

Rapid fire progress: solutions

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- Introduce a model that represents all phenomena of rapid fire progress
- Techniques vs tactics
- 3 approaches
 - Smoke as energy containing medium
 - Smoke as fuel
 - Anti-ventilation
- Solutions per form of rapid fire progress

Problem solving

Medicine

- Students first learn about the patient
- Then about the diseases
- Then about the cures

Engineering

- Students learn first about how nature works
- Then about the problems
- Then about the solutions

“The only thing that doesn’t change
is that everything keeps changing”

Problem Solving in firefighting

- We should invest in knowledge about rapid fire progress.
- This increases understanding of the “disease”.
- We can learn about solutions.
- All this is continuously evolving.



© Picture: NIST

Techniques vs. tactics

- A technique is a procedure used to accomplish a specific activity or task .
- A tactic is a conceptual action implemented as one or more specific tasks.

(source: wikipedia)

Example: the long pulse

- A long pulse is a technique.
- It implies a series of actions.
- The task to complete is “gascooling”



© Picture: John McDonough

Example: ventilation



© Picture: NIST

- Ventilation is a tactic
- It implies several tasks
 - Selecting an inlet and an outlet
 - Positioning the fan
 - Prepare lines
 - Making the openings
 - Aim the fan
- Several people have to do things simultaneously

Comparison

Technique

- Easy to teach
- 1 person skill
- The same person can evaluate and act

Tactic

- Harder to teach
- Team skill
- One leader evaluates and chooses a tactic. The team applies the tactic
- Officers need to be trained in decision making and follow-up.
- Firefighters need to train the tactic.

Prevent Rapid Fire Progress
=
Smoke management



© Picture: Martin Calle

Smoke is the problem

- All forms of Rapid fire progress: smoke ignites
- Smoke = potential (chemical) energy
- Smoke explosion and backdraft:
potential energy is released in short time
- Normal fire behavior: Smoke layer ignites
→ radiation towards objects under smoke
layer increases → Flashover

Solution: Gascooling

- Smoke accumulates energy.
- Energy is captured by the water.
- Steam becomes thermal ballast.



© Picture: John McDonough

Solution: remove the smoke

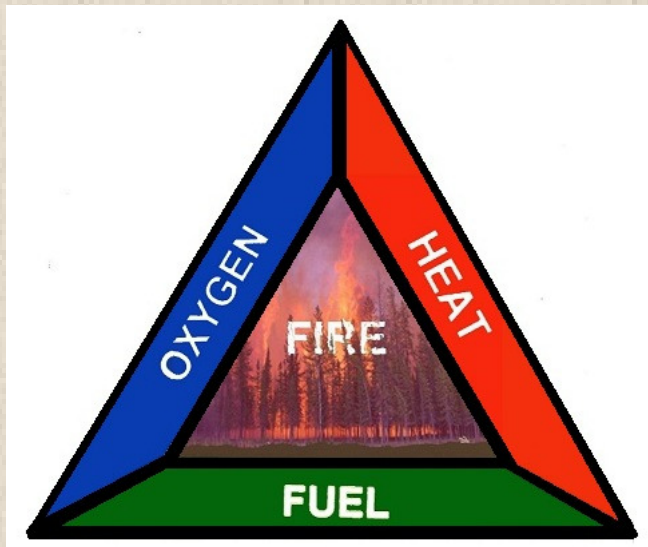


© Picture: David Ashton

- Smoke = fuel
- Ventilation = removing fuel
- Ventilation is always flow in and flow out
- Air flow in = oxygen
→ HRR increases
- More hoses needed.
- What with new buildings?

Fire triangle

- Smoke contains energy
- Smoke = fuel



© Picture:

www.firetriangle.co.uk

→ Two sides of the triangle

What about the third side?

Anti-ventilation

- Keep oxygen away from the fire.
- Approach 1:
Keep the fire closed up
- Approach 2:
Close the door to the fire



© Picture: Paul Grimwood –
www.firetactics.com

Case: industrial fire




Flashover



- Gascooling: short pulse, long pulse
- PPA (caution!)

© Picture: Ed Hartin

Ventilation induced flashover

- Gascooling
 - Cooling before entry (piercing nozzle, cobra)
- PPA
 - Caution: HRR 
 - Fire can not be in concealed space
- Possible tactic:
 - First cobra for cooling
 - Then ventilation
 - Then attack



© Picture: Cold cut systems
Svenska AB

(Hot) Backdraft

- Gascooling
 - Cooling + inertion
 - Piercing nozzle
 - Cobra
- Open up after cooling
- Induce backdraft



© Pictures: Lars Ågerstrand

Fire gas ignition

- Remove smoke when possible
- Check false ceilings if suspicion of built-up of gasses.
- Pressurize adjacent buildings



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