Why Converting Line Tissue Waste is Desperate for a Kaizen Event

Creating efficiency in the collecting, moving and handling of tissue waste from the converting line to the re-pulping process.

By David Barnard, CEO, Industrial Shredders, Ltd.

The tissue industry has done a good job optimizing its processes in both making and converting paper, allowing manufacturers to produce the most commodity-type product and make money. Year after year, there has been mechanical and chemical innovations that have allowed the industry to meet customer-demanded characteristics for absorbency, value and appearance.

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— David Barnard, CEO, Industrial Shredders

However, many of these characteristics have made the converting process more difficult and challenging. For example, softer usually means drier, which creates extra dust and a more fragile sheet. As the industry has been able to increase production capacity rate over the years, it has not been able to improve its historical converting efficiency rate between 40%-70%. This results in an ever-increasing amount of tissue waste coming off the converting lines.

The tissue industry, like most other industries, has embraced the concepts of Lean Manufacturing and Six Sigma, but the focus has been on its paper processing value stream. This is where the money is made, so, of course, this is critically watched and managed. I have seen much effort to improve the efficiency rate of the converting process and the equipment used. I believe we are closer to the 70% range rather than the 40%. So, great progress is being made in the actual value stream. **But what about the inevitable waste stream?**

The industry is also making great strides in the utilization of its waste. Almost all of the tissue waste created during converting goes into a baler to be transported to a re-pulper or directly into the re-pulper. Of course, the purpose of re-pulping is to reuse the fibers for new tissue, creating a closed loop system where virtually 100% of in-mill tissue waste is reutilized. Kudos.

In my observation, the industry is working the two bookends around the management of waste — the reduced creation of waste on the converting line itself, and the utilization of the waste when it is created. **But what about collecting, moving and handling the waste from the converting line to the re-pulping process?**

Let us put this into a Lean Manufacturing context.

What is Lean? *Lean Manufacturing focuses on the elimination of the eight kinds of waste noted in the diagram. By eliminating these forms of waste on a continual basis, the overall manufacturing process becomes leaner and more efficient,*

having the typical added benefit of better quality and cheaper costs. This waste is called muda.

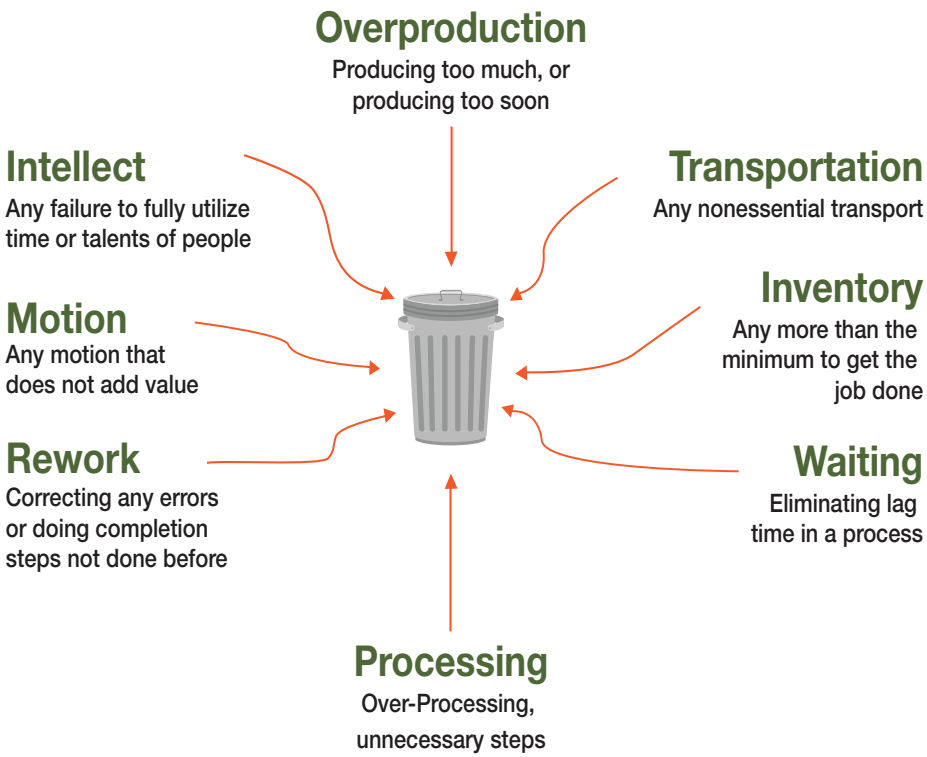
What is a Kaizen Event? *Kaizen events are single, coordinated events designed to make some type of improvement over a set period of time. They can be big or small depending on the complexity of the process being improved. But they should be as focused as possible upon one process.*

This article is shining a light on an opportunity that I see in the tissue industry: the elimination of muda by better managing the tissue waste that comes from the converting process. What I am suggesting is a kaizen event that will help identify the muda in your own mill or plant specific to the process of accumulating, storing and moving this waste to either a baler or re-pulper. This exercise falls easily into a kaizen event because of its specific focus on managing the waste through coordination with all parties associated with the process, including management.

Where does waste come from?

In a typical tissue converting line, there are four areas of waste: slab waste, log waste, cookie or trim waste, and reject roll waste.

During the converting process, there are several reasons a tissue log can be rejected. But generally, every time a mother roll is replaced, three to four logs are rejected to ensure the splice does not end up in the finished product.



The mother rolls get damaged in transport and loading into the equipment. In order to process clean tissue, a layer of about 1/4-inch deep is typically removed to reveal the clean material. This is called slab waste.

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This occurs about every 45 minutes and is called log waste. There has been a lot of improvement in this area, but as long as there is a splice, we will never get to zero rejections.

When a log is accepted, it is trimmed to clean up the two outer ends — the trimmings are called "cookies" or "trim waste." If the line is running well, you could end up with a colossal pile of cookies in no time.

Finally, some rolls are rejected before packaging. These make up a small percentage of the overall waste and are applicably called reject roll waste.

Traditional methods of removal from the converting line

Traditionally, the above waste has been removed using human labor. Most plants have employees roll large plastic bins around to pick up waste. All four streams of waste need to be managed quickly because, if left to accumulate, they will become hazards very quickly. For example, fires are a major concern in all paper plants. Having quantities of paper laying around or in bins is only supplying a flame with fuel. We are all better off if we can get the waste removed from the converting floor as efficiently as possible.

Slab waste is generated at the front of the line where operators need to be continuously attentive to the mother rolls. The log waste is generated near the middle of the line where it is discharged out onto the floor, either on the controls side where operators are monitoring and adjusting the entire

converting process or out the back of the converter where few operators are present. Cookie waste and rejected roll waste are discharged closer to the end of the line. I suggested that most effort has been focused on the paper processing value stream, but some efforts made in converter waste management improved the management of cookie and reject roll waste. Most converting machines now provide a short discharge conveyor for the cookies, while the log waste and slab waste are typically manually picked up.

The next innovation came from the air material handling system industry in the development of heavy-duty fans that could take the impact of sucking up cookies and sometimes even rejected rolls. These fans are huge and require a tremendous amount of air to carry material as large and dense as cookies and individual rolls. The impact of the varying density of the cookies and rolls also has a mechanical impact on the highly balanced fans and cause a lot of maintenance.

Only a few progressive companies have embraced the idea of shredding the waste at its source and then air handling it to either a baler or directly into the re-pulper. Shredding provides a mean to move all forms of waste with minimal to no human intervention.

Why should we shred?

The tissue log is the most cumbersome form of waste, so let us start there. A machine called a tissue log shredder can butt directly up to the tissue log discharge conveyor on most traditional converting machines. This allows the log that is rejected to convey directly from the converting machine into the shredder, be processed, then immediately air conveyed to the baler or re-pulper. The shredder is essential to transform the log into a material that can be carried across the plant hands-free automatically.

Industrial Shredders' tissue log shredder can butt directly up to the tissue log discharge conveyor on most traditional converting machines. This allows the log that is rejected to convey directly from the converting machine into the shredder, be processed, then immediately air conveyed to the baler or re-pulper.

The remaining three forms of waste can also be shredded and transported through the same air system. Because we are not trying to move large cookies and/or rejected rolls, there will be far greater capacity in the air system to move multiple sources of uniformly shredded tissue waste.

What about fiber quality for re-pulping?

Many tissue paper manufacturers re-pulp their waste and some utilize industrial shredders in the process. Unlike traditional shredders for tissue paper materials processing, Industrial Shredders' "Tissue Log Shredder" has a single point shear contact between the rotary cutting blade and cutter bar. We refer to this as a "ninja-style cut." The blades are formed on a helix, which produces a cleaner cut; thus keeping the fibers intact. Our process has a greater recyclable yield and less disposable dust in comparison to other industrial shredders on the market. Also, since more fibers are intact, manufacturers are able to create a stronger paper product during the re-pulping process. Our machine can shred tissue/paper logs up to 8" in diameter.

Sounds good, but what are the Lean benefits?

Remember, we are performing a kaizen event to remove as many of the eight types of waste as possible. The forms of waste are defects, over-production, waiting, non-utilized talent, transportation, inventory, motion and extra-processing. I believe utilizing a shredder at the source of converter-generated tissue waste eliminates six forms of waste in this process.

Waiting: In this case, the re-pulper is waiting for manual transportation and will benefit from a continual stream of waste rather than a manually transported bulk drop-off.

Non-utilized talent: In this case, manual removal of waste is using talent that can be better utilized optimizing the production process.

Transportation: This is self-explanatory in its definition: "the unnecessary or excessive movement of materials, etc."

Inventory: I am admittedly stretching its true definition by calling waste inventory, but my intent is to express the reduction of space waste takes up and the processes needed to manage it collecting on the precious floor space around the converter.

Motion: The human motions required to pick up and move the waste can all be eliminated.

Extra-Processing: Is again self-explained in the definition "doing more work than is required or necessary to complete a task" — the task being moving the waste to the baler or re-pulper.

Six out of eight is not bad. ■

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