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Implementation of working procedure on semi skill workers in textile industry for recovery of wastage by Taguchi method

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ABSTRACT: In the textile industry waste includes a large variety of dyes and chemical additions that make environmental challenge for textile. it is not only as liquid waste but also in its chemical composition .The main pollution in textile wastewater come from dyeing and finishing process and these process require the input of a wide range of chemicals and dyestuffs, which generally are organic compounds of complex structure. In this paper, we utilize Taguchi methods to obtain the optimum conditions of a dyeing process at XYZ Company and to gain the percentages of contributions of each parameter. Taguchi's method was for experimentation. Taguchi was applied to evaluate the effect of these parameter and Signal to noise data used for compute the importance & there effect on the response parameter. The Cochorus (Tossa) variety of jute fibre was collected from the company. About 60cm from the bottom of the fibre was discard and then 30cm was taken. This portion was washed with 6.5g soda and 3.5g soap flake per litre at 75°C for 30min.The washed jute was then bleached with sodium chlorite solution of strength of 0.5% at pH 4 & 85-90°C for 90 min. Then the bleached jute fibre was dried at 85 °C & was taken as the experimental material.

Keywords: Taguchi Method, Dyeing Process, Textile Industry

I. INTRODUCTION

Knitdyeing: Knit dyeing is a technique of dyeing the knitted fabrics. The dyeing of knitted fabrics occurs in the exhaust method or in batch-wise process. Knit dyeing process is near similar to yarn dyeing process but there is some difference in quality measurement [1]. Generally all types of single jersey, double jersey and their derivatives are dyed by different way. Flowchart of knit fabric dyeing describe shortly [3].

Sequence of Operation for Knit Fabric Dyeing:

Grey fabric inspection
↓
Batching
↓
Fabric turning
↓
Loading to the m/c
↓
Pre-treatment (Scouring & Bleaching)
↓
Dyeing
↓
Dewatering
↓
Drying
↓
Compacting & Calendaring
↓
Final inspection & packing

II. EXPERIMENTAL DESIGN DATA

Material used in this experiment is 100% cotton knit fabric that had undergo scouring process and preparation of material done by cutting the cotton knit fabric [1].

A. Signal to Noise Ratio

(SNR) Calculator is an online statistics tool to calculate how much a signal may corrupted by unwanted noise and contains meaningful information [6].

Signal-to-noise ratio is also called as SNR or S/N, is defined as the ratio of signal power to the noise power [24] which measures the original signal corruption. It's a defining factor when it comes to measure the quality of signal in communication channels or mediums [8].

Table 1: Control Parameters.

Control Parameter & Their Levels					
Parameter	**Code**	**Level**			**Unit**
		1	**2**	**3**	
Evection Red	A	3	3.5	4	%
Na_2SO_4 Concentration	B	70	80	90	g/l
Na_2CO_3 Concentration	C	4.8	5.8	6.8	g/l
Temperature	D	80	90	100	^oC

A higher SNR guarantees the clear acquisitions with low distortions and artifacts caused by unwanted noise. The better ratio of SNR cause the better signal stand out, makes the better quality of original signal or transmitted information signals [10]. S/R ratio measurement is commonly used in the field of science and engineering fields. A ratio higher than 1 indicates more signal strength [18].

The below mathematical formula used in statistics to calculate the signal to noise (S/N) ratio to find the quality of signal [16].

$SNR = P_{signal}/P_{noise} = \mu/\sigma$

where

μ = signal mean or expected value

σ = standard deviation calculation of the noise

Response of this experiment is the color strength that was measured by the reflectance (R) that was adopted from Kubelka-Munk theory [19].

$$\frac{K}{S} = \frac{(1-R)2}{2R}$$

where

K = Absorption coefficient

S = Scattering Coefficient

R = Surface of reflectance

Table 2: Data collected by observation in textile industry (by Orthogonal Array).

Observation	**Parameter Code**				**Data collection**		
	A	B	C	D	R1	R2	R3
1	1	1	1	1	13.2	13.75	12.5
2	1	2	2	2	17.03	17.4	17.95
3	1	3	3	3	17.06	16.5	16.42
4	2	1	2	3	18	18.4	18.54
5	2	2	3	1	18.2	18.85	18.7
6	2	3	1	2	20	20.34	20.85
7	3	1	3	2	20.56	20.29	19.8
8	3	2	1	3	19.85	19.42	19.5
9	3	3	2	1	18.9	19.54	18.32

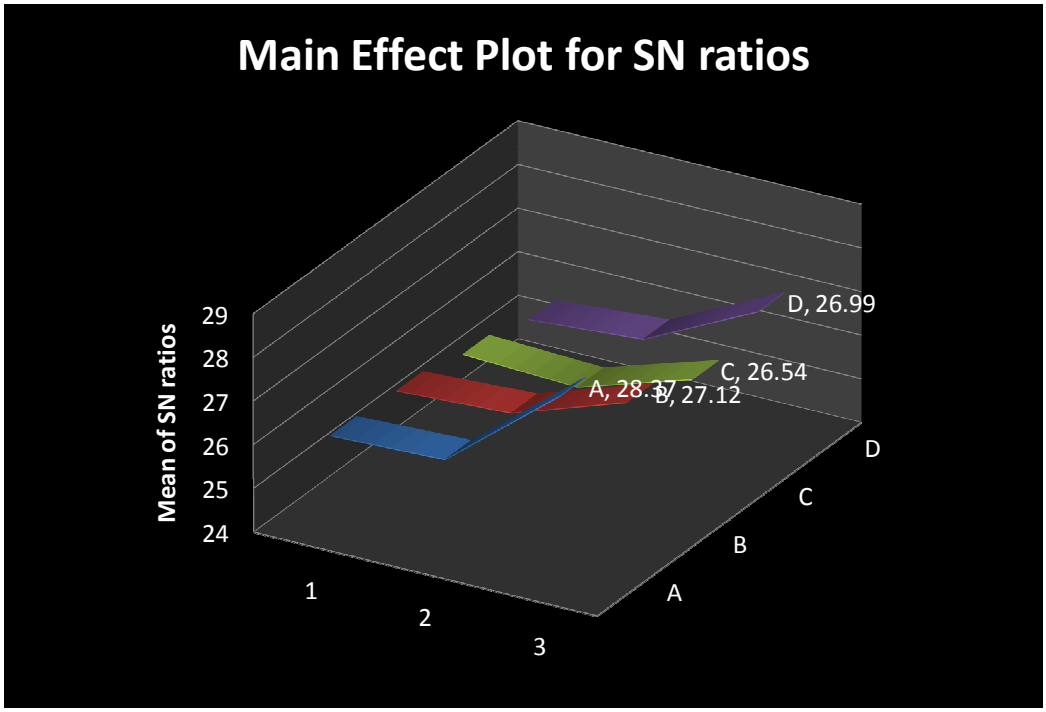
Table 3: Mean & S/N Ratio.

Mean & S/N Ratio					
Observation	**R1**	**R2**	**R3**	**Mean**	**S/N Ratio=(-10log(1/square of mean)**
1	13.2	13.75	12.5	13.15	22.37
2	17.03	17.4	17.95	17.46	24.84
3	17.06	16.5	16.42	16.66	24.43
4	18	18.4	18.54	18.31	25.25
5	18.2	18.85	18.7	18.58	25.38
6	20	20.34	20.85	20.4	26.19
7	20.56	20.29	19.8	20.22	26.11
8	19.85	19.42	19.5	19.59	25.84
9	18.9	19.54	18.32	18.92	25.53

III. RESULTS

As mentioned before, the character of S/N Ratio used in this paper is the larger the better. Therefore, the grater the delta value of a parameter is the better. The optimum conditions on this approach obtained by sorting the delta in an order of significantly affecting the process. The higher the delta values signify the more effect its parameter contributes.

Optimum condition by Utilizing S/N Ratio				
	A	B	C	D
Level 1	26.19	26.11	25.84	25.53
Level 2	26.28	26.24	25.73	25.72
Level 3	28.37	27.12	26.54	26.99
Delta	2.18	1.01	0.7	1.46
Rank	1	3	4	2
Optimum	A3	B3	C3	D3



IV. CONCLUSION

By using Taguchi method obtained result of optimum conditions. The following are the parameter and level in order of significantly affecting the dye process at XYZ company. The predicted result compared to the experiments is verified. Therefore the obtained optimum conditions are proven to be effective .The optimization process that performed by Taguchi method brings out of the best conditions to be used in a dyeing process that could actualize a friendly environmental process in a textile industry.

REFERENCES

[1]. Wahyudin, Angel Kharisma, Richards Dimas, Muhammad Kevin, Tota Pirdo Kasih: application of Taguchi method and ANOVA in the optimization of dyeing process on cotton knit fabric to reduce re-dyeing process.doi:10.1088/1755-1315/109/1/012023.

[2]. Gopnik A, Meltzoff A. Minds, bodies, and persons: young children's understanding of the self and others as reflected in imitation and theory of mind research. In: Parker S, Mitchell R, and Boccia M, eds. Self-awareness in Animals and Humans. Cambridge: Cambridge Uni-versity Press; 1995.

[3]. Gopnik A, Wellman H. Why the child's theory of mind really is a theory. Mind Lang 1992, **7**: 145–171.

[4]. Perner J. Understanding the Representational Mind. Cambridge, MA: MIT Press; 1991.

[5]. Leslie A. Pretense and representation: the origins of 'theory of mind'. Psychol Rev 1987, **94**: 412–426.

[6]. Dennett D. The Intentional Stance. Cambridge, MA: MIT Press; 1987.
[7]. Gergely G, Csibra G. Teleological reasoning in infancy: the naıve theory of rational action. *Trends Cogn Sci., 2003*, **7**: 287–292.
[8]. Heal J. Replication and functionalism. In: Butterfield J, ed. Language, Mind, and Logic. Cambridge, MA: Cambridge University Press; 1986.
[9]. Harris P. Children and Emotion. Oxford: Blackwell; 1989.
[10]. Harris P. The work of the imagination. In: Whiten A, ed. Natural Theories of Mind. Oxford: Blackwell; 1991.
[11]. Goldman AI. Interpretation psychologies. Mind Lang 1989, **4**: 161–185.
[12]. Goldman AI. In defense of the simulation theory. Mind Lang 1992a, **7**: 104–119.
[13]. Goldman AI. Simulating Minds. New York: Oxford University Press, 2006.
[14]. Gordon R. Simulation without introspection or inference from me to you. In: Stone T, and Davies M, eds. Mental Simulation. Oxford: Blackwell; 1995.
[15]. Nichols S, Stich SP. Mindreading: An Integrated Account of Pretense, Self-awareness, and Understand-ing of Other Minds. Oxford: Oxford University Press, 2003.
[16]. Perner J. Simulation as exploitation of predication-implicit knowledge about the mind: Arguments for a simulation-theory mix. In: Carruthers P, Smith PK, eds. Theories of Theories of Mind. Cambridge: Cambridge University Press; 1996.
[17]. Kosslyn SM. Image and Brain: The Resolution of the Imagery Debate. Cambridge, MA: MIT Press, 1994.
[18]. Gallese V, Fadiga L, Fogassi L, Rizzolatti G. Action recognition in the premotor cortex. Brain 1996, **119**: 593.
[19]. Gordon R. Simulation without introspection or inference from me to you. In: Stone T, and Davies M, eds. *Mental Simulation*. Oxford: Blackwell; 1995.
[20]. Nichols S, Stich SP. *Mindreading: An Integrated Account of Pretense, Self-awareness, and Understand-ing of Other Minds*. Oxford: Oxford University Press, 2003.
[21]. Perner J. Simulation as explicitation of predication-implicit knowledge about the mind: Arguments for a simulation-theory mix. In: Carruthers P, Smith PK, ed *Theories of Theories of Mind*. Cambridge: Cambridge University Press; 1996.
[22]. Currie G, Ravenscroft I. *Recreative Minds*. Oxford: Oxford University Press, 2002.
[23]. Kosslyn SM. *Image and Brain: The Resolution of the Imagery Debate*. Cambridge, MA: MIT Press, 1994.
[24]. Gallese V, Fadiga L, Fogassi L, Rizzolatti G. Action recognition in the premotor cortex. *Brain* 1996, **119**: 593–609.