Productivity Working Trip to UK on Prefabricated Mechanical Electrical and Plumbing (MEP) Systems

21 – 27 January 2018

Photo Story By:
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Executive Manager
Technology and Capability Department / CPQ
Trip Objectives

1. Prepare the industry for upcoming prefabricated MEP projects;

2. Gain insights on the approaches adopted by overseas firms in the procurement, design, prefabrication and installation of MEP systems; and

3. Establish contacts with overseas prefabricated MEP specialists for future training and business collaboration.
### Trip Overview

#### 22 January 2018

- **Balfour Beatty** (Modular Systems+)
- **Gripple** (MEP Hanging Technology)

#### 23 January 2018

- **Balfour Beatty** (Graphene Engineering Innovation Centre Project)
- **Balfour Beatty** (Project WREN)

#### 24 January 2018

- **Bouygues UK** (MEP Framework for Housing Projects)

#### 25 January 2018

- **Bouygues UK** (University College London Hospital Project)

#### 26 January 2018

- **TEEKAY** (Coupling Technology)
- **George Fischer** (Pipe / Coupling Technology)

30 delegates from 23 organizations
Balfour Beatty – Modular Systems+ Factory

Factory set-up and module production

1. Adopt just-in-time concept
2. Conduct factory acceptance tests
3. Good workmanship quality

Well organized work stations!

Prefabricated switchboard room comprising main switch boards, cables, lighting, etc.

Modular utility cupboard comprising electrical and plumbing services
Prefab single-layer modules are less challenging to design and manufacture

- Modules are pre-assembled in factory.
- No fixing of fittings required on site! Only requires connection to main header.

Benefits

- Prefab single-layer modules are less challenging to design and manufacture
- Single layer modules (installed sideways) can be adopted for projects with less complicated MEP systems or where space is limited
Gripple – Hanging Technology for MEP Systems

MEP Module installation with Gripple’s accessories

1. Wire rope suspension systems allow easy adjustment of the modules to the desired height.
2. No hot work required!
3. Enables faster on-site installation

Benefits

Gripple VS Traditional method

Video Link: click here
George Fischer (GF) – Piping, Joints and Module Manufacturing Factory

1. Preparation of materials to fabricate module frame
2. Assembly of module frame
3. Installing MEP services in the completed module frame

Benefits
1. Pre-insulated piping system including fittings, valves and accessories
2. Designed to transport chilled water
3. Push-fit / press-fit fittings enable faster installation of modules on site

Prefab MEP headers adopting GF’s cool-fit piping

GF cool-fit piping installation
Video Link: [click here]
Bouygues UK – Sharing of MEP Experience

**Design approach for prefabricated MEP systems**

- Identified the services (highlighted in yellow) to be modularized and prefabricated.
- Prefabrication based on BIM models and engineering details.
- Create BIM models.
Teekay - Pipe Coupling Factory

Advanced coupling can compensate for minor mis-alignment of modules!

No hot work, threading and grooving! Able to also accommodate expansion and contraction

Seal and lock the pipes together without the use of flanges or grooving.

Teekay installation video link: [click here]

Solution to pipe misalignment

Coupling allows connection at an angle

Solution if out of alignment by not more than 3mm or 1% of pipe overall diameter
Prefab Components

- Pre-insulated plastic piping

Sub-assemblies

- Include MEP services only
- Integrate with architectural/structural components

Integrated Assemblies

- MEP PPVC
- Complete assembly

Prefabricated MEP continuum

- Prefab horizontal module with ceiling board
- Prefab plant room

Manpower Savings (Trade Level)

- 30%
- 45%
- 60%
- 70%
Productive MEP accessories

Hanging system

Supporting system

Flexible joints

Coupling offering metal-to-plastic pipe transition

Frame materials

Push-fit/ Press-fit joints

Mechanical coupling
Common misconceptions about prefabricated MEP systems

What we thought: **Sprinkler pipes and droppers cannot be in the same module with common services**

What SCDF says:

“**There are no concerns with the sprinkler piping being fitted in a module** as long as it complies with the requirements of CP52.”
What we thought: The frame of MEP modules must be fire rated should it carry services such as sprinkler piping

What SCDF says:

“Unless there is a fire rated duct in the module or any requirements for the module to be fire rated / compartmented, there is no need for the module frame and support elements to be fire rated.”
## Common misconceptions about prefabricated MEP systems

<table>
<thead>
<tr>
<th>What we thought: MEP accessories must be SCDF approved, before they can be used in modules</th>
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<tbody>
<tr>
<td>What SCDF says: “With regards to fire safety, SCDF does not regulate components and fittings of systems. Should the systems (e.g. pipes, ducts) need to achieve the required fire-rating stipulated in the Fire Code, they shall be protected with fire-rated materials.”</td>
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### Hanging support

### Flexible mechanical coupling

MEP Accessories are not regulated by SCDF. Relevant certificates to be produced if used in fire rated zones
What the delegates said

Mr Adrian Ting
Vice President
CapitaLand

“It was a very fruitful trip as we got to see and hear from the specialists and manufacturers on various aspects of prefab MEP modules. I like the way it was organised that we got an overall view of all the components for an entire prefab module.”

Mr Vincent Toh
Executive Director
TEE International

“The learning trip is a great inspiration to us in adopting prefabrication and modularization of MEP services. We look ahead to strive for a greater breakthrough in the construction industry.”

Er Lim Ee Hong
Project Director
United Project Consultants

“It is always interesting and educational to see how works are done in other countries. Such opportunities would not have been available to us if not for the contacts and hard work by BCA.”

James Jian
Senior Associate Director
SMU

“Thanks for the well-organized study trip. It is an enlightening journey to me!”

Daniel Ong
Deputy MD
Jardine Engineering

“Good trip and great effort by BCA to make everything smooth.”
Thank you!