

Accumulation: Output Boost or Wasted Capital?

Summary: Too often, leaders make decisions on how to use accumulation arbitrarily or by opinion alone. Misconceptions and confusion about the underlying principles of accumulation diminish the performance of integrated production systems. Applying these principles with consideration for the facts that drive system performance can bring alignment to the group that makes those decisions, ultimately leading to better performance and a higher return on investment in accumulation assets.

Written by Ryan Hale.



The first example of accumulation many people see each day is a coffee pot. A full coffee pot, besides providing well-needed chemical stimulus to the brain, decouples the downstream process of “drinking coffee” from the upstream process of “brewing coffee.” The heartbreak imparted by seeing an empty coffee pot, and subsequent unproductive bleary-eyed moments (in the brain or “bottleneck” of the process), are effects of downtime cascading through a series of assets.

Accumulation is often an underperforming investment

Many businesses invest scarce capital in assets to decouple steps in a process, on a much larger scale than coffee pots. In the vast majority of cases, ineffective configuration and operation of these assets diminish the return on investment.

The simplest way to learn if the opportunity to improve accumulation exists is to choose ten names out of the employee directory for an operating area and ask: “what’s the best way to set up the accumulation between X and Y?” and count the number of different responses. This exercise is very likely to get the same result within a leadership team, engineering group, crew of operators, or maintenance shop. Too often, confusion surrounds the underlying principles of optimizing accumulation; therefore the assets are very likely to be configured sub-optimally. Essentially, the goal of accumulation in a business is to increase the net profit generated by a series of processes. After making the investment in accumulation assets, the

daily operating strategy determines the profitability of that investment. By exploring a few common misconceptions about accumulation, we will determine a few sound principles to consider when optimizing an accumulation system that will maximize the return on investment.

Common misconceptions about accumulation

When asking your survey question from the introduction, some of the answers you receive will pass the initial “gut check” for common sense, but fail the test of facts. Use the facts behind how

accumulation set-up will affect profit to determine the right strategy for your business. Let’s explore a few of the most common “common sense” answers.

“Keeping the accumulation half-full makes it more flexible”: true, however, flexibility is not the reason to

invest in accumulation—it is to maximize output of the bottleneck asset. Going back to our coffee pot analogy, this is equivalent to brewing no more than half a pot of coffee. Frequently, the peak demand for coffee exceeds half a pot, and the brain bottleneck suffers waiting for more. In reality, always maximize the size of the accumulation (full upstream, empty downstream) to minimize stops at the bottleneck.

“Running steady is better in the long term”: only in the rare case where the total financial value of the restart waste at a given stop frequency is greater than the additional throughput produced between stops. For

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about accumulation

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our analogy above, running steady would imply brewing the coffee at average consumption rate (1 cup every half hour?) to prevent any spills, evaporation, or other coffee loss associated with starting or stopping the brewing machine. Clearly, the value of the brainpower output in between brew cycles exceeds the cost of a few spilled drops of java. In reality, measure the financial cost of waste vs. output lost when running the assets below maximum speed. In most industries, the right course of action is to solve the problem that causes waste and then increase system rates, rather than hiding the problem by running slowly.

“Keeping product in accumulation isn’t Lean, so it should always be empty”: similar to the first example, this statement compares the financial value of inventory on the balance sheet with additional throughput per system hour. Would you be “richer” at the end of the day by finishing all the work and going home earlier, or by staying at the office but never reported the carrying cost of coffee? In reality, compare the profit impact of additional throughput per operating hour to savings in depreciation.

How accumulation can help

In reviewing a few misconceptions, we have revealed some straightforward benefits of investing in and operating accumulation correctly. Primarily, accumulation allows the bottleneck asset to operate relatively unhindered by upstream or downstream interruptions. This increases the total system output by reducing idle time at the bottleneck. Secondly, adding accumulation is a “no brainer” improvement when a bottleneck frequently halts for upstream or downstream stops—meaning that the system gets the benefit without actually solving the downtime problems to root cause. Of course, there are additional financial benefits to removing the downtime from neighboring assets, and the system will benefit from the output increase provided by

accumulation while solving the problems. Specifically, adding accumulation to a system will have significant financial value when either the frequency of stops, or the waste cost associated with stops, is high. Even the morale boost from seeing empty reject bins (regardless of the cost) can justify the investment to maximize accumulation.

Conclusion

Too often, leaders make decisions on how to use accumulation arbitrarily or by opinion alone. Misconceptions and confusion about the underlying principles of accumulation diminish the performance of integrated production systems. Applying the principles above with consideration for the facts that drive system performance can bring alignment to the group that makes those decisions, ultimately leading to better performance and a higher return on investment in accumulation assets.

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About the Author

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How accumulation can help

- Protects the bottleneck from stops upstream or downstream
- Works no matter what the cause of other stops – even if installing accumulation is not a root cause
- Great for assets with high frequency of stops, high cost of restart waste

Takeaway message: use facts to decide the most profitable setup—throughput net of waste, maintenance, and carrying cost of inventory