

Improving Performance and Flexibility of Thermal Power Plants Combined with Advanced Digital Technologies

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Abstract

Thermal power plants are facing new challenges around the World. In some regions they continue to provide critical base-load generation. In other regions they are still a very important segment of the generation mix but their operation is shifting towards lower capacity factors, and sometimes more start-ups. In all regions minimizing the emissions from thermal power plants and maximizing their efficiency is critically important, especially for plants with changed or varying fuel characteristics. This is even more important for plants which are retrofitted for higher operational plant flexibility with additional fuel flexibility, e.g. enabling variable coal/biomass mixtures to be burned in parallel for decreasing CO₂-emissions.

Newly available and evolving digital technologies can help with these challenges. AI-based expert systems, for example, can provide real-time optimization for fuel changes or operational and life consumption trade-offs. Advanced sensors and digital control modifications can enable faster start-ups and higher ramping rates with reduced impact on equipment reliability and life consumption.

Specific case studies will be discussed, where advanced digital technologies and fuel flexibility as well as highest levels of operational flexibility have been deployed and successfully improved the economics and operating condition of the plant while reducing the emissions of thermal power plants.