

Study of Cost Optimization and Quality Enhancement by Web Break Minimization & Wastage and Machine Downtime Reduction in Web Offset Printing Machine

(A Case study of "BENNETT, COLEMAN & CO.LTD" Delhi)

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ABSTRACT

This project related to study of web offset printing technology. It is related to proper utilization of resources like ink, newsprint and machine handling procedure. It directly relates to pre press, press & post press operation. During data collection shop floor operation is monitored like reel handling procedure, webbing up, proper maintenance of machine, break down minimization and various initiatives to improve quality and minimizing wastage. Proper analysis of individual operation is done and initiatives taken are part of continuous improvement in web offset printing procedure.

INTRODUCTION:

OFFSET PROCESS

It is Plano graphic process. In this system, both image & non-image areas lie on same surface. Here image area accepts ink & non-image area accepts water. During printing emulsified ink charged on printing image carrier, which accepts ink & non-image area accepts water, then replica of image taken on substrates.

Generally Offset Printing process consists of Plate Cylinder that carries image carrier (in the form of plate) that accepts ink in the image area & water on non-image area then this inked image is transferred on to Blanket cylinder surface then from Blanket cylinder to printing substrate with the help of Impression cylinder. By maintaining proper squeeze pressure, inked image is transferred from Plate to Blanket cylinder then to substrate with the help of Impression cylinder.

TYPES OF OFFSET PRINTING PROCESS

Generally, Offset Printing Process could be categorized on two from

- a) **Sheet Fed Offset** in this case, supplied substrates are in the form of sheets; they are piled up on board then by using forwarding Gripper chain mechanism these sheets are supplied in between Blanket & Impression Cylinder, after printing printed sheets are delivered to delivery section. Several Sheet Fed press incorporate facility of ant setoff spray to minimize “set off“, Problem.
- b) **Web Fed Offset:** in this type of Printing Process, substrates are supplied in the form of web. It is continuously feeding mechanism. Webs are different dimension in nature as per requirement of jobs specification. It is high-speed continuous process.

WEB FED OFFSET PRINTING PROCESS

As name, suggested substrate in web offset is web form in nature. Generally, Web Offset consists of following structural elements.

- a) **Reel Stand:** This area remains in the floor area having capacity to feed reels in different dimension as per requirement of Jobs to be specified. Various high speed Press having capacity of two to three holding facility on reel stand.
- b) **In-feed Section:** This section in between reel stands area & printing press section. It mainly maintains web tension control mechanism by means of feedback taken from Dancer roller that supply signal to E to P converter. Thus by means of anti-torsion mechanism proper web tension controlling is done.
- c) **Printing Unit:** This unit consists of Plate, Blanket & Impression Cylinder. In case of perfecting printing Unit Blanket of one unit acts as impression cylinder of other unit. Generally, bearer setting of Plate & blanket Cylinder helps to maintains proper squeeze pressure between Plate & blanket Cylinder.
- a) **Folding Unit:** This unit consists of former, cutting, folding section & delivery wheel. Some folding unit also having slitting & stitching mechanism.
- b) **Register Control Mechanism:** Generally Multicolor high speed web offset printing unit having facility of Register Control Mechanism. Individual process color prints single spot at the edge of printed sheet, by measuring distance from each dot from a reference point both lateral & circumferential registration usually maintained.
- c) **Console Area:** It is generally situated on Deck level of printing Machine. Now a day's various touch panel facilities provided where by simply pressing area of touch panel controlling of entire machine is done. This console area has facility of web tension controlling, registration controlling, and ink water balance controlling facilities. Depends on Press speed & requirements number of console terminals increases.

TYPES OF WEB OFFSET PRESS

As per mode of operation, web offset presses are four types:

- a) **Inline Type:** This type of press is horizontal in nature, most suitable for single web & slow speed press operation. This type of press configuration needs large amount of floor area.
- b) Drying & other press related problem are very less in this type of press.
- c) **Stack Type:** This type of press configuration is vertical in nature, mostly high speed & most suitable for multicolor printing. This type of press configuration needs very less amount of floor area as compared to Inline Press configuration.
- d) **Common Impression Cylinder:** In this type of Press configuration, generally, impression cylinder is common in nature, image carrier cylinder different but impression cylinder is common. Sometimes this type of Press configuration needs addition drying facilities to minimize various inks drying problem.
- e) **Perfecting Type:** It is commonly known as back-to-back printing mostly used in newspaper printing. In this type of web printing press Blanket cylinder of adjacent unit act as a impression cylinder. Generally, back to back printing is done in this type of printing press. This is type of press configuration suitable for high-speed multicolor back-to-back printing. Now days this type of press configuration is very much accepted.

MACHINE DOWNTIME / BREAKDOWN IN WEB OFFSET PRINTING

Machine downtime related to sudden unwanted stop of machine that directly affects resources like Man, Machine, materials. Unwanted down time not only reduced productivity but also affect on time print finish. Generally, Machine down time are categorized into following segments:

- a) **Electrical down Time:** Down time related to various electrical problem are categorized into this type of segments, it could be related to Drive Error, module failure, communication error & could be system failure too. Proper Inventory & skill personnel required to trouble shoot this type problem. Sometimes it got solved within few minutes sometimes taken hours. Various supporting drawing & analytical approach very much essential to troubleshoot such type of problems.
- b) **Mechanical down Time:** It is related to various types' mechanical component failure like breaking of shafts, gear assembly replacement, bearing replacement, folding jaw replacement. Various types of links failure, coupling failure. Adequate skill is required to replace failure components provided by supportive inventory available on Machine room area. Sometimes mechanical problems are identified by unwanted abnormal sound heard during running of printing machines. Sometimes abnormal jerking of shafts also signifies initiation of mechanical problem. Timely identification & proper attentions required to solve problem before it is going to be vast.
- c) **Production down Time:** Production down time related to various operational problem oriented downtime, it related to web sway, registration problem, pasting failure, web break, improper plate fixing, ink wash out, blanket problem and various other printing related to problem. Timely analysis & adequate skill is required to trouble shoot such type of problem, sometimes mechanical & electrical team members also coordinate jointly to trouble shoot such type of problems.

REMEDY

To minimize above mentioned problem adequate maintenance plays a great significance role. Timely maintenance not only minimize machine down time but also improves health of machines. Different types of maintenance are as follows:

RESEARCH OBJECTIVE:

Now a day to sustain for long time any organization should focus on proper utilization of Man, Machine & Materials, so by reducing down time, web break & quality enhancement, this project directly supportive to sustain in modern work culture.

In this competitive market customer are very much price conscious, so doing timely print finish by reducing down time & proper utilization of resources helps to introduce product on competitive pricing on market, thus objective of research supportive to enhance profit margin as well as brand building.

The main objective of this research is as follows

1. To identify reason of web break.
2. To collect information regarding different types of machine down time.
3. To trouble shoot various quality related problem.
4. To find out reason behind newspaper wastage.
5. To find out reason behind ink wastage.

RESEARCH METHODOLOGY:

A thorough systematic approach will be initiated to complete this research method.

First, of all various causes that are related to machine down time will be identified then reason behind those causes will be identified. After that, day to day data to be collected then root cause analysis will be done regarding those problem.

So research methodology could be summarized as follows:

1. Find out different causes that relate to machine down time & wastage.
2. Collets day-to-day data sheet related to relevant field.
3. Preparation of checklist to minimize to those problems.
4. Monitoring the system & again re collect data.
5. Measure quantity of improvement.
6. In case of deviation again re initiative will be taken.

DATA COLLECTION & ANALYSIS:

Data was collected from Double Width Double Circumference Press.

Machine specification as follows:

Name of Company: Man Roland

Year of Manufacture: 1998

No's of Folder: 02

No's of Former: 02

Number of tower: 05

Tower Specification: It consists of 8 couple (plate & blanket) unit, means single pass of web inside a tower could print four colour back to back printing. It's double width double circumferential machine.

Number of reel stand: 05

Plate & Blanket Cylinder speed ratio: 1:1

Paper Cut off Length: 560 mm

Running web width: 1397 mm.

Machine Max Speed: 70 K/ Hr

Conventional Running Speed: 30K/Hr

Job Change over Time: 30 Mins (Approx)

No's Of Job Assigned: 03 No's (Max)

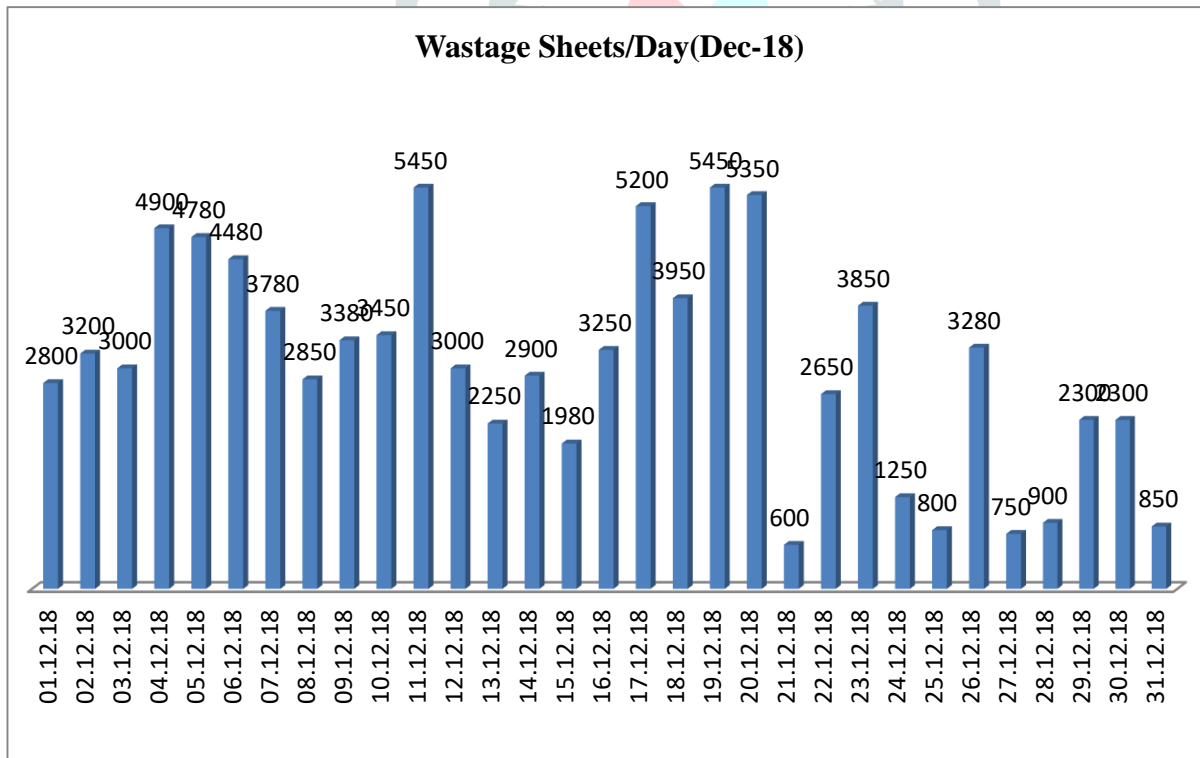
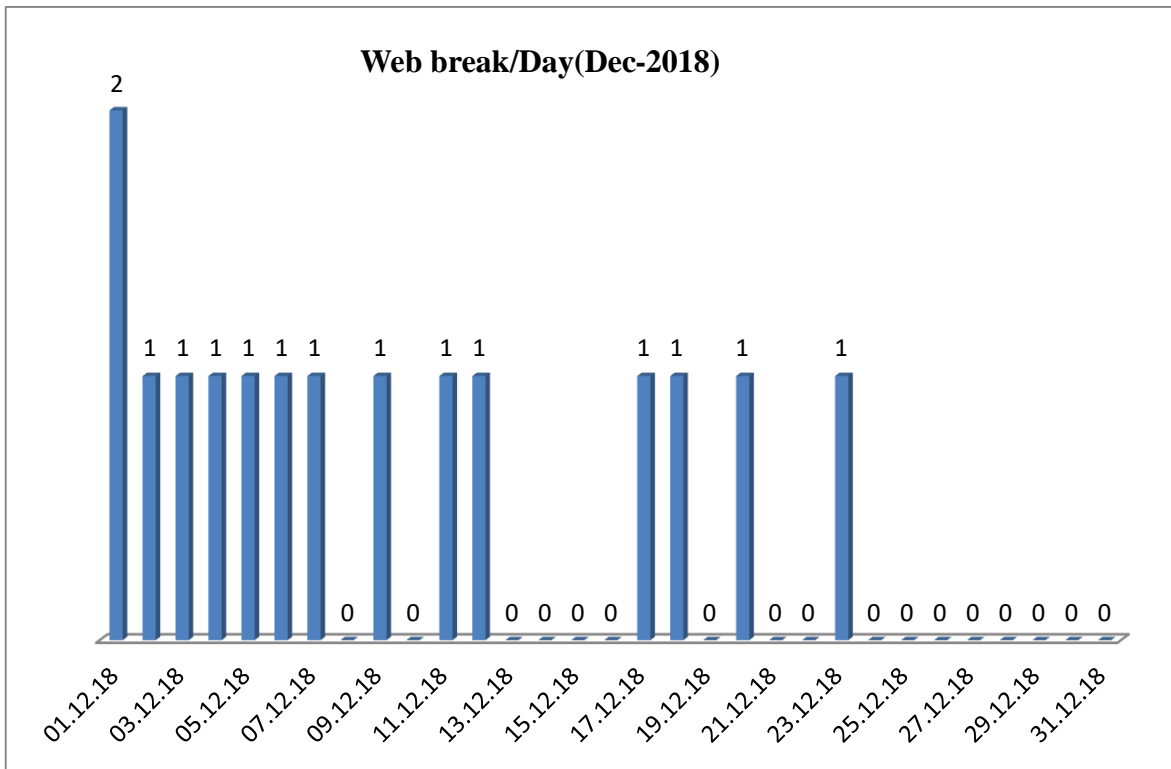
Wastage Percentage: 02 % (Usually)

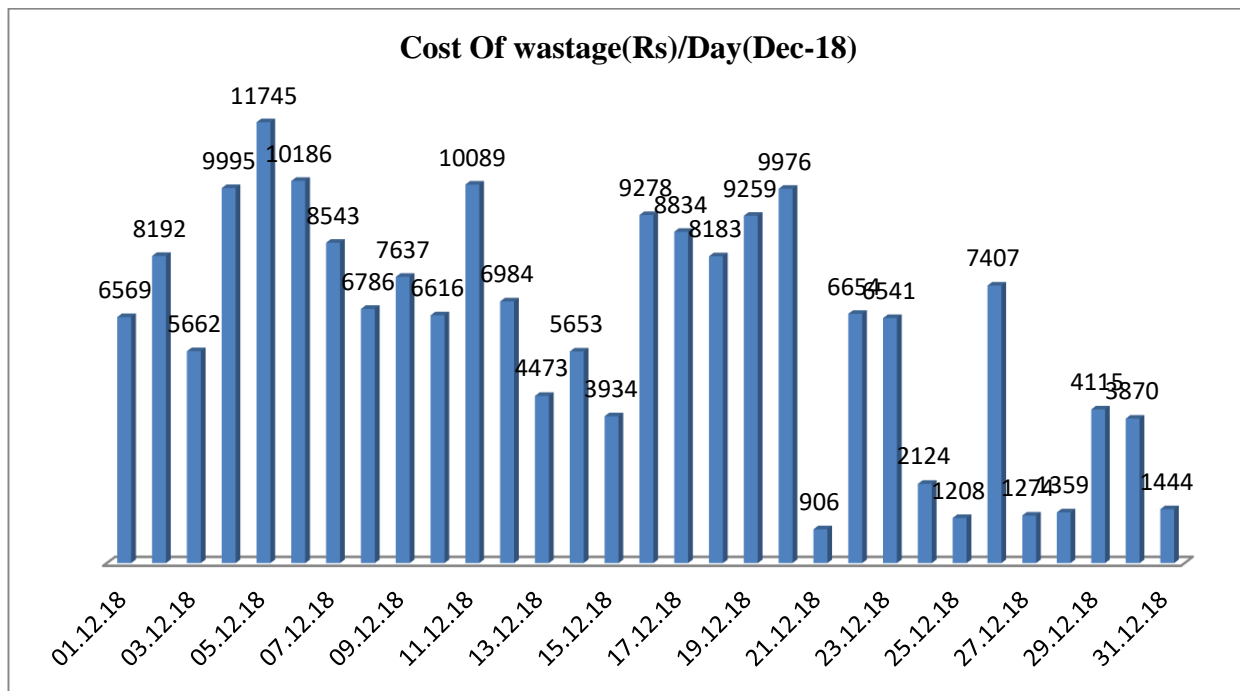
Mode of operation: It could run either Single Folder (1 UP Mode) or double folder (2 UP Mode) as per requirement of product.

Number of Drive per Tower: 02, means lower four couple controlled by single drive, upper four couple controlled by another drive.

Lubrication System: Distributed (Printing Unit, Folder, FSS section)

December 2018 data chosen as Base data:





To minimize web break, wastage and machine down time following checklist introduced:

Check List:

1. Ensure floor area to be free from any kind of hazardous material to avoid accident.
2. Ensure to carried out proper preventive maintenance both production as well as engineering as guided by manufacturer manual.
3. Ensure removal of unwanted material from reel handling floor area to avoid any kind of surface damage during reel handling on shop floor.
4. Regular inspection of forklift rubber pads.
5. Provide adequate cushioning material near reel unloading area to maintain its proper shape.
6. Proper inspection of newsprint before loading on reel stands after removal of cover.
7. Ensure correct splicing pattern preparation on right reel surface area.
8. In case of reel having mill joint, reduce machine speed near mill joint area to avoid web break.
9. Machine speed to be reduced in case of reel, having side surface out of round to minimize bouncing of reel on reel stand during run.
10. Proper inspection of blanket condition before print start.
11. Proper inspections of web path that must be free from any kind of unwanted obstruction.
12. Inspection of turner bar section and its proper positioning & locking.
13. Checking web tensioning and FSS PIV values
14. Checking folder guide bars, diameters, jaw setting as per user manual.
15. Check all ink ducts & duct sensor connection.
16. Check Techno -Tran's working condition.
17. Check Techno Tran's PH, Conductivity & Temperature.
18. Checking various web break detector bar sensor in working condition.
19. Ensure availability of right tools in right place.
20. Ensure availability of commonly consumed spare near floor area store.
21. During running of press, no one should be allowed to carry out any kind of activities without prior permission.
22. Ensure usage of PPE (Peoples protecting equipment) during working in floor area.
23. Support various training session regarding news print handling & press operation in the floor area.

RESULT DISCUSSION:

In this complete project, Base data was selected on December 2018 production data on Man Roland machine. Data was tabulated in the form of individual day wise. Total number of edition, web break, machine down time, wastage of copies & monetary loss calculated for the whole month.

In the month of December, total number of web break was 15, total down time was 283 minutes, wastage of copies 94930 number & cost of waste was 195496 rupees.

Then to improve productivity several checklist introduced,

Next month January-2019 result was better. In this month total number, web break was 13, total down time was 260 minutes, wastage of copies 85340 number & cost of wastage was 185277 rupees.

Then in the month of February-2019 little bit, more improvement was observed.

In this month, total number of web break was 10, total down time 241 minutes, wastage of copies 79986 number & cost of wastage was 183203 rupees.

Finally in the last month, March-2019 more improved result was observed.

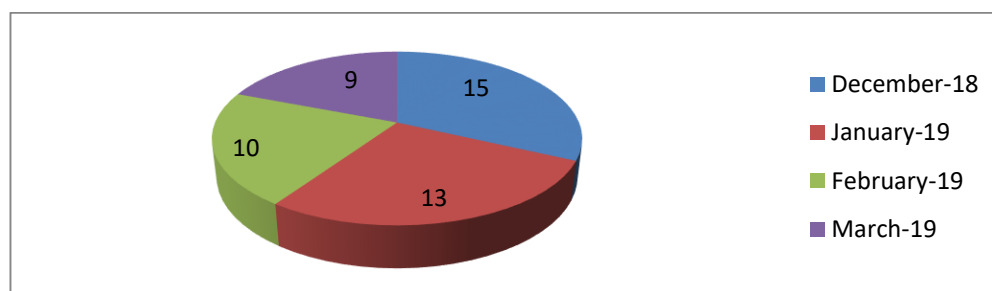
In this month, total number of web break was 09, total down time was 232 minutes, wastage of copies 76450 & cost of wastage was 180471 rupees.

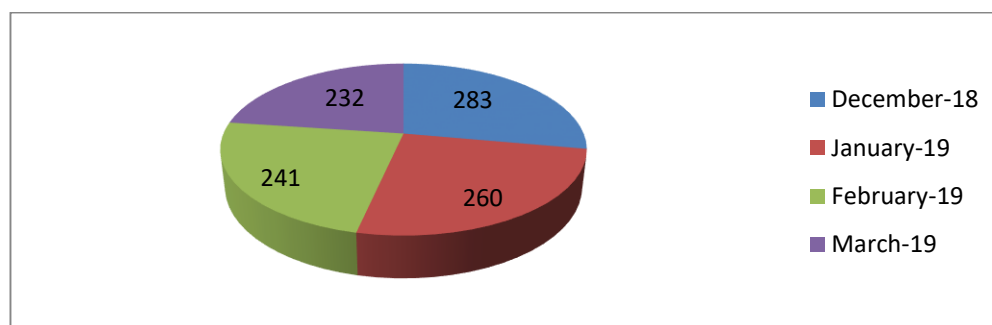
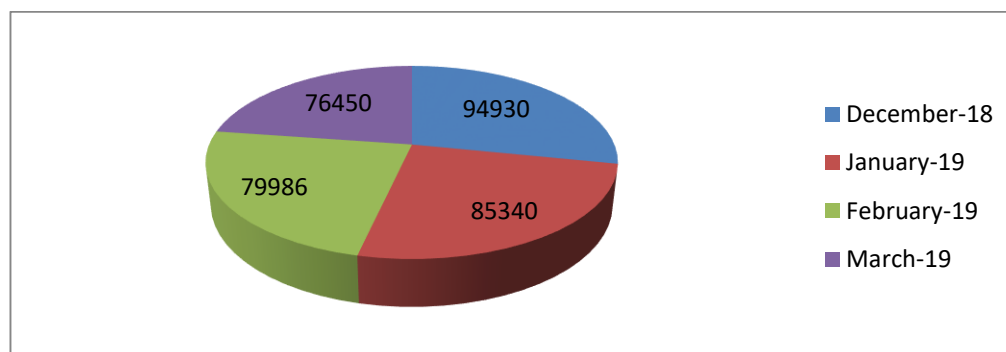
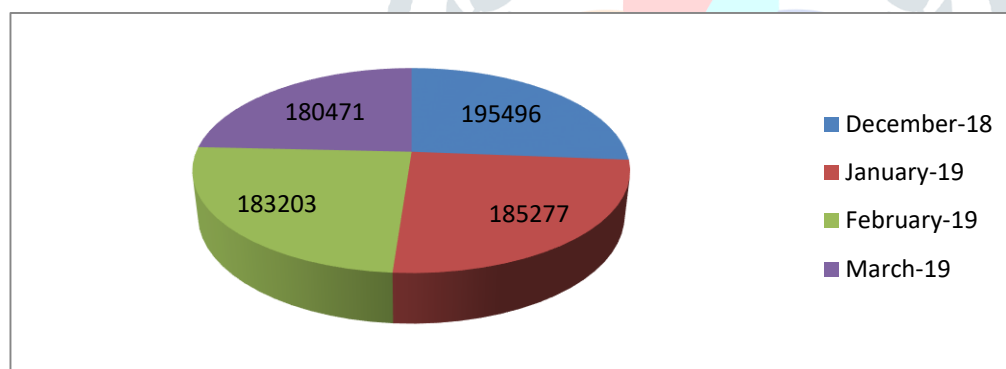
Therefore, above result shows continuous improvement in the mode of press operation.

Let's have a view of this tabulated value of four months:

| Month | Total No's Web break | Total Down time (Mins) | Total Waste(Sheets) | Cost of Waste (RS) |
|-------------|----------------------|-------------------------|---------------------|--------------------|
| December-18 | 15 | 283 | 94930 | 195496 |
| January-19 | 13 | 260 | 85340 | 185277 |
| February-19 | 10 | 241 | 79986 | 183203 |
| March-19 | 9 | 232 | 76450 | 180471 |

Month Wise Number of Web Break:



Month Wise down Time (Minutes):**Month Wise Wastage of Sheets (No):****Month Wise Cost Of Wastage (Rs):****CONCLUSION:**

Finally, it is concluded that by means of adopting certain technical initiatives big improvement of operation methods could be done.

Obtained result clearly indicates that lesser number of web break and machine down time quite supportive for lesser amount of waste of copies cost of wastage reduces gradually month wise.

Thus lesser down time supportive for production improvement.

Finally, it is concluded that less interrupted the whole production process more optimal usage of resources could be done.

Therefore, the above-mentioned project supportive to minimize machine down time, reduces number of web break & finally reduced cost of wastage.

FUTURE IN SCOPE:

The result obtained through this research method will help to minimize unwanted down time in machine area. It will help to trouble shoot various web break related problem & initiatives to be taken at inventory level also. Result of this research also supportive to initiate various quality enhancement activities.

These research activities will helpful to minimize wastage reduction & increase mileage of ink. By using this research initiatives optimum usage of resources could be done.

This research unanimously could be applied all newspaper industry to minimize down time, reduction of wastage, quality enhancement & to increase mileage of ink.

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