

# Here's how to improve the productivity of your discrete parts manufacturing process:



**PRODUCTION PROCESS**  
Manage production, machines and OEE in real-time

Londonderry, NH USA (603) 434-2300 [info@productionprocess.com](mailto:info@productionprocess.com)

# The System: **ProductionACE**

**ProductionACE** is a practical, proven and affordable system to help you improve the productivity of your discrete parts manufacturing process. With it you can manage production, machines, people and OEE in real-time.

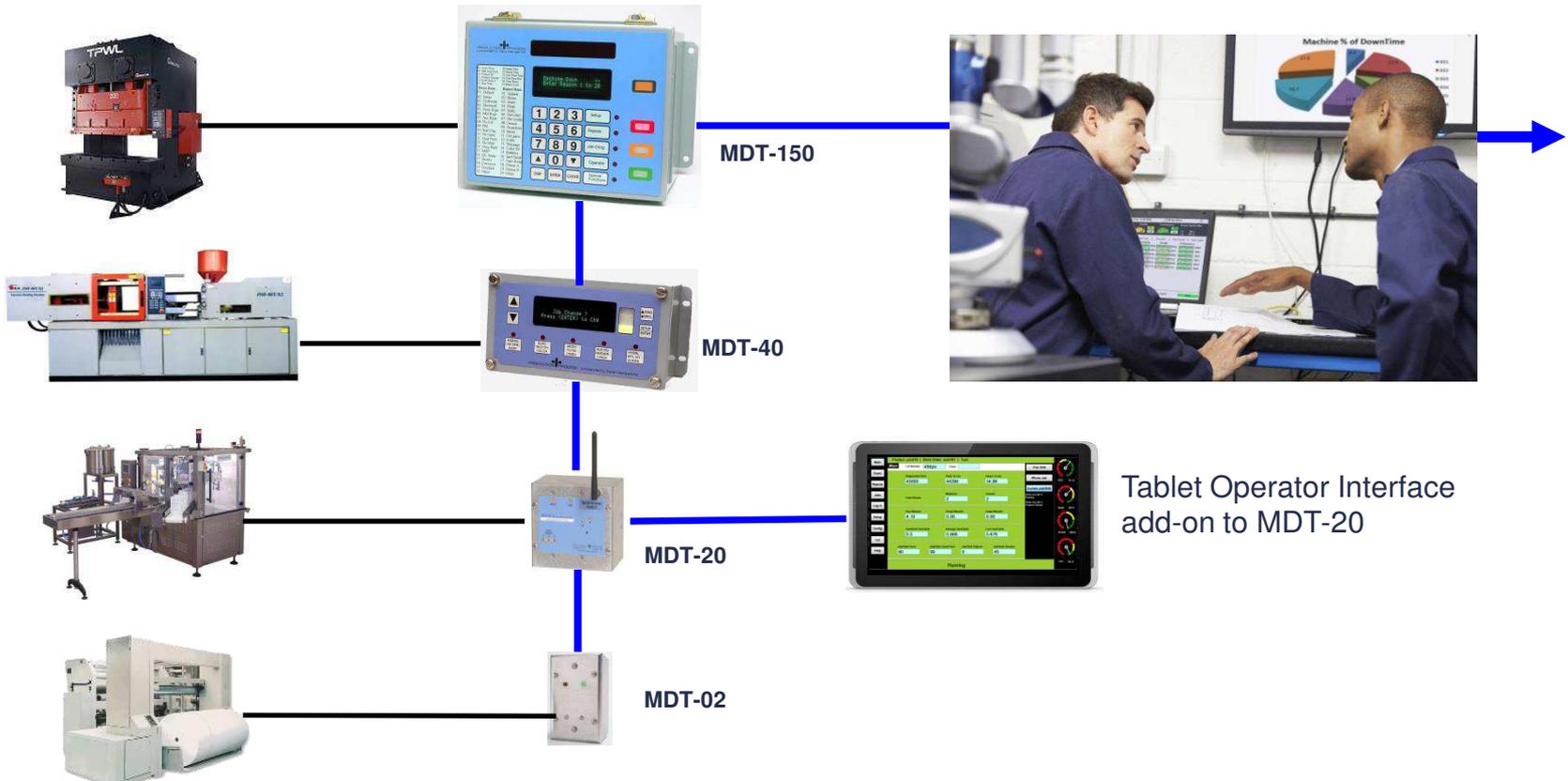
The system connects directly to any older, “non-communicating” production equipment through a family of Machine/Operator Data Transducers (MDT). For newer, “intelligent” equipment, OPC or MTConnect provides the connection. Either way, you can match your data collection and operator interface requirements to individual machine characteristics for the most flexible and cost-effective system available today.

**ProductionACE** is installed in more than 500 manufacturing facilities of all types and sizes...from an eight--machine molder, to many multi-plant Fortune 1000 companies.

# Machine Data Transducers (MDT) are Operator/Machine Interfaces that collect, display and transmit real-time data to a remote PCs.

MDTs connect directly to any production machine using the existing electrical signals that operate the machine: switches/relays, photo/proximity sensors and voltages: 24V-120V AC/DC.

MDTs communicate with remote PCs running Windows **Production Manager** or **Job Manager** software to collect, display, analyze and share data throughout the Enterprise.



## **ProductionACE is a practical, proven and economical means to improve the productivity of *any* discrete parts manufacturing process.**

**Manufacturing Production Reporting:** Eliminate manual data collection, transcription.

**Monitor Equipment OEE:** Track and display machine status to analyze, improve production efficiency.

**Analyze Machine Down Time and Rejects:** Collect, analyze, eliminate causes for downtime and rejects.

**Visual Factory Displays:** Inform, empower, motivate Operators and Management with real-time data displayed on low cost, large screen TV displays.

**Production Scheduling:** Visual Production Scheduler produces real-world forecasts because it tracks job progress in real time.

**Preventive Maintenance:** Schedule *Predictive* Maintenance based on actual equipment and tooling/molds/dies run hours and cycle count.

**Link ERP and Manufacturing:** Link Master Production Schedule to production floor for dynamic scheduling, accurate Job completion forecasts, automatic inventory and WIP updates.

# Eliminate manual data collection and reporting with Report Generator.

Live and printed reports available Enterprise-wide with Crystal Reports, and export to Excel.

## User Customized Screens:

Point and click to select Data Elements to be displayed.

Mach	Shift	Cycle	Std	Cycle	Good	Shift	Run	Down	Mach	Mach
Mach	Cycle	Sec	Cycle	Eff %	Parts	Rej	Time	Setup	Yield%	Util%
1	2.0	0.0	2.0	100.9	1803	0	52.0	0.0	100.0	60.3
2	2.0	2.0	2.0	101.9	1801	0	58.8	0.0	100.0	68.4
11	2.0	2.0	2.0	100.9	1680	117	58.7	0.0	93.5	68.3
40	2.0	2.0	2.0	102.0	1679	117	51.6	0.0	93.5	60.1
41	2.0	2.0	2.0	101.9	677	1117	58.6	0.0	37.7	68.3
42	0.6	0.6	2.0	361.7	9302	0	85.8	0.0	100.0	100.0
152	0.4	0.5	0.5	133.3	8934	0	52.4	0.0	100.0	84.5
250	2.3	2.3	2.0	88.8	2269	0	85.1	0.0	100.0	100.0

Displayed at 14:49:56; data as of 14:49:53

Recv #250 A

100%

# Analyze OEE and production performance with Excel and Crystal Reports.

- \* Wide choice of selection criteria.
- \* Use standard reports, or make your own with Crystal Reports.
- \* Export to Excel or other applications.
- \* Sorting control for multiple levels: For example, by Date, Shift, Product, Machine, Material, etc.

Printed 9/12/2007 at 15:37

From 3/1/2007 to 3/31/2007

SUMMARYC.RPT: test

Sorted by Shift Date; Shift Number; Machine Number

Page 8

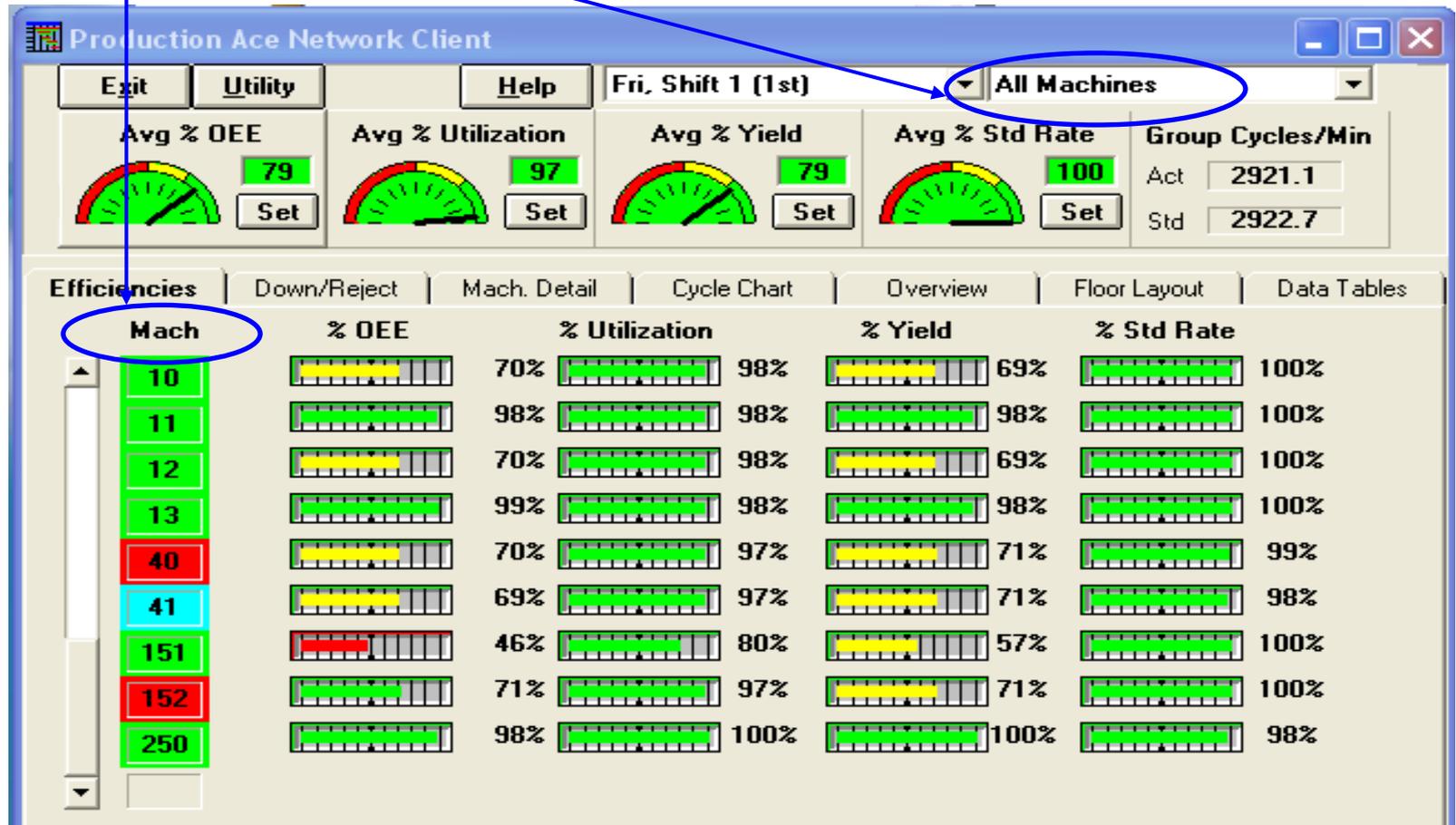
**OEE**

**Individual Components that make up OEE.**

<u>Machine</u>	<u>Date</u>	<u>Shift</u>	<u>Product ID</u>	<u>Work Order</u>	<u>Lot num</u>	<u>Overall Eff%</u>	<u>Run Hours</u>	<u>Down Hours</u>	<u>Machine Util. %</u>	<u>Shift Parts</u>	<u>Shift Rejects</u>	<u>Yield %</u>	<u>Std. Cycle</u>	<u>Avg. Cycl</u>	<u>Cycle Eff%</u>
NS 40 #7	3/2/07	DAY	R4M10219		uf	117.8	8.00	0.01	99.9	18,120	8	100.0	15.00	12.71	118.0
Machine Number = 7						<b>117.8</b>	<b>8.00</b>	<b>0.01</b>	<b>99.9</b>	<b>18,120</b>	<b>8</b>	<b>100.0</b>			<b>118.0</b>
FN 1000 #8	3/2/07	DAY	245279		uf	91.4	7.22	0.78	90.3	1,792	36	98.0	60.00	58.04	103.4
Machine Number = 8						<b>91.4</b>	<b>7.22</b>	<b>0.78</b>	<b>90.3</b>	<b>1,792</b>	<b>36</b>	<b>98.0</b>			<b>103.4</b>
FN 1000 #9	3/2/07	DAY	3168-430/276		uf	125.1	7.85	0.15	98.1	2,414	14	99.4	30.00	23.40	128.2
Machine Number = 9						<b>125.1</b>	<b>7.85</b>	<b>0.15</b>	<b>98.1</b>	<b>2,414</b>	<b>14</b>	<b>99.4</b>			<b>128.2</b>
FS 80	3/2/07	DAY	51B18101680		uf	0.0	0.00	8.00	0.0	0	0	0.0	30.00	0.00	0.0
Machine Number = 10						<b>0.0</b>	<b>0.00</b>	<b>8.00</b>	<b>0.0</b>	<b>0</b>	<b>0</b>	<b>0.0</b>			<b>0.0</b>

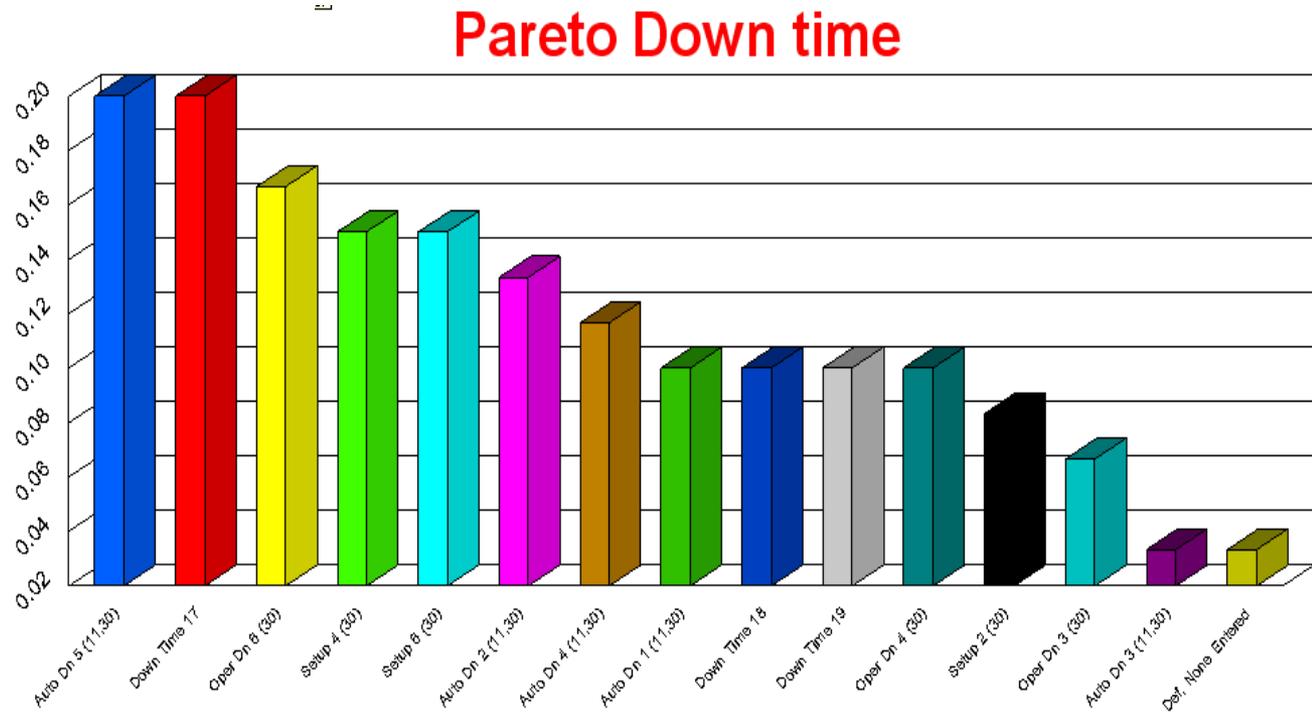
## Identify problems fast, before quality suffers, with real-time OEE displays.

Track OEE, and its components: Availability/Utilization, Yield/Quality and Performance/Std Rate of individual machines, all machines, or a department/group.



# Increase uptime, reduce downtime: collect and analyze causes for Downtime and Rejects with simple, yet powerful graphical tools.

Downtime and Reject Causes can be reported by Machine, Job, Product, Shift, etc.



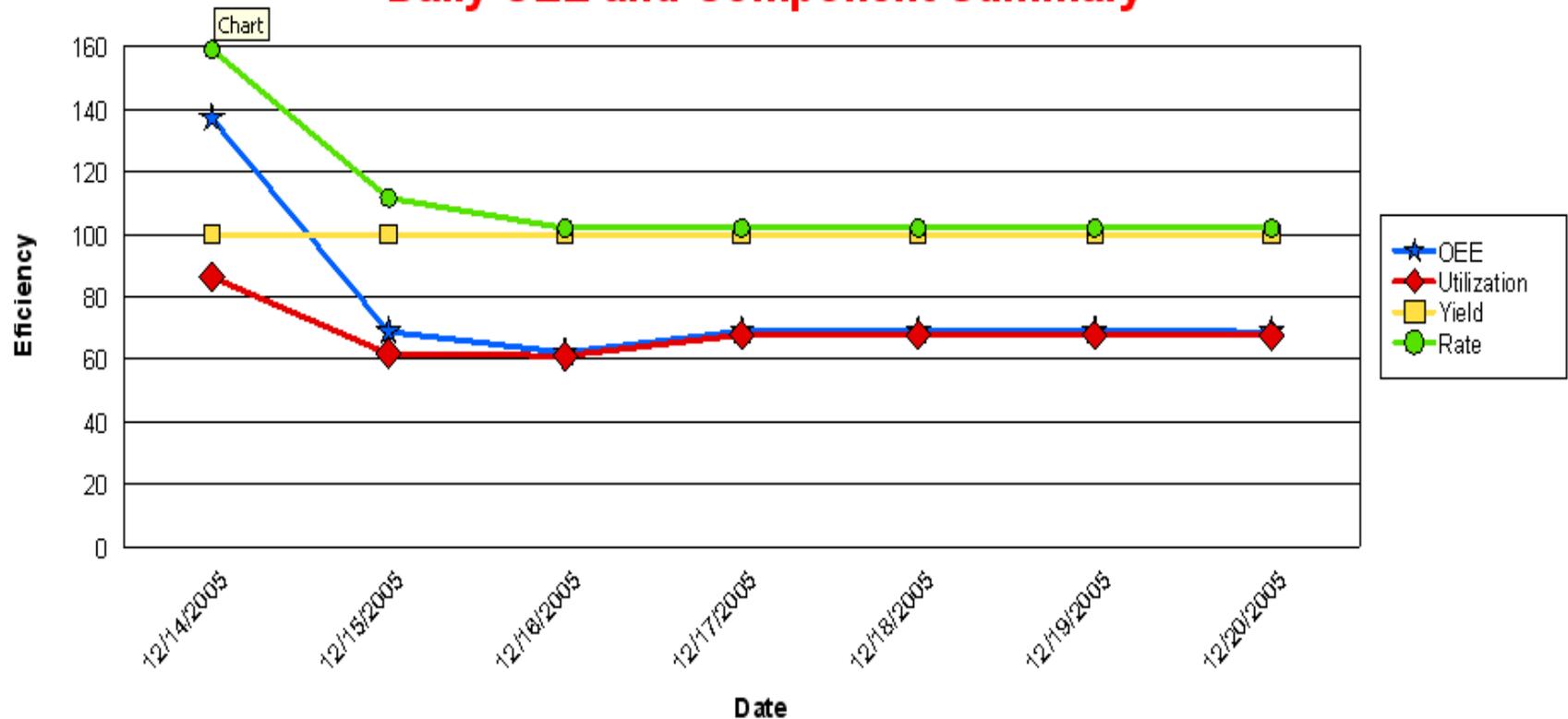
Use standard, but sophisticated Excel tools like Pivot Tables to summarize and analyze data.

## Establish benchmarks, set standards, then track your progress with analytical tools.

Historical data can be viewed by user-selected date range... from a day to years.

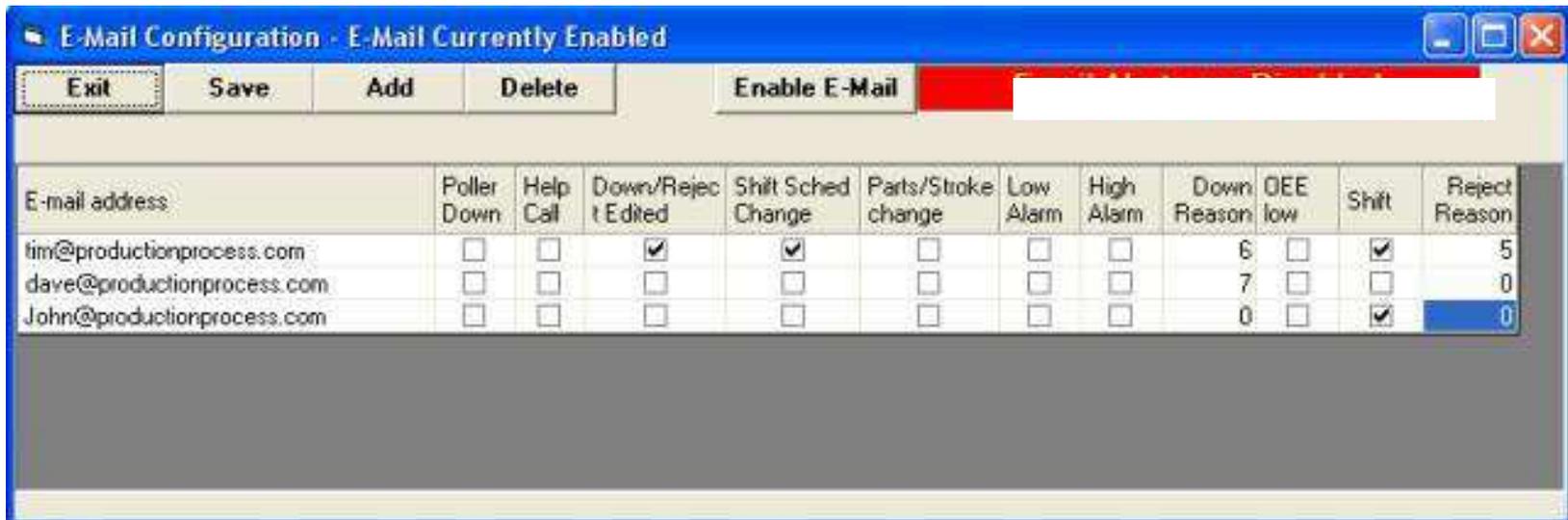
Charts/reports can be run for a single machine, a department, or the entire plant.

### Daily OEE and Component Summary



## Notify managers to potential issues with real-time e-mail “alerts”.

E-mail notifications can be automatically generated to identify actual or potential problems on the production floor. Selecting reasons to generate e-mail is a simple check-the-box process. (This screen is typical, many other trigger reasons are provided).



The screenshot shows a window titled "E-Mail Configuration - E-Mail Currently Enabled". It has a menu bar with "Exit", "Save", "Add", "Delete", and "Enable E-Mail". Below the menu bar is a table with the following columns: "E-mail address", "Poller Down", "Help Call", "Down/Reject Edited", "Shift Sched Change", "Parts/Stroke change", "Low Alarm", "High Alarm", "Down Reason", "OEE low", "Shift", and "Reject Reason". The table contains three rows of data:

E-mail address	Poller Down	Help Call	Down/Reject Edited	Shift Sched Change	Parts/Stroke change	Low Alarm	High Alarm	Down Reason	OEE low	Shift	Reject Reason
tim@productionprocess.com	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6	<input type="checkbox"/>	<input checked="" type="checkbox"/>	5
dave@productionprocess.com	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	7	<input type="checkbox"/>	<input type="checkbox"/>	0
John@productionprocess.com	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	0

### Typical reasons that trigger e-mail alerts:

- \* Help call: the e-mail will specify the particular machine requesting the help call.
- \* Down/Reject Reason occurrence: any time a specific Down or Reject Reason occurs.
- \* Fast/Slow Rate or Cycle Time: whenever the machine is operating outside limits.
- \* OEE deviation: if machine, group of machines or department OEE is below user-set limit.
- \* Shift Schedule change: any time the shift schedule is changed.
- \* Parts-made-per-cycle change: for example, if a mold cavity has been closed off.

Customizable, **web-enabled displays** provide plant wide, enterprise wide real-time data visibility onto any production floor.

Users can “point and click” to develop their own screens (and reports) like this.

Home

Performance Schedule Diagnostic Test

Production screen Last update 10/18/2006 09:41:38

Mach	Work Order	Std Cycle	Shift Ave. Cycle	Run Time	Setup Time	Down Thrsh	Down Man	Shift Parts	Shift Rejects	Good Parts
1	3322	4.0	4.2	7.7	0.0	0.0	153.6	115	4	111
2	32156	4.0	4.2	7.8	0.0	0.0	153.4	116	3	113
30	6954	4.0	4.2	0.0	0.0	153.1	7.9	232	230	2
35	57845	4.0	0.0	0.0	0.0	0.0	161.1	0	0	0
40		4.0	4.2	7.9	0.0	0.0	153.0	116	2	114
41	n/f	60.0	4.2	8.0	0.0	152.8	0.0	117	0	117
80	wo-80-15	4.0	4.2	7.9	0.0	0.0	152.9	117	2	115
140	7788	4.0	8.4	160.8	0.0	0.0	0.0	5780	0	5780
151	wo-151-15	4.0	4.1	8.1	0.0	152.6	0.0	234	0	234
250	8547	4.0	4.3	160.6	0.0	0.0	0.0	4002	0	4002

Done Local intranet

**Machine Status:**

Green: Running in limits

Yellow: Slow

Blue: Production Hold

Red: Down

## Give customers accurate delivery dates with Visual Job Queue.

**Job Queue provides a graphical view of production schedule and Job completion time. It continually monitors actual shop floor activity to provide an accurate Job completion date.**

Drag and drop a Job to see effect on schedule: The System highlights a Job that won't meet needed date, or if machine or tooling is already scheduled.

From the MDT-150 or Tablet, the Operator can select the next job in the queue, or he can wand-in the new Job with a bar code wand.



### Job completion calculation factors:

1. Production quantity scheduled.
2. Shift production schedule.
3. Performance of current running Jobs.
4. Machine setup/change-over time.
5. Machine and Job-specific efficiencies.
6. Maintenance schedule.

### Interface to any ERP/MRPII system.

ERP downloads production requirements into each machine's Job Queue. At Job or Shift end, production and productivity data is exported to ERP.

Unassigned Jobs	08:18	10/11/00	10/12/00	10/13/00	10/14/00	10/15/00	10/16/00	10/17/00	10/18/00	10/19/00
(Default)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Cap 400		WorkOrder3	-----	-----	-----	-----	-----	-----	-----	-----
Cap300		MainProd	-----	-----	-----	-----	-----	-----	-----	-----
Cap400		newweek	-----	-----	-----	JOHNS TOOL	-----	-----	-----	-----
New Product		MyOrder	-----	-----	-----	-----	-----	-----	-----	-----

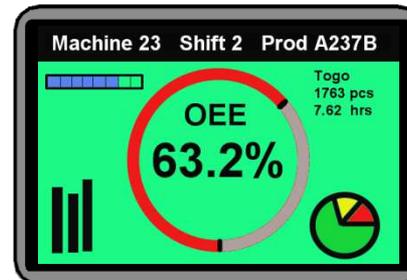
Unassigned job: New Product MyOrder -----

## Visual Factory Displays: Inform, empower, motivate operator with Andon Displays at individual machines.

Optional “intelligent” TV Displays are low cost OEE/productivity scoreboards. More capable and ***much less expensive*** than LED-style Andon Systems that typically cost \$3000 or more. Many standard display formats are available, or build-your-own with a simple software tool we supply.

Call for details and pricing at 603-434-2300.

PROD TARGET	1134
PROD ACTUAL	1048
TAKT TARGET	26.6
TAKT ACTUAL	25.7
OEE	88.5
DOWN	1:26



## **MDT Machine/Operator Interfaces: a choice of capabilities to match machine functionality means a very economical system.**

### **You can mix all types of Machine Data Transducers (MDT) in the same system.**

All models of MDT accept 24V to 120V AC/DC, contact closures and sensor open collector outputs directly from machine. Below is a brief summary of MDT types capabilities, but following slides will provide more detail.

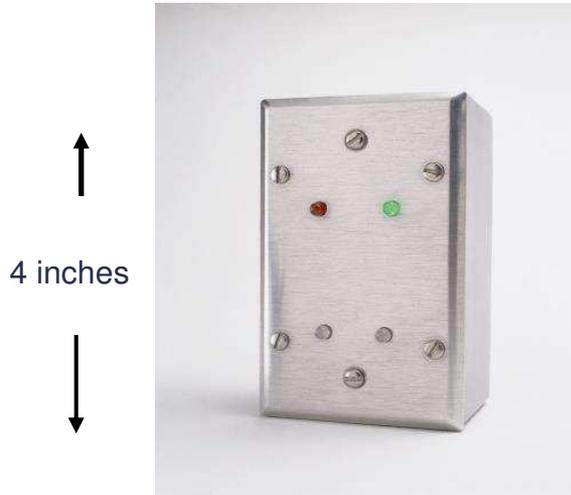
**MDT-02** has no operator interface. It has two direct machine connections for production and direct reject part tracking, productivity/OEE recording and job tracking. It automatically records two Reasons for downtime. Hard-wired plant floor communications interface also supplies operating power to MDT-02 for a very low cost installation.

**MDT-20** has no display or data entry ability, but can be upgraded with a touch screen Tablet PC operator interface. Has four machine connections for production and reject part tracking, productivity/OEE recording, an end-of-line output/Case Count. Automatically records two Reasons for downtime. Choice of wired or wireless Ethernet for plant floor communications.

**MDT-40** has operator data display and data entry. Has six direct machine connections for Production counts, Reject counts, Case Count, automatic downtime tracking (three reasons), or Cycle Start and Cycle Stop (for CNC). Operator enters Reason for 10 downtime and 5 Reject types. Operator can initiate Job change from MDT. Machine “lockout” output ensures down reason entry by Operator. Options include three color light tree and wired or wireless Ethernet for plant floor communications.

**MDT-150** has operator data display, data entry. Has six direct machine connections for Production counts, Reject counts, Case Count, automatic downtime tracking (three reasons), or Cycle Start and Cycle Stop (for CNC). Operator enters Reason for 40 downtime and 20 Reject types. Operator can initiate Job change from MDT from keypad or optional Bar Code Scanner. Machine “lockout” output ensures down reason entry by Operator. Options include three color light tree and wired or wireless Ethernet for plant floor communications.

Use the very low cost **MDT-02** when no Operator interface is required.



**MDT-02**

**MDT-02 has two Machine Signal Input connections:**

**One input is connected to machine cycle signal:**

This input should be momentarily activated each time one or more Parts are made/processed.

**One input can (you select one function at installation):**

- \* Track downtime when input is absent or present
- \* Count Reject Parts
- \* Count Filled Cases

**Plant Floor Communications:** Standard wired (similar to RS485) where a “black box” **VT-28** Communications Interface at the PC also supplies operating power to MDT-02 for a very low cost installation..

**Use the MDT-20 when no operator interface is required and you need wired or wireless Ethernet communications.**



← 5 inches →

**MDT-20 has four Machine Signal Input connections:**

**One input is connected to machine cycle signal.**

This input should be momentarily activated each time one or more Parts are made/processed.

**One input is used for direct input of Reject Part counts.**

Can be from automatic inspection/reject station.

**One input can be configured as end-of-line Totalizer /Case Count or automatic Reject input.**

If you don't have a direct Reject Part Input, the system can track Rejects by recording difference between Parts made and the Totalizer/Case Count.

**One input senses when the machine is powered down.**

This downtime is tracked as a separate Reason from machine powered up, but not cycling downtime.

**Installation is economical:** Device is powered by machine power (120V or 220V AC) and records downtime when machine is off.

**Plant Floor Communications:** wired or wireless Ethernet

## Tablet PC Operator interface expands MDT-20 functionality



Machine Lockout Output



Expand MDT-20 with a low cost touch screen Tablet PC Operator Interface for a very cost-effective shop floor control system:

- \* Operator enters 20 Reasons for Downtime
- \* In addition to MDT-20 automatic Reject tracking, Operator enters 20 Reasons/Counts.
- \* Select next Job in Job Queue from Tablet, or with Bar Code wand.
- \* Entering Non-Scheduled Mode—need for OEE
- \* Track Setup time. MDT can track Parts made in Setup as rejects.
- \* Real-time OEE display including “components”: Availability, Performance, Quality
- \* Log on Operator and Maintenance staff for tracking their performance.
- \* MDT-20 Machine Lockout is activated when machine goes “down” to ensure Operator enters Reason for down event.
- \* Custom displays, real-time OEE Dashboards.

## Mid-level MDT-40 has operator display and data entry keypad.



← 10 inches →  
MDT enclosure is heavy gauge steel.

### MDT-40 has 6 Machine Signal Inputs:

- \* A machine cycle signal should be momentarily activated each time a Part(s) is made/processed
- \* Three inputs for Direct entry into a down reason.
- \* Automatic Reject Signal
- \* Case Count

### Operator enters through keypad:

- \* 10 Reasons for Downtime
- \* 5 Reasons and quantities of Rejects

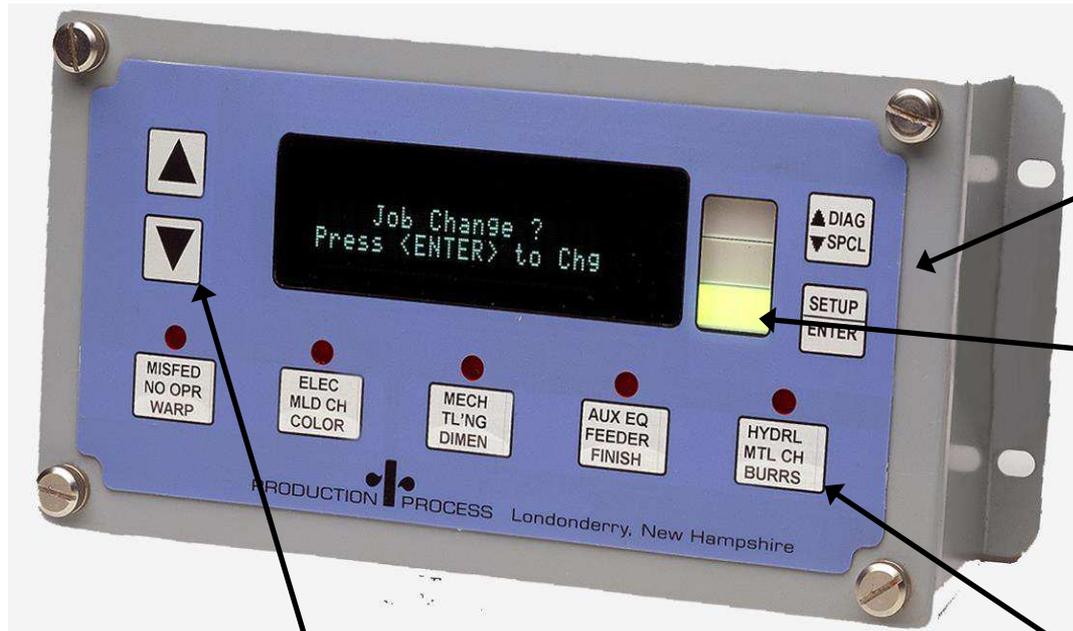
### MDT-40 has four outputs:

- \* Lockout machine to force Reason entry
- \* Indicate machine down.
- \* Indicate machine fast/slow.
- \* Batch Count.
- \* Tri-color Light Tree (replaces down/fast/Batch outputs).

### Communications to system Poller PC

**options:** Standard wired (similar to RS485), or wired or wireless Ethernet..

## MDT-40 has simple operator interface and multiple data displays.



### Use Function keys to enter:

- \* Next Job
- \* Rejects
- \* Setup Mode (MDT tracks Rejects made in Setup)
- \* Non-scheduled Mode
- \* Operator Help Call

### 3 colored Status Indictors:

- Red--machine down
- Yellow--outside high/low limits.
- Green-- Running "OK".
- Red & Green—in Setup.

### When machine goes "down"

MDT prompts Operator to enter Reason and tracks the downtime.

### Operator uses "arrow" keys to select Data Functions to display such as:

- \* Hours to Go to finish Job
- \* Parts to Go to finish Job
- \* OEE and productivity components that make up OEE
- \* Rejects
- \* Cycle Time and Rate
- \* Custom Functions

**Reason keys** are labeled with user-prepared labels of 10 Down and 5 Reject Reasons specific to each machine.

Change Reason list at any time: A total of 999 Down and Reject Reasons are available in System.

# The MDT-150 has operator Interface, many Down and Reject reasons.



← 10 inches →

MDT enclosure is heavy gauge steel.

## Operator can enter through keypad:

- \* 40 Reasons for Downtime
- \* 20 Reasons and quantities of Rejects

## Six electrical inputs for:

- \* Machine Cycle should be momentarily activated each time a Part(s)
- \* 3 inputs for direct tracking of Down Reasons.
- \* One automatic Reject
- \* One Case Count

## Three or (optionally) four outputs for:

- \* Lockout machine to force Reason entry
- \* Indicate machine Fast/Slow
- \* Batch Count
- \* 3 color Light Tree (replaces Fast & Batch).

## Operator uses Function keys to enter:

- \* Next Job in Job Queue from keypad or (optionally) a Bar Code Scanner.
- \* Setup Mode: MDT can track Rejects in Setup.
- \* Non-Scheduled Mode
- \* Operator Help Call
- \* Log on Operator and Maintenance staff to track their performance.
- \* Lot Number

# The MDT-150 has operator Interface, tracks 40 Down and 20 Reject reasons.

**Data function and Down and Reject Reason menu**—a user-prepared listing of up to 40 Down and 20 Reject codes specific to each machine.

A total of 999 Down and Reject Reasons are available for use in System.



**Four colored indicators or light tree for MDT status:**

- Amber—Job changing
- Red—machine “down”
- Orange—machine fast, slow
- Green—machine operating within high and low limits
- Red and Green: In Setup

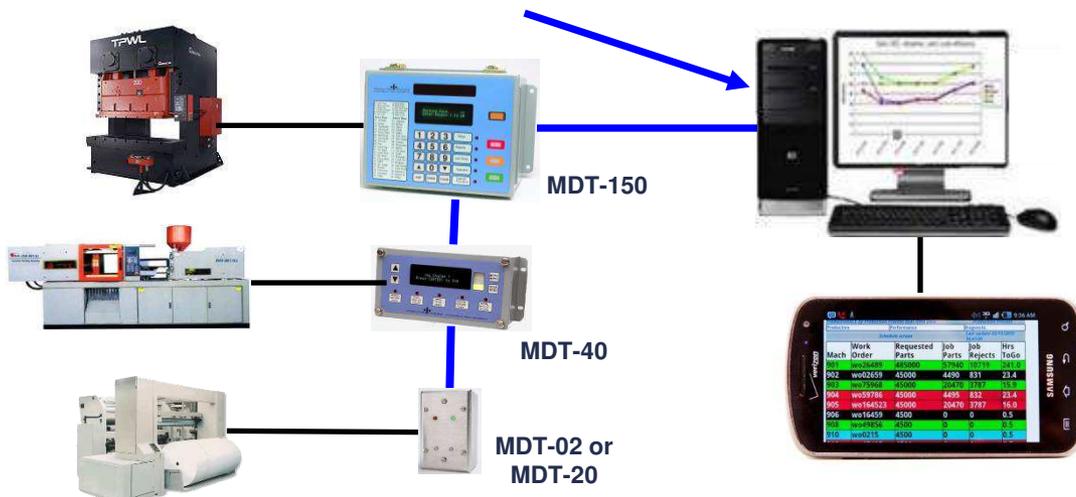
**Operator uses “arrow” or number keys to select Data Functions to display such as:**

- \* Cycle Time: last cycle and shift average
- \* Production Rate: instantaneous, average, shift average
- \* OEE and components that make up OEE: Availability, Performance and Quality.
- \* Hours to Go to finish Job
- \* Parts to Go to finish Job
- \* Rejects
- \* Run Time, Down Time, Setup Time

**Communications to system Poller PC options:** Standard wired (similar to RS485), or wired or wireless Ethernet.

# System architecture makes real-time manufacturing operations visibility and integration with Enterprise applications as simple as 1 – 2 – 3.

1. A dedicated Poller PC “talks” to MDTs connected to each production machine via RS485, wired or wireless Ethernet.



Mobile access via smartphone. Also “alert” e-mails are automatically sent

# System architecture makes real-time manufacturing operations visibility and integration with Enterprise applications as simple as 1 – 2 – 3.

Large, low cost TVs display your choice of alphanumeric or graphical data.

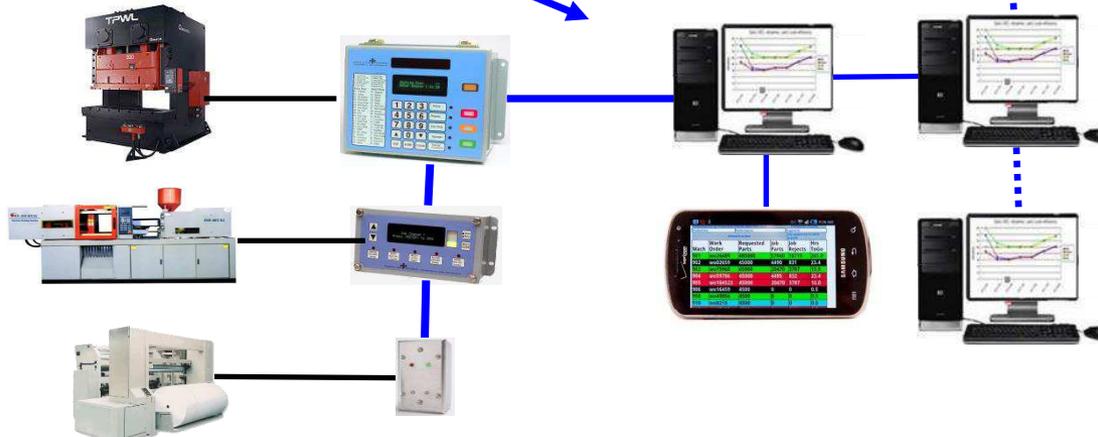


2.

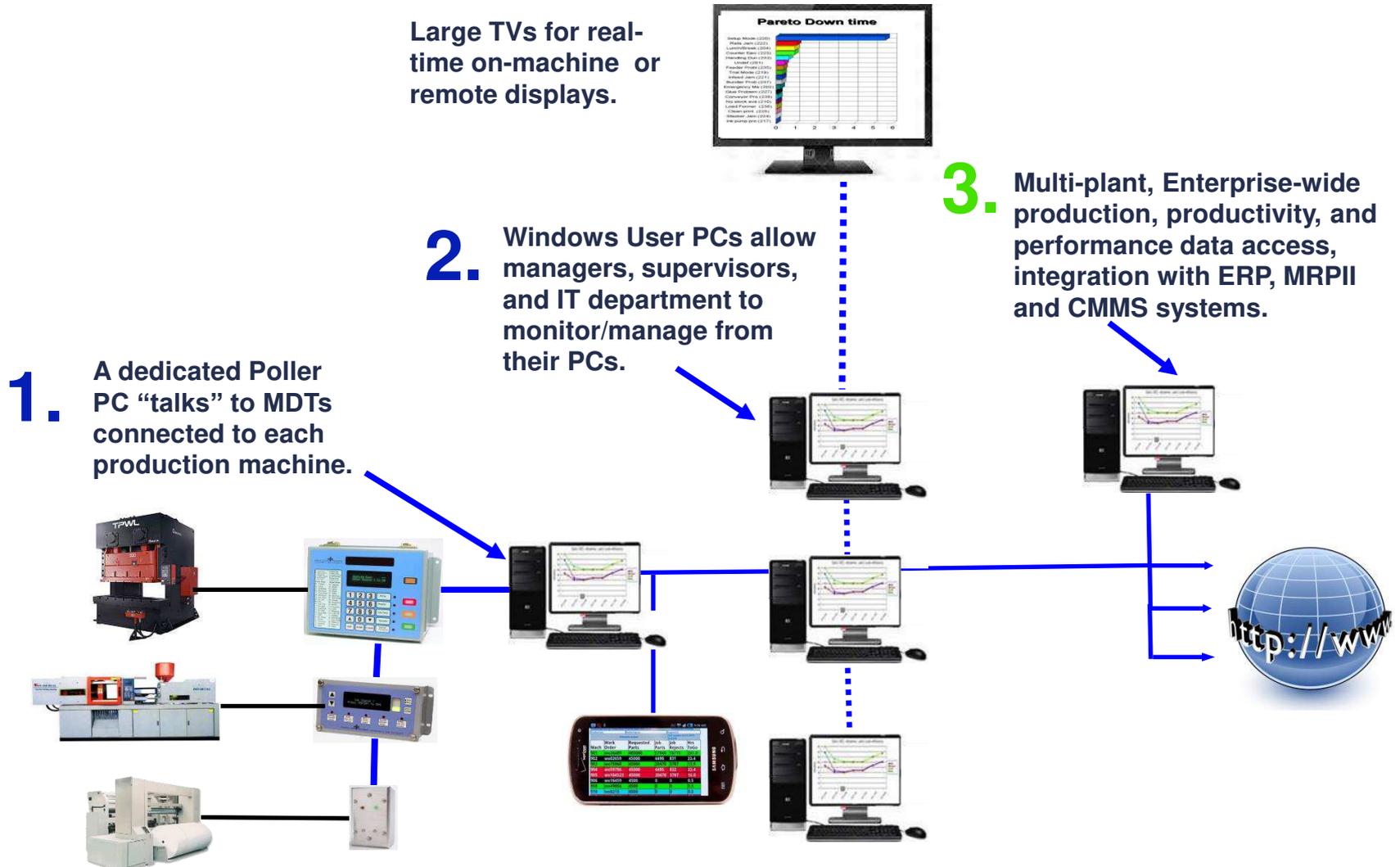
Windows User PCs allow managers, supervisors, and IT department, to monitor/manage from their PCs.

1.

A dedicated Poller PC "talks" to MDTs connected to each production machine.



# System architecture makes real-time manufacturing operations visibility and integration with Enterprise applications as simple as 1 – 2 – 3.



Large TVs for real-time on-machine or remote displays.

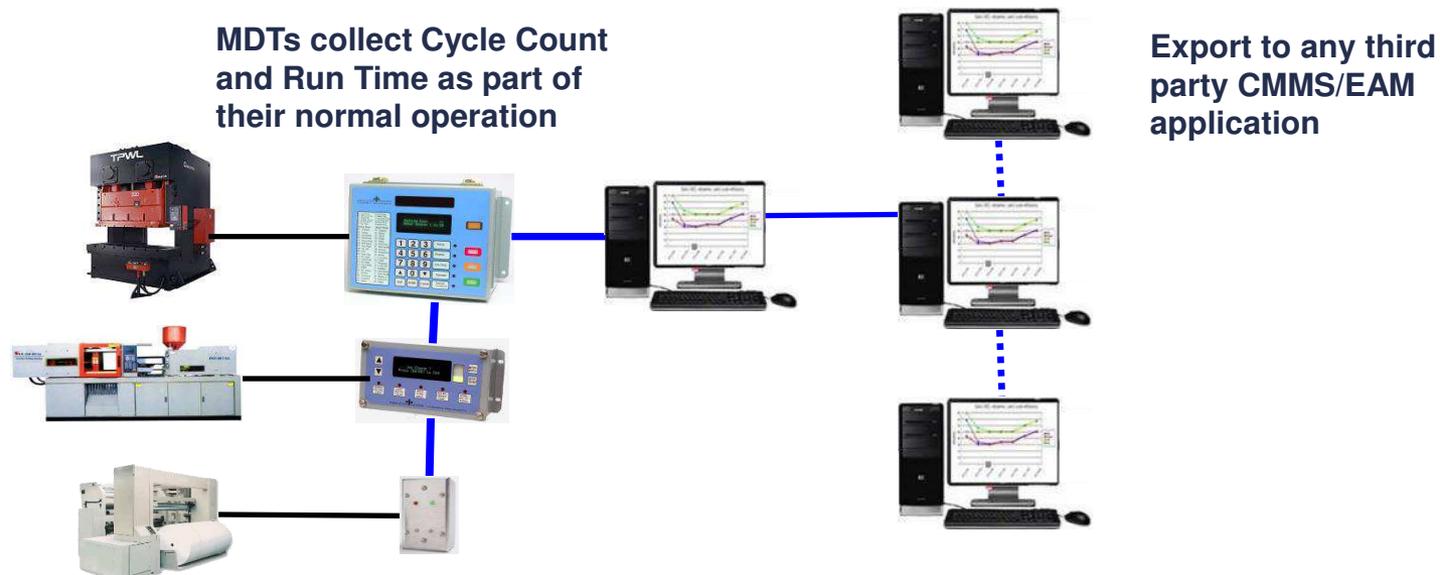


3. Multi-plant, Enterprise-wide production, productivity, and performance data access, integration with ERP, MRPII and CMMS systems.

# Preventive Maintenance Scheduler replaces ineffectual calendar-based scheduling with usage-based PM.

**PM Scheduler** tracks actual Run Time and Cycle Count on machine and up to 99 individual machine Components, dies, tooling, etc. System alerts users when maintenance is “near” and “due” for machine and each component.

The System can also export equipment Run Time and Cycle Count to any CMMS application.



Most ERP systems have a disconnect when it comes to the shop floor, but now you can link production operations to any ERP with **Advanced ERP Interface**

Import ERP production schedule into ProductionACE Job Queue, then track Job progress in *real-time* at each machine.

- \* Simplify and improve Production Scheduling performance.
- \* Maintain accurate Finished Goods and WIP counts.
- \* Provide accurate delivery dates.
- \* Track raw material usage.
- \* Detect slowdowns, stoppages before productivity suffers.

At end of Shift and Job, export actual production and performance data to ERP.

- \* Eliminate error prone, manual data collection and data entry.
- \* Improve Product Costing accuracy.



A direct link to ALL types of manufacturing machinery.

**ProductionACE:** Installed worldwide in over 500 manufacturing facilities, from an eight-machine molder to many large, multi-plant Fortune 1000 operations.



Please contact us for a “live” system Web demo.

(603) 434-2300

[info@productionprocess.com](mailto:info@productionprocess.com)

