Tracking trains the smart way

**OPERATIONS** Vietnam’s state railway DSVN is radically updating its train supervision, fleet management, and passenger information systems using a suite of IVU software communicating via the public mobile phone network.

Work is underway on a project to update Vietnam Railways’ operations management, with the traditional train control process to be replaced by a computerised system in 2015. Planning and specification has been underway for the past six months, along with software development, and hardware installation is to begin in the next few months.

Railway modernisation is a key part of the Vietnamese government’s economic development strategy for 2020. Concerned that poor transport is constraining economic development, it is investing in harbours and airports, as well as the road and rail networks.

While Vietnam has more railway than some of its neighbours, it still has less than 1 route-km per 100 km². Largely metre-gauge, the network is characterised by single-track lines, steep gradients, unsupervised level crossings, and decrepit bridges. Train speeds are low, and even the flagship Reunification Express takes around 30 h to cover the 1726 km between Hanoi and Ho Chi Minh City.

Today, the railway is only carrying a small percentage of the country’s passenger and freight business. However, demand is steadily increasing, particularly for bulk loads such as ores and coal, as well as containers. In future rail is expected to handle a greater proportion of the total demand, in order to relieve the congested roads.

**Improved efficiency**

In July 2012, a contract for updating DSVN’s Operations Control Centres was awarded to IVU Traffic Technologies AG of Germany. This covers the introduction of IVU.rail software, along with supporting hardware.

The system will enable DSVN to deploy its rolling stock more efficiently, and to manage train operations in real time. With trains changing crews, and often locomotives, at key stations, it is important to keep track of train movements. Unless the controllers know the precise location of all trains and locomotives, it can be extremely difficult to re-schedule the train running order or rearrange crossing movements on the single-track lines.

Other objectives include increasing the throughput of the network and reducing energy consumption. The system will be able to monitor delays and provide real-time data to support a passenger information system, with display screens initially to be installed at eight principal stations.

Optimising train crossing movements is a core task, because many of DSVN’s locomotives are underpowered for the heavy trains that are now being operated. It can take a long time for these trains to get back up to full speed after a stop, and better scheduling that prevents them from coming to a stand will help to reduce delays.

Operations will be managed from two control centres: one in Hanoi with three workstations and another in Ho Chi Minh City with two. These are two of DSVN’s existing control
centres, which will be renovated by IVU’s local partners. All locomotives will be fitted with an on-board unit, which will send GPS location data to the control centres in real time (Fig 1).

Communications will be undertaken using the public mobile phone network, making it possible to design the system without installing WLAN at stations or depots. This includes voice communication, text messages and software updates. As Vietnam’s mobile networks are not yet as well developed as in Europe, the on-board units can send coded messages, which require much lower data rates.

Control centre software

The heart of the package is the IVU.rail software suite, which is already used by operators in Europe, and is being adapted for Vietnamese conditions. Thanks to a high degree of standardisation, the necessary changes will only require minor modifications to the software.

To meet the requirement for a powerful conflict management tool, the IVU.rail time-distance diagram is being enhanced to display extra information including trip plans and the status of train movements, as well as potential conflicts. Drag and drop functionality will enable the operators to adjust trip plans and eliminate conflicts. Coded messages can be sent to the drivers, telling them to speed up or slow down to optimise the next crossing movements.

It is also possible to alter the status of individual trains, for example to add labels such as ‘ready for departure’ or ‘waiting for engine’. Comments can also be attached to locomotives, so that telephone calls between the OCC and local traffic controllers can be kept to a minimum. Each change to the time-distance diagram is automatically registered by the vehicle dispatching module (Fig 2).

On-board equipment

On-board units will be fitted to around 300 locomotives, including 100 double-cabbed locos which will need two, plus maintenance and inspection vehicles. These IVU.box units are similar to those used in Europe, but there have been some changes to the casing, as local climatic conditions mean that the on-board computers could be exposed to extremely high humidity. The equipment is also being reconfigured to suit the local communications strategy.

Fitting the on-board units presents a number of challenges. Over the years, DSVN has amassed a very diverse fleet of locomotives. In many cases the original technical documentation which would provide details about the status of power connections, for example, is no longer available. Thus the first locomotive of each type will be retrofitted by IVU engineers, who will document the procedure precisely, so that DSVN staff or local subcontractors can undertake the remaining installations.

Project timescale

After the contract was signed on July 3 2012 (RG 10.12 p21), the project got underway last November. The on-board units are being manufactured in Germany, and the passenger information displays will be imported from a German supplier. Components such as the servers, workstations and network infrastructure are being sourced and installed by a local partner.

The specification phase has been largely completed, and the first software package will be delivered in the coming months. The main server rooms and new hardware will be installed during 2014, with the second software package to be delivered before the end of next year. This will enable the roll-out to begin in early 2015, followed by staff training.

All being well, the system is due to go live in the summer of 2015. As it will not be practical to commission the equipment on a region-by-region basis, there will be a ‘big bang’ switchover taking about four weeks, during which the controllers will work in parallel using the old processes and the new software.

IVU engineers will support the implementation and the initial warranty period. The company has also proposed a longer-term maintenance agreement for the following years.