



FIRE DYNAMICS





WHAT IS FIRE DYNAMICS?

- ***The study of how chemistry, fire science, material science and the mechanical engineering disciplines of fluid mechanics and heat transfer interact to influence fire behavior. (NIST.gov)***



WHAT IS FIRE DYNAMICS?

- ***It's the study of how fires start, spread and develop. (NIST.gov)***





WHAT MAKES FIRE DYNAMICS SO IMPORTANT TODAY?

- *It's due to the fact that even though we are having less fires today than in the past, we are having **MORE FIREFIGHTER'S INJURED OR KILLED***





RECENT FIREFIGHTER TRAGEDIES

- ***Houston Fire Department
- 4 LODD's on 5/31/13***
- ***Toledo Fire Department
- 2 LODD's on 1/26/14***
- ***Boston Fire Department
- 2 LODD's on 3/26/14***





SO WHAT HAS CHANGED?



- ***The fire ground environment***
- ***Technology***
- ***Fire service research***





THE FIRE GROUND ENVIRONMENT

- ***Modern fuels versus legacy fuels***
- ***Changing building materials and design***
- ***Lightweight truss construction***
- ***Larger homes and bigger open spaces***





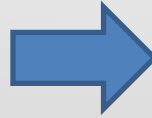
THE FIRE GROUND ENVIRONMENT

- ***Modern fuels vs legacy***



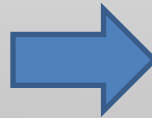
- ***Faster fire growth***

- ***Changing building materials & design***



- ***Shorter time to flashover***

- ***Lightweight truss construction***



- ***Shorter escape times and quicker structural collapse***

- ***Larger homes & bigger open spaces***



- ***Rapid changes in FIRE DYNAMICS***



TECHNOLOGY

- ***New turnout gear and SCBA's***
- ***Thermal imagers***
- ***They allow firefighter's to go deeper and farther in structure fires than ever before***
- ***But with the advantages of this new technology comes danger as well***





FIRE SERVICE RESEARCH

- ***NIST Study***
- ***UL Research***
- ***Finally, we have scientific studies which can show the effectiveness of firefighting tactics***





WHY SHOULD YOU CARE ABOUT FIRE DYNAMICS?

- ***Because we can use this information to be MORE educated and AGGRESSIVE than ever before to:***
 1. ***Put out fires faster and more efficiently***
 2. ***Decrease the chances of firefighter's getting hurt or killed***
 3. ***Increase the survivability for victims***



DOES THAT MEAN WE....

- ***Never go inside?***
- ***Always fight fire from the outside?***
- ***Never ventilate?***
- ***Always spray water into smoke?***
- ***Never go above a basement fire?***

NO!!!



SO WHAT DOES IT MEAN?

- ***It means that an understanding of fire dynamics can and SHOULD be another tool in your toolbox***
- ***It means that you MAY use a different firefighting tactic than you used before, AND be more effective and safe***





OUTLINE OF FIRE DYNAMICS COURSE

- ***PowerPoint modules over the next 6 months covering the following topics:***



- ***Fire Dynamics***
- ***Reading smoke***
- ***Importance of a 360***
- ***Flow path***
- ***Interior and exterior fire attack***
- ***Penciling***
- ***Ventilation and door control***
- ***Coordinated fire attack***
- ***Risk vs reward***



OUTLINE OF FIRE DYNAMICS COURSE

- ***After all of the online modules, we will have a manipulative drill consisting of a live burn in a Dräger Flashover Box***
- ***This manipulative drill will be used to tie in and reinforce the Fire Dynamics concepts***





QUESTIONS?

- *Please feel free to contact us with any questions at [SDFD Fire Dynamic Group](#)*





THE "NEW" FIRE SCIENCE AND YOU

TACTICAL APPLICATIONS FOR THE FIREGROUND



Culture & Tradition





WHAT IT'S INTENDED TO DO

- Allow you to make better tactical decisions
- Be a better predictor of fire behavior
- Attack fire more aggressively with a greater degree of safety

In Short....

Make you a better firefighter



WHAT IT'S NOT INTENDED TO DO

- Prohibit interior firefighting
- Eliminate ventilation operations
- Make you less aggressive
- Be a substitute for good fundamental skills





CONTROLLING THE FIRE ENVIRONMENT

THE BIG 3

1. Exterior water application-**Transitional Attack**
2. Cooling the fire environment—**Penciling**
3. Controlled/timed ventilation—**Flowpath**



EXTERIOR WATER APPLICATION & TRANSITIONAL ATTACK
DON'T GO PAST FIRE...TO GET TO FIRE

- Hit the fire from wherever you can
- Research has proven hose streams **Do Not** “push fire”
- Temperatures drop throughout the building
- Conditions improve for both occupants and firefighters





SOFTENING THE TARGET

- Straight stream
- Aimed at the ceiling
- As close to the sill as possible
- Flow for 10-15 seconds
- Avoid moving the stream around
- **Needs to be followed up with interior firefighting**



Video Placeholder
Your video will display here.



WHEN TO USE IT





SMOKE IS FUEL !!!





FIRE SCIENCE REVIEW

- The smoke from the contents of today's structures is more dense, more toxic and more combustible
- Most fires are “ventilation limited”..all that hot flammable smoke is too rich to burn
- **We need to control this environment by cooling with water and/or limiting the available oxygen**



COOL THE GAS LAYER AS YOU GO

- “pencil “ the ceiling as you advance
- Short bursts of straight stream
- *If droplets of water don't return—that's a watchout situation*





CONTROLLING VENTILATION

- Where ,When and How you ventilate— understand what the impact on the fire will be....You're creating a **FLOWPATH**
- Don't break windows indiscriminately
- Forcible Entry = Ventilation
- “Door Control”



SHUT THE DOOR!!!

- Doors left open by occupants
- Opened by people attempting rescue prior to our arrival
- Our own forcible entry efforts
- **These will all lead to fire growth and spread**





CONTROLLING THE DOOR

- Make a quick visual check for any victim near the door, Then shut it while you call for water and get ready to make entry





WE REALIZE THESE ARE A LOT OF CHANGES





QUESTIONS?

- *Please feel free to contact us with any questions at [SDFD Fire Dynamic Group](#)*

