IMPROVEMENT DESIGN OF BLENDING PROCESS

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ABSTRACT

Improvement design of blending process is a tweaking project on how the current used or available agitation systems in the industry is revamped and enhanced the mixing efficiency by changing the impeller type or design. In this project, a multistage impeller consists of merging design of two hydrofoil impeller is chosen as the substitute impeller for the existing one. The reasons are because these impellers are commonly found in many agitations system. Moreover, throughout the past research and simulation it has been proven that the proposed impeller design is superior in every aspect juxtapose to the one that currently appointed in the industry. Besides, a Pugh chart that comprise of comparison between three initially chosen impeller also has been constructed to further approved which design meets the necessary criteria to reinforce the blending process. Further studies details within this paper are gathered by using SolidWorks. The pictorial design and flow simulation of the proposed impeller has been compared to other two impeller that has been used in the industry and proved to be the best impeller design for multistage impeller and effective compared to the other two. Thus, the impeller has satisfied both project objectives which are to compare the proposed and current used multistage impeller and configure the best multistage impeller design. Analysis of the impeller also proved that the configuration able to improve 33% of the blending time by cutting down the excess 30 minutes for recirculation as it has more balanced flow and absence of unmixed zone which is the problem for the multistage impeller configuration used before. Therefore, by using this configuration for the multistage impeller is the best possible method recommended for Sumber Petroleum Cemerlang Sdn Bhd (SPC) to eliminate over blending time problem due to improper mixed of the lubricant.

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CHAPTER ONE

INTRODUCTION

1.1 Research Background

Blending is a common operation that has been widely used in chemical process industry. The embodiment of this process is to satisfies viscosity requirement and reaching uniform distribution of each component in a mixture of two or more viscous fluid. Within the process, mechanical agitation usually employed in order to stir the mixture to reach a pre-set fluid homogeneity. The time taken to achieve these requirements is called the blend time. Depending on the desired finished product, the blend time and composition for the mixture can be varied. Therewithal the necessary type of impeller also can be differed as blending process of certain fluid viscosity value might require other specific type of impeller styles that capable to perform much better than others within the condition. As every type of impeller has its own trait which carry distinct advantages and disadvantages, not all impellers are suitable for blending process.

In a blending system, the agitator carries significant effect in a blending process as the performance of the system is dependent greatly on the impeller design. Internal parameters such as impeller type, agitation speed, vessel design and even flow geometry can affect the mixing system effectiveness. Lack of understanding the blending process fundamental on the other than can cause inconsistencies in blending quality [1]–[3]. The fundamental of every common impeller used in industries has been issued in various journal article that has been published throughout the years. Many analyses, evaluation and even comparison between impellers have been written by numerous authors. All the findings that can be amass through different available journal are very crucial material and helpful to appropriately determine the best mixing impeller for blending process. Furthermore, it will also provide the basis on the ideal size of each impeller type can be designed and the optimal distance between impellers when constructing a multistage impeller.