Offsite Manufacturing in building services
Agenda

• Introduction
• History of offsite
• Developments
• Benefits
  – Health & Safety
  – Quality
  – Environment
  – Prelims/design
  – Program
  – Controls/commissioning
  – Whole life costs
• Challenges
• The future
History of offsite

Necessity is the mother of all invention...

- Shortage of raw materials
- Lack of skilled labour
- Housing shortage
- Manufacturing base
- Industrialisation of construction
Developments

Move towards integration
Developments

Move towards integration
Health & safety

- Working environment
- Site movements drastically reduced
- Reduced man hours on site
- Less vehicle movements/crane lifts
- Factory work is generally safer than site work
Quality

- ISO 9001
- Tooling directly linked to 3D modelling
- Use of mm accurate software (Solidworks)
- Rigorous and easier to implement QA procedures
- 5C’s & lean etc.
- Factory finish and testing
Sustainability

• Reduced deliveries to site
• Reduced packaging
• Reduced & easier to quantify CO2 output
• Reduced urban pollution
• ISO 14001 compliance
Prelims/Design
Program

• Large plant construction/installation can start before building fabric is in place
• Plant can be taken off the project critical path or moved later.
• Complex operations moved off site
• Less “hook” time required for crane
Controls integration

- Integrated controls
- Pre-wired
- Pre-tested
- Pre-commissioned
- Factory performance test certificates
Controls integration
Whole life costs

• Improved construction quality
• Possible improved running costs
• Improved PPM
• Lower over all installed cost*
• Accelerated delivery of building
Challenges

• Lead time
• Design
• Lead time
• Design

Good prefab can only happen with planning having a conventional design with no time will not work
The future
The future
The future

LPHW/CHW Pump Plant Room – **Current State** – On Site Assembly – ‘Example’

<table>
<thead>
<tr>
<th>Client Instruction</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Selection of components
- Detailed BIM/3D Coordination of plant room
- Approval of Coordination Drawings
- Production of shop/working drawings
- Order of components/fittings
- Manufacturing lead in of components
- Logistics & on site positioning (kit components)
- 1st Fix Plant Room – components/supports/plant/controls/pipework
- Test all connected components, electrical dead testing, 2nd Fix

<table>
<thead>
<tr>
<th>C_{t}</th>
<th>134</th>
</tr>
</thead>
<tbody>
<tr>
<td>NVA</td>
<td>90.87</td>
</tr>
<tr>
<td>VA</td>
<td>43.13</td>
</tr>
</tbody>
</table>

Total Time to completion (pre-final commission) = ‘Say’ 134 days
The future

LPHW/CHW Pump Plant Room – **Future State** – Off Site Assembly – ‘Example’

Total Time to completion (pre-final commission) = ‘Say’ 87 days

<table>
<thead>
<tr>
<th>Ct</th>
<th>87</th>
</tr>
</thead>
<tbody>
<tr>
<td>NVA</td>
<td>74</td>
</tr>
<tr>
<td>VA</td>
<td>13</td>
</tr>
</tbody>
</table>
Thank you