



ORCHIDEE



A tool for optimisation of operation and maintenance characteristics of electrostatic precipitators

The ORCHIDEE Package

ORCHIDEE is a simulation software for the operation of the electrostatic precipitators (ESP) in coal fired Power Plants, designed to be installed in the control room of the plant.

From fuels analyses, boiler operating conditions, plant characteristics and control parameters, ORCHIDEE simulates in real-time the operating conditions of the different fields of the precipitator, evaluates the dust emissions at the stack and estimates the effects of SO3 injection and back-corona in the ESP efficiency.

As a result, ORCHIDEE enables the plant staff to take operating decisions supported by simple "what if" scenario analysis; it enables also the maintenance staff to define more effective maintenance plan by early detection of ESP problems.

ORCHIDEE is also a powerful assistance tool for on-line and off-line diagnostics.



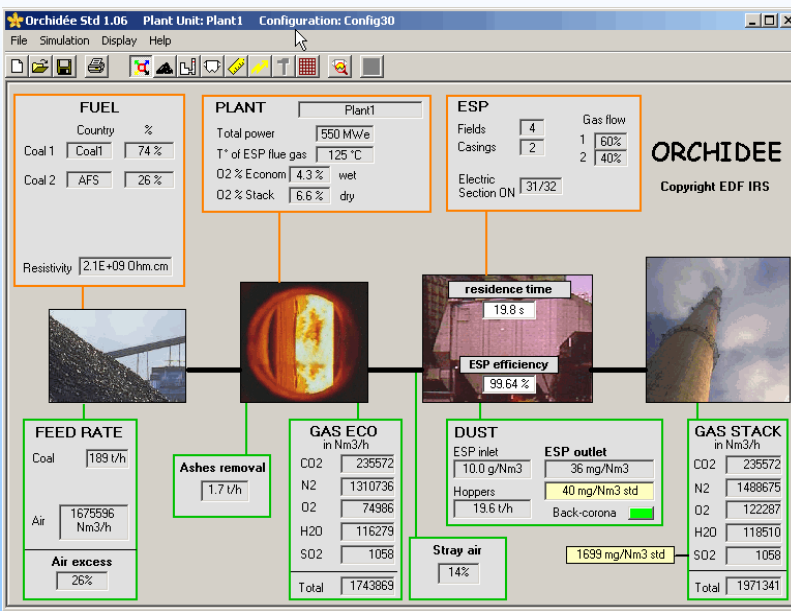
ORCHIDEE has been installed and validated in 8 EDF coal thermal power plants in France and UK. It is actually used for the daily operation of the plants.


The ORCHIDEE applications

Poor ESP performances may result in revenue losses, such as reduced plant production or penalties: a 1 % derating of a 250 MW unit, due to poor environmental performances, may correspond to losses of the order of 1 M\$.

Early detection of reduced ESP performances is therefore essential to keep plant optimal production levels. Few plants have resident experts able to estimate in advance the plant performances.

ORCHIDEE simulation software enable plant staff to understand major ESP problems: by changing plant or ESP parameters it is possible to review instantly any modification of the operating conditions.



| | |
|--|--|
| <p style="text-align: center;"><i>A user-friendly tool</i></p> <p>ORCHIDEE offers a user-friendly interface with rolling menus, self-explaining forms and action buttons. This allows fast learning and easy use of the software.</p> <p>The help on line, always available, facilitates the use of the software and gives all necessary information.</p> | <p style="text-align: center;"><i>A useful tool</i></p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%; border: 1px solid black; padding: 5px; background-color: #e6f2ff;"> <ul style="list-style-type: none"> • Fuel: coal characteristics; blend up to 4 coals; oil admixture • Power plant: nominal power, electric power output, thermal efficiency. • Combustion parameters: combustion air excess, O₂ % content at economiser and content at stack, unburnt %, flue gas temperature. </div> <div style="width: 45%; border: 1px solid black; padding: 5px; background-color: #e6f2ff;"> <ul style="list-style-type: none"> • ESP Characteristics: overall geometry, local electrode geometry, flue gas velocity distribution at inlet. • ESP operation parameters: power supply characteristics, applied voltage or current, circuits out of service </div> </div> <div style="text-align: center; margin: 10px 0;">  </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%; border: 1px solid black; padding: 5px; background-color: #e6f2ff;"> <ul style="list-style-type: none"> • Impact of combustion parameters on particle emission (excess of combustion air, flue gas temperature, etc.). • Coal blending in order to avoid back-corona and reduce emissions. </div> <div style="width: 45%; border: 1px solid black; padding: 5px; background-color: #e6f2ff;"> <ul style="list-style-type: none"> • Consequences of geometric or electric faults on ESP operating conditions • Impact of inlet flue gas distribution on ESP performances. </div> </div> <div style="text-align: center; margin-top: 10px;"> <div style="border: 1px solid black; padding: 5px; background-color: #e6f2ff; width: 80%; margin: 0 auto;"> <ul style="list-style-type: none"> • Simulation of ESP retrofitting: modifications of internals geometry (height, channel width, electrodes type), modification of power supplies, addition of fields. </div> </div> |
| <p style="text-align: center;"><i>A fast tool</i></p> <p>ORCHIDEE computes dust emissions in real-time. At first installation, the performance chart is computed by calibration simulations with different input parameters: it takes several hours of computation time. Then ORCHIDEE computes the ESP operating conditions instantly, by interpolating the data on the performance chart.</p> | |
| <p style="text-align: center;"><i>Databases included with</i></p> <p>ORCHIDEE includes two databases: the first for coal characteristics, and the second for the electric power plant characteristics. The user needs only to define combustion and precipitation parameters.</p> | |
| <p style="text-align: center;"><i>Designed for network use</i></p> <p>ORCHIDEE is designed to run in a network configuration. Databases and files are stored on a network server and the program can be accessed from any client computer.</p> | |
| <p>Recommended system requirements</p> <div style="display: flex; justify-content: space-between;"> <ul style="list-style-type: none"> • Windows XP, Vista • Microsoft Excel <ul style="list-style-type: none"> • 128 Mb RAM • 200 Mb of temporary file on hard disk for calibration </div> | |