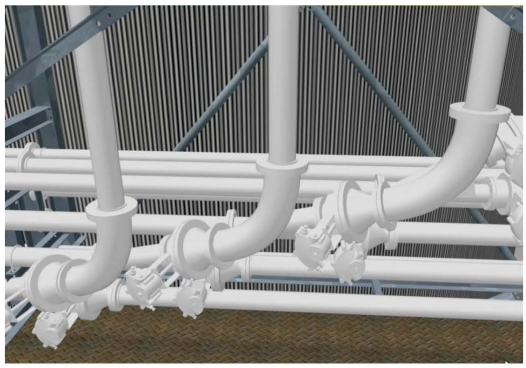
H-CAM®
Carbon in ash analyser

Sampling from hoppers and dense phase pipe work.

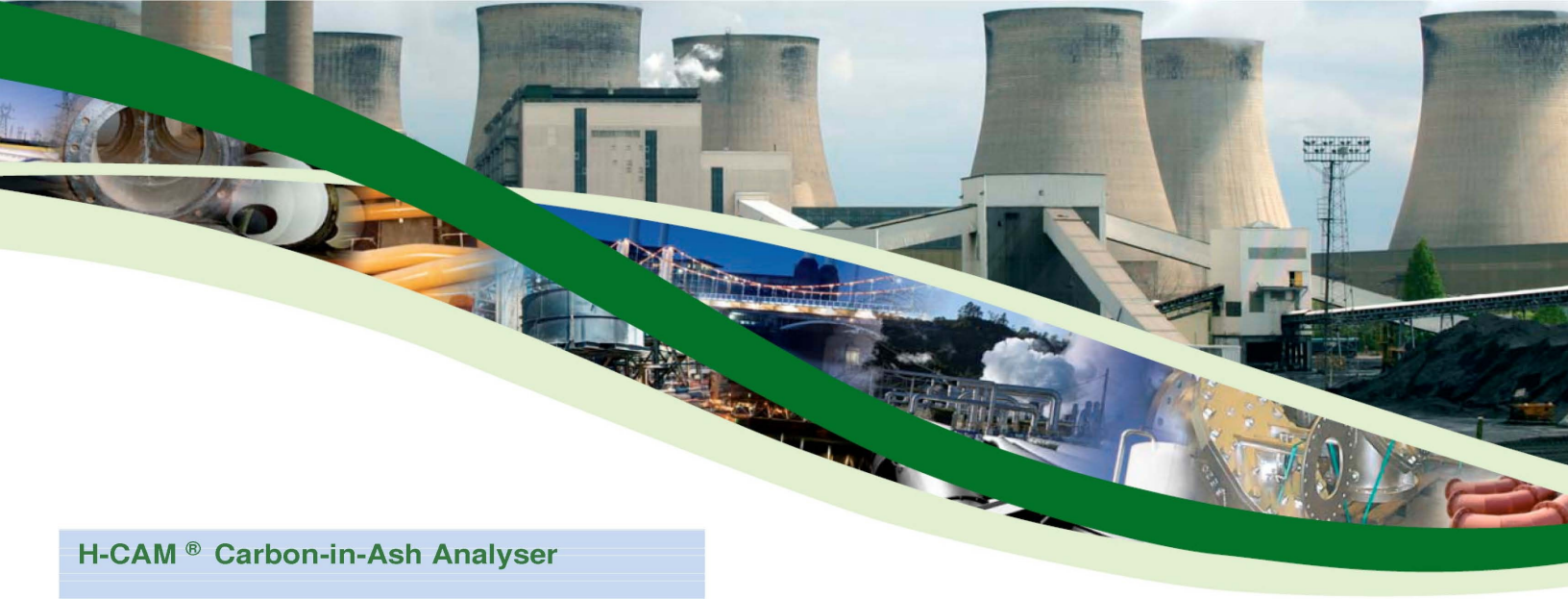


Helping optimize fly ash value

GREENBANK

Greenbank Energy Solutions Inc.

“ Enhancing the performance of our customers plant & equipment ”



H-CAM ® Carbon-in-Ash Analyser

The H-CAM carbon in ash monitor system can be used to monitor, control and optimize fly ash for sale, and help minimize the waste when good fly ash is sent to lagoon or land refill avoiding taxes where applicable.

The system can accept ash from multiple samplers up to 30 m apart. User decides whether to utilize existing screw / grab type samplers or Greenbank supply as a complete system.

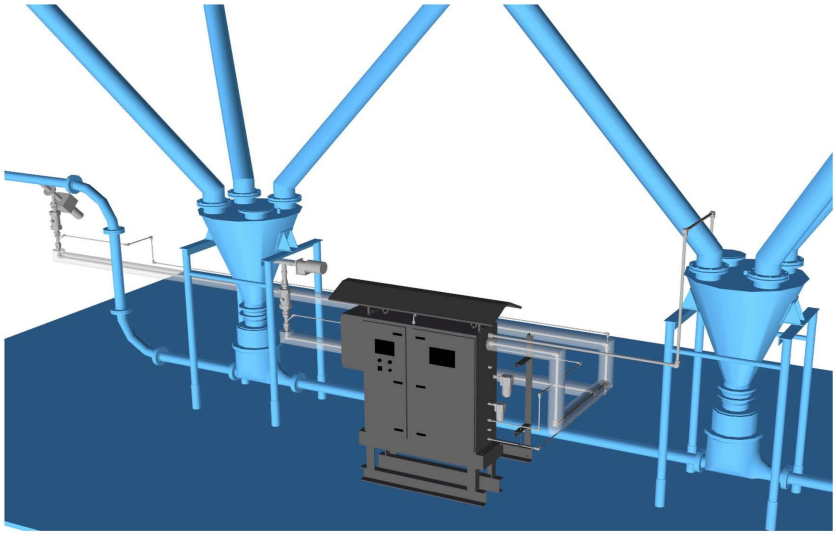
The cabinet controls each sampler sequentially and is fully automatic, the sampled ash is blown through heated pipe to H-CAM for measurement.

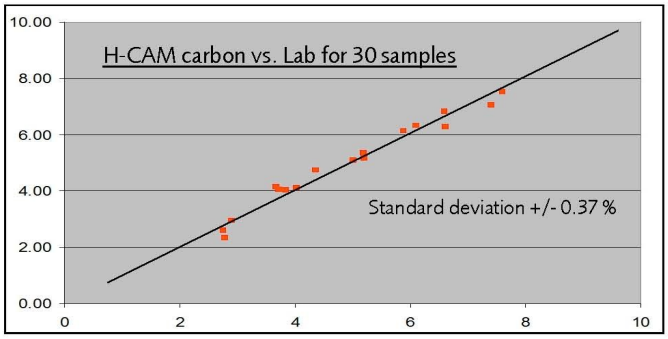
The H-CAM only differs from the G-CAM in that it has a larger reception hopper below the cyclone with level detection to positively detect the amount of ash, and continues the sampling process until sufficient ash has been collected.

The H-CAM then feeds the ash into the microwave wave-guide and uses a patented process of microwave attenuation and phase shift with air compression, over a range of 2-3 GHz to determine the carbon / density of fly ash.

The ash compression technology and density compensation measurements are key for accuracy. They allow the technology to accurately measure even high carbons > 20 % when burning coal additives such as bio-mass and petroleum coke. The measured ash is then blown back to another hopper or into a sample jar for lab analysis.

The system can advise via outputs the fly ash quality for a control system to decide the routing and fate of the ash measured, or the PLC controller can activate actuators directly to sort fly ash.





H-CAM - how much ash ?

The H-CAM is designed to accept up to 400 g of fly ash from a bulk sampler and analyze in a few minutes. H-CAM is designed to connect to multiple samplers, although the base configuration is 3.

H-CAM benefits and advantages

The microwave technology and process was developed at one of the largest European power stations end of 2007, on a boiler used for heavy bio-mass and petroleum coke additives. The goal to measure complex fuel variations fly ash accurately with minimal yearly maintenance.

The technology has been proven to be superior to all of our competitor products, simply by the fact that over 40 have supplied to customers who had existing systems, one of which the in-hopper microwave system.

- Very low annual maintenance, backed up by optional full service contracts on annual or multiple year basis.
- Bulk samples can be turned around in typically under 5 minutes, allowing high resolution for process control of varying fly ash quality in ash transport system.
- Maintenance for bulk samplers chosen is the only focus required by plant, depending on duty cycle required and sampler technology.
- Full PLC controller and control cards allow for hot swap and ruggedness.
- Fully automated cabinet heating, cooling, and intelligent monitoring of bulk sampler operation, ash flow and system temperatures allows H-CAM technology to monitor itself and keep the process moving.
- Latest microwave absorption and phase shift technology with accommodation for ash density variations, deals with all coal types and bio-mass additions including petroleum coke.
- Ash compression technology with density measurements gives a target accuracy of under +/- 0.4 % for multiple fuel types.
- Fully heated stainless system with level sensors, vibrators, dry air purge and intelligent control keeps ash moving and system operational.
- High quality industrial touch screen with heavy duty PLC allow optional control of actuators for fly ash sorting by quality.

Maintenance

The system is designed to be maintenance free. On an annual basis check cyclone vibrator, cyclone outlet valve and wave-guide with a view to changing every 2 years or as required. For normal coals inspect bend fittings and the cyclone every 2 or 4 years depending on how abrasive fly ash is. The bulk samplers maintenance schedule would depend on duty cycle and technology chosen by user.

Specification

Accuracy : +/- 0.5 % for range 0-5 % Carbon,
+/- 0.6 % carbon for 6-10 % Carbon

Carbon in ash Range : Up to 50 % carbon

Ash Measurement : Microwave absorption & phase shift multiple frequencies, using patented process and ash compression.

Sample representation : Multiple bulk samplers, each can present up to 400 g sample to H-Cam for measurement.

Sampling rate : Measurement process and ash handling in under 5 minutes. Total time dependent on bulk sampler operation.

Outputs to plant : Up to 6 x 4-20mA current outputs for % carbon per bulk sampler. Typical 3 bulk samplers per cabinet standard option. Optional control for fly ash sorting using PLC.

Connectivity : Ethernet - Carbon in ash, bulk samplers in operation, process temperatures, ash flow.

Control system : National instruments PLC industrial controller with storage and removable flash card option

Layout of bulk samplers : Up to 30 meters between samplers with centrally located cabinet. Can accept any bulk fly ash sampler.

Control valves : Long life high temperature pinch valves isolating bulk samplers allowing sequential operation.

Ash Transport : Samplers and transport controlled by cabinet PLC, using 30 PSI dry air to move ash through heated pipe.

Heat tracing : Sample line bulk samplers to cabinet heat traced, typically 10-25 amps at 110 VAC, lagged to 50 mm.

Sample collection : Option for samples to be automatically collected in sample bin

Enclosure dimensions : w1105 x h1215 x d405 mm, 2.5 mm sheet steel rugged design to IP 65.

Environmental : Floor or wall mount with cabinet cooling, 0 - 50 deg C, 95 % RH

Display : IP 65 industrial color touch screen on door

Cabinet Power : 110 VAC at 15 amps System includes water, oil and articulate filters to 1 micron.

Background shows typical measured fly ash sample from wave-guide in hand

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