

Fieldbus Communications Overview

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MAGUIRE

Fieldbus Connectivity for Maguire WSB Gravimetric Blenders



1. Introduction

Over the last five years, there has been a growing popularity with many plastics processors to look to integrate as much of their production systems as possible to rationalize production and maximize efficiency.

Maguire blenders offer a wealth of information for the production process. This includes the ability to send and receive settings, change setup and configuration and compile accurate data on materials consumption.

Therefore, to allow customers to connect their blenders to integrated control systems Maguire developed with a Fieldbus Communications specialist three market-leading fieldbuses - Profibus DP, DeviceNet and Modbus TCP/IP.

2. What is a Fieldbus?

A Fieldbus is the physical medium and software protocol for the inter-connection of plant and machine control devices (sensors, actuators, and remote I/O) in industrial applications to master controllers via digital buses or networks.

The Fieldbus solution offers an effective means of reducing factory wiring of control systems by integration to one common system. For example, a Fieldbus installation can cut installation and wiring costs by up to 50% on a typical large-scale system installation, and can also substantially reduce commissioning and running costs.

Fieldbuses are now being used extensively to connect between various control, measuring, data collection and visualization devices, around

a manufacturing plant or large machine. For example, in a large plastics manufacturing plant there may be up to a hundred or so bar-code printers, a few hundred drive controllers, a hundred or so temperature controllers, and many other devices, all communicating data and control information between each other via a Fieldbus network. Also connected to the Fieldbus network will be master or multiple master control systems and Visualization systems, which allow plant / machine operators to input production requirements, product recipes and view the production process. The Fieldbus could also be linked to computers on the manager's desk and corporate data processing computers providing information on production throughput and efficiency. All these devices need a Fieldbus interface.

3. What are the emerging Industrial Standard Fieldbus Protocols?

Historically there exists a wide range of Fieldbus protocols, but over the last few years of open standards and the emergence of clear market leaders Profibus DP and DeviceNet have become most popular. The growth in Profibus and DeviceNet is being driven mainly by the World's leading Programmable Logic Controller (PLC) manufacturers, Siemens and Rockwell (Allen Bradley) respectively.

Another popular Fieldbus has been Modbus. This has been a popular traditional method to

integrate different devices into a central system, yet their popularity has fallen in recent years due to limitations in speed of communication and functionality.

For the future in Fieldbuses the growth in Ethernet is being driven by the use of PCs, LAN Networks, the Internet, and its software TCP/IP protocol links with the Internet Protocol, (IP). The Modbus protocol has heavily benefited from this and has grown significantly on the ease of IP.

As companies strive to reduce manufacturing costs the growth in use of Fieldbus products in large-scale system integration is inevitable.

4. What does Maguire offer?

Unlike many other competing blender systems, whose PLC based control limits communication protocols, Maguire instead offers 3 Fieldbus adapters. These provide processors with real flexibility to allow integration by communicating on 3 of the most popular protocols currently used in manufacturing applications. These are;

Profibus DP - Siemens S-7

DeviceNet - Allen Bradley, GE, Rockwell

Modbus TCP/IP - Industrial Ethernet solutions

5. Card Installation

All Maguire Fieldbus modules are network cards that mount inside the controller. The Fieldbus card plugs directly onto the serial communications port on the main controller board and replaces the standard DB9 M-LAN / RS232 Serial port on the controller.

One additional connection internally is required to power the card, and then installation is complete. Typically most installations are made at Maguire prior to shipping for new controllers, however the cards can easily be retrofitted to existing units in the field.

6. How does the Maguire Interface work?

Once the Fieldbus card has been installed, the connectivity will need to be setup and configured on the control system. To do this Maguire supplies several different tools to support this.

Once installed, the Fieldbus card is then ready to receive and send data to the central control system. The Fieldbus card software translates the commands between the proprietary Maguire MLAN open protocol and the selected Fieldbus; be it Profibus, DeviceNet or Modbus TCP/IP.



When connecting the unit to a Fieldbus system it is necessary for the Systems Integrator to 'tell' the Fieldbus Master Controller, (PLC, PC, HMI) about the Maguire WSB controller and how the data is structured.

This is supported with the relevant GSD or EDS files pending on the protocol being used, which the PLC engineer or system integrator 'loads' into the Fieldbus Master Controller.

7. What information is available from the blender?

Any information that is available on the normal MLAN protocol is available via the adapter.

This includes the ability to send and receive standard information available on the controller;

- Materials Settings
- Materials consumption data
- Blender ID and Status
- Alarms and status
- Get Cycle by Cycle and Parameter reports
- Keypad Functionality

For further information on data available please review the Maguire MLAN Protocol manual which can be found at

http://www.maguire.com/ps_image/pdf/mlan-protocol.pdf

8. Application Examples

There are many examples of applications on how the Fieldbus units can be used.

Fundamentally the end user can achieve the following benefits and features;

- Central one stop control point
- Central data linked direct to other production information on the machine
- Quicker setup and settings from one point
- Reduced hardware & software costs
- Advanced and integrated data management

When integrated directly to the process machinery the user can take advantage of a range of information that previously would have been difficult to determine or access without such an interface.

Meaningful data such as accurate kg/hr output, materials consumption, material settings and types can all be used to optimise the machine.

Likewise, other areas such as alarms no longer require to be hardwired separately. Instead this can be monitored and controlled from the central control panel, allowing operators to have greater flexibility in controlling the overall system in one simple central interface and style as preferred by the business overall.

Moulding Applications

Examples of this include Injection or Blow Moulding applications showing materials settings and data linked to shot weight and cycle time.

Regrind consumptions can be particularly optimised for Moulding applications, which in turn assists with optimising setup times and maintaining stable and consistent production.

Extrusion Applications

Blender data is also vital for Extrusion applications allowing fast material settings and changes and overall throughput information to maintain consistent and stable output on the extrusion line.

In addition, if the line also has the Maguire LineMaster™ Extrusion Control then all of this data can be monitored centrally and integrated to the complete line, allowing for one stop management of the process.



Ancillary Applications

Another option is to integrate the blenders to other ancillary equipment used in production.

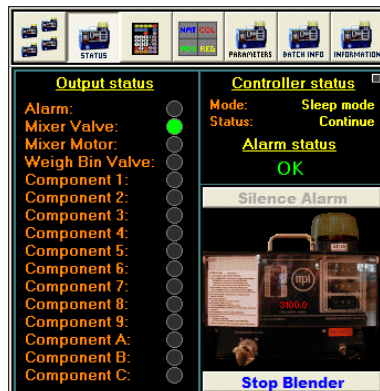
A company may link different software systems together to manage their materials usage. The data from their Silo Systems, Central Materials

loading system, Maguire blending systems and dryer systems can all be linked to one central control point. From there production personnel can facilitate better materials control, manage operations clearly and monitor alarms and process overall.

Plant Management Applications

Other applications the Fieldbus adapter can be used for are to allow the customer to take all the key information from the blender and enter it automatically into the overall production management system.

When blend data is linked to other production information the data can then be used to analysis a range of other production information such as overall product costs, materials efficiency and quality control, providing a complete picture of production to all levels of personnel in the company.



9. Is this the right solution for managing data?

The Fieldbus offers a good solution for those blender users wishing to integrate their blenders directly to the process management.

However, in many cases other blender users have wanted to get an effective control on their materials in an easier way.

Maguire also provides a simple solution for this in the form of the G2 software program. G2 software allows customers to manage their blenders from their computer network, allowing users to send and receive settings, build databases of raw materials and product recipes and then fully report on all materials consumed

over recipe, period or a range of other factors. G2 also is ideal for monitoring blenders, job reviews, throughput and productivity.

G2 can also be integrated to other programs within a company to share data more effectively. This can be done with MySQL, allowing dynamic links between different PC systems in company. Further information on G2 software and G2 with MySQL can be found at <http://www.maguire.com/page.php/overview.htm>

10. Requirements Review

Maguire would happy to assist is assessing the best way for customers to maximise on how to get valuable data from their process and how to structure this.

For Fieldbus Systems we do recommend that the customer uses the services of a skilled integrator who can easily implement the system to provide the data link to a wide variety of different applications and processes.

Resources:

For further information on the Fieldbus systems, protocols and general Maguire communications please visit our web site at www.maguire.com

Manuals, and eds / gds files can be found at <http://www.maguire.com/page.php/manuals.htm>

For any assistance of any other questions you might have please email info@maguire-europe.com.

Other useful resources for information and data on Fieldbuses, their use and their operation can be found at the following web sites:

DeviceNet
www.rockwell.com
www.odva.org

Profibus
www.siemens.com
www.profibus.com

Modbus
www.modicon.com
www.modbus.org