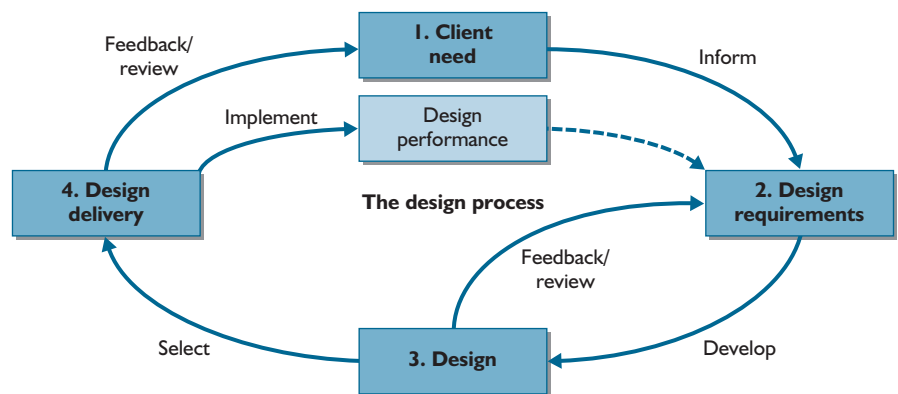


## 2 The heating design process

### 2.1 The design process

Design involves translating ideas, proposals and statements of needs and requirements into precise descriptions of a specific product<sup>(4)</sup>, which can then be delivered. (See Figure 2.) Two major features characterise the design process in general. Firstly, design tends to evolve through a series of stages during which the solution is increasingly designed at greater levels of detail, moving from broad outline through to fine detail. Secondly, design tends to contain iterative cycles of activities during which designs, or design components, are continually trialled, tested, evaluated and refined. Feedback is therefore an essential component of the design process, as shown in Figure 2.

Figure 2:  
The design process



Within construction, design is a part of the larger construction process, as shown in Figure 3. Both the RIBA Plan of Work Stages<sup>(5)</sup> and the ACE Conditions of Engagement Agreements A(2) and B(2)<sup>(6)</sup>, which are commonly used for mechanical and electrical building services design, divide design into the separate stages of outline design, scheme design and further/detail design. In practice, therefore, the construction design process is invariably iterative, with many design steps being revisited and revised as the design evolves and develops, and this necessitates constant communication and clarification between team members.

RIBA plan of work (1999)	ACE Agreements A(2) & B(2) (2002)	
A Inception/Identification of client requirements B Strategic brief	C1 Appraisal stage C2 Strategic briefing	Pre-design
C Outline proposals D Detailed proposals E Final proposals	C3 Outline proposals stage C4 Detailed proposals stage C5 Final proposals stage	Design
F Production information	C6 Production information stage	
G Tender documentation H Tender action	C7 Tender documentation and tender action stage	
J Mobilisation/Project planning K Construction to practical completion L After practical completion	C8 Mobilisation, construction and completion stage	Construction

Figure 3:  
Construction process stages

## 2.2 Heating design process

The problem with the standard design process is that it is both complex and lacking in design task details. Although design is a clear part of the process, detail of the design tasks involved is not given beyond global statements such as ‘develop the design and prepare sufficient drawings...’.

Therefore, a simple straightforward design sequence for heating design has been developed (see Figure 4 over the page) to both clarify the process and allow detail of specific design tasks to be added. This gives a simplified linear design sequence, from the pre-design stage through the various analysis, decision and calculation steps through to the final solution, enabling design tasks to be clearly linked to both preceding and succeeding actions. Although some feedback loops are shown, in practice there are often feedback loops between all tasks and even within specific tasks, reflecting the more iterative nature of real-life design. Further detail on all of these steps is available in section 3.

It is important to still set this in the context of the full design process. In practice there are several design repetitions within the various stages, and overlaps from one stage to another. For example, information on overall space requirements and plant structural loadings is often required by other team members at the outline design stage. This degree of detail is unknown at this early stage therefore often assumptions and approximations have to be made in order to provide information. It is vital that these are checked as the design progresses.