

THALES



FIREKING

Outstanding firefighting and crew protection

FIREKING

>> A WORLD FIRST IN PROTECTING FIRE CREWS AND COMBATING BUSHFIRES

FireKing* is purposely designed and built to meet modern demands for protecting fire crews and delivering powerful and effective bushfire-fighting capability. Such a vehicle is imperative in hot summer conditions for asset protection and saving lives.

Following extensive research amongst stakeholders responsible for combating bushfires in Australia, Thales Australia identified three key attributes that are essential for on-the-ground bushfire-fighting equipment:

- Crew protection—the natural primary concern of all fire fighting services. FireKing minimises personal risk while maximising crew effectiveness
- Vehicle survivability—improve the vehicle's survivability by careful selection of material and appropriate vehicle designs that minimise potential fuel sources while at all times maximising crew safety.
- Vehicle performance—safely and effectively deliver fire-fighting resources where they are needed with on- and offroad mobility. FireKing transports crews with a high level of safety and comfort.

Thales Australia developed a modular approach to incorporate these essential features based on its successful Bushmaster troop carrier produced for the Australian Army. Bushmaster's proven performance and sturdy all-terrain mobility makes it the ideal platform for FireKing.



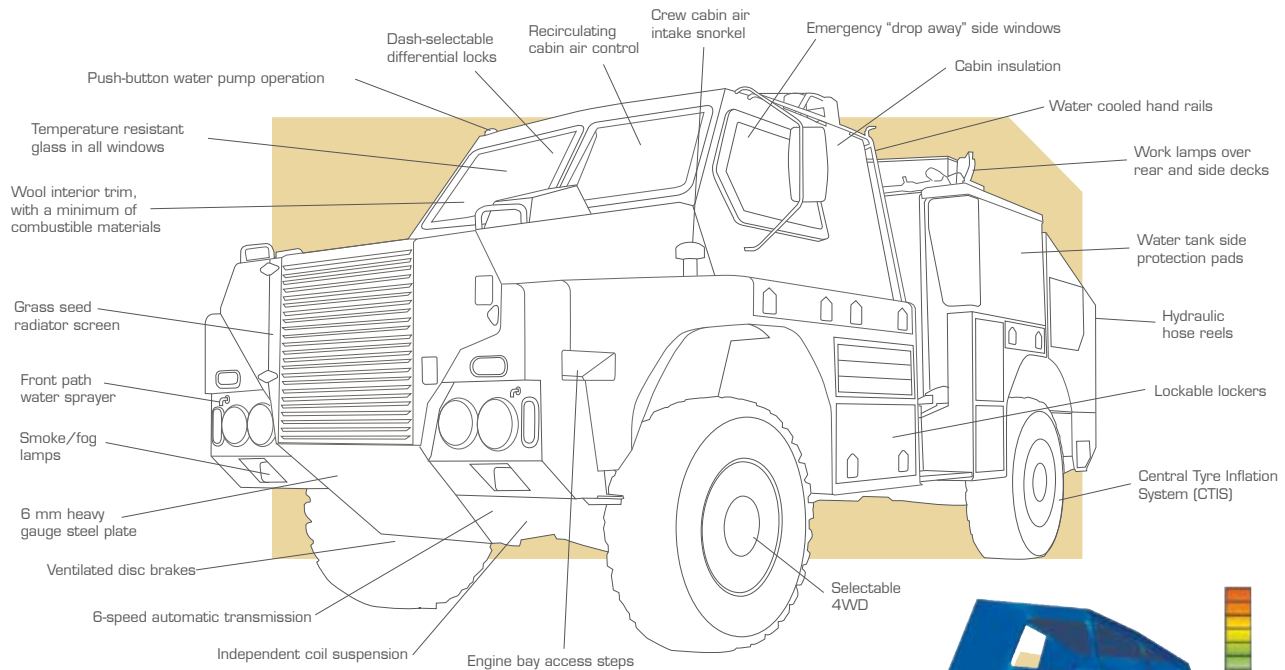
The result is the world's first purposely designed and built bushfire-fighting vehicle that rapidly and safely delivers trained and well-equipped resources to bushfire areas in a wide variety of environments and conditions. FireKing offers unprecedented levels of crew and vehicle protection, while operating efficiently from a proven driveline and platform that will provide extended service life and reduced whole-of-life costs. Independent testing confirms that FireKing provides these essentials with great efficiency.

> Crew protection

FireKing's purpose-built cabin is a passive crew survival module. It is resistant to fast moving superheated bushfires and provides a high level of personal protection that has never previously been available to firefighting crews.

Unlike commercial truck cabins in

*Jointly designed with Timoney Technology Ltd.

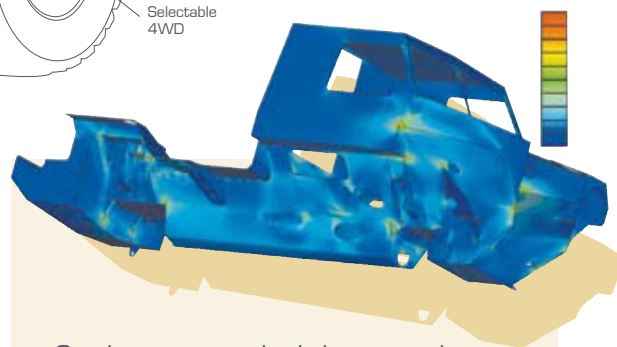


conventional bushfire-fighting vehicles, FireKing's crew survival module is designed to protect the crew of four in emergency conditions.

In an emergency situation, the crew simply needs to access FireKing's cabin. Once inside, the crew shuts the door and windows, pushes the emergency button and draws the Nomex radiant heat reflective curtains.

An emergency water supply spray system protects tyres and the cabin if required. Independent testing developed by the Commonwealth Scientific and Industrial Research Organisation (CSIRO), with input from various Australian fire authorities, demonstrated that FireKing protects its crew during severe emergency bushfire conditions. After testing, Fireking was still drivable once the emergency had passed.

Initial testing simulated intense and threatening bushfire conditions. FireKing's systems proved highly effective against radiant heat and direct flame. Total heat flux exceeded 120 kW/m^2 for a period greater than 33 seconds, replicating a Fire Danger Index (FDI) of 50 and a fuel loading of 15 tonnes per hectare.



- Steel monocoque body incorporating chassis and fully enclosed underbody



- Cabin-operated backup water supply to spray over tyres and cabin if required
- Nomex radiant heat reflective curtains.



During this exposure the vehicle's cabin temperature rose by less than 20°C above the initial ambient conditions.

Vehicle survivability

FireKing's dedicated design gives it a unique range of applications: first strike vehicle-to-ground reconnoitre; personnel evacuation from dangerous hotspots; and survival in situations caused by sudden weather change that can trap and destroy more conventional vehicles currently in use.

FireKing's construction completely encloses the vehicle underneath, protecting its vital systems from radiant heat and flames. Unlike adapted commercial trucks, FireKing's air lines, fuel tanks, engine bay, and electrical and braking systems are specifically protected from bushfire conditions—a critical design advance.

In emergencies, FireKing has a 700 L dedicated water supply that is sprayed over the tyres, wheels, crew's cabin and rear work deck as a backup. This backup water tank is housed within the main 3,700 L phenolic resin water tank which itself is fire and heat resistant.

As a backup, the spray system can also be powered by the vehicle's batteries and operated from inside the crew's cabin.

The FireKing vehicle is constructed from a rigid, heavy-duty steel monocoque body up to 6 mm thick. This provides the structure that encases all vital vehicle systems in a fireproofed environment and supports the crew's survival module, while also providing long service life expectancy. By design, there is minimal use of plastic or other flammable materials on the vehicle's interior and exterior.

These survival features are crucial for protecting the crew and enabling FireKing to survive or escape intense danger areas. The dedicated design provides an efficient, well-protected firefighting vehicle and extends its service life, unlike modified conventional vehicles which are comparatively vulnerable in bushfire conditions.

> Vehicle performance

FireKing is a highly adaptable vehicle for on and offroad performance, quickly delivering firefighting capabilities across a wide range of terrains and conditions. FireKing's monocoque construction provides structural rigidity and precise handling.

The vehicle power pack is a Caterpillar 3126E turbo-charged diesel engine coupled to an Allison six-speed automatic transmission (with optional retarder). The Meritor independent coil suspension and air-operated ventilated disc brakes make the ride and handling very precise and stable.

Drivability is "car like" with all vehicle controls and seating designed for ease of use and reduced operator training requirements. The four-man crew is comfortable in high backed bucket seats with inertia reel seat belts in the airconditioned cabin.

Offroad travel through rough terrain





is enhanced by a combination of four-wheel drive and independent coil spring suspension. The selectable dash control engages front and rear differential locks on request, while the optional Central Tyre Inflation System (CTIS) lets the driver select tyre pressures that match the terrain while on the move.

Offroad performance is also enhanced by significant ground clearance and generous approach, departure and ramp-over angles. These features combine with a relatively low centre of gravity, good wheel articulation, power steering and a clean vehicle underbody to provide excellent and safe offroad performance.

The independent suspension allows

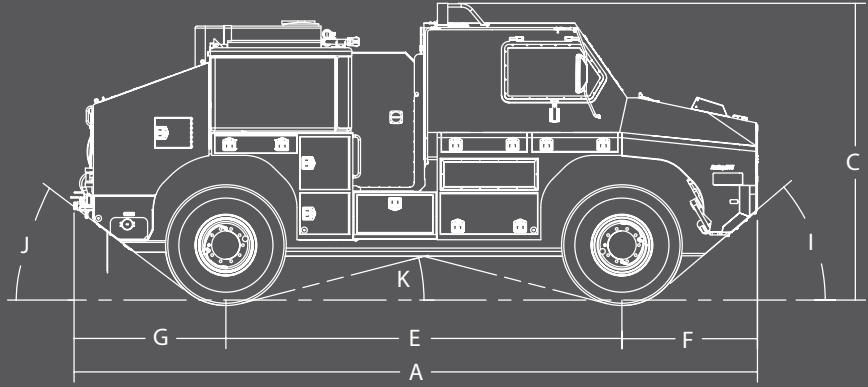
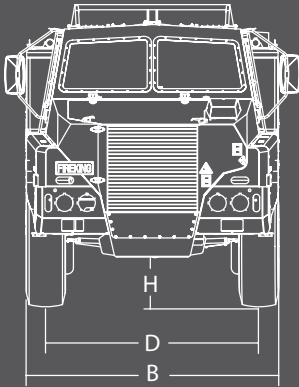
precise handling over rough terrain, delivering significantly higher average offroad speeds than conventional beam-axle leaf-spring suspension systems. This puts FireKing safely on the scene more quickly than other firefighting vehicles and with less operator fatigue.

> **Through life support (TLS)**

FireKing uses state-of-the-art commercial off-the-shelf components that have well-established international service support networks.

This ensures that service and replacements can be easily sourced nationally and internationally. Suppliers include Caterpillar, Allison, Meritor, Waterous and Fabco.

>> FIREKING VEHICLE SPECIFICATIONS



A Length	6,730 mm
B Width	2,500 mm
C Height	2,920 mm
D Track	2,100 mm
E Wheelbase	3,900 mm
F Front overhang	1,335 mm
G Rear overhang	1,495 mm
H Ground clearance	430 mm
I Approach angle	40°
J Departure angle	37°
Kerb weight	10,200 kg
Gross vehicle mass	14,200 kg
Wheels / tyres	20 x 10 / 395 85 R20
Power to weight ratio	15.7 kW to 1 tonne (22 hp to 1 ton)
Transmission	6 speed Allison automatic MD 3060PR
Transfer case	Fabco single speed part-time (optional full-time)

Drive configuration

Two differentials (opt. full-time)

Axles Rockwell Meritor 4000 series independent suspension

Differential locks Electrically controlled front/rear

Brakes Rockwell air operated discs, dual circuit with option for ABS

Fuel capacity

200 L (diesel) with anti explosion material in-tank

Range 500 km (approx)

Engine Caterpillar 3126 E six cylinder turbo intercooled diesel developing power of 223 kW (300 hp) and torque of 1166 Nm (860 ft lb)

Suspension 4 wheel, independent coil sprung, double acting shock absorbers

Chassis/body construction

Purpose-built steel monocoque body incorporating chassis and fully enclosed underbody with integrated insulation in key areas

Windows High temperature glass in all positions with radiant heat blinds

Ventilation Fully airconditioned with fresh air intake including floor, dash, demister vents and emergency override

Firefighting equipment

The design of FireKing's firefighting equipment can be customised to suit individual customer's needs. The modular rear work platform houses the hose reels and water outlets and these configurations can be simply redesigned to suit specific use requirements.

All FireKing's hard plumbing fittings are, where possible, high-grade stainless steel.

FireKing's key firefighting equipment includes its phenolic resin main tank which holds 3,700 L of water. This includes a secondary 700 L backup inner tank that always fills first.

The water pump is hydraulically driven by FireKing's engine with a constant speed hydraulic motor delivering pump and roll capability. An electric pump provides backup pumping power and this is driven by the vehicle's batteries.

FireKing utilises this same electric diaphragm pump to provide priming for draughting operations with simple pushbutton controls. The electric pump also delivers water sprays over the vehicles tyres and cabin in case of emergency. Pump controls are located within the driver's reach and externally on the rear operating platforms.

As an option, the vehicle can also have provision to carry Class A Foam system with selectable proportions from 0.1 up to 1.0% through a Robwen Hydro-Flo 100 series mixer.



Main pump Engine driven through transmission PTO via hydraulic drive constant speed motor

Main pump type Waterous CPK-2. Max flow 2,400 L/min @ 700 kPa (528 gpm @ 100 psi)

Back-up pump 24 volt/2.2 kW electric motor with minimum electrical capacity for 10 minute emergency operation @ 100 L/min

Priming pump 24 volt/2.2 kW electric positive displacement diaphragm type @ 45 L/min over 5 m head

Pump control On/off controls in cabin, work platform, positions rear of vehicle plus suction control at rear of vehicle

Water tank construction Phenolic resin, internal baffles, overhead sock, suction or hydrant fill with overhead fill, hydrant and tank overflow to rear

Water capacity
Main 3,000 L + reserve 700 L

Water reticulation Stainless steel single live pressure manifold to rear of vehicle with full width access, single live pressure supply to service rear platform, front wheel sprays, front path sprays and front cabin spray systems

Hose reels and fittings 3 hydraulically driven live reels plus 1 dead reel—no hose

Work platform Mid-vehicle access from both sides to work platform and cabin

Working positions Rear cabin (mid vehicle) and rear of vehicle

Equipment storage Side-mounted bins both sides, front and storage rear of vehicle

Communications gear, warning light and sirens Provision for installation of customer supplied equipment

> A research-based solution

Developing FireKing involved three crucial stages of research. Firstly, firefighting authorities around Australia helped Thales Australia identify the key criteria that are vital in a state-of-the-art bushfire-fighting on-ground vehicle. FireKing was developed to match the industry's demands for fire crew protection, vehicle protection and high levels of on and offroad vehicle performance.



During our vehicle design stage we used the modelling software Pro/ENGINEER, which allows accurate checking, optimisation of fitment and stress analysis before prototyping and metal cutting. It delivers superior accuracy in manufacture and final assembly and ensures uniformity of production units with less risk.

Finally, the CSIRO with input from several fire authorities developed the "Burn Over Standard" used to test FireKing's protective and survivability standards.

The initial testing simulated some of the most intense and dangerous bushfire emergency conditions facing crews at fire scenes. The rigorous testing proved the effectiveness of the vehicle's capabilities against radiant heat and direct flame contact.

Serviceability

Although FireKing is a purpose-built vehicle, its monocoque body and modular construction mean that the vehicle has a long service life expectancy.

This method of design, construction and commercially available component selection ensures that service, maintenance and parts replacement are readily available and simple to execute.

The power pack module including engine, transmission and radiator can be removed by two trained mechanics in less than one hour. Maintenance and repair of body components including front guards, side lockers and rear-deck lockers is simplified through a modular "bolt on" approach.

Service points are provided in the vehicle's hull and also at the rear, allowing access to the main water pump and other components.

System commonality with Bushmaster and other vehicles means FireKing can be serviced and supported in most locations around the world.



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