

Purpose-built Heavy Fire Tankers — a Cost Effective Option

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Abstract

Purpose-built, dedicated heavy fire tankers present an unattractive profile to managers when viewed from capital efficiency, fleet management, maintenance and long-term reliability perspectives. The Forestry Commission, Tasmania, has developed a cost-effective alternative which minimally compromises the standards of performance expected of such a vehicle when operating in a multi-purpose role.

Introduction

With declining budgets and the ongoing search for increased capital and cost efficiency, the Fire Management Branch of the Forestry Commission has been exploring alternatives to the traditional purpose-built heavy fire tanker. The problems associated with operating an expensive truck in a limited and highly seasonal usage pattern and the attendant accelerated depreciation and lack of reliability which parallel that operating mode are major considerations.

History

A variety of approaches to using regular heavy fleet vehicles in a forest fire-fighting role has been tried in the past, usually in the form of large slip-on units for 6x4 and 4x2 tipper style trucks.

The limitations of this approach include:

- Poor off-road performance from the vehicles due to their inappropriate chassis type, low ground clearance and non-driven axles.

- An unnecessarily high centre of gravity and high tare weight which is reflected in diminished carrying capacity as a consequence of the presence of the superfluous tipper body.
- The difficulty of providing adequate crew protection other than in the vehicle cab.
- The operating controls and hose reels are inaccessible to the crew from ground level, a feature which is ergonomically inefficient and potentially unsafe.
- The relatively high cost of providing safe and efficient loading and unloading facilities.

Whilst these limitations are severe, a worthwhile place does exist for this type of equipment as a mother tanker to supply water to front-line units from made roads. It should be designed down in cost and sophistication to suit such an application.

Solution

A solution was required which would not compromise the vehicle's capacity to perform as a front-line fire-fighting unit.

The solution adopted consists of the construction of a modular heavy forest fire tanker carried on a five tonne, four-wheel drive cab chassis and interchangeable with other body applications such as tipper or tray styles which can be attached when the unit is not required in tanker mode (see Photo 1).



Photo 1. Modular heavy tanker.

The use of interchangeable bodies or modules for trucks in a bid to increase flexibility and usage is not new. Many rusting relics in the back premises of transport operators' premises testify to previous unsuccessful efforts. The need for heavy lifting equipment to effect changeover and the time taken to do so have been limiting factors.

The system adopted in the Forestry Commission module uses a patent clip locking and self-loading system developed by L.M. Engineering of Adelaide. With the six clip locks (see Photo 2) disengaged from the module sub-chassis, three small on-board hydraulic rams (see Photo 3) raise the module 100 mm above the truck chassis proper. The module is then fitted with stands and the rams retracted bringing the stand bases into ground contact and supporting the module clear of the truck (see Photo 4). Following disconnection of an ancillary wiring plug and one quick-break plumbing fitting, the truck can be driven from under the fire tanker

module and, in reverse order, load another module.

Changeover takes an experienced crew some twenty minutes and the only facilities required are a flat parking area sufficient for the modules themselves.

Given average truck usage levels within the Department, the age of the cab chassis component should not exceed seven years and capital outlay should be almost halved on the cab chassis component. Adaptation of the module to another truck chassis configuration will, at worst, involve the fabrication of a new sub-chassis compared to a virtual rebuild in the case of a purpose-built dedicated unit.

The units being produced in modular form have all the attributes of purpose-built dedicated equipment, *viz.*:

- Proven off-road performance and safety with a low centre of gravity.

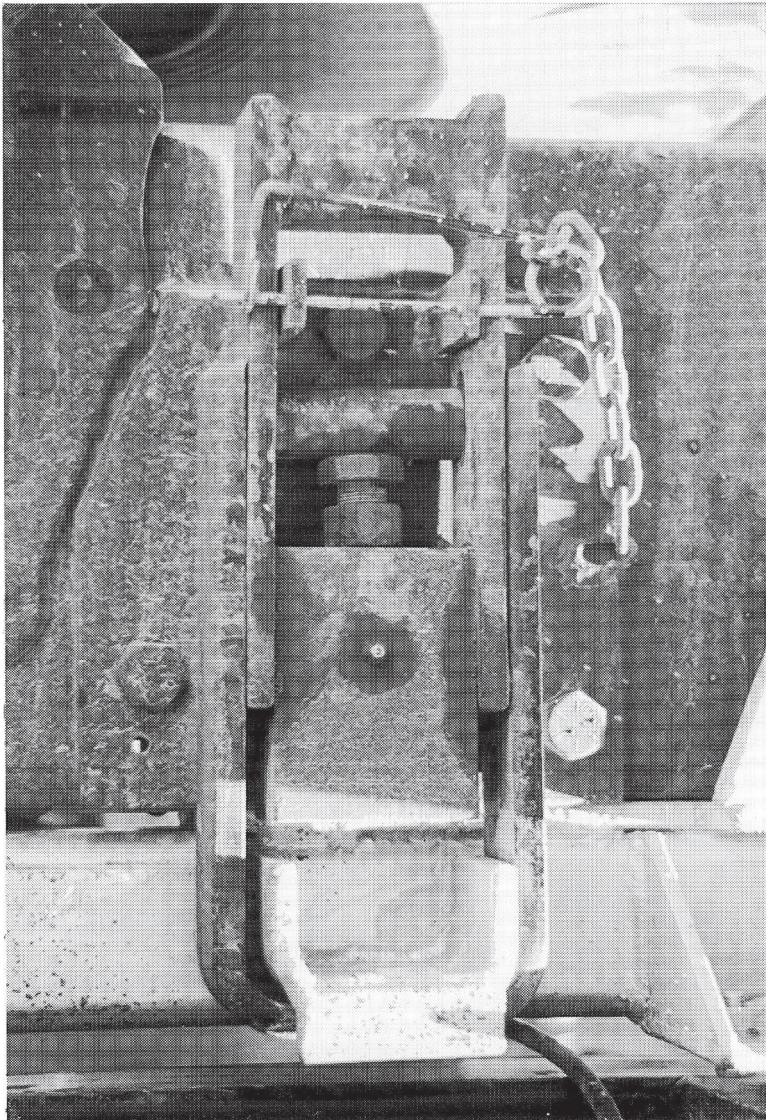


Photo 2. One of the six centre-locking clamps locked into position.

- A fast diesel-powered truck and diesel-engined pump.
- A high standard of crew protection and ease of operation from ground level.
- water capacity of 3800 litres, with a high pressure electric start pump, electrical centrifugal primer and electric rewind hose reels.
- Adequate equipment stowage.

Local innovations

Whilst the 'clip on' aspect of the design and the concept of presenting a heavy fire tanker in this format have been developed by others, some local innovations are of particular note.

Firstly, the fire tanker module is constructed as three independently and flexibly mounted sub-units on the sub-chassis, the forward unit being the crew haven,



Photo 3. The module is lifted from the truck chassis by single-acting hydraulic rams.

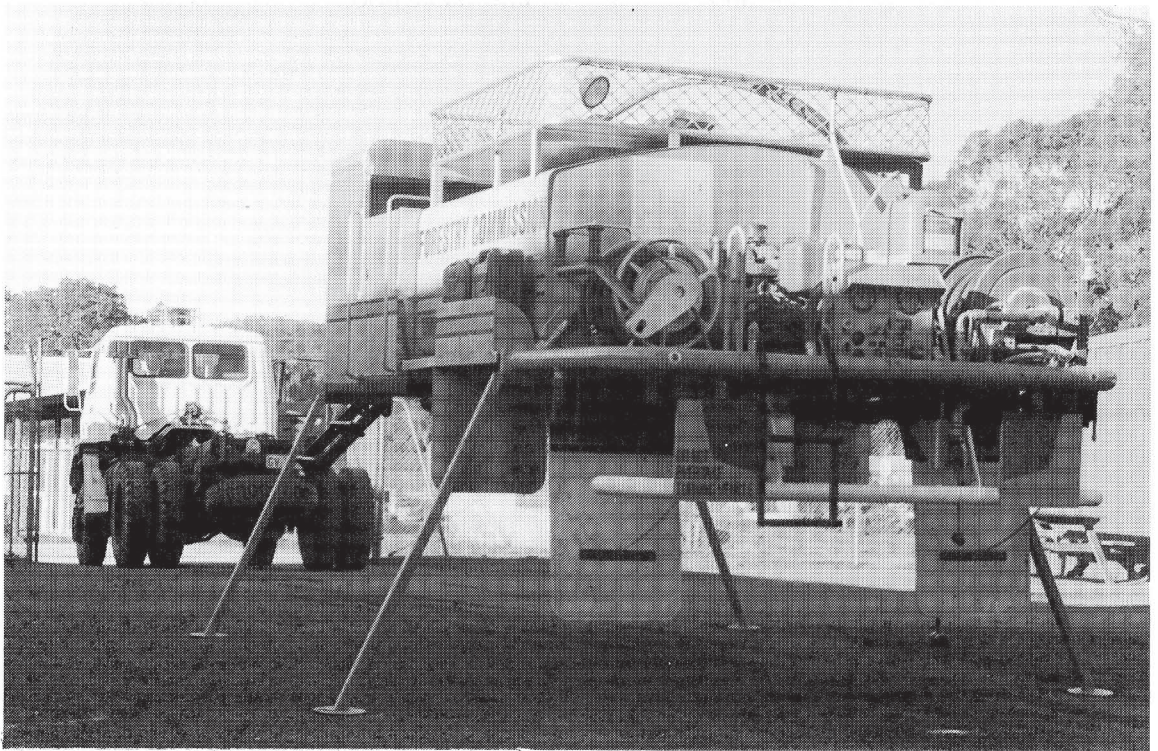


Photo 4. The unit de-mounted from the truck.

stowage, and forward working platform, the mid unit being the tank, and the rear unit the platform carrying the pump and hose reels. This approach optimises the ability of the truck chassis to flex to its design limits in off-road service situations maximising traction and minimising component stress to both truck and fire unit. Arising from this design criterion flowed the opportunity to substantially reduce tare weight by reducing material specifications throughout the module.

Secondly, the unitised construction approach allows updating or replacement of any of the three components without affecting the others and permits their easy adoption to a modified or replaced sub-chassis in the event of a truck chassis change.

Thirdly, the hollow section sub-chassis and the heavy tubular wrap-around pump platform surround guard have been pressed into service as a manifold connecting the tank, pump, and all pressure and suction outlets. This obviates the need for underbody flexible plumbing and eliminates the risk of plumbing damage in this area during service and in loading and unloading operations.

Four units of this type are in service and a fifth is currently under construction. User reaction is extremely positive and no changes of significance have been made in four years of fabricating the type.

Acknowledgements

The Fire Management Branch of the Forestry Commission wish to acknowledge the help and expertise provided in the development of this unit by:

- The South Australian National Parks and Wildlife Service for the original concept.
- The South Australian Woods and Forests Department for further concept input.
- L.M. Engineering, Adelaide, for the changeover equipment and advice relating to its fitting.
- Derby Products, Hobart, for design input and fabrication of major components in lightweight format.
- Garry Kennedy, Byron Garrod and Vic Millar at the Forestry Commission Plant Workshops for innovative thinking and skilled workmanship in bringing the whole project successfully together at an affordable price.
- Gary Richardson for photography in Photo 1 to Photo 4.