

2,254 BUSES FITTED WITH HIGH PRESSURE WATER MIST



FIRESTORM GROUP – Presenter Mick Cory



BACKGROUND

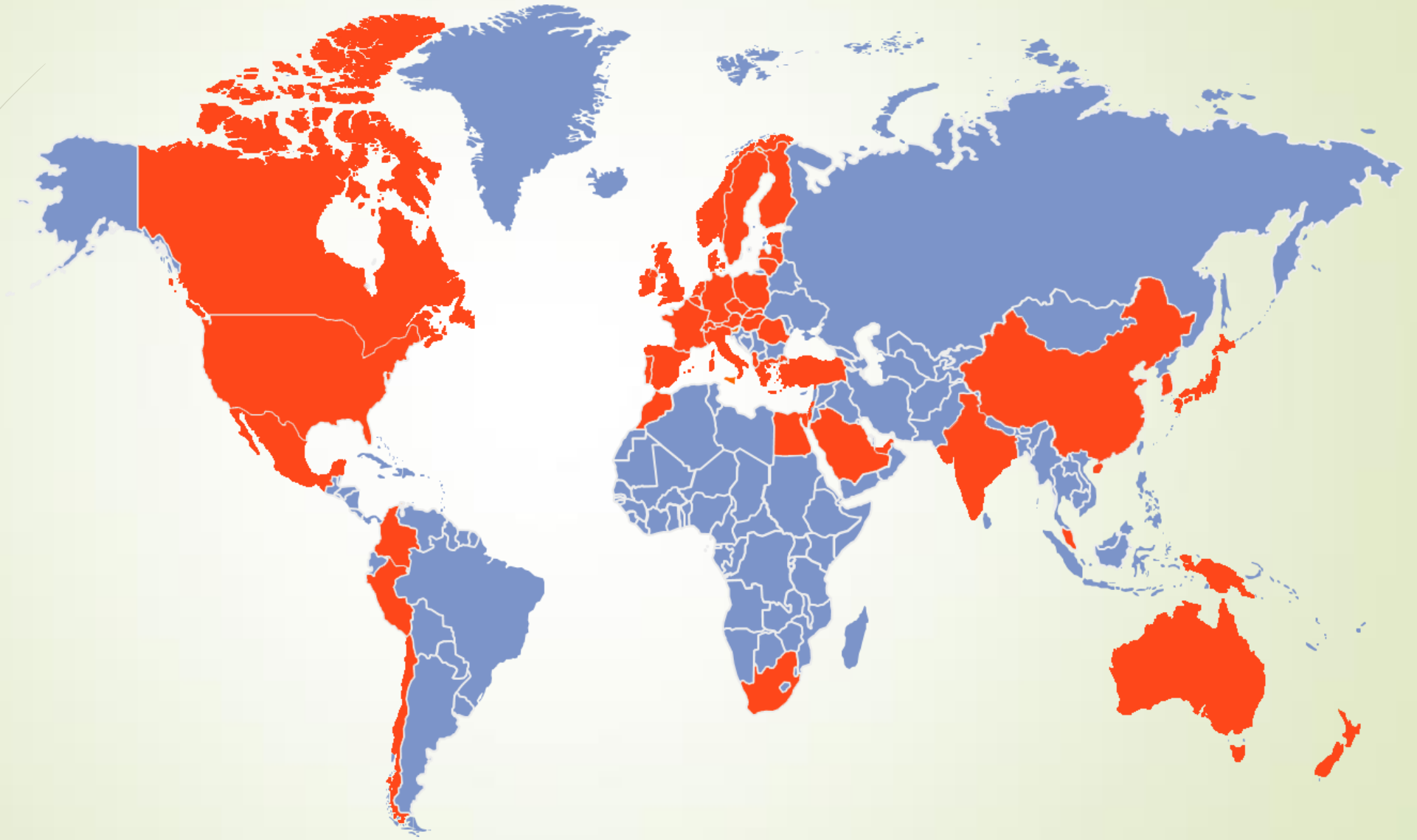
- ▶ The Firestorm Group was founded in 2004 and our head office is based in the Hunter Valley NSW, Australia.
- ▶ Stemmed from underground & open-cut mining industry
- ▶ Moved into Public Transport
- ▶ Engine Bay Fire Suppression remains our core business & as such, we sell, service and maintain most types of fire systems including but not limited to:
 - ▶ Powder (DCP)
 - ▶ Dual Agent
 - ▶ Foam (AFFF)
 - ▶ Aerosol
 - ▶ Gaseous
 - ▶ Deluge & hydraulics
 - ▶ Water Mist



FOGMAKER
AUSTRALIA PTY LTD

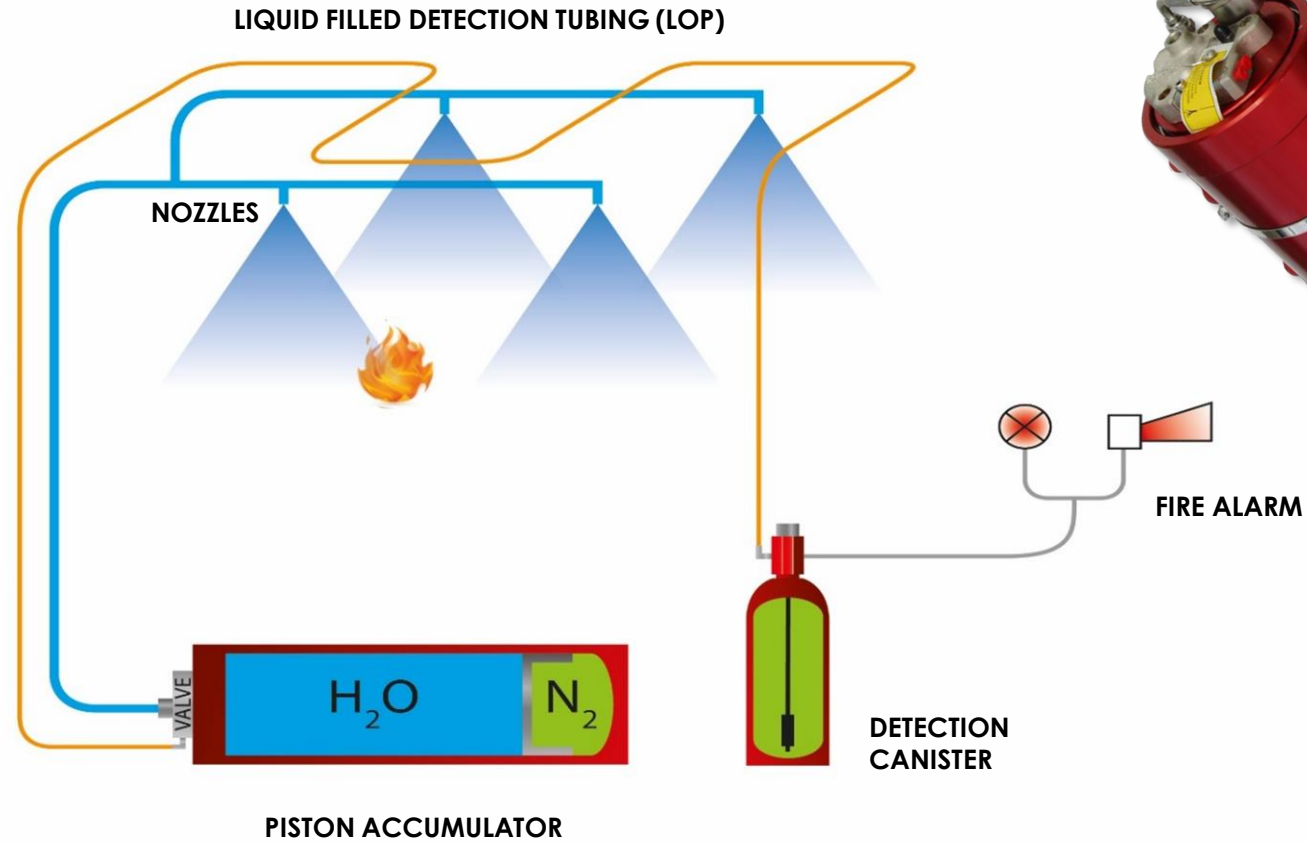


BACKGROUND **FOGMAKER**



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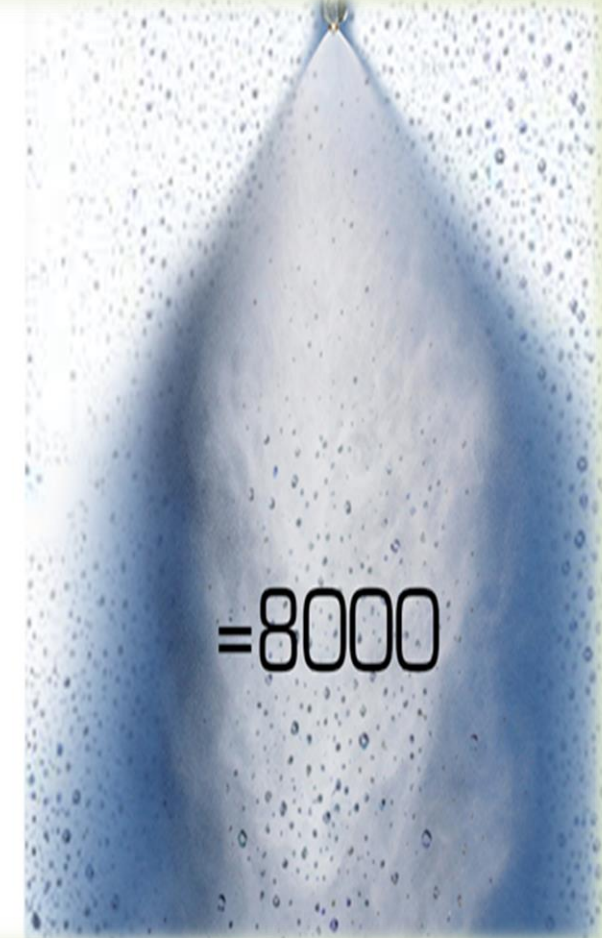
INTRODUCTION OF FOGMAKER HIGH PRESSURE WATER MIST



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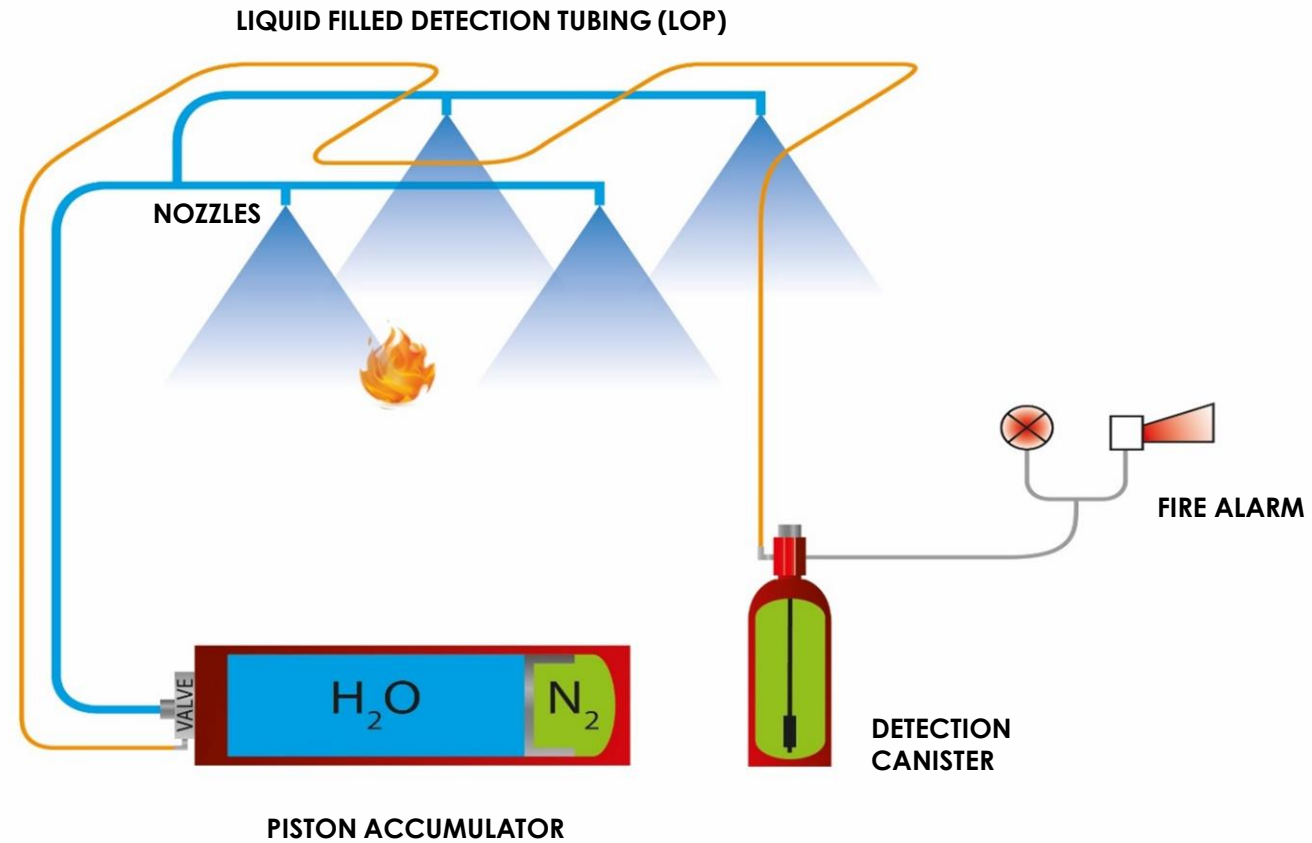


INTRODUCTION OF FOGMAKER HIGH PRESSURE WATER MIST – NOZZLES PRODUCING APPROX 50 MICRON DROPLET SIZE

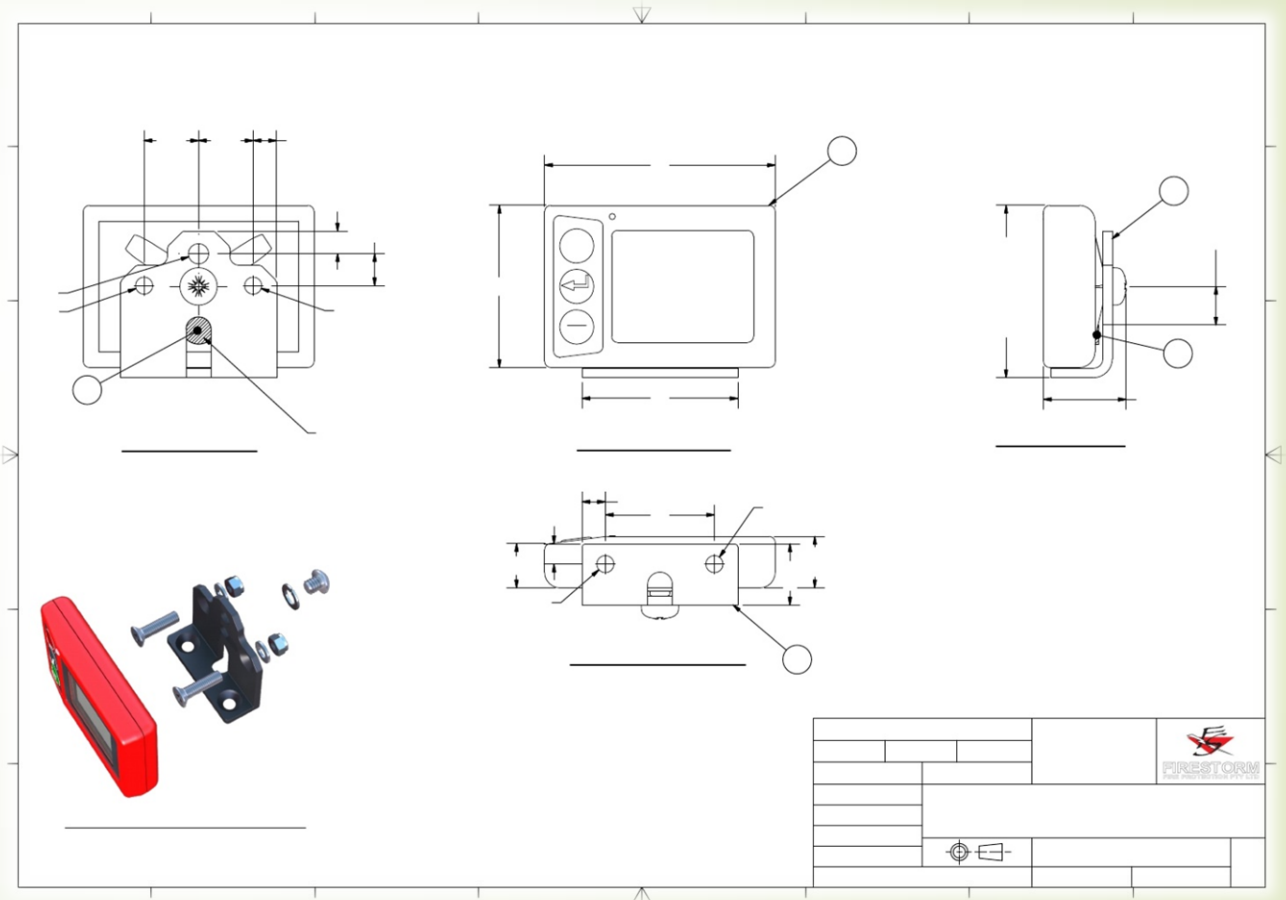


BACKGROUND

INTRODUCTION OF FOGMAKER HIGH PRESSURE WATER MIST



INTRODUCTION OF FOGMAKER HIGH PRESSURE WATER MIST – FIRE ALARM PANELS



WATERMIST FIRE SUPPRESSION FITTED TO LARGE PLANT



WATERMIST FIRE SUPPRESSION FITTED TO LARGE PLANT



WATERMIST FIRE SUPPRESSION FITTED TO LARGE PLANT



THE INSTALLATION OF WATER MIST TO UNDERGROUND MOBILE PLANT



CHALLENGES

- ▶ Although the fitment of fire suppression was common place on mining & construction across Australia
- ▶ The fitment of Fire Suppression on Government Transport emanated after a succession of bus fires across Australia.
- ▶ Perpetual media coverage & bus unions begin to pressure the Australian Government to respond swiftly in mitigating fire risk on public transportation.



BIC Fire Mitigation Advisory

Section 1 Important reading

Section 2 Review of Fires on Buses (Aust & Overseas)

Section 3 Risks Associated with Bus Fires

Section 4 The Risk Assessment Process

Section 5 Reducing the risk of the fire

[http://bic.asn.au/literature_176984/Fire Mitigation Advisory](http://bic.asn.au/literature_176984/Fire_Mitigation_Advisory)



FIRE SUPPRESSION FITTED TO MINING PLANT

- HEAVY STEEL STRUCTURE
- TYPICALLY ONE PERSON ON BOARD
- LARGER PLANT HOWEVER, FIRE MITIGATIONS ALREADY IN PLACE
- FIRE SUPPRESSION SYSTEMS ALREADY WIDELY ACCEPTED
- MINING EQUIPMENT LOCALISED / MINIMAL EXPOSURE TO OTHER TRAFFIC ETC
- HIGHLY TRAINED EMERGENCY TEAMS AT READY



FIRE SUPPRESSION FITTED TO BUS INDUSTRY

- FLAMMABLE STRUCTURE – FIBREGLASS, TEXTILES, TIMBERS & PLASTICS
- HUMAN CARGO – 70 +
- LIMITED FIRE MITIGATION IN PLACE
- FIRE SUPPRESSION SYSTEMS NOT WIDELY ACCEPTED
- LARGE EXPOSURE TO OTHER TRAFFIC / ENVIRONMENTAL IMPACT
- MIMIMAL TRAINING



THE INSTALLATION OF BUS ENGINE-BAY FIRE SUPPRESSION ESCALATES

- 2010 – 475 Compressed Natural Gas (CNG) Buses retrofitted in Perth WA
- 2011 – 250 Gas Buses retrofitted in Sydney with all new buses to be fitted with





THE AUSTRALIAN AUTHORITIES SEEK SPECIFIC BUS & COACH STANDARD

- 2015 – An additional 1,300+ Buses retrofitted in Sydney
- Firestorm awarded the contract using water mist
- Firestorm's first introduction to using "P"Mark
- Retrofit on 14 x different bus designs
- Evident that "P" Mark is a preference
- Evident that Water Mist is a preference from others agents



SPCR 183

Certification rules
regarding

Fire suppression systems
in engine compartments
of buses and coaches

SP Sveriges Tekniska Forskningsinstitut



SP Sveriges Tekniska Forskningsinstitut
SP Technical Research Institute of Sweden
Certifiering - Certification
2013-06-28

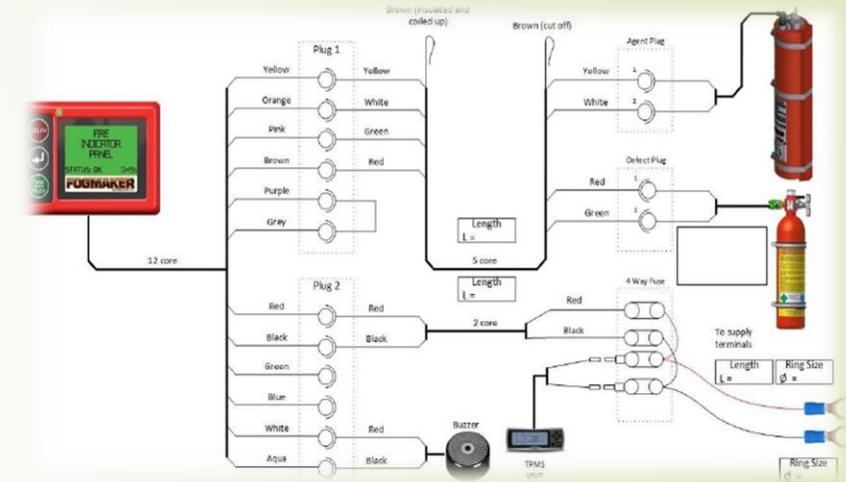
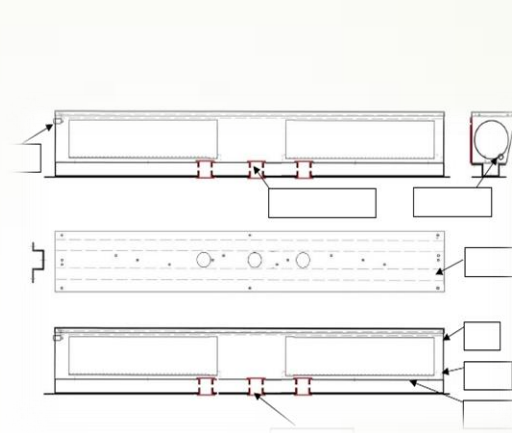
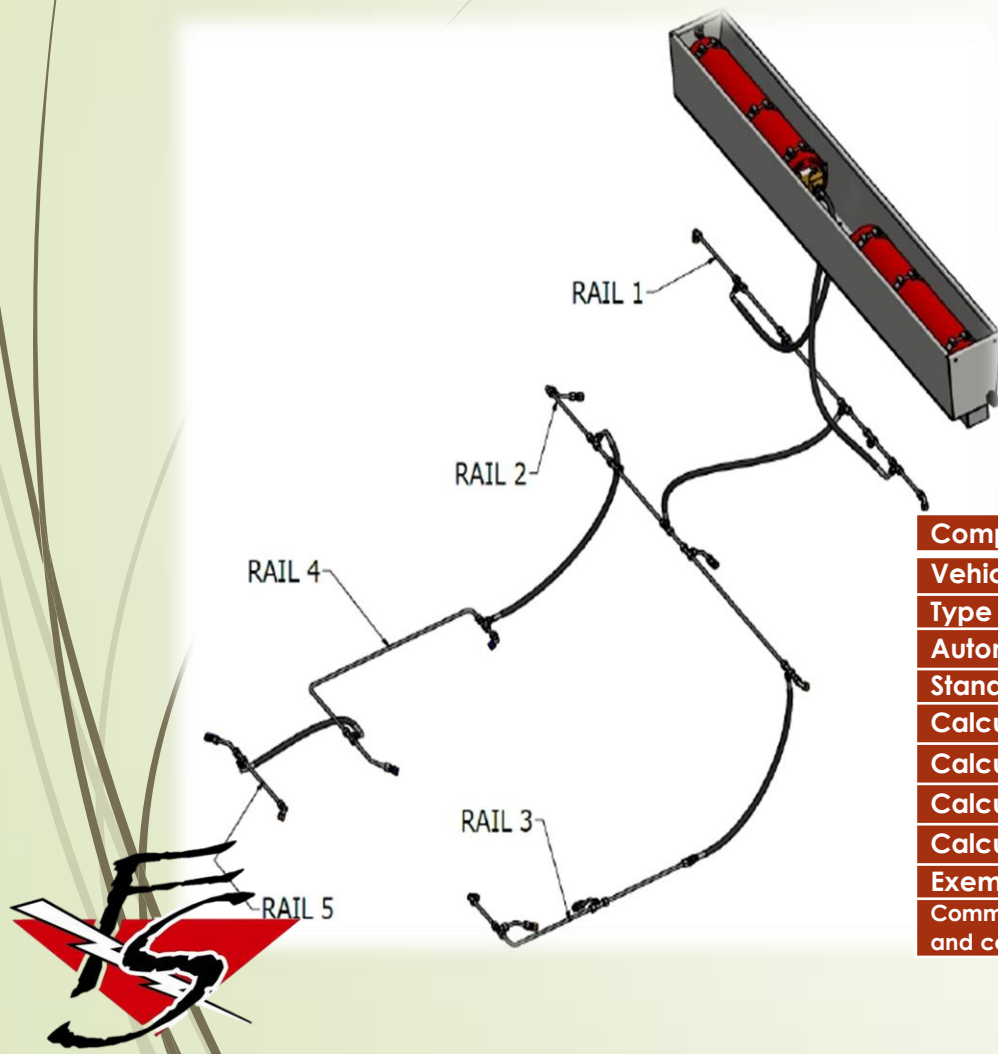
THE AUSTRALIAN AUTHORITIES SEEK SPECIFIC BUS & COACH STANDARD

Company: FIRESTORM FIRE PROTECTION		Place, Date: N/A	
Vehicle/Machine type: BUS		ID Number: MERC O500LE VOLGREN CR228 V2	
Type of Engine, Fuel: DIESEL ENGINE		Designer/Installer: KEVIN ZAMMIT	
Automatic shut-down: YES NO		Please define/clarify: N/A	
Standard and/or specification: SPCR 183			
Calculation A (H)x(W)x(D)	() x () x ()	N/A	Total 3.7m ³
Calculation B (H)x(W)x(D)	(1.1) x (2.4) x (0.46)	= 1.21m ³	Nozzles 0.8ltr N/A
Calculation C (H)x(W)x(D)	(0.82) x (2.4) x (1)	= 1.97m ³	Nozzles 1.2ltr 9
Calculation D (H)x(W)x(D)	(0.65) x (2.4) x (0.7)	= 1.09m ³	Nozzles 3.5ltr 6
Exempted Area Calculation		= 0.57m ³	Cylinder Size 2 * 6.5
Common risk areas: generator, turbo, fuel feed, exhaust system, electricity, air filter, a/c compressor, heater, air compressor, hydraulics and concealed/built-in areas. See the Installation Manual (Part no. 8010-002) for more information.			

Nozzle No.	Nozzle Size l/min.	Risk Area	Risk Level Low/Medium/High	Characteristics Volume-building/Partial/Direct
10	1.2	Muffler	H	Partial
9,13	3.5	Turbo	H	Direct 1, Partial 2
8,11	1.2	Exhaust	M	Direct
2,6	3.5,1.2	AC Compressor	M	Direct
2,5	3.5,1.2	Alt 1	M	Direct
2,5	3.5,1.2	Alt 2	M	Direct
7	1.2	Fuel Rail	M	Partial
15	3.5	Transmission	L	Partial
12	3.5	Top of engine	L	Partial
4,7	3.5,1.2	Fuel Filters	M	Direct
4,7	3.5,1.2	Oil Filters	M	Direct
12	3.5	Starter Motor	M	Volume Building
1,2,3,4	1.2,3.5,1.2,3.5	Engine to rear hatch void	M	Volume Building
14	1.2	Air Compressor	M	Volume Building



FIRESTORM BEGIN TO INCORPORATE “P” MARK SPECIFICATIONS INTO THE 1300 x BUS FIRE SUPPRESSION RETROFIT



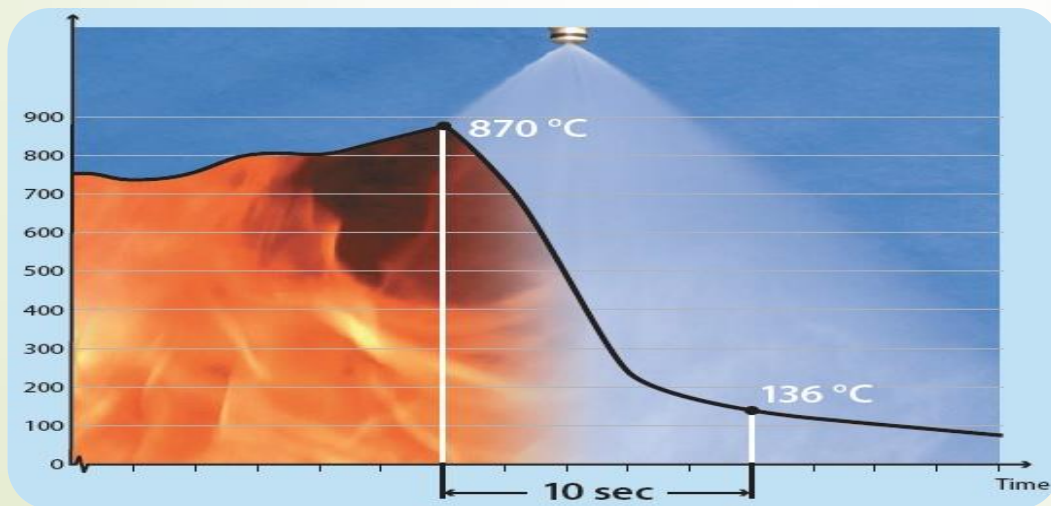
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THE SYDNEY HARBOUR BRIDGE BUS FIRE - 2016



“P” MARK COMPLIANT SYSTEMS GIVEN PREFERENCE IN THE LARGEST BUS FIRE SUPPRESSION RETROFIT IN AUSTRALIAN HISTORY

- 2,300 + P Mark approved Fire Suppression Systems to be retrofitted on buses across the Sydney Metropolitan area
- Firestorm Fire Protection tendered the Fogmaker “High Pressure Water Mist Suppression System” to be installed in line with “P Mark” specifications.
- The largest “P” Mark retrofit of buses in the world at that particular time
- The largest “single safety project” being performed under the NSW Government at that particular time



FIRESTORM RAMP UP OPERATIONS TO SATISFY ACCELERATED FIRE TENDER

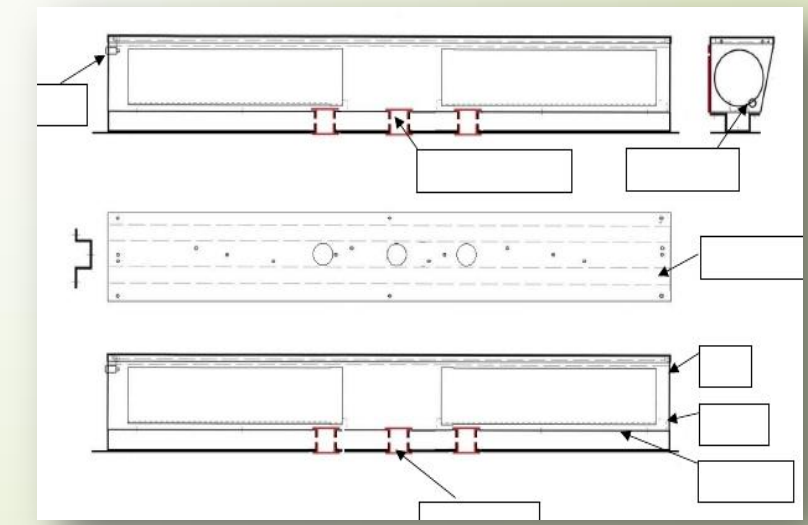
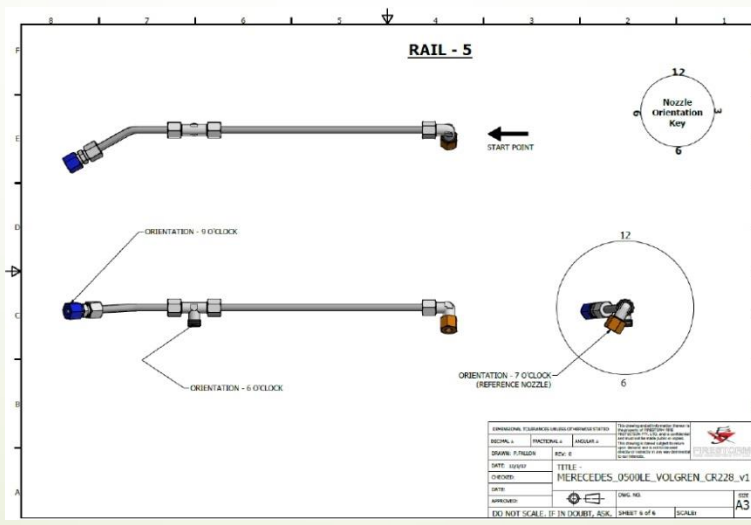
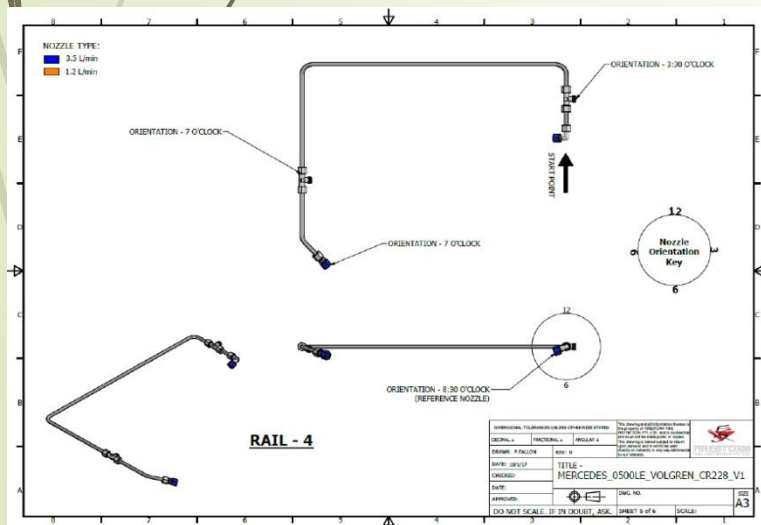
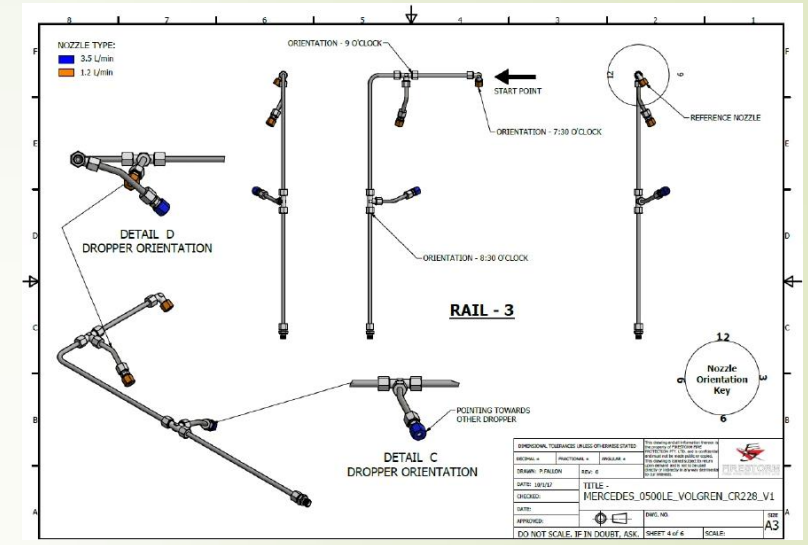
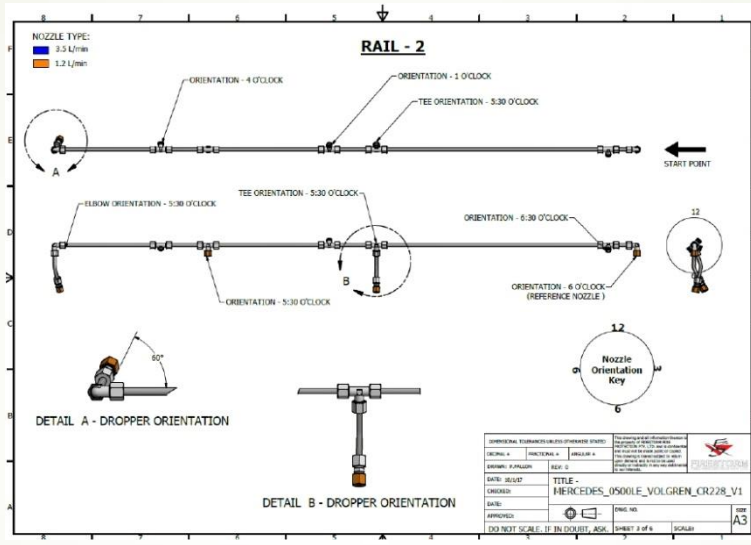
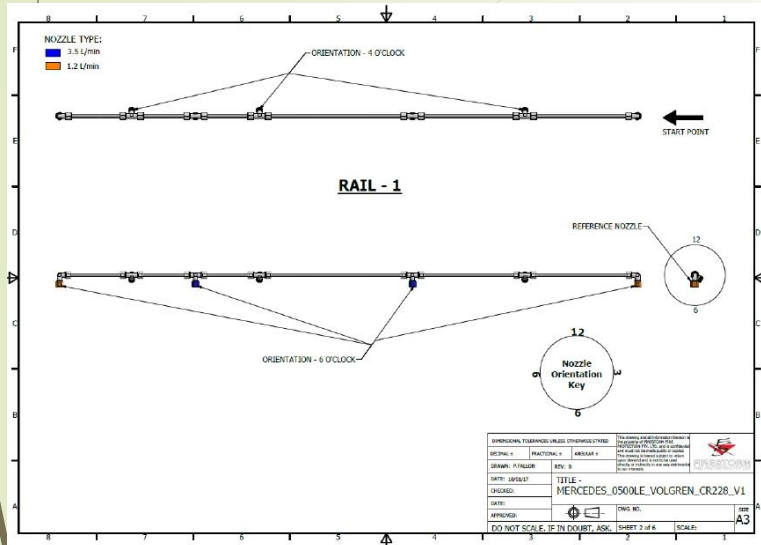
- 10 x months to complete the project – reduced from 24 months
- Minimal stock in Australia (Sweden gets to work)
- Retrofit on 250 + different bus designs across 30 x different sites
- Higher level of complexity due to differing bus types (many orphan buses)
- 50 + new staff required to resource the project
- Training of all new staff members to work under an experienced staff member
- Many older buses had “no room” to install the fire system to “P” Mark specs
- Tanks could not be located near the rest of the fire system
- Specialised housings required to install piston accumulators



FIRESTORM RAMP UP OPERATIONS TO SATISFY ACCELERATED FIRE TENDER

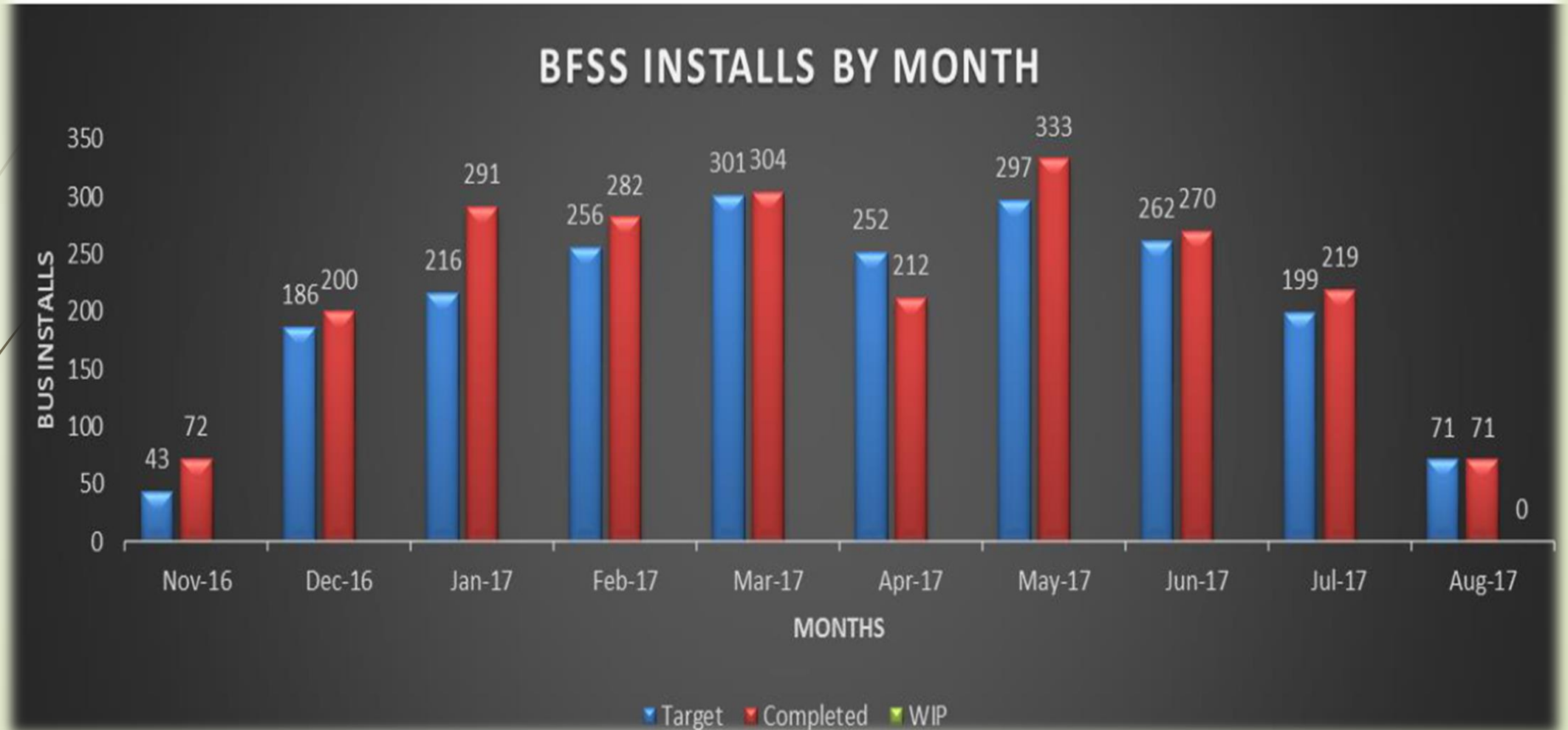


WORKSHOP DRAWINGS TO CREATE "PRE-MANUFACTURED KITS"



EXECUTING THE PROJECT AHEAD OF SCHEDULE

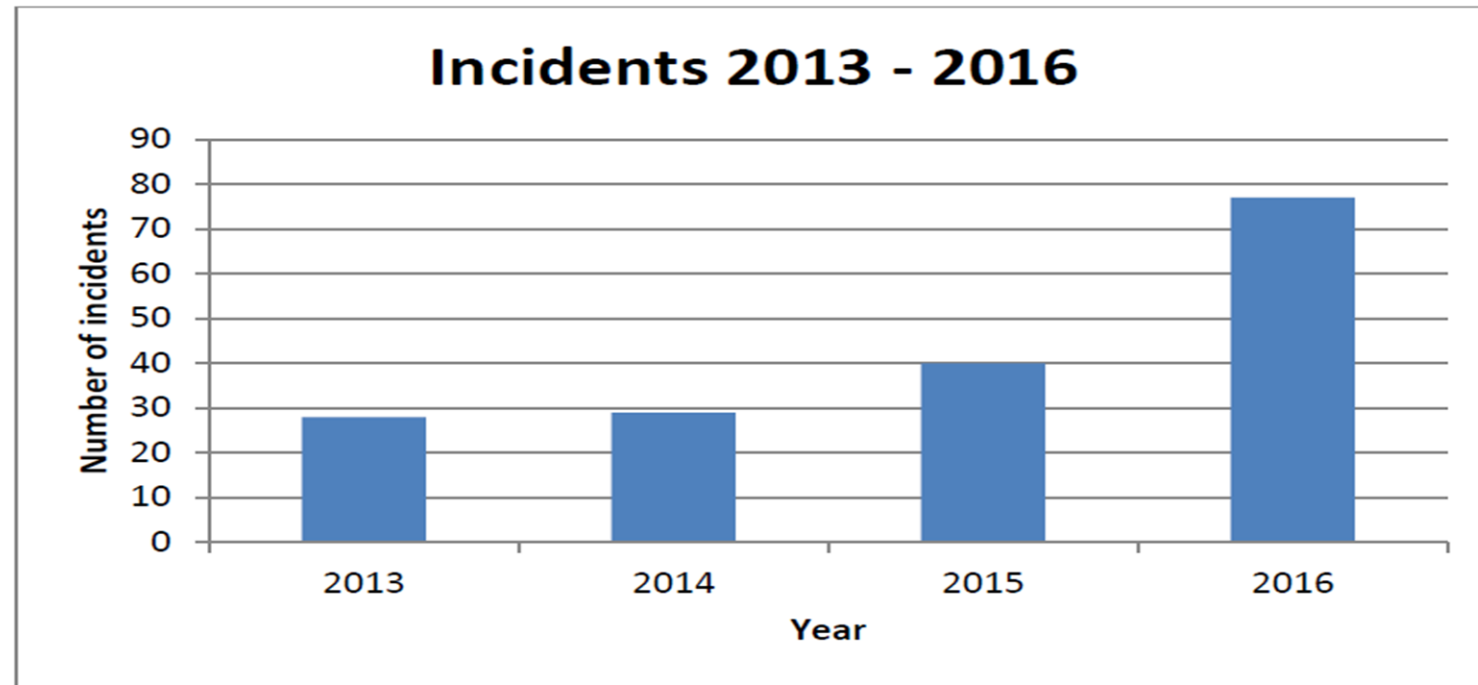
Performance Charts / Overview BFSS Project



OTSI – CONTINUAL MONTIORING OF BUS FIRE INCIDENTS

Data Analysis

In 2016 there were a total of 77 reported incidents: 37 fire incidents and 40 thermal incidents. This was an increase of 92% from 2015. The total represents a significant increase over the number of incidents recorded for prior years: 28 in 2013, 29 in 2014, 40 in 2015 and 77 in 2016 (see *Figure 1*).



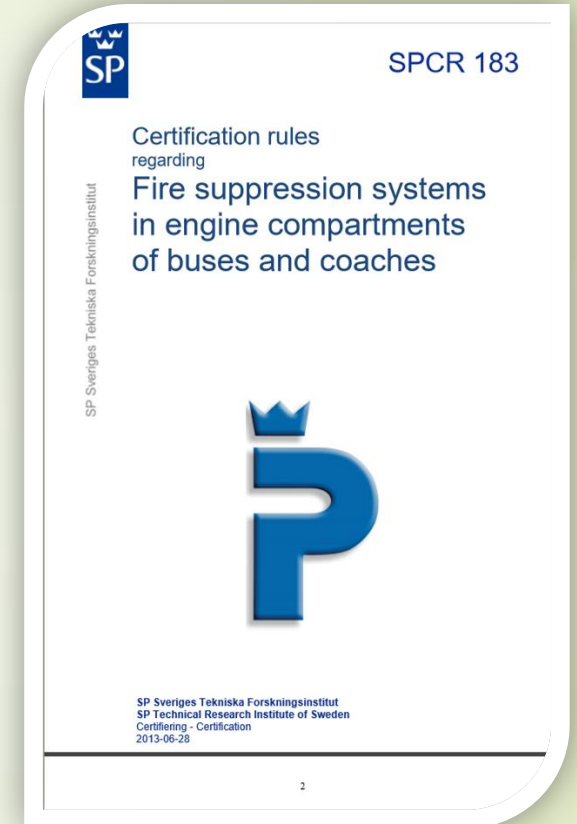
TO CONCLUDE

Our Company is more comfortable working under applicable testing regimes to the vehicle type than our current Australian Standard in relation to Fire Suppression Systems

With continual development of tunnels throughout major Australian cities, our hope is to see more work done in the truck & logistics industry – especially in relation to the haulage of dangerous or flammable goods

Firestorm will continue to lobby the bus & truck industries to fit fire suppression as standard

Our experience to date with Water Mist has seen exceptional growth & success in our business



THE FUTURE

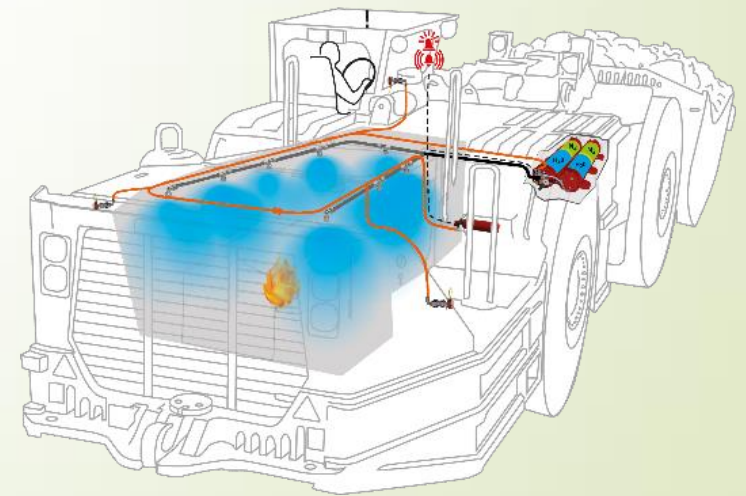
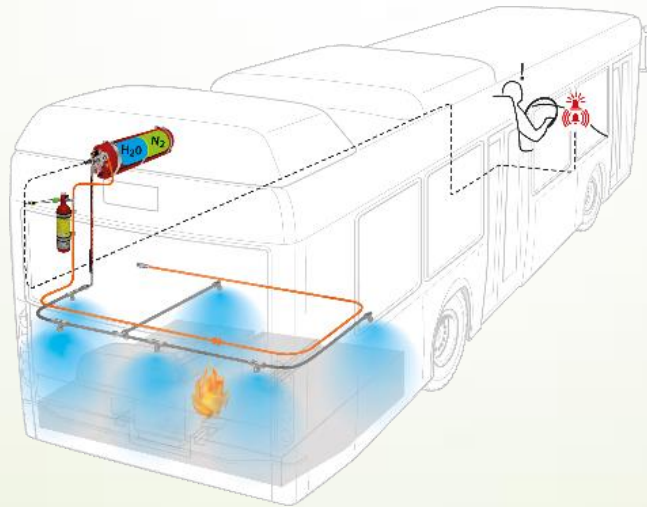
The future of water mist within Australia is bright, with further major projects on the horizon.

The NSW Government has submitted a request for funding for a further 2,700 buses in regional NSW to be retrofitted by Fire Suppression Systems

Firestorm will continue to promote Water Mist Suppression Systems as our preferred option & continue to seek partnerships

Firestorm continues to grow into various industries such as:

- ✓ Tunnelling
- ✓ Recycling
- ✓ Ports
- ✓ Forestry
- ✓ Construction
- ✓ Mining
- ✓ Public Transport
- ✓ Light Vehicles



THANK YOU FOR YOUR ATTENTION

