

# CASE STUDY

[ MIDEL® ]  
SAFETY INSIDE

**PROJECT:** Dockyard indoor transformer | UK  
**ESTER TYPE:** MIDEL 7131 synthetic ester  
**PURPOSE:** Reduce costs and avoid decommissioning asset

## [ OVERVIEW ]

Her Majesty's Naval Base, Devonport (HMNB Devonport) is one of three operating bases in the United Kingdom for the Royal Navy and is the sole nuclear repair and refuelling facility for the Royal Navy.

Operated at the time by Devonport Management Ltd (DML), one of the in-service dockyard transformers required inspection and assessment for possible decommissioning, as internally it had become extremely wet. Core insulation readings by Megger test were of  $<20M\Omega$ , and oil testing showed that the transformer had very wet insulation; the mineral oil water content was 51ppm with a breakdown voltage of only 22kV.



# CASE STUDY



## [ SITUATION ]

The 30 year old free breathing mineral oil distribution transformer was located indoors within the dockyard, and with test values well below acceptable limits (due to the low insulation resistance and poor oil condition), the transformer was to be taken out of service and earmarked for removal and refurbishment.

Facing substantial costs with this process, DML explored additional options before making their final decision. Following consultation with the MIDEL technical team, DML took the option to refill the transformer with MIDEL 7131.

It was believed that the use of MIDEL 7131 would dry out the insulation and enable the transformer to be re-energised without the need to relocate it. To monitor the condition of the transformer closely during the refill a field trial was conducted between MIDEL and DML. The mineral oil in the transformer was tested prior to refill to check the furan content as an indicator of the cellulose condition. The value obtained suggested that the cellulose was in a suitable condition for the refill to go ahead.

## [ RESULT ]

Subsequent testing of oil samples following the refill found that after seven days the moisture content of MIDEL 7131 had risen to around 350ppm, but the breakdown voltage was maintained at a high level. After 25 days the resistance of the transformer had risen to a value of >80MΩ, a great improvement on the initial result and a demonstration that the moisture content had been reduced in the cellulose.

The overall cost saving by refilling, rather than replacing the transformer was substantial and the transformer is still operating at the present time of writing, over 9 years later.

The MIDEL team has continued to receive and analyse samples from the Devonport refill, demonstrating that it has maintained good condition and is still suitable for continued service.

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The use of MIDEL ester fluids in this project supports the following UN Sustainable Development Goals:

