HEATEC PRODUCT LINES & SERVICES

POLYMER BLENDING SYSTEMS

ASTEC™

Astec provides equipment and services to build polymer blending systems. We were an early pioneer in producing systems to blend polymer with asphalt cement to make PMAC (Polymer Modified Asphalt Cement). PMAC is used as a binder in HMA (Hot Mix Asphalt). PMAC is also used to make asphalt roofing shingles to increase their life.

We can build your polymer blending system to meet your exact needs. Heatec makes a variety of systems for blending polymers (including ground tire rubber) with virgin asphalt cement. Our systems are available in both fixed and portable configurations.

We can also upgrade an existing blending system. You may want to replace old or unreliable controls and equipment with new products. You may need to expand your plant to increase production volume.

Our most popular system is for asphalt terminals. Accordingly, the information in this brochure focuses on polymer blending systems for asphalt terminals. Please contact us if you need additional information on portable systems, including systems for ground tire rubber (GTR).

Our unique position

Astec occupies a unique position for building polymer blending systems. We are virtually the only company that provides a full range of services, including system design, manufacturing, setup, startup, maintenance, etc.

This provides significant advantages for you, the buyer. You only have to work with a single source for the diverse products and services involved. And it greatly reduces the likelihood of costly reworks due to incompatibility and miscommunication.

Polymer for HMA

The polymer most commonly used for HMA is SBS (Styrene-Butadiene-Styrene), which must be ground in a mill during the blending process. The blending process requires unusually high temperatures and constant agitation.

A stationary system that blends SBS polymer pellets with virgin AC (asphalt cement) is most commonly used at asphalt terminals. A typical Astec system is illustrated in the drawing on the next page.

Here's how it works:

Virgin AC is metered or weighed out of a heated storage tank into a heated mixing tank. The SBS pellets are augured from a hopper into the same mixing tank. In the mixing tank the virgin AC and pellets are blended with each other to make a concentrate of about 12 percent polymer.

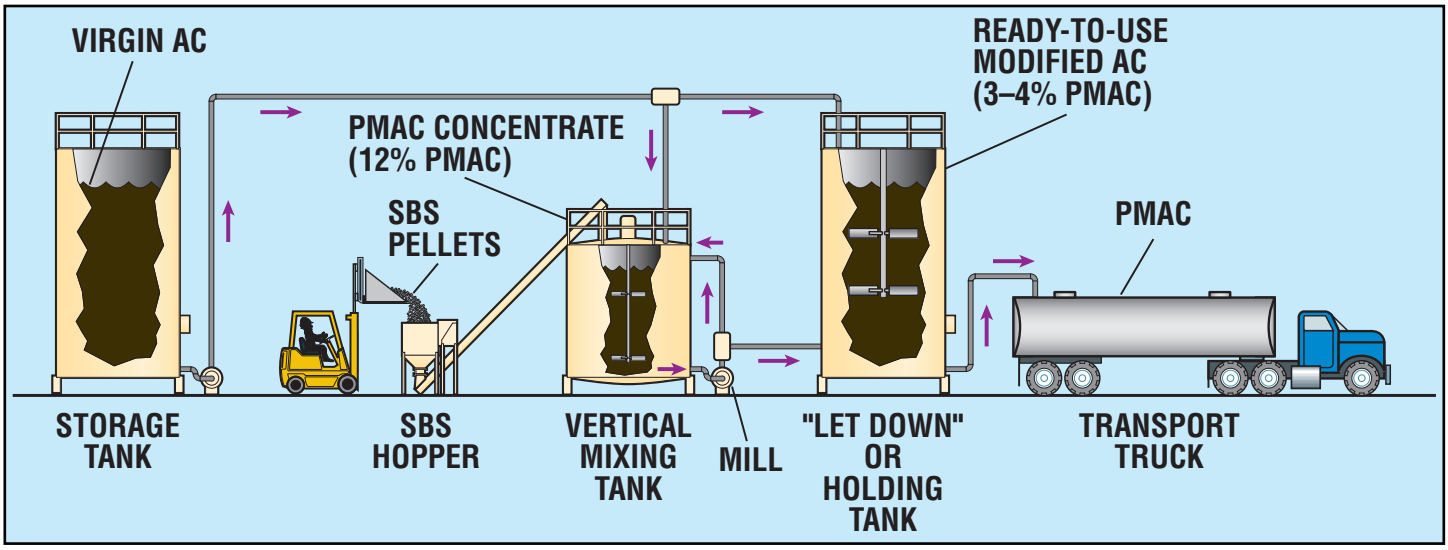
Impellers of a mixer mounted through the top of the tank pull the pellets down into the liquid AC. This wets and disburses them before they are circulated through a grinding mill near the bottom of the tank. The pellets are sheared into smaller and smaller pieces as they make multiple passes through the mill. This speeds up the blending process and ensures that all of the pellets are dissolved. The temperature of the mixture is elevated to about 170 degrees C (340 degrees F) to ensure proper blending.

The amount of mixture made in this tank is usually limited to small batches of concentrate. This is because the mill grinds more effectively when higher concentrations of polymers pass through it. Moreover, making small batches affords better quality control. And there is less waste in case there is a problem with a batch and it can't be used. Each batch of concentrate requires about 3 to 4 hours of blending time.

After the initial blending, the concentrate is pumped into a heated let down or holding tank where it is blended with additional virgin AC. The virgin AC is metered to produce a mixture containing about 3 to 4 percent polymer. This tank also has a mixer mounted in its top. Its mixer runs continuously to constantly agitate the mixture and prevent separation. The mixture is maintained at a temperature of about 170 degrees C (340 degrees F). The mixture only requires about 45 to 60 minutes for blending before it is ready for load out. If the mixture is to be stored over a period of time, the temperature is reduced to prevent degradation.

While this system is actually a batch system it has a great deal of flexibility. The holding tank is usually larger than the mixing tank and provides surge capacity. Most terminals use two vertical mixing tanks to increase production capacity.

A system with a single mixing tank produces 16 tons of liquid mix per hour. Using two mixing tanks the system produces 24 tons per hour. It is possible to design the blending system so that the SBS pellets make only a single pass through the mill for increased production volume. However, the multi-pass method ensures greater uniformity and higher quality where there might be variations in the virgin AC used.



Typical Astec system for blending AC with SBS. Most systems have two vertical mixing tanks.

Polymer pellets are augured into the two mixing tanks shown in the background from the hopper on the right side of the photo. A "pants leg" chute allows the pellets to be diverted into either tank.

Source of products

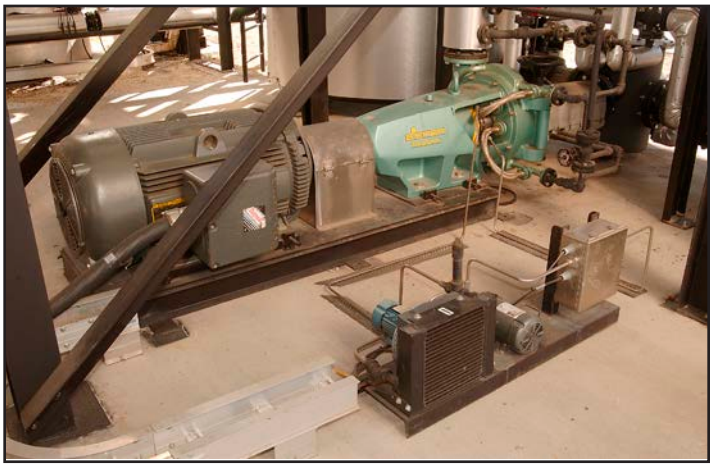
Most of the components of our polymer systems are manufactured in our factory in Chattanooga, Tennessee. In addition to the products we make, we include products made by other reputable manufacturers, so that you get a complete system ready to operate. We also offer on-site services to install the system and get it running.

On Site Services by Astec personnel

- Installation of the polymer blending equipment
- Installation of piping
- Start-up and testing of the polymer system
- Training of plant personnel for operation of the system
- Troubleshooting and maintenance of the system

The three vertical tanks shown here are for polymer-asphalt storage. They are heated, insulated, and have mixers. Each tank holds 35,000 gallons.

Heat for the polymer blending system is usually provided by the thermal fluid heater that heats asphalt storage tanks and other components at the terminal.



A Siefer mill is used to shear the polymer pellets into smaller pieces as they make multiple passes through the mill.

A booster heat exchanger may be required to increase the temperature required for blending.

Here is a popular way to load polymers into the hopper of the blending system. The bags of polymer are hoisted over the hopper and untied so the material fills the hopper.

At this terminal polymer pellets are purchased in Super Bags and are stored on shelves shown here. The bags are easily accessed by a trolley that transports them to the hopper for unloading. This system eliminates the need for a lift truck and box dumper.

Two mixing tanks are shown on the left side of the photo. A hopper and box dumper is shown under the covered area.

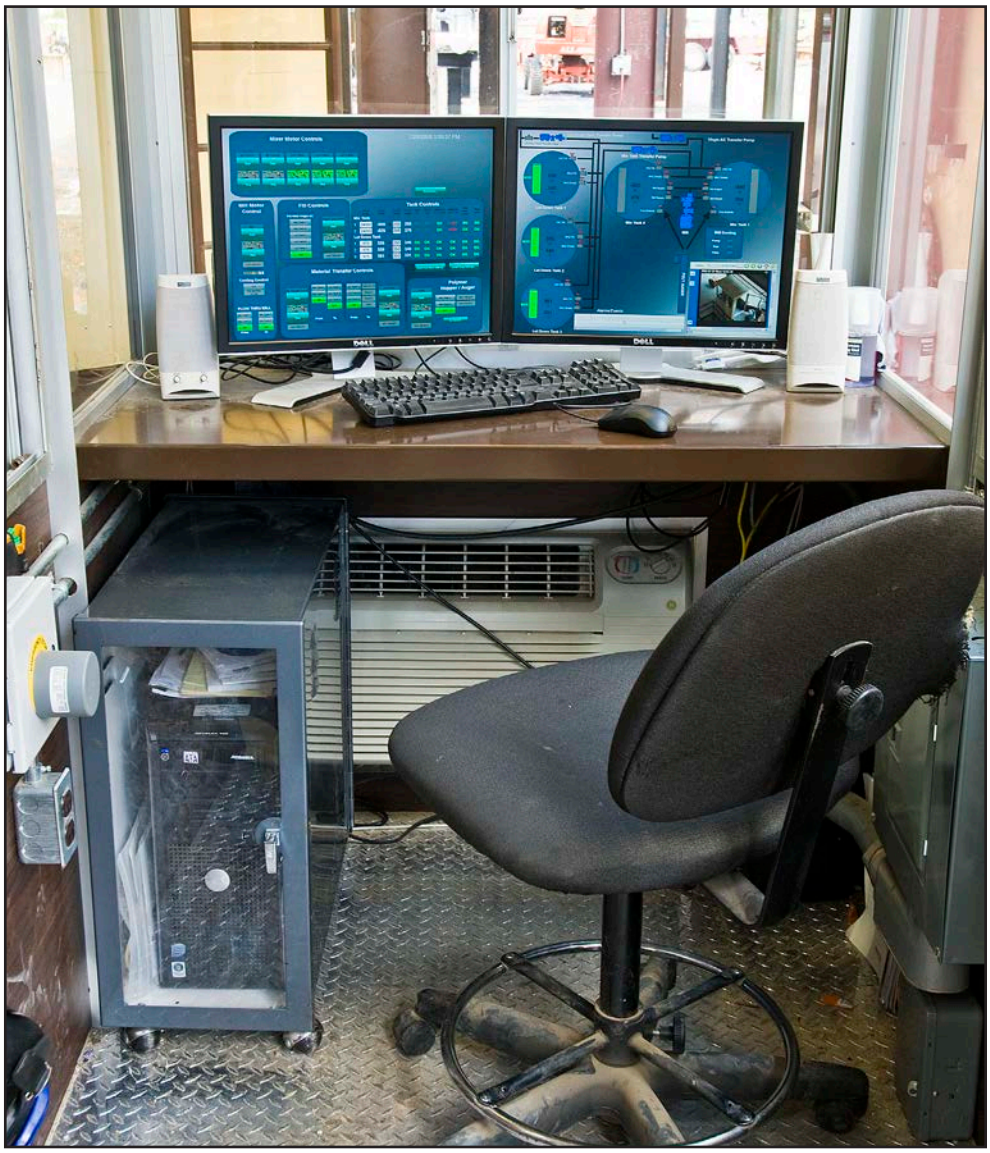
A conventional desktop computer running the Microsoft Windows operating system is now used to operate Astec polymer systems. This provides advantages over some of the early systems we provided.

The controls are now indoors where the environment is usually more comfortable for an operator.

The operator views a set of screens that show status of system components. The operator controls the entire system using the screens and buttons on the computer mouse.

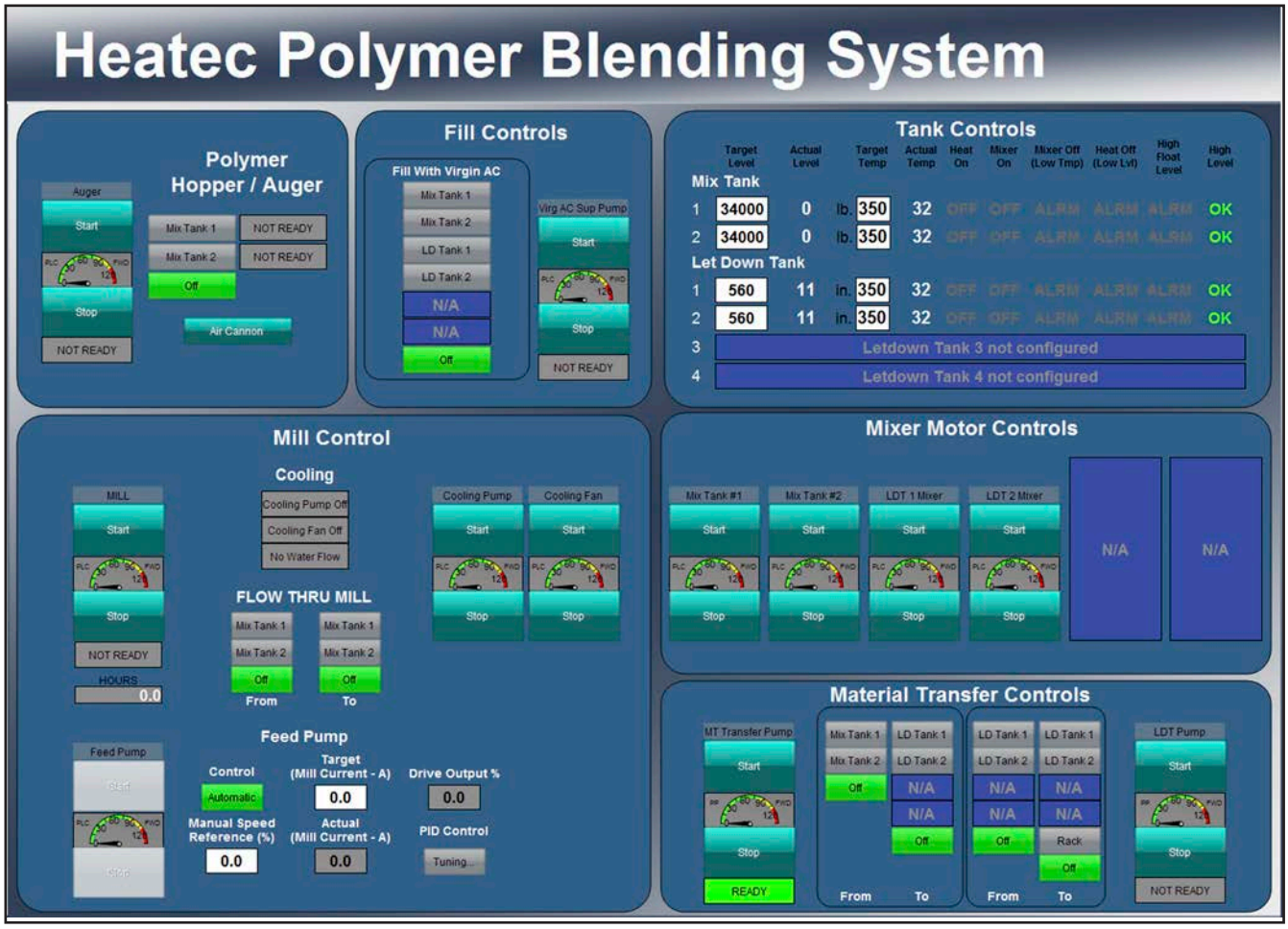
The screens are customized with graphics for the actual equipment installed. The graphics are more intuitive than displays on conventional controls. So operators are less prone to make errors.

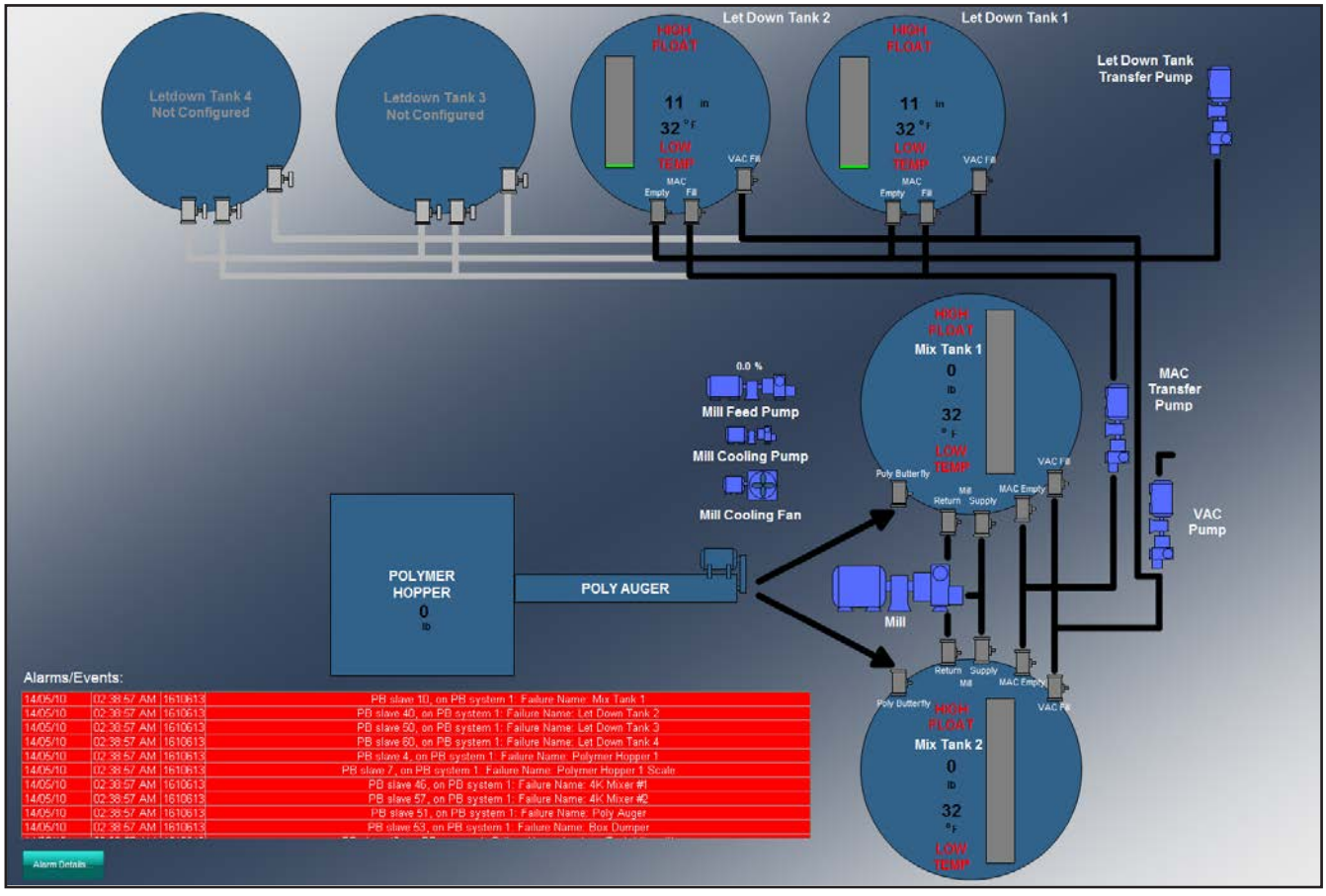
Screens from one of our latest polymer systems are shown on the next page.



The main control panel for an early Heatec polymer system at an asphalt terminal. The operator initiates the blending process using controls on this panel. A PLC in the panel sequences the operations. Fiber-optic wiring, which is not affected by lightening strikes, can be used to interconnect panels in the system. Some of the controls on this panel are now replaced by a conventional desktop computer like the one shown above.

Astec normally pre-pipes the blending system at our factory using jigs for critical fits. This significantly reduces piping errors, speeds up field installation and reduces field re-works.


Heatec Polymer Blending System
Polymer Hopper / Auger
Auger
Start
Stop
NOT READY
Mix Tank 1
NOT READY
Mix Tank 2
NOT READY
Off
Air Cannon
Fill Controls
Fill With Virgin AC
Mix Tank 1
Mix Tank 2
LD Tank 1
LD Tank 2
N/A
N/A
Off
Virg AC Sup Pump
Start
Stop
NOT READY
Tank Controls
Target Level
Actual Level
Target Temp
Actual Temp
Heat On
Mixer On
Mixer Off (Low Tmp)
Heat Off (Low Lvl)
High Float Level
High Level
Mix Tank
1 34000 0 lb. 350 32 OFF OFF ALRM ALRM ALRM OK
2 34000 0 lb. 350 32 OFF OFF ALRM ALRM ALRM OK
Let Down Tank
1 560 11 in. 350 32 OFF OFF ALRM ALRM ALRM OK
2 560 11 in. 350 32 OFF OFF ALRM ALRM ALRM OK
3 Letdown Tank 3 not configured
4 Letdown Tank 4 not configured
Mill Control
Cooling
MILL
Start
Stop
NOT READY
HOURS
0.0
Cooling Pump Off
Cooling Fan Off
No Water Flow
Cooling Pump
Start
Stop
Cooling Fan
Start
Stop
FLOW THRU MILL
Mix Tank 1
Mix Tank 2
Off
From
Mix Tank 1
Mix Tank 2
Off
To
Feed Pump
Feed Pump
Start
Stop
Control
Automatic
Target (Mill Current - A)
0.0
Drive Output %
0.0
Manual Speed Reference (%)
0.0
Actual (Mill Current - A)
0.0
PID Control
Tuning...
Mixer Motor Controls
Mix Tank #1
Start
Stop
Mix Tank #2
Start
Stop
LDT 1 Mixer
Start
Stop
LDT 2 Mixer
Start
Stop
N/A
N/A
Material Transfer Controls
MT Transfer Pump
Start
Stop
READY
Mix Tank 1
Mix Tank 2
Off
LD Tank 1
LD Tank 2
N/A
N/A
Off
From
LD Tank 1
LD Tank 2
N/A
N/A
Off
LD Tank 1
LD Tank 2
N/A
N/A
Rack
Off
To
LDT Pump
Start
Stop
NOT READY


Letdown Tank 4 Not Configured
Letdown Tank 3 Not Configured
Let Down Tank 2
HIGH FLOAT
11 in
32 °F
LOW TEMP
VAC Fill
MAC Empty Fill
Let Down Tank 1
HIGH FLOAT
11 in
32 °F
LOW TEMP
VAC Fill
MAC Empty Fill
Let Down Tank Transfer Pump
0.0 %
Mill Feed Pump
Mill Cooling Pump
Mill Cooling Fan
POLYMER HOPPER
0 lb
POLY AUGER
HIGH FLOAT
Mix Tank 1
0 lb
32 °F
LOW TEMP
Poly Butterfly
Mill Return
Supply
MAC Empty
VAC Fill
MAC Transfer Pump
VAC Pump
Mill
Return
Supply
Mill
MAC Empty
Poly Butterfly
VAC Fill
HIGH FLOAT
Mix Tank 2
0 lb
32 °F
LOW TEMP
Alarms/Events:
14/05/10 02:38:57 AM 1610613 PB slave 10, on PB system 1: Failure Name: Mix Tank 1
14/05/10 02:38:57 AM 1610613 PB slave 40, on PB system 1: Failure Name: Let Down Tank 2
14/05/10 02:38:57 AM 1610613 PB slave 50, on PB system 1: Failure Name: Let Down Tank 3
14/05/10 02:38:57 AM 1610613 PB slave 60, on PB system 1: Failure Name: Let Down Tank 4
14/05/10 02:38:57 AM 1610613 PB slave 4, on PB system 1: Failure Name: Polymer Hopper 1
14/05/10 02:38:57 AM 1610613 PB slave 7, on PB system 1: Failure Name: Polymer Hopper 1 Scale
14/05/10 02:38:57 AM 1610613 PB slave 46, on PB system 1: Failure Name: 4K Mixer #1
14/05/10 02:38:57 AM 1610613 PB slave 57, on PB system 1: Failure Name: 4K Mixer #2
14/05/10 02:38:57 AM 1610613 PB slave 51, on PB system 1: Failure Name: Poly Auger
14/05/10 02:38:57 AM 1610613 PB slave 53, on PB system 1: Failure Name: Box Dumper
Alarm Details

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