

IMPROVED MATERIALS FOR ADVANCED PF BOILERS AND STEAM TURBINES

OBJECTIVES

The overall aim of the project is to ensure the continued participation of major UK power generation organisations in the European Co-operation on Science and Technology COST 522 initiative. The project covers two distinct areas of the COST 522 initiative, steam power plant and plant integration & ancillary components. The specific objectives of these two groups within COST 522 are to demonstrate advanced components for the supercritical boiler and steam turbine that will permit thermal efficiencies of 50% to be achieved and to develop technology (gasification, heat exchanger, hot gas clean-up) for alternative cycles and fuels that will play a major part in future high efficiency low emission power plant. Specific objectives for the participants within the project are the development of:

- advanced material technologies to enhance the performance of critical components thereby increasing efficiencies and reducing plant emissions
- lifting techniques and methods to improve prediction of materials and component behaviour under service loading, leading to accurate life prediction, improved design, reduced plant downtime and increased availability
- plant integration, advanced control and monitoring techniques to enhance the performance, reliability and availability of mechanical systems and to optimise plant performance

Strategies and business opportunities for UK companies in the power generation sector will also be identified.

SUMMARY

The major challenge facing the power generation industry in the 21st century will be to achieve the targets of increased efficiencies brought about by stringent environmental regulations, whilst ensuring reliability, availability, maintainability and costs are not compromised.

In respect of steam power plant, short term (five years) quantitative targets have been set to demonstrate advanced components for the supercritical boiler and steam turbine. The operating temperature target has been set at 650°C with appropriate increases in steam pressure (>300 bar) and, with cycle optimisation, thermal efficiencies of 50% should be possible. Compared with the performance of existing UK steam power plant, this constitutes a relative efficiency improvement of 25%. These targets are based on the incremental development of the most advanced ferritic and austenitic materials currently available rather than developing an entirely new generation of ferritic, austenitic and nickel alloys.

The plant integration and ancillary components group plays a key role as it takes a total plant and links the various activities performed into the overall project. It deals with fuel related problems, process simulation, control and monitoring and constructional issues associated with future plant components. A strategic view is being taken that alternative cycles and fuels will play a major role in future world power generation. Although much of this may be beyond the five year timescale of this project, significant work needs to be performed on gasification technologies, high temperature heat exchangers, and hot gas clean up. For this reason such developments will be taken up with a view to securing the long term future of advanced power plant.

COST

The total cost of the project is £2 482 000 with a contribution from the DTI of £1 205 350

DURATION

5 years commencing September 1999

CONTRACTOR

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In collaboration with

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Boiler furnace burner panels

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