

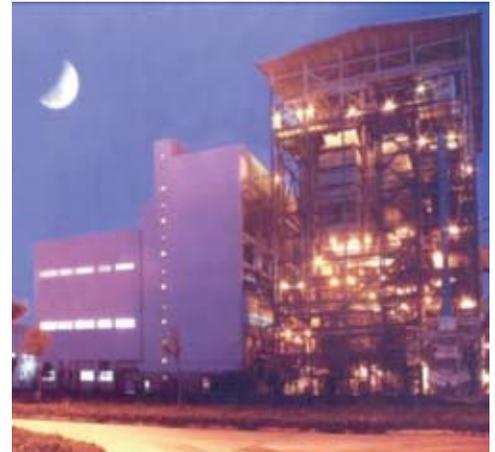
“As the first company in the world to apply advanced control application technology to CFB units, Sinopec significantly enhanced the effectiveness and control performance of the distributed control system at the CFB boiler level and for the entire plant. Even more impressive, all improvements were achieved by implementing software rather than executing a major hardware refurbishment at the plant. We have also to date achieved an estimated \$1 million of savings on the supply of energy to our refinery.”

— Zhao Weijie, Chief Engineer, Sinopec Shanghai Petrochemical Company (2008)

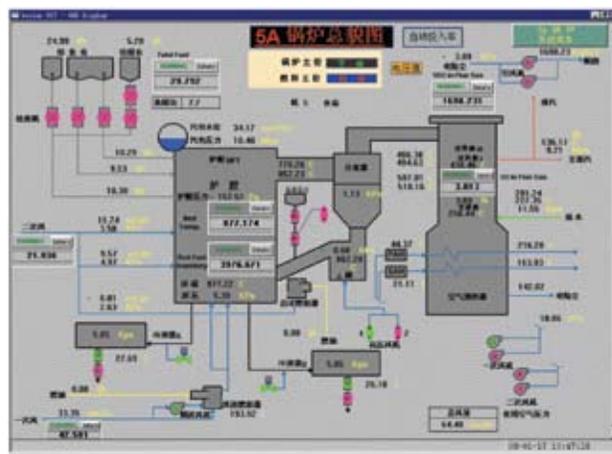
Inventions and Innovations

Advanced Energy Solutions incorporates innovative concepts to improve energy efficiency, reduce emissions, and improve the economic operation of industrial and utility fossil-fueled power plants:

- Dynamic coordination of the air-fuel ratio (AFR) in the boiler reduces the AFR variation and enables combustion optimization. An extension of linear model predictive control technology for ratio control was developed.
- Turbulence during combustion results in emissions being highly stochastic. Deterministic optimization methods were unable to provide satisfactory performance. AES's "cautious optimization" strategy takes uncertainty into account.
- One of the key challenges for coal-fired power plants is the variability in the BTU content of the coal. With advanced estimation and inferential sensing technology, leaking air variation and coal quality variation are identified and combustion parameters are optimized online.
- The solution has been extended for circulating fluidized bed (CFB) boilers. CFB boiler dynamics depend significantly on the accumulated char in the bed. An inferential bed fuel inventory (BFI) sensor was developed to estimate the accumulated char level and adapt the model used for predictive control accordingly.
- Another innovation is the plantwide optimization of boilers, turbines, and heat recovery systems to improve the end-to-end efficiency of a power plant.



Most Innovative Power Technology of the Year Award from Asian Power magazine, 2008



For the application of AES to Sinopec's Shanghai Petrochemical Company Principal Power Plant in Shanghai, Honeywell received the 2008 Most Innovative Power Technology of the Year Award from Asian Power, the leading publication for energy professionals in Asia.