Use of timber in projects construction essay

The informal interviews revealed some additional factors, not discussed in the literature review, which may have helped to shape the position of timber within the marketplace in the UK. These factors were included in the formal questionnaire and are discussed below.

Time to complete timber construction projects

Discussion with timber engineers revealed that the time taken to build on site with timber is longer than typical steel structures. Though we would not wish to suggest that careful engineering of steel structures is any less important, it must be accepted that the steel construction in the UK has a very well established track record for single storey non domestic use. Steel sheds for commercial and industrial use are ubiquitous the length and breadth of the UK and, by association, the engineering and site skills which produced them must be very well established in the UK construction industry.

How long history of steel construction manifests itself in a construction project can be quite subtle. The bolt length in steel is 30mm but timber can be 300mm so tolerance to fit them on site is far narrower with timber. Timber engineer, Peter Steer remarked that to get the bolt into its fixing can be highly problematic and can cause delay for inexperienced fabricators. Such delay simply wouldn’t happen for steel fabrication as the skill involved in fitting a 30m bolt is commonplace compared to a 300mm bolt. There are very many more steel fabricators with the skills to deliver the former but far fewer timber site specialists who can comfortably deliver the latter. So the tendency is for delay on site. It is difficult to compare timber projects with an

exact match for a steel frame project but timber structural engineer Frank Werling said that engineered timber structures can require 3 weeks to engineer versus 1 week for steel.

Price differential between steel and engineered timber sections

Nick Milestone, MD of B & K Timber Structures said that the rising price of steel during the period 2000-2008 saw the price of engineered timber draw closer to comparable steel sections. This gave greater price competitiveness to timber suppliers and the use of timber gradually became more widespread in the UK. The word ‘ gradually’ must be emphasised there because long span timber structures were still quite rare until very recently when supermarkets and their architects led the way in demanding timber for these low rise, long span timber structures. Even though steel prices were climbing rapidly there was such a weight of expertise, of established supply chains and comfort of architects and clients in steel structures that steel retained its hegemony in the market.

However since 2008 steel has crashed from circa 1400euro to 1000euro a tonne. This has coincided with a drop in the value of the pound relative to the euro. (European Central Bank statistics www. ecb. europa. eu/stats) The result is that, although the disparity between steel and Glulam sections had narrowed to approximately 10% in 2008, it is now over 40%. However demand at B&K timber structures hasn’t fallen while the price differential has widened during the past 2 years. This may be because there are other drivers such as the high aesthetic of Glulam beams and the sustainability of using timber structures that are keeping timber buoyant in the marketplace.

Supply of engineered timber for large framed structures

Tim Reynolds of BRE explained that UK timber eg Sitka spruce has a strength grade of C16. That grown in the drier EU countries is C24 or better. Glulam requires at least C24 timber. Therefore, here in the UK we must accept a situation where our own forests cannot produce timber of adequate strength grades.

Either the timber is imported from other countries for UK factories to produce the Glulam, or Glulam sections are bought ready made from factories overseas. If the former situation were to take place then a company would need to find enormous start-up costs to procure the right machinery and train the workforce necessary to begin producing large Glulam sections. This would need to take place against a growing but still relatively minor market share for engineered timber frame construction in the UK. Furthermore, this hypothetical new UK Glulam factory would still be competing against established European competitors who have developed their expertise and can use locally sourced timber. In fact, often the large forestry and sawmilling companies in EU nations have sufficient scale and turnover to be able to afford the capital investment necessary to develop their own Glulam manufactories. This could not realistically take place in the UK where, not only do our forests produce insufficiently strong softwood for Glulam manufacture, but the forestry industry is diffuse. Small UK forestry firms with modest turnover are content to sell their lumber for fence posts and other lower grade uses. They would be unlikely to find the capital necessary to establish their own Glulam manufactories.

Where timber buildings, such as grid-shell structures, can be built with lower strength UK grown timber there has traditionally been a problem with the supply from the UK forestry industry, according to Peter Wilson of the centre for Timber Engineering at Napier University. The Scottish enterprise centre identified this as a key barrier to development of UK forestry into higher value added markets. It came to the conclusion that the barrier to using UK grown timber was a lack of qualified engineers who understood the potential of the material. For this reason the centre for timber engineering was set up. Peter Wilson says there has been a significant improvement in the skill base in the UK but there is still no culture of building with timber in the UK. Also, here the forestry sector is fragmented and, apart from isolated examples such as the magnificent Savills Grid-shell building, earns its living at the bottom of the value chain with fence posts and pallet manufacture. Due to this fragmented and low earning forestry sector there is little capital to invest in plant and sawmill machinery. By contrast, Scandinavian, Austrian and German forestry companies are large economic concerns with the capital to set up Glulam manufactories where start-up costs can be 20 million euro or more, almost as a secondary concern. No UK timber company or forestry company would be able to set up such a facility. This is likely to remain a structural reason why high strength structural engineered timber must be imported into the UK. This may have implications for surety of supply and cost differentials due to exchange rates.

UK traditional procurement methods

According to survey respondents the UK has, to some extent, lagged behind mainland Europe in the adoption of Project Management procurement

methods, or Novated design and build, where a site structural engineer can be part of the design team at an early stage. There are fewer architects experienced and skilled enough in designing the connection details of large span timber structures in the UK due to the relative scarcity of such projects. By contrast architects who can design and work with steel connections in relative comfort are far more common and all stages of the design process for steel structures are so well established in the UK that the plans are efficiently realised on site by the steel fabricators.

The relative lack of recent project experience from UK architects with timber means that the involvement of a site structural engineer is of great importance. The connection details can be complex and often need to be prefabricated to specific design tolerances before they can be assembled on site. A traditional procurement process would tend to leave these connection details until later in the process when there is a pressing and critical need for erection of the structure on site. As the site engineers in this traditional process will be unlikely to have been involved in the design team then there will be inevitable delay as they attempt to interpret the plans of the design engineer. At this point, the costs incurred by the site fabricators are higher as they are devoting more resources into carrying out plans that they have not been involved in. This lack of communication or cohesion in the design of the engineering element of the building can have cost implications and act as a disincentive to design timber structures.

If we look at the example of the Savill building at Windsor great park Green Oak Carpentry’s Site Manager, Steve Corbett, said “ there were genuinely no real problems with the construction”, which he attributed to the architect

commissioning Buro Happold and Green Oak Carpentry early in the design phase so that engineering issues were addressed as part of the design from the start.

Mark Feely, a chartered architectural technologist, who worked on a recent RICS award submitted design for an ASDA timber store in Oldham told me that his client pushed for a sustainable green store and Finn Forest UK Ltd were employed before the architect. It was a design and build contract so it was unusual to go straight for a technical supplier without competitive tender. Mark explained that sometimes this unusual sequence of procurement happens when a contractor is persuasive with a client and can demonstrate a technical mastery of a structure that suits their needs. This possibly lends weight to an argument that both clients and architects lack the experience of working with these timber structures and are looking for technical leadership from contractors who, as we have discussed, are few in UK construction. This ASDA store was also deemed to be time critical as there was a clear marketing strategy to keep pace with Tesco who had recently procured a timber framed store building.

Fire risk, perception of risk and insurance implications

Suppliers of timber structural products said that they faced a perception from clients that their building insurance would be higher due to a perceived high risk of fire. Discussions with fire engineers at insurance companies have suggested that there is no price difference fixed for timber structures and it depends on the overall building design and detailing.

Skills and training in design and assembly of timber structures

There are fewer carpentries in the UK than in other EU countries where there is a tradition and a demand for timber building in non domestic settings. For timber contractors such as B&K structures, the demand for their services can outstrip their capacity and as there are few competing companies the order books become full and projects may struggle to find contractors without booking well in advance of the project. This would also suggest that the price of carpentry is kept buoyant by a relative lack of competition.

At the Napier school for Timber engineering there has been a recent surge in applicants for courses in timber engineering to Eurocode 5 on 31st March 2010. The courses were oversubscribed and, while this represents a positive demand from qualified timber engineers for developing their skills, there will be an inevitable lag effect. Engineers will need to familiarise themselves with EC5 and to become proficient with putting the new code into practise. Dr Julie Bregulla of the BRE told me that this is quite a significant barrier for the UK timber industry and stems from the ‘ almost cottage-industry’ nature of the sector. In other countries the timber sector has more resources to employ people to lobby and negotiate to have the code structured in a way that suits their industry.

Analysis of structured questionnaire

The table on (page...) shows the full data set from the respondents to the questionnaire. The statements listed were put forward to a range of leading figures from all parts of the supply chain in timber construction. Suppliers, clients, timber engineers, architects and academic research professionals

were asked to rank these statements from 0 to 10 with 0 at the end of the continuum where there was profound disagreement and 10 at the end where there was strongest agreement.

This data is expressed in the chart below, where the bars represent the highest, lowest and mean ranking for each question.