

Christopher J Haynes, P.E.

Summary

Mr. Haynes is an independent consultant with 40 years of experience in thermal performance, system design, troubleshooting and performance testing.

He is the Principal Author of FCYCLE, CCYCLE and NCYCLE Heat Balance Software. He has three US patents for power plant apparatus.

He has been employed by Stone and Webster, New England Power, Dominion Energy, Calpine and Shaw Power, and is a Registered Professional Engineer in Massachusetts.

Experience

Thermal Performance Analysis

Mr. Haynes developed heat balance models for over 1000 generating units. He has used these models to evaluate test data and for predicting off- design performance. These generating units include:

- Conventional Steam
Ranging from 3 to 1100 megawatts, including supercritical and double reheat units, units for cogeneration and district heating. These units fired coal, oil, gas, wood, bark, black liquor, refinery gas, refuse, and other fuels,
- Combined Cycle
Ranging from 4 to 1200 megawatts, including units with cogeneration, wet air compression, reheat cycle gas turbines, steam cooling, and conventional boiler retrofits.
- Nuclear
Including PWR, BWR, LMFBR, HTGR, pebble bed units.

System Design and Analysis

Mr. Haynes has designed hundred new and retrofitted fluid systems for fossil, combined cycle, and nuclear power plants. These systems include:

- Systems to shorten startup duration
- Systems to increase maximum output, reduce minimum load.
- Systems to improve heat rate
- Systems for providing process systems and hot water
- Systems for energy recovery
- Main and auxiliary cooling systems.

Thermal Performance Software

Mr. Haynes is the Principal Author of FCYCLE, CCYCLE and NCYCLE Heat Balance Software, sold by Power Software associates Inc., of Paris Maine.

This software has been used by dozens of power generators, engineering firms and manufacturers. It calculates complete heat balances, either to predict off design performance or to determine actual measured performance with test data.

He has also developed Add-ins that interfaces this software with Microsoft Excel, and that also provides steam, gas, and psychometric tables, and hydraulic analysis.

Performance Testing and Evaluation of Improvements

Mr. Haynes has done performance tests and evaluated potential improvements for several hundred fossil, combined cycle, industrial and nuclear power plants.

The testing has ranged from use of plant instrumentation to full ASME code tests.

Patents

- US 6,644,030 Cooling Systems and Methods of Cooling
- US 5,836,162 Feedwater Heater Drain Recycle System
- US 5,676,521 Steam Turbine with Superheat Retaining Extraction