

Greengill Farm Anaerobic Digester Facility

Penrith, Cumbria, UK

There is currently a significant focus on greener, renewable energy production across the United Kingdom. Greengill Farm Anaerobic Digester (AD) Plant is a renewable energy project on the outskirts of Penrith, Cumbria. Raw silage is fermented to produce natural gas fuel, which is burnt to power turbines which output electricity. The 2.4MW Facility is being constructed on land at Greengill Farm and will produce approximately 8Mwh of electricity a year; enough to supply 2,400 average households.



Contractor
T J Kemp Construction Ltd

Product
DURUS \$400 45mm
Macro Synthetic Fibre

Function
DURUS \$400 Macro Synthetic Fibres replace conventional steel mesh reinforcement, which would be at high risk of corrosion due to the Acidic liquids from the stored organic material.

Volume
3,000m³ of DURUS \$400 Synthetic Macro Fibre Reinforced Concrete

Background

The AD Plant Facility is comprised of a 42m diameter fermenter tank with associated CHP building, plant & machinery operations areas and gas storage tank.

Adjacent to the Tank areas are large covered storage bays where raw grass silage is housed before being inputted into the fermenter tank to produce fuel gas.

The storage bay areas and connected reinforced concrete apron need to handle laden HGV traffic and constant mobile plant operations, tipping and handling the silage.

Due to the Acidic Liquids released from the damp silage, the

Client wanted to use a method of reinforcement which was not at risk of corrosion and subsequent spalling, leading to reduced service life.

The resulting reinforced concrete pavement had to be able to accommodate frequent mobile plant dynamic loadings.

Solution

- Design information & loadings were provided by the Client, with the designated concrete grade and pavement thickness, to allow ADFILS Consulting Engineers to provide a professionally indemnified solution with a calculated dosage of DURUS \$400 macro synthetic fibre.



With the elimination conventional Steel Mesh, large strips pours can be completed, allowing quicker construction.

- By replacing the steel fabric with inert DURUS S400 polypropylene macro fibres, the risk of a shortened service life resulting from steel corrosion was eliminated.

Benefits of the Solution

- Macro synthetic fibres do not rust or corrode. This eliminates the risk of a reduced working life of the reinforced concrete.
- There is no requirement for handling, cutting and fixing of steel mesh; as a consequence build time and overall construction cost are reduced.
- There is an embedded CO2 saving of around 56% when compared to the use of traditional welded steel fabric reinforcement.

Installation benefits

- The Macro Synthetic Fibre Reinforcement is mixed into the concrete during batching, allowing direct discharge into formwork from the Mixer Truck on arrival to site.
- There is no need to allow for steel cutting and fixing in the construction schedule.



One of the 48m diameter Tanks in which the silage is broken down to produce gas fuel which is burnt to heat water. The resulting steam powers turbines to make electricity.

- There is no risk of steel mesh being placed incorrectly, with insufficient concrete cover, as the fibre reinforcement is distributed throughout 100% of the concrete volume.
- Significant Health & Safety Hazards associated with the handling, cutting & fixing of steel mesh, are eliminated.

Result

The external pavement was installed well within the construction schedule.

There is no risk of the acidic silage causing steel mesh corrosion which would result in shortened service life of the concrete pavement.

Tim Kemp of T J Kemp Ltd commented,

"The original specification for the bays was a concrete with reinforcing mesh to provide the structural performance required," said Tim. "But I have used Hanson's Fibrecrete on previous projects and know what it can deliver in terms of time and cost savings. With this proven track record it was not difficult to convince the client of its benefits and the results speak for themselves."

Products used: DURUS S400 45mm Macro Synthetic Fibre



Effective replacement for Steel Mesh reinforcement in ground bearing reinforced concrete pavements.