

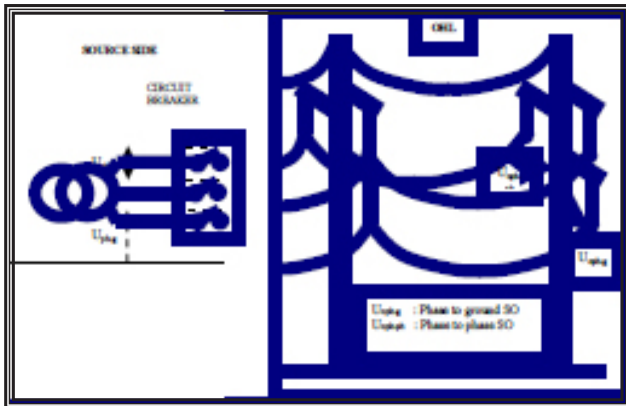


## R&D Fund Project

### Feasibility Study on The Wooden Cross-Arms Replacements With Steel Cross-Arms for 132KV and 275KV Transmission Towers



Electrical Testing of Cross Arm



Switching Surge Simulation Study

#### Project Overview

Woods have been used as cross-arms for transmission towers in TNB as early as 1959. The woods (Chengal) were known to have an arc-quenching property that would help improve the lightning performance of the lines. However, some of the wooden cross-arms have failed during service, causing TNB power supply reliability. Several of them were reported to have failed prematurely before they reached the expected end-of-life. This has raised a question on the quality and durability of the wooden cross-arms in-service in TNB. One option was to replace the wooden cross-arms with steel cross-arms. TNBR was requested by TNBT (Engineering) to carry out a study to determine the feasibility of this option. The study commenced in April 2006 and was completed in August 2007.

#### Deliverables

- Final Report detailing the performance of 132kV and 275kV lines with steel cross-arms as follows :
  - (i) Lightning impulse and power frequency withstand determined by laboratory tests
  - (ii) Lightning performance determined by simulations
  - (iii) Switching surge performance determined by simulations

#### Benefits

- The benefits are :
  - (i) Reduced outages and increased supply reliability
  - (ii) Reduced cross-arm replacement
  - (iii) Reduced maintenance cost