Response to the House of Lords Science & Technology Committee Inquiry on Offsite Manufacture for Construction – April 2018

Constructing Excellence is a platform for industry improvement to deliver excellence for clients, industry and users through collaborative working. Constructing Excellence has a national corporate membership spanning the construction supply chain from client to supply chain, as well as a network of associated regions and clubs across the England and Wales.

'Increased standardisation and pre-manufactured content' is a core part of our vision. In 2017 Constructing Excellence launched an Offsite Manufacturing & Technology Group that works across the construction supply chain to look at the issues affecting the implementation of Offsite Technology and suggest solutions to overcome those barriers. The group uses practical demonstrations and visits to delve into opportunities and benefits around offsite technologies.

A poll of over 100 participants at the December 2017 Constructing Excellence Annual Conference revealed 61% of respondents were positive that their organisation were in a good position to exploit the full benefits of offsite manufacturing and technology, whilst only 11% felt negative. This may reflect the positive and forward-thinking organisations that engage with Constructing Excellence rather than the industry as a whole.

Constructing Excellence firmly believes that offsite is only part of the solution. It needs to align with a shift in industry procurement towards whole life value and incorporate high value manufacturing techniques and digital technologies – doing what is currently done on sites is not going to effectively deliver the high quality buildings and infraststructure that the UK needs.

What are the opportunities offered by off-site manufacture for construction? What are the drawbacks to offsite manufacture for construction?

Opportunities

Fully embracing offsite manufacturing and digital construction has the potential to transform the construction industry. Increased productivity will come from greater utilisation of capital, elimination of waste in the supply chain, reduced time on site which will lead to greater predictability.

It has the potential to alleviate the industry's skills shortage by creating new job roles that are more attractive to the emerging workforce. There is a fear that the push towards offsite and associated automation that may lead to job losses. However, evidence from the manufacturing sector suggests increased automation mean a higher level of training and therefore opportunities to improve the workforce skillset and flexibility. High quality production and just in time service also require resources and training in Quality Asurance, planning and Health & Safety to support the supply chain.

Drawbacks

A clear message from Constructing Excellence members is that **early decisions** on offsite are required in order to deliver real value for clients.

The industry in its current form cannot deliver the full benefits of Offsite manufacture for construction. Existing procurement and contractual relationships are not geared up to recognise the full benefits of offsite manufacture. To realise its full potential clients need to have long term relationships in place with offsite providers and decisions need to be made much earlier in the process.

It is often claimed that offsite manufacture can lead to: lower costs, faster delivery and increased quality; increased productivity; improved health and safety; greater provision of new, affordable housing. What is the evidence for this?

Constructing Excellence has 18 years of industry performance data and benchmarking, which it continues to collect. The offsite theme group is developing a set of KPIs for projects delivered using offsite techniques in order to benchmark performance against traditional build methodologies.

What factors are likely to influence clients, architects, design engineers, contractors and the supply chain to choose or not to choose off-site manufacture?

Construction supply chains are often fragmented and inefficient. Across the supply chain construction product manufacturers have the opportunity to change the perception of their product from simple commodities. In order to add more value they need to get closer to their clients to really understand their requirements and how they define value, in much the same way as the automotive sector has done. This would require a movement away from traditional supply chains towards more integrated supply chains.

The existing contractual and procurement model does not encourage offsite delivery. When clients procure traditionally they are effectively limiting and even excluding the potential use and benefits to be derived from offsite approaches. The existing supply chains could take a flatter more integrated form, much in the way that has happened with the automotive and aerospace sectors. Factors such as increasing digitisation through Building Information Modelling (BIM) and the potential use of smart contracts could help enable this.

Greater **standardisation and harmonisation** of offsite approaches de-risks the implementation of offsite as clients are not limited to a single supplier on a particular scheme and also makes servicing and maintenance easier.

There is a need for verified and comparable evidence of the performance of offsite solutions in design, construction and operational phases. Constructing Excellence is working up a set of Key Performance Indicators (KPIs) which integrate with its existing KPIs to enable comparison across traditional and offsite methodologies.

Generating a **pipeline of repeatable projects** and elements that can unlock long-term investment and enable the industry to build on knowledge and transfer learning more effectively

between projects. The government presumption towards offsite is a very welcome intervention to help achieve this.

What are the drawbacks to offsite manufacture for construction?

Many of the perceived drawbacks of offsite manufacture for construction are linked to the current contractual and procurement processes, which do not allow offsite to operate at it's optimal levels. The effective implementation of offsite requires decisions to be made and confirmed at an earlier stage, effectively applying manufacturing principles to offsite. Moreover in order to benefit from the economies of scale offsite manufacture needs to deliver cost savings, the supply chain requires greater certainty of demand and longer term commitment from clients.

What re-skilling of the construction workforce is required to facilitate a change to more offsite manufacture for construction?

- More design for manufacture
- More manufacturing based jobs, including automation and digital technology
- Different skills on site in terms of logistics and assembly

Can the benefits of standardisation and factory manufacture be realised without hampering architectural ambition? If so, how?

Offsite manufacture opens up new possibilities for building design. It requires a new way of thinking in terms of design for manufacture and indeed, design for customisation, something which has been embraced by other industries without hampering design ambition. New skills are needed to deliver effective design for manufacture.

Generative design tools and a platform based approach with a pallet of products will help allow construction to start full advantage of manufacturing and its added value. This relates to the work that Constructing Excellence Members have been doing in the education space to identify a kit of parts for the education sector that can be configured to suit the specific site and client requirements, whilst still meeting Education Funding Agency requirements at higher spec and lower costs.

Finding ways to enable **early manufacturer engagement** whilst remaining compliant with European procurement regulations. This will enable tenders and procurement to be delivered in a way that supports innovation and SME involvement.

What R&D is needed, and by whom, to fully realise the potential benefits of off-site manufacture?

R&D needs to focus much more on higher technology readiness levels. Seeking practical implementable solutions and capturing learning on real projects. These include:

- Performance indicators for offsite manufacture, which map on to existing industry performance indicators.

- Developing standards to de-risk the implementation of offsite for clients and ensure consistency and maintainability. This is both on the technical and contractual side.
- Research into performance in use to ensure that offsite is delivering the quality and value required.
- The integration of digital technology into the design, manufacture and assemble process.
- Research into the application of high value and precision manufacturing techniques and principles on the delivery of buildings and infrastructure.

What changes could be made to public procurement processes to encourage more sustainable practises in the construction industry and facilitate off-site manufacture?

Procurement processes are in place to manage risk, and particularly in the public sector to ensure fairness and transparency. It is doubtful whether existing complex supply chains can be open and whether they do deliver transparency and that current processes were skewed towards traditional delivery. It was considered that existing procurement procedures can get in the way of early manufacturer engagement and therefore limit some of the advantages of offsite. Moreover, passing risk down the supply chain has the effect of multiplying risk. Informed and enlightened clients have the power to change this and change the attitude to risk.

Long term relationships: Suppliers invest in production facilities on the basis of long-term and certain demand based on standardisation and systemisation, making it easier to make long term investments in manufacturing facilities. Long-term relationships with clients, it can take 2 years of discussions with end clients before a part gets put on the production line. The steel industry is not without risks but those risks are clearly identified and understood so therefore investments can be justified. Short–term procurement models don't support long-term engagement with supply chains. Contracts need to change to support better, fairer payment mechanisms.