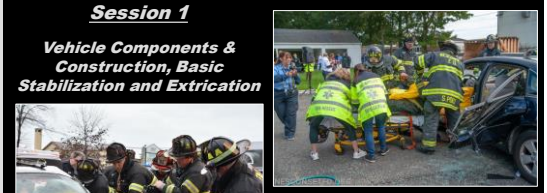
Heavy Rescue

Session 1

Vehicle Components & Construction, Basic Stabilization and Extrication



Suffolk County Fire Academy

1

House-Keeping

- Instructors
- Students
- Paperwork
- Student Manuals
- Exits
- Cell Phones and Pagers.

2

Course Overview

4 Sessions

- **Session 1 – Vehicle Components/Construction, Size-up and Vehicle Stabilization, Basic Extrication Tools, and Extrication**
- **Session 2 – Airbags/Vehicle Safety Systems, Other Extrication Tools and Techniques**
- **Session 3 – Hybrid/Alternative Fuel Vehicles, Advanced Vehicle Stabilization and Extrication**
- **Session 4 – Air Bags, Pneumatic Tools, Other Lifting Tools, Final Exam and Course Evaluation.**

***** ALL SESSIONS REQUIRE PPE *****

3

Course Objectives

- Explain size-up as it relates to existing and potential conditions at vehicle incidents (NFPA 1670 8.3.4)
- Identify probable victim location and survivability (NFPA 1670 8.3.4)
- Describe and implement the methods to identify and control hazards presented by the vehicle, its position, or its systems (NFPA 1670 8.3.4)
- Identify the need for containing and stopping fuel release (NFPA 1670 8.3.4)
- Describe the need and procedure for protecting victims during extrication or disentanglement (NFPA 1670 8.3.4).

4

Course Objectives

- Describe methods used to package a victim prior to extrication or disentanglement (NFPA 1670 8.3.4)
- Perform extrication and disentanglement operations (NFPA 1670 8.3.4)
- Mitigate and manage general and specific hazards associated with vehicle incidents (NFPA 1670 8.3.4)
- Identify the procedures used to control traffic at a vehicle incident (NFPA 1670 8.3.4).

5

Session Objectives

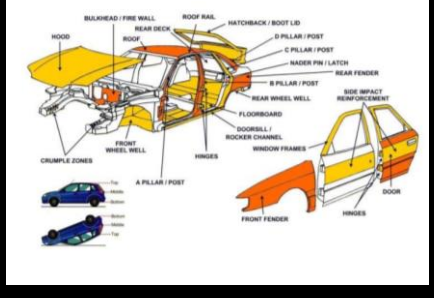
- Recognize vehicle components, construction, and safety systems
- Identify specific vehicle nomenclature as it relates to extrication
- Explain an appropriate size-up at vehicle extrication incidents to include victim access and vehicle stabilization
- Identify tools used for vehicle extrication
- Perform vehicle extrication procedures appropriate for specific scenarios.

6

Vehicle Components/Construction

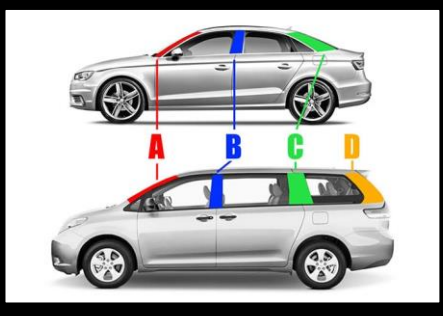
7

Vehicle Component Terms



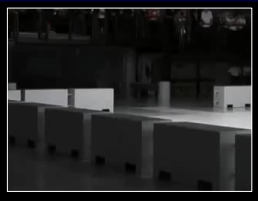
8

Pillars / Posts



9

Vehicle Design History



The "Tanks" vs. Today

Bigger Is Better?

10

A Matter of Deceleration

The longer the vehicle absorbs the impact, the safer the passengers

11

Crumple Zones

12

Federal Safety Standards

"... the public is to be protected against unreasonable risk of crashes occurring as a result of the design, construction, or performance of motor vehicles and is also protected against unreasonable risk of death or injury in the event crashes occur."

The National Highway Traffic Safety Administration

13

Exotic Metals / High Impact Plastics

Advanced High Strength Steels (AHSS)

Twinning Induced Plasticity (TWIP)

High-Strength, Low Alloy (Boron)

- **Stronger, lighter weight materials**
- **Test the effectiveness of our extrication tools**
- **Materials tend to crumple or shatter rather then bend**
- **Used in the areas that encapsulate the passengers (i.e. doors, posts, roof, floor).**

14

Door Impact Beams

Side impacts are still the leading cause of death in motor vehicle crashes

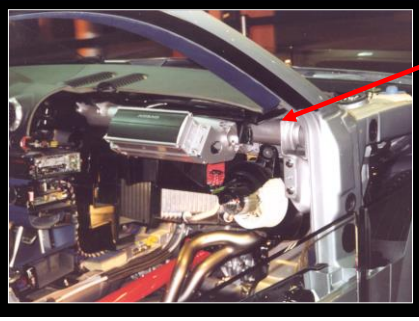
15

Post (Pillar) Reinforcement



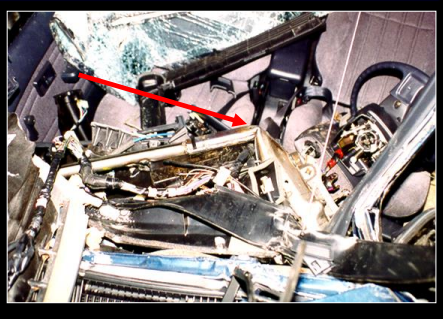

16

Transverse Beams



17

Transverse Beam (Impingement)



18

Unibody vs. Body On Frame

- Unibody – body and chassis are one unit. The outer surface adds to the overall strength of the vehicle
- Body On Frame – body panels are attached to the frame to produce an outer surface (plastic or composite material).

How will this affect our extrication tool selection and ultimate effectiveness?

19

Size-up and Vehicle Stabilization

20

Vehicle Extrication Size-up

- Apparatus positioning
- Number of vehicles
- Number of victims (inside/outside)
- Vehicles secured (parking brake, keys - fobs, battery)
- Fire hazard (line stretched)
- Vehicles stabilized
- Extrication tools required.

21

Battery Location

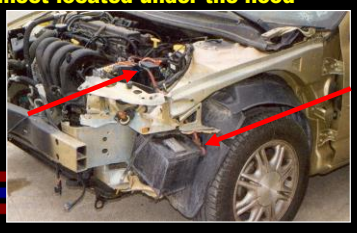
- Under Hood
- Trunk
- Under Hood and Trunk
- Wheel Wells
- Under Back Seats
- Anywhere!

22

Battery Disconnect

Disconnect Negative Terminal (cut if necessary)

Regardless of location, there may be a battery disconnect located under the hood



23

Vehicle Stabilization

The goal of vehicle stabilization is to prevent "rocking" of the vehicle

- Three Rules:
  - Vehicles are stabilized as they are found
  - Check under vehicle for victims before stabilization efforts
  - NEVER right a vehicle with a victim inside

24

Step Chocks

25

Step Chocks

Not Necessary

Can Deflate Tires If Needed

26

Other Stabilization Tools

27

Basic Extrication Tools

28

Hurst Tool ("Jaws of Life")

George Hurst developed original tools in response to a need for rescuing racecar drivers

- "Hurst Tool" has become the brand name to describe most extrication tools
- Today there are several different extrication tool manufacturers and system types:
  - Hurst
  - Holmatro
  - TNT
  - Genesis
  - 5,000 psi systems
  - 10,000 psi systems
  - 15,000 psi system
  - Electric powered
  - Gas powered
  - Battery powered
  - Pneumatic
  - Manual

29

Extrication Tool System
Gas Powered

30

Extrication Tool System
Battery Powered


Cutter


Spreader


Ram

31

Extrication Tool System
Other Equipment


Combi-Tool


Manual System


Manual Combi-Tool

32

Extrication Tool System
Fluid

Phosphate Ester Based vs. Mineral Oil

33

Extrication Tool System
Fittings

Double Connection

Single-core

Quick Connect

34

Extrication

35

Extrication vs. Disintanglement

- **Extrication** – the physical removal of the victim from the vehicle
- **Disentanglement** – the removal of wreckage from around the victim

Initiate victim access whether simple extrication or disentanglement

36

Glass Removal

- Laminated – windshield (or all glass)
  - Glas-master (windshield saw)
  - Sawzall
  - Rhyno Tool
  - Axe

Controlled glass removal is important to gain patient access and access for extrication tools

37

Glass Removal

- Tempered – side and rear windows
  - Window punch
  - Tape (if practical)

38

Door Removal

- Looking to defeat the nader pin (lock side) or expose and cut the hinges
- Various attack methods
  - Manual pry
  - Vertical crush
  - Fender crush
    - Hinge cut
    - Hinge pry

39

Door Removal
Manual Pry – Latch Side

- Halligan for purchase
- Incremental spreader use


40

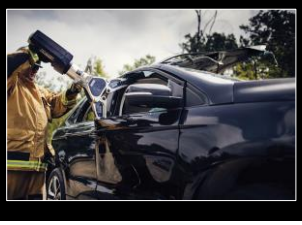
Door Removal
Manual Pry – Hinge Side

- Spreader placed in space between door and fender
- Hinges pried off frame or exposed for cutting

41

Door Removal
Vertical Crush – Latch Side

- Spreader placed vertical near B post (C post on rear door)
- Door is spread away to defeat nader pin




42

Door Removal
Vertical Crush – Hinge Side

43

Door Removal
Fender Crush

- Spreader used to crush fender, creating space to spread, exposing hinges

44

Door Removal
Fender Crush – Hinge Cut

- Cut top hinge first

45

Door Removal
Fender Crush – Hinge Spread

- Spread top hinge first

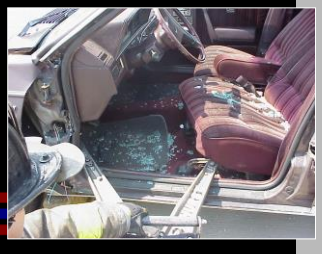
46

Victim Access
Seat Displacement

- After door removal, may have to manipulate seat to affect extrication

Ensure patient stabilization

May use manual release or electric button (battery function)



47

Victim Access
Steering Wheel Displacement

- After door removal, may have to manipulate steering wheel to affect extrication

Can be cut or manually moved using steering wheel adjustment

Use extreme caution if airbag not deployed

48

Roof Removal

- Remove inside, plastic components
- Cut A post at dashboard, B and C higher
- Cut windshield if performing complete removal
- Cut seat belts attached to roof
- Discuss roof removal movement (front or rear).

49

Roof Removal

Cut Above Seat Belts

50

Roof Removal

C Post May Require Multiple Cuts

Where Are We Going With The Roof?

51

Summary

- Common vehicle nomenclature is important, so we are "speaking the same language."
- Posts are labeled starting with A in the front, working toward the back of the vehicle.
- Passenger safety is a matter of deceleration.
- Side impacts are still the leading cause of deaths in vehicle accidents.

52

Summary (Cont'd)

- Batteries can be located anywhere in the vehicle.
- Disconnect the negative terminal of a battery first.
- Three rules of stabilization:
  - Vehicles are stabilized as they are found
  - Check under vehicle for victims before stabilization efforts
  - NEVER right a vehicle with a victim inside
- Extrication must be a well thought out process. Refrain from removing components you may need later in the operation.

53

Questions

54