



Collaborative Bachelor's Degree Program of Fire Protection and Safety
Engineering Technology between Southwest Jiaotong University and
Oklahoma State University, U.S.A.




FPST 1213 Fire and Safety Hazard Recognition

Fire Hazard Recognition

1




Collaborative Bachelor's Degree Program of Fire Protection and Safety
Engineering Technology between Southwest Jiaotong University and
Oklahoma State University, U.S.A.




Accidents happen due to unsafe
behaviors, unsafe conditions or a
combination of the two.

Fires are no exception

2



Unsafe Behaviors



- Inadequate housekeeping
 - Oily rags in open waste containers
 - Accumulations of trash near ignition sources

3



Oily and Solvent Rag Disposal



4



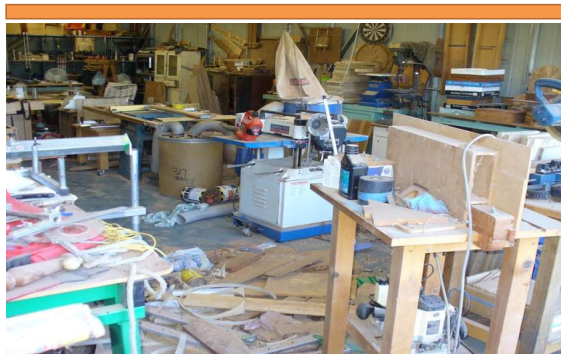
Good Housekeeping



5



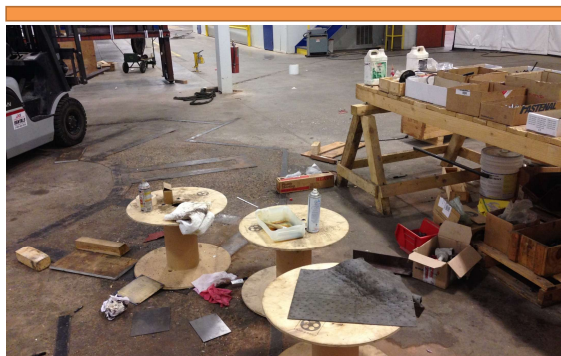
Not so much...



6



Not so much...



7



Unsafe Behaviors



- Unintentional ignition sources
 - Heating devices
 - Open flames
 - Overheated circuits
 - Ignoring prohibitions on open flames or smoking
- Improper disposal of smoking materials
 - Open burning
 - Typically requires a permit from the fire district responsible for regulating the area

8



Unsafe Behaviors

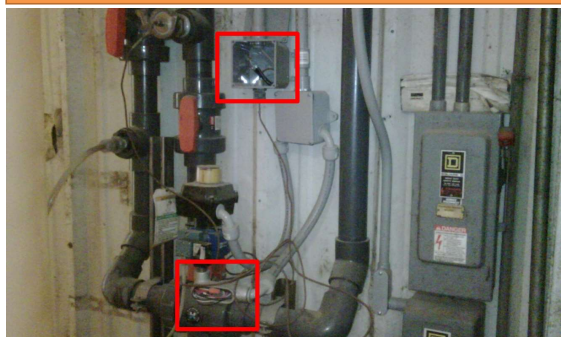


- Improper use of electrical equipment
 - Frayed or damaged extension cords
 - Extension cords used for permanent wiring affixed to walls or running through doors, ceilings or joists
 - Unprotected temporary lights or wiring
 - Daisy chained

9



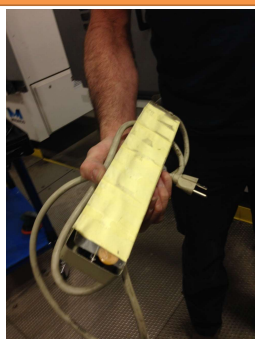
Poor Electrical Equipment



10



Poor Electrical Equipment



11



Poor Electrical Equipment



12



Poor Electrical Equipment



13



Daisy chains



- Connecting two or more extension cords or power strips together to gain additional outlets and/or length



14



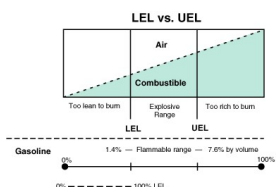
Concerns?



15



Flammable and Combustible Liquids



- Key Terminology
 - Evaporation
 - Flammable Range
 - Flash Point
 - Boiling Point
- Fire Prevention
 - Control Ignition
 - Exclusion of O₂
 - Closed Systems
 - Ventilation Control
 - Inert Gas

16



Unsafe Behaviors

- Improper use and storage flammable and combustible liquids
 - Definitions of flammable and combustible liquid classes is part of the class activity
- Improperly dispensing, mixing, or transferring flammable or combustible liquids
- Storing flammable or combustible liquids in unapproved containers for location
- Improper equipment use
- Improper grounding and bonding
- Dispensing
 - Classes IA-IC - 25 feet from storage tanks, property lines or adjacent building
 - P. 315 Figure 9.10
 - Class II and Classes IIIA and IIIB - 15 feet from storage tanks, property lines or adjacent building
 - Must have curbs, sloped ground or other means to contains spills

17



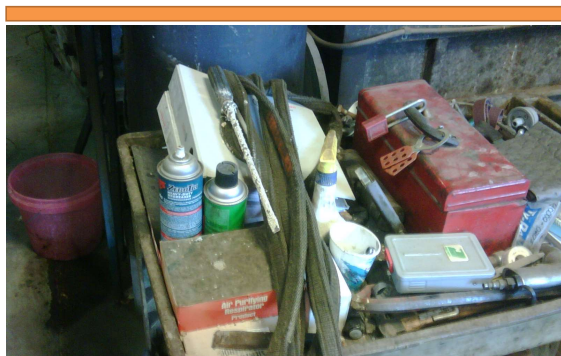
Poor Flammables Storage



18



Poor Flammables Storage



19



Poor Flammables Storage



20



Approved Cabinet



21



Concerns?



22



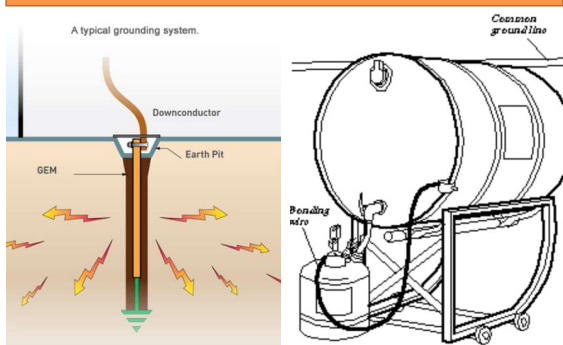
Concerns?



23



Grounding and bonding



24



Grounding and bonding



25



Video

STATIC DISCHARGE

26



Concerns?



27





Intrinsically safe





- Intrinsically safe equipment
- Equipment designed and approved for use in flammable atmospheres is not capable of releasing sufficient electrical energy to cause the ignition of a flammable atmospheric mixture

28




Intrinsically safe labeling

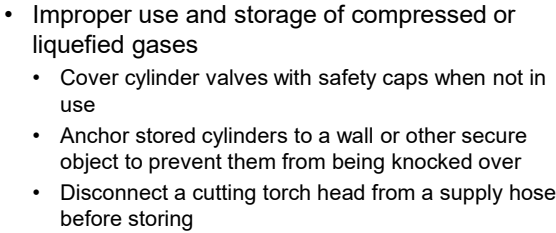





29



Unsafe Behaviors





30






Concerns?







31



Concerns?





32




Behaviors




- Kitchen grease fire
- Homemade fireworks
 - video


33






Unsafe Conditions





Electrical hazards


Worn electrical equipment
Defective or improper
electrical installations




Material storage facilities

Storing products too close
to ceilings or electrical
panels
Blocking fire sprinklers

34



Unsafe Conditions



- Storage methods
 - Pallet storage
 - May include encapsulating the pallets with plastic wrap
 - More difficult for water from the sprinkler to reach, wet and control a fire
 - Rack storage
 - Racks may have in-rack sprinklers
 - NFPA 13, standard for the installation of sprinkler systems
 - Solid piling
 - Stacking materials directly on top of each other

35



Encapsulation

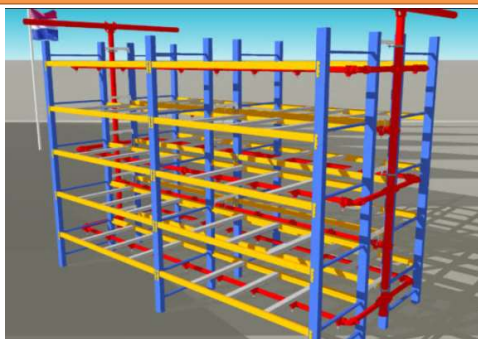




36



Rack Storage



37



Rack Storage Sprinklers



38





Solid Piling





39





BUILDING SYSTEMS



40



Heating Ventilating and Air Conditioning Equipment

- Air conditioners
- Fans
- Ducts
- Thermostat controls
- Heaters
 - Furnaces
 - Hazards
 - Inadequate clearances
 - Lack of proper limit control
 - Floor furnaces must have safety controls that turn off the fuel source if the pilot light is extinguished
 - Thermocouple
 - Improper maintenance procedures

41




Heating Ventilating and Air Conditioning Equipment


- Boilers
- Pressure vessels that are used to generate steam to power machinery or provide heat to industrial processes
- American Society of Mechanical Engineers (ASME) boiler and pressure vessel codes govern the design
- Hazards vary depending upon a number of fuel and malfunction possibilities
 - Natural gas
 - Gas leaks
 - Coal
 - Dust explosions
 - Oil


42








Unit Heaters




 Self-contained and controlled with a thermostat

 Propane


 Natural gas

 Electrical

43




Temporary/portable Heating Equipment





- IFC and IBC contain requirements for the installation of carbon monoxide detection in Group R and Group I occupancies


44




Cooking Equipment



 Main issues are with ventilation hood and associated exhaust

 Ensure no grease accumulation

 Ensure proper provisions for regular grease removal

45



Industrial Cooking Equipment



46



Powered Industrial Trucks

- Diesel
- Gasoline
- Liquefied petroleum gas (LPG, i.e. propane)
- Hazard for the three above surrounds ensuring they are used in the atmosphere for which they are designed.
 - Hazardous atmospheres require special equipment to remove the forklift as a source of ignition
- Electric batteries
 - Accumulation of hydrogen gas and during recharge operations

47



Hazardous Processes

- Hot work
 - Any operation that requires the use of tools or machines that may produce a source of ignition
- Hot work program
- Designated hot work areas
- Hot work permit
- Fire watches
 - OSHA - 30 minutes
 - Insurance company - 60 minutes

48



Flammable Finishing Operations

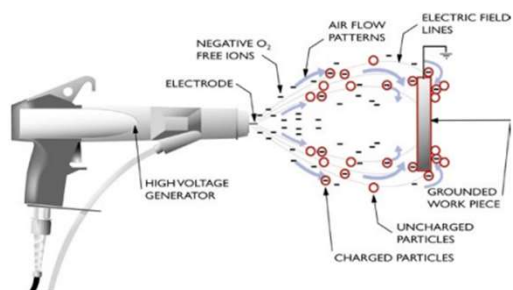


- Spray finishing
 - Pressurizing a flammable or combustible liquid and are atomizing it to create an aerosol
- Most common flammable finishing operation
- Requires use of a plenum
 - An enclosed space in a building designed to officially capture and discharge or circulate air
 - Booth or room has interlock between the spraying equipment in the mechanical ventilation system.
 - Spraying cannot be performed unless the ventilation system is operating

49



Electrostatic Spray Finishing



50



51



52



53



Powder Coating



Suspension of electrically charged combustible powders



Hazard is flash fire or dust explosion



Application equipment must be listed Underwriters
Laboratory (UL) Factory Mutual (FM)



Must have a powder collection system for overspray

54



Powder Coating



55



Immersion Coating



Dipping or coating systems



Have flammable liquids that are heated and agitated



Must provide ventilation and local exhaust equipment to control buildup of vapors

56



Immersion Coating



57



Immersion Coating



58



Dust Hazards

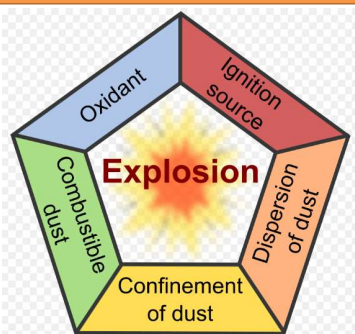


- In order for a dust exposure to occur five conditions must be present
 1. Combustible dust must be suspended in air
 2. The particle concentration must be within its explosive range
 3. An ignition source must be present
 4. The dust must be in a confined space
 5. Oxygen concentration must be capable of supporting combustion

59




Explosion Pentagon





60






Dust Controls







Dust must be continually picked up by manual sweeping vacuuming or other means



All equipment must be grounded to minimize static electricity



Restrict smoking two designated areas



Provide fire protection equipment throughout our buildings as required

61



Fire Protection and Safety Professionals





Must have the ability to immediately recognize common fire hazards



Understand the types of occupancies and applicable codes




Understand the processes




Evaluate the effectiveness of existing hazard controls...if any

62



Collaborative Bachelor's Degree Program of Fire Protection and Safety
Engineering Technology between Southwest Jiaotong University and
Oklahoma State University, U.S.A.



Ensure you know the answers to Chapter 9 review questions for the next exam

63
