

# Simulation Modelling



## Background

Accurate modelling of the operational reliability and capacity of your rail network is required to assess the impact of timetable changes, infrastructure changes, reduced capacity, maintenance, enhancements and many other factors. Systems modelling can provide the mechanism for developing appropriate evidence to inform key investment decisions.

## The Challenge

Unique challenges associated with simulation modelling include the creation of reliable analysis that provides systems assurance for planned changes to infrastructure or service levels. Consequently, a key requirement is the ability to use an array of modelling methods ranging from static analysis, dynamic simulation and increasingly detailed modelling through to the deployment of formal optimization methods.

## How We Can Help

Our access to detailed knowledge of how existing networks perform as well as our appreciation of what the future may hold in terms of technological solutions, allows us to provide real insight into the range of current challenges faced by railway networks as well as the technologies and solutions being adopted to overcome them.

We can assess your service requirements and match these to current and planned future infrastructure and signalling capacity, via a series of iterative simulation models. Disruptive events can also be modelled in order to assess system recovery capability. This will give a baseline for modelling interventions and future scenarios.

- ▶ assessing the signalling system capacity to establish whether it is capable of operating the required service frequency

- ▶ assessing electrification, infrastructure and layout capacity
- ▶ identifying safety risks inherent within a proposed rail system
- ▶ establishing whole life-cycle infrastructure costs after maintenance frequencies have been taken into consideration
- ▶ commencing initial timetable iterations in order to assess how best to meet passenger demand, diagram services and identify both train and passenger 'pinch points'
- ▶ assessing passenger access/egress from trains and through stations using 'pedestrian flow' modeling tools.



## Major UK enhancement programs

Our experience includes the provision of extensive and trusted analysis to the majority of major enhancement programs undertaken within Great Britain. In addition to the provision of direct support, we are frequently engaged in an independent capacity to major programs adding commercial / legal weight to the outputs we produce.

### Thameslink

Major Rail Infrastructure Programme renewing systems and removing track bottlenecks and increasing platform lengths, allowing longer trains through the London core area every 2.5 minutes. To support the development of the project we have undertaken a range of simulation modelling, including asset reliability assessment; station dwell time analysis; reliability requirements apportionment and specification and Signalling Performance Assessments.

## Northern hub

Major rail infrastructure programme to renew systems, remove bottlenecks and increase line speeds in the Manchester conurbation area, enabling 700 additional trains each day. We carried out a Whole Systems Reliability Study of the existing and the proposed designs to provide RAM predictions, as well as Scheme Performance Assessments (SPA) and Capacity Utilisation Assessments to establish technical headways and re-occupation times for various option developments.

## HS2

HS2 is a proposed high-speed line between London and the West Midlands with onward legs to Manchester and Leeds. Completion of the route will provide a step-change in capacity at the southern end of the West Coast Main Line. On behalf of HS2 we have provided strategic systems engineering guidance on programme

through life management planning; early scheme analysis on optimal attainable speeds for new rolling stock on existing parts of the network; analysis of performance impact on the classic and high-speed network interface, as well as an initial assessment of HS2 performance benchmark against other railway system.