Digitising Manufacturing Conference

Connectivity and interoperability

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Brainboxes Ltd
Machine Monitoring – Industry 3.1
What do we mean by connectivity and interoperability?
## Interoperability - Automation Protocols

<table>
<thead>
<tr>
<th>Process automation</th>
<th>Automation protocols</th>
</tr>
</thead>
<tbody>
<tr>
<td>AS-i, BSAP, CC-Link Industrial Networks, CIP, CAN bus (CANopen, DeviceNet), ControlNet, DF-1, DirectNET, EtherCAT, Ethernet Global Data (EGD), Ethernet Powerlink, EtherNet/IP, Factory Instrumentation Protocol, FINS, FOUNDATION fieldbus (H1, HSE), GE SRTP, HART Protocol, Honeywell SDS, HostLink, INTERBUS, MECHATROLINK, MelsecNet, Modbus, Optomux, PleP, Profibus, PROFINET IO, RAPIEnet, SERCOS interface, SERCOS III, Sinec H1, SynqNet, TTEthernet</td>
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<tr>
<th>Industrial control system</th>
<th>Automation protocols</th>
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<td>MTConnect, OPC DA, OPC HDA, OPC UA</td>
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<th>Building automation</th>
<th>Automation protocols</th>
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<td>1-Wire, BACnet, C-Bus, CEBus, DALI, DSI, DyNet, Factory Instrumentation Protocol, KNX, LonTalk, Modbus, oBIX, VSCP, X10, xAP, xPL, ZigBee</td>
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<th>Power-system automation</th>
<th>Automation protocols</th>
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<td>IEC 60870 (IEC 60870-5, IEC 60870-6), DNP3, Factory Instrumentation Protocol, IEC 61850, IEC 62351, Modbus, Profibus</td>
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<th>Automatic meter reading</th>
<th>Automation protocols</th>
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<td>ANSI C12.18, IEC 61107, DLMS/IEC 62056, M-Bus, Modbus, ZigBee</td>
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<th>Automobile / Vehicle</th>
<th>Automation protocols</th>
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Connectivity – Data connector types
Wireless Protocols
The WEB – one unified platform?
Security/Encryption – surely that’s standard?

**SSL Secure Connection**

MD5
SHA-1
SHA-256
Don’t worry the big boys have you covered
Bluechip Industrial Minded Corporates

Interoperable??

Interoperable??
2 EXAMPLES

• CONNECTING TO A SINGLE UNIT

• INTEROPERABILITY IN COMPLEX SYSTEMS
CONNECTING TO A SINGLE UNIT
Secure REST API

Customer Website

Existing Equipment

Brainboxes I/O module takes signals from existing PLC without interrupting its operation

Easy Install – little disruption

Format works with proprietary software

Big data becomes useful data
INTEROPERABILITY IN COMPLEX SYSTEMS
What are we measuring?
Retrofit Existing Sensors

- Low capital investment
- Don’t need to know what the PLC is doing
- Doesn’t interfere with PLCs functions
- Still taps into existing signals
Connectivity: Retrofit

FPF Sorter
4x Photo Eyes and 4 x Lasers

Existing Equipment

Brainboxes I/O module takes signals from existing PLC without interrupting its operation

Easy Install – little disruption

Interoperability: provide the users connectivity of choice

Sent to IBM Watson
Data can be drawn down from the cloud into the companies SAP system

Format works with proprietary software

Dashboard
Instant alerts for engineers
Trends over time for managers

Big data becomes useful data
• Find a pain point, an easy win in your business; build from there

• Start with the end result – what are you trying to achieve?

• Go to the source of the signal, leave existing system in place

• Connectivity: a terminal block is good, so is wired ethernet

• Interoperability: the web is the core standard,
  • but it can be the intranet, not the internet
We are a premium brand in these core businesses and at your service with 3 003 employees:
Global Reach
Our Sales Companies
1,190 sales, services and engineering staff

Map showing locations of sales companies around the world, including cities in the USA, Europe, Asia, and South America.
Key barriers in manufacturing to overcome with Digital Solutions

Scarcity of Expertise

Machine-2-machine Interoperability

Shopfloor Connectivity

TRUE Precision solution
Automated, high accuracy EDM-Milling-CMM process chain based on the true geometry of the electrode

rConnect solution
Make machine information always available to ensure the workshop operates to its full potential at all times.
T.R.U.E Precision: Dialog of machines
rConnect: from data to value in real time
Issues and Solutions

Issues

• Development of Software Solutions: Resources
• Machine-to-machine Communication Protocols
• Reliability and Security

Solutions

• Partnerships: Autodesk
• Implementation of MTConnect and OPC UA standards
• Integration of Symmedia (Connectivity infrastructure partner)
GF Machining Solutions

Passion for Precision