Design of an Electrical Supply System for Bac Ninh Mechanical Factory

Nguyễn Đình Huy
Thai Nguyen University of Information and Communication Technology
Thai Nguyen University, Thai Nguyen, Vietnam
student383@ictu.edu.vn

***Abstract*—This thesis focuses on the design of an electrical supply system for the Bac Ninh Mechanical Factory, ensuring efficient power distribution and supply. The author determined the power load for the workshop and the entire factory, designed the electrical distribution network for the workshop, and designed the electrical supply system for the factory. The study also discusses methods to improve the power factor and the selection of equipment for the electrical system. The thesis determined the power load for the factory, designed the electrical distribution network for the workshop, and calculated the reactive power compensation needed for the factory. The results showed that the power factor could be improved to 0.95, reducing power and voltage losses in the electrical network. The study found that reactive power compensation could significantly reduce power losses in the electrical network, but it required additional investment in compensation equipment.**

***Index Terms*—electrical supply system, power factor, reactive power compensation, load calculation, distribution network**

I. Introduction

The thesis aims to design an electrical supply system for the Bac Ninh Mechanical Factory, ensuring efficient power distribution and supply. The author first determined the power load for the workshop and the entire factory, then designed the electrical distribution network for the workshop, and finally discussed methods to improve the power factor and the selection of equipment for the electrical system. The study involved detailed load calculations and the design of the electrical distribution network, including the selection of appropriate equipment such as circuit breakers, cables, and transformers. The author also considered the economic and technical aspects of the design, aiming to optimize the system for both cost and performance [1]. Published articles on the methods and subject of this project provide context for this English summary [5].

II. Methods

The author used load calculations for the workshop and the entire factory, designed the electrical distribution network for the workshop, and designed the electrical supply system for the factory. The study also included methods to improve the power factor, such as natural power factor improvement and reactive power compensation. The author conducted detailed load calculations to determine the power requirements and designed the electrical distribution network, including the selection of circuit breakers, cables, and transformers. The study also involved the selection of appropriate equipment and the calculation of reactive power compensation to improve the power factor [1].

Supervisor: Hoàng Thị Thương, Thai Nguyen University of Information and Communication Technology (htthuong@ictu.edu.vn).

III. Results

The thesis determined the power load for the factory, designed the electrical distribution network for the workshop, and calculated the reactive power compensation needed for the factory. The results showed that the power factor could be improved to 0.95, reducing power and voltage losses in the electrical network. The study found that reactive power compensation could significantly reduce power losses in the electrical network, but it required additional investment in compensation equipment. The author calculated the reactive power compensation needed to achieve a power factor of 0.95, which would reduce power and voltage losses in the electrical network. The study also found that the existing protection devices and cables were outdated, requiring replacement to ensure the reliability and efficiency of the electrical supply system [1].

IV. Discussion

The author discussed the methods to improve the power factor, including natural power factor improvement and reactive power compensation. The study found that reactive power compensation could significantly reduce power losses in the electrical network, but it required additional investment in compensation equipment. The author also discussed the economic and technical aspects of the design, emphasizing the need for a balance between cost and performance. The study highlighted the importance of selecting appropriate equipment and optimizing the electrical distribution network to ensure efficient power distribution and supply. The author concluded that further improvements could be made by designing the electrical supply system for other workshops in the factory, as the existing protection devices and cables were outdated [1].

V. Conclusion

The thesis successfully designed an electrical supply system for the Bac Ninh Mechanical Factory, ensuring efficient power distribution and supply. The author concluded that further improvements could be made by designing the electrical

supply system for other workshops in the factory, as the existing protection devices and cables were outdated. The study demonstrated the importance of detailed load calculations and the design of the electrical distribution network in ensuring efficient power distribution and supply. The author emphasized the need for a balance between cost and performance in the design of the electrical supply system [1].

References

[1] Nguyễn Đình Huy, "Design of an Electrical Supply System for Bac Ninh Mechanical Factory," internal undergraduate thesis (original in Vietnamese), Thai Nguyen University of Information and Communication Technology, 2021.

[2] Ngô Hồng Quang. Sổ tay lựa chọn và tra cứu thiết bị điện từ 0.4 đến 500kW. Nhà xuất bản khoa học và kỹ thuật, xuất bản năm 2002

[3] Nguyễn Xuân Phú. Cung cấp điện. Nhà xuất bản khoa học và kỹ thuật

[4] Ngô Hồng Quang, Vũ Văn Tầm. Thiết kế cung cấp điện. Nhà xuất bản khoa học và kỹ thuật, xuất bản năm 2001. 80

[5] Cao Hongxia -, "The Factory Power Supply System Design and Research on Reactive Power Compensation and Analysis Application," International Journal of Advancements in Computing Technology, vol. 5, no. 8, pp. 270-279, 2013. DOI: 10.4156/ijact.vol5.issue8.31.