

Instrumented Runway Visual Range (IRVR) System for Civil Aviation

Campbell Scientific equipment used at Exeter Airport



CS120A Visibility & CS140 Background Luminance Sensors mounted on a frangible mast

Exeter Airport is undergoing a huge refurbishment to expand their capabilities and streamline their operations in order to increase the capacity of the airport. Modernising their Runway and Lighting System was a core aspect of their refurbishment. They chose Campbell Scientific Limited to supply and install an Instrumented Runway Visual Range (IRVR) system.

Dim runway lighting in low visibility makes it difficult for pilots to see the runway. Bright runway lights in good visibility cause glare for pilots. So controlling the runway light intensity based upon Runway Visual Range (RVR) is an important

safety factor in take off and landing. Prior to the installation of a Campbell IRVR, Exeter Airport required a trained operator to make an estimate of the RVR based on a laborious process counting lights along the runway. The IRVR system provides operators with more reliable RVR measurements which are calculated automatically and displayed clearly and unambiguously.

IRVR systems consist of sensors measuring visibility and background luminance. Data measurements from these sensors are transmitted to an IRVR Controller. The IRVR Controller uses

these measurements to calculate the RVR using processes defined in ICAO 9837. The IRVR Controller has inputs for Runway Light Brightness and Runway Direction which are also used in the calculations.

The IRVR system at Exeter airport consists of a CS120A Visibility Sensor and CS140 Background Luminance Sensor at each end of the runway. Since the TDZ and END points will change, if the runway direction changes, the IRVR controller can use information on the runway in use to select the sensors required to calculate IRVR for the TDZ point in use. A CS125 Visibility and Present Weather

Case Study Summary

Application:
Civil Aviation

Location:
Exeter Airport

Contracting Agencies/Organizations:
Exeter & Devon Airport Ltd

Campbell Products Used:
CS120A Visibility Sensor
CS140 Background Luminance Sensor
CS125 Visibility and Present Weather Sensor
CS215 Temperature and Relative Humidity Probe
IRVR Controller
Frangible Masts

Communication Links:
RS485
Ethernet

Measured Parameters:
Visibility
Present Weather
RVR (Runway Visual Range)

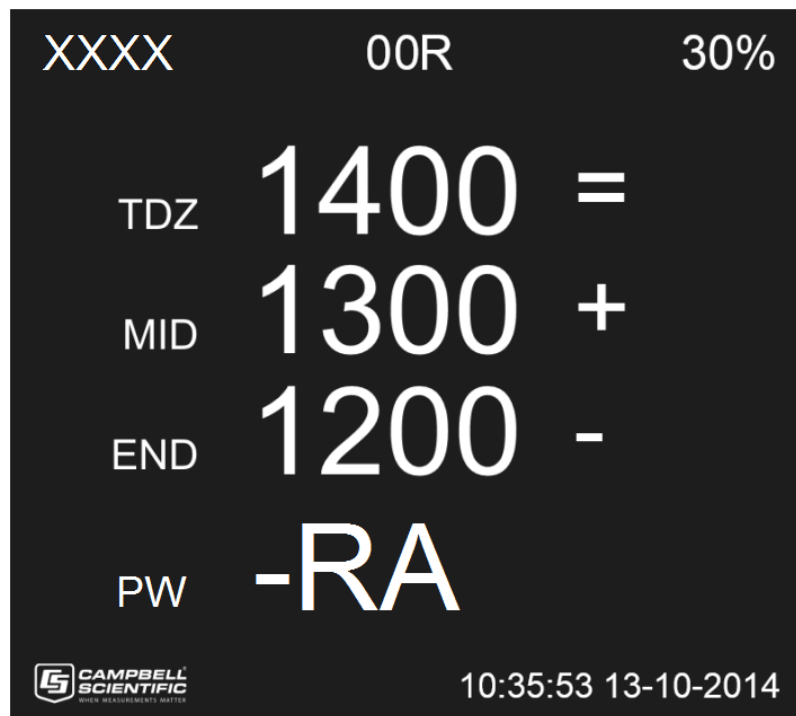
Compliances:
CAA Approved
ICAO 9328
ICAO 9837
ICAO Annex 3

Sensor is located at the Midpoint (MID) to provide information of the RVR at the MID point. The CS125 also provides Present Weather measurements which comply with WMO standards. The present weather data output can provide the airport with either a SYNOP (numerical value for the weather) or a METAR formatted present weather value. The IRVR controller can output messages to any third party system. The visibility and present weather measurements are continuously fed into Exeter Airport's Weather Monitoring System. The addition of a temperature and humidity sensor (CS215) means that temperature and relative humidity information can also be sent to the Weather Monitoring System from the processed message provided by the IRVR controller.

All of the processed information from the sensors are output from the controller and shown on displays

provided and installed by Campbell Scientific. Two displays were installed and connected to the IRVR controller via Ethernet.

The display will show the RVR values for the TDZ, MID and END of the runway. The light intensity of the runway lights is shown on the top right of the display. If the IRVR controller calculates that the light intensity is not suitable for the conditions the display will show "LAMPS". The IRVR display also shows if the RVR is steady "=", increasing "+" or decreasing "-". All of this information is clearly displayed to help airport controllers make well informed decisions. The Present Weather information is displayed on terminals located in the control room. Exeter Airport asked for the inclusion of the present weather information to be added as a bespoke custom display.



Example IRVR Display showing three runway points and present weather

Campbell Scientific provided comprehensive training for Exeter Airport engineers. The training covered maintenance and calibration of the sensors and troubleshooting for the system. Exeter engineers are now able to maintain the system ensuring the IRVR system provides reliable data and dependable output for years to come.

The project from design, build, testing, installation and getting CAA approval was all completed in less than six months. The quick installation and approval was essential as a part of Exeter Airports expansion. Campbell Scientific will continue to offer support and maintenance for the system.