

Fighting costs at all levels, making your tissue mill profitable for the future

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Tissue is a growing market worldwide and enjoys such comparatively good profitability that it attracts new entrants from many related industries. This fortunate situation is never-the-less producing some extremely sharp competition within different tissue grades and regions and, to become a successful player in the future, a tissue producer must ensure cost savings at all levels and implement smart decision making from a strategic and technological point of view. The competition between retailer / private brands and the multinational suppliers will become even fiercer in the future, which in turn will drive development of low cost production and new products.

Today, the tissue technology has brought our clients to efficiency levels of 99% - a level unheard of in other paper grades – and it leaves very little room for improvement. As a result, focus has switched to cutting costs and creating a steady, increasing cash flow.

For a mill to be sufficiently successful to produce both tissue and profit in the future, it will have to look at decreasing levels of energy consumption or finding the least expensive energy supply. More than that, it will take a whole-hearted effort in all areas of a mill's production costs. 'Keep your friends close but your enemies closer' is an old, but wise proverb – especially in papermaking – and being in charge of where and how the costs develop means exactly that.

However, by decreasing your controllable production costs, your business model will in theory open itself up to higher risk with an increasing share of uncontrollable costs on production at the end of the day.

This paper will look at the savings potential from all different technical production angles: chemicals,

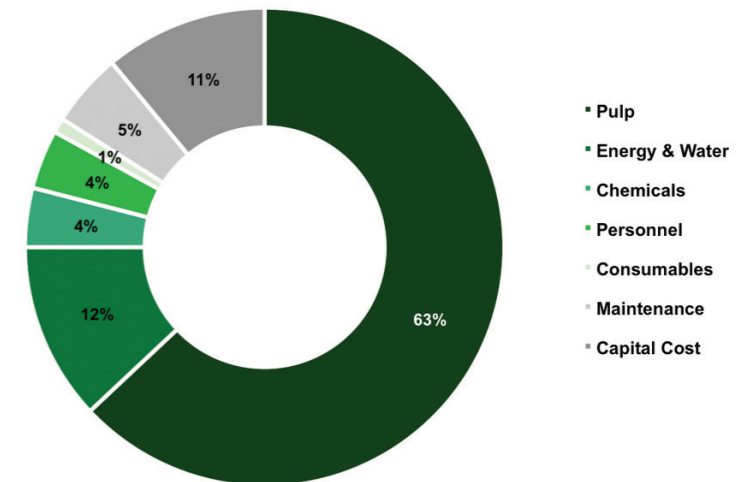
maintenance, personnel, fibre, energy and consumables. At the end of this paper, some general application examples are highlighted to show the potential available to you.

When a process to control what one can control within papermaking is started, it should not be forgotten that it is quickly boiled down to the factory floor – prices for energy, pulp and water are only controllable to a small extent by hedging or investments in areas outside the core business of tissue manufacturing.

Focusing on energy

As the price for gas and oil have increased dramatically, focus was easily put to the machinery which consumes it. Not to be forgotten, the energy price has an impact also on the price for pulp, chemicals and equipment. Today, no real breakthrough concepts have been presented to radically cut energy consumption, but there are several interesting concepts which can be combined to reduce the levels to “manageable” and enable focus to be put elsewhere.

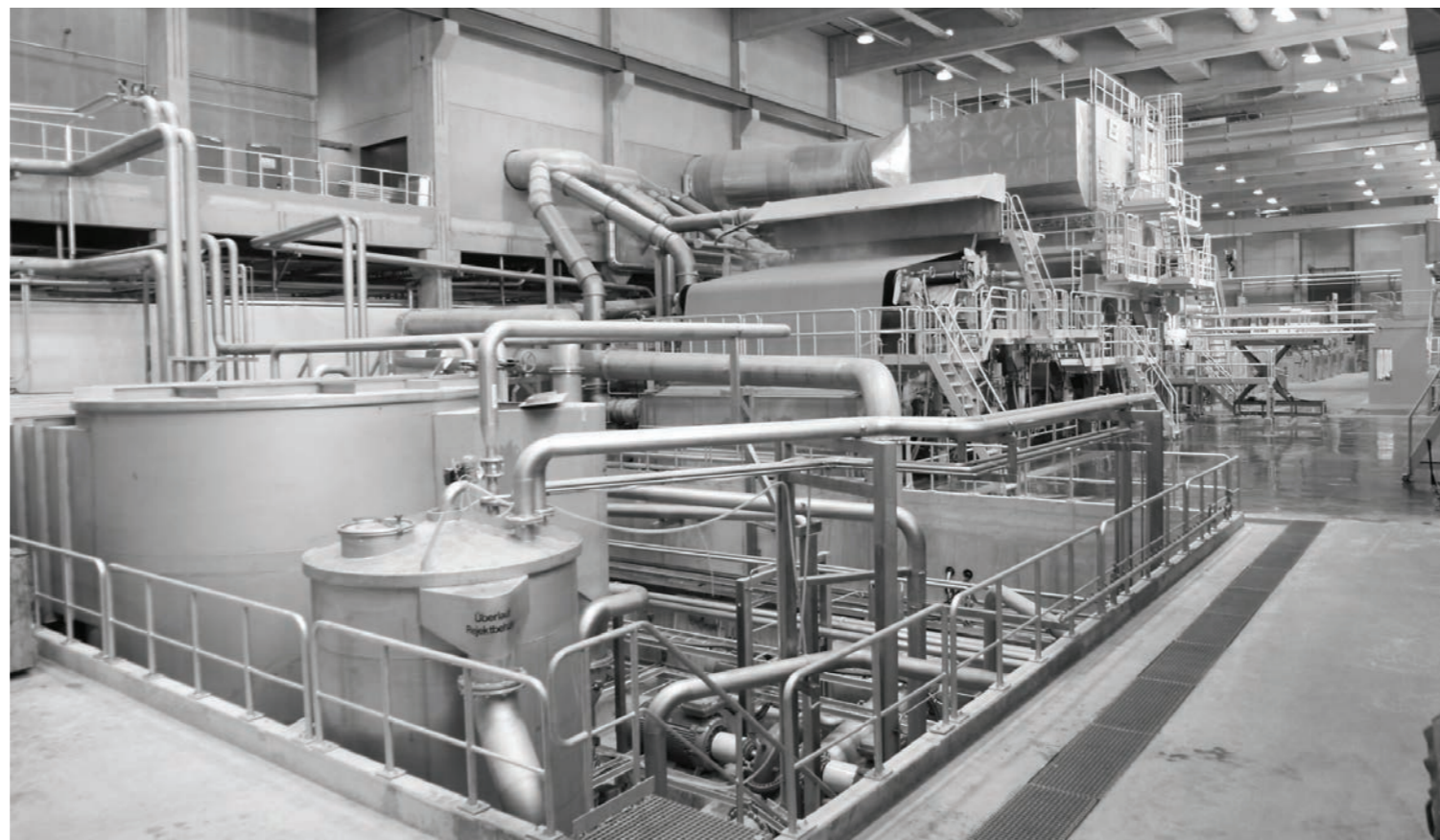
General Variable Production Costs



For a Greenfield mill, this is normally not an issue from the technical side, but as we all know, in the majority of final decisions, the financial side is the one calling the shots. Thus, when a decision is taken – based on the current economic and financial situation and markets – it will render many a headache over the lifespan of a production line. For example, when a simple solution such as a shoe press would easily be paid back in 2 years or less, these kind of returns are not even considered in today's business climate. Paybacks of less than a year and for much smaller investments are equally difficult to get through. The prevailing approach is to design a new production line that will be “just good enough for the next couple of years”, even though economic studies and theory prove the opposite in every single case.

The most talked about technical and process related options available for improving the production cost situation today are:

- Shoe press technology
- Increase consistency in stock preparation and approach flow systems
- Automation and controls
- Vacuum Systems
- Pulper
- Cast iron vs. steel yankee.
- Deep ribs in cast iron yankee dryer



- Cogeneration
- Insulation heads for the yankee
- Variable speed drives

Additionally, it should not be forgotten that the choice and design of the smaller machinery parts also has an impact - doctor blades and doctor blade holders may appear insignificant compared to a Crescent former of a Shoe press installation, but they still possess potential for efficiency and energy production.

At the end of this article is listed some of the potential savings for leisure and future reference, always keeping in mind that all mills and tissue production lines may be similar in design but are individual in performance. One has to study the local running conditions in detail to effectively design a new tissue line or optimise / rebuild an existing one.

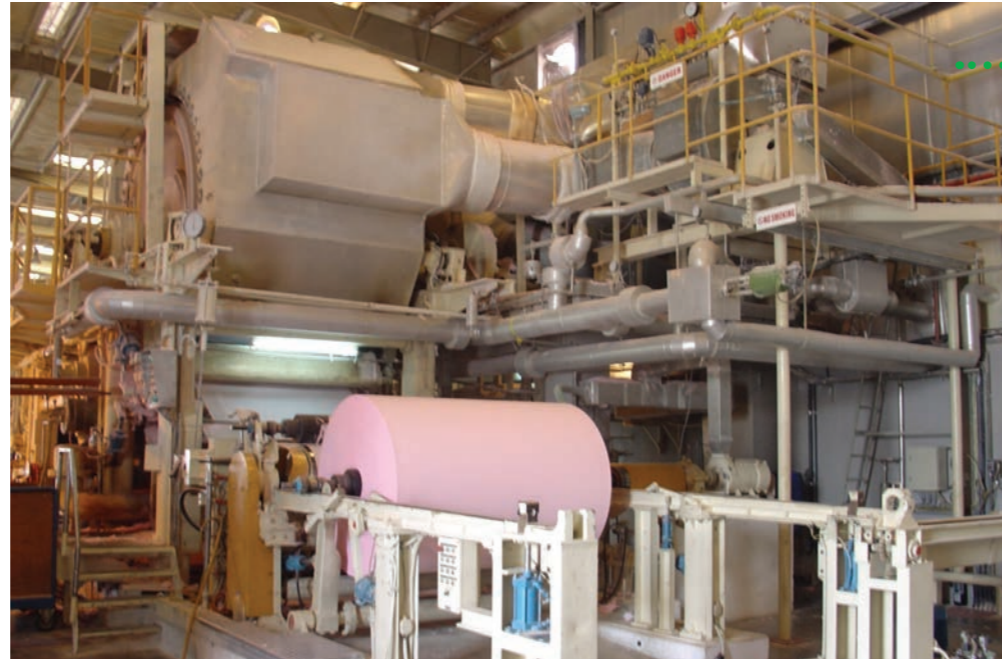
1 Shoe press technology:

Shoepress technology is not new; it has become standard for almost all paper grades due to the process advantages of higher dryness available after the press, in comparison to a suction roll press. For high basis weights, one would consider roughly a 3-6 % increase in dryness at same speeds. This makes for a large energy saving in the Yankee and hood. Roughly, the popular rule of thumb says that per each percentage point in the press, you gain 3-4% in the dryer section. So, possible savings would reach according to calculations about 15-25% in saved energy, which in a normal mill could mean savings of roughly EUR 500.000 or more per year. However, and as discussed above, it all comes with an investment cost plus certain consumables and maintenance, so a fast ROI is not always the case. Additionally, the technology has yet to prove itself for the maximum speeds and all tissue grades and basis weights.

For a major global supplier, the flexibility which the Shoepress offers is not the main driving force, but rather the cost and pressure from cut-throat competition faced worldwide. For a smaller supplier, with jumbo roll sales being part or all of its production, a Shoepress with tilting ability must be regarded as the ultimate tool to be both flexible to its ever shifting changing market needs and produce with low energy consumption. It also comes with a possible fibre savings option due to its potential to save bulk.

2 Multi-Layer Headbox / Stratified forming:

Another way of saving on fibre – normally the highest cost of any production of fibrous material – is to design production for multilayer sheet production already at the



Trying to save in production costs will always be a matter of seeing the broader picture – one change in the stock preparation can have a major impact in the product quality, production and evidently overall production costs.

headbox. Modern standard tissue machines almost always run with a combination of layers – 2 or 3 – which are combined just at the tip of the headbox before entering the crescent former. By exchanging one of the layers for less expensive fibre and designing the sheet-making for the right fibre properties, the options of cost savings open up.

3 Increase Consistency in Stock & Approach Flow:

By using newly developed controls and stock and approach flow equipment, and by designing them properly, for the shortest and quickest possible adjustment of production changes, you can double the consistency in certain parts of the system (possibly increasing pulper consistency from 4-5% to 7-8%, for instance). Shorter piping also helps to lower losses of energy, so building a compact system has an advantage which should be accounted for in the design phase.

4 Yankee Technology

It is obvious that, as one of the world's leading cast iron Yankee suppliers through our sister company PMT Industries in Great Britain, the author would propagate for a cast iron Yankee as opposed to steel. But, it is also equally true, that earlier drying efficiency differences in evaporation rates - which steel Yankee suppliers have argued – have been completely removed through the introduction of new deep rib technology. Safety, expected life span, shape stability aspects etc. were always in favour of the cast iron Yankee.

By choosing deep rib design for a new Yankee, the evaporation rate can be increased with up to 10 %, which if you are drying hood limited would immediately increase your production. Or, if you are installing a brand new TM, this may reduce investment costs reducing the design of the drying system as well as the size of the Yankee dryer cylinder.

5 Yankee head insulation:

It has already become a standard for new machines, so Yankee head insulation is mainly an option available to the existing Yankee dryers which are yet to be equipped. This is being remedied at an increasing rate – the investment cost and time used for installing makes the ROI incredibly fast, and the savings are roughly 8 – 10 % in drying efficiency (depending on size and evaporation rates).

6 Automation and Control:

Automation and control of the process is thus far a relatively untapped source of locating production cost savings and the great potential in pinpointing the sweet spots of production among the different shifts virtually every paper mill experiences. Such costs as raw material, chemical consumption etc. have the potential to be slashed by controlling and stabilising the process, managing and optimising set process targets. There are software solutions able to pinpoint and control dewatering and drying energy, which properly applied increases the tissue sheets for maximum thermal efficiency and subsequent results in great savings. Not to forget, the automation

solutions are labour saving as well, by using the latest technology to sample and test the sheet properties through a hands-free operation. These new and self-diagnostic measurement instruments, together with the lifecycle cost analysers and automation equipment, have been shown to lower the production costs considerably, and will become increasingly more important.

Control systems are also able to make paper quality more consistent and predictable, controlling the product quality in the machine and cross directions, hereby reducing paper and process rejects. Additional advantages include reduction of losses from grade changes, start-up times and web breaks which directly increases the production efficiency.

7 Variable Speed Drive (VSB):

Through the use and control of Variable Speed Drives, a production manager can match output and production with accurate driving of motors throughout the whole papermaking process. It can be expected that energy savings in the teens is available and would most likely even give a fair payback time on rebuilds.

8 Chemicals:

Chemical costs are a bit harder to reduce. Running a chemical system in balance with set quality targets and changing pulp properties is not easy, but options and advantages are found in the optimisation and necessary flexibility of systems. It is also highly dependent on pulp. Throughout the industry, there is a constant effort to reduce chemicals as these are non-controllable cost and, for certain products, quite high. Using the right technology – from pulping, refining and screening, to forming and drying - will ensure your production of the lowest chemical usage by sheer design, but the balance is intricate.

9 Steamboxes:

Steamboxes have become increasingly popular as the ability to decrease drying energy is paired with the controlling of profiles. In press sections where the ability to control the moisture profiles is already there, the steambox is mainly used to heat up the sheet and increase the drying efficiency.

10 Fibre:

The most interesting piece of the cost structure as it is very

often up to 75% of the whole production cost. For tissue makers, the issue of lowering amount of fibre in their converted products is important. The latest rally in pulp prices has not been helpful, and producers have had to make do with sometimes pulp of lesser quality which has impacts further down in the process – higher chemical costs, lower retention, more energy consumption etc.

11 Consumables:

By designing and implementing proven, state of the art technology for the different consumables, there are benefits for maintenance, personnel, safety and energy tied with the upside of increased production and improved quality. However, one has to look at the whole picture to correctly improve and take the optimal effect out of the potential in each segment. When put together, shoe press sleeves, doctor blades, wire and felt designs can all have a positive impact on your tissue machine. The ability to choose from many sub-suppliers and pairing that with the expertise and knowledge of tissue-making could mean millions in savings each year.

12 Process Audits:

As the running conditions of any mill changes year from year and its processes are constantly being adapted to new (and very often less financially optimal) performances, regular process audits are a necessity. To audit and benchmark ones paper making process should be a yearly or every second year procedure firmly cemented in the agenda at every mill. The benefits are huge in comparison to the actual cost to the mill.

There are even more areas to cover and to study in order to manufacture tissue at the lowest possible production cost, but I will stop here. Paramount to understand is that trying to save in production costs will always be a matter of seeing the broader picture – one change in the stock preparation can have a major impact in the product quality, production and evidently overall production costs.

The list below gives an indication of the possibilities which may be implemented at your tissue mill. The numbers are general and case specific data will have to be collected in order to properly understand and design your own process and what is required to achieve the positive effects which would be found after implementation. ■

| Technology | Potential in each segment | Comments |
|----------------------------|--|--|
| Increased consistency | 10 - 15% Energy savings | Depends on how much and where. Standard on new TMs, ROI longer on rebuilds |
| Stratified forming headbox | 5 - 10% Energy and Fibre Savings | For optimal flexibility in fibre raw material choice |
| Shoe press | 15 - 25% Energy Savings | Flexibility and drying efficiency in one. |
| Yankee head insulation | 7 - 12% Energy Savings | Standard – every TM should have one |
| Cogeneration | 5 - 10% Energy Savings | Clear-cut advantage, but investment cost is higher |
| Variable Speed Drives | 5 - 15% Energy and Maintenance Savings | Depends on amount, process location and control philosophy |
| Fibre | 0 - 10% Fibre Savings | Very mill and region dependent |
| Chemicals | 0 - 20% Chemical Usage | Mill and Product dependent |
| Automation and Controls | | |
| | 0 - 40% Energy, Chemical, Fibre, Maintenance and Personnel Savings | This is untapped source thus far – high potential |
| Yankee technology | 0 - 10% Energy Savings | Deep rib vs. standard. Cast vs. Steel. No difference in evaporation any longer. |
| Consumables | 5 - 20% Energy, Water, Maintenance and Personnel Savings | Plus sides also include: improved quality and increased production. |
| Process Audits | 0 - 30% Energy, Water, Maintenance and Fibre Savings | Needed continuously as mills change running conditions – could easily be tied in with Automation and Control systems |