

Implementation of Material Models in Design Procedures (CPD4C)

Project CPD4C was concerned with the implementation of materials models in design procedures for composite components. The CPD4C project was part of the DTI Composites Performance and Design (CPD) Programme 1997-2000 and more specifically CPD4 on specific issues of manufacture, safety and design. Complementary issues covered in other CPD4 work included: Repair Technology (CPD4A), Manufacturing/Processing measurements (CPD4B), NDT Methods (CPD4D), Fire Test Programme (CPD4E), Machining and Specimen Preparation (CPD4F), and Friction and Wear (CPD4G).

The underlying theme behind CPD4C and its predecessor projects is the fact that the absence of engineering procedures is felt by many to be one of the primary impediments to the uptake of composites by industry. Manufacturers need them for a baseline against which to design their products. Material suppliers need them so they can tailor their input to the front end of the supply chain. End users need them to provide confidence that the products they will buy will meet their needs. The regulatory agencies also need them to provide the necessary guidance and tools in order to make judgements on fitness for purpose. Without this infrastructure it is difficult for a market to become established and evolve, and hence it increases the hurdles in competing with other materials where there is an established backdrop of documentation.

The primary objective of CPD4C was the establishment of an exploitation route for the composites materials models that have been developed in previous DTI programmes. The models are contained within a software suite, PREDICT, which contains a number of programs that are concerned with prediction of mechanical properties and the response of a composite structure under mechanical load. The project continued the collaboration between AEA Technology and the National Physical Laboratory in the area of composite materials modelling and design.

The chosen route for exploitation was the 'Composite Toolkit' project. This is a joint initiative involving the CPD4C team (AEA and NPL) and DERA the objectives of which have been to establish a framework for the integration of a set of composites design tools. To develop the 'toolkit' itself a technical software company, SER Ltd (formally PAFEC Ltd) was employed. A modular approach was adopted that allowed the linking of a number of design tools both between themselves and to a common materials database. The structure that was adopted also allows the subsequent addition of new 'tools' as and when they are developed. The PREDICT software suite has been incorporated within Version 1.0 of the 'Composite Toolkit' and this has now been issued to a number of industrial users.

As well as reviewing the work undertaken in achieving the primary objective of the project other aspects of the work included: provision of internet access to the materials analysis; development of design procedures and the application to selected case studies.