Validation of Taguchi Design using Quality Parameters of Toilet Soap Manufactured in a Local Industry

By

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The work described in this thesis was carried out by me under the supervision of Prof. R. A. Dayananda, Mr. P. Dias and Mr. S. B. Nawarathne. A report on this has not been submitted in whole or in part to any University or any other institution for another Degree / Diploma.

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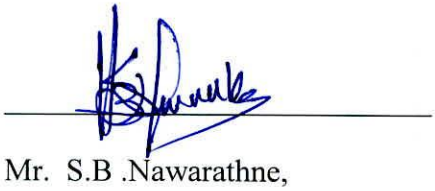

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ABSTRACT

The objective of this study is to investigate the applicability of Taguchi method to the production process of a local industry. Harishchadra Mill Ltd, a local industry is engaged in soap manufacturing process, was selected as this process is entangled different kinds of variables.

Four critical variables – two types of oils coconut (a^1) and palm oil (a^0) on the basis of high and low saponification values, two levels of caustic soda (b^0, b^1), two different saponification temperatures 70^0C (c^0) and 80^0C (c^1) with and without stirring process for saponification (d^1, d^0) were adopted.

The results obtained for TFM, foam height, and moisture content was used to calculate optimum value (Y_{opt}) for each of which with respect to best combination of each of variables. This trial was conducted with and without replicates. The results for Y_{opt} for TFM, foam height and moisture content with and without replicates were 75.98%, 960.66 cm, 26.06% and 76.66%, 959.14 cm 24.50% respectively. The best treatment combinations under this method were $a^1b^1c^1d^1$ (high saponification value of oil, high concentration of NaOH (18%), high saponification temperatures (80^0C) and with stirring), $a^0b^1c^1d^0$ (low saponification value of oil, high concentration of NaOH (18%), high saponification temperatures (80^0C) and without stirring), $a^1b^0c^1d^1$ (high saponification value of oil, low concentration of NaOH (12%), high saponification temperatures (80^0C) and with stirring) for same sequence of quality parameters (TFM, foam height, and moisture) given above.

The values obtained for validation test – four factor factorial design and block design with and without replicates also revealed that above treatment combinations were the best except TFM, where best treatment combination was $a^0b^0c^1d^1$. But when comparing numerical values obtained for $a^1b^1c^1d^1$ and $a^0b^0c^1d^1$ are much closed to each other (73.50% and 73.60%) and standard TFM value (76.5%) as well.

Relationships between significantly different variables were also determined by plotting response surface and contour plots.

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