

Ramp metering: delivering significant benefits to both the Highways Agency and road users

Ramp metering is a highly effective traffic management tool that controls the rate at which vehicles join a motorway during busy periods, the purpose being to prevent or delay breakdown in the flow of motorway traffic.

The benefits of ramp metering include:

- greater throughput of vehicles during peak periods;
- less congestion and improved traffic flows;
- more-reliable journey times;
- reduced risks of accidents;
- environmental improvements due to noise reduction and improved fuel consumption.

Part-time traffic signals using the familiar red, amber and green lights come into operation at times of peak traffic flows to control the rate at which vehicles are released from a slip road onto a main carriageway.

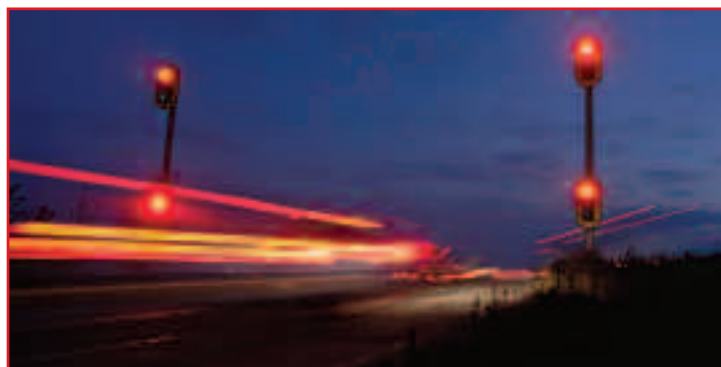
How does it Work?

With ever increasing volumes of traffic, many motorways become so busy at peak times that traffic slows down significantly and can come to a standstill, a situation known as flow breakdown. There are many locations across the country where the amount of traffic joining a motorway at a junction causes this flow breakdown to occur, usually just after the junction.

Ramp metering works on the principle of carefully controlling the rate at which traffic is allowed to join a motorway. By doing this, the motorway can be kept flowing for longer and, if flow breakdown does still occur, ramp metering can ensure traffic starts moving freely earlier than it would have done otherwise, resulting in improved journey times for drivers.

The system makes use of detectors buried in the road to monitor traffic conditions and, when the main carriageway starts to become busy, the lights switch on and start controlling (or “metering”) the rate of vehicles released from the slip road. This control is achieved by modifying the amount of time for which the red and green lights are on. The same sort of detectors are also buried in the slip road and are used by the system to manage the length of the queue on the approach to the lights. This is essential to ensure that the system doesn’t cause traffic to back up onto the roads leading to the motorway junction, which would of course be detrimental to vehicles not using the motorway.

The lengths of time that the traffic signals display red and green are generally far shorter than for traffic lights at a typical road junction. This is done deliberately so that small groups of vehicles are released from the slip road (quite often only four vehi-



(Top) Metering the flow at M1 J39.
(Above) Short reds split Vehicles into small groups on the M1.

cles at a time). This arrangement makes it easier for these small groups to merge into the flow of traffic already on the motorway, which is one of the fundamental reasons why the system works.

How do we know it works?

Evaluation of the first 30 ramp metering sites installed confirmed a reduction in journey times of up to 40%, with an average improvement of 13%. These results were better than expected, and translate to a much better driving experience for people both on the main carriageway and joining at junctions with ramp metering.

What’s next?

Based on these positive results, the Highways Agency decided to deliver more sites across England, bringing the total to approximately 80 by March 2009.

A trial linking a ramp metering system with the traffic signals at junctions approaching the motorway (controlled by an Urban Traffic Control system) has shown a combined journey time saving of 14.7% on the mainline motorway; as well as significant improvements for the local roads in the vicinity of the motorway. This Integrated Traffic Management provides a holistic solution to traffic management problems and requires the Highways Agency and local authorities to work in partnership to achieve improved re-

sults across the combined network.

Ramp Metering Task Force

In April 2008, the Highways Agency formed the Ramp Metering Task Force to ensure that best practice is shared across all ramp metering projects in the country.

The task force maintains a panel of experts from the Highways Agency and industry whose activities include reviewing the performance of existing sites, providing technical direction for consistency across all schemes, and coordinating future development of the ramp metering system.

Given the continual development and deployment of ramp metering sites across the UK the next few years will certainly be busy for the Task Force.

For further information please contact the Highway Agency (08457 504030; website: www.highways.gov.uk/rampmetering). You can also contact the RMTF directly at rmtaskforce@highways.gsi.gov.uk.