

Creating Material Change



Composite Transition Piece Cost Benefit Analysis



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Composite Transition Piece Revolusionising Energy Transmission

There are around 300 locations on the National Transmission System where gas pipes pass through reinforced concrete walls, for example in valve pits. Currently, several types of seal are used to prevent contamination by water or soil, but when these seals fail, technicians face a major task to fix the problem.

Large scale excavations are required to cut out these seals and allow inspection or repairs to be carried out. The process is time-consuming, high-risk and complex. As assets age, it is likely to need to replace seals more often. Repeated repairs also pose the risk that the reinforced concrete could be weakened, creating further challenges for the Operations teams.



The benefits

Over a period of six years, National Grid expects to install about 60 CTPs on the National Transmission System. As Paul Ogden explains, the change will bring dual benefits: "It will significantly improve safety as well as creating savings of up to £5 million in the next five to ten years."

The financial benefits of installing and inspecting a composite transition piece are significant when compared with traditional methods.

Taking less time to inspect the pit wall area with a CTP fitted means that just under £230k could be saved over a design life of 50 years per unit installed.

National Grid estimate that 700 fewer hours of 'at risk' activities will be required for each CTP during its design life. Working on the pit wall requires technicians to work inside a pit, which may be several metres deep.

Previously, the method of breaking out concrete, inspecting the seals and replacing the concrete took about three weeks. Thanks to Haydale's CTP system, two technicians will be able to complete the inspection in half a day.

There are also environmental benefits. Although the carbon cost for the initial CTP installation is higher than the current method, National Grid calculated that this new approach will save 12 tonnes of carbon equivalent (CO₂e) for each CTP over its 50 year lifespan, as fewer excavations are needed. It looked at tasks such as excavating soil to expose the pit wall and generator power needed on site for the duration of the works.

Benefits can be tracked after the first inspection and continue for the entire design life per unit, and this can subsequently be extended further following simple replacement of the seal around the CTP.

"Over a period of six years, we expect to install about 60 CTPs on the National Transmission System, which will significantly improve safety as well as creating savings of up to £5 million in the next five to ten years."

Paul Ogden
Senior Civil Engineer, UK
National Grid

Key Benefits:

£228,000

Saving per CTP over a 50-year life

12 tonnes

The amount of CO₂e saved per CTP over 50 years

700

Fewer hours carrying out 'at risk' activities for each CTP over 50 years

What's new

The key challenge faced by National Grid was how to make the laborious and time-consuming process of cutting away concrete to access the failed seals quicker and safer. The solution lay in Haydale's development of the removable Composite Transition Piece (CTP).

Haydale worked with National Grid's Senior Civil Engineer, Paul Ogden and his team, to develop the solution. The innovative composite seal units can be used to plug the gap between the pipe and the wall, meaning that technicians can easily remove the unit and check the pipe for corrosion and damage. The CTP can then be replaced if necessary in one quick operation.



Safety:

NIA project:
NGGT0009
Removable
Composite Transition
Pieces (CTP)

PEA cost:
£632,000

Duration:
24
months

Supplier:
Haydale

PEA benefits:
£70,000 per year

PEA realised:
Nine CTPs to be
installed by the end
of 2019. Benefits to
be confirmed after
first installation

Early progress

Two key compressor sites have undergone large-scale works recently. National Grid installed the new CTPs at the pit wall transition areas during the new-build process. In total, eight new CTPs have been pre-fabricated and will be installed during the construction of the pit wall, further reducing installation costs. These units, along with one installed as part of the initial trial, will start to provide benefits after their first inspections.

Haydale is a global technology solutions company passionate about creating the next generation of advanced composite materials. We bring together cutting-edge technology with engineering know-how to enhance the performance of products and materials thus delivering business value for our customers. We:

- use tailored advanced materials to enhance the quality and performance of our customers' products
- develop nanomaterial enhanced resins for the prepreg carbon fibre market to deliver enhanced electrical, thermal or mechanical performance to the aerospace, automotive and other hi-tech industries
- offer nanomaterial enhanced polymers for additive manufacturing that allow better products to be made faster
- formulate proprietary nanomaterial-based inks and coatings for the print and sensor markets, including regulatory approved ink for biomedical sensors
- manufacture unique, proprietary silicon carbide fibres and whiskers that strengthen ceramics and enable highly scratch and wear resistant coatings for applications as diverse as cookware coatings, cutting tools that make jet engine turbine blades and corrosion protection for oil and gas pipelines

We are at the start of the fourth industrial revolution and we are helping companies seize new opportunities.



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