

**POWER FACTOR CORRECTION IN LV
DISTRIBUTION SYSTEMS AND ITS COST
BENEFIT ANALYSIS**

Master of Science Dissertation

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March 2006

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ABSTRACT

When the complex power definition is analyzed, it will be seen that, if a pure resistive load is connected to an AC source, the source will be fully utilized while the reactive power delivered will be zero. A practical load, however, absorbs both active power and reactive power. The active power does the useful work, while the reactive power is required to produce the electromagnetic field. Both the active and the reactive powers place a burden on the conductor (or on distribution line), however the power company must provide the current to the load whether it is inductive or capacitive, and this current generates the power losses in the distribution lines and also increases the maximum demand.



The aim of this study is to analyze LV distribution feeders of substations to find the optimum point along the feeder to correct the power factor. At this particular point, the loss, which considered as the main burden are at minimum level while some reduction in maximum demand. To find the optimum point, calculation for each and every point load (i.e. pole load) is very difficult and complex task without having a specially developed computer software package. Hence the whole loads of the distribution feeder are generalized to thirteen point loads (i.e. twelve spans). Calculations have been done based on practically obtained data to determine the optimum location for power factor correction. This shows that, pay back period is very attractive and results were quite differing from case to case due to different loading patterns of the feeders.

Still this type of power factor correction is not being practiced by both the utilities (CEB & LECO) of Sri Lanka. This study shows that there is a high potential to improve the LV system performance by having a relatively low investment with farley short pay back periods.

DECLARATION

The work submitted in this dissertation is the result of my own investigation, except where otherwise stated.

It has not already been accepted for any degree, and is also not being concurrently submitted for any other degree.


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I endorse the declaration by the candidate.

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Prof. H.Y.R Perera

ACKNOWLEDGEMENT

Thanks are due first to my supervisor, Prof. H.Y.R Perera, for his great insights, perspectives and guidance.

My sincere thanks go to the officers in Postgraduate office, Faculty of Engineering, University of Moratuwa, Sri Lanka for helping in various ways to clarify the things related to my academic works in time with excellent cooperation and guidance. Sincere gratitude is also extended to the people who serve in the Department of Electrical Engineering Office.

I am very much grateful to Mr. H.H. Sumanadasa, Branch manager of Lanka Electricity Company (Pvt.) Limited and Mr. Daminda Darshana, Electrical Engineer of Lanka Electricity Company (Pvt.) Limited for their assistance and cooperation during the research work



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Finally, all my friends and postgraduate students in University of Moratuwa and all the others who helped me in various ways through my research are also appreciated.

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LIST OF ACRONYMS

- AC – Alternative Current
CEB – Ceylon Electricity Board
EMR – Energy Management Report
LECO – Lanka Electricity Company (Private) Limited
LV – Low Voltage
MD – Maximum Demand
PF – Power Factor



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