The Offsite market in the UK - a new opportunity for precast?

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The Offsite market in the UK – a new opportunity for precast?

Introduction
Concrete, both precast and in situ, is frequently the first choice, and sometimes the only choice, for the designers of civil engineering projects. In the residential sector, however, concrete experiences stronger competition from other materials such as masonry, steel and timber. Although precast concrete is a mature and developed industry, in the residential sector in particular it is frequently categorized as a MMC, or Modern Method of Construction. This paper discusses the relative position and image of precast concrete in the residential sector amongst clients (including the public), designers, producers, contractors and other stakeholders in the construction supply chain. Historical events such as the Ronan Point collapse are outlined. The results of a recent market survey by Loughborough University [1] and Robert Gordon University [2] are also presented.

Precast concrete in high-rise buildings
In May 1949, the first high-rise building was opened in the UK and since then around 2,700 tower blocks have been built in Greater London alone. More than 250 precast concrete “systems” have been acknowledged, but less than 100 were deemed to be sufficiently robust or durable to warrant further commercial development [3]. The design chosen for many of the high-rise buildings constructed in the 1960s was the “Larsen-Nielsen” method of using precast reinforced concrete panels. By 1960, over 165,000 precast concrete dwellings had been built, ranging from small single storey bungalows to large high rise (multi-storey) blocks [3].

These tower block developments had as much to do with politics as with architecture, partly due to the 1956 Housing Act which introduced subsidies to local councils for every floor that they built over five storeys [4]. The challenge for current precast manufacturers in the residential sector is to leave behind the association of some types of precast system with poor quality housing and social exclusion. If precast becomes linked again with these problems, then there will be a risk of it being viewed as a socially unacceptable system which, regardless of other technical merits and environmental benefits, will be viewed as a failure [5].

Ronan Point
Ronan Point was a 22 storey, precast reinforced concrete panel high-rise building which was constructed in March 1968. In the previous year, 470,000 new flats and houses had been constructed using this type of construction – the largest number recorded [4].

On the 16th of May 1968 a gas explosion in a corner flat on the 16th floor produced a progressive collapse of all the flats on this corner of the structure, with the loss of 4 lives. Progressive collapse is defined as a chain reaction of failure initiated by a loss of one or a few supporting elements [6]. The building was subsequently repaired and all the section joints were strengthened. Inadequate design and poor quality construction were blamed for the collapse.

The scandal that followed Ronan Point, combined with the running down of many public tower blocks due to under investment and the poverty of many of the inhabitants, served to undermine public confidence in high-rise precast concrete construction [7].

The public image of precast concrete did suffer significantly, and became closely associated with the social malaise of high-rise dwellings. Precast concrete in housing has therefore become unfortunately associated with the negative aspects of 1960s social engineering, even though it has been shown that any actual structural failures were due principally to poor understanding of materials technology, poor workmanship and a lack of quality control on site, rather than inadequacies in the actual design or construction technique.

Present image of precast concrete in the UK residential sector
People’s perception about “tradition” in housing has been found to be based primarily on material and to a lesser extent on form [2]. In general terms people are not resistant to new forms of prefabrication and standardization per se, although there is strongly held antipathy towards the old idea of post-war “prefab”.

Housing supply in the UK has also fallen in recent years to its lowest level since the Second World War and there is a shortfall in housing supply of between 93,000 and 146,000 units per annum, which is constraining economic growth in the UK [8].

A great opportunity not experienced for 30 years therefore exists for precast concrete in the UK due to the current government passion and commitment for MMC and offsite technologies. The challenge is whether the UK precast con-
crete industry can rise to the occasion and overcome its previous negative image sufficiently to compete with their newer emerging MMCs from the timber and steel sectors.

prOspA survey results
A survey was conducted to investigate the views of the UK construction industry on off-site production (OSP), based upon research carried out by Loughborough University as part of the ongoing prOspA research programme. More than 800 detailed questionnaires were distributed to three main types of OSP users – suppliers/manufacturers, contractors and designers/clients – and more than 80 questionnaires were completed and returned [1].

Demand for and awareness of offsite
Nearly three quarters of the suppliers surveyed thought that take-up of offsite by industry was increasing in their sector, and only one respondent thought that it definitely was not.

The majority of clients and designers (73%) claimed that they were sufficiently aware of the relative advantages and disadvantages of offsite over traditional construction, compared with just over half (54%) of the contractors surveyed. However, less than a third (30%) of the suppliers questioned thought that their customers were aware of the relative advantages and disadvantages of offsite over traditional construction.

Advantages
The biggest advantage of OSP compared with traditional construction is thought to be the decreased construction time on site, stated by about 90% of the respondents in this survey (Table 1). Increased quality also ranked highly by all respondents. A more consistent product and reduced snagging and defects were also seen as advantages.

Barriers
A recent study by Robert Gordon University was based upon the premise that house buyers are so strongly influenced by negative perceptions of post-war "pre-fab" that they will resist any innovations in house construction which affect what a "traditional" house looks like [2]. One of the conclusions of the study was that "resistance to prefabrication is a complex function of both rational and ill-considered biases amongst the full range of groups involved in housing provision in the UK".

It has also been shown that the public associate heavy-weight construction with solidity and added value and that the UK continues to prefer the secure and sellable image of heavy-weight construction [3].

The belief that using offsite is more expensive than traditional construction was found to be the main barrier to the increased use of offsite in the UK, even though a large proportion of the respondents thought that one of the advantages of using OSP was both a reduced initial cost and a reduced whole life cost (Table 1). Suppliers often argue however, that offsite is not more expensive as costs are not compared in the right manner in order to take into account advantages such as reduced on-site construction time and economies of scale [9].

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Table 1. Advantages of Offsite

<table>
<thead>
<tr>
<th>Advantages</th>
<th>% of respondents</th>
<th>% as 1st choice</th>
<th>% of respondents</th>
<th>% as 1st choice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decreased construction time</td>
<td>87</td>
<td>38</td>
<td>92</td>
<td>69</td>
</tr>
<tr>
<td>Increased quality</td>
<td>79</td>
<td>28</td>
<td>77</td>
<td>15</td>
</tr>
<tr>
<td>More consistent product</td>
<td>77</td>
<td>18</td>
<td>54</td>
<td>0</td>
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<td>Reduced snagging &amp; defects</td>
<td>79</td>
<td>8</td>
<td>69</td>
<td>0</td>
</tr>
<tr>
<td>Increased value</td>
<td>51</td>
<td>5</td>
<td>23</td>
<td>0</td>
</tr>
<tr>
<td>Increased sustainability</td>
<td>49</td>
<td>3</td>
<td>31</td>
<td>0</td>
</tr>
<tr>
<td>Reduced initial cost</td>
<td>44</td>
<td>3</td>
<td>15</td>
<td>8</td>
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<tr>
<td>Reduced whole life cost</td>
<td>41</td>
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<td>Increased flexibility</td>
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<td>0</td>
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<td>Greater customization options</td>
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<tr>
<td>Increased component life</td>
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<td>15</td>
<td>0</td>
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<td>Other</td>
<td>18</td>
<td>15</td>
<td>8</td>
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</tr>
</tbody>
</table>

Conclusions
This paper outlined briefly the history of use of precast concrete in the residential sector in the UK and discussed the negative effect that the accident at Ronan Point had on the use of precast concrete in high-rise construction. The current opportunity for the UK precast sector to help address the under-supply of housing is also discussed. The MMC and offsite market place is changing rapidly in the UK and the precast concrete industry must overcome its historically poor image within the house-buying public if it is to take full advantage of this opportunity.

References