The Wavin company provides above and below ground solutions for hot and cold tap water, surface heating and cooling, soil and waste, rainwater management and last mile telecom. The company’s end-to-end solutions include consultation, design, implementation and aftersales service. Customers are building and civil wholesalers, plumbing merchants, civil contractors, housing developers, large installers, utility companies and municipalities.

One department of its factory in Hardenberg, The Netherlands, had recently undergone a major transition, including the installation of a new PLC-based control system and replacement of the original hardwired networking system by a new Profibus network. The transition from a traditional control system to bus control offered a lot of benefits, including significant saving on wiring and better and more reliable control. On top of that, the bus system offered diagnostics capabilities not available with traditional control systems, and allowed for data exchange through an ethernet-link with the company’s management- and ERP-systems.

To avoid potential problems, Wavin engineers initiated a preventive maintenance program. The company already used Fluke handheld ScopeMeters for general electrical and electronic maintenance tasks, but for this task, it tried out the Fluke 225C ScopeMeter® Test Tool with the new bus health test function.

**Spotting hidden problems**

The Profibus network within the Wavin factory supports over a hundred stations and, at the time, had been operating without problems for several months.

**Top causes of bus health issues**

Three things can either prevent bus signals from getting through or make them unrecognizable when they do:

1. Signal non-compliance
2. Electrical disturbances
3. Induced noise

**Top causes:**

- Temperature and humidity extremes
  - Corrosion and cable impedance changes, intermittent connections and equipment failures
- Heavy duty machinery-induced power disturbances, noise, and electrical interferences
  - Intermittent performance, random equipment shutdowns and failures
- Unpredictable installation environment: Long cable runs, abuse from heavy duty machinery, vibration, and other common factors
  - Infrastructure breakdowns
Fluke Corporation   Europe’s foremost manufacturer of plastic piping nips industrial bus problems in the bud

Nevertheless, measurements made with the 225C revealed an anomaly on the signals passing through the network at one particular station, located in the mixer area. The ScopeMeter showed an overshoot reading that was far too high, with an average value of 47 percent, and a peak value of 51.4 percent. This was the first indication that something was not right (see Figure 1).

Based on these findings, Wavin service engineers investigated the hardware in this section of the bus system further and found two violations of the Profibus standards:

• At the last station, the required bus terminators had not been switched on
• The length of the cable sections between the last four stations, which were all built in a single cabinet near the mixers, was far shorter than the required minimum length of 1 meter per section

The service engineers replaced the cable sections with longer runs and switched on the bus terminators. Then, they repeated the bus health tests. The results, displayed in Figure 2, showed significant improvement.

**Conclusion**

From this test, Wavin engineers saw the potential to get both early warnings of potential bus problems and to avoid production stoppages. Wavin’s preventive maintenance program now includes a regular health check at every station on the bus. The Fluke 225C ScopeMeter® Test Tool helps technicians ensure that all signals remain within specifications and spot drifts over time that could lead to problems.

### Bus health measurements with the Fluke ScopeMeter

Instead of relying on proprietary diagnostic tools designed for specific bus systems, the Fluke 225C, 215C, and 125C ScopeMeter® test tools provide quick, easy assessment of signal quality on a range of buses and networks.

These new ScopeMeter models are designed for technicians who may deal with several different industrial buses and networks within a plant, as well as general electronics. They perform ‘physical layer tests’ to verify the electrical signal quality of Profibus, Foundation Fieldbus, Ethernet, CAN-bus, AS-I bus and RS-485 networks, among others. Most importantly, the tool summarizes bus health results in a go/no-go view for easy interpretation—without analyzing waveforms—

To get started, connect the scope, initiate the Industrial Bus Health function, select the bus type, and the tool will evaluate the network against industry standards. Switch over to the so-called ‘eye-pattern mode’ to see a waveform display of successive pulses, displayed with selectable persistence. As the waveforms overlap each other, disturbances or other anomalies in overall signal quality are readily visible. The eye-pattern view is particularly useful for detecting external electromagnetic influences caused by, for example, large power lines or motors in the vicinity, which may induce noise onto bus wiring.