

Title: Economics of On-Line Ash, Coal and Unburned Carbon Monitors in Coal-Fired Power Plants
Author: Jorgen Peetz-Schou
E-mail: MOGW@post4.tele.dk
Telephone: +45 49 13 98 22
Fax: +45 49 13 91 62
M&W Asketeknik ApS
Oldenvej 5
DK-3490 Kvistgaard
Denmark

Economics of On-Line Ash, Coal and Unburned Carbon Monitors in Coal-Fired Power Plants

M&W is a Danish company employing around 100 engineers and qualified craftsmen. After almost 24 years on the market we have become specialists in development, design, construction and production of special-purpose machinery, production equipment, state-of-the-art measuring instrument and automatic control systems.

For the past 15 years, M&W has developed, in cooperation with Danish power plants, several measuring and analysing instruments for coal-fired power plants and we are now one of the leading producers of automatic control systems for this industry.

In cooperation with power plants worldwide, M&W has developed a line of products to ensure the combustion optimization. Some of the keywords of these *Combustion Optimization Solutions* are:

- Decreased Coal Consumption
- Increased Boiler Efficiency
- Coal Flow Balance

- Reliable Fineness Testing
- Improved Fly Ash Quality
- Fly Ash Control

The following two case studies will describe the principles of two of M&W's systems and demonstrate the financial advantages. It should be emphasized that as no two plants operate under the same conditions, M&W has considered it to be of the utmost importance that a close co-operation between the plant and M&W is established from the beginning of any project. It is vital to define the individual conditions and problems of the plant in order to provide the best solutions. Some of the keywords for M&W are **teamwork** between M&W and the power plant and a **payback-time** of around 1 year.

Case study A: Residual Carbon Analyser (RCA)

The **M&W Residual Carbon Analyser** has proven its importance by being a great help to the plant personnel during their daily routines, by giving the operators real-time information about the combustion conditions through a continuous monitoring of the carbon content in fly-ash.

The RCA is a very reliable and low-maintenance system, which considerably reduces the need for performing the labour intensive manual analysis previously done.

The M&W RCA continuously analyses the carbon in fly-ash through the following steps:

- The flue gas is extracted isokinetically through the collecting pipe by means of the vacuum created by the ejector.
- The fly-ash is separated in the cyclone and collected in the analysing unit. Clean gas leaves the ejector.
- When the analysing unit reports a full sample the analysis is performed.
- The result is transmitted to the control unit where it is processed in the microprocessor.
- The carbon content is indicated on the control panel and signals are sent to the control room.
- The cycle is completed by cleaning the system with compressed air.
- A new cycle starts automatically.

Financial Advantages of the RCA:

Example of a plant:

Coal consumption per boiler:	1.000.000 tons/year
10% fly ash:	100.000 tons/year
1% u/b carbon in fly ash:	1.000 tons/year

M&W's experience after the implementation of RCA (e.g. in Eastern Europe):

A reduction of the u/b carbon in fly ash of 2 - 5% (where the percentage was above 10%)

Project Target: Reduction in the u/b carbon of 3%:

⇒ 3000 tons = US\$ 90.000,00

Investment:

Single fly ash duct	approx. US\$ 60.000,00
Double fly ash duct	approx. US\$ 100.000,00
Installation	approx. US\$ 4.000,00
Commissioning	approx. US\$ 6.000,00

Total investment approx. US\$ 70.000,00 - 110.000,00

Pay-back time: approx. 1 year

Case Study B: Automatic Coal Flow Monitor - ACFM

The **M&W Automatic Coal Flow Monitor** is a fully automatic device designed for collecting pulverized coal from pneumatic transport pipes. The sampling sequence is based on the international standard ISO 9931.

The sampler has three main movements:

- insertion of the sampler tips into the pulverized coal stream,
- rotation of the sampler tips in the powder stream
- retrieval of the sampler tips from the transport pipes. The movements are driven by small electrical motors.

The coal particles from the extracted sample are separated in a high-efficiency cyclone and collected in a funnel at the measuring unit.

The measuring unit consists of a tube with a top and bottom valve and fiberoptics measuring unit. After the measuring procedure, the bottom valve is opened and the sample is blown back to the main pulverized coal stream.

The ACFM system is mobile and can therefore be used on several coals pipes and mills.

Additional Advantage:

Automatic sampling for fineness test.

Financial Advantages:

Example of a plant:

Coal consumption per boiler: 1.000.000 tons/year

Project Target: 0.5 - 1% reduction of the coal consumption:

⇒ approx. 5.000 - 10.000 tons coal per year

or

⇒ approx. ca. US\$ 150.000 - 300.000 per year

Investment:

4 measuring units	approx. US\$ 150.000,00
Installation per pipe	approx. US\$ 1.000,00
Electrical and compressed air installations	approx. US\$ 15.000,00
Commissioning	approx. US\$ 6.000,00
Total investment	approx. US\$ 200.000,00

Pay-back time: approx. 1 year

If you need any further information, please contact us on any of the following numbers:

M&W USA:

1764 Rosalie Drive
Fullerton
CA 92835

Tlf.: 714 990 9492
Fax.: 714 991 9480
E-mail: spillane@aol.com

Contactperson: Mr. Brian Spillane, Consulting Engineer

2160 Kingston Ct.
Suite H
Marietta
GA 30067

Tlf.: 770 984 2667
Fax.: 770 984 9901
E-Mail: jgnincalt@compuserve.com

Contactperson: Mr. Johnny Nielsen, Consulting Engineer