Off-site manufacture in Australian
Barriers and opportunities

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School of Property Construction & Project Management

RMIT University

CRC Construction Innovation
Building Our Future
Offsite Manufacture in Australia

• CRC Construction Innovation
• Report on the current state and future opportunities of OSM in Australian construction
• Workshops, interviews, case studies
  – NSW, QLD, VIC, WA
The industry’s views

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Off-site manufacture in Australia: Current state and future directions

Featuring seven case studies
Why consider OSM?
Why offsite manufacture?

Why offsite manufacture?

“inspirational unconstrained building design ...combined with highly efficient industrialised production”

(Source: www.manubuild.net, 2007)
Drivers and constraints to OSM in Australia
Drivers for offsite in Australia

Processes and management
- reduce construction time
- simplify construction processes
- provide fewer trades and interfaces to manage and coordinate on site

Quality
- provide higher quality, better control and more consistency
- produce products that are factory tried and tested

Costs
- reduce costs when resources are scarce, or in remote areas

OHS
- result in improved working conditions
- reduce on-site risks

Skills
- alleviate skills shortages in certain centres

Other
- revitalise ‘traditional’ manufacturing regions
- reduce waste on and off site
- improve housekeeping on site
- facilitate the incorporation of sustainable solutions
- achieve better energy performance.
Monarch Building systems
## Constraints to offsite in Australia

### Process
- lengthened lead times
- need to fix designs at an earlier stage of the project process
- need to specifically design products and building components
- very low IT integration in the construction industry
- high fragmentation in the industry
- interface problems on site due to low tolerances
- difficult and expensive long distance transport for large, heavy loads

### Cost
- appears expensive when compared to traditional methods
- high set-up costs

### Regulation
- restrictive regulations, especially between geographic jurisdictions
- a lack of codes and standards

### Perception
- a negative stigma and pessimism based on past failures
- union resistance
- a perception that it is restrictive and unable to deliver customer desires
- difficulties in financing

### Supply
- loss of control on site and into the supply chain
- limited capacity of suppliers
- inter-manufacturer rivalry and protection
- difficulties in inventory control
- low quality imports

### OHS
- possible increased consequences of incidents

### Skills/Knowledge
- a lack of professionals skilled in OSM
- a lack of manufacturer/supplier skills lack of a knowledge portal
Future Directions
Manufacture and Interface control – Housing example

- **OFFSITE**
  - **TRADITIONAL STICK & FRAME BUILD**
  - **PANELISED**
  - **MODULAR**

- **ONSITE**
Offsite Manufacture for Housing

- AusIndustry - Industry Cooperative Innovation Program (ICIP)
  - Concrete Prefabricated Housing via Advances in Systems Technologies (Concrete PHAST)
- Produce Technology Roadmap for Manufactured House
  - NSW, QLD, SA, VIC, WA
Concrete Prefabricated Housing via Advances in Systems Technologies (Concrete PHAST)

**Design / Consumer Demand**
- Standard product / Project home
- Production house with some changes
- Production house with many changes
- Full custom (one-off design)

**Product**
- Blocks
- Panels
- Columns / Beams
- Composite panels (Sandwich)
- Volumetric modules ‘pods’
- Modular rooms

**Process**
- Individual design
- Use selected engine
- Full pre-engineering (not all)
- Integrated design & construction (all elements & systems)

**Platform**
- 2D modeling (digital)
- 3D modeling (digital)
- 4D modeling (full spec.
- Whole-of-life process modeling
- Energy-performance modeling

**Logistics and Delivery**
- No off-site
- Some assembly of major components (mostly onsite)
- Full factory production + onsite placement
- All site works

**Onsite Production / Construction**
- Cast-in-place
- ICF
- Composite panels (Sandwich)
- Volumetric modules ‘pods’
- Modular rooms

**Operation / Maintenance**
- None
- Full factory production + onsite placement
- Some assembly of major components (mostly onsite)
- On-site assembly of components

**Adaptability**
- Role in wall (non-structural)
- Full design of all interfaces between systems
- Design of interfaces between systems
- Some design of interfaces between systems
- Undesigned interfaces between systems

**Performance measurement**
- As-built drawings (digital)
- Digital building models
- As-built drawings (non-digital)

**Energy performance modeling**
- Full factory production + onsite placement
- Some assembly of major components (mostly onsite)
- On-site assembly of components
- All site works

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