



1 Ships up to 304 m length can be unloaded at the Redcar port in Middleton, UK.

Speedy overhaul of a transformer

Having to unload large ships without cranes, transport devices, or electrical power is a scenario any logistics company urgently aims to avoid. The Redcar Port in the United Kingdom was confronted with this situation. After a transformer failed, a critical link in transmitting power from the electricity grid to functional business equipment was lost. The delivery time for a new transformer was several months. After only eight weeks, the transformer was refurbished by Sulzer and was operational again.

The Redcar Port, owned and managed by Redcar Bulk Terminal Ltd (RBT), is situated on the south bank of the River Tees in North Yorkshire, UK. The port handles a wide range of bulk cargoes and is the deepest port on the east coast of England (Fig. 1). Because it operates 24 hours, 7 days a week without a break, the operational ability of the port infrastructure is of vital importance.

Loading and offloading capacity

RBT has two rail-mounted gantry cranes with bulk and hook capability. One crane can handle 42 tons, the other one 63 tons. This equals the weight of nine and thirteen elephants respectively. Both unloading cranes can achieve offloading rates of more than 40 000 tons per day (Fig. 2). The size of the ships that can be unloaded is impressive. The Redcar Port can handle transport ships up to 304 m in length, 48 m in width, and 17 m in depth (draft).

Systematic quality assurance

Quality and environmental management are important for the Redcar Bulk Terminal — it is both ISO 9001 and ISO 14001 certified. Both management systems are systematic ways of avoiding problems when delivering services to customers. Preventive maintenance and immediate action in case of equipment failures are also a part of ensuring the port service quality.

It is interesting to know that the UK navy already had a system of quality control in place in the 12th century. Back then, King John of England (1167 – 1216) appointed William of Wrotham to report on the quality of construction and repair of ships. Nowadays, RBT relies significantly on electrical power to maintain efficient operation and to offer reliable services. A failure of a medium-to-low voltage transformer would significantly affect business, especially when the port is operating 365 days a year without any break.

Fast problem solving required

The RBT maintenance team has worked with the Sulzer Middlesbrough Service Center over many years. They first called Sulzer, when an 840 kVA transformer failed at RBT. Initially, RBT contracted Sulzer to investigate the cause and to provide recommendations for the best course of action. The failure occurred because a primary winding short-circuited. The Sulzer engineers suggested a direct replacement of the transformer as the quickest — if not the cheapest — repair. Unfortunately, the original equipment manufacturer (OEM) supplier was not able to deliver such 3.3 kV transformers on a short notice with an acceptable lead time.

“The transport of goods is about speed, speed, speed. Transformers such as this one provide power to a wide range of equipment. So, any failure will have significant consequences for us in terms of productivity. We have to uphold the transportation deadlines of our port customers. For RBT, the speed of Sulzer's repair and the cost savings were crucial because we needed to rent large generators just to keep the plant operating.”

Steve Bonner, Electrical Maintenance Engineer at Redcar Bulk Terminal Ltd (RBT)

The RBT maintenance team needed an alternative to solve the problem faster. Under these circumstances, the quickest solution was a complete transformer refurbishment. RBT contacted Sulzer again because Sulzer has the engineering expertise for such refurbishment projects. The Sulzer Middlesbrough Service Center is fully equipped with all facilities to renew the transformer in house. After only eight weeks, Sulzer redelivered a virtually new transformer to RBT.

Secure refurbishment with quality control

“For this particular project, we developed new formers and racking — in order to create the new windings with exactly the right dimensions. This was very important because of the specific design of the RBT transformer. The low-voltage windings sit inside the high-voltage windings, and they share the laminated core,” explains Kevin Hardy, Workshop Supervisor at the Sulzer Service Center in Middlesbrough. “Quality control with high-voltage equipment is essential. Once a new winding has been finished, it is tested. Then the windings are assembled together to create the high-voltage



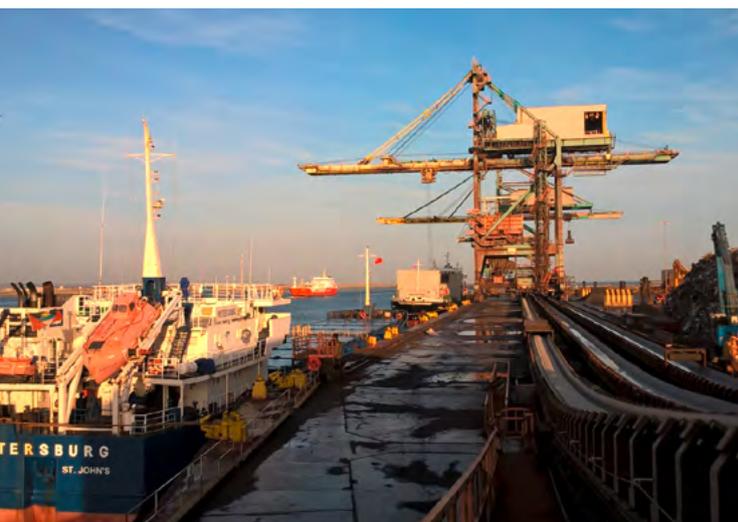
3 Quality control of the refurbished RBT transformer.

circuit, which is connected in a star configuration. The low-voltage circuit of the transformer is joined together in a delta configuration. After the fixation of the windings on the laminated core, we retest the new coils again (Fig. 3). This ensures that we have made the correct connections and that the insulation meets the required standards,” Hardy adds.

Completed in eight weeks

The Middlesbrough Service Center completed the project on time — as quoted — within eight weeks. A real time saving compared to a lead time of several months for a new transformer. Kevin Hardy concludes: “We have a close working relationship with RBT that has been built up over many years. Because they are located almost next door, their engineers can come in easily and review the progress of their project. In general, we communicate with our customers on a regular basis about the progress of any repairs. Thus, they can plan accordingly and use their resources more efficiently.”

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2 Rail-mounted gantry cranes at the Redcar port.