NPL

# CoDA

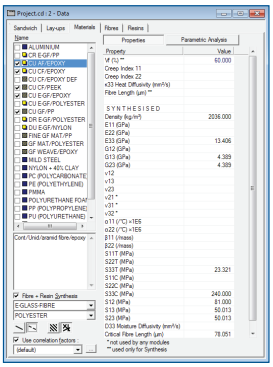
## *Component and Composite Design Analysis*

CoDA is a product of the Composites Group of the NPL Materials Division. It is based on several years research, which included extensive experimental validation. Major UK companies assisted with the developments through advisory panels and additional funding.

The CoDA PC software is used worldwide in a range of industrial sectors (material suppliers, end users and fabricators) and universities.

# Modules

CoDA is available in seven individual modules, each capable of operating on its own, but also fully integrated into the common user interface and data structures. Extensive experimental validation testing has resulted in reliable predictions using correlation factors.
The seven modules are:



**Panels** (rectangular or circular, with point, line or pressure loads, ribstiffened)

**Beams** (T, I, U, box, tube, angle sections in various configurations, with local buckling analysis)

**Laminates** (CLT analysis for 3D stiffness and strength, moisture, conduction, fatigue)

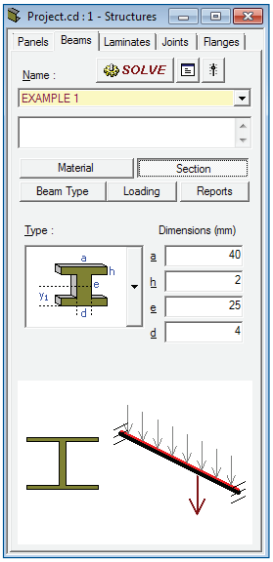
**Joints** (bolted or bonded doublelap joints in tension)

**Flanges** (thick curved beams with through-thickness stress-field)

**Synthesiser** (material property synthesis, 3D stiffness, strength, hygrothermal)

**PREDICT** (micro-crack initiation propagation simulation)

Furthermore, four modules (Panels, Beams, Joints, Synthesiser) have parametric options that enhance their design capabilities.

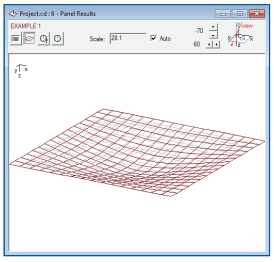


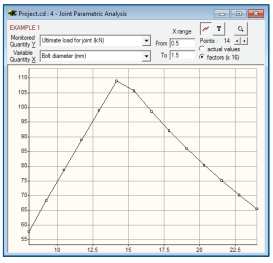

# What is CoDA used for?

The CoDA program enables preliminary design analysis of components or subcomponents to be quickly and easily undertaken.

CoDA allows rapid assessment of the effect of choosing different design solutions and gives high degree of physical appreciation of the relative effects of different input parameters (eg different edge conditions such as clamped, simply supported and free for both beam and panel analysis). This allows a preliminary analysis to be undertaken to determine feasible combinations of material and geometry prior to more detailed analysis or "build and test".

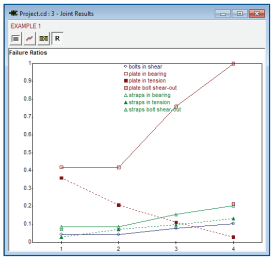
Material properties can be isotropic or orthotropic. For material systems where property data are not easily available, CoDA can synthesise the properties of composite materials, laminates and sandwich structures from fibre and matrix, or material databases. Fibre formats can be continuous or discontinuous, aligned or random. As experimental data are often incomplete, predicted, user or mixed properties can be used within the design modules.

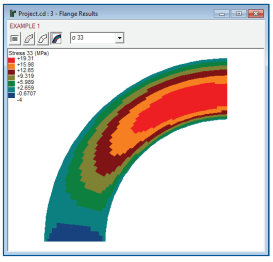




The integration of the modules allows the effect of changes on any input data (eg fibre properties) or laminate parameters (eg fibre angles, skin thickness) on the design solution to be instantaneously assessed in a seamless manner.

In addition, parametric options allow "what if" scenarios to be rapidly assessed for all output data as a function of variations in the input data. The effect of a particular input parameter on all output parameters can also be readily scanned.





The synthesis capability of CoDA is used to predict the 3D mechanical and 2D hygrothermal properties of potential development materials to predict microdamage, moisture and temperature properties.

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|---|---|
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