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Quality and Productivity Improvement through Business Process Re-Engineering/Re-Orientation



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ABSTRACT

Innovation with minimum investment is the need of the hour to tackle the menacing issues of burgeoning global economic slowdown, growing market demands, depletion of primary energy sources, growing energy demand & the consequent energy insecurity altogether. In this regard, Business Process Re-engineering (BPR) stands out as the best viable way of garnering positive achievable results at a faster pace rather than investing immense. BPR is the act of recreating a core business process with the goal of improving product output, quality or reducing costs. It involves the analysis of workflows, finding processes & sub-processes that are inefficient & figuring out ways to get rid of them or optimize them.

It's essential nowadays in the existing stiff market competition to reimagine our business from inside out. Empowering our people with optimized processes using emerging technologies can deliver more intelligent workflows. But always it's not possible to invest right away from business perspective. There is no off-the-shelf readymade way that can solve all our challenges so the imperative is to reinvent every part of our business. By harnessing in-house resource & technology available at hand we can help to strengthen the process capability to avoid disruption.

By the term "Re-engineering" common notion among people is all about upgradation of technology & by that they understand mainly about hardware alteration but re-engineering can be done in many ways as such for product, chemistry, process, pulp, chemicals etc. Some real life cases are being demonstrated in this context to validate our school of thinking & further helped to either eliminate or reduce the problems.

Introduction

BPR is a business management strategy which focuses on the analysis and design of workflows and business processes within an organization. BPR helps organizations to rethink about their performance in order to reduce operational costs, to improve customer service and set a benchmark. BPR is the practice of rethinking and redesigning the predefined workflows to support effectively an organization's mission , thereby , reducing the cost. Re-engineering embarks upon with a high-level assessment of the organization's strategic goals aligned with the customers' requirements.

Re-engineering focuses on the organization's business processes—the macro & micro steps and procedures that govern how resources are used to create products and services that meet the market requirements . Re-engineering identifies, analyzes, and re-designs the organization's core business processes in parameters, such as cost, quality, service, and speed in order to improve the critical performance. Hence, re-engineering focuses on re-designing the process as a whole in order to achieve the greatest possible benefits to the organization and their customers. (Refer Fig 1)

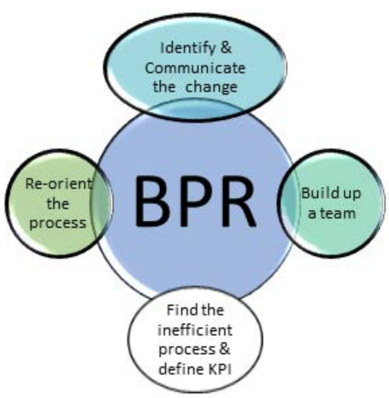

Fig 1:BPR model

BPR Steps:

Step #1: Identify and Communicate the Need for Change- Need to visualize the upcoming market trend & identify the goal aligned to the requirement for the future growth. Accordingly, the decision needs to be communicated down the line.

Step #2: Build up a Team of Experts- BPR needs a team of highly skilled, motivated people who will carry out the required steps. Usually, the team consists of Senior Manager, Operational Manager and Re-engineering experts.

Step #3: Find the Inefficient Processes and Define Key Performance Indicators (KPI)- Once the team is ready and about to kick-off the initiative, it's required to define the right KPIs. A new process is adapted and the inefficient ones are identified so that they can be stopped or modified.

Step #4: Re-engineer/Re-orient the Processes and Compare KPIs- If the KPIs show that the new solution works better, slowly scaling up of the solution to be done, putting it into action within more processes. If not, it's needed to brainstorm among theteam to find new potential solution.

Case Study-I

Prelude:

Product-1 is made up of 100% unbleached pulp that is used for insulation in transformer manufacturing industry. The product is sent to the customers in the form of reels. They convert the reels into bobbins of different width.

Problem:

Customers were unhappy on account of the following issues and because of that we had lost 50% of our business in this segment.

- Frequent break during winding
- Unwinding after coiling
- Cracking of paper during winding
- Convex bobbin formation

Fig 2: Unwinding after coiling

Root Cause Analysis:

To address the initial issue of paper break we had increased refining to increase the tensile strength. We had introduced special refining enzyme to minimize both the refining energy and refining time to maintain the productivity. Paper breaks were persistent at customer's end and developed few newer abnormalities like uncoiling, cracking and convexing of bobbins. To know the exact issue, we visited different customers and understood their processes and the subsequent problems. The process of wire winding was not straight perfectly, rather it was approx. at an angle of 45^0 to the plane of the bobbin where both tensile and tear strength acted. By increasing the refining and introduction of refining enzyme, we had increased the tensile strength. At the same time, we had compromised the tear strength and bursting strength. Paper became stiffer and smoother than earlier as the paper lost its permeability and gripping characteristics. Hence during moisturisation the bobbins were unable to intake water and were convex due to moisture variation on both the surfaces and the paper was found to be uncoiling after winding over the coil (Ref Fig 2).

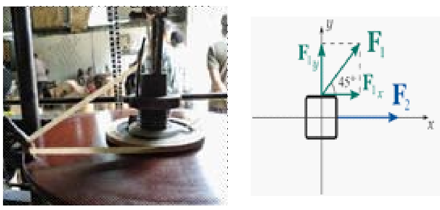

Fig 3: end application process at the customer's end

Action taken:

The refining was reduced & optimized to make a balance between tensile and tear strength and discontinued the special refining enzyme was discontinued. Humectant was used to preserve the moisture which helped in quick absorption of moisture during moistening process. The refiner streets were modified (Refer fig-4) to increase the productivity.

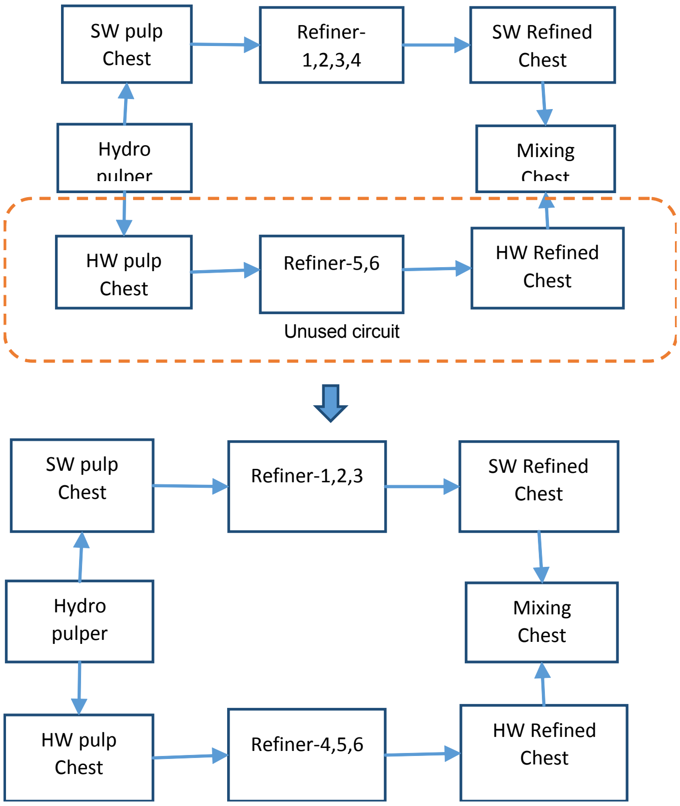

Fig 4: Shows the refining cycle

Result:

The problems faced by the customer are resolved and now there is zero complaint on functional properties. Regained the market share and in addition to that share increased by 25% and productivity increased by 22%.

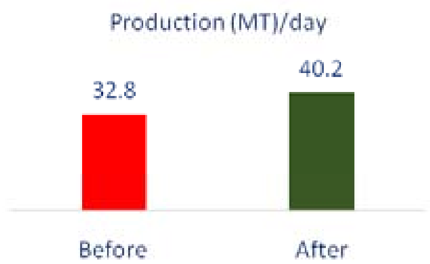

Fig 5: Increased Productivity

Case Study-II

Prelude:

Product-II is used as an interlayer between digital plates used for printing digital image made up of aluminum foil to prevent scratching during transportation. The key CTQs are blemish and joint free reels.

Problem:

High quality rejection due to joints and holes.

Root Cause Analysis:

Data was analyzed for past months' production of this grade. Breaks ratio at machine stage and at Rewinder was around 2:3 and most of the break happened at the post dryer section. SEM of samples containing holes were carried out and it was observed that the breaks were due to tiny holes embedded with some kinds of micro deposits which were not being captured in the ULMA system. So we focused on the size press chemical (Oxidized starch along with cross linker) preparation system. The laboratory result depicted that the initial turbidity decreased with enhanced cooking at the same temperature. It revealed cooking was improper and tiny particles remained in the system which might have caused holes by sticking onto the dryer or calendar surface. Also there was a mismatch of reel diameter with jumbo length as well as break to break length observed.

Action taken:

Fiber furnish ratio and refining pattern were re-engineered. Separate cooking system was incorporated for both the oxidized starch and the cross linker for efficient uncoiling of the polymers. Size press system hygiene was taken up on priority. Reel weight to jumbo length matrix was made and administrative control was put in place.

Result:

Fig 6: Quality rejection decreased by 24%

Machine and rewinderrunnabilityimproved. Quality rejection decreased by 24% on account of holes and joints.

Case Study-III

Prelude:

Product-III is going for floral design application for decoration purpose.

Problem:

High internal rejection on account of shade variation

Root Cause Analysis:

Different pigments are used for coloration. As we all know that, unlike dye, pigment has no affinity towards fiber. We used alum as the fixing agent in silo. Alum dosing was interlocked with back water pH to control its dosage. The statistical analysis of DCS data showed a strong correlation between alum dosage and ΔE value of paper. Back water pH was used as an indicator to measure the residual free alum in the system and a certain amount was required to balance sudden turbulence in the system. The more the back water was being recycled, the back water pH (pseudo) was decreasing and simultaneously the alum dosage. As alum was an unstable product and it had several forms over a pH range, it was found to be unable to fix the pigment to the fiber surface properly leading to shade variation. (Refer fig 7)

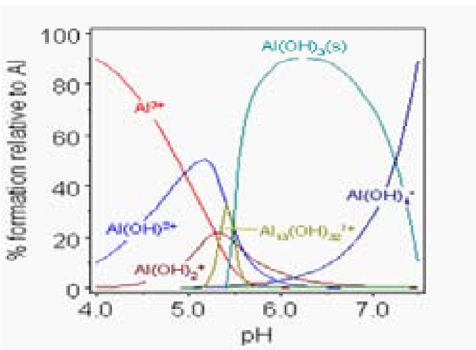

Fig 7: Graph depicting alum activity over a range of pH

Action taken:

Laboratory experiments were carried out with two conventional fixing agents such as alum and PAC. PAC proved to be more efficient than alum as it was found to be stable in a wide range of pH between 6 and 9. Plant trials were conducted with PAC and an optimum dosage was fixed. Back water pH variation was not observed with PAC as was observed in alum and there was no fluctuation in PAC dosage.

Result:

Paper ΔE remained almost constant leading to elimination of internal rejection on account of shade variation.

Case Study-IV

Prelude:

Product-IV is going for printing sector, used in annual report, pharma data sheet and bible book printing segment.

Problem:

High down time at machine as well as at rewinder incurred because of paper break due to occurrence of holes which lead to high quality rejection. Joints in reels also posed another threat for higher quality rejection.

Root Cause Analysis:

ASA dosage was high at a tune of 2.5 – 3.0 kg/ MT. That might be due to poor retention and improper preparation of ASA. SZP of headbox stock data was analyzed and found to be abnormally low (-15mV). So more cationic demand was there in the system. Poor ASA retention aggravated the formation of hydrolyzed ASA products. While observing the cationic starch preparation system it was found that the batch size was too high. Almost a single batch was used for 10 hours. We know that cationic starch is very sensitive towards bacterial growth. Bacterial growth can decrease the function of cationic starch and increased bacterial growth may cause deposition in the system which may lead to holes' problem in paper. ASA particle size distribution was analyzed and observed that the particle size was higher than the requirement. That might be because of catering of ASA from a single feeder to two machines. (Refer Fig 8)

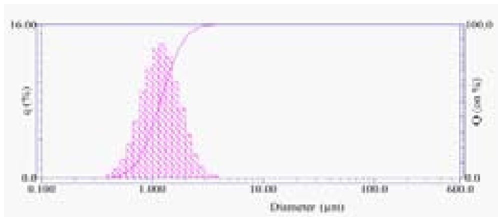

Fig 8: : Initial particle size distribution of ASA

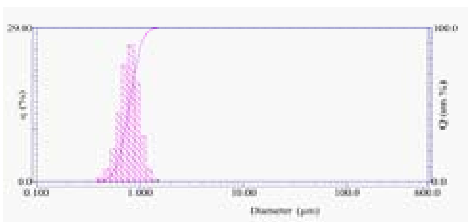

Fig 9: : Final particle size distribution of ASA post optimization

Action taken:

Cationic polymer dosing was split and optimized to increase the SZP of the head box stock to -6 mV to -5 mV range. The batch size of cationic starch preparation was reduced so that it will be consumed in 4 hours to avoid any bacterial growth. ASA:Emulsifier ratio was optimized to get the desired particle size and uniform distribution pattern. (Refer Fig 9)

Result:

Down time in both themachine and rewinder reduced and the number of joint reel was under control.

Conclusion:

BPR stands out as the best viable way of garnering positive achievable results at a faster pace rather than investing immense. The four case studies that have been discussed above in details prove that by micro-analyzing the sub-processes at hand like pulp, refining, chemicals etc. profitability in terms of reduced internal rejection, increased customer satisfaction, increased productivity, good runnability and decreased downtime can be achieved.

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