New Applications for Sicem-Saga Chemi-Mechanical Pulp Break Through the Fast Growing Market in China

Founded by mechanical engineer Giorgio Gazza in 1960, Sicem Saga S.p.A is located near Parma in the north of Italy. Sicem Saga was the world's first producer of hardwood chemi-mechanical pulp (CMP), a valued, high-yield wood fibre for paper manufacturing. With an abundant supply of good quality aspen/poplar plantations in the Po Valley, the pulp mill has focused on quality and technical expertise using its own-patented technology. For 50 years, Sicem Saga has proudly developed long-term collaborations with leading paper producers around the globe. The company’s experience is the result of continuous product research and plant modernisation with more than 90% of our equipment designed internally. Over the years, Sicem Saga has been able to maintain stable production of top quality materials: all of its products are bleached with peroxide, totally chlorine free (TCF) and have held a FSC controlled wood certificate since 2005. Sicem Saga uses a flexible process integrated with the minimum use of energy & water to produce a wide range of pulp having customer selected oSR 30-57, and brightness ISO 30-85. An overview of the main applications for each pulp grade appears in Table 1.

Over the last few years, the company has developed specific products to meet the fast growing Chinese market. Sicem Saga technical experts provide on-site, systematic technology transfer from our tested applications in Europe to Far Eastern manufacturers. Advanced European production methods fit well into the new requirements of China, where challenges for high quality and cost effectiveness are increasing daily.

Sicem Saga’s intention for the Eastern market is to position its CMP as a partial replacement for more expensive virgin fibres and for enhancing finished paper quality at the same time. Below are four current applications for CMP suitable for Asian paper producers:

Chemical mechanical pulp in tissue paper
Sicem Saga’s production rate for tissue paper has increased substantially from 15% in 2009 to over 20% this year. This market uptake is due to several reasons:
• Chemi-mechanical pulp (CMP) can replace some of the HW chemical pulp without changing the main properties of the tissue paper. There is a significant cost saving using CMP, a high yield pulp at a lower price than available HW chemical fibres.
• CMP can increase tissue paper bulk giving evident marketing advantages.
• Mechanical properties (tensile strength) of Sicem Saga CMP are comparable to HW chemical pulp, which allows CMP substitution without compromise to paper strength.
• Hardwood CMP enhances opacity and helps achieve improved paper web formation.

European tissue makers have used CMP for many years. Varying quantities of CMP can be introduced in tissue paper stock depending on the desired characteristics of the product and the quality of locally available pulp. The average fibre composition for hygienic products is from 50% hardwood and 50% softwood chemical pulp; CMP can replace the HW in quantities between 5% to 15%. For the production of kitchen towels, the typical mix is 70% hardwood and 30% softwood chemical Pulp; in this case 10-30% CMP can fill in for the same amount of HW (and partly SW) chemical fibres.

Figure 1 shows a mix of eucalyptus chemical pulp and Sicem Saga CMP used in the production of tissue paper. Every manufacturer has to find the right compromise between cost reduction, paper properties and quality. Therefore, to maximize the CMP quantity in the stock Sicem Saga developed a product called SE 80/38, especially prepared by the R&D department for tissue paper. This pulp has good brightness (80 ISO), the right compromise between bulk and tensile strength, and promotes faster de-watering.

Chemical mechanical pulp in cup stock board (paper cups)
Cup stock is used to produce eco-friendly disposable paper cups. It consists of multi-layer board manufactured by miscellaneous techniques, depending on the desired quality of the product and its final use. Several types of cups are available on the market produced with fibres from different origins, such as:
• Hardwood and softwood chemical pulp
• Hardwood and softwood CTMP or CMP
• Low yield pulp from annual plants, like straw, rice, reed or others

A hardwood/softwood chemical pulp mix is normally used for the white top layer
The mechanical strength of Sicem Saga CMP is at the top level among high yield pulp brands and the controlled number of fines helps to get good sheet formation avoiding pin hole problems. The paper surface smoothness before calendering is also improved: this leads to reduce the nip linear loads of the machine calender. Unloading the nips helps to achieve a better bulk of the paper at reel.

Sicem Saga CMP has an excellent response to wet end chemicals such as retention aids, starch and AKD, and its introduction in the pulp mix does not significantly change the paper chemistry. Table 3 shows how Sicem Saga CMP can be introduced in the mix to increase the quality of the sheet and reduce raw material costs for wallpaper.

Printing and writing paper (often called “cultural paper” for books, exercise books, notebooks) has the same mechanical and cleaning properties of wallpaper. Additionally, it is characterised by good printability, feasibility for handwriting and high surface smoothness.

Sicem Saga CMP can satisfy these extra requirements, thanks its wide expertise with different qualities of printing paper, including copy paper and wood-free coated (WFC).

**Chemi-mechanical pulp in coated paper (WFC) and white top testliner (WTTL)**

CMP for coated paper (WFC) accounts for 50% of Sicem Saga’s sales volume. The company has developed a pulp with excellent printability and low shive content. By paying attention to the printing process, especially when offset technology is used to meet high quality standards, the company understands the necessity for surface smoothness and that the base paper should not release shives or other detrimental particles (the main cause of “linting” problems on the printing cylinders). Shives must also be kept under full control during the coating colour application on the base paper; they can build-up under the blades and cause strikes or paper breaks. Pulp cleaning (dot count) is another advantage of hardwood CMP when used inside offset printing paper. Compared with softwood high yield pulp, hardwood has less dirt, due to the different wood used as raw material.

For high quality offset paper the recommended solution is CMP grade SE 85/40 - it combines high brightness and low shive content, together with good tensile strength. The typical quantity is from 10% to 20% of the total fibre mix, depending on basis weight and finished paper properties.

**Table 1: The main applications of Sicem Saga CMP pulp grades. Brightness and freeness level are the key figures for choosing the right product.**
Table 2: BCTMP from eucalyptus, aspen and softwood are mixed together (first column). Sicem Saga CMP is introduced in the mix (second and third columns) showing a significant increase to the tensile strength. The higher porosity Gurley is due to a better sheet closure.

Table 3: In the first column 50% chemical pulp (softwood + hardwood) is mixed with softwood BCTMP. In the second column 25% Sicem Saga CMP is introduced to replace the same amount of SW BCTMP. The result is an improvement of optical properties, tensile strength and decreased water absorbency.

Another advantage in using CMP instead of virgin fibres is the improved dryness after the press section. The fast de-watering can help to achieve good dryness, improve the paper machine speed and reduce energy consumption.

All these advantages make CMP an important tool in the production of WFC, as is well known in Europe for decades. Today, many of the biggest paper mills in China are also using CMP or CTMP in the stock and virgin fibres (mainly BHK) are reduced proportionally.

Sicem Saga expertise with coated woodfree paper has been extended over the years to the production of white top testliner (WTTL), since the white surface of this multi-layer containerboard is often colour-printed and must have a comparable visual appearance to WFC. The majority of Sicem Saga WTTL customers are located in Italy and Central Europe (mainly in Germany), who have purchased CMP on a regular basis for years. High yield pulp on the top layer of WTTL can be used together with quality waste paper or virgin fibres. In both cases Sicem Saga pulp gives two main advantages to the board quality: uniformity of the layer and surface coverage, thanks to the high opacity and scattering coefficient of the CMP. The result is a reduction of the basis weight for the top layer with important cost savings and the same or improved surface quality. Over 20% of the production volume of the company was dedicated to WTTL last year, and the outlook is always positive. The poor availability of high quality waste paper on the market is a growing problem that all producers have to face sooner or later. This is why more and more board mills are considering the use of high yield pulp as an effective alternative.

Moreover, environmental reasons recommend to increase the usage of high yield pulp instead of pure chemical fibres. Sicem Saga CMP is made from fast growing trees, which are systematically replaced after use by contractors.
In addition, the production yield of CMP is over 80% of the dry wood, while for chemical fibres like BHK and BSK it is below 50%. These advantages where economy meets ecology, together with low cost and excellent quality, make CMP the pulp of the future.

Conclusions
The fast-developing Eastern market is the key reason for Sicem Saga’s expansion plans. Sicem Saga has established friendly co-operations with Chinese and Southeast Asian companies producing various paper products: art paper, paper cups, food packaging, tissue, wallpaper and cultural paper (printing/offset, copy paper). Some examples reported above prove how chemi-mechanical pulp can easily meet the quality targets of this market and can cut raw material costs by replacing some of the more expensive virgin fibres.

Sicem Saga ships engineered six-bale units designed for flexible transportation in both traditional trucks and 40’ containers for overseas ports.

For more information www.sicemsaga.com

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**SPECIAL REPORT**

- **Total chlorine free (TCF)** bleaching towers, designed to reach brightness over 85 ISO, in full respect of the environment.

- **Rotary screens in Sicem Saga pulp mill**, key to the process engineering to select high quality fibres and remove shives.

**Sicem Saga**

Sicem Saga is an Italian company specialized in the production of chemi-mechanical pulp (CMC). CMC is an environmentally friendly pulp that is produced by a process that combines chemical and mechanical treatments. This process results in pulp with high brightness and excellent physical properties, making it suitable for a wide range of paper products.

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