



What is Fire ? **The Combustion**

**a Chemical Chain Reaction
Between Oxygen and
a Combustible Material**



Under the Development of

Heat / Energy

Smoke

Gasses



Fire Parametres

- Energy
- Heat – UV Radiation – IR Radiation
- Smoke
- Visible – Invisible Particles
- Gasses
- CO – CO₂ – H₂O/Steam
- Nitrogen Oxides



Fires !

- **Slow Combustion**
 - **No Measurble Flame Speed**
- **Normal Combustion**
 - **Flame Speed in dm per minute**
- **Deflagration**
 - **Fast and accellerating – Flame Speed in Metres per Second**
- **Explosion**
 - **Flame Speed < 6 Metres per Second**
- **Detonation**
 - **Flame Speed in Kilometres per Second**



Smoke Generation

- **10 Kg of Mixed Materials**
 - Develops
- **50 m³ Smoke per Minute**



Flame Temperatures °C

- Cigarette 780
- Wood 1000/1500
- Propane 1930
- Hydrogen 2050
- Welding Flame 3100



Rate of Heat Release

- Paper Basket 175 KW
- Arm Chair 800 KW
- Hospital Bed 1,85 MW
- 12 m2 Bedroom 2,5 MW



Methods of Extinguishing

- **Cooling – Heat Absorption**
 - Water and Water Based Agents
- **Oxygen Depletion**
 - CO₂, N₂, Argonite, Inergen – Inert Gasses
- **Inhibition**
 - Halogenated Hydrocarbons + Bromine/Iodine salts



Water as a Fire Extinguishing Agent

Properties
&
Capacities



Water Heat Absorption Capacity

- One Litre of Water
 - At 100° C 2,256 Mjoule
 - At 300° C 3,000 MJoule



Rate of Heat Release

- Paper Basket 175 KW
- Arm Chair 800 KW
- Hospital Bed 1,85 MW
- 12 m2 Bedroom 2,5 MW



Water Expansion Factors

- One Litre of Water
 - 100° C 1700
 - 300° C 2000



Cooling Surface Area Droplet Sizes One Litre of Water

- 1 micron 5813 m²
- 20 micron 290 m²
- 50 micron 116 m²
- 300 micron 20 m²
- 0,5 mm 11 m²
- 1,0 mm 6 m²

The Quattro Effect of Water Fog



- Heat Absorption
- Cooling of Hot Gasses and Surfaces
 - Creating a Steam Barrier
 - Reduction of Oxygen
 - Secondary Effects
 - Air Scrubbing
- Ambient Temperature Reduction



Do Not Use Water

- **Reactive Metals**
 - **Metal Oxides**
 - **Metal Amides**
 - **Carbides**
 - **Halides**
 - **Sulfides**
 - **Cyanides**
 - **Liquified Gasses**
- at Cryogenic Temperatures**



What is

**Impulse Fire Extinguishing
Technology ?**



Discharging the Agent

**At a very High Velocity
Within an Extremely
Short Period of Time**



Velocities

- **100 to 150 Metres per Second**
 - **360 to 540 km/h**
 - **224 to 336 miles/h**

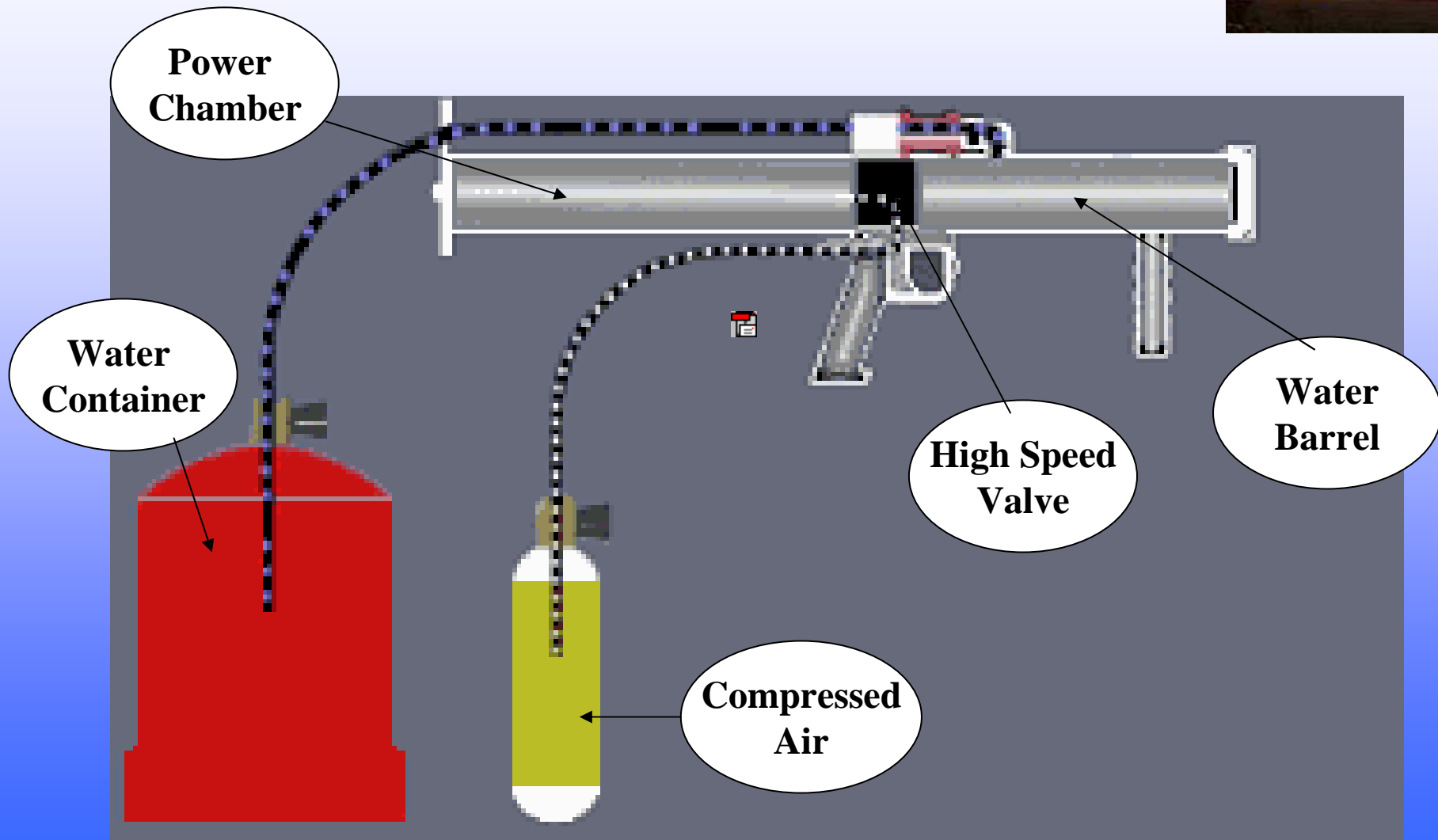


Water Droplet Sizes

- **Droplet Sizes2 to 200 micron**
- **Mean Droplet Size50 to 100 micron**
- **Cooling Surface Area ... 60 to 200 m² / ltr.**



Water and Air





High Speed High Performance Valve

- **Opening and Closing Time 20 to 100 mS**
- **Anti Bounce Mechanism Pneumatic**
- **Operating Pressure 15 to 55 bar**
- **Material Aluminum / Titanium**



Performance

- **Shot Lengths Up to 75 metres**
- **Width of Shot 3 to 8 metres**
- **Average Cover Area 20 to 200 m²**



Fire Extinguishing Agents

- Sweet Water
- Sea / Salt Water
- Film Forming Fluids
- Biological Additives
 - Retardents
- Any Water Based Additive



Revolutionary Fire **Knock Down Power**

- **High Kinetic Energy**
 - **High Momentum**
- **High Penetration Power**
- **Creating High Turbulence**



IFEX Technologies **Design Parametres**

- **Water Based**
- **Water Mist – Water Fog**
 - **High Efficiency**
- **Compact and Simple**
 - **Versatile**



IFEX Impulse **F**ire **E**xtinguishing **T**echnology

The **IFEX** Video

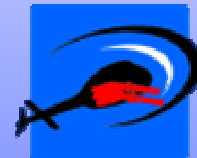
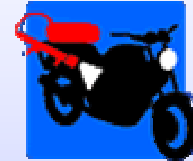
IFEX Product Range

Portable Systems

Mobile Systems

Fixed System

Integrated Technologies





Portable Equipment

- **One litre Impulse Gun**
 - **13 litre Backpack**
 - **35 litre Trolley**
 - **50 litre Trolley**

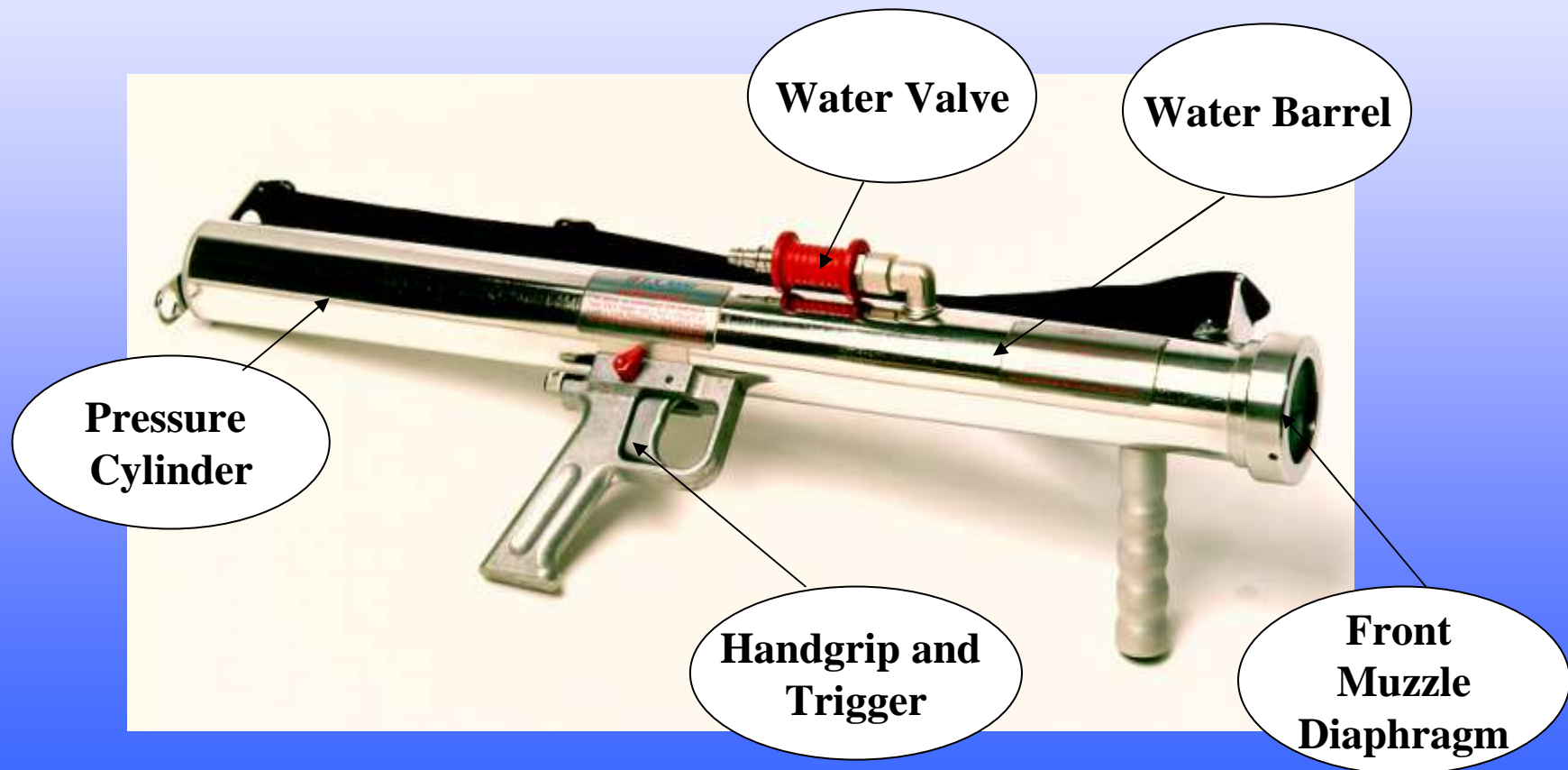


Impulse Gun and Backpack





Impulse Gun





Impulse Gun

- **Operating Pressure 25 bar**
- **Shot Capacities 0,25 to 1 ltr.**
- **Droplet Sizes 2 to 200 micron**
- **Cooling Surface Area Up to 200 m²/ltr.**
- **Throw Distance Up to 16 metres**
- **Shot Duration 20 mS**



Backpack

Harness

**2 ltr.300 bar
Air Cylinder**

**13 ltr.
Water Canister**

**Air Pressure
Regulator**

**Impulse
Gun**





Backpack

- **Water Capacity 13 ltr.**
- **Water Pressure 6 bar**
- **Air Cylinder 2 ltr./300 bar**
- **Regulator 300/25/6 bar**
- **Overall Weight Water Filled 25 kg**

- **Any Water based Additive can be used**



Trolleys

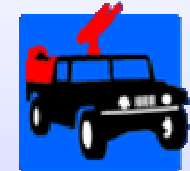
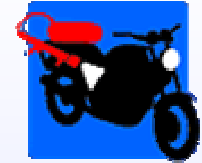




35 and 50 litre **T**rolleys

- **Water Capacities 35 / 50 ltr.**
- **Water Pressure 25 bar**
- **Air Cylinder 6 ltr. 200 / 300 bar**
- **Regulator 300/25/6 bar**
- **15 mtr. Water/Pressure Hose Co-Axial**

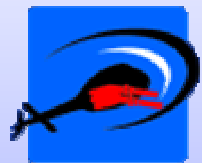
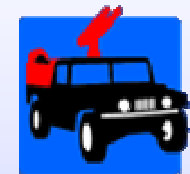
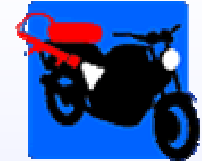
- **Any Type of Water based Additive can be used**



Mobile Equipment

- **Impulse Gun Backpack / Trolleys**
- **Slide Skid with Gun 72 ltr.**
- **Hose Reel Units 30 to 100 mtr. hoses**
- **Dual Intruder Cannons 12, 15, 18, 25, 40 ltr.**

IFEX Mobile Applications



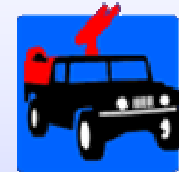
- **Motorbikes with Gun and Backpack**
- **Small Vehicles with Slide Skid and Gun**
- **Mid Sized Trucks with Dual Intruder Cannons**
- **Fire Trucks with Hose Reel Units and Gun**
- **Tunnel Fire Trucks**
- **Fire Tractor with Remote Controlled Cannons**
- **IFEX FireCopter – Helicopter Application**



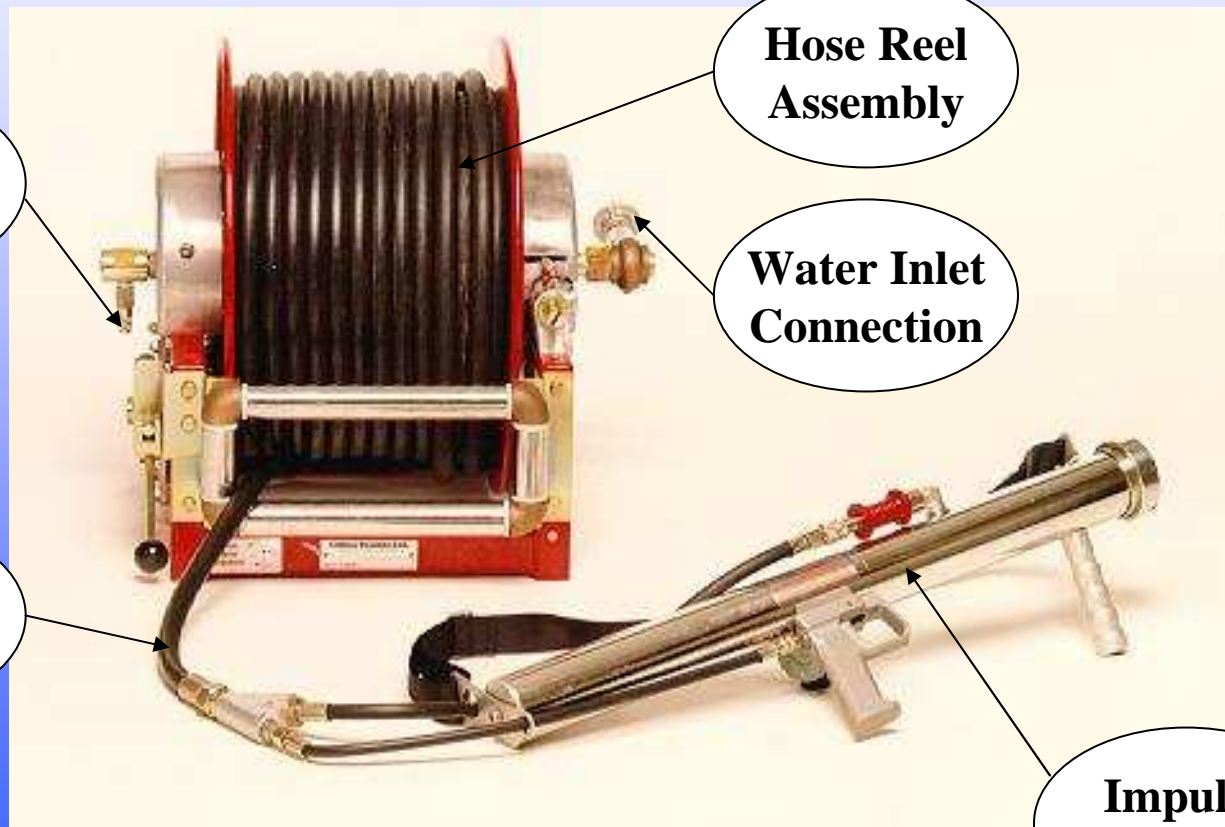
FireHunter



**Hummer FireHunter with
2 x 12 litre Dual Intruder
Impulse Cannons**



Hose Reel Unit



Air Inlet Connection

Hose Reel Assembly

Water Inlet Connection

Co-Axial Hose

Impulse Gun



Hose Reel Units

- **Water Pressure 6 to 12 bar**
- **Air Pressure 25 bar**
- **Air Cylinders 6 ltr. 200/300 bar**
- **Regulator 300/25 bar**
- **Co-axial Hose 30 to 100 mtr.**

- **Options Electrical Rewind**

Slide Skid Unit



Hose Reel

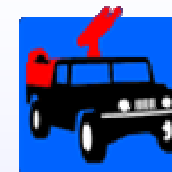
Air Cylinders
With Regulators

72 ltr. Water
Reservoir

Slide
Skid

Co-Axial
Hose to Gun



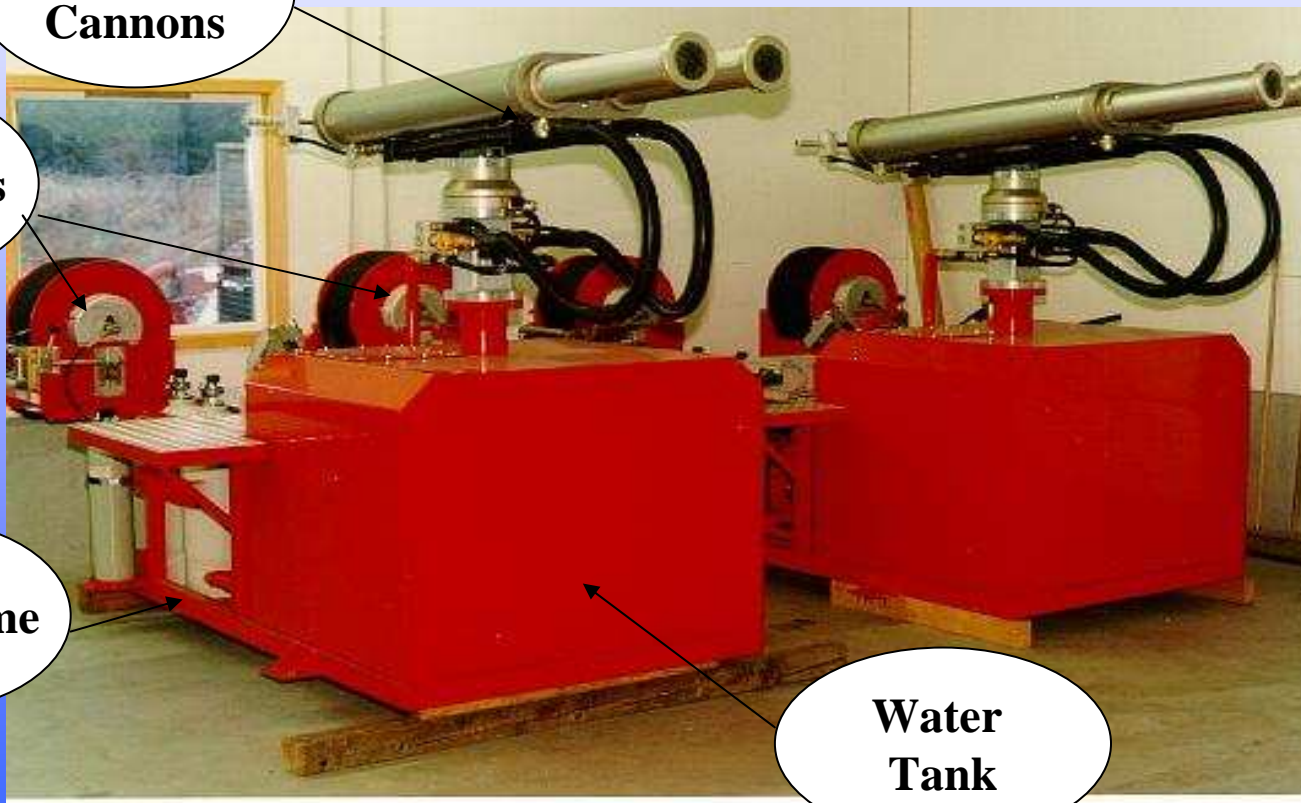


Dual Intruder II Impulse Cannons





Dual Intruder II Bolt On Skid



**Impulse
Cannons**

Hose Reels

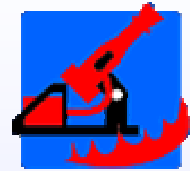
Skid Frame

**Water
Tank**



Dual Intruder II Impulse Cannons

- **Operating Pressure 25 bar**
- **Water Capacities 12,15,18,25 and 40 ltr.**
- **Valve Operation Time 20 to 100 mS**
- **Droplet Sizes2 to 200 micron**
- **Throw distance Up to 75 metres**
- **Shot Duration 50 to 100 mS**



Fixed Systems

Range of Equipment

1,0 Itr. Axial Cannon

2,5 Itr. Co-Axial Cannon

5,0 Itr. Co-Axial Cannon

15,0 Itr. C-Axial Cannon

30,0 Itr. Co-Axial Cannon



30 ltr. Co-Axial Cannon





The **20 mS** Impulse Shot





Fixed Systems

- Tailormade
- Range of Cannons
- PLC Monitoring and Operation
 - High Efficiency
 - Low Water Usage
- Local Application Systems



Road and Railway Tunnel Fire Protection

Impulse Fire Extinguishing Technology



Criteria

- **Traffic Frequency**
- **Transportation of Dangerous Materials**
 - **Fire Loads and Hazards**
 - **Tunnel Construction**
- **Use of Combustible Materials**
- **Statistics – Incidents - Fires**



Fire Protection Systems

- Fire Detection
- Sprinkler / Deluge
- Water Mist Water Fog
 - Fixed Foam
- Impulse Fire Suppression



Measurements

- Fire Propagation
- Smoke Generation
 - Visibility
- Rate of Temperature Rise
 - Heat Radiation
- Smoke and Gas Spreading



Objective

- **Fire Suppression / Fire Control**
- **Reduction of Ambient Temperature**
- **Maintain Accessible Temperature Level**
 - **Air Scrubbing**



Integrated Technologies

- **Impulse Fire Extinguishing Technology**
- **Addressable Intelligent Fire Detection**
- **PLC – Operation, Monitoring and Control**
 - **Rail and Wagon Positioning System**
 - **IR / UV / Laser Aiming System**
 - **Pan and Tilt Technology**



System Configuration

- **Fixed Mounted Impulse Cannons**
- **Mobile "FireTracer" Rail System**
 - **Mobile "FireTracer Wagon"**



Fixed Cannons

- Side or Ceiling Mounted
- PLC Operation and Control
 - Fully Self Contained



Range of **Cannons** **Ifex Dual Intruder II**

- **2 x 12 ltr. Co-Axial**
- **2 x 15 ltr. Co-Axial**
- **2 x 25 ltr. Co-Axial**
- **2 x 40 ltr. Co-Axial**



FireTracer Mobile Unit

- **Dual Intruder Impulse Cannons**
 - **Pan and Tilt Mechanism**
- **Aiming Device – Automatic Release**
 - **Built in Water and Air Supply**
- **Built in Propulsion Motors and Power Supply**
 - **PLC Operation and Control**
 - **High Speed Wagon**
 - **Fully Self Contained**



FireTracer





FireTractor

