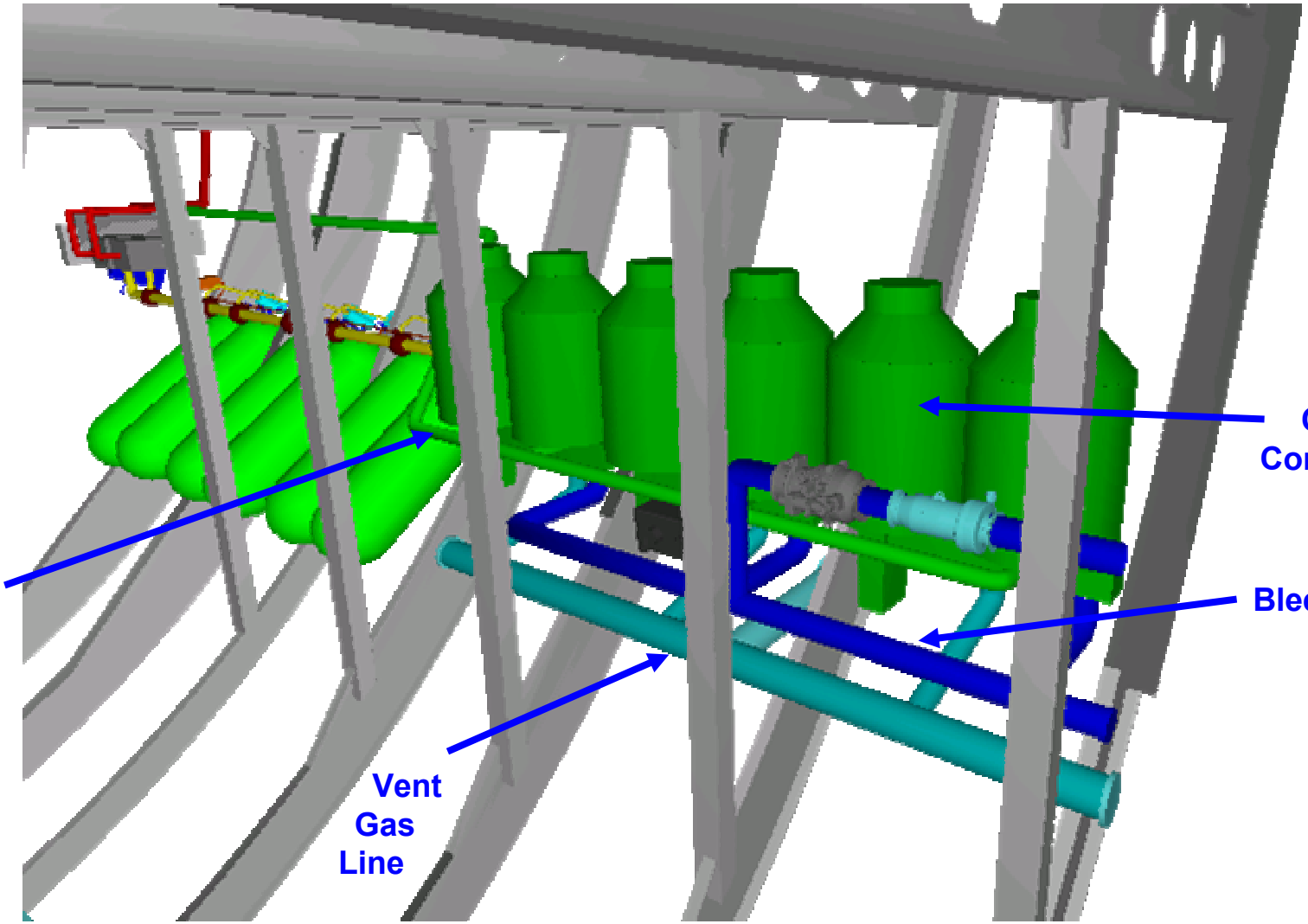
- Solutions under investigation:
  - OBOGS “On-Top” to refill on-board oxygen cylinders
  - OBOGS “On-Line” to generate oxygen on demand

- Flight test program running at **Air Liquide** company

OBOGS: On-Board Oxygen Generating System

Alternative Oxygen on Board

Typical OBOGS Installation (On-Line Configuration)



Conclusions

- **Prevention of incidents/accidents by anticipating and solving problems before they occur**
- **Continued efforts to improve fire safety required**
- **Manufacturers are committed to Fire Safety Research**
- **Balance of aircraft safety / economics and performance**

Thank you

The Fourth Triennial International Aircraft Fire and Cabin Safety Research Conference