



**ADVANCED TRAFFIC TECHNOLOGY**  
COUNTS, SEPARATES & CLASSIFIES IN **ALL** CONDITIONS

Technical Sheet No. 1

# Idris®

## DETECTION TECHNOLOGY

### Background to Development

## HOW IT ALL BEGAN

Idris was originally developed to detect single stopped vehicles in the low flow traffic conditions typically encountered at off peak times on the A55 North Wales Coast Road, UK. Three tunnels (no hard shoulder) with restricted visibility on this main arterial route to the port of Holyhead gave rise to potentially dangerous traffic conditions. Idris' advanced traffic detection capability made a major contribution to driver safety.

Since then Idris has developed and advanced into one of the world's most accurate vehicle detection systems. Over time, several new manifestations of the original Idris Technology have been generated, taking the development team at Diamond Consulting Services Ltd (DCS) into new and expanding market areas.

## BACKGROUND

The Idris incident detection system uses outstation units which collect and process data from inductive loops. The processed data from a number of outstations is combined to determine the existence of various hazardous conditions:

- slow-moving traffic
- individual slow vehicle
- queuing vehicles
- vehicles travelling in the wrong direction
- a single stopped vehicle at any point on the equipped road section

The algorithm responsible for detecting a stopped vehicle requires very high quality data from the outstation, as it is dependent on count accuracy and vehicle identification by length and speed measurement. The single stopped vehicle algorithm operates by using vehicle data at one outstation to predict when that vehicle will arrive at the next outstation. Should it fail to arrive at its designated time, it is deemed to have stopped and an alarm is raised within ten seconds. As a prediction is made for each vehicle at each outstation and the correlation process is critical in alarm determination, the requirement arose for increased accuracy of vehicle data in order to reduce false alarm rates.

**Diamond Consulting Services Ltd**

Chestnut Farm, Dinton, Aylesbury, Bucks. HP17 8UG Tel: +44 (0)1296 747667 Fax: +44 (0)1296 747557

Email: [idris@diamond.demon.co.uk](mailto:idris@diamond.demon.co.uk) [www.idris-technology.com](http://www.idris-technology.com)



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From this requirement, the outstation processing was developed to cope with real traffic conditions without sacrificing accuracy i.e:

- distinguishing between vehicles straddling and two vehicles side by side;
- differentiating between signal overspill from a large vehicle and a genuine small vehicle alongside;
- correctly classifying tailgating and towing vehicles;

All the above to be achieved in congestion as well as free flowing traffic.

### **In 1995/96, when Idris was being developed and enhanced, loop detectors typically registered:**

1. count errors of approximately 1 in 100;
2. measured speed accurately only if the vehicle was properly in lane;
3. measured length accurately only if the vehicle was properly in lane;
4. ceased to operate reliably in congestion due to continuous occupancy of the loops;
5. counted 2 vehicles in straddling (vehicle down the white line) conditions unless special loop arrangements were installed (n+1, 2n-1 etc.)

### **Consequently, the Idris Enhanced Detection Specification was:**

1. count error of better than 1 in 10,000 in free flow;
2. count error of better than 1 in 1,000 in congestion;
3. accurate speed irrespective of vehicles position in the lane;
4. accurate length irrespective of vehicles position in the lane;
5. reliable operation in all traffic conditions;
6. to deal properly with straddling vehicles with standard loop installations eg: 2m (6ft) square loops, 4m leading edge to leading edge.

Initial trials with prototype equipment took place at Peek Traffic UK's test site on the A34, a two-lane dual carriageway of free-flowing traffic. Having proved the prototype, two outstations were prepared for thorough and exhaustive trials on a congested site - the most difficult situation and one which other systems could not handle.

## UK TRIALS

The UK Highways Agency co-operated in traffic measurement trials and conducted trials on the clockwise M25, London, England orbital motorway (freeway) between junctions 15 and 16, one of the most congested sections. During the two weeks of the trial more than 50 hours of data was collected. The trial data consisted of a full range of traffic conditions including free flowing, congested traffic on both carriageways and across all four lanes and stop-start traffic.

The loop site chosen was a standard MIDAS loop site (2 x 2m loops 4.5m leading edge to leading edge, one loop pair per lane) connected to a MIDAS outstation. The existing equipment was temporarily disconnected and replaced by Peek' Traffic's DBFO (Design, Build, Finance & Operate) outstation, which had been modified to enable it to collect large amounts of low-level data. The site chosen was adjacent to an overbridge which allowed simultaneous collection of video data for comparison purposes.

The trials were conducted focusing on count and length. Further developments of the system over time have provided more detailed profiles of the vehicles producing what we would know today as "Automatic Vehicle Classification" (AVC) systems.

### **The following traffic manoeuvres were identified using the validation techniques and subsequently confirmed by video:**

- vehicles straddling two lanes;
- tailgating;
- changing lane at 45 degrees in congestion over the loop site.

### **Using the Idris automatic validation process the results revealed:**

- errors of less than 1 in 20,000 during free flow situations;
- errors of less than 1 in 3000 (excluding motorcyclists) in heavily congested traffic.

It should be noted: A 3 hour video tape was manually validated. To validate the tape took more than 30 hours; it was time consuming, expensive and capable of repeated errors and is therefore an unreliable and unworkable validation process.

The M25 trials validated the design goals for Idris. Subsequently there have been many more validations (every new market/customer not wishing to accept their neighbours testing!) and all have borne out the original validation.

Idris is an extremely accurate vehicle detection system, in fact in a market of imprecise measures, it is a precision instrument.

*The Idris Technology is protected by one or more of the following patents:*

**EP0879457, USA 6345228, 6337640 and 6483443**

*Patent Applications Pending in other Countries*

*Idris<sup>®</sup> is a registered trademark of Diamond Consulting Services Ltd.*

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