



SIEMENS
Ingenuity for life

How tissue mills can reduce risk, save money and increase performance

with digitalization and electrification

The pulp, paper and packaging industry is undergoing a transformational change as it shifts from the declining publication grades (newsprint, Sunday inserts, etc.) to the steadily growing market for packaging and tissue-based products, particularly private label tissue.

This shift is creating new business opportunities and sparking new investments in greenfield paper mills, as well as brownfield projects in which manufacturers convert an existing newsprint facility into one that produces toilet paper, facial tissues, and paper towels.

“If you thought the paper industry was going to disappear, think again. Graphic papers are being squeezed, but the industry overall has major changes in store and exciting prospects for new growth,” according to a recent McKinsey

& Co. report, which predicted that packaging paper and tissue would grow at a steady pace, offsetting the decline in graphic papers such as mechanical, newsprint and wood free.

The impact of the Internet on the publishing industry has been a key factor in the decline of the newsprint business. For example, the Pew Research Center for Journalism and Media reports that US daily newspaper circulation dropped from 65 million in 1990 to less than 30 million today. And total advertising revenue plummeted from \$50 billion a year in 2010 to \$16 billion in 2017.

And that trend is not expected to reverse itself anytime soon. As the McKinsey report stated, “Graphic papers, particularly newsprint and coated papers, will continue to face a severe decline in demand and our

research has yet to find credible arguments for a specific floor for future demand.”

But that decline is being more than offset by increased demand from companies like ecommerce giant Amazon, which requires vast amounts of packaging papers, and from big box retailers like Costco, who sell private label tissue products in bulk.

Since the private label market is essentially an end-run around the major branded labels, who have their own well-established manufacturing facilities, production of these private label tissue-based products is being driven by smaller, opportunistic competitors who are either building new plants or converting existing facilities. These investments, which can exceed \$300 million, aren't without tremendous risks, both commercial and technical.

For example, these competitors may be smaller and nimbler. They may not have a centralized engineering team, may not have developed manufacturing standards, and do not have an extensive track record of executing large investments. In addition, some of these companies may be headquartered outside the U.S., which presents its own challenges and risks.

Furthermore, these companies face considerable financial pressure. Investors expect a quick return on these investments, as well as time pressure to get products on the shelves ahead of competitors.

Adding to the risk profile is the graying of the labor force. For example, in 1979 the average age of TAPPI members was 43. In 1990 it was 44. Now it's 53 years old. This affects the financial disciplines, the engineering disciplines, and operations personnel. That means, when the commissioning team turns over the asset to the operations team, a slower-than-expected startup curve may be expected.

Overall, this creates pressure to automate and digitize processes as much as possible.

Siemens can play a key role

Whether it's a greenfield project or the conversion of an existing mill, Siemens has the expertise and the comprehensive, end-to-end product line to help companies cut capital costs, reduce risk and increase performance.

When looking at a paper mill, many people might see a woodyard, a pulp mill, the paper machine building, the settling ponds of the water treatment plant and the power generation building, all spread over a couple of hundred acres surrounded by forest.

Siemens experts see an integrated electrical system with a primary substation, low and medium voltage switchgear with monitoring and control systems using relays and SCADA, MV and LV MCCs, DCS, instrumentation, motors, variable frequency drives and digitalization. This connected system gathers, stores, and analyzes data making it available to all stakeholders.

Before construction even starts, Siemens can analyze the design plans and recommend cost-effective ways to generate and distribute power throughout the facility using the concept of minimal effective design. In other words, the design should provide sufficient, reliable power to get the job done, but there's little reason to overprovision or overengineer the facility.

As the McKinsey report points out, "Operating costs are another area where companies need to get a tighter grip. Despite the fact that this area receives continual focus from management, our experience suggests there is still significant potential for cost reduction."

Siemens can assist in developing the ROI comparing "first cost" versus the long term, total cost of ownership.

Here are three cases in which Siemens delivered significant cost savings to companies who were either building a new mill or converting an existing newsprint facility for tissue production.

Simplification of Power Distribution System

A company headquartered outside of the U.S. was building a new tissue mill in the Midwest U.S. on a 280-acre site that featured good access to major highways as well as proximity to rail lines. This allowed the cost-effective import of pulp from as far as Canada or South America and the shipment of finished product via interstate highways.

The facility was designed to include a virgin fiber stock preparation area, two tissue machines, a converting area, and a warehouse, all contained in a vast 1.5 million square foot building. The plans called for two, 8-megawatt gas turbines to produce electricity for the facility and to deliver heat for the dryer hoods.

The complexity of the power distribution system created opportunities for Siemens experts to identify simplifications that could result in cost reductions during construction, plus ongoing benefits to the long-term maintenance of the mill.

In the original design, there was a medium voltage bus system to support a limited number of medium voltage drives and motors. When Siemens analyzed the overall design of the electrical system, they determined that the capacity of the existing low-voltage bus was sufficient to consolidate around this bus. By making this change, the customer was able to reduce the overall cost of the project by 10%, as well as reduce the complexity and required maintenance.

Reduction of Capital Investment

In this case, a large producer of newsprint was looking for alternative investments and decided to remove one newsprint machine from an existing production facility and replace it with a tissue machine.

The risks associated with brownfield replacement projects are higher than a greenfield scenario because there are many unknowns that can cause delays (problems with demolition, problems with reusing of existing equipment, etc.)

The company worked with an engineering firm that delivered an initial design which showed an arrangement of equipment that required as many as six unit substations in part of the plant. In this instance, a unit substation is defined as a transformer electrically and mechanically connected with protection that feeds downstream equipment.

By examining the loads of the motors, the size of the drives, the rating of the transformers, and viewing electrification as a whole, and not as individual, independent boxes, Siemens was able to rearrange the equipment to reduce to four unit substations.

With a 33% reduction in the amount of equipment being supplied, project costs are slashed, the risk of not meeting schedule deadlines is reduced and future maintenance costs reduced.

Minimal Effective Design

In this project, a new tissue mill was being built in the Northeast by a major private label tissue manufacturer who specializes in the “away from home,” premium, and ultra-premium tissue markets.

The specifications that were developed by the manufacturer had many premium features not typically seen in the tissue industry. After discussing the requirements with the project team, Siemens was able to offer a much more cost-effective solution that still met all of the functional and safety requirements of the mill.

For example, Siemens was able to substitute a lower cost power meter than the one in the specification. One power meter doesn't seem like much, but when you consider there could be more than 50 spread throughout a paper mill, the savings build.

By looking at the electrification and automation systems as a whole, Siemens was to reduce the cost by more than 20%, saving the project cost millions, yet providing a safe, robust operation.

Electrical systems account for between 4-8% of the total costs of a new paper mill or a renovation project. When the total investment value range between \$300-\$400 million, having a second look to find savings really add up. In addition, through optimization, digitalization and automation, Siemens engineers can help companies reduce ongoing maintenance costs.

For companies under deadline pressure to get paper on the reel, Siemens can deliver certainty of schedule, certainty of delivery, certainty of risk, certainty of interoperability and ease of procurement through normalized commercial terms across electrical and control components, which includes engineering, commissioning and startup.

Siemens Industry, Inc.

100 Technology Drive
Alpharetta, GA 30005

1-800-365-8766
info.us@siemens.com

Subject to change without prior notice.

All rights reserved

Printed in the USA

©2019 Siemens Industry, Inc.

The technical data presented in this document is based on an actual case or on as-designed parameters, and therefore should not be relied upon for any specific application and does not constitute a performance guarantee for any projects. Actual results are dependent on variable conditions. Accordingly, Siemens does not make representations, warranties, or assurances as to the accuracy, currency or completeness of the content contained herein. If requested, we will provide specific technical data or specifications with respect to any customer's particular applications. Our company is constantly involved in engineering and development. For that reason, we reserve the right to modify, at any time, the technology and product specifications contained herein.