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PENINGKATAN PRESTASI PROSES MENGGUNAKAN KAEDAH REKA BENTUK UJI KAJI DALAM INDUSTRI BAHAN KIMIA

(Improvement of Process Performance by Application of Design of Experiment in Chemical Industry)

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ABSTRAK

Industri Bahan Kimia merupakan industri yang makin berkembang dan mendapat permintaan yang tinggi dalam pasaran selaras dengan perkembangan teknologi yang kian pesat. Persaingan antara kilang sentiasa berlaku dan pihak pengurusan sentiasa mencari kaedah yang paling baik serta menjimatkan kos bagi meningkatkan produktiviti. Kajian ini dilakukan dengan menggunakan kaedah reka bentuk uji kaji bagi membantu kilang menentukan syif dan mesin yang terbaik yang menjadi panduan bagi penghasilan pigmen Titanium Dioksida yang berkualiti tinggi mengikut permintaan pelanggan. Kajian yang dilakukan ini dapat dijadikan panduan kepada pengusaha kilang untuk memahami kaedah reka bentuk uji kaji dan mengamalkan kaedah ini pada masa akan datang bagi mengurangkan sebarang kecacatan yang berlaku kepada produk yang dihasilkan. Mesin yang digunakan untuk menghasilkan hablur Titanium Dioksida ialah mesin *XSM Milling* yang memerlukan masa selama 90 minit bagi mendapatkan saiz hablur mengikut spesifikasi yang telah ditetapkan. Pihak kilang bercadang untuk menukarkan mesin *XSM Milling* ini kepada mesin *Speedmixer* yang hanya memerlukan masa selama 4 minit sekaligus membantu kilang untuk menghasilkan lebih banyak produk seiring dengan permintaan pelanggan yang sentiasa meningkat tanpa menjejaskan kualiti produk yang dihasilkan. Kajian ini adalah untuk melihat kemampuan mesin baharu dalam menghasilkan pigmen yang berkualiti tinggi sekaligus membantu menjimatkan masa pemprosesan bahan dan secara tidak langsung memberi keuntungan kepada kilang. Melalui kajian yang telah dibuat, didapati mesin *Speedmixer* merupakan mesin yang terbaik untuk digunakan bagi mendapatkan saiz hablur Titanium Dioksida yang diperlukan.

Kata kunci: reka bentuk uji kaji; industri bahan kimia; peningkatan prestasi proses

ABSTRACT

The Chemical Industry is a developing industry and has popularity in the market due to fast development of innovation. Competition between industrial facilities is normally occurred and administrations are continually searching for advantages and reducing cost to expand efficiency. This study is directed utilising the design of experiment (DoE) method to help the plant to decide the best machine and the best shift to maintain the production of high quality Titanium Dioxide pigment as per customer requirements. This study can be utilised as a guide for the plant to comprehend the DoE method and to apply this strategy later on to overcome any issues or imperfections that might occur in the product. XSM Milling machine is used to produce Titanium Dioxide crystal which takes 90 minutes to acquire the exact crystal size. Plant intended to change this XSM Milling machine to a Speedmixer machine which is capable to produce Titanium Dioxide crystal size accordingly in just 4 minutes. This will help the plant to produce more products in accordance with perpetually expanding customer requirement without influencing the Titanium Dioxide crystal size. This study is to observe the capacity of new machines to deliver the right size while sparing time on material handling and reducing processing cycle time. Through this study, it is found that the Speedmixer machine is the best machine to use to obtain the correct crystal size of Titanium Dioxide.

Keywords: design of experiment; chemical industry; improvement of process performance

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