

**Project Info**

-  26 / 05 / 17
-  CCH5™ Bulk Rolls
-  900m<sup>2</sup>
-  Transverse layers
-  Undisclosed
-  Sean Carr Lining Technology (SCLT)
-  CCH5™ used to provide secondary containment for tank floor at an oil & gas refinery.






*The installation of CCH5™ before the addition of Bitsand*

In May 2017, 900m<sup>2</sup> of CC Hydro™ GCCM\* (CCH5™) was used to provide a retrofit below tank liner for a tank overhaul project at a refinery in the UK. CCH5™ was specified by IKM Consulting, a multidisciplinary consulting engineering company, with 20 years of Oil & Gas and Petrochemical experience. Work was carried out by Sean Carr Lining Technology (SCLT) on behalf of the client.

When tanks are taken out of service for inspection, the floor plate integrity is checked in accordance with industry requirements. Where deemed to be out of tolerance or specification, floor plates are normally either repaired or replaced. In this instance, despite the tank still being in good condition, the client decided to replace the floor plates to ensure longer lifespan.

The client took this opportunity to also install a new below tank liner during the overhaul for economical reasons. The liner acts as a mitigation measure to prevent the spread of product to nearby environmental receptors in the event of bottom leakage. Following good practice industry guidance, COMAH Containment Policy, a flexible, impermeable below tank liner with a permeability of at least x10-9m/sec was to be provided along with a bitsand finish to the foundation.

Typically, the client adopts HDPE below tank liners which are embedded within the flexible granular foundations to protect the liner from the heat of the hot bitsand and construction traffic. In this case, utilising HDPE would result in large construction costs due to removal / replacement of existing foundation material due to the embedment requirement.

\*Geosynthetic Cementitious Composite Mat



## Project Info



The tank jacked up by 2m around the full perimeter



Preparation of the substrate



Testing the welding machine at the start of each day prior to installation



Deployment of the CC Hydro



Thermal welding



Thermal welding and testing of the joints



## Project Info



*CCH5™ layers prior to hydration*



*Leading edge of CCH5™ covered and held down with sandbags during hydration*



*Hydration taking place*



*CC Hydro™ fully saturated*

As an alternative approach to HDPE, IKM specified CCH5™ as a below tank liner. In comparison to a HDPE liner, CC Hydro™ has excellent puncture resistance where the overlying concrete surface protects the integrated geosynthetic membrane. CC carried out specific testing of the CC Hydro system to ensure the integrity of the liner would not be compromised by the laying of the hot bitsand. This allowed the liner and bitsand to be laid directly above the remediated foundation with no additional costs associated with excavation, replacement or import of new material.



## Installation

CC Hydro™ is installed in a similar fashion to conventional plastic and geomembrane products, using off the shelf tools and accepted standard design details. The general process for installation on site was as follows:

### 1. Preparation of the substrate

To prepare for the deployment of CC Hydro™, the substrate of the tank floor was filled and compacted with 75mm Type 1 granular material. This material was then covered with a layer of sand and compacted for a smooth substrate and to ensure intimate contact between the material and the surface of the tank floor.

### 2. Deployment of the CC Hydro™

The site had several access issues, including working within a constricted tank with closely spaced jacks and no access for heavy machinery within the perimeter of the tank bunds. Due to this, the CCH5™ bulk rolls of 150sqm, were deployed via a spreader beam suspended from a crane located outside the bund area. In order to reduce wastage, the bulk roll format allowed the contractors to cut lengths of CC Hydro™ using basic hand tools to match exactly the dimensions of individual sections of the tank diameter.

### 3. Thermal welding and pressure testing of the joint

The CC Hydro™ was welded in accordance to Thermal Welding Institute (TWI) guidelines. The CC Hydro™ material incorporates a high-visibility welding strip, allowing the joint to be thermally bonded with a triple-track air channel for fast and simple on-site pressure testing. This propriety Triple Tracked Weld, which not only provides the twin track weld required for pressure testing of joint, incorporates a third weld that secures the overlying CCH5™ layer to the layer beneath. This provides additional protection to the CCH5™ membrane from environmental exposure and results in a neater finish.

### 4. Hydration

Following the welding and testing of the joints, CC Hydro™ was hydrated at the end of each day via the local onsite water mains. The material cannot be overhydrated so an excess of water was used to ensure full saturation.

The CC Hydro™ was then allowed to cure for 24 hours before laying a final 50mm layer of Bitsand over the material. Once the Bitsand had been laid the contractor used a handheld vibrating plate to compact the Bitsand to the required depth and consistency. The new steel tank floor was then successfully installed over this final layer of Bitsand material.



Laying 50mm of Bitsand layer over the CC Hydro™



## Summary



*Bitsand compacted prior to installing the new tank steel floor*

CC Hydro™ is a variant of CC, incorporating the standard fibre-reinforced erosion control concrete technology, with a hydrocarbon resistance impermeable geomembrane. CC Hydro™ was developed in 2015 for the containment market and this tank lining remediation represented the first large scale installation of this type.

The use of CC Hydro™ allowed the client to save money and reduce installation times by eliminating the need for hazardous waste excavation, which required costly treatment and the need for additional fill material.

In challenging weather conditions, and in a tank area of extremely limited access, the entirety of the 900m<sup>2</sup> of CC Hydro was installed over a six-day period by a crew of 5 operators. Following the success of this installation, CC Hydro™ is now being considered for several other future tank remediation and containment schemes across the site, including another tank located in the same region.