

Application of 7QC Tools on SD110 Machine to Improve Productivity

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Abstract: “our work is aimed at analysis of in-process defects of SD110 machines an earth moving equipments assembled in Volvo construction equipments, Bangalore by using Quality control tools[5]”. The work was started by data collection on in-process defects of SD110 machines by check sheets, After data collection Analysis was done to find out the root causes for in-process defects.

Pareto chart[1] was plotted to determine the most significant issues to be work first for the collected data of in-process defects and find out the causes for most significant issues. The most significant issues were determined by plotting the cumulative percentage defective occurrence.

Cause and effect diagram[2] was constructed by brainstorming method in production line to find the causes for defects. Our work was concluded with installing the solutions obtained by analysis and reducing the total in process defects of SD110 machines.

Keywords: Brain storming, Cause and effect diagram, Check sheets, pareto chart

I. Methodology

The work was started to reduce the in process defects of SD110 earth moving equipment in Volvo construction equipment plant. The work was started by taking the in process defect data of SD110 by check sheets as shown in table1. The summary of the defective issues were created by using check sheets of 1 month data as shown in table2. The pareto chart was constructed by the collected defective data from check sheets to find the vital few issues which causes 80% of the defects in the machines. The defects which causes 80% of the defects in SD110 machine are shown in bar graph fig1. The Brain storming process was done on the shop floor with production experts, Quality engineers, supervisors and workers to find the root causes for occurring the defects and Fish and bone diagram was constructed based on the root causes developed in the brain storming process. The Cause and effect diagrams was constructed by considering all suggestion given by the workers, To find the vital causes for the defects, cause verification process was carried out to find the relation between causes and defects at gemba. Table3 shows the sample cause verification process of the defect. The second level cause and verification diagrams and action plan was constructed to find the possible solution to the problems. The brain storming sessions was conducted to generate the possible solution for the problems. The developed solutions was installed in the gemba and we have collected the reduced defects data from the check sheets. Table shows the defects occurred in the SD110 machine after analysis.

1. 2. Figures and Tables

2.1 Tables

SI no.	The following points to be checked before shipment	OK	Remarks
1	Cooler hose	✓	
2	Engine throttle lever	✓	
3	Engine Low and High RPM		To be set properly
4	Hazard light	✓	
5	Shock mounting		Crack
6	Drum vibration hose fowl with bracket	✓	
7	Silencer mtg sheet M12 bolt	✓	

8	Engine oil pressure guage	<input checked="" type="checkbox"/>	
9	Silencer outlet stake pipe	<input checked="" type="checkbox"/>	
10	Front indicator lamp	<input checked="" type="checkbox"/>	

Table 1 : Check sheet format

SI no.	Issues	No. of incident	Corrective action responsibility
1	Cooler hose	8	shop
2	Engine throttle lever	2	shop
3	Engine Low and High RPM	20	shop
4	Hazard light	2	shop
5	Shock mounting	6	shop
6	Drum vibration hose	4	shop
7	Silencer mtg sheet M12 bolt	1	shop
8	Engine oil pressure guage	3	shop
9	Silencer outlet stake pipe	1	shop
10	Front indicator lamp	2	shop

Table 2: Summary of defective data

SI no.	4m's	Cause	Investigation	Analysis*
1	Man	Wrong assembly	no problem with Assembly	△
		Operator error	Negligence	△
2	Machine	Gap b/w throttle lever and preset	1mm gap b/w lever and spring	◎
		Bolts loosen due to vibration	Visually checked Abnormality present	◎
3	Method	Wrong assembly	no problem with Assembly	△
4	Material	Defect in throttle lever spring	Visually checked	○
		Cable problem	No problem in cable	△

◎ STRONG RELATIONSHIP ○ MEDIUM RELATIONSHIP △ WEAK/NO RELATIONSHIP

Table3 : Cause verification table for Engine low and high RPM to be set

Sino.	What (Action)	When	Who (doer)	How(method)
1	Gap b/w throttle lever and preset		Project team	Use of loctite for the bolts to fit tight
2	Bolts loosen due to vibration		Project team	Use of Uclamp for the bolts to avoid vibration from the engine

Table 4: Action plan taken after brain storming

SIno.	Issues	No. of incident	Corrective action responsibility
1	Cooler hose	2	Shop
2	Engine throttle lever	1	Shop
3	Engine Low and High RPM	4	Shop
4	Hazard light	2	Shop
5	Shock mounting	5	Shop
6	Drum vibration hose	5	Shop
7	Silencer mtg sheet M12 bolt	0	shop
8	Engine oil pressure guage	2	shop
9	Silencer outlet stake pipe	0	shop
10	Front indicator lamp	2	shop

Table5: Final summary of defective data after analysis

2.2 Figures

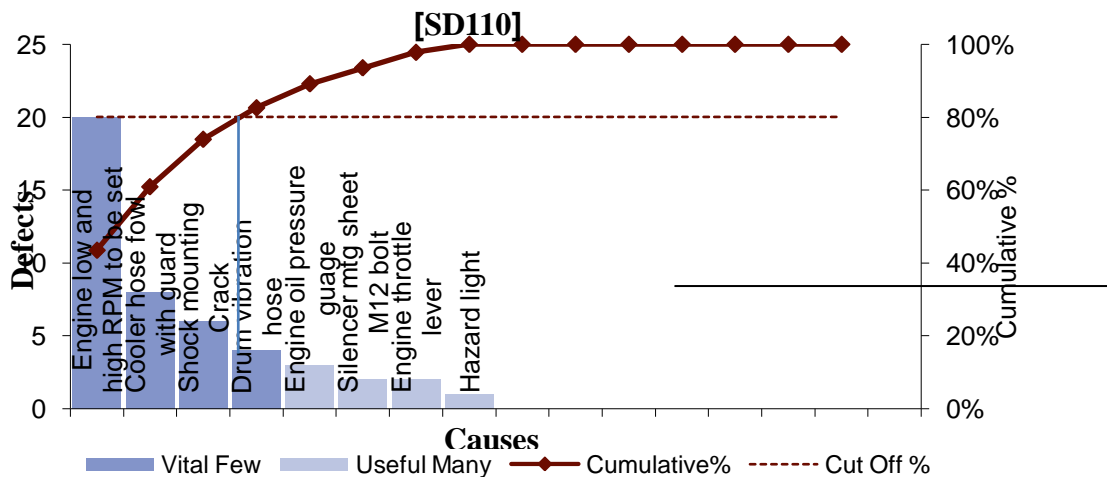


Figure 1 : Pareto chart for SD110 Defects

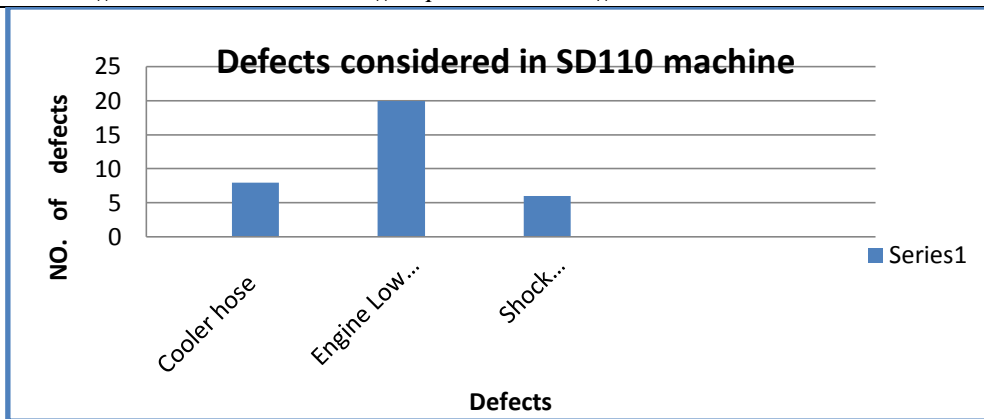


Figure 2 : Defects considered for analysis by pareto analysis

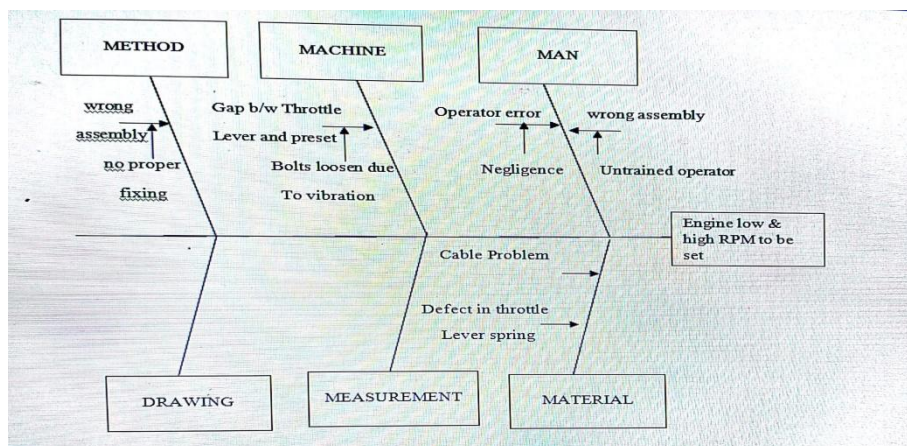


Figure 3: Sample Cause and effect diagram of Engine low and high RPM to be set

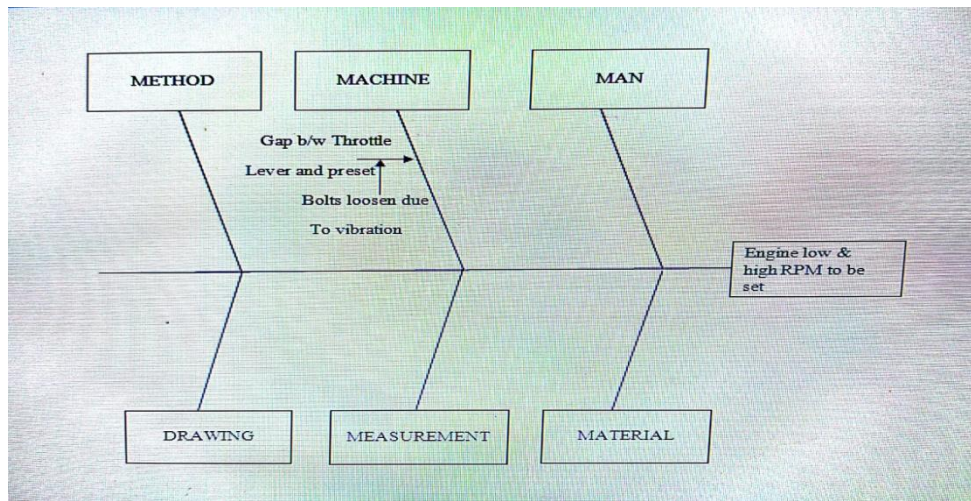


Figure 4: Sample Cause and effect diagram of Engine low and high RPM to be set after cause verification process

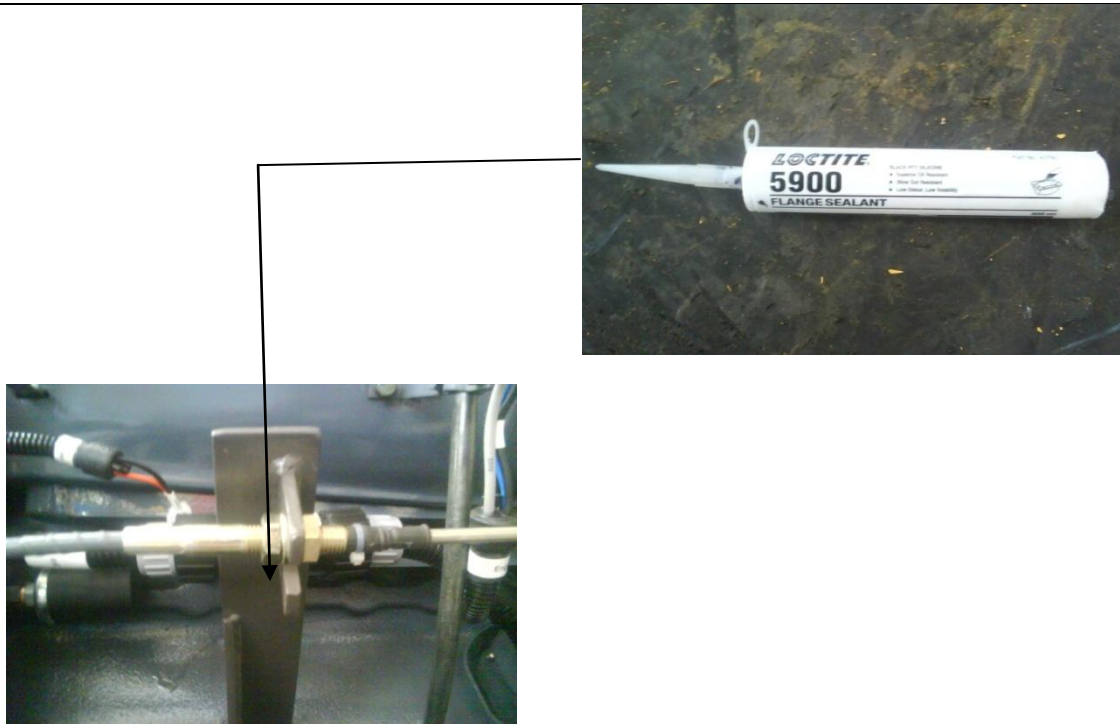


Figure 5: Suggestion given to the root cause Gap between throttle lever and preset

2. Conclusion

1. The research has been conducted to show the importance of 7QC tools in improvement of productivity.
2. The outcome of the work is by implementing the 7 Quality control tools we have reduced the defects of SD110 machine to 53%
3. Further we can continue the process to bring down the defect rate minimum.
4. Effective implementation of quality control tools and brain storming with the peoples who are involving in the production we can reduce the defect rate to minimum.

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