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Instantaneous Stop Improvement Methods and Case Analysis of Subdivided Semi-Chronic, Chronic and Unexpected Type

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ABSTRACT: The purpose of this study is to provide an implementation method for improving the instantaneous stop by each type. There are three types of instantaneous stopping: semi-chronic, chronic and unexpected. The proposed method of implementing the stopping improvement is briefly reinterpreted for the semi-chronic, chronic, and unexpected. Then, the analysis system is used to carry out improvements in the stages of development, cause analysis, and countermeasure implementation. Improvement of instantaneous stopping is the most fundamental and important step of understanding the phenomenon, and it subdivides contents by day, facility, site, alarm, message, and time. Knowing the information about the phenomena of the facilities is the basic step for improving the instantaneous stoppage. And we verify the efficiency of the proposed method through case.The results obtained from this study show that the improvement methodology that can zero out the instantaneous stop and the automatically quantified values can be used as KPI performance indicators.

KEY WORDS: Zero out of Instantaneous Stop, Semi-Chronic Type, Chronic Type, and Unexpected Type

I.INTRODUCTION

A. Method of Study

This study is an improvement method for instantaneous stopping zeroing and analyzed for instant stopping. And we analyzed the problems of the existing improvement methodology and proposed a methodology to improve it. This is because the existing improvement methodology does not lead to continuous activities because it is not systematically connected. By using the instant stop analysis system rather than the existing step-by-step improvement, it is not the improvement by the procedure but the practice, that is, the improvement is normalized. The efficiency of the instantaneous suspension analysis system of the proposed method was verified as a result of the improvement before, the improvement of the first, and the improvement of the second by applying the method of instant stoppage to the raw data of the L company. As the Raw data of S company, time-based analysis methodology was applied to calculate the instantaneous stop by various methods so that the plant operator can select the method suitable for the purpose. Efficiency of production is to minimize the input (material, people, equipment, energy, etc.) necessary to drive production and to obtain the maximum output. As a result, it means measures to increase added value and to reduce manufacturing cost. The final goal of production efficiency is as follows. It is the ability to demonstrate human ability to fully demonstrate and maintain the inherent capabilities of the production facility, and to maintain the highest and extreme conditions of the Man / Machine System.

B. Instantaneous Stop

Losses due to instantaneous stoppage are as follows.

1. Equipment utilization rate (total efficiency) falls.

The instantaneous discovery delay directly affects the operating rate of the plant (total efficiency).

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2. The number of people in charge is constrained, unmanned.

In the case of a site in charge of several units, if a pause occurs, the operator is forced to take measures to limit the number of units in charge.

3. It leads to poor quality.

If there are many momentary stops due to clogging of the workpiece, the workpiece is worn or deformed, which affects the quality defects.

4. Energy loss occurs.

Machine stoppage, idling, power, fuel, etc. are lost.

Table 1. Phenomenon and reason of Instantaneous Stop

Instantaneous Stopping Phenomenon	Reason
Blockage	Adulteration
Jammed	Wear
Entrapment	Adhesion of magnetic particles
Stick	The slip of the conveyor
Work	Surface conditions of the suit
Overlapping	An attachment situation
Fall	Installation Degree
Insertion Error	A breach of timing
Sensor Not Detected	Vibration
Sensor Error Detected	Method of attaching sensor, Location of Sensor

And the reasons why momentary stoppage has been neglected are as follows

1. It was difficult to appear on the surface as a loss.

Momentary stoppage, although depending on the frequency of occurrence, was often considered to have been ignored without realizing the extent of the loss and not appearing on the surface as a loss.

2. The coping method was bad.

There was not enough investigation of the actual condition of the momentary stopping, and it ended with an urgent first aid, and there were many cases of public therapy that only partial measures could not be taken.

3. Field survey and observation were insufficient.

The processing speed was so fast that it was not observed sufficiently. The challenge of completely eliminating pauses is never difficult automation. In the field of unmanned operation, the challenge of suspension is indispensable.

II. IMPROVEMENT METHOD FOR EACH INSTANTANEOUS STOP

A. Improvement Method for Semi-Chronic Type

1) Phenomenon

1. It occurs in a wide range compared with the unexpected and chronic type, so the total number of small chronicity is never few.
2. Low incidence and long intervals.
3. There was less interest and fewer occurrences of the same site, so the cause analysis was difficult to improve until now.
4. Even if you try to shoot a movie, it is not easy to shoot a small number of minute instantaneous stopping phenomena in a small number of occurrences.

2) Reason

- A small defect is enlarged due to a defect or several defects appear as a superimposed defect.

3) Cause Investigation

1. It is important to identify the defects of the equipment to the extent that it can affect the minor instantaneous shutdown.

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2. Find defects while clearing the way through the semi-finished product and the initial condition (desirable condition) of the area where the equipment deteriorates.
3. Poor results (step / heat / wear / burr / wear) are found.

4) Measures

1. Restore any missing defects to the desired state and principles. The restored state and conditions are improved so that they do not change easily. Example) Improves wear resistance to prevent wear.
2. Educate for easy restoration in the field and improve difficulties.

B. Improvement Method for Chronic Type

1) Phenomenon and Cause Investigation

1. The worker can only see the completion type phenomenon after a momentary stop and stop or alarm. Cause analysis is difficult and hardly reduces. Often, the causes are complex and work without knowing the cause.
2. It is necessary to investigate the progressive phenomenon corresponding to the process from instantaneous stop to complete phenomenon.
3. It is necessary to investigate the progressive phenomenon corresponding to the process from instantaneous stop to complete phenomenon.
4. If you observe moving images of a progressive phenomenon from instantaneous stop to slow motion, it is easy to analyze the cause that affects the instantaneous stop.

2) Measures

1. If a progressive phenomenon is observed, find the root cause by Why-Why analysis or PM analysis.
2. Make fundamental improvement of facilities.
3. Find and improve defects in design and production.

C. Improvement Method for Unexpected Type

1) Phenomenon and Cause Investigation

1. It occurs because of a single cause.
2. Investigate the cause of the problem.
3. A few days later, the same phenomenon causes many repetitions.

2) Measures

1. Take action measures.
2. It should be divided in terms of the desirable aspect of the facilities.
3. Find the root cause.
4. Look for countermeasures that do not cause the underlying cause to recur (Use why - why analysis methods)

III. CASE ANALYSIS

A. Percentage of Each Instantaneous Stop (Before Improvement)

Table 2 summarizes the distinction and ratios for each instantaneous stopping according to the proposed method. We apply the same processing conditions of data to compare the existing method with the proposed method and apply it to the case to understand.

Table 2.Percentage before Improvement

	Semi-Chronic	Chronic	Unexpected	Existed Method
Bowl Feeder	13.73	38.56	47.71	52.58
Line Feeder	100	0	0	5.84
Vacuum	14.05	19.01	66.94	41.58

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When the existing proposal method is applied, the phenomenon appears at a quantitative rate when the ratio is divided into small chronological, chronic, and erratic by the classification of instantaneous stoppage. It is difficult to find out the direction of setting and improving the goal of the existing method by calculating the whole method and not understanding what the phenomenon is. If we make improvement as suggested in the proposed method, we set the goal of the primary improvement goal of 47.71% for ball feeder and 66.94% for vacuum, and apply the sudden stop improvement method.

Table 3.Percentage after Primary Improvement

	Semi-Chronic	Chronic	Unexpected	Existed Method
Bowl Feeder	57.14	42.86	0	52.5
Line Feeder	100	0	0	15
Vacuum	88.46	11.54	0	32.5

As shown in Table 3, existing methods can not tell what has changed. However, in the proposed method, quantitative data suggest that the sudden stoppage has been improved by 100%. If we make improvement as suggested in the proposed method, we set the goal of the second improvement goal of 42.86% for the ball type and 11.54% for the vacuum type. For the second improvement, apply the methodology to improve the chronic type stoppage, or if there is a reoccurrence in the unexpected type, it can be done first.

Table 4.Percentage after 2nd Improvement

	Semi-Chronic	Chronic	Unexpected	Existed Method
Bowl Feeder	100	0	0	45.9
Line Feeder	100	0	0	4.92
Vacuum	100	0	0	49.18

A new fact can be found in Table 4.The existing method has not changed much. As a result of applying the proposed method, it is suggested that only the instantaneous stoppage of the subatomic vocal cord is 100%.The important point here is that the method for instantaneous zeroing can be applied by resetting the criterion for calculating the ratio of the minor molding, the chronic type, and the unexpected type. The reason for resetting is a micro-bouncing chronic, erratic, zeroing out the cause. In the case of the temporary mold stopping, the part of the chronic type is not improved, and it is continuously generated. It can be zeroed by applying the functional type initial cleaning method.

As for the change trends before and after the activities, it can not be concretely understood what kind of phenomena appear because the existing activities do not distinguish the instant pauses but set the targets at the ratio to the whole. As a result, unnecessary time is wasted in the cause analysis step. Also, when applying the existing method, the person in charge of execution can not know the exact cause and is not connected to continuous activity.

As shown by the change before and after the first improvement and the change after the second improvement, the third improvement may be improved for the semi-chronic, or the semi-chronic and the eruption may be eliminated through the resetting.

The instantaneous stop analysis system implemented by the proposed method is configured to calculate the MTBE, the operation time, the operation rate, the operation cycle, and the MTBE of the semi-chronic, chronic and unexpected stop rates. Table 5 and Table 6 show the instantaneous stop rate for the manual process data and the automatic process data calculated by the analysis system, respectively.

Table 5.Percentage of Instantaneous Stop by Facility by Manual Process Data

	Semi-Chronic	Chronic	Unexpected	Existed Method
Bowl Feeder	100	0	0	45.9
Line Feeder	100	0	0	4.92
Vacuum	100	0	0	49.18

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Table 6.Percentage of Instantaneous Stop by Facility by Manual Process Data

	Semi-Chronic	Chronic	Unexpected	Existed Method
Bowl Feeder	100	0	0	45.9
Line Feeder	100	0	0	4.92
Vacuum	100	0	0	49.18

IV.CONCLUSION AND FUTURE WORK

In the research, the improvement methodology was presented through the case study for each of the unexpected, chronic, and semi-chronic, and the reliability was verified by combining the data before and after the activity. It is easy to know the relationship between instantaneous stoppage and facility utilization rate by line and facility by analyzing system and it is easy to manage performance in improvement activity. Although the existing instantaneous stopping activities were promoted by improvement activities of the event formula, if the instantaneous stopping analysis system is used, it is possible to perform continuous activities through daily monitoring.

The methodology proposed in this paper proved the quantitative data as a result of applying the data after the first improvement and the second improvement after the improvement of the instantaneous stop analysis system. The information provided by the instantaneous stop analysis system proved that the proposed method can be improved step by step in the order of semi-chronic, chronic type, and unexpected type.

A study on plant management and facility management did not provide a concrete solution for the suspension. In this study, the instantaneous stopping analysis system is designed by the method based on the instant stopping frequency and the method based on the instant stopping time, and the efficiency of the instant stopping analysis system based on the application case is verified.

In case of application to the industrial field, the information provided by the analysis system and the method of improving the detailed instantaneous stoppage have provided a basis for improvement by a simple procedure of the phenomenon identification, cause analysis, and countermeasure implementation. We will study the methodology for realizing fault zero and fault zero in relation to fault activity and quality activity by complementing the instant stop analysis system.

REFERENCES

[1] Hyun Woo Lee, Jae Woo Kim, S. H. Park, “MTBF Estimator in Reliability Growth Model with Application to Weibull Process”, The Korean Society for Quality Management”, 1998, pg no: 71-81.
[2] Young-In Kim, Byung-Kwan Choi, Hyo-Joon Hahn, “ The Efficient TPM Application Based on the Manufacturing Characteristics for Semiconductor Industry”, Journal of the Korean Institute of Plant Engineering, 2003, pg no : 5-20
[3] “Managerial Requirements for the Successful Implementation of TPM”,Journal of the Korean Institute of Plant Engineering, 2009, pg no: 119-124.
[4] Won-Tae, Tae-Young Song, Hyo-JoonHahm, “A Study on the Role of Scheduled Maintenance in TPM Activity”, Journal of the Korean Institute of Plant Engineering, 2005, pg no: 47- 53
[5]Jung-Sik Kim, “On the Appraisal Factors for Maintenance Management in TPM”, Journal of the Korean Institute of Plant Engineering, 2016, pg no: 99- 108
[6]Chae Heung Park, “The Effect and Influencing Mechanism of TPM Factors to Performance”, The Korean Society for Quality Management”, 2002, pg no: 154-163
[7]Yong-Keon Lee, Tae-Soo Rye, “A Case Study of Six Sigma and TPM’s Integrated Methodology for Manufacturing Innovation”, Journal of the Korean Institute of Plant Engineering, 2011, pg no: 93-101
[8] Robert W. Holtz, Paul A. Cambell, “Six Sigma : It’s Implementation in Ford’s Facility Management and Maintenance Functions”, Journal of Facilities Management, 2004, pg no.: 31-40
[9] Cochrance, D., “Breathing New Life into TPM, Works Management, 2003, pg no.: 30-33
[10] Taesu Hwang, Cheol-Seok Kim, Juyoung Jang, Jonghwan Lee, “Classification of Instantaneous Stop for Machine Maintenance”, International Journal of Advanced Research in Science, Engineering and Technology, 2018, pg no: 6304-6308
[11] Juyoung Jang, Jonghwan Lee, “Mathematical Modeling to Calculate the Ratio of Instantaneous Stop and MTBE using Instantaneous Frequency”, International Journal of Advanced Research in Science, Engineering and Technology, 2018, pg no: 6503-6506