

The Greenbank Group UK

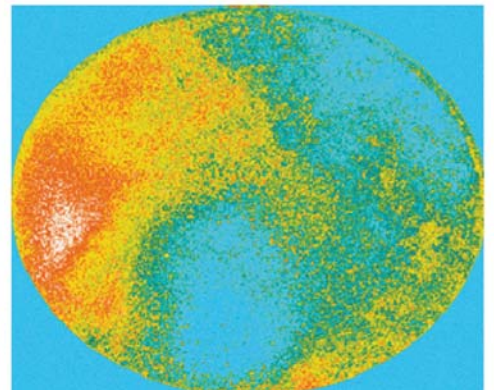
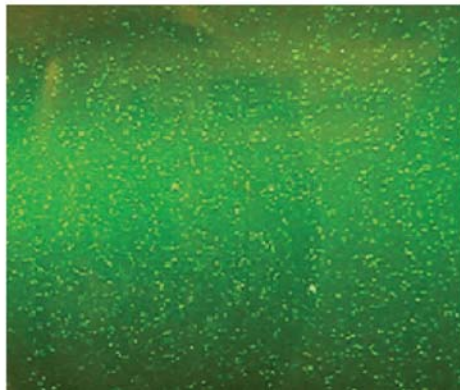
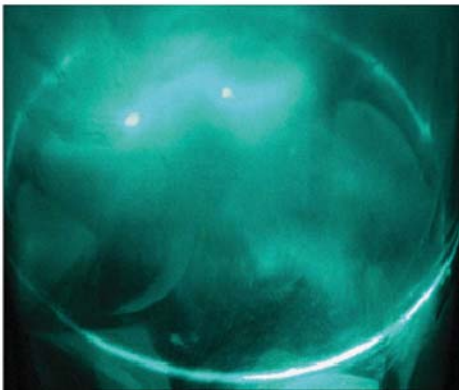
Enhancing the performance of our customers plant and equipment



Enhancing Performance

Greenbank **MillMaster**

Monitoring Particle Size from the Mill Outlets



www.greenbankgroup.com

Greenbank MillMaster

The **Greenbank MillMaster** utilises a unique patented light sheet technology to size particles being conveyed in a lean phase pneumatic conveying system.

The size of particles that can be measured ranges from 0.5 microns to 500 microns [for the standard device].

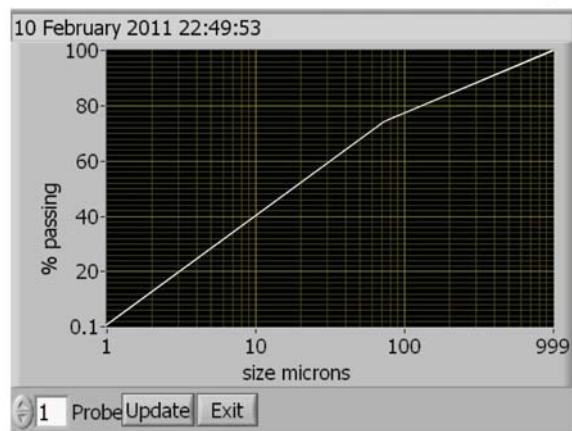
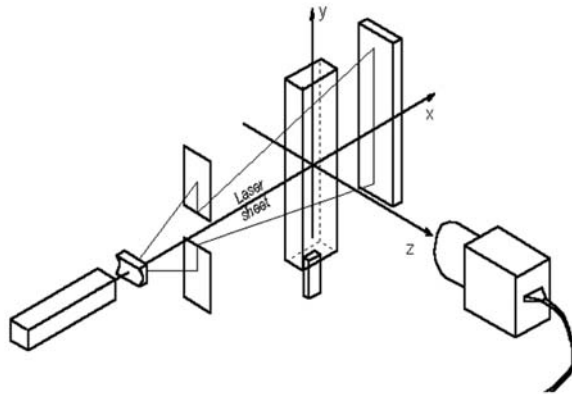
The device works by illuminating the particles using a coherent laser and generating a light sheet through a specialist optic. The illuminated flow is then captured using a high speed charge-coupled-device (CCD) camera.

The speed of the camera shutter "freezes" the frame of the illuminated flow and from this snapshot; various image processing algorithms can be applied.

The **Greenbank MillMaster** performs several measurement operations. Primarily the **Greenbank MillMaster** counts and sizes the particles in the sample. This size distribution can be arranged in a number of ways to the user.

As a default it is arranged into bins of various sizes indicating the approximate size distribution. The system can alternatively arrange the information as a Rossin-Rammler distribution, which is more familiar to engineers operating milling groups and classification processes.

The **Greenbank MillMaster** system is built into an air cooled IP65 industrial cabinet which is built to survive most industrial environments.



The cabinet is usually attached to metal work and then vibration isolated with specialist mounting or supplied with a separate plinth system. As the system is laser based, the cabinet is fully interlocked which means there is no danger of laser exposure. The laser diode used is of such a scale that there is no chance of any ignition from the laser light.

"It is our vision to excel and lead the world in our area of expertise"

The **Greenbank MillMaster** cabinet can be set up to perform continuous sampling on a single point or timed samples on a number of points and rotate between these ports.

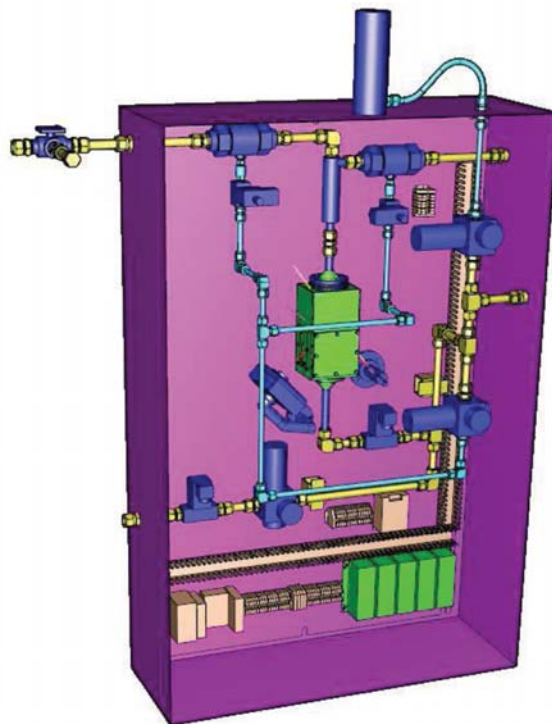
To do this the cabinet can control motor operated valves (MOV) connected to a stainless steel pipe network. In this way a system can take up to 8 single point samples.

Once a sample is measure it is returned to the pipe network through either returning it to the particulate flow or to a reject line.

It has been suggested that the key focus of the grind improvement should be 'increasing the percentage of material to be below 75 microns and reducing the amount above 300 microns.'

Particles above 300 microns have been shown to contribute to an increased level of carbon in fly ash due to poor combustion.

The bin sizes for the size distribution are set up to monitor these size fractions and the 4-20mA signals are organised to indicate the percentage of particles above 300 microns in each sample.



Whilst developed primarily for coal, the system is generic enough to be applied to any lean phase powder system. As long as the powder is relatively dry the **Greenbank MillMaster** can be used to measure any lean phase dynamically conveyed particles.

The benefits and advantages of the **Greenbank MillMaster** include:

- **Cost reduction through reduced energy consumption.** By monitoring the online particle size for a particular feedstock it will be possible to set the mill to the minimum settings required to give the desired particle fineness.
- **Cost reduction through more complete combustion.** Particle fineness is a key factor in combustion. If you can monitor the particle size from the mill and adjust a setting of the mill based on the data you can improve the combustion and efficiency of the plant.
- **Monitoring of Mill Performance** looking for maintenance and preventing catastrophic failures. By monitoring the online behavior of a mill (particularly looking at the percentage of coarse particles and fine particles) operators can assess if the performance of the mill is degrading. With this information maintenance strategies can be revised at catastrophic failure avoided by early identification.



Cabinet Specification

Bracket mounted, IP65 / NEMA 4 cabinet.

1000mm x 750 mm x 300 mm cabinet.

Optional air cooling, maintaining NEMA 4.

Interlocked to prevent unwanted laser emission.

Quality: Standard Rittel Cabinets

Material: Sheet steel

Surface Finish: Dipcoat-primed, powder-coated on the outside in textured RAL 7035

Probe Specification

Rugged interchangeable probe.

Probe fits through dustless connector into sampling area.

Probe is set at iso-kinetic for mill operation velocity.

Probe operated by Motor Operated Valve (MOV).

Compliant with DSEAR regulations for inanimate items.

Returns Specification

Sampled coal can be ejected to either:

Primary Air inlet; Coal inlet or Reject line.

Physical samples can be taken using the machine.

Sensors / Optical Equipment

Laser with optics fully enclosed for parallel beam laser sheet including mounting.

High resolution rapid CCD camera.

Input / Outputs

4-20mA outputs for particle size in customer specified ranges.

Optional Ethernet for full sizing information.

Optional MODBUS/TCP.

Touch Screen for onsite viewing.

Service Requirements

110VAC, 10A.

Alternative supplies can be considered.

6 Bar clean air for operation.

Sampling specification

Measures as small as 0.5 m.

Sampling intervals programmable.

Collection takes between 1 and 6 minutes.

Range of particle sizes recorded in four user specified bins:

0-75 m

75-150 m

150-300 m

>300 m

Additional values of the maximum, minimum and mean particle sizes displayed.

Accuracy of sizing is within 1%.

Pipework & Cabinet exterior Specification

Material: 316L Stainless Steel tube.

Inspection: 100% Visual and dimensional examination otherwise in writing.

Packing

Packed and protected, suitable for shipment in wooden crates.

All wood will be heat treated to ISPM 15 regulations.

Desiccant will be used where necessary.



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GAIM

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