Traditional versus Modular Construction: a closer look

September 2021
The UK housebuilding industry is overdue for a shake-up. Despite the rapid advancements in digital transformation and technology, it has largely remained relatively unchanged. JLL undertook an analysis of the differences between modern methods of construction (MMC) and traditional housebuilding methods. The key findings focus on three areas – time, cost, and quality, design and sustainability.

1. Time

When considering the various differences between MMC and traditional housebuilding, perhaps the most obvious is time to completion. On average, off-site manufacturing reduces construction time on-site by 30%. Latest ONS figures show just over 175,000 homes were completed across England in 2019/20, well below the government target of 300,000. If MMC had been used and we assumed a 30% reduction in time on site, we could theoretically expect completions to be closer to 250,000, a net addition of 75,000 homes. Of course, time is not the only constraint to increasing UK construction capacity, but using MMC could support the government’s Build Back Better initiative and inject the market with the ability to increase the rate of delivery. As MMC benefits from economies of scale, with larger projects and increased uptake, we can expect to see an even higher time reduction in the future.

For PRS investors and affordable housing developers, this time saving directly translates to revenue generation, as they can fill tenancies more quickly and begin to collect rent. For local authorities, the ability to produce more social housing quickly provides much needed support as social housing completions have lagged private since the mid-1970s. In fact, according to a recent National Housing Federation (NHF) report (September 2020), 1.6m households in England alone are in need of social housing accommodation. MMC’s ability to deliver units more quickly could help alleviate this problem and is one of the main reasons it is being bolstered by Homes England’s Affordable Homes Programme (2021-26). The Affordable Homes Programme provides grant funding to support development of affordable housing, with increased incentives for those who incorporate MMC into housing delivery.

It would seem the time reduction on-site should be reason enough for more developers to explore MMC when the UK is in the midst of a housing crisis and perennially missing its 300,000 homes a year target. Unfortunately, it is unlikely the time savings alone will encourage private build for sale developers to fully embrace MMC, as they are more focused on delivery based on market performance.

2. Cost

As highlighted above, one of MMC’s main advantages relates to the time it can save in the construction process. However, at present it is not a cheaper way to build homes. MMC requires a constant pipeline, a repetition of product, and thus relies on economies of scale in order to generate ever-more efficient income. Thus, larger scale projects and a consistent pipeline would mean eventual cost savings, but as it stands today, the industry is not at that scale yet and is likely at least a decade away.

However, cost can mean a lot more than just build cost. If you take into account less time on site, council tax and rents coming in quicker (for PRS and social housing), less waste overall, less repairs down the line, and less disruption to neighbours and the community during construction, it could be seen as a cost benefit in the long run.

With MMC, it is also easier to maintain margin. Recently, markets have been impacted by rising prices in timber and steel. However, JLL’s recent interviews with several MMC providers in creating this research, found that none of them had experienced any build cost pressures post-COVID 19.

MMC in this instance largely refers to volumetric off-site construction (categories one and two)
3. Quality, Design, and Sustainability

Most notably, one of the biggest differences between traditional building and MMC is the ability to ensure a level of quality in the finished product that meets exact design specifications. Due to its repeatable nature and construction process in a controlled indoor environment, offsite manufacturers can guarantee their homes will achieve certain design standards and meet regulatory safety requirements. Design errors can immediately be identified in the prototype stages and then adjusted accordingly, mitigating risk. One of the biggest challenges currently faced by the housing industry is adhering to fire safety requirements and abating cladding risks. Post-Grenfell, there is a more stringent focus on building safety standards and rightly so. MMC has a clear advantage over traditional build in this capacity as each unit is an exact replica of the original design and therefore the factory can ensure regulatory standards are met. Additionally, as all the data for each design is easily accessible, it is easy to know the exact specifications of each unit so if there were any issues with materials it would be easy to identify which products were affected and thus easy to resolve. With traditional build however, there is no guarantee that the contractors were able to deliver to the exact design specifications for a multitude of reasons, namely ensuring they are hitting their margins.

It is becoming widely accepted that decarbonisation could be the single biggest driver for change in the construction industry. Recent data from the Department for Business, Energy & Industrial Strategy shows that in 2020, the residential sector accounted for 21% of all carbon dioxide emissions. The UK has committed to be Net Zero Carbon by 2050, and thus the homes being built must be highly energy efficient. According to volumetric manufacturers, MMC delivers at least an Energy Performance Certificate B (EPC). This is true of most new builds, regardless of if MMC or traditional building was used, as homes are now built with increasing environmental performance metrics in mind. Data from the MHCLG reveals that, as of Q1 2021, only 3% of existing homes in England had an EPC rating of A or B, compared with 82% of new build homes. The accompanying table compares the EPC ratings over the past five years for new builds and existing stock in England.

In their September 2020 report, ‘From the Green Homes Grant towards a resilient Net Zero economy’, The Energy Efficiency Infrastructure Group estimated that upgrading all UK homes to an energy performance rating of C by 2030 would require £73 billion investment in total, (equivalent to an average of around £3,800 per property). Based on the latest English Housing Survey EPC data, in England, JLL has calculated that if all 14.56 million homes currently rated below C were retrofitted to at least a C, it would equate to roughly 33,530 tonnes of carbon savings per annum\(^1\). This is the equivalent of 20,445 round trip flights between New York and London and this estimation is likely below the operational carbon emissions in reality.

---

\(^1\)EPCs are based on expected performance of specification only and in reality, in-use operational carbon could be quite different. EPCs also do not account for unregulated loads (e.g. washing machines)
Final word

JLL UK Residential Research Associate Kimberly Markiewicz, says: Through several conversations with both MMC providers and traditional developers, it is clear that a successful housing industry depends on transparency and collaboration between the two. The current system is ripe for change, and the UK housebuilding industry is building a lot of different housing products at a small scale. However collaboration is needed more than ever and in a more structured way. A new system is required where traditional developers engage strategically with MMC and agree on a similar design that can be produced at scale. Manufacturers need to come together and align on a system to share high quality specifications and designs so they are not siloed. Ideally, we would move to a system where clients come together, perhaps with Government intervention or incentivisation, to agree that go forward, we will design and provide a more similar product at scale and if you can’t provide it, you won’t get the work. Essentially, we need demand-led change to the supply chain, where demand from the end consumer dictates what has to be built and developers, manufacturers and funders deliver accordingly.