

MARKET DEVELOPMENT: THE UK EXPERIENCE

Andrew J. Minson

Executive Director of the Concrete Centre, UK

Abstract

Concrete is the most widely used material in the world but there is no room for complacency. The UK experience demonstrates that alternative materials can be chosen to replace concrete for large percentages of the market place. In addition as new markets develop there is no automatic right that concrete is chosen.

There is a need to invest in activity to ensure concrete can compete with alternative materials - that concrete is “on the playing field”. This activity requires technical expertise and understanding of designing projects in concrete to be able to influence standards, regulations and industry guidance. It is an extension of license to operate activity and expertise in the material or concrete products themselves. These activities are essential but not sufficient.

There are further opportunities for specific target market development, and in the UK this has focussed on multi storey buildings, housing, offshore wind foundations and more recently roads. In the first two markets, market share statistics show a recovery in the fortunes of concrete and concrete products following investment in activity. The new market of offshore wind foundations is yet to show a return on investment.

Keywords: Marketing, sustainability, steel, timber

1. INTRODUCTION

Concrete is the most widely used material in the world but there is no room for complacency. The UK experience demonstrates that alternative materials can be chosen to replace concrete for large percentages of the market place. In addition as new markets develop there is no automatic right that concrete is chosen.

2. THREAT FROM ALTERNATIVE MATERIALS

Steel has become the dominant structural material for long span steel single storey buildings with a UK market share in excess of 95%. This contrasts markedly with the UK in the 1960s, when concrete dominated this market. The multi storey buildings market is also dominated by steel with a two-thirds market share. A doubling in market share was achieved in a 20 year period from 1980.

In housing timber frame construction in the UK almost trebled its share from 8% in a 9 year period at the beginning of this century. In all building markets, the cross laminated timber (CLT) product, currently imported into the UK from Austria, poses a new threat. It is a flat panel made up of layers of poor grade timber to form structural grade wall and floor panels of typically 180mm to 250mm thickness. This product together with glulam beams (which in the UK are more a threat to long span steel beams), offer a new palette of products to those wishing to construct using timber for its perceived sustainability advantages.

A third alternative material is plastics. The term plastic covers a whole spectrum of properties and performance but the common features of lightness and corrosion resistance make plastics a potential risk to concrete in many applications. Currently the most significant impact into concrete market share is in pipeline systems. Market share figures are not available but qualitative evidence is undeniable.

Finally, asphalt dominates as the material of choice in the UK for pavement construction and wearing surfaces. Concrete roads, particularly with concrete as the running surface fell out of favour in the UK because of joints and road noise.

The threat from alternative materials exists in new markets as well. For example, offshore wind is a huge potential market for concrete with approximately 1,500 towers to be built by 2020. The foundations of these could be 5,000 tonne of concrete each – or they could be founded on steel bases.

3. COST

It is a given that concrete products need to be available and cost effective in order that market share can be defended, market share grown or new markets entered into. Availability and cost effectiveness can be, and is supported by trade associations and this license to operate activity.

However, cost effectiveness is also a function of how designers can use the products. For examples of how this impacts market share we can learn from history. How did the UK steel industry win the multi storey buildings market? They made it cheaper to construct by standardizing connection details, refining calculation procedures so smaller beams were needed and reducing costs of fire protection by successfully lobbying for changes in regulations. The outcome was cheaper steel frames. The steel tonnage per building may have been reduced, but more steel buildings were built. The economy was not due to lower cost of the product per tonne, but lower cost of the solution.

In the UK we have responded by lobbying regulations and building standards to be advantageous to concrete and masonry. We have provided the guidance documents, computer software and training to equip engineers to develop the most economical concrete solutions so that these are more likely to successfully compete against steel. As a consequence we have halted the growth in steel market share in multi storey buildings and begun to make inroads.

Looking forward, there is extensive work to be done with design standards to ensure that concrete construction is not more expensive than it needs to be. Ten issues are listed in Table 1 which need to be addressed by the concrete industry during the the current revision process to of Eurocode 2 to ensure that concrete design remains as competitive as possible. Such a simple list does not do justice to the extensive work over many years in understanding these issues and the opportunities an dthreats that lie within them. The issues have been brought to the attention of the European Concrete Platform together with analysis of the potential impact on market share and investment required to address each of them

Table 1: Issues with EN 1992, Eurocode 2: Design of concrete structures, which offer potential commercial market advantage to the concrete sector

Deflection: client specified limits	Sway sensitivity
Deflection: codified calculation procedures	Punching shear
Concrete partial safety factor	Fire – to gain parity with other sectors
Design for say 91- day strengths	Compression anchorages
Bond and low cover	Detailing

4. SUSTAINABILITY

Sustainability is perhaps more significant in the UK than most countries. The perception of timber’s sustainability credentials, together with its perceived speed of construction and offsite manufacture, helped it nearly treble its market share in housing from 2000-2009. The new product of CLT is also marketed extensively on its sustainability credentials.

The UK concrete industry’s response on sustainability is now well established and widely respected. A concrete industry strategy bringing together cement, ggbs, fly ash, admixtures, aggregates, ready-mixed, precast and reinforcement is now in its 8th year. A single voice across all these sectors has enabled a more credible, consistent and effective voice. The message is improved sustainable production, unparalleled in-use performance benefits that enable whole-life sustainability and end of life recycling. We promote, local, low whole life carbon and long life’. The Concrete Centre has published extensively for the audience than make material choices or those that in turn influence them. A textbook “Sustainable Concrete Solutions“¹ brings together into one publication the sustainable story that can be told.

In general, sustainability credentials of concrete may not win much market share, but it can ensure concrete remains an option to be considered. The exceptions to this relate to performance characteristics such as thermal mass, fire performance and longevity, all of which can rightly be attributed as sustainability and do sometimes, in themselves win projects.

A specific market of note is offshore wind foundations. Some steel solutions are ruled out on environmental grounds, namely the vibration resulting from percussive piling which adversely affects porpoises, seals and some fish species. This makes concrete foundations more likely to be chosen.

Another specific example is that of highway central reservation barriers. Concrete barriers do not need repairing whereas the steel alternative had the adverse social sustainability consequence of 5 or 6 highway workers being killed per year whilst repairing steel barriers during night time lane closures. This was a key aspect in transforming concrete to be the overwhelmingly dominant solution for central barriers.

5. BEING ON THE PLAYING FIELD

“Being on the playing field“ describes our ambition that concrete can be chosen - that concrete is able to be considered an option because regulations, standards, voluntary assessment schemes, planning restrictions etc permit concrete to be chosen without undue restrictions. The issues addressed above - cost and sustainability - are very much a case of being on the playing field. A further example from recent years in the UK involved local planning rules for which there was a proposal for timber construction to be the default material unless good reason could be provided in local planning was successfully countered. This is a good example of seeking to ensure concrete is on the playing field. It is of note that the key arguments that won this argument were that concrete is local, offer low whole life carbon solutions, durable and fire safe and that designers are best placed to choose materials.

Educational work in universities to ensure future designers know why to choose concrete and how to design with concrete has obvious merits but in the UK over the recession this work has been significantly curtailed. An effective activity that has been retained, maquerades as a competition. Concrete building design is embedded as a design project into the course work in the final year of engineering courses by providing a design brief and a caompetition format where the best entry from each university is entered for national judging. More information on this, including the design problem set each year and summary video can be found at www.concretecentre.com.

6. TARGET MARKETS

Specific work on market development in the UK is focussed into target markets – the resource cannot stretch to try and grow or defend market share in every possible market. For several years The Concrete Centre, over and above the work already highlighted in this paper, has concentrated on target markets of multi storey buildings, housing and offshore wind. More recently concrete roads with asphalt wearing surface has also been the focus of attention. These markets are chosen for special efforts because of the potential return on investment in them.

The multi storey market has been a target market since The Concrete Centre was formed in 2003 and there has been established an extensive library of documents on:

- Performance (e.g. thermal mass, fire)
- Construction method (e.g. post tensioning, hybrid, precast)
- Analysis Methods (e.g. Eurocode 2, finite element analysis, vibration analysis)
- Sectors (e.g. offices, schools, tall buildings)

For this market there are many professionals who influence material choice. A study of this and what impacted their decisions was the subject of research funded through The Concrete Centre. An example output is presented in figure 1. Such research findings helps target efforts to ensure efficient use of resources.

The benefits of work in this market has been seen in the reversal of some of the market share gains by steel from 1980 through to 2005.

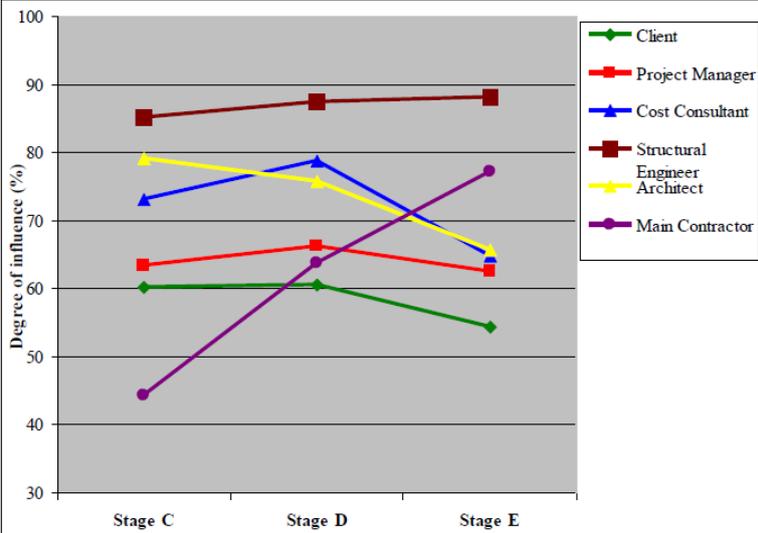


Figure 1: Respondents’ view of the influence of the project team members during concept (stage C), scheme (stage D) and detailed (stage E) design stages showing that the structural engineer has the most significant degree of influence on material choice²

The Housing market has been addressed in a similar manner as above with architects being the dominant decision maker and structural engineers rarely featuring. There are three further additional features of note. A significant amount of the innovative end of the market is self-build, and these offer a particular client audience that do heavily determine material choice. Social housing (or public housing) is also worthy of note in that it can affect associated private housing developments where planning requires a mixed tenancy provision. And finally major house builders dominate the UK market and even though architects, whether working in-house or as consultants determine material choice, the build repetition can influence commercial decisions even to the extent of purchasing timber frame manufacturing capacity.

The benefits of work in this market has been seen in stemming the rise in timber frame market share as demonstrated in Figure 2.

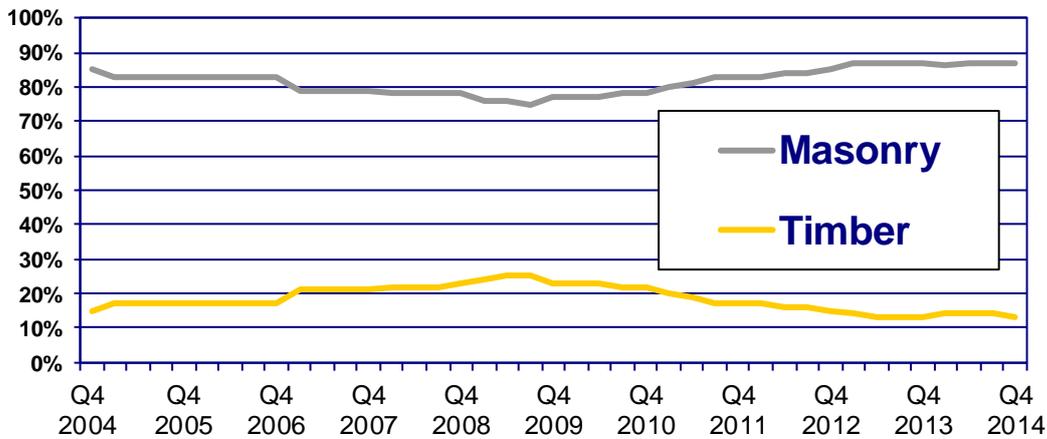


Figure 2: Low rise housing timber market share data from NHBC³ (Masonry is assumed as 100% - timber frame %)

The Offshore wind foundations market has offered different opportunities to influence market share. These have arisen because:

- Design teams have committed to concrete as a solution and have become co-workers in championing concrete solutions
- A single landlord exists for the UK seabed and hence for all wind farm development
- There is no established solution for deep wind turbine foundations because it is new.

As a consequence, the mix of activity and the funding for this market this has been distinctive from other markets with an Offshore Wind Interest Group being formed with companies beyond the concrete industry. It is still too early to determine a return on investment, as the deeper wind farms are only now receiving planning permission.

Finally the roads market has recently opened up because of rising bitumen prices and a focus on whole life low maintenance pavements. This has arisen because of a change in ownership/funding of UK highways which places it at more distance from government. In private hands, the appeal of low maintenance solutions increases and concrete is considered more favourably. However, this does not include concrete as a running surface as it is still considered to be unacceptably noisy.

7. CONCLUSIONS

The experience in the UK is that there is both a need and an opportunity to address market share of concrete. Alternative materials will be used at the expense of concrete unless action is taken, but action can change perceptions, decisions and ultimately market share.

REFERENCES

- [1] Georgopolous, C and Minson A. Sustainable Concrete Solutions. Wiley 2014

- [2] Haroglu H. Investigating the structural frame decision making process. Loughborough University
December 2009
- [3] NHBC. Housing Market Report. March 2015