Connecting Your Tools Can Be Easy

(Despite What Some People Say)

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Co-Founder and CEO
Pico MES

Mechanical Engineer with 22 years of experience on the automotive plant floor

Solving unique problems for innovative companies, including

- Improving traceability capabilities with tier 2 & 3 suppliers
- Maximizing efficiency for electric motorcycle & car production

Recognize the importance of small & midsize companies in the supply chain

Made it a mission to provide all the opportunities to companies of all size after witnessing that there was not a tool that captures the unique needs of this market.

On a mission to improve small towns

- Including Bloomington, IL where I live
- Wife, Amanda, and son, Cole (16 months)

Historical means of data collection

Manual & siloed

Time-consuming

Error-prone

10% bad data = 100% bad data

Historical means of quality control

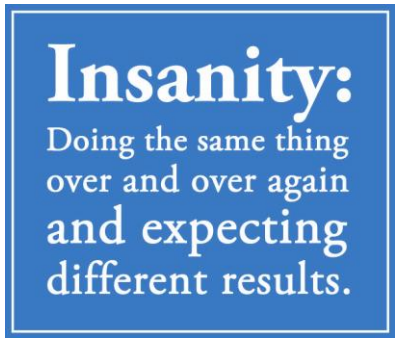
Manual QC checks

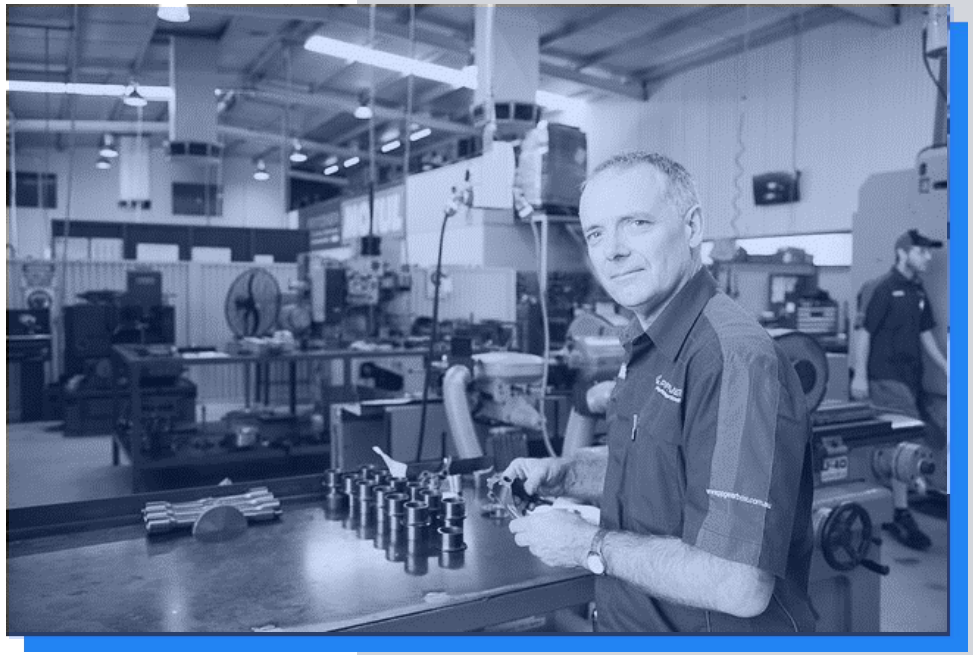
A few points in the line

Errors identified later in the process

0%

Effectiveness of asking people to be more perfect





Why is this important?

There’s a lot of opportunity to improve; those who do it fastest win

Technology has made connectivity and data more available than ever

The US can now compete with overseas manufacturers for risk mitigation but need to incorporate quality & efficiency improvements

40-60%

Average Station Efficiency

85% +

World-Class Efficiency

It’s a new world with new technology

DO YOU BELIEVE FACTORIES WILL HAVE LESS CONNECTED TOOLS OR MORE CONNECTED TOOLS IN THE FUTURE?

How tools may be connected

DIY

Full-time coder/IT team sets up tools from scratch, every time, and connects them to internal systems

HIRE IT OUT

Consultants are hired to create connections for the company

INSTALL A TRADITIONAL MES

Link tools with other internal systems

Or you can go through a different type of system

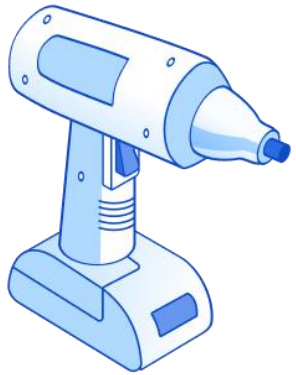
Pico MES was designed by engineers for engineers

Tool connectivity is a few steps

Hundreds of tools already connected

Data feeds into centralized source, consolidating results for entire plant

Scan tool | Zebra Printer | Torque Tool



Scan Tools

- USB HID (Human Interface Device)
- same driver as keyboard, mouse, touchscreen, etc
- supported by nearly all operating systems
- open source libraries in Node.js, Python, and more
- data sent on every key press and release
- some support serial as well *(can be used to remotely trigger scanner)

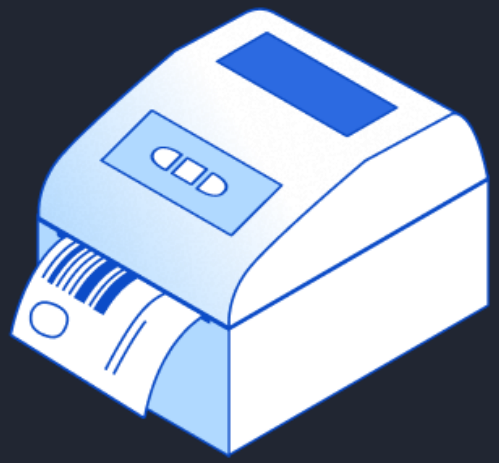
Benefits

- tracks individual sku numbers
- eliminate manual entry errors
- key pace point for tracking time

```
RCVD: <Buffer 00 00 1e 00 00 00 00 00>
PARS: 1
RCVD: <Buffer 00 00 27 00 00 00 00 00>
PARS: 10
RCVD: <Buffer 00 00 00 00 00 00 00 00>
PARS: 10
RCVD: <Buffer 00 00 27 00 00 00 00 00>
PARS: 100
RCVD: <Buffer 00 00 00 00 00 00 00 00>
PARS: 100
RCVD: <Buffer 00 00 27 00 00 00 00 00>
PARS: 1000
RCVD: <Buffer 00 00 00 00 00 00 00 00>
PARS: 1000
RCVD: <Buffer 00 00 27 00 00 00 00 00>
PARS: 10000
RCVD: <Buffer 00 00 25 00 00 00 00 00>
PARS: 100008
RCVD: <Buffer 00 00 2d 00 00 00 00 00>
PARS: 100008-
RCVD: <Buffer 00 00 20 00 00 00 00 00>
PARS: 100008-3
RCVD: <Buffer 00 00 2d 00 00 00 00 00>
PARS: 100008-3-
RCVD: <Buffer 02 00 04 00 00 00 00 00>
PARS: 100008-3-A
RCVD: <Buffer 00 00 00 00 00 00 00 00>
PARS: 100008-3-A
RCVD: <Buffer 00 00 1e 00 00 00 00 00>
PARS: 100008-3-A1
RCVD: <Buffer 00 00 2d 00 00 00 00 00>
```

Source: https://www.usb.org/hid

Printers



- Standard printer drivers (IPP)
- USB and Serial options
- ZPL programming language to format text fields, barcodes, QR codes, graphics, etc
- saved as plain text files

```
^XA~TA000~JSN^LT0^MNW^MTT^PON^PMN^LH0,0^JMA^PR4,4~SD20^JUS^LRN^CI0^XZ
^XA^MMT^PW600^LL0374^LS0
^FT26,253^BQN,2,4
^FH\^FDQA,100008-3-A1-96A3B225^FS
^FT25,273^A@N,29,29,TT0003M_^FH\^CI17^F8^FD100008-3-A1-96A3B225^FS^CI0
^FT25,306^A@N,29,29,TT0003M_^FH\^CI17^F8^FDAssembly, Complete, Base Hub, 4, 2GB^FS^CI0
^FT23,339^A@N,29,29,TT0003M_^FH\^CI17^F8^FDMAC: E4:5F:01:9F:08:1C[1E]^FS^CI0
^PQ1,0,1,Y^XZ
```

Benefits

- serialized parts tagged for traceability
- print on demand with up to date information
- saves time through elimination of manual steps

Source: https://www.zebra.com/us/en/support-downloads/knowledge-articles/zpl-command-information-and-details.html

Torque Tools

- Open Protocol most common
- Ethernet TCP/IP (supported by most program languages)
- supported by most torque controllers
- data sent/received based on message IDs
- subscribe to events (torque results)
- command PSET selection and tool enable/disable

```
038500610020000000000010179020003ESCIC-PCM079                04No BCode
0500010600107020800000090000100000111122131141151161171181191200000000000021001890220023
1023002100240021142500000263200027000002800013290000030000003100000320003300034000350
0000036000000370000003800000039000000400000004100000059354200000430000044SP19G18085
 452022-10-24:13:58:50462022-10-24:13:56:53
```

Benefits

- exact torque can be set and confirmed based on process
- torque data captured in context

Source: Atlas Copco

Key things to look for when it comes to tool connectivity

Tool Selection & Setup

- ❑ Pick the right tool for the job
- ❑ Speed of setup
- ❑ Factory team can use/adjust

DATA AVAILABILITY

- ❑ Integrated with the operator experience
- ❑ Immediate feedback on errors
- ❑ Speed of data to knowledge for continuous improvement

10-15% output improvement by integrating the experience with the operator

Another 20-30% of incremental yield improvements

Questions?

Come see us in Booth 613

(shared with Ingersoll Rand)

What you can do with this info from tool 1