SHIP FIRE TO FUEL SEA CHANGE IN CAR CARRIERS

Nuts and bolts

Edmund Leung

Motor vehicle fires occur from time to time, but when one happens at sea and in a vessel transporting a large number of them, it becomes a much more serious matter.

The Fremantle Highway caught fire last month near the Netherlands, lasting for almost a week before finally being brought under control.

The damage was huge and there was one casualty among the 23-strong crew.

This tragedy has caused grave concern among motor vehicle manufacturers and transportation companies.

The vessel was a roll-on/roll-off ship purpose built for carrying motor vehicles.

It has an opening and ramps at its stern, enabling vehicles to be driven on and off under their own power.

Unlike conventional cargo vessels, there are no bulkheads to segregate the cargo holds into different compartments.

Instead, they have multiple decks. When one deck has been loaded, cargo floors can be lowered to facilitate loading to other decks to store more vehicles.

The problem with such an "open" layout, with vehicles closely packed like a can of sardines, is that, in the event of a fire, the compartment cannot be isolated.

Fires can therefore spread along the whole length of the ship and fire-fighting could become much more challenging.

At the start of the incident in question, the shipper said there were some 3,700 vehicles on board, comprising mainly internal combustion engine vehicles plus 25 battery electric vehicles. The information was later amended to report that, actually, some 500 EVs were on board.

As there were a large number of batteries, the fire load was high.

The normal method of fighting a fire is by closing off the compartment and pumping in carbon dioxide.

But in this case, the battery fire resulted in a continuous chemical reaction that does not require outside oxygen to sustain combustion, unlike fossil fuel fires.

Fire-fighting pros call this a thermal runaway fire, as it can easily reignite even after it has been put out temporarily.

Under this scenario, the intense heat created can quickly spread to other vehicles, including those in adjacent levels.

The fire would spread not only lengthwise but also into the depths of the vessel.

Without special lifting devices, it was not even possible for the crew to eject some of the burning vehicles into the sea to minimize the spread of the fire.

Firemen on another ship could only spray seawater into the compartments.

But such an operation must be carefully done as a huge volume of water could lead to the ship listing and sinking.

Worse still, the fumes given off can be extremely toxic, so the crew and firefighters would be unable to get close to the source of the fire.

In the end, substantial damage to the vessel had been caused, incurring huge losses to the vessel operator and others.

Photos show a large opening at the side of the ship, damaged by the immense heat penetration.

Such incidents will probably cause a major rethink of future vehicle types and their methods of transportation, but meanwhile it will already be serious enough for vehicle makers, transport and insurance pros to put on thinking caps to find quick ways to better manage such risks.

Engineers must engage in holistic thinking when designing systems and equipment.

What appears to be a good way forward often opens up new problems, and scenarios of possible outcome must be carefully analysed and addressed to ensure high levels.

Veteran engineer Edmund Leung Kwong-ho casts an expert eye over features of modern life