University of Wisconsin–Stevens Point
Paper Science and Chemical Engineering Department

GREEN BAY PACKAGING & GEORGIA PACIFIC ~ FIELD TRIP REPORT

Personal and Career Considerations in Corrugated Paperboard and Tissue Manufacturing

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Course: PSEN 115
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Date Submitted: May 5, 2026

Prepared for the Paper Science and Chemical Engineering Department at
University of Wisconsin–Stevens Point

1 Market and Product Requirements

Overview

Corrugated packaging and tissue products represent two different markets within the paper industry. Corrugated packaging paper production is primarily about producing paper that can support the needs of more logistical and structural applications, while tissue products are primarily produced because of the need for soft products that can be used in personal care and other industries. These differences create similar but still vastly different engineering principles in practice.

Discussion

The contrast between these markets is important when understanding the concepts behind these separate industrial processes. Paper produced for corrugated packaging has to withstand higher stresses than tissue products, this requires a dense fiber network with strong bonding to ensure the final product holds up. Tissue products, however, require a soft and absorbent structure making it much less dense than paper produced for containerboard.

Tissue products, however, need to be soft and absorbent, making the need for density much less than containerboard production. Instead of maximizing strength, this process seeks to create a porous sheet with air pockets and bulk so that it becomes absorbent and has a texture suitable for its usage as a tissue product.

Additionally, containerboard needs to be cost effective to reduce overall shipping, packaging, production costs, and other costs that may be associated with its use. Since it needs to be produced in such high quantities, small inefficiencies can lead to large cost increases. On the other hand, tissue products are more consumer driven, for these products the quality and feel are more important than the cost of production. This is also why they can charge a premium for their products; while containerboard production needs to use cost as a large part of operational considerations.

2 Raw Materials and Fiber Physics

Overview

Raw material acquisition is important for both industries; both facilities that we toured primarily operate with recycled fibers which are sourced from old, corrugated containers (OCC). Tissue production, however, also uses virgin fibers due to the need for softness and a different structural properties.

Discussion

The use of recycled fibers causes several challenges when it comes to production for both products. In containerboard production, they need a dense result which is primarily solved by refining the OCC board in two separate processes; The long chain and short chain fibers are filtered off and refined separately.

3 Process Architecture and Stock Preparation

Overview

Both systems go through similar stages in the process; however, they handle impurities, fiber dispersion, and suspension flow behavior differently. Additionally, the general process operations for stock preparation, formation, pressing, and drying are the same for both corrugated and tissue manufacturing.

Discussion

The high number of impurities in recycled materials makes stock preparation in corrugated systems much more difficult. The first step in the process is hydro pulping, which turns recovered paper into a slurry. After that, there are further screening and cleaning steps to get rid of any other undesirable compounds like adhesives, dirt, etc. Cleaner cones, which sort out contaminants with respect to density difference are used in the forward direction to remove heavy pollutants, whereas reverse cleaners remove lighter materials.

The fact that the stock consistency is roughly 99% water and 1% fiber highlights how crucial fluid mechanics are to the sheet production procedure. Turbulence, flocculation, and dispersion control the behavior of fiber suspensions at such low consistencies, so, any instability in the flow can lead to flaws. Thus, maintaining a uniform fiber distribution is essential for creating a consistent sheet.

Tissue systems require more control over fiber dispersion and sheet creation, but they also require less intense contamination removal. The balance between fiber preservation and contamination removal is reflected in differences between stock preparations.

4 Personal Considerations

Water

A couple questions I had for this trip were more related to the energy side of things as well as water recycling. Since this is such a large-scale business, energy costs are one of the main concerns when it comes to production of both types of sheets. It was refreshing to see that Green Bay Packaging has made large strides in improving their energy conservation with the build of their new facility. While the industry is strong and profitable, there are many ways that I see to improve energy efficiency; among other areas of potential improvement.

Career Considerations

When it comes to a career at either facility we toured, the short answer is that I don't know if I would consider either to be my ideal long-term position. There are some really interesting aspects of both facilities, and the scale and complexity of both operations are very impressive. However, as a process engineer in these roles, the primary focus is on maintaining operations, improving efficiency, and maximizing runtime rather than developing new technologies or fundamentally advancing the industry.

I find myself more interested in the roles that exist earlier in the engineering chain. Companies like Voith which is the company that designed and manufactured the equipment used at GBP, seems to be more of an interest to me, because I believe that those roles would put me closer to an environment where I can apply my knowledge to influence boarder improvements across the whole industry rather than focusing on optimization of just one facility.

This is not to say that meaningful improvements in these plants couldn't be implemented. There are many opportunities that I observed such as process optimization, energy reduction, and system improvements. However, I am more interested in being involved at a level where engineering decisions impact multiple operations and could make a change that benefits the industry as a whole.

While this might be a bit ambitious, it reflects my current interest in perusing roles that emphasize innovation, system design, and large-scale impact rather than solely operational performance.