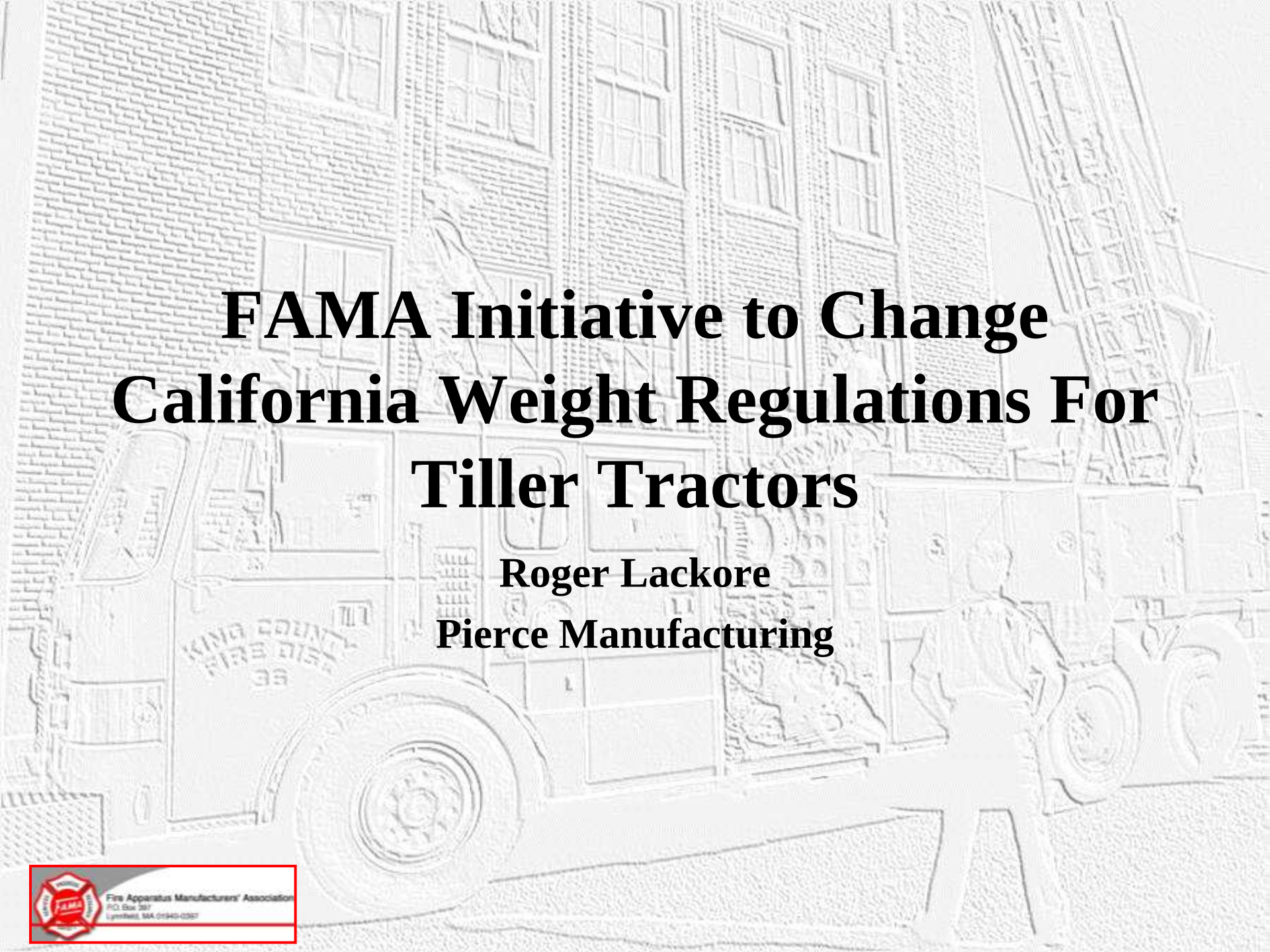
FAMA Initiative to Change California Weight Regulations For Tiller Tractors

Roger Lackore

Pierce Manufacturing



Fire Apparatus Manufacturers' Association
P.O. Box 397
Lynnfield, MA 01940-0397

§1411.7. Fire Trucks.

§ • Note • History

(a) Any fire truck may exceed the maximum allowable axle weights of the Department's Transportation Permit Program, but shall not exceed the following weight limits:

California Code of Regulations

Axle Configuration	*Max. allowable weight*
Single steering axle	23,000 pounds
Single Tiller axle	24,000 pounds
Single drive axle	24,000 pounds
Tandem axles	48,000 pounds
Tridem axles	54,000 pounds

(b) Notwithstanding the weight limits set forth in (a) above:

1) A two-axle aerial ladder fire truck and a two-axle aerial water tower fire truck shall not exceed 31,000 pounds on the rear axle. A three-axle aerial platform ladder fire truck shall not exceed 53,000 pounds on the tandem axle assembly. An aerial ladder fire truck, two vehicle combination, shall not exceed 27,000 pounds on the single-drive axle of the power unit.

2) A pumper fire truck designed to carry a minimum capacity of 1,200 gallons, shall not exceed 27,000 pounds on a single drive axle.

(c) A fire truck designed to carry a minimum capacity of 1,200 gallons and exceed axle weights authorized in California Vehicle Code Section 35551 or Section 35551.5, shall be permanently marked on the manufacturer's GVW rating plate with the gallonage the fire truck is designed to carry.

(d) Tandem axles shall have a minimum axle spacing of 4 feet and tridem axles shall have a minimum axle spacing of 9 feet as measured from the centerline of the first axle to the centerline of the last axle in the axle group. Tandem axle spacing shall not exceed 8 feet and tridem axles shall not exceed 10 feet as measured from the centerline of the first axle to the centerline of the last axle in the axle group.

Except for front steer and tiller axles, all axles within the same loading group shall have a common suspension system that naturally divides weight between all axles in the suspension group equally and equitably, both statically and dynamically under all loading conditions without any influence from an outside source.

"An aerial ladder fire truck, two vehicle combination, shall not exceed 27,000 lbs on the single-drive axle of the power unit."

Summary of Drive Axle Regulations

- **Two-axle aerial ladder fire truck** **31000 lb**
- **Two-axle aerial water tower fire truck** **31000 lb**
- **Aerial ladder fire truck, two vehicle combination** **27,000 lb**
- **Pumper fire truck** **27,000 lb**

- **None of these specifications cover the Tiller "Quint" apparatus which would be termed an "<u>Aerial water tower fire truck, two vehicle combination.</u>"**

Communications with CALTrans

- **Initial Contact**
- **Meeting with CALTrans and CHP in Sacramento**
- **Three rounds of correspondence**

What is the need for the Tiller Quint configuration.

- Greater maneuverability in congested areas the
- Used for both aerial rescue and fire fighting operations.
- The single drive axle feature allows a shorter over-all length
- 500 lb tip capacity will support two firefighters at the tip of the device (or one firefighter and a victim) at full reach and full extension of the ladder.

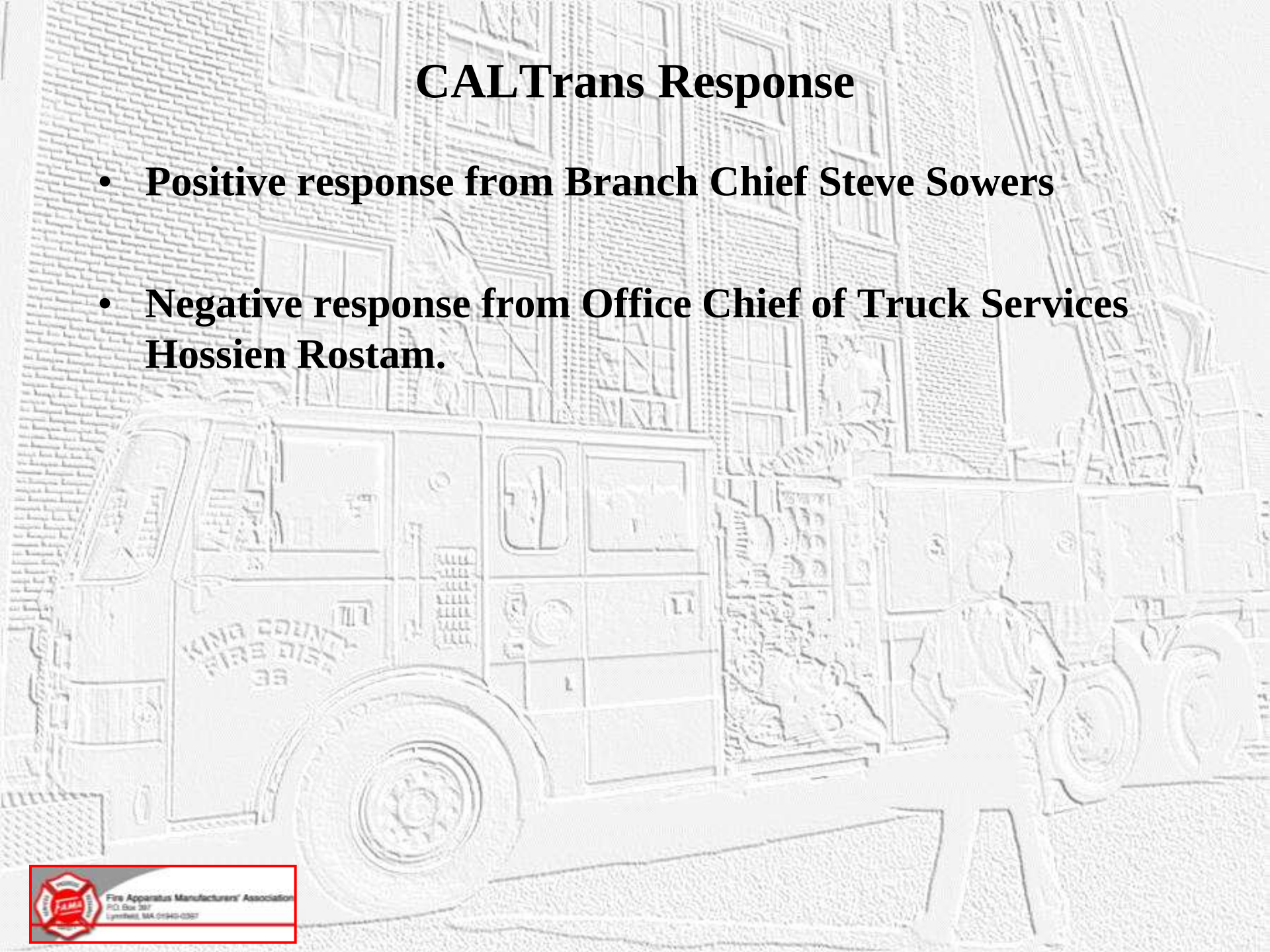
What advantages does the Quint Tiller offer to California citizens and government?

- **Saving Lives**
  - **Fire departments who purchase a 500 lb tip capacity Quint Tiller are doing so to provide better and safer service to their citizens.**
- **Saving Money**
  - **The Quint concept allows the same apparatus to be used for fire suppression, aerial rescue operations, and water tower operations. Fewer apparatus saves the fire department capital and maintenance costs, and provides savings in personnel cost by allowing a fixed number of firefighters to cover a broad range of operations.**

CALTrans Response

- **Positive response from Branch Chief Steve Sowers**

- **Negative response from Office Chief of Truck Services Hossien Rostam.**



Where to go from here

- **CALTrans will not initiate a change in the statutes without a push from California users.**

1. **Limit California sales to tandem axle Quint Tillers**

2. **Organize a petition to change the statute to allow 31,000 lbs on the drive axle of a Quint Tiller**

CALTrans Contact

Hossein Rostam
Office Chief
Office of Truck Services
Department of Transportation
Traffic Operations, MS 36
1120 N. Street
Sacramento, CA 95814
916 654 5548

FAMA Initiative to provide relief for Fire Apparatus from EPA Engine Changes

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EPA Presentation Agenda

- Fire Apparatus Manufacturers
- Fire Apparatus Types and Functions
- Apparatus Standards and Regulations
- Fire Apparatus Market Size
- Unique Design Concerns
- Design Process Challenges
- Justification for Special Consideration
- How can EPA Help

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What is FAMA?

The Fire Apparatus Manufacturers' Association (FAMA) is a non-profit trade association organized in 1946. Members of FAMA are committed to enhancing the quality of the fire apparatus industry and emergency service community through the manufacture and sale of safe, efficient fire apparatus and equipment.

97 Member Companies

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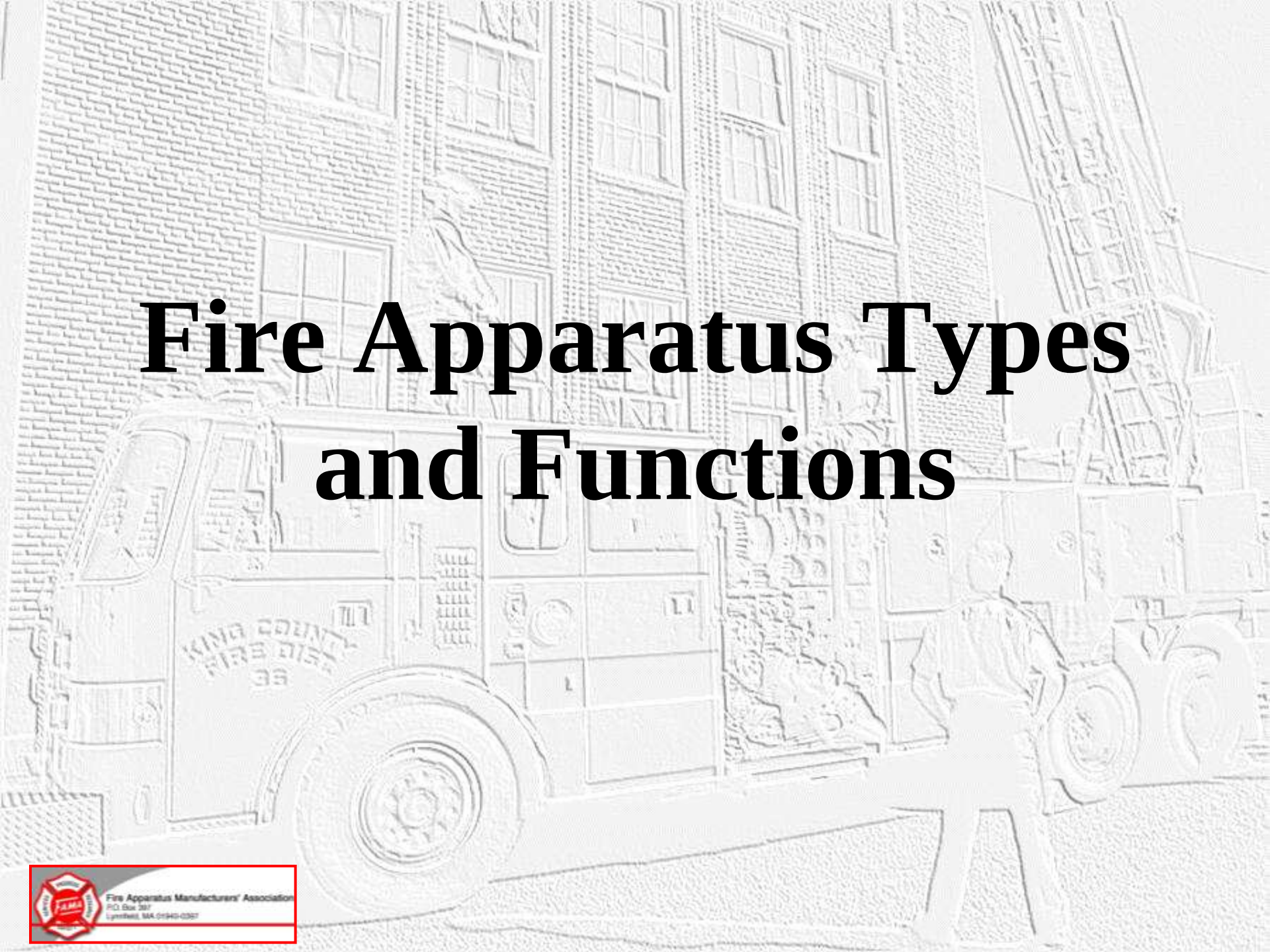
Fire Truck Manufactures

- American La France
- E-one
- Ferrara
- HME
- KME
- Marion
- Pierce
- Spartan
- Seagrave
- Sutphen

Fire Apparatus Types and Functions



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Fire Apparatus Standards and Regulations

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Fire Apparatus Market Size

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Annual National Apparatus Sales 2002

• Pumper	3441
• Aerial	603
• Rescue	636
• Specialty	1051
• Total	5731

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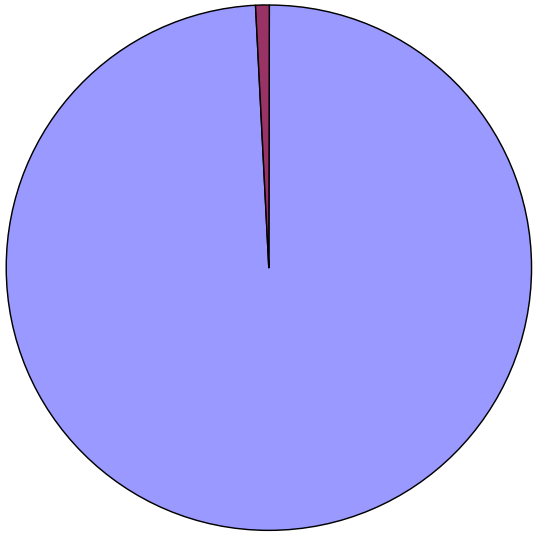
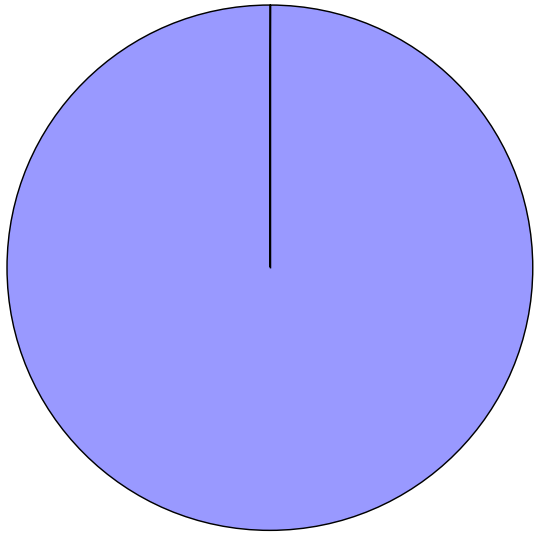
Custom Fire Trucks as Percent of Medium & Heavy Trucks for 2002

Units



Miles



Unique Fire Apparatus Design Concerns

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NFPA Mandates Performance

- **NFPA recognizes the need for fast response time by providing standards for:**
  - **Acceleration**
  - **Minimum Speed on Grade**
  - **Minimum Top Speed on Level Road**

Fire Trucks Need High HP While Stationary

- Pumping water
- AC Power Generation
  - Exhaust Fans
  - Lighting
- Breathing Apparatus Fill Stations
- Hydraulic Powered Rescue Tools
- Emergency Warning Lights
- High Output Air Conditioning
- Multiple PTOs Aerial, Rear Steer

High HP Engines Required to Get to the Fire Quickly

- **Typical Aerial Apparatus GVW 73,500 lbs**

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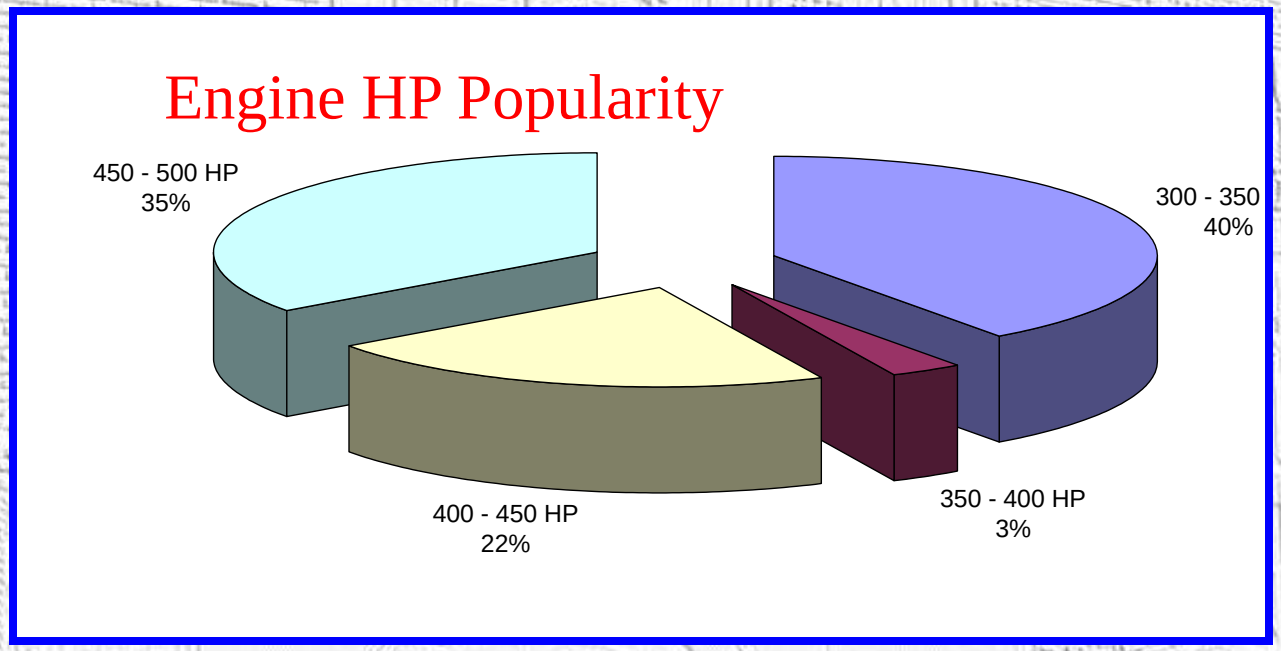
High HP Needs are Reflected in the Market Figures



2004 Engine Changes Increase Cooling System Requirements and Force Larger Radiators and Charge Air Coolers

- **Series 60**
  - **15% Increase already in 2002**
  - **AECDs go away in 2004, Increasing Cooling Requirements another 15%**
- **Cummins ISM**
  - **22% Increase already in 2002. Torque has been cut back to 1450 ft-lbs and limited to 450 HP**
  - **Additional 6% to offer 500 HP in 2004.**
- **CAT C12**
  - **18% increase in 2002**
  - **Estimated 23% increase in 2004**

Higher Cooling Requirements Force Major Cab Redesign with Negative Impact on the Firefighter

- **Engines are packaged very tightly beneath the cab**
- **Growing the cooling package forces the engine tunnel to grow <u>wider or taller, or forces a higher cab.</u>**

KME

E-One

Spartan

#1 Custom Fire Chassis Complaint "Insufficient Room for the Officer"

- The Officer rides in the right side front seat performing the following functions
  - Navigation
  - Dispatch Communication
  - Emergency Warning Device Control
  - Incident Command and Communication with Crew
- The Officer typically carries bunker gear and boots at his feet
- Equipment operated by Officer during response travel
  - Radio
  - GPS
  - Laptop PC
  - Maps and Binders

Engine Tunnel Designs are Tight to the Officer Seat

KME Excel – Llanarch 2001

E-One Cylone II – Clay Cty

Spartan Gladiator WestChester

FFA Inferno – Berwyn 1998

E-One Typhoon – Villages 2001

ALF Metropolitan – Bushnell 2001

Officer Area Room is Limited by Engine Tunnel

Spartan Gladiator - Belgium

Pierce Dash – Hot Springs

Seagrave – Willingboro

HME 1871 - Belgium

Sutphen – Orlando

ALF Eagle – Maple Shade

#2 Custom Fire Chassis Complaint "Insufficient Room for the Crew"

- **Custom fire cabs typically transport 4 to 6 fire firefighters to a fire scene.**
- **Crew typically wear a full compliment of turn-out gear while traveling. This gear is heavy, bulky, and restricts their range of motion.**
- **Emergency response equipment stored in the crew area of the cab include:**
  - **SCBA packs for crew and officer**
  - **EMS equipment**
  - **Spotlights and hand-lights**

Taller Engine Tunnels Provide Less Room for the Officer to Work and Communicate with the Crew

LA City - Seagrave

LA County - KME

Belgium, NY - Spartan

An Alternative to Raising the Engine Tunnel for larger Cooling systems is to Raise the Entire Cab. Higher Cab Heights Force Higher Truck Heights and Restrict Trucks in the Eastern US where Bridges are Old and Low

Design Process Challenges and Hardships Unique to Custom Fire Apparatus

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Small Volumes and High Option Variability

- **Fire apparatus manufacturers must satisfy a very diverse range of needs**
  - **Custom and Commercial Chassis**
  - **Pumpers**
  - **Aerials**
  - **Rescues**
  - **Tens of Thousands of Options**
  - **Limitless Configurations**
  - **Unique designs for most large city Fire Departments**

•2600 Custom Chassis Annually
•9 Custom Manufacturers
•Average Production Volume
•288 Units/Year!
•113 Units/Model!

- **The impact of each wave of engine changes is multiplied by the extreme product variability.**
- **Most Fire Apparatus manufacturers must spread the cost of engine installation effort over just a few hundred vehicles per year.**

Reasons Why Fire Trucks Could be Considered for Special Consideration

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Precedent for Special Consideration by Industry and Government is Well Established

- **Industry Recognizes the Special Duty Requirements by providing Special Fire Service Ratings**
  - **Engine manufacturers give unique top-tank temp. limits**
  - **Tires ratings higher than OTR in recognition of duty cycles**
  - **Wheel ratings higher**
  - **Axles ratings higher**
- **Government Allows Fire Trucks Special Consideration**
  - **Traffic Regulation Exemptions (Speed and Right of Way)**
  - **Axle Weight Limitation Exemptions**

Improved Fire Apparatus Performance has the Potential for Reducing Air Pollutants

- **Typical Particulate Emissions from Fires**
  - House Fire (wood only) — 17,800 grams
  - Dumpster Fire (paper & plastic) — 9,500 grams
- **Truck Emissions on Typical Fire Call**
  - Drive Time (2 miles each direction) — 2 grams
  - Idle Time (45 minutes) — 3 grams
  - Pumping (2 Hours at house fire) — 70 grams
  - Pumping (10 Minutes at dumpster fire) — 6 grams
- **Ratio of Fire Emissions to Engine Emissions**
  - House Fire — 238
  - Dumpster Fire — 880
- **Conclusion: There is great potential for reducing emissions by getting to the scene quicker and knocking down the fire faster.**

Higher Horsepower Engine Improve Response Time on Level Ground

- **Engines with high HP and Torque improve response time particularly for heavy apparatus. The following study assumes a 75,000 lb aerial device with identical parasitic losses.**
- **The comparison assumes a response run from L-Enfant plaza to 501 3rd St NW in Washington DC.**
- **A 500 HP engine can shave 19 to 26 seconds off a response time!**

Engine	Response Time (sec)	Variance (sec)
Series 60 500 HP, 1650 Torque	123.3	
Series 60 430 HP, 1550 Torque	142.1	18.8
ISM 450 HP, 1450 Torque	149.7	26.4

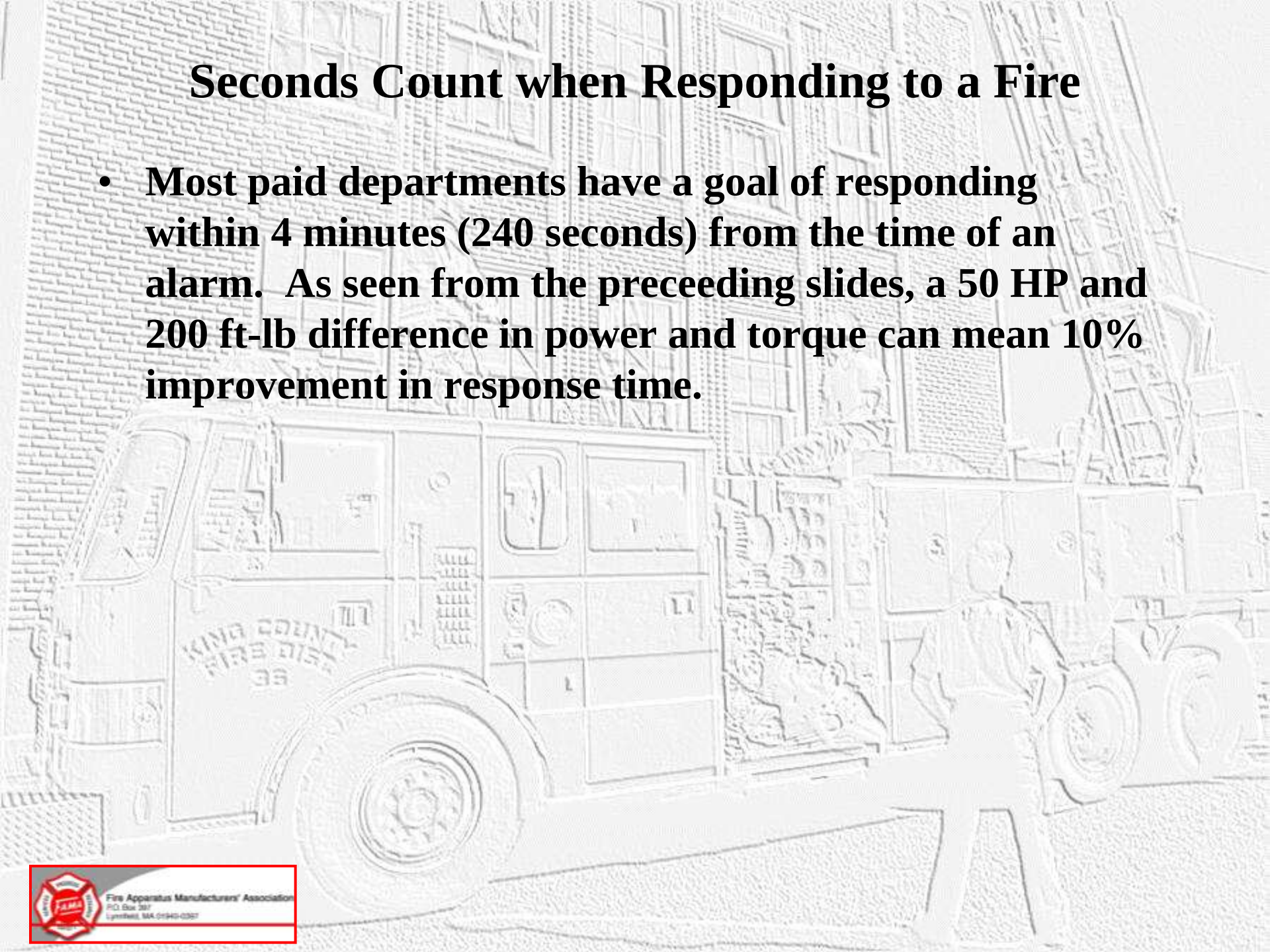
Higher Horsepower Engine Improve Response Time in Hilly Regions

- **Apparatus that must respond in hilly regions can improve response time by using engines with higher power and torque.**
- **The comparison assumes one mile of travel on a 6% grade.**
- **A 500 HP engine can shave 10 to 22 seconds off a response time!**

Engine	%Grade	Speed (MPH)	Time on 1 mile of Grade (sec)	Variance
Series 60 500 HP, 1650 Torque	6	28	128.6	
Series 60 430 HP, 1550 Torque	6	26	138.5	9.9
ISM 450 HP, 1450 Torque	6	24	150.0	21.4

Seconds Count when Responding to a Fire

- **Most paid departments have a goal of responding within 4 minutes (240 seconds) from the time of an alarm. As seen from the preceeding slides, a 50 HP and 200 ft-lb difference in power and torque can mean 10% improvement in response time.**



Improved Response Time means Less Pollution

- **The house fire example that emits 17,800 grams of particulates assumes a 1200 square foot all wood home that is burned 40% before being extinguished. A competent fire department can knock down this type of fire in 15 minutes.**
- **With these assumptions, the house fire is emitting particulates at a rate of 20 grams per second.**
- **A 26 second improvement in response time will equal a savings of 520 grams of particulates.**
- **This represents an emissions payback of 750% assuming the that the truck will emit 70 grams while responding to the fire, pumping for 2 hours (this time includes mop-up operations), and returning to the department.**

How Can EPA Help?

The Need

- **Custom Fire Apparatus must be designed around the conflicting needs of in-cab ergonomics, and maximum vehicle performance.**
  - **High engine horspower is required to meet the performance needs both in driving and pumping operations**
  - **Maximized Cab interior space is essential to optimize personnel performance during emergency response.**
- **High heat rejection of new diesel engines forces a trade-off between vehicle performance and ergonomics that will be detrimental to our nations fire fighters.**

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Proposal

- **Allow engine emissions strategy for fire apparatus applications to continue AECD (EGR off during high ambient and high power conditions) without cutting back power for 2004 and beyond.**

Current Status

- **Cummins and DDC have draft letters in review with EPA describing how they propose to use AECD to provide relief for Fire Apparatus.**
- **EPA has reviewed the draft letters and will be contacting engine manufacturers to ensure that no competitive advantages are being given.**
- **“You can give folks at your conference a pretty warm feeling about this, that you are going to get the relief you need, that we just need to get the paperwork together.” Rick Gezelle – US EPA**