Firing on all

Fire and rescue vehicles couldn't be more important to the efficient functioning of the emergency services. Brian Tinham talks to the specialists about specifying and maintaining these critical fleets

Talk to any fire service fleet manager and you'll quickly understand what's behind the very specific choices they make when it comes to vehicle types, their detailed design and engineering, and the range and location of on-board equipment. You'll also swiftly see the rationale for their robust and demanding maintenance and testing regimes, and the multi-skilling expected of workshop technicians operating in the emergency services (see panel).

The West Midlands Fire and Rescue Service (FRS) fleet provides an excellent insight. The brigade has 61 front-line B type appliances (pump and rescue ladder, with five fire crew, including driver). Its most recent are based on Volvo FLL chassis cabs, running at 13 tonnes and carrying 1,600 litres of water and equipment, including four ladder types and a PTO-driven high- and low-pressure Godiva pump, which delivers up to 4,000 lpm at 30 bar.

The service also has four, 32-metre reach aerial platforms, each based on Volvo FM 9 26-tonne 6x2 chassis, with mid-steer, non-lift axles (for manoeuvrability and reduced tyre wear). These are equipped with Bronto Skylift, remote-operated hydraulic platforms, capable of carrying up to 400kg.

Beyond these, this brigade has six 6x4 demount units from the government's national New Dimension fleet initiative and six more of its own 6x2 demounts. These are all based on MAN TG chassis cabs, also with mid steer axles and cab-operated Multilift hook lift systems, designed to load around 25 different pod types – from rescue units to foam tenders.

Other forces have variations on the theme, both in terms of the vehicles and equipment. As West Midlands FRS fleet manager Chris Beebee says, it's about ensuring that the right equipment is available to match the risks in each region. Some fleets run more 4x4s, 6x4s and compact vehicles with, for example, on-board RIBs (rigid inflatable boats) for river rescue. Many also use on-board compressors to deliver foam, while some have invested in Cobra cutting and misting systems, which blast through any material before delivering fire suppressant.

Specialist engineering

So what's special about the engineering? "You need to think about the different roles of our appliances, the services they fulfil, the way they are driven and the fact that these vehicles run fully laden," advises Beebee. "You won't see many hauliers encouraging their drivers to accelerate, brake and corner fully loaded trucks anything like as harshly as our guys have to. So fire appliances are designed to handle all that, in terms of robustness, brakes and suspension etc, the body configuration and the powertrain – and their safety systems."

Other aspects include the fact that these vehicles are driven nowhere near as intensively as hauliers' tractor units or distributors' rigids, with many rarely exceeding 10,000km per year, and drivers being fire crew first and professional drivers second. So simplicity for the drivers is important. Hence the preference for fully automatic, torque converter transmissions and FRSs' early uptake of everything from electronic braking to stability programmes.

"These vehicles are delimited and tend to have the biggest engines in their weight range. So they're often capable of hitting 50mph in under 20 seconds and running up to 80mph at 12.5 tonnes fully loaded," says MAN's fire service specialist Andrew

four

Cover photo and left: West Midlands Fire Service

Young. Clearly, drivers need all the help they can get.

But Beebee believes that powertrains have also transformed fire service vehicles' drivability. "Everything is ECU-driven, with all systems talking to one another. So we get more intelligent gear changes, matched to the vehicle weight and power demand. That means better performance and handling, and it's the same with the braking. We use Allison transmissions, with built-in retarders, to support engine braking, which make a big difference and take the strain off the service brakes."

Such improvements have also positively impacted maintenance. As Young explains: "With ECUs controlling these vehicles, drivers can't over-rev them. Also, brakes and tyres don't wear like they used to. The combination of integral retarders and electronics, constantly balancing everything right down to pad wear, means that a lot of issues these vehicles used to experience have long gone."

Multi-talented irtec technicians

The British fire and rescue services are not subject to the 'O' licence rules that ensure vehicles are properly managed and maintained. But neither are they above the law. So, from a maintenance and testing perspective, they work to an inspection manual, agreed between the CFOA (Chief Fire Officers Association) TOG (Transport Officers Group) and VOSA, which effectively tightens up on the equivalent HGVs' manual.

For example, whereas HGVs must demonstrate 50% braking efficiency to pass the MOT, for fire service vehicles the required performance is 60%. Similarly, when it comes to type approval, appliances are required to demonstrate better handling – even to the extent that tilt table tests are several degrees more demanding.

West Midlands FRS fleet manager Chris Beebee says that explains the requirement for robustly designed vehicles, but also the more aggressive maintenance regimes, to ensure that these expensive and critical machines are in proper working order whenever called upon. That, in turn, he says, means seriously skilled and competent technicians – and, given the range of on-board equipment, also with wider skill sets than usual.

"That's why the fire service is at the forefront of taking on irtec licensing," says Beebee. "All our technicians go through the irtec courses and attend yearly reviews. We also bring in VOSA to carry out inspections and run through revisionary training to help maintain our standards. All our technicians are trained and examined to the CFOA requirements."

And he adds that, beyond the standard vehicle mechanics and electronics, they are also expected to be fully up to speed on the appliances' pumps, hydraulics, pneumatics, cutting equipment, ladders and much more.

Nevertheless, Richard Osborne, technical sales manager with Volvo Trucks, suggests that some fire appliances may be over-powered and argues that projects need to be assessed individually. "West Midlands FRS went for the largest 290bhp engine and slightly high diff ratios, so they can run at high speeds in metropolitan areas. But, at the opposite end of the spectrum, the Isle of Man and Jersey services went for smaller engines with deeper diff ratios, because mostly they're running at 0–40mph."

Either way, while steels on the front and airbags

Centre top and left: West Midlands FRS's new Volvo appliances Centre bottom: a truck from MAN's New Dimension fleet Bottom right: tilt testing to the CFOA/TOG standard

Integral transmission retarder makes handling water tankers a breeze

Clare County Fire & Rescue Service, in Ireland, is reporting success with Allison transmissions, specified on its water tankers for their integrated retarders. Al Meaney, Clare County's maintenance supervisor, says there are five Allison-equipped water tankers on the fleet – four Hino 500 Series trucks acquired in 2009 and 2010, and a Hino FS 6x4, purchased in 1992. He also reports that, of a total of 24 vehicles on the fleet, 14 now have Allison transmissions.

Meaney makes the point that, in the countryside, there are very few water hydrants: hence the tankers, which carry 2,000 gallons of water each and escort fire tenders to incidents. "The transmission is crucial in ensuring that our 18-tonne tanker arrives immediately behind its 11-tonne fire-fighting counterpart," he says.

"An important feature of the Allison transmission is the integrated retarder, which makes braking under so much weight much easier," he adds. And he says that narrow, hilly country roads are far easier to negotiate, with the full power-shifting auto box – thanks to its torque converter and constant mesh planetary gearing.

Beyond the transmission though, Meaney says that key features of this brigade's water tankers revolve around the pumping equipment. He cites, for example, an inflatable pool carried by each tanker, which it fills from the tank at the incident, while tending to the fire. This allows fire fighters to continue extinguishing the fire, while the tanker leaves to extract water from the nearest source.

A water unit on the roof can also be directed remotely from inside the truck's cab to spray forest fires as the truck drives along adjacent roads. And a further pump located under the front bumper has been configured to spray a mix of water and foam to break up oil spills at road traffic accidents.

on the rear remain common, there is also a general move towards stiffer anti-roll bars, thicker chassis frames and air suspension all round. That is not only for the greater comfort it affords the fire crew, nor for the better stability. It's not even for the longer life that airbags grant some of the more sensitive fire service equipment. The real issue is that, when the truck pulls up and the PTO is engaged for the water pump, it can drop down on its 'knees', so that everyone, regardless of height, can easily reach the equipment on the back.

So much for the chassis and powertrain: in the fire service, everything counts, and that includes the crew cab, where the emphasis is on visibility, space, seating arrangements, height, and ease of access and egress – with EC29 regs defining the overall safety requirements. West Midlands FRS's latest Volvo FLL B types, for example, were selected from the models available through the FireBuy purchasing consortium for their scores in all the above areas.

"Volvo's four-door crew cab offered the lowest entry and exit for the driver and crew, due to their use of 19.5in wheel rims, instead of 22in," states Beebee. "Also, they extended the cab design in the rear to provide a single seat for each fire fighter, with breathing sets and PPE on, and with full three-point harnesses. So the crew get good, usable working space, safety and all-round visibility."

And it's a similar story with the appliance body and the on-board equipment: from the bodybuilders' perspective, the task on a B type is making sure that some two tonnes of water and three tonnes of fire-fighting equipment arrive at the shout in one piece, and are quickly accessible. That's not trivial. As Alan McClafferty, managing director of John Dennis Coachbuilders, explains, with some appliances expected to take speed bumps at up to 70mph and others to travel off-road at speed, chassis are bound to transfer significant forces to the body, no matter how well they're stiffened.

Plastic performance

Hence, for example, the FRSs' interest in his firm's plastic bodies, which are replacing conventional aluminium structures. "Our solution is to make the bodies out of copolymer, which is lighter than aluminium and 10 times stronger – and then 100% recyclable at the end of their life," states McClafferty. And, indeed, West Midlands FRS has used this construction on all its 26-tonne aerial platforms and is trialling two B types with the material now. Many other fire and rescue services are also changing over, as their appliances come up for replacement.

As for the equipment itself, Beebee says that, on his latest appliances, the big push was to move as much stowage from the cab to the rear lockers, while also introducing 'through lockers' that span the vehicle width. "We went for a different locker area design and worked with John Dennis Coachbuilders to move the main high-pressure hose reels from the sides to the front in-board, to make better use of the space and improve access," he states.

McClafferty explains that making that work was about integrating the water chamber into the body centre and providing three lockers along each side: a through locker at the front, individual lockers over the wheel arches and deeper lockers at the rear butt up to a central rear pump, positioned so that the operator can see both sides of the vehicle.

Top-mounted beam gantries on gas struts then carry the ladders and other rescue equipment. "The beam gantry brings the equipment down to ground level on a controlled pull-and-slide mechanism, and presents it to the fire fighters," says McClafferty. "As for the rest of the equipment, we use a bollarding approach that secures it, but also allows for instant access on a tilt-and-slide system. When they get to a shout, fire fighters are generally keen to get the equipment out fast." TE