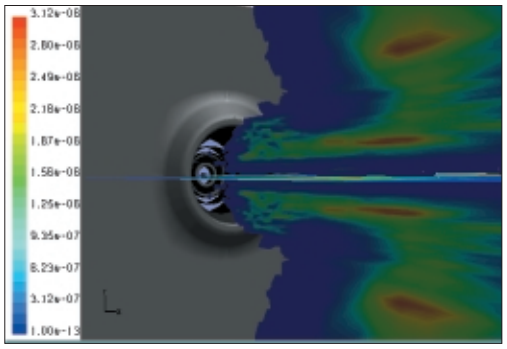
ADVANCED COAL COMBUSTION MODELLING

OBJECTIVES

With the use of combustion modification-based techniques for NO_x reduction in pulverised coal-fired plant, the carbon-in-ash has increased significantly in almost all cases, adversely affecting combustion efficiency and hence generation efficiency. An unacceptable increase in carbon-in-ash level has also affected the marketability of fly ash for use in making building material, thus creating a disposal problem. In addition, the efficient operation of electrostatic precipitators can be compromised by the high carbon content of the dust. Carbon levels are likely to increase further if future legislation imposes increasingly stringent NO_x targets.

With the issue gaining importance both in the UK and overseas, the aim of the advanced coal combustion modelling project is to develop and validate an improved combustion model for predicting the combustion efficiency in pf fired utility boilers. The model techniques will be able to:

- predict carbon burnout in new boiler and firing system designs
- identify the impact of different coals on existing boiler and firing system designs



CFD analysis used for char burnout optimisation in a low NO_x pulverized fuel burner

SUMMARY

A number of key plant parameters and processes affect the carbon-in-ash including fuel grindability, reactivity, mill performance, classifier performance and fuel supply (both around the furnace and within flames). A significant amount of development work is required to understand the interaction of these processes and their impact on unburned carbon in full-scale industrial plant. More accurate ways to predict char burnout and process parameters will be identified and incorporated in the model. The feasibility of using these more precise computer sub-models for the development of the predictive technique will be investigated.

There is a need, for overseas plant in particular, to provide rapid but accurate predictions of combustion efficiency over a wide range of coals and plant types. This will enable operators to respond to opportunities for purchasing coal for plant supply within the short timescale (1-3 days) necessary to exploit such opportunities.

COST

The total cost of the project is £102 400 with a contribution of £50 400 from the DTI

DURATION

May 2000 – April 2002

CONTRACTOR

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In collaboration with Innogy plc and ALSTOM Combustion Services Ltd

Further information on the Cleaner Coal Technology Programme, and copies of publications, can be obtained from:
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CLEANER COAL TECHNOLOGY PROGRAMME

Project Profile 288