Coal mill performances optimization through non-invasive online coal fineness monitoring

S. Collura, D. Possanzini
Loccioni Group

M.Gualerci, L.Bonelli, D.Pestonesi
Enel Engineering and Research

Abstract

In coal fired power plants, control of grinding quality is generally operated on the basis of the static characterization of the mill carried out during commissioning. Wear and occasional damages can dramatically affect performances of a mill during normal working conditions, causing a worsening of fineness of grinded coal powder; this has a strong affect on combustion, emissions, slagging and presence of unburned carbon in fly ash. At present time, checks on coal particle size distribution are usually performed periodically or after a mill failure has occurred. Results of these tests are then used as a new reference to adjust milling parameters during normal working conditions. These measures are generally carried out by using the reference methodology of sampling and sieving that is cumbersome and costly. Furthermore the time delay between sampling and laboratory analysis makes impossible to use this practice for a real-time feedback control. Then, capability of online monitoring coal particle size distribution becomes a fundamental step forward to a better control of both mill and burner performances. On line measurement systems are commercially available, but normally based on intrusive sensors that require high maintenance levels. Due to this, further development is needed in order to improve reliability and reduce costs.
This paper presents some results of an experimental campaign carried out at Enel Torrevaldaliga Nord power plant with an innovative online, non intrusive, coal fineness monitoring system, installed on one of the mills of a 660 MW coal-fired unit. Test results show that real-time monitoring of coal particle size enables the operator staff to adjust the mill parameters to obtain combustion optimization and coal consumption saving. This work is envisaged to be the first step towards the development of an integrated mill diagnostic and monitoring tool able to improve the whole combustion process and avoid possible production losses due to mills unavailability during operation, connected with unpredicted mill failures.