

**COMPARATIVE EVALUATION ON STATOR
INSULATION METHODOLOGIES OF OLD LAXAPANA
PRIOR AND AFTER REHABILITATION**

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University of Moratuwa, Sri Lanka.
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Degree of Master of Science

Department of Electrical Engineering

University of Moratuwa

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Abstract

Key words: Stator, Ground wall insulation, Global Vacuum Pressure Impregnation, Vacuum Pressure Impregnation

All the hydro and thermal generators belonging to Ceylon Electricity Board, Sri Lanka are manufactured according to the Vacuum Pressure Impregnation (VPI) process except for the three new generators installed in Old Laxapana Power Station during the recent rehabilitation project (2012/2013). These three units replaced the previously existed VPI generators. The manufacturing process utilized for these generators is known as Global Vacuum Pressure Impregnation (GVPI). Even though GVPI process is more economical and offers many advantages, several cases of premature failures of GVPI generators have been reported worldwide. This influenced carrying out this study to assess the insulation condition of GVPI insulation comparatively with the VPI insulation. One new GVPI stator and two VPI stators were selected as test specimens. Removed stator of Old Laxapana and newly installed stator of Wimalasurendra Power Stations were selected to represent VPI insulation. During this research, the condition of the GVPI Stator was evaluated using the DC ramped high voltage test and Frequency Domain Spectroscopy (FDS) test. A mathematical model that has been established by both local and international research was utilized for separating the current components of the total measured current of the DC ramped high voltage test. By the current component separation it could be observed that minimum absorption current was required for the new GVPI insulation, which is an indication of superior quality of the insulation. The FDS test revealed important information of the dielectrics in the low frequency region. The results proved that minimum dielectric loss and minimum moisture absorption of all the three samples was for the GVPI insulation. The new VPI insulation had losses and moisture absorption lesser than the old VPI stator but nevertheless it could not match the low values of the GVPI insulation. Hence it could be clearly concluded that the GVPI insulation has better performance over VPI insulation.

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Table of Contents

Abstract	ii
Acknowledgement.....	iii
List of Figures	vi
List of Tables.....	viii
Abbreviations	ix
List of Appendices	x
1. INTRODUCTION.....	1
1.1 Background	1
1.2 Literature Survey.....	2
1.2.1 Types of stator winding construction.....	2
1.2.2 Random wound stators.....	2
1.2.3 Form wound stators.....	3
1.2.4 Features of stator winding insulation system.....	5
1.2.5 Evolution of the insulation materials	10
1.2.6 Evolution of Insulation Methodologies.....	11
2. GVPI SYSTEM.....	13
2.1 Introduction - GVPI System.....	13
2.2 Procedure for Global Vacuum Pressure Impregnation of Old Laxapana....	13
2.2.1 Pre-GVPI process.....	13
2.2.2 GVPI process	14
2.3 Advantages of GVPI System.....	14
2.4 Disadvantages of GVPI System	14
2.5 Premature Failures and Site Repairs.....	15
2.6 Resin Injection.....	18
2.7 General Procedure for GVPI Stator Rewinding	18
2.7.1 Repairing the core	18
2.7.2 Repairing the windings	19
3. DIAGNOSTIC TESTS FOR INSULATION.....	20
3.1 DC Ramped Voltage Test.....	20
3.1.1 Dielectric Phenomena	22
3.1.2 Test set-up	24

3.1.3	Test specimens	25
3.1.4	Site tests	25
3.2	Frequency Domain Spectroscopy Test.....	30
3.2.1	Dielectric behavior along a frequency sweep	31
3.2.2	Site tests	33
3.2.3	Behavior of dielectric with moisture.....	35
4.	RESULTS AND ANALYSIS	37
4.1	Analysis by Observation on DC Ramp Test Results.....	37
4.2	Analysis Using a Mathematical Model for the DC Ramp Test Results	40
4.3	Mathematical Model.....	40
4.4	Current component separation.....	43
4.5	Analysis on Frequency Domain Spectroscopy Test Results	45
5.	CONCLUSION	49
5.1	Conclusion.....	49
5.2	Recommendations	51
	References.....	52
	Appendix-A.....	54
	Appendix-B.....	64
	Appendix-C.....	68



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List of Figures

Figure 1.1 : Form wound coils of Wimalasurendra power station.....	3
Figure 1.2 : Roebel bar windings of New Laxapana stator.....	4
Figure 1.3 : Transposition of roebel bars	4
Figure 1.4 : Cross section of OLPS stator with six turns and six strands per turn.....	6
Figure 1.5 : Applying semi-conductive tapes to the roebel bars at New Laxapana.....	8
Figure 1.6 : Equivalent electrical circuit for bar/coil with semi conductive coating ...	9
Figure 2.1 : Removing the damaged windings of GVPI stator at Tenau diesel plant	16
Figure 2.2 : Removal of the winding bars using hydraulic jacks.....	17
Figure 2.3 : Effects due to vibration sparking.....	18
Figure 3.1 : DCR-50 Test Set.....	20
Figure 3.2 : Response curve of a DC ramp test	22
Figure 3.3 : Schematic and actual test set-up with DCR-50	24
Figure 3.4 : VPI stator of Old Laxapana	26
Figure 3.5 : Setting up of the apparatus for DC ramp test	26
Figure 3.6 : Grounded two phases	27
Figure 3.7 : Real time plotting of I-V curve	27
Figure 3.8 : High voltage connection and grounded two phases	28
Figure 3.9 : Setting up the apparatus to test GVPI stator.....	28
Figure 3.10 : Measurement of temperature and relative humidity.....	29
Figure 3.11 : Wimalasurendra form wound stator	29
Figure 3.12 : Applying high voltage through the DCR-50 instrument at Wimalasurendra power station.....	30
Figure 3.13 : Schematic diagram for frequency domain spectroscopy test set-up.....	31
Figure 3.14 : Dispersion curve	32
Figure 3.15 : Variation of loss index with frequency.....	33
Figure 3.16 : Voltage application to one phase of VPI stator of Old Laxapana while other two phases being guarded	34
Figure 3.17 : Voltage application to one phase of GVPI stator while other two phases being guarded.....	34
Figure 3.18 Monitoring the waveform along the frequency sweep	35
Figure 3.19 : Real and Imaginary parts of permittivity variation before and after drying for 48 hours.....	35
Figure 3.20 : Variation of loss tangent with different moisture contents at 70 °C.....	36
Figure 4.1 : Current vs. voltage plot for Old Laxapana VPI stator	37
Figure 4.2 : Current vs. voltage plot for Old Laxapana GVPI stator	38
Figure 4.3 : Current vs. voltage plot for Wimalasurendra new VPI stator	39
Figure 4.4 : Separated current components of DC ramp test- OLPS VPI stator.....	43
Figure 4.5 : Separated current components of DC ramp test - OLPS GVPI stator....	44
Figure 4.6 : Separated current components of DC ramp test- WPS VPI stator	44

Figure 4.7 : Real part of permittivity vs frequency plot.....	46
Figure 4.8 : Imaginary part of permittivity vs frequency plot.....	47
Figure 4.9 : Dissipation factor vs frequency plot.....	47



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List of Tables

Table 1.1: Service and rehabilitation periods for hydro power stations of CEB	1
Table 3.1 : Summary of test specimens	25
Table 3.2 : Test conditions	33
Table 4.1 : Summary of observations from DC ramp test results	39
Table 4.2 : Capacitance at higher frequencies	42
Table 4.3 : Statistics of goodness of fit	43
Table 4.4 : Information obtained from parameter estimation	45
Table 4.5 : Dissipation factor at power frequency	48



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Abbreviations

AC	- Alternating Current
AESIEAP	-Association of the Electricity Supply Industry of the East Asia and West Pasific
CEB	-Ceylon Electricity Board
DC	-Direct Current
DIRANA	-Dielectric Response Analyser
ELCID	-Electromagnetic Core Imperfection Detection
FDS	-Frequency Domain Spectroscopy
GVPI	-Global Vacuum Pressure Impregnation
IEC	-International Electrotechnical Commission
IEEE	-Institute of Electronic and Electrical Engineers
kV	-Kilo Volts
MW	-Mega Watts
OLPS	-Old Laxapana Power Station
PD	-Partial Discharge
RMSE	-Root Mean Squared Error
SSE	-Sum of Squared Errors
UK	-United Kingdom
VPI	-Vacuum Pressure Impregnation
WPS	-Wimalasurendra Power Station



List of Appendices

Appendix A	: Actual measurements of DC Ramp and FDS test	54
Appendix B	: MATLAB workspace.....	64
Appendix C	: Author's publication (IESL Annual Sessions 2014).....	68



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