UNIVERSITY OF CHEMISTRY AND TECHNOLOGY PRAGUE

VSB TECHNICAL UNIVERSITY OF OSTRAVA | FACULTY OF SAFETY ENGINEERING

TECHNICKÝ ÚSTAV POŽÁRNÍ OCHRANY

Introduction of Technical Institute of Fire Protection

Václav Vystrčil
Lucie Hasalová, Ph.D.

LabΠ

UNIVERSITY OF CHEMISTRY AND TECHNOLOGY PRAGUE

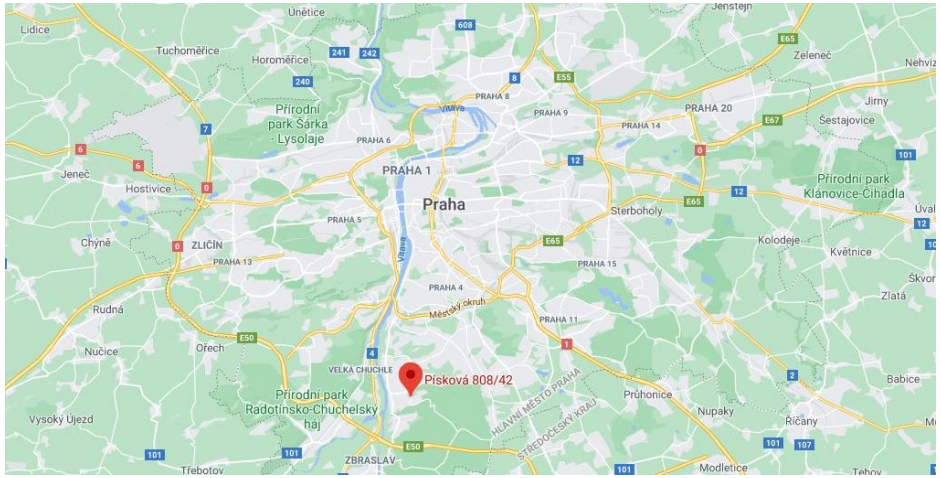
TIFP Prague

VSB TECHNICAL UNIVERSITY OF OSTRAVA | FACULTY OF SAFETY ENGINEERING

TECHNICKÝ ÚSTAV POŽÁRNÍ OCHRANY

TECHNICAL INSTITUTE OF FIRE PROTECTION

FIRE AND RESCUE SERVICE OF THE CZECH REPUBLIC



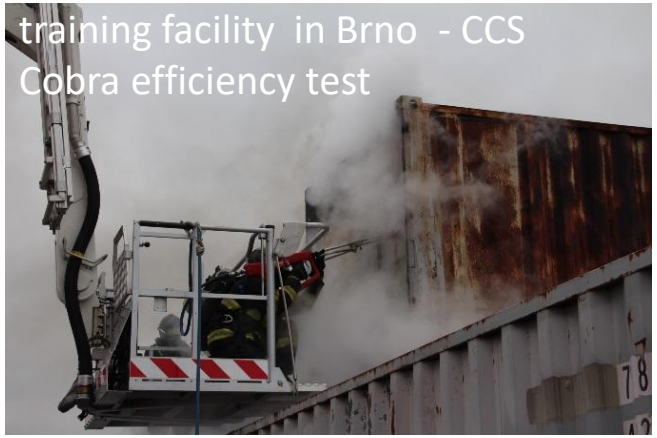
Testing and certification of fire equipment

Fire investigation

Applied R&D in Fire Science

TIFP Prague – activities

- ✓ Requests by fire and rescue service – short research projects
- ✓ Long term research projects
  - ➢ Release of CNG from vehicles
  - ➢ Thermal decomposition of wood products
- ✓ Cooperation with universities
  - ➢ **University of Chemistry and Technology,**
  - ➢ Czech Technical University,
  - ➢ Brno Technical University,
  - ➢ VSB – Technical University of Ostrava.
- ✓ Fire tests for customers
- ✓ computer fire modeling (CFD, zone models)
  - ➢ Research
  - ➢ Forensic analysis
  - ➢ Guidance for building designs


training facility in Brno - CCS Cobra efficiency test


Fire test in Bílina

Case Study – Deadly fire in a nursing home

- Building from the year 1985
- Converted from the home for elderly people to home for people with mental illnesses without any special changes…
- 34 clients accommodated in total
- One member of staff during night
- Fire started in early morning between 4 and 5 am.
- It started in the common room - same fire section as five client rooms (17 clients)
- No fire detection
- 8 fatalities and 5 clients seriously injured - one of the most severe fire in last 30 years

Case Study – Results of investigation

- The fire was set by one of the clients, who set small pillow on fire
- Direct offender of the fire was found not responsible because of his mental health
- Fire could propagate for almost 30 minutes unnoticed – no fire detection
- Investigation of possible violation of the building codes is still ongoing

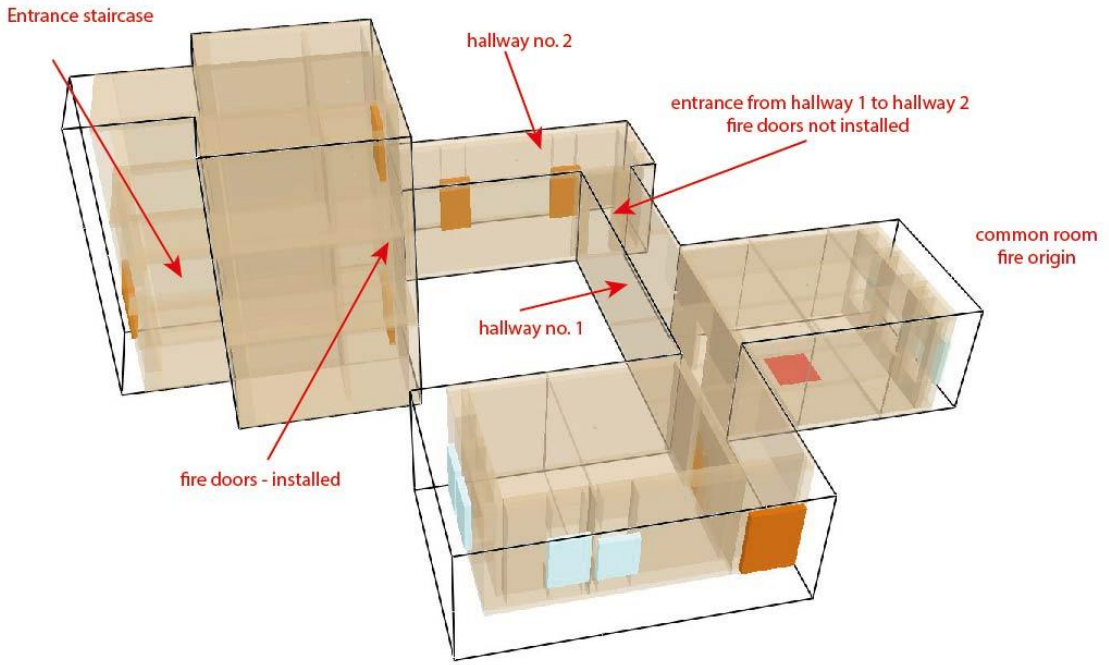
Case Study – versions

Real fire

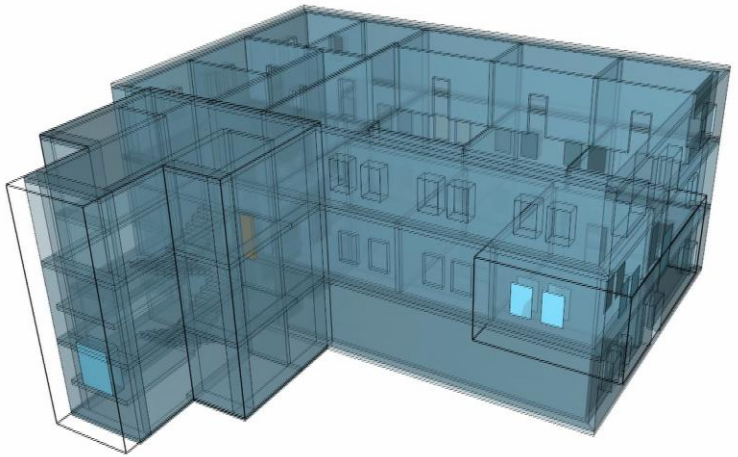
- Started in common room
- Fire doors between hall 1 and 2 not installed
- Fire doors to staircase open

„Ideal“ fire

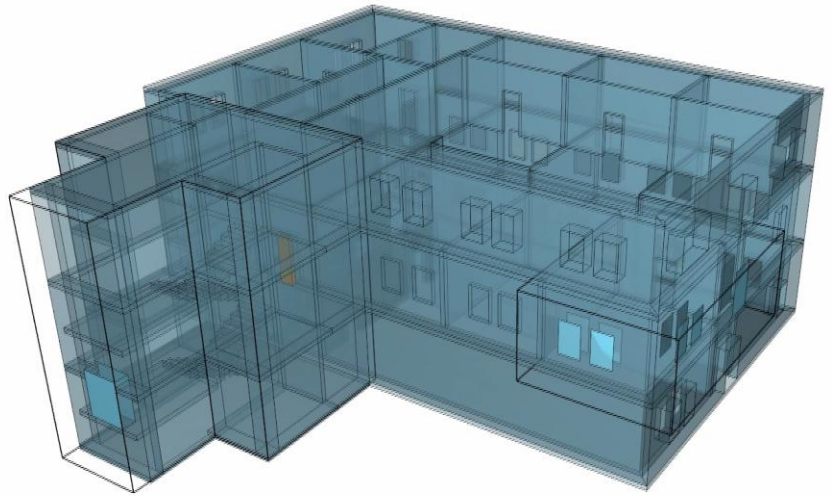
- Started in common room
- Fire doors between hall 1 and 2 installed
- Fire doors to staircase closed



Case Study –Smoke spread



Real fire – no fire compartments



Hypothetic fire – fire compartments in acordance with design

Case Study – Smoke detector activation

Time to detection		Common room	Hallway 1	Hallway 2
Used model		FDS	FDS	FDS
Real fire	(sec)	16	83	217
	(min:sec)	0:16	1:23	3:37
Ideal case	(sec)	16	88	Not activated
	(min:sec)	0:16	1:28	
	(min:sec)	00:41	01:29	

- Default settings of smoke detectors
- Time to detection in order of seconds or minutes
- Significantly less then 30 minutes

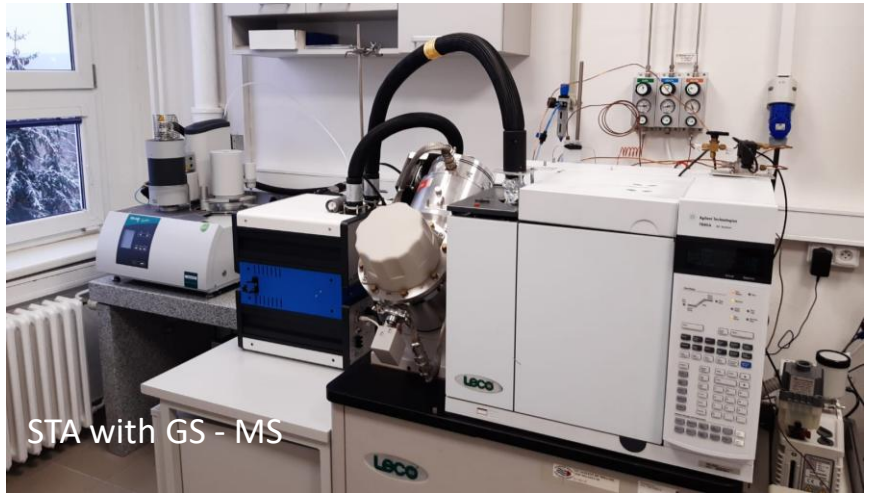
Case Study – Consequences after investigation

- Building were the fire occurred was reconstructed.
- Internal layout of the building was changed so the common rooms are the separate fire sections.
- Equipped with smoke detection system

- Discussion how to prevent such fires in the future.
- Change of fire code in Czech republic
- All buildings of this kind have to be equipped with:
  - fire detection system (if more than 50 clients are present)
  - autonomous smoke detectors (If less then 50 clients are present).
  - change applied retrospectively (3 years) to prevent such fire in a future.

TIFP Prague – test lab

- **Bench-scale fire tests:**
  - Cone calorimeter with enclosed box and soot sampler,
  - Smoke chamber,
  - Oxygen index,
  - Setchkin furnace,
  - Explosion characteristics.
- **Material analysis:**
  - FTIR,
  - GC – MS,
  - HP – DSC,
  - STA with connection to GS – MS



STA with GS - MS

FTT iCONE

NITROGEN GENERATOR

UNIVERSITY OF CHEMISTRY AND TECHNOLOGY PRAGUE

VSB TECHNICAL UNIVERSITY OF OSTRAVA | FACULTY OF SAFETY ENGINEERING

TECHNICKÝ ÚSTAV POŽÁRNÍ OCHRANY

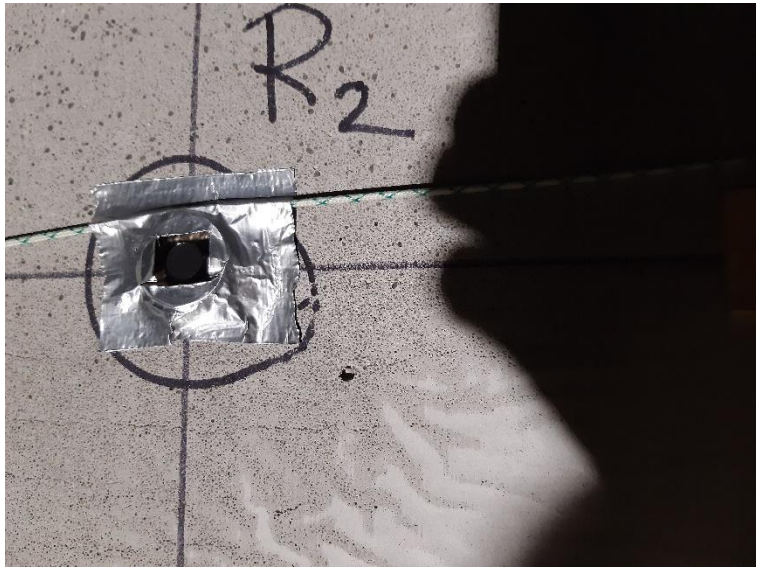
Measurement of temperature and heat fluxes during fire tests

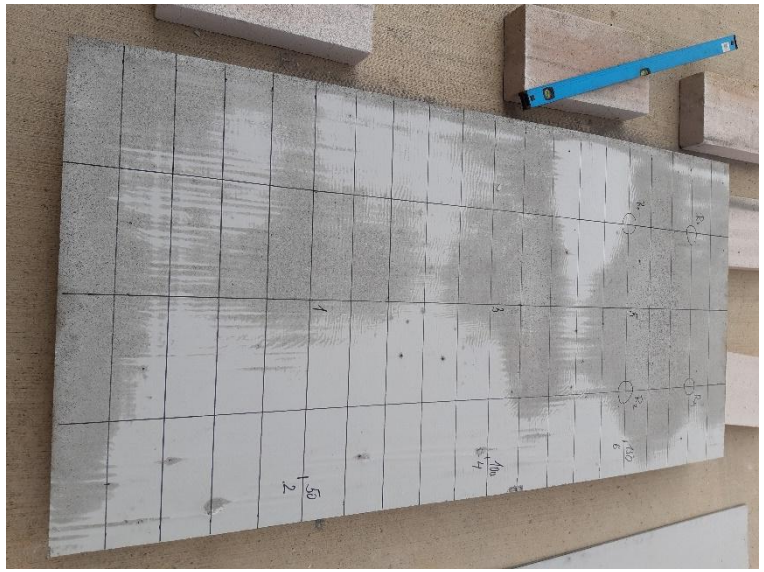
Václav Vystrčil

LabPi

Motivation

- Conditions of fire test are destructive
- Heat flux meters – usually expensive
- Fire test can become costly.





Aims and goals

- Evaluation of heat flux measuring error induced by convection during full scale tests
- Comparison of commercial schmidth-boelter sensors to plate thermometers.
- Evaluation of non-contact temperature measurement induced by typical surroundings during fire tests (eg: smoke, water mist, fog)
- Comparison of dual and single thermocouple technique
- Something else?
  - Visualisation of data
  - Better methods for test documentation

Thank you for your attention!

Václav Vystrčil

University of Chemistry and Technology Prague

Technical Institute of fire protection in Prague

Fire and Rescue Service of the Czech Republic

vaclav.vystrcil@tupo.izscr.cz