The energy saving of railroad stations made great progress with the IoT devices.

We have succeeded in eliminating the effort of patrolling and keeping maintenance records in writing.

We have also succeeded in accelerating equipment troubleshooting.

M-System products are designed and manufactured as pieces of general industrial equipment. Do not use them for applications requiring extremely high reliability and safety.

M-SYSTEM CO., LTD.
www.m-system.com
Introduction

M-System has grown as a component manufacturer focusing on industrial instruments necessary for process automation (PA). Today, M-System has expanded its products to a variety of railroad-related applications as well as factory automation (FA) and building automation (BA) applications. The examples introduced here have been selected from the railroad-related applications of M-System industrial instruments. We hope that these examples are informative to users.

1. Rail Yard
   - Case 1: Remote Monitoring of Train Car Washing Equipment
   - Case 2: Utility Monitoring of Rail Yard
   - Case 3: Inspection Device for Train Car Coupler
   - Case 4: Wastewater Management of Railroad Facilities

2. Rolling Stock
   - Case 5: Temperature Measurement of Vehicle Hydraulic Equipment
   - Case 6: Data Measurement of Automatic Train Operation Device

Chairman of the Board
M-System Co., Ltd.
Shigeru Miyamichi
Rail Line

Case 7: Bridge Displacement Measurement
Case 8: Remote I/O Monitoring of Temporary Turnout
Case 9: Remote Control System of Exhaust Fan
Case 10: Signal Transmission in BRT Tunnel

Power and Meteorology

Case 11: Substation Monitoring Using LAN
Case 12: Lightning Protection for Weather Observation Board

Railroad Station Building

Case 13: Centralized Wireless Monitoring of Station Building
Case 14: Remote Monitoring of Lighting Equipment of Unmanned Railroad Station
Case 15: Broadcasting System Display of Railroad
Case 16: Voice Notification of Electric Leakage at Unmanned Railroad Station

Web Data Logger

Model: DL30
- Consult M-System

Basic functions
- Simple web server (e.g., for a trend screen)
- Data logging
- Email notification function
- FTP function
- Modbus/TCP communications function
- SLMP communications function
- Report (daily, monthly, and annual report) creation function
- Various calculation inputs
- User defined views
- Scheduling
- I/O mapping

Tablet Recorder

Model: TR30-G

Basic functions
- Trend data/Event data recording
- Simple web server (e.g., for a trend screen)
- SLMP communications function
- FTP function
- Modbus/TCP communications function
- Various calculation inputs
- Email notification function

900 MHz ISM Band Multi-hop Wireless System

WL40F Series

FCC Part 15 compliant wireless module

The WL40F Series uses 900 MHz radio waves that have excellent wraparound and propagation characteristics with long-distance reachability, transmitted in a multi-hop system (in relay mode via child units).

- Free communication charges.
- No license fees.
- Reaching a long line-of-sight distance, up to 1 km (0.62 mile) (*2).

(*1) This device is approved for use only in the US.
(*2) Be sure to conduct a signal strength site survey before introducing the WL40F Series.

Wireless Gateway

Model: WL40EW2F

Model: WL40MW1F
**Case 1: Remote Monitoring of Train Car Washing Equipment**

**Train Yard**

We needed electronic file recording because of a change in management standards.

Before:  
We adopted DL30, which has easily digitized our data and started creating daily and monthly reports automatically. It's convenient. It has also enabled remote monitoring, which speeded up our troubleshooting.

After:  
We needed electronic file recording because of a change in management standards.

**Case 2: Utility Monitoring of Rail Yard**

**Rail Yard**

We wanted to monitor the power supplied to an industrial water pump and a transfer table remotely as well as alarm signals, and we were looking for a remote monitoring device.

Before:  
We adopted TR30-G, which has made it possible to monitor the site from anywhere. Furthermore, recording the data has enabled us to conduct preventive maintenance.

After:  
We wanted to monitor the power supplied to an industrial water pump and a transfer table remotely as well as alarm signals, and we were looking for a remote monitoring device.

**Case 3: Inspection Device for Train Car Coupler**

**Rail Yard**

The coupler inspection equipment handled a large number of analog signals. When it handled I/O signals of a programmable logic controller (PLC), many external converters were needed, which caused a lot of expense.

Before:  
We used the Remote I/O R3 Series in combination with the PLC, which reduced the number of converters and led to a cost reduction. Furthermore, the board has been streamlined.

After:  
The coupler inspection equipment handled a large number of analog signals. When it handled I/O signals of a programmable logic controller (PLC), many external converters were needed, which caused a lot of expense.

**Case 4: Wastewater Management of Railroad Facilities**

**Rail Yard**

We wanted to monitor the amount of wastewater from the water treatment plant 300 m (984 ft) away, but we did not have sufficient budget for wiring work.

Before:  
We introduced the DL8 and WL40F Series for wireless conversion, which eliminated all wiring work. Furthermore, the installation period was short and within our budget.

After:  
We wanted to monitor the amount of wastewater from the water treatment plant 300 m (984 ft) away, but we did not have sufficient budget for wiring work.
Case 5  Temperature Measurement of Vehicle Hydraulic Equipment

The noise inside the vehicle is severe and instruments could malfunction. We wanted to make oil temperature measurements and were looking for a noise resistant temperature converter.

We found M-System’s 26RS, which is a compact model provided with I/O isolation and has resistance to noise.

Case 6  Data Measurement of Automatic Train Operation Device

We were looking for a way to make high-speed measurements and recording of the running data from an automatic train operation (ATO) unit.

We adopted the TR30-G, which has made it possible to collect data at 5-ms intervals.

Case 7  Bridge Displacement Measurement

We measured bridge deflections with a laser rangefinder and collected data over RS-485 communications, but we were looking for a way to increase the number of sampling data.

We introduced the Remote I/O R7 Series for HLS (*4) ultrahigh-speed communications, which has made it possible to shorten the measurement cycle and increase the number of sampling data items.

Case 8  Remote I/O Monitoring of Temporary Turnout

We once forgot to return a set-off mechanism (*5) on the railroad track after maintenance and had trouble, so we wanted to take some measures to prevent this happening again.

We attached a limit switch to confirm the return of the set-off mechanism and monitor the operation with the Remote I/O R8 Series and PLC. Since then, we have succeeded in preventing any further oversight.

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(*4) HLS is an open field network of StepTechnica Co., Ltd.

(*5) Set-off mechanism: A branching device switched manually when railroad maintenance vehicle enters or leaves a maintenance base track.
It was time to update the remote control system, but Company A's telemetering system we had in use was obsolete and we did not know what to do.

As company A recommended M-System's D3 Series as a successor model, we were able to update our system with no worries. The D3 Series was perfect. We were able to introduce it immediately within our budget.

We wanted to remotely monitor equipment condition at the monitoring center and wondered if we could use LAN communications to transmit the signals.

The Remote I/O R3 Series is perfect because it has a great record of accomplishment in LAN communications and can receive various signals.

We were looking for a device that would transmit safety signals for traveling in a one-lane alternating tunnel. We wondered if there was anything that could be installed quickly.

The D3 Series was perfect. We were able to introduce it immediately within our budget.

We wanted to install a surge protector to protect an existing weather observation board from lightning damage, but we did not have enough space.

We introduced the MD7ST, an ultra-thin lightning surge protector with a width of 7 mm (.28 in), which was easily accommodated with a margin.
We planned to collect data on the amounts of electric power and water used in the facilities distributed inside the station building, but the wiring work was troublesome, so we wanted to do it wirelessly.

We used the WL40F Series (*) in combination with the Remote I/O R7 Series to collect data. Because it was wireless, hard wiring was not necessary.

It has become convenient since we introduced the IT60SRE, which connects to a PC over the LAN. Each command destination is displayed in color, which has made it possible for everyone to distinguish the command.

We wanted to get a voice notification device to report electric leakage precisely from an unmanned railroad station, and we wondered whether there were any products that could do this with ease.

M-System immediately conducted a test with the TLO, and the result was good. We decided to go with the TLO.
Products Introduced in Case Examples

Remote I/O R3 Series
The multi-channel, mixed signal Remote I/O R3 Series supports a wide variety of network types and I/O module types.

Head-mounted Signal Conditioners 26-UNIT Series
A head-mounted two-wire-type temperature converter.

Remote I/O R7 Series
A compact remote I/O of all-in-one construction.

Remote I/O R8 Series
Ultra-slim, slice type, mixed signal Remote I/O.

D3 Series
A telemetering system that can be used on a variety of communications lines, ranging analog leased lines to radio links.

Ultra-Slim Lightning Surge Protectors
7 mm (.28 in) wide, ultra-slim Lightning Surge Protectors.

MsysNet Series
A telemetering system using a public telephone line.

Tower Lights
Tower Lights provided with communicating function.

Voice Notification Device
A voice notification device using a public telephone line.

For details of the products introduced here, please visit M-System's website.