



Magic bullets

The combination of modern plant and equipment being harnessed for maintenance on the new Channel Tunnel Rail Link trains looks impressive. Brian Tinha reports

Maintenance of the all-new Hitachi trains for the Channel Tunnel Rail Link – the first consignment of which is now in the UK – is going to be a challenge. It's not that this fleet, which is based on the iconic Japanese Shinkansen bullet trains, is likely to be problematic. With such a high-profile project, everyone will want to be certain that this service sticks like glue to its scheduled 37 minutes from Ashford to St Pancras.

First, a few facts and figures. Each bullet train comprises six vehicles with 24 wheel-sets, 16 of which are driven. Hitachi boasts that, even with 25% of the traction equipment out, it will still run to timetable, the remainder being man enough to drive this 250-tonne machine at 140mph. So far, three have been delivered and the first unit has now completed 12,000 miles of test runs.

So what is Hitachi Rail Maintenance Engineering doing to ensure the required reliability? Engineering manager Dan Barrett, whose job it is to oversee development of the maintenance programme, says the organisation is taking a two-pronged approach – harnessing the latest thinking in train plant at its new depot in Ashford, while taking advantage of condition monitoring technologies.

Looking at the depot itself, Barrett points, for example, to its synchronised jack system, capable of raising the entire train. "With this plant, we don't have to waste time splitting down trains, uncoupling vehicles and separating the inter-vehicle gangways," he explains. "We've also got five pitted roads and the capability to drop bogies from beneath the vehicles, so we can minimise replacement times."

That's good for labour saving, but also excellent for health and safety – which seems to be the approach throughout. For example, there's also very good access to the trains at roof level, with gantries and fall-arrest systems running the whole length of the train on every road. "Maintenance engineers just go up, hook on to the harness and they can get working very quickly and very safely," says Barrett.

It's a similar story with gearbox and compressor fluid changes, which should be faster and safer than at any other depot in the UK, thanks to bespoke drain and refill plant. "That means we'll be able to suck out old oils in a clean and safe manner, and automatically refill with the correct fluid."

Meanwhile, in terms of inspection equipment, there are two main technologies. First is the MRX, mounted on the track at the depot. Transponders identify each unit on arrival and MRX takes a wheel profile measurement of every vehicle. The system also monitors wear of brake pads and third rail shoes, and is linked to Hitachi's Equinox CMMS (computerised maintenance management system).

Temperature taking

"We also carry out routine physical inspections and, at the moment, the maintenance regime is time-based. Inspections include checks for door operation, the bogies, all the roof equipment, the insulators, HVAC units, brake resistors and so on. And we carry out under-frame visual inspections."

But Hitachi's second key technology is infrared, using a Flir ThermaCam T400. "Thermography is very important to us – for example, for checking HV cables and terminals. There will always be problems with burn-ups, so we're pre-empting those by using the camera to pinpoint high resistance contacts. We're also getting away from the usual problems of, for example, having to undo junction boxes just to check that fixings are torqued up – which is not only time-consuming, but can be fault-inducing."

Barrett also cites using the equipment to monitor motor temperatures – specifically around bearing casings on blowers and HVAC fans. "We're also using it on third rail shoe gear – putting the unit under load and reviewing thermal images. The camera is extremely useful: we've got some batteries on charge now and we're using it to look at those to make sure there are no high resistance cells. It's all about building a thermal history." **PE**

Pointers

- Non-invasive condition monitoring is making maintenance fast, effective and ultra reliable
- Good maintenance planning starts well before the technologies, to include provision for health, safety and speed of operations
- Serious civil and mechanical spending up-front can transform the effectiveness of maintenance engineering
- Infrared thermography saves way more than time in electrical and mechanical fault detection

Visual under-frame inspections are important, but thermographic inspections are essential

