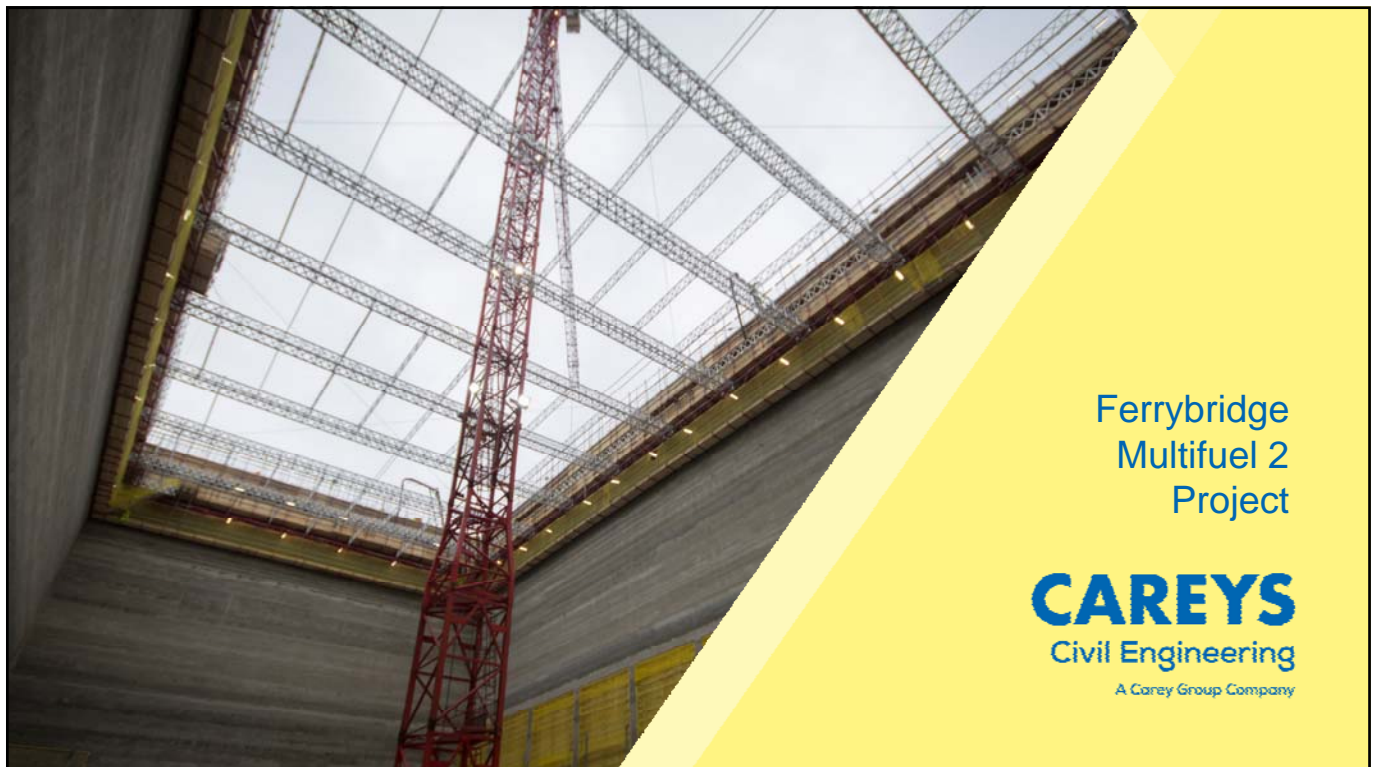


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PRESENTATION TO
The Concrete Centre



Ferrybridge Multifuel 2 Project

SSE gained planning permission for the £330 million energy from waste facility in October 2015. FM2 is due to generate circa 90MW and will produce enough energy to power around 160,000 homes. The power plant is planned to be operational late 2018.

Careys Civil Engineering were awarded the RC and infrastructure package from main contractor Hitachi Zosen Inova in September 2016.

Presentation Agenda

- Technical Aspects
- Formwork
- Slipformed Structure
- Falsework
- Reinforcement
- Concrete
- Slipform Concrete
- Reference and Sample Panels
- Health & Safety
- Waste Bunker Time-lapse



Ferrybridge Multifuel 2 Project

Technical Aspects

Waste Bunker

- 85m x 45 m
- 330m of wall
- 28.900m high
- 185m³/ m
- 4500m³ total
- Geometric complexity
- 3D Modelling
- Temporary works



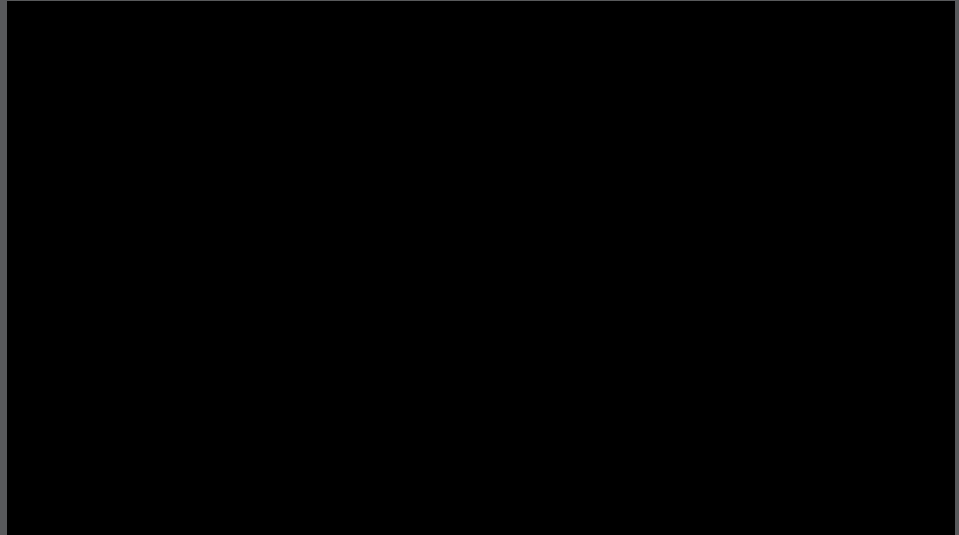
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Formwork

Designers

- UK Slipform – Waste Bunker
- Peri – Lift Shaft
- Doka – Mass foundation edge shuttering
- RMD – Turbine Table edge shuttering



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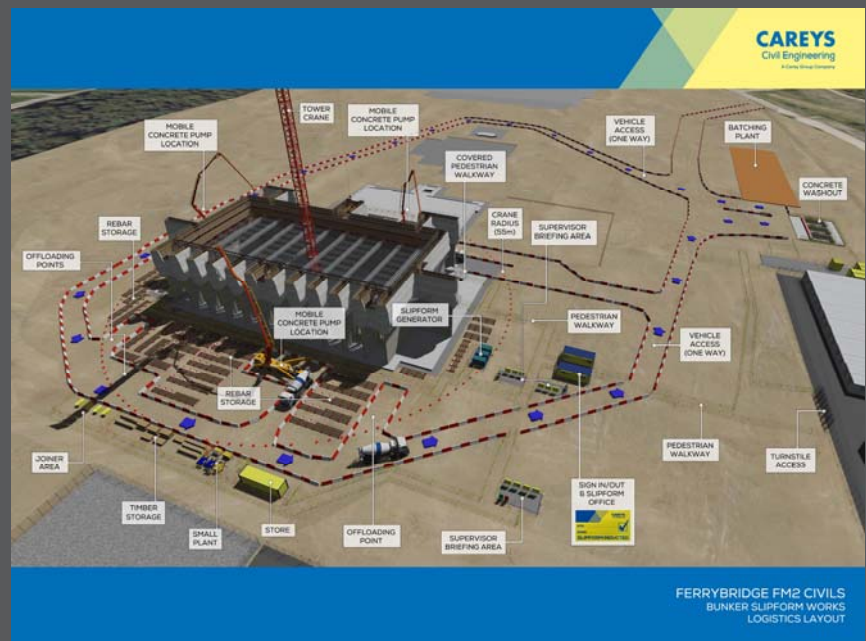
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Slipform

- Slipform Build Commenced 5th December 2016
- Build - 6 weeks duration
- Slide to Level 2.500m - 1 day
- Install Hanging – 2 days
- Main Slide to level 25.100m – 11 days
- Adapt and Dismantle Rig – 15 days
- Slide to Level 28.900m – 2 days
- Slipform complete and removed from site on the 27th March 2017

Challenges

- Geometry: 3D model utilised
- Logistics
- Number of operatives



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Falsework

Hopper Deck Truss Wall

- 24m high
- 65m long x 700 thick x 5.4m high
- 240kg reinforcement/m³
- RMD were awarded the contract to design soffit support systems
- 1200m² of falsework support



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Reinforcement

- Total project tonnage: 5000 Tonne
- 800 Tonne installed within Slipform Works
- Supplier: **BRC**

Challenges

- Bar length and diameter breaching manual handling regulations.
- Congestion of reinforcement



Ferrybridge Multifuel 2 Project

Concrete

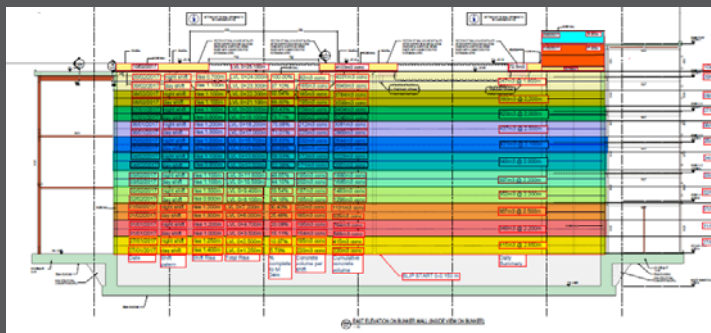
- Total cubage on site 40,000
- 9 Mix designs approved – C40/C60/Air Entrained/Fibre Concrete
- Site specification determines a set of 6 cubes be taking every 40m3 pours
- Strike cubes taking separately to allow stripping of False/Formwork
- Hydration monitored with Thermal Couplers
- Maximum pour size 850m3



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Concrete - Waste Bunker (Slipform)

- **Hanson** awarded contract to provide on site batching plant to provide 4500m3 on 24 hour working cycle.(Max 45 m3/hr)
- **Placement**
 - Wall thickness 500mm-700mm
 - 4 mobile concrete pumps
 - 90 Concrete operatives per day
 - 1 layer of 100mm per hour
 - Average 350m3 per day



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Mix Designs - Waste Bunker (Slipform)

- Concrete specified was C32/40
- 3 mix designs approved for variants in ambient temperature
- Approved mix designs tested for setting times.
- 460 kg Cement/Combination content in each design.
- DC Classification relaxed from DC4 to DC3Z allowing the GGBS content to drop below 70%
- GGBS content 42%-55% in acceptable mixes
- Concrete strength of 0.2 n/mm² required to allow slip form process.
- Sika P180/VS1000 Admixtures used to manipulate setting times.

The image shows three overlapping copies of Hanson 'CERTIFICATE OF CONCRETE COMPOSITION' forms. The forms are for the 'Waste Bunker' project, dated 15/06/2017. They specify a concrete grade of C32/40 and include details for various mix designs (e.g., 1, 2, 3) with their respective material proportions and test results. The forms also include sections for 'MIX SPECIFICATIONS' and 'MIX CONCRETE COMPOSITION'.

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Reference Panel

Finish

- Waste Bunker Walls agreed finish from Ferrybridge Multifuel 1 (Adjacent project)
- Slabs- Reference Panels cast on site agreed prior to construction

Trial mixes

- Setting time suitability for method of construction

QUALITY WORK INSPECTION RECORD – Slipform Finish agreement

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Internal Corner

2017/06/17

Inspected By: [Signature]
Date Inspected: 27/06/17

Project No: PJC/2016/07/01/001/01/00

QUALITY WORK INSPECTION RECORD – Slipform Finish agreement

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Inspection & Test Criteria

Description of Inspection Check	Inspection Frequency, Location, Information & Comments	Date & Time Inspected	Inspected on behalf of (print & initial)	
			Client Representative	Contractor Representative
<p>6 m x 10 m</p> <p>2017/06/17/2017</p>	Slab Area (South of Pier 1)	20/11/16	MM	

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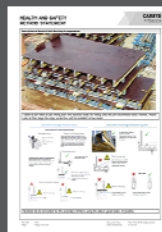
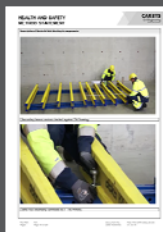
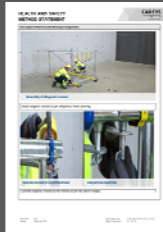
Project No: PJC/2016/07/01/001/01/00
Date Published: 27/06/17

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Health & Safety

- CCE employed up to 5 full time HSE advisors at labour peak
- Pictorial Method Statement produced to assist Operative understanding
- Managers and Operatives competently trained and familiarised
- Daily co-ordination with all site contractors



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