

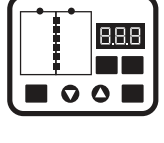
The Power of Smart Devices

Setting Data Objectives Around a Functional Problem

What is a smart device?

Smart devices communicate valuable data. They enable collection of data, even high speed data, via Ethernet and managed switches. Smart devices share diagnostics (run-time, temperature, others). This data can be used to improve both process performance and reliability.

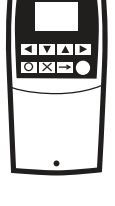
Examples of Smart Devices



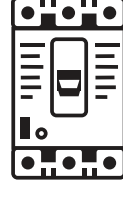
Motor Overload Relays



Temperature and Pressure Transmitters



VFDs



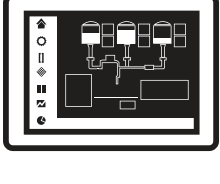
Circuit Breakers



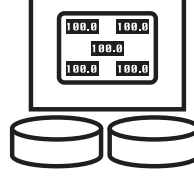
Flow Meters



Power Meters



HMIs



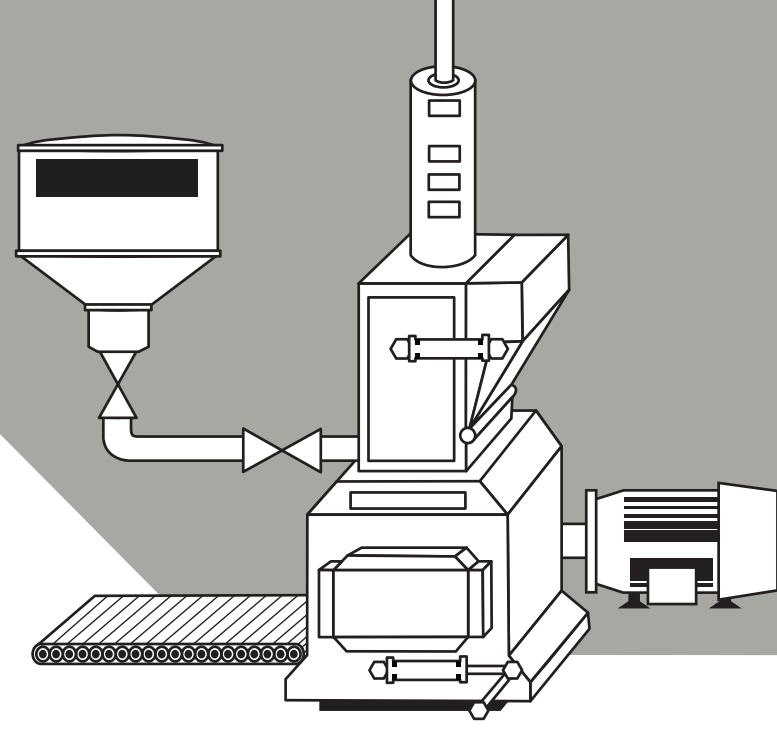
Load Cells

How to Choose the Right Smart Devices



Consider this Example:

The Problem: An industrial mixer was not meeting OEE goals between multiple shift operators. The team needed to determine what data was necessary for meeting OEE objectives.



1



Objectives Based Planning

Start with These Questions:

1. What is your team trying to accomplish?
2. What metrics are you trying to influence?

Basic Start Example Exercise

This exercise is simply to align your data objectives with plan goals, and inspire creativity.



Machine Level Planning

Start with These Questions:

1. Where are we missing the mark?
2. What would accelerate our performance?
3. What could real-time data tell us?



2

3



Device Level Planning

Mixer Example: The team identified the missing data elements and those that needed to be brought together from other sources.

Data we need	Source for getting that data
Supplier ID, product and batch ID	MES System
Operator ID and shift	Added to HMI input
Mixer infeed speed	Variable Frequency Drive (VFD)
Raw material temp at mixer infeed	Temp Probe
Mixer start and stop time stamps	Smart Relay (added because VFD did not support all parameters)
Mixer speed	VFD
Mixer motor torque	VFD
Mixer motor fault	Smart Relay
Mixer motor current, KVAR and winding temperature	Smart Relay
Mixer output (weight)	Load Cell

Device Implementation

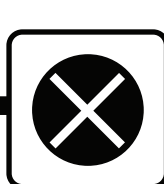
Mixer Example: After selecting the right smart devices they were installed throughout the mixer.



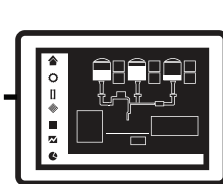
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MES System
Supplier ID, Product and Batch ID



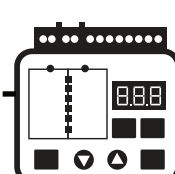
Data Aggregator



HMI
Operator ID and Shift



Mixer VFD
Motor speed and torque

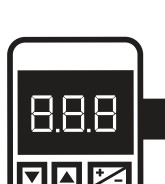
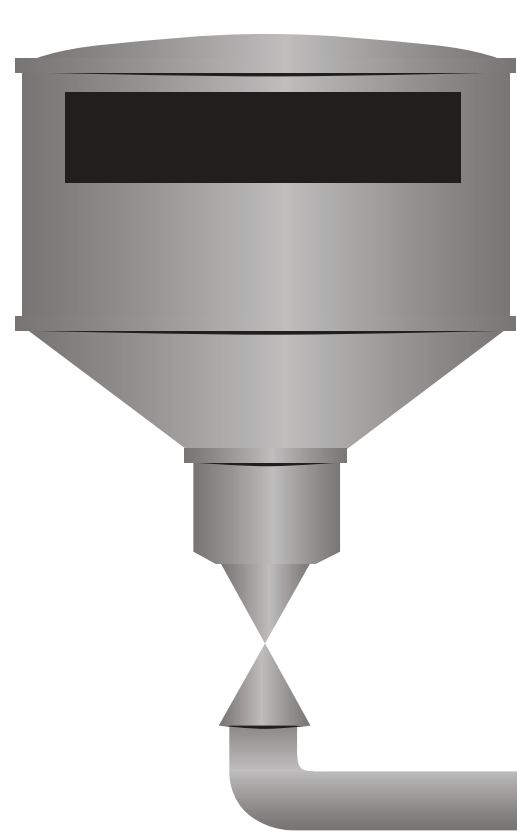


Smart Relay (Mixer Motor)

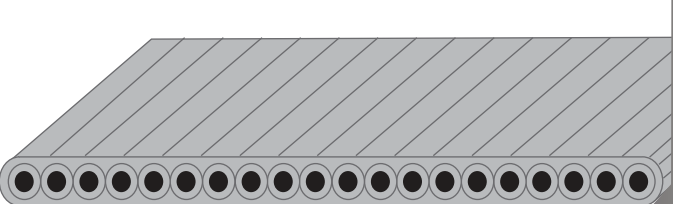
- Start and stop time stamps
- Motor fault diagnostics
 - a) Current
 - b) KVAR
 - c) Winding temp



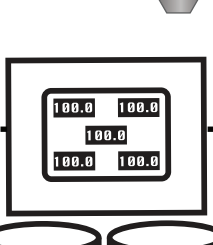
Several improvement opportunities were discovered as the new data became available, resulting in design improvements and personnel training.



Temp Probe
Raw material temp at mixer infeed



Infeed VFD
Mixer infeed speed



Load Cell
Mixer output (weight)

Improvements from Smart Device Implementation

1. Less inconsistency in mixer output
2. Captured best practices of best performing teams
3. Raw material variations caught early
4. Preventative maintenance became simpler
5. Mixers were fully optimized for quality and performance



Want to learn more about applying Smart Devices?
[Click to download the Guide to Smart Manufacturing](#)