

Wilhelm Schober gives his personal view of how the consumption of calcium carbonate filler and coating pigment will develop in the next few years. He assesses progress region by region.

Calcium carbonate demand set to soar

IN THE EARLY 1970s, kaolin was the dominant filler as well as the dominant coating pigment used by the paper industry. The installation of new paper production lines led to an unexpectedly large demand for this pigment but European customers were discouraged by the high prices and tough pricing policy of the suppliers and thus began to look for alternatives. The strong dollar also encouraged these efforts.

Since then, calcium carbonate has made tremendous advances in the market and there is no sign of an end to this process (Figure 1). Much of the development can be attributed to companies such as Plüss-Staufner of Austria. It set about securing deposits of carbonate and developing know-how in mineral processing and paper technology. This included a complete adaptation of the wet-end of the PM.

Woodfree papers are ahead

During the 1980s, many woodfree mills switched to neutral sizing with the aim of profiting economically from the use of natural ground calcium carbonate as a filler. According to a speech given to the Prima meeting in Munich in April 1991 by Ludwig Huggenberger, there are more than 300 PMs operating under alkaline conditions worldwide, and of these, around 180 are in Europe. The main factors which have accounted for this change are:

- The higher brightness of carbonates;
- Reasonable price range;
- Good availability in different regions;
- The potential for using higher filling rates in the papers produced;
- Economies in aluminum sulfate consumption;

Reduction in machine corrosion;
 Reduction in refining energy needed.
 The considerably-greater durability of the papers is a favorable side effect of the neutral sizing technique.

In Western Europe, 80% of woodfree papers - coated and uncoated - are made with neutral sizing, and carbonates are employed. paper machine conversions are underway everywhere and a complete changeover to carbonates is only a couple of years away (Figure 2).

Eastern Europe: quantum leap?

The former Comecon-countries are likely to stimulate the growth of the carbonate industry. Paper mills, which form investment joint ventures with Western partners, will change to the neutral sizing and thus will convert to carbonate, as they are modernized. The expansion of the free market economy will lead to rapid growth in the consumption of paper, in newspaper publishing and in employment advertising.

North-America is catching up

With kaolin and pulp readily available at reasonable prices, North America was slower to switch to carbonates than Europe. But rising pulp prices and new paper quality demands - especially brightness and opacity - initiated by the import of papers from Europe resulted in new thinking in the mid-1980s. There have been major changes in the past few years:

- By 1990, 86% of North American coated woodfree papers were being produced with carbonates. That compares

with 58% in 1988;
 Alkaline sizing of uncoated paper, meanwhile, had grown from 22% to 66% in the same time period².

Nevertheless, the consumption of carbonate per kilogram of paper produced is still considerably lower than in Europe. (See also Figure 3.)

PCC: rising in rebellion

The availability of low-priced natural carbonates of high quality has been limited in North America. It was for this reason that satellite plants making precipitated calcium carbonate (PCC) first started to appear. Present capacities are estimated at around 600,000 tons/yr, with the product precipitated as a slurry (18-20% solids content) and applied immediately without a drying stage. The cost to the paper mills is about \$110-140/ton.

PCC has been extensively used in Europe as a filler for special papers for a long time. In cigarette paper, it is used to control the burning rate, while its function in other papers is to increase opacity (see an article by the author in Industrial Minerals, October 1989, p. 69-77).

The likelihood that PCC will develop further in Europe is in the balance and depends on the relative weight given to opposing factors. On the positive side, PCC can certainly be considered as a partial substitute for ground calcium carbonate (GCC) and titanium dioxide, and its use will allow opacity to be increased. How-

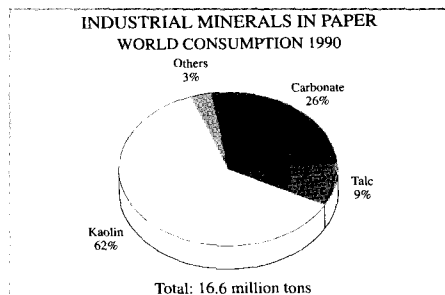


Figure 1

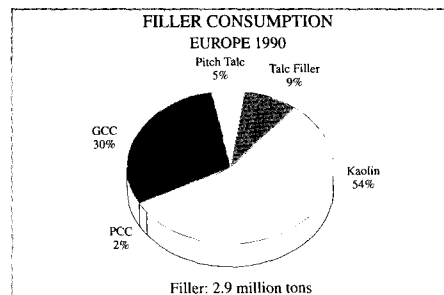


Figure 2

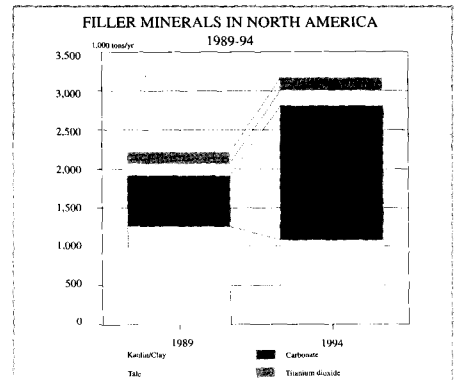


Figure 3

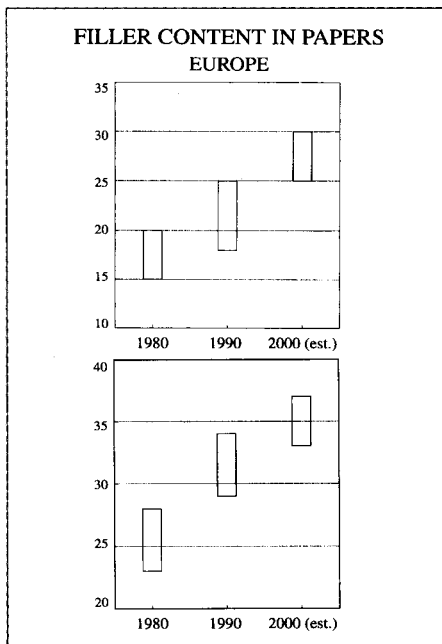


Figure 4

ever, there are many other arguments which can be made against it:

- Poor development of mechanical properties;
- Reduced filling rate;
- Slower dewatering;
- Higher demand for binder as a result of using PCC;

All these factors are enough to limit the rate at which applications develop. The high prices (DM 500-900/ton) and the lack of technical field support in Europe have so far been obstacles to success. However, the first satellite plants at paper mills in Scandinavia have a more reasonable cost basis and a better technical understanding of PCC application.

The advance of PCC technology will depend on ecological considerations, particularly with regard to the carbon dioxide balance in the mill:

- CO₂ is produced during quick-lime production, both during the generation of

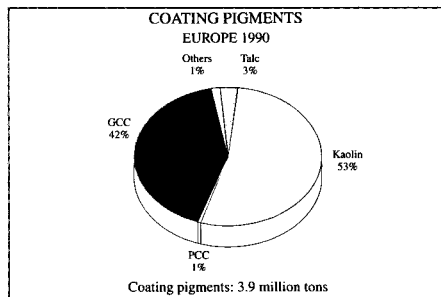


Figure 5

energy and during the decarbonation of the calcite;

- Only part of the total CO₂ emission is consumed during the recarbonation (precipitation) process;
- In most cases, especially in the satellite plants where quick-lime is used as raw material, the removal of CO₂ from the decarbonation occurs at a different location from where it is used for the precipitation.

We expect that this technology will be penalized in the future by the proposed carbon dioxide tax. Cost-conscious paper mills may thus decide not to invest in this type of raw material.

The reaction of the manufacturers of natural ground carbonates to the rise of PCC is predictable, too. Superfine carbonates with high opacity have already been developed, allowing the usual degree of filling to be used without any negative impact on the development of mechanical properties.

Coating pigments: kaolin still ahead

In the early 1980s, calcium carbonate had a market share of merely 20% among the coating pigments in Europe (Figure 4). Currently, the figure is 42-43%, and in the course of the next few years calcium carbonate is expected to outstrip kaolin as a coating pigment.

The technical and commercial arguments in favor of carbonate are convincing and are becoming virtually irrefutable as

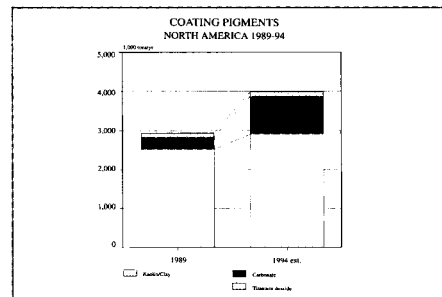


Figure 6

coating speeds rise and demands on coating weights increase:

- Coating formulations with high solids contents are only feasible when high concentrations of natural calcium carbonate are used;
- The brightness of the coating is gaining in importance;
- Quality requirements placed on the paper are likely to lead to more double coating;
- Growing attention is being paid to economic arguments (binder consumption and dewatering energy).

According to market analysts, demand for coated woodfree papers will continue to rise over the next few years. Consequently, the consumption of bright pigments is expected to increase by between 6.8 and eight million tons/yr by the year 1994-95. One million tons of this is expected to be coating pigments and natural calcium carbonate will be in front.

With printing machines becoming more and more sophisticated and working at higher speeds, the demands on paper webs which are thinner and thinner are ever-increasing. Steady improvements in coating base papers and in coating formulations have allowed this challenge to be met.

The trend continues to favor double coating. In double-coated woodfree papers the concentration of pigment accounts for between 35 and 48%, whereas, with LWC, 30 to 35% is the standard percentage. Carbonate can be up to 80% in coating formulations for web-offset LWC; rotogravure LWC still remains a domain of kaolin.

Talc is a typical rotogravure pigment and as a result of fundamental development by Finnminerals, has been adopted in coating formulations and has led to improved printability. Some papers are treated with compounds of talc, kaolin and carbonate and this is probably the trend for the future.

To be able to employ made-to-measure formulations of this kind, it is imperative that technological partnerships be established to develop the required know-how in slurry-making and in the preparation of coating formulations made with hydrophobic and hydrophilic mineral compounds. In combination with talc, carbonate is sure to develop into a rotogravure pigment in great demand within a short time.

Recycling: a challenge ahead

The application of carbonates to mechanical papers at first failed to meet with approval. There were problems arising from sizing and water-cycle systems. There was also a partial decline in brightness as a result of the pH-change. Pseudo-neutral sizing, however, has shown excellent results and is carried out at a pH ranging between 6.8 and 7.4 with Alaun functions as a pitch absorber.

In case of SC and LWC rotogravure papers, carbonates have not achieved a breakthrough due to the higher porosity. Today rotogravure with ESA, however, ensures problem-free printing. The potential for applying carbonates in the production of SC papers is estimated at

something like 150,000 tons/yr.

With the steady rise in the use of recycled paper, carbonate will be introduced into the system through the fiber reprocessed as well as through external broke. Carbonate is roughly 2-8% of the current wastepaper mix. In addition, ash contents continue to increase, and technical and quality problems are being tackled.

Wastepaper recycling rates in Europe and the USA are high. It is newsprint which shows the most striking difference in filling rate, since wastepaper can be up to 60% of furnish in Europe, whereas values range between 10 to a maximum of 40% in the USA.

Talc: brightness is expensive

Internationally, the use of talc as a filler is also considerable. More than 1.5 million tons go into paper products - as pure filler and as a pitch control agent. Due to the low dosage rate, darker talc can be employed for pitch control, while a minimum brightness of 76-80% ISO is required when talc is used as a filler. These qualities, however, are a rarity in Europe and are only available in Finland and France at a low price. Japan, China and India use something like 850,000 tons of filler-talc.

Europe consumes around 300,000 tons, but this amount includes talc for pitch control (see PPI March 1991, p. 62-64).

The change to carbonates has taken place even in those European countries where talc is readily available. Moreover, quality requirements formulated by Xerox led to a reduction in the application of talc for copy papers worldwide in the 1980s, and this resulted in a big reduction in the quantity used. At present, talc is used as a filler mainly for SC rotogravure papers.

On the other hand, the use of micronized talc for pitch control constitutes a growth market initiated from Europe and the USA, and is gaining importance on an international scale. It is an economical and environmental alternative to the use of chemicals.

allow domestic production to expand.

Thus, Southeast Asian output of high-quality coated papers is expected to increase sharply. An examination of the prognoses on titanium dioxide consumption clearly illustrates this trend. In spite of the fact that there will be a slight oversupply in the market between 1990 and 1992, titanium dioxide capacities of 260,000 tons/yr are being established, and a quarter of this is earmarked for papermaking. This amount is roughly half of the TiO₂ consumption of the paper industry in Europe.

High-quality industrial minerals are just beginning to be used. Local carbonates and kaolins used today often have only average quality specifications by European standards. Top-quality raw materials have to be imported. Locally-sourced fillers with abrasions of up to 40 mg and only medium brightness make life difficult for paper manufacturers. In most cases a delivery of slurries is unthinkable.

With the expected growth in the demand powerful suppliers of industrial minerals have already launched projects (for example, Plüss Staufer in Japan, Thailand and Australia; Pfizer in Taiwan) to exploit the opportunities in the future.

Kaolin holds sway in North America

Georgia Clay in North America still has the highest market share among the coating pigments, with 2.5 million tons/yr or 90% of the total consumption (Figure 5). High-quality coating pigments are just beginning to penetrate the market.

There is a strong increase in demand for coated papers. However, there are only a few paper manufacturers in the USA who produce double-coated papers. Further growth in the paper industry, however, will certainly call for fully-utilized pulp capacities during this decade. As a consequence, ash contents will have to be increased and double coating introduced.

Faster printing presses will also raise

demands on the paper, stimulating the use of higher quality pigments, including carbonate. Alabama Carbonates (a joint venture of Plüss Staufer and Georgia Marble) is opening a manufacturing company for making high-quality filler and coating pigments this year.

Asia: domestic production vs imports

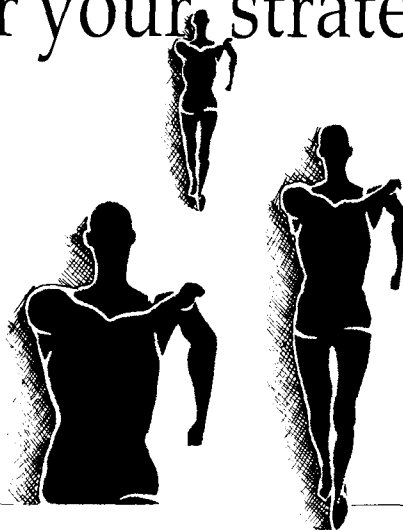
With economic growth surging ahead in Southeast Asia, per capita consumption of paper is expected to increase rapidly. At present, Western producers export considerable quantities of coated papers to this region. We expect that trade barriers and customs duties on European paper imports will remain in place in the future to

Price trend is upwards

The papermakers assess the price of their raw materials on the grounds of quality and timely delivery. At a time of unfavorable paper prices and overcapacity, the suppliers

Continued on page 49.

essential for your strategic management



schoconsult

- * Business Planning
- * Reorganization
- * Product Development
- * Market Strategy
- * Sales Organization
- * Public Relations & Advertising

schoconsult, dr. wilhelm schober, austria-8045 graz, nepomukgasse 21
tel. (316) 69 20 72, mobiltel.: (663)36 0 30, tlx.: 75310323 = scon a, fax.: (316) 69 20 724

Continued from page 27.

of raw materials have to suffer as well. Over the past 10 years, there has been a downward movement in minerals prices. And this situation has been exacerbated by increasing competition, leading to lower profitability for the suppliers.

The paper industry might be tempted to be unconcerned about the plight of its suppliers. Yet this short-term way of thinking involves great risks, because the paper industry is in need of economically-sound and innovative partners to remain successful in the long term.

It has been common practice that the producers of raw materials undertake fundamental research and development work for the paper industry. The acquisition of know-how, the installation and running of pilot plants, and the provision of technical support, all give rise to big costs.

The paper industry will have no choice but to acknowledge this in minerals prices, since it is impossible to finance such facilities and research efforts from the dwindling proceeds of the mineral producers, at least in the long term.

Transport charges increase sharply

Paper engineers have been on the lookout for more highly-sophisticated raw materials (like lamellar kaolins from North and South America) to differentiate their products. The low international value of the US dollar and reasonably-priced freight rates still permit this. However, in the longer term, environmental measures and the expected sharp increase in the transport rates will mean that transport logistics and strategies will have to be reviewed and optimized. Commodities for which transport around the world is becoming increasingly less justifiable will be particularly affected.

The merchant fleet for commodities is outdated: 30% of the ships are older than 15 years and should be withdrawn from service. A rising accident rate, environmental problems, and other factors may result in a heavy upward price movement over the medium term. At the same time increases in insurance costs are to be expected, along with the usual rise in wages as well as social contributions. A 30% increase in freight charges is to be expected over the medium term and rises of 70-80% may be expected in the next few years.

At present, cargoes from overseas countries to Europe are less expensive than those moving within Europe. The Rhein-Main-Danube Canal opens up new prospects for keeping costs down when transporting commodities.

However, regionally-available raw materials will become more important to the market. In Europe, calcium carbonate will certainly be a winner in this respect.