Data Access via Human Machine Interface

The processor acts as a web server. Any data stored can be accessed through any HMI workstation via a standard Internet browser. The Controller/Operator or Maintainer can access the data via their workstation or laptop when the computer is linked into the rail operator’s network (TCP/IP protocol).

The WIM HMI performs the following functions:
- Highlights any alarm with a visual warning signal (and acoustic if required)
- Displays alarm details
- Manages alarm recognition
- Maintains a log of the Operators’ activities
- Stores alarm and vehicle-related data and diagnostic information
- Displays a list of past and present train movements and consist data
- Displays the system diagnostic status (for each item of equipment)

The system authenticates each Operator through Username and Password credentials, and the authentication provides different Operator profiles, e.g., ‘View Only Operator’ (Operator can only perform alarm recognition) or ‘System Administrator’ (typically sets the authentication and profile for all other Operators). The WIM system output data is provided to the relevant Train Control Centre for display and database storage.

FIBRE OPTIC DETECTION OF WEIGHT AND LOAD IMBALANCES ON MOVING TRAINS.

This innovative system measures weight and checks load conditions of each train while in transit.

The system also acts as an announcement sensor. When a train passes in the measurement zone (regardless of its running direction) a sensor will detect its transit. It can operate day and night and under any weather conditions.

WEIGH IN MOTION
Fibre Optic Detection of Weight and Load Imbalances on Moving Trains.

The Weigh in Motion (WIM) system measures weight and checks load conditions of trains as they transit over the Measurement Zone, and displays the results and any alarm signals via a processing unit. It does not require speed limits to be placed on trains as they transits the Measurement Zone and can operate day and night and under any weather conditions.

The innovative technology and design of the fibre optic sensors provide a number of advantages:
- Reduced overall dimensions and minimal impact on the track
- No modifications of structural or physical characteristics of the rail are required (no rail drilling or installation platform)
- Ease of installation and removal
- No modifications of structural or physical characteristics of the rail are required (no rail drilling or installation platform)
- No electric/electronic circuits along the rail
- Fibre optic cables (no electric cables are required)
- Electromagnetic immunity of equipment
- No power supply required so all insulation specifications are met
- Wide working temperature range (-40°C to 85°C)
- Robust construction for operation in harsh conditions.

The system is automatically calibrated using test locomotives or wagons of known weight. It must be re-calibrated annually, or more often, depending on the specific operating conditions.

Main Functions

Transit train detection
The WIM sensor also acts as an announcement sensor. When a train passes in the Measurement Zone (regardless of its running direction), a sensor will detect its transit.

Weight measure calculation
For each train that transits the Measurement Zone the WIM system will determine:
- Direction of transit
- Average transit speed
- Total number of axles
- Gross weight of wheel
- Gross weight of axle
- Gross weight of bogie
- Gross weight of wagon
- Weight per linear metre
- Total weight of train
- Total train length.

Load imbalance/overload detection and alarm generation
Weight measure values are compared to threshold values to check the presence of:
- Axle overload
- Overload per linear metre
- Transverse axle imbalance
- Transverse wagon imbalance
- Longitudinal wagon imbalance.

In the event of a load imbalance or overloads, the system will generate the corresponding alarm.

Auto diagnostics
The system is equipped with auto-diagnostic tools which routinely check the operating conditions of the individual system components.

In the event of a component failure, the WIM system will operate in ‘degraded’ mode, highlighting its condition along with the weight measures of the transited train.

Typical System Installation Layout

The WIM system sensors are set in parallel along the two rails and every WIM sensor is fitted with fibre optic cables provided with proper connectors in order to implement the connection between two successive sensors. This connection is implemented via an adapter of the same type compatible with connectors.

Technical Features

<table>
<thead>
<tr>
<th>Power Supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outdoor equipment [W]: power supply not required</td>
</tr>
<tr>
<td>Indoor equipment [W]: 125</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mechanical features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual sensor size (l x h x d) [mm]: 200 x 150x100</td>
</tr>
<tr>
<td>Installation: fibre optic sensors anchored to the rail foot, installed on a track section and parallel-distributed along both rails.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Environmental and climatic features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outdoor equipment [°C]: -40 ÷ 85</td>
</tr>
<tr>
<td>Indoor equipment [°C]: -20 ÷ 60</td>
</tr>
<tr>
<td>Connector box IP degree: 67</td>
</tr>
<tr>
<td>Humidity [%]: 0 ÷ 95</td>
</tr>
<tr>
<td>Electromagnetic interference: immune</td>
</tr>
</tbody>
</table>

The above technical features may be changed with no advance notice.