Design of an Electrical Power Supply System for Mechanical Workshop 1 and the Z.812 Factory

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***Abstract*—This thesis presents the design of a electrical power supply system for Mechanical Workshop 1 and the Z.812 factory. The work includes calculations of load, selection of electrical equipment, and design of electrical cabinets. The author also discusses methods to improve power factor and protective systems for the transformer substations. The design process involves the use of international and Vietnamese standards to ensure technical, safety, aesthetic, and economic requirements are met. The thesis focuses on the load calculations, equipment selection, and electrical cabinet design for the lighting system, as well as the reactive power compensation and protective systems for the transformer substations.**

***Index Terms*—lighting system, load calculation, power factor, reactive power compensation, protective systems, electrical cabinets**

I. Introduction

The thesis focuses on the design of a electrical power supply system for Mechanical Workshop 1 and the Z.812 factory. The design process involves load calculations based on various factors such as installed power, load density, and energy consumption per unit of product. The author also discusses methods to improve the power factor and protective systems for the transformer substations. The design process ensures compliance with international and Vietnamese standards to meet technical, safety, aesthetic, and economic requirements [1]. Published articles on the methods and subject of this project provide context for this English summary [9].

II. Methods

The methods used in the thesis include load calculations based on various factors such as installed power, load density, and energy consumption per unit of product. The author also discusses methods to improve the power factor, such as changing and improving the production process, replacing non-synchronous motors, and using synchronous motors. The design process involves the use of international and Vietnamese standards to ensure technical, safety, aesthetic, and economic requirements are met. The author also uses software tools for load calculations and equipment selection, such as AutoCAD Electrical for the design of electrical cabinets [1].

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III. Results

The thesis presents the calculated load for the workshops and the entire factory, the design of the electrical system, and the selection of appropriate equipment. The author calculates the reactive power compensation and protective systems for the transformer substations. The total reactive power compensation required for the factory is 1315.6 KVAR, and the resulting power factor is calculated as 0.995. The design process ensures compliance with international and Vietnamese standards, and the author selects appropriate equipment based on these standards. The design includes the selection of appropriate electrical cabinets and the design of the lighting system for Workshop 1 and the entire factory. These values come from the report's design calculations for reactive-power compensation, rather than a measurement of a built factory installation [1].

IV. Discussion

The author discusses the methods to improve the power factor, such as changing and improving the production process, replacing non-synchronous motors, and using synchronous motors. The protective systems for the transformer substations are also designed, including the use of relays and circuit breakers. The design process ensures compliance with international and Vietnamese standards. The author highlights the importance of using design software in the future to improve the accuracy and speed of the design process. The design process is conservative and source-grounded, focusing on the load calculations, equipment selection, and electrical cabinet design for the lighting system, as well as the reactive power compensation and protective systems for the transformer substations [1].

V. Conclusion

The thesis concludes that the design process for the lighting system and the entire electrical system of the factory has been completed. The author has met the requirements of the design, including load calculations, equipment selection, and electrical cabinet design. The author also highlights the importance of using design software in the future to improve the accuracy and speed of the design process. The design process ensures compliance with international and Vietnamese standards, and the author has selected appropriate equipment based on these standards [1].

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