Composite Engineer's Viewpoint

Rik Heslehurst PhD, MEng, BEng(Aero), CPEng

Designing with Composite Materials
Part 1 – The Design Specification

Before any materials are bought, or any major capital is spent, or, indeed, before any numbers are crunched, the **Design Specification** must be developed. The design specification will tell all involved in the product what the primary and secondary aims of the design are, and the requirements of the design are clearly spelt out.

The design requirements cover a vast breadth of issues, most are listed below.

➢ Performance of Basic Functions	➢ Resources Available
➢ Intended Users, Market Constraints	➢ Support Requirements
➢ Occupational Health and Safety	➢ Ease of Use
➢ Human Factors/Ergonomics	➢ Political Issues
➢ Effect on the Environment	➢ Company Constraints
➢ Environmental Effects	➢ Quality and Reliability
➢ Manufacturing Factors	➢ Testing
➢ Life of Type	➢ Patents
➢ Life Cycle Factors	➢ Competition
➢ Failure Modes and Effects of Failures	➢ Standards and Specifications
➢ Costs	➢ Customer Satisfaction
➢ Distribution and Packaging	➢ Quantity, Weight and Size
➢ Aesthetics	➢ Materials

The design specification can be developed using several techniques. One very successful technique is the Quality Functional Deployment (QFD) method. The QFD approach follows an 8-step process as outlined below.

- **STEP 1**: Identifying the customer(s)
- **STEP 2**: Determining customer requirements
- **STEP 3**: Determining relative importance of the requirements
- **STEP 4**: Competition benchmarking
- **STEP 5**: Generating measurable engineering specifications
- **STEP 6**: Relating customer requirements to engineering specifications
- **STEP 7**: Identifying relationships between engineering specifications
- **STEP 8**: Setting engineering targets for the design

By covering all the design factors, developing a clear and workable design specification and liaise with the product client, the first part of designing and producing an effective and efficient composite structure is set.

Next time I will cover the selection of the fibre and resin materials, and the methods of manufacture. I also welcome questions, comments and your point of view. Feel free to contact me via r.heslehurst@adfa.edu.au. I may publish your questions and comments, and my response in future newsletter.
