ISSN : 1978-774X

ANALYSIS OF HUMAN ERROR PROBABILITY USING HUMAN ERROR ASSESSMENT & REDUCTION TECHNIQUE (HEART) IN DYEING DEPARTMENT PT. XYZ

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ABSTRACT

Due to high CTD (Cumulative Trauma Disorder) Index in Dyeing Department PT. XYZ is indicate that Dyeing process have the high probability of accident in general. Using HEART or Human Error Assessment and Reduction Technique can be identified that unify/sew up task in Dyeing Department has the most human error probability (54.4 %). The operator should be always improve sew up skill via training regularly.
Keywords: *Cumulative Trauma Disorder, Human Error Probability, HEART, Reduction Technique*

1. INTRODUCTION

PT. XYZ is in textile industry. There are 3 (three) main process in the company: spinning, waving and dyeing to change cotton to be clothes. Due to high CTD (Cumulative Trauma Disorder) Index in Dyeing Department PT. XYZ from previous research (Fildzah, 2014), it is indicate that Dyeing process have the high probability of accident in general. To find which activity with a high human error probability in the Department, one of this following technique is HEART or Human Error Assessment and Reduction Technique.

2. RESEARCH METHODOLOGY

Ergonomics is the application of scientific principles, methods, and data drawn from a variety of disciplines to the development of engineering system in which people play a significant role. Among the basic disciplines are psychology, cognitive science, physiology, biomechanics, applied physical anthropometry and industrial system engineering (Kroemer et. al., 2001)

The design of cognitive work has not been traditionally included as part of methods engineering. However, with ongoing changes in jobs and working environment, it is becoming increasingly important to study not only the manual component of work but also the cognitive aspects of work (Freivalds, 2009) and to measure human error probability has the cognitive approach aspects because it is hard to determine quantitatively.

HEART was developed by Williams in 1986. It is a first generation HRA technique, yet it is dissimilar to many of its contemporaries in that it remains to be widely used throughout the United Kingdom. The method essentially takes into consideration all factors which may negatively affect performance of a task in which human reliability is considered to be dependent, and each of these factors is then independently quantified to obtain an overall Human Error Probability (HEP), the collective product of the factors.

The first main function of HEART is to classify the task in general category and to determine nominal level to find human unreliability (see table 1) (Kirwan, 1994).

Table 1. Generic HEART Task Type

Generic Task	Category	Proposed Nominal Human Unreliability
A	Totally unfamiliar, performed at speed with no real idea of likely consequences	0.55
B	Shift or restore system to a new or original state on a single attemp without supervision or procedures	0.26
…	…	…
M	Micellaneous task for which no description can be found	0.03

The next procedure is to identify relevant error producing condition (EPCs) to the task under analysis which may negatively influence performance and obtain the corresponding multiplier (see table 2).

Table 2. Error-Producing Condition

Error-Producing Condition		Multipler
1	Unfamiliarity with a situation but which only occurs infrequently	x 17
2	A shortage of time available for error detection and correction	x 11
…	…	…
38	Age of personnel performing perceptual task	x 1.02

After determine the EPCs, expert evaluation is need to find proportion of effect with value between 0 – 1, and then calculate the 'assessed impact' for each EPC according to the formula:

[(Multiplier – 1) Assessed Portion of Effect] + 1

Finally overall probability of failure can be calculate base on the formula:

Nominal human unreliability x Assessed impact 1 x Assessed impact 2 x …

3. RESULT & DISCUSSION

After observation and classify the activities, there are 9 (nine) task in Dyeing Department in the following table 3:

Table 3. Dyeing Department Activity

Task	Activity
1	Preparing clothes
2	Open circular machine
3	Make sure chemical dyestuff is ready
4	Inspect water circulation & chemical dyestuff
5	Regulate & inspect temperature
6	Unify/Sew up the clothes
7	Put the clothes in circular machine
8	Close circular machine
9	Regulate dyeing time process

For the result of generic task type for task number 1 (one) is G because it is completely familiar, well designed and occurring several times per hour with nominal human unreliability 0.004 (0.4%). But multiple value of Error Producing Conditions (EPCs) is x11. The task has a shortage of time available for error detection and correction due to operator has to always supervise all of the job. Chief Production of Dyeing Department (Mr. Subardi) as an expert judge Proportion of Effect (POE) about 10% and make the assessed effect of task 1 (one) is 2. Following table is assessment for all of the tasks:

Table 4. Human Error Probability

Task	Assessed Effect	Nominal Human Unreliability	HEP
1	2	0.0004	0.0008
2	-	-	-
3	1.8	0.003	0.0054
4	2	0.003	0.006
5	3.1	0.003	0.0093
6	3.4	0.16	0.544
7	1.9	0.16	0.304
8	-	-	-
9	1.45	0.00002	0.000029

4. CONCLUSION

The highest Human Error Probability in Dyeing Department is task number 6 (six) with human error probability value 54.4%. It

means that unify the clothes in Dyeing Department is the most susceptible activity that could make error happens. Conclusion from this result for preventive purpose is the company should improve operator sew skills training to unify the clothes. The other one is to make standard operating procedure (SOP) for unify/sew up activity

5. REFERENCE

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