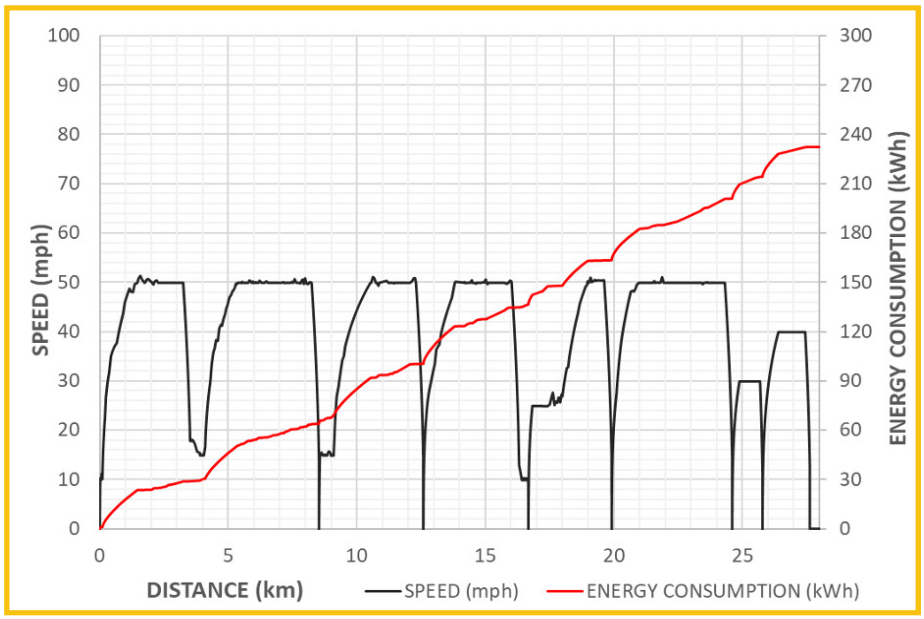
Element Materials Technology

Train Battery Route Assessment

Background

The UK rail authorities are aiming to eliminate diesel traction wherever possible, but the network itself does not yet have complete electric coverage, and it will be many years before that is achieved. However, there are many routes that are partially electrified, there being either occasional gaps in electrical coverage or the overhead wires do not extend the full length of the line.



One rail leasing company was looking for a solution to such a route, and approached Norton Straw Consultants, part of **Element Digital Engineering**, to assess whether a large battery could provide the power to take an electric train along an unelectrified section at the end of the line.

The Challenge

The first challenge was to assess the energy required for the route. A model was needed that considered the gradients on the line, friction caused by bends and points, acceleration away from stations, and the possibility of unplanned stops at signals.

The second challenge was charging time. The battery would charge during its time on the electrified portion of the line and then again at a charging point at the station at the end of the non-electrified section. The model had to consider whether the timetable allowed enough time for sufficient charge to be taken on at these times and whether an intermediate charging point might be necessary for times when the schedule was disrupted.

The Solution

The team built a dedicated route model of the line incorporating all the geographical features and

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details of the line itself. A very large number of simulations were then run, considering all possible combinations or operating events.

The Result

We were able to confirm that a battery was a viable solution and could provide extremely good performance and service in nearly all operating conditions. However, there were some cases where battery depletion would mean more time would be needed to recharge at the end of the line, and an upgrade to the charging equipment was recommended. For more information, take a look at our **rail testing** services on the Element website.