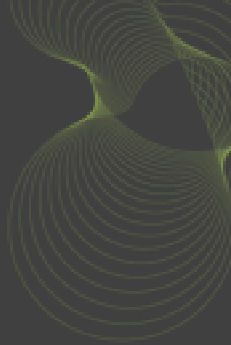


# Regulatory guidance for timber buildings in the UK and results from full-scale tests

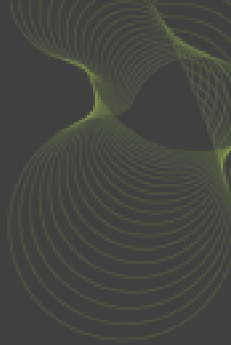
Julie Bregulla

Tallinn, 13 September 2005

# TF 2000



# Project Partners and Objectives



## **PARTNERS**

- United Kingdom Government
- BRE
- TRADA Technology
- UK Timber Industry

## **OBJECTIVES**

- Data to assist in harmonisation of UK building codes
- Demonstrate the fire performance of timber frame construction
- Investigate the relevance of standard fire resistance tests compared to real fire exposure

# Building Regulations before TF 2000

- Different Regulations for different parts of the UK
  - England and Wales – Approved Document B
  - Northern Ireland- Technical Booklet E
  - Scotland- Technical Standard D
- Requirements for timber frame generally more onerous in Scottish regulations
- Importance of England and Wales as future market for timber frame
- Great need for harmonisation of regulations



# Main fire related barriers to using timber in building regulations before TF 2000

- Scottish regulations:
  - -separating floor-greater than 11m to be of non-combustible construction, precluding timber frame above 5 storeys
  - stair shaft and protected lobbies to be of non-combustible construction
  - stairs to be non-combustible
- Rest of UK - stairs to be non-combustible where single means of escape for flats of four or more levels



# Compartment Fire Test



- Fire load provided by timber cribs
- Floor loading equal to one third of the design imposed load
- Investigate
  - compartmentation,
  - integrity of means of escape,
  - structural stability and
  - tenability criteria
- Termination criteria based on period of exposure of timber elements

# Compartment fire test - project objectives

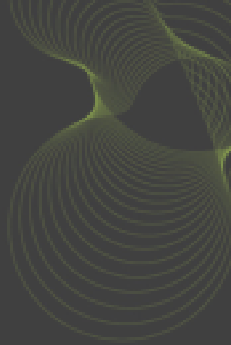
- To obtain valuable data on the performance of a complete building subject to a real fire
- To provide a quantitative appraisal of the performance of forms of construction tested to the standard fire resistance test
- To demonstrate that a medium-rise building of timber frame construction can meet the functional requirements of the UK Building Regulations

# Instrumentation

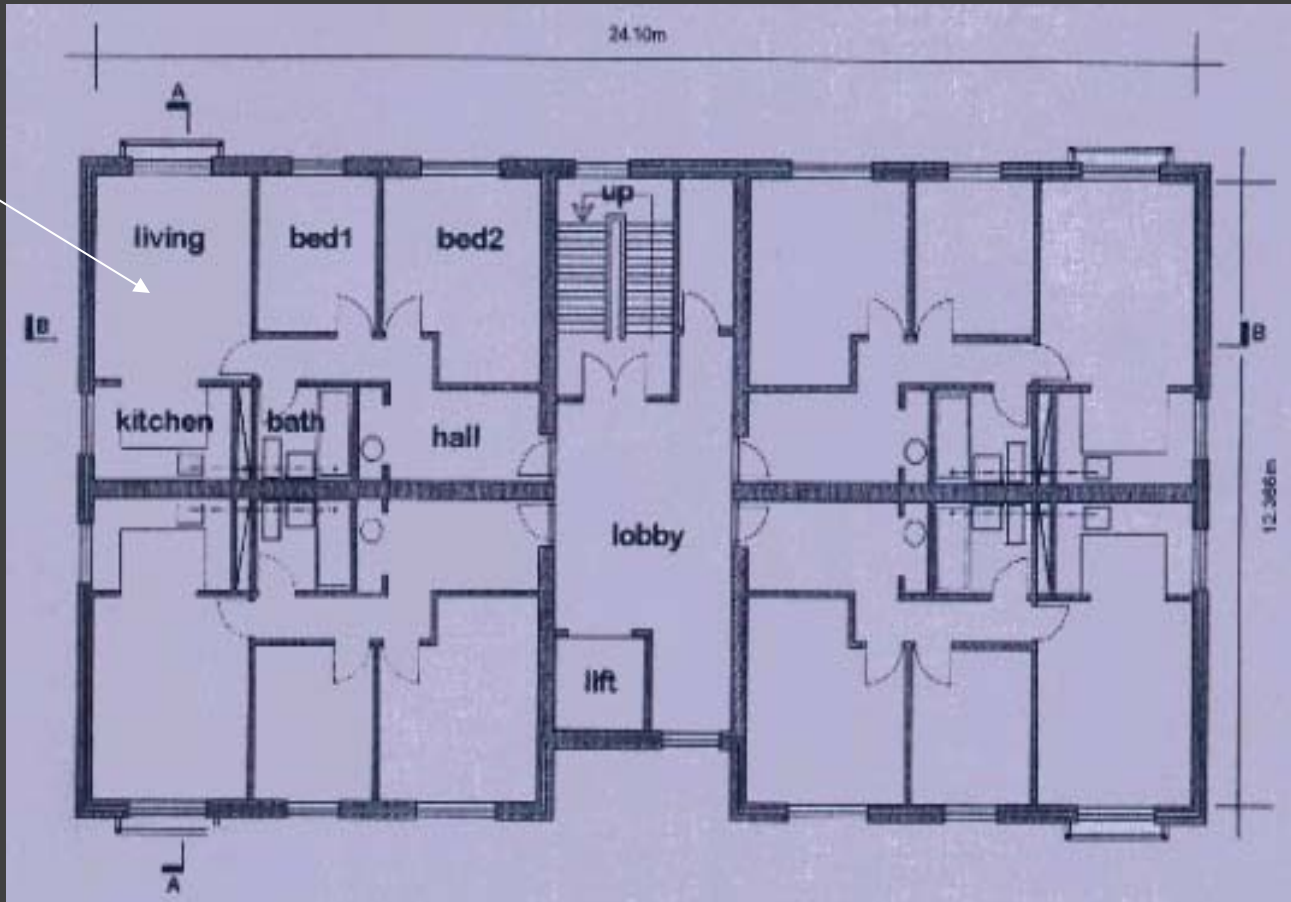
- ✦ Fire atmosphere temperature
- ✦ Heat flux
- ✦ Oxygen concentration
- ✦ Charring depths
- ✦ Differential pressure
- ✦ Fire/Smoke detector response times
- ✦ Carbon Monoxide concentration
- ✦ Smoke density
- ✦ Video record



# Plan view of test compartment

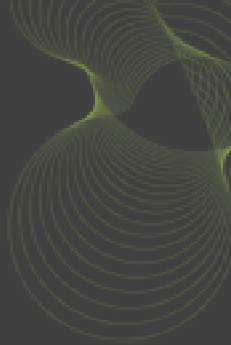


Fire flat



# Fully developed fire

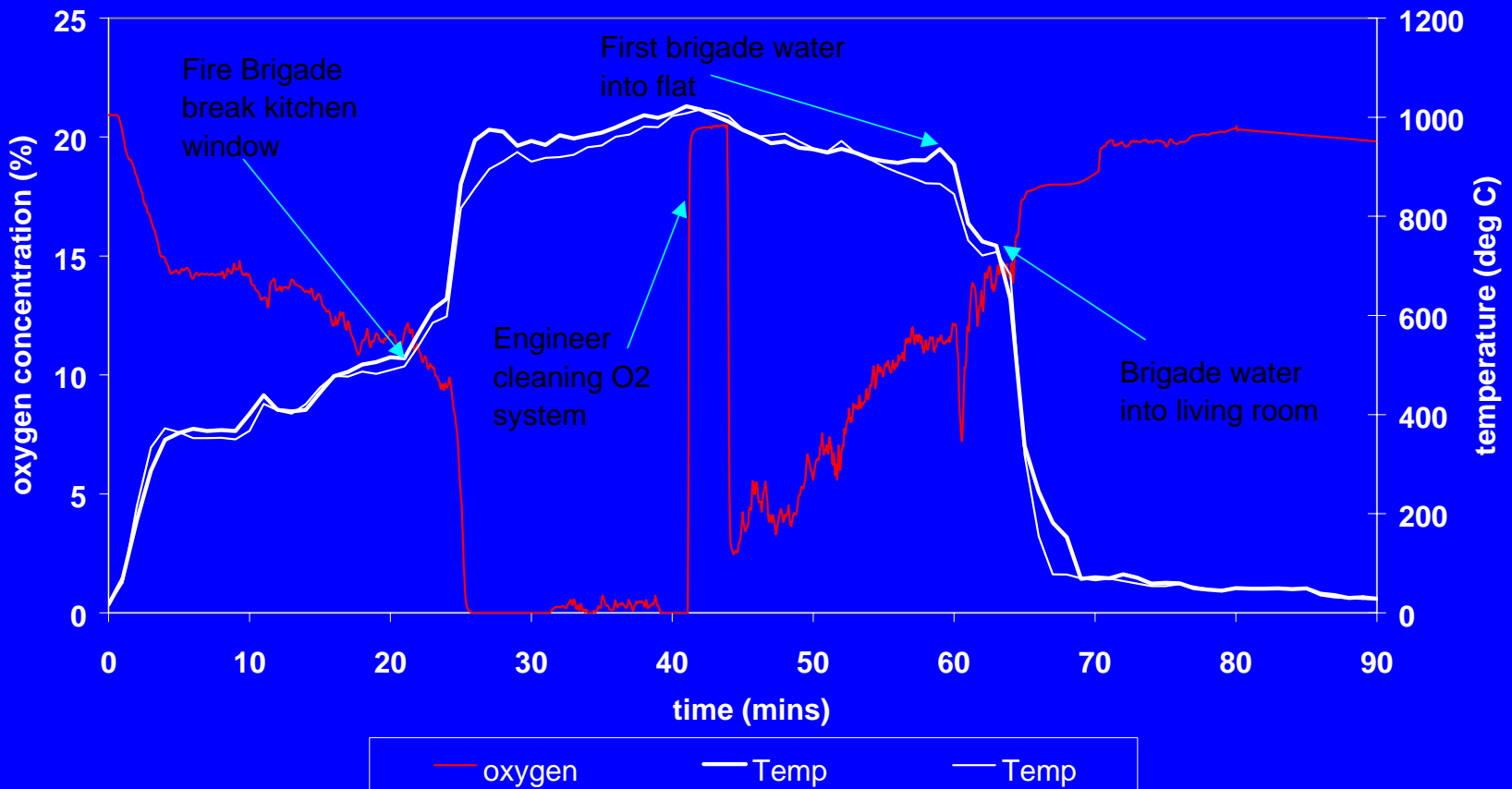




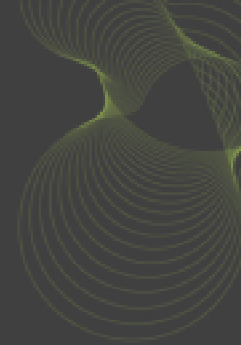
bre

# Compartment fire test - air temperatures

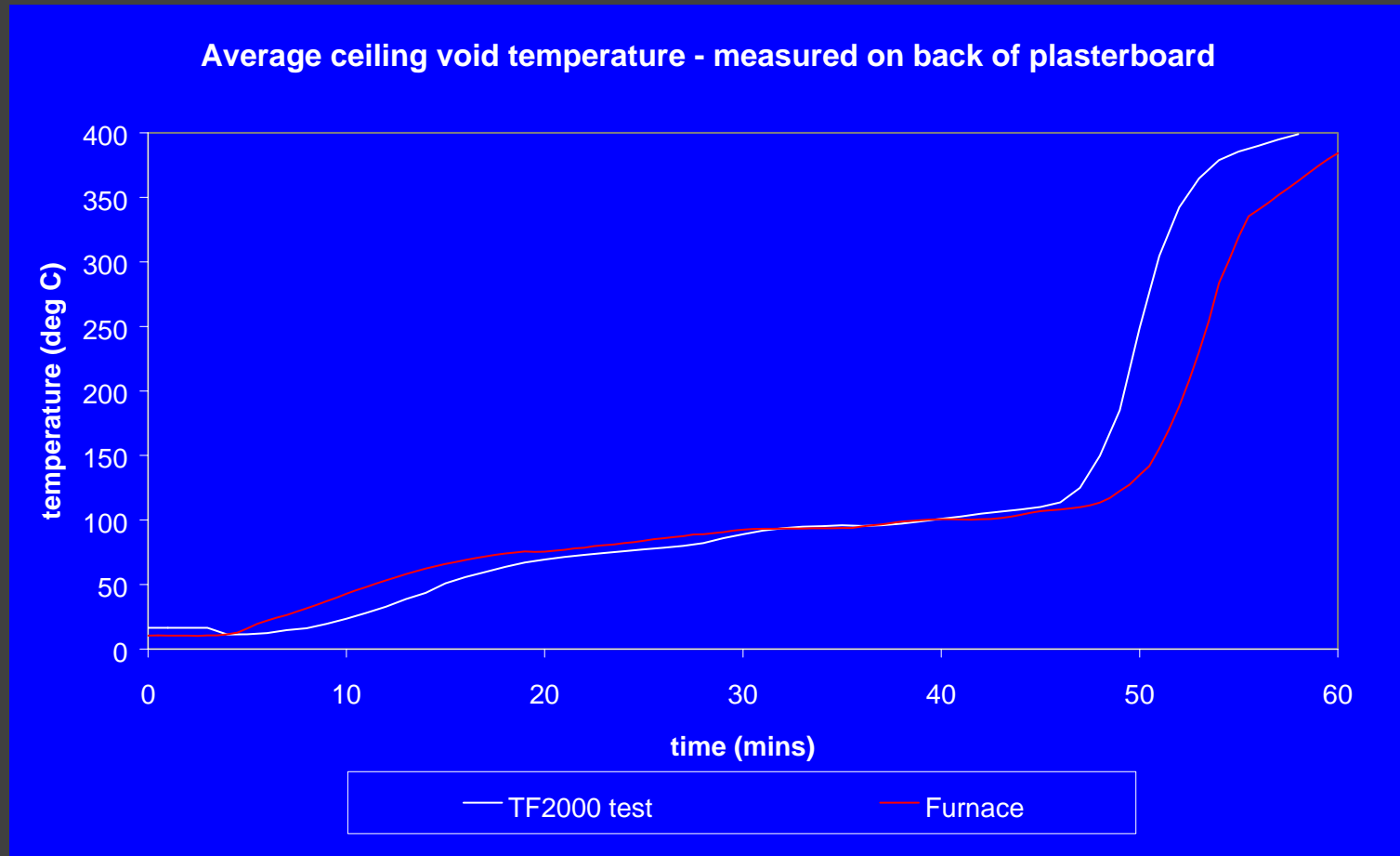
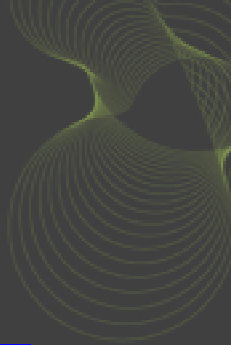
Oxygen concentration and atmosphere temperature at 200mm below ceiling in living area of fire flat



# Post-test fire damage



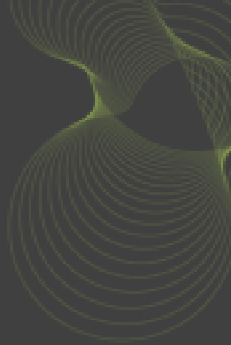
# Time equivalence



# Conclusions from compartment test

- Common areas remained tenable for means of escape
- Importance of workmanship in terms of fire performance
- Exposure equivalent to 66 minutes exposure in a BS476: Part 20-22 fire resistance test
- Integrity between compartments maintained
- Load bearing capacity maintained





## Impact of TF 2000 on regulations

- Harmonisation of UK regulations
- Changes to Scottish technical standards- 6th Amendment March/April 2002
- Removal of non-combustibility requirement for separating floors between 11m and 18m



# Stair test: Functional fire safety objectives

- Access for fire brigade
  - remove persons immediately at risk
  - access to fight fire
- Evacuation of other occupants after the fire event



# Fire performance requirements for stair

If fire is in the stair,  
the staircase

- **must retain** its load bearing capacity
- **must not contribute** significantly to the fire development

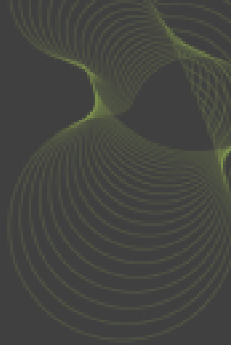


# Generic Features



- Scissors type stair geometry
- Whitewood timber
- Thermosetting type glue (*Cascamite*)
- No stair coverings
- Pressure impregnated treatment (*Hickson Dricon*)
  - Notional Class 1 Reaction- to-Fire performance

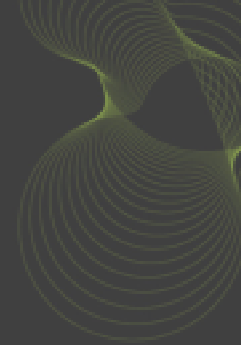
# Trial tests



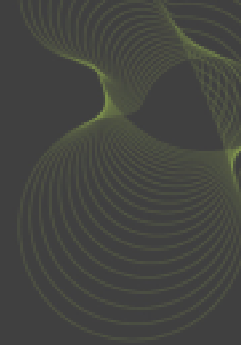
# Impact on stair



# Underside of stair



# Stair performance



## Conclusions from stair fire test

- The test has demonstrated the ability of an appropriately treated timber stair to meet the functional fire safety objectives for the UK
- Benchmarking tests required
- Stair Coverings not currently included



## Other TF 2000 Research

### Reinstatement of fire damaged timber frame structures

