notable attempts to explore the implications of this is to be found in the housing work of the Dutch architect Habraken who believed that 'the process simply does not work if the occupants are not involved'. This led Habraken to write his famous treatise, *Supports*, in which he advocated the deliberate separation of those parts of the solution which he thought must be determined by the architect from those which he felt must be more capable of being determined by the users. This leads to a design process which consciously allocates responsibilities between designer and user (Habraken 1972).

Practical

The practical constraints offer fertile ground for guiding principles. For those designers who are fascinated by the materiality and process of making things, these practical constraints can offer major generative design ideas. The so called 'high-tech' school of design depends on the glorification of the technology and the expression of the technology in a very self-conscious way.

In architectural design, the business of making buildings stand up, span large spaces and withstand the forces of nature offer a whole range of structural ideas. For some designers the structural elements should describe how they do their job. Thus Richard Rogers tells us that he designs each structural member to be efficient and reflect the nature of the loads imposed upon it:

> Tension chords become the thinnest of solids, compression members are steel tubes; the differing diameters describe the various loads each member must carry.
>
> (Suckle 1980)

By contrast, Arthur Erikson tells us that:

> I have long preferred in spite of structural inefficiency, the visual ambiguity of columns and beams being the same size. Logically the beams should be narrow and deep for bending moments and the columns in compression proportionally smaller, but this makes for a great deal of visual tension.
>
> (Suckle 1980)

The great architect and engineer Santiago Calatrava studied moving folding structures for his doctorate. To this day he retains a keen interest in the idea of 'dynamic equilibrium' in which structures balance but in rather more athletic ways than the more normal, rather static forms used in architecture. Calatrava is fascinated by the human body and in particular its ability to move and thus take up a variety of

configurations each of which is stable and suitable for resisting a particular set of forces. The exhibitions of his work show how he explores these ideas in abstract sculptures as well as in realised designs:

> It is very good to do a sculpture because you can have it at home and look at it every night, you can meditate on it and turn it. This is the only quiet moment in the whole process to bring a project to realisation . . . this focus is very important because it gives you a certain authority . . . you can also show it to people and they understand.
>
> (Lawson 1994b)

Calatrava is also fascinated by the properties of materials rather than just the structural configuration of his work:

> For me the antagonism between materials, especially materials like steel and a material like concrete or stone creates a simple dualism which you can see sometimes in the sculptures. I have done this with two or three materials hitting each other.

Often we find the design ideas are not as new as they first seem, and in this case Calatrava himself readily acknowledges the historical influence of Violet-le-Duc on his work. The interior designer and architect Eva Jiricna also uses a design process very much driven by decisions about materials:

> In a way material dictates the concept . . . and materials are not interchangeable . . . to me the material really is the starting point of the story.
>
> (Lawson 1994b)

Keeping engineering and technology in the background can be a guiding principle as much as expressing it. The product designer, Dick Powell considers that they 'should simply be slaves of the market place':

> It's people who determine what products are. We've been entrusted with the task of trying to reflect what people want. We have to bend technology to suit that purpose . . . our work is a constant compromise, a half-way point between artistic creation and a logical engineering approach to design.
>
> (Gardner 1989)

This difficult balancing act is referred to by the architect Ian Ritchie who has something of a 'high-tech' reputation but who nevertheless does not feel that technology is a design generator for him:

> When people ask me this question I use an analogy. I describe this beautiful parrot sitting on my shoulder – multi-coloured, very beautiful – called 'technology'. Very often he leaps off the shoulder and onto the