30 April 2006 Issue Number 111

APRIL 2006

A Monthly Review of Companies, Markets, Products and Technology in Paper Chemicals

- Market Summary 2
- Kaolin 2
- Omya launches new grade-based pigment families 3
- Titanium Dioxide 4
- Dow establishes Paper/Paperboard Expertise Center 6
- Research Institute of Wuhan develops new latex product 7
- EcoSynthetix launches nano particle biopolymer coating binder 7
- Efforts in latex substitution vary widely 8
- RohmNova breaks with traditional lubricant technology 10
- Manufacturers seek further lowering in PFOA levels in fluorochemicals 11
- Clariant launches two red dyes that reduce environmental impact 11
- Hercules to acquire full ownership of Shanghai Hercules Chemical Company 12
- Buckman Laboratories consolidates its operations in Asia and Africa 12
- Ashland to acquire Stockhausen's Water Chemicals business from Degussa 12

Harriman Chemsult Limited
24-25 Scala Street, London W1T 2HP Tel: 44 (020) 7462 1860 Fax: 44 (020) 7462 1861
Email: info@harriman.co.uk Website: www.harriman.co.uk
Harriman Chemsult (Asia) Pte Ltd, Tel: 667 123 6868 or 6012 218 7712 Fax: 603 80231830
Email: enquiry@harriman-asia.com
Harriman Chemsult America, Tel: (1) 301 371 8303 Fax: (1) 301 371 8305 Email: MJBrady@aol.com

Paper Chemicals

MARKET SUMMARY

Much of the focus this month for the specialty chemicals industry has been on the price of oil, which continues to attain new heights. During the final week in April, the price of oil reached $73/barrel, having shown an increase of 300% during the past two years. This sets new levels of pricing for specialty chemicals that are closely linked to the price of crude. The Supplier Showcase at the Tappi Coating & Graphic Arts Conference underlined the ongoing efforts to displace the more costly and volatile components that are affected by oil pricing. There is a sense that a relatively brief period of price stability for S-B latex may be at an end. The comparatively modest movements on monomers have been reflected in a quarter of reasonably flat pricing for latex. The difficulties in managing some of the other petrochemical-based products, such as defoamers, are shown by the disappearance of another supplier from the scene. The paper chemicals activities of Stockhausen are being absorbed into Ashland Chemicals.

Contract negotiations for kaolin are now finalised, but the market has every appearance of remaining tight. Meanwhile, the uncertainty in the carbonates market, particularly in Europe, looks set to continue while the EU continues its deliberations.

KAOLIN

The tightness in the **North American** clay market has high visibility, as customers occasionally find themselves on allocation and are aware that their suppliers are often hand to mouth. Problems with availability of clays are compounded by the railroads, which can more or less impose price increases as there are often no viable alternatives. Although no further price increases in kaolin are expected at the mid-year point, producers are likely to start preparing the market well in advance for a successive substantial price increase at the year-end. There are still sizeable volumes tied up in multi-year contracts, although more of these will come up for renegotiation in 2007. There seems to be a gradual move towards shorter contracts and one supplier has moved its entire customer base to annual contracts.

Huber has already announced a further price increase of $8/st for hydrous clays and $26/st for calcined clays for industrial applications, with effect from 15 May. However, this excludes paper applications. While seeking higher prices for industrial products, it has eliminated its temporary surcharge. There are indications that other suppliers have also been withdrawing surcharges from paper applications as the energy component becomes less onerous.

BASF has raised its offer price for Engelhard by $1/shr to $38/shr. It has also threatened to withdraw its bid when the offer expires on 5 June if it fails to gain support from Engelhard's shareholders.

As part of their ongoing efforts to improve profitability, papermakers are seeking substitute some of their more costly pigments. They are therefore aiming to identify pigments that will bring the same benefits at a lower cost.

Cornish filler clay, already suffering a dent in profitability in consequence of the Finnish lockout in summer 2005, has again lost volumes as a result of the lockout at Stora Enso Port Hawkesbury.

Although some relief may be in sight in terms of freight, which tripled in 2005, there are concerns that the current high level of oil could lead to bunker surcharges. Availability of tankers should improve, as more are being built. The disappearance of multi-year contracts is unlikely for Brazilian clays, which require a 40-day round trip between Brazil and Europe, making the freight component absolutely crucial. With some of the volumes tied up in long-term contracts, they are better positioned to negotiate favourable freight contracts. Production costs in Brazil have also increased dramatically, partly as a result of the appreciation of the Brazilian Real and partly because of the soaring cost of electricity, which has more than doubled since 2002 to some $60/MWh.

The 11.6% annual growth in **China**'s paper and board industry exceeds that of the other Asian countries. Coupled with this, it has one of the largest kaolin deposits in the world and it is the second largest kaolin consumer in Asia, after Japan. So it will continue to be a primary focus for kaolin producers. Current consumption of kaolin in China is mainly in coated paper, art paper, white board and other coated paper products. The supply of Chinese kaolin for the paper industry is said to be tightening and domestic paper producers are heavily reliant on imported kaolin to meet their growing demand.

Currently, the Chinese Mining Authority has identified more than 700 locations that are rich in kaolin deposits. Based on a mining study carried out on its 200 kaolin deposits, China has an estimated 3 billion mt of kaolin. The kaolin deposits are mainly located in the Provinces of Guangdong, Guangxi, Hunan, Zhejiang, Hebei, Shanxi and Inner Mongolia. However, there is also some 1.67 billion mt kaolin trapped in the coal formation. The morphology of this kaolin renders it unsuitable for use as coating or filler in papermaking. Total fine clay deposits are estimated at just 1.43 billion mt. However, the pigmentary

properties of kaolin mined in China and used in papermaking cannot generally match the brightness levels of Georgian and Brazilian clays; hence, it is predominantly used as filler.

The major factor causing the tightening supply of kaolin in China's paper manufacturing sector is the surging demand across a broad range of industrial sectors. It is estimated that 22% of the fine kaolin consumed in China is used in papermaking industries, mainly in filler and coating. Kaolin derived from coal formation is used primarily in paint applications and it is not commonly used in the papermaking process.

The kaolin mined in China does not have the performance properties that could command high value in papermaking compared to the clays from Brazil and Georgia. Hence, most of the kaolin producers focus on other applications, where they can command greater value for their products. Chinese paper producers still rely heavily on imported Brazilian and Georgia clays, which raise brightness levels among other performance characteristics. In fact, the only Chinese clay that comes close to matching the imported kaolin from Moaming is in Guangdong Province.

In China, the use of calcined clay in paper applications is less extensive than in North America or Europe. It is commonly used in low weight coated paper, low-bulk paper and high end coated paper board. It is estimated to be in the range of 30,000 mt/year and it is supplied mainly from kaolin producers in the Province of Shanxi, Henan and Inner Mongolia. Imported calcined clays are mainly targeting premium paper products.

Paper is the second largest kaolin consuming sector in China. In 2005 an estimated 3 million mt coated paper and 6.3 million mt coated paper board were produced. Thus paper manufacturing contributed the highest growth in kaolin consumption in China. If the existing consumption and supply trends prevail, then it will be difficult for paper manufacturers to avoid paying more for their kaolin.

While the current energy cost shows no sign of receding, kaolin producers are riding on this momentum, imposing price increases in the region while seeking to optimise capacity utilisation and maintain volumes. Most of the kaolin contracts are negotiated on an annual or half yearly basis. In order to protect producer profit margins, the energy surcharge is included as part of the contract to protect kaolin producers from the rising energy cost. Furthermore, some of the major kaolin producers are promoting more value added kaolin products, targeting the higher end of the paper product range.

CARBONATES

Omya launches new grade-based pigment families

Presentations from both Omya and Imerys at the 2006 Tappi Coating Conference pointed to the importance of being able to offer a mix of different pigments in order to exploit the synergies between different minerals. With that, customers require flexibility within those ranges. Omya used the forum of Tappi for the official launch of its multi-dimensional pigment concept. It uses the whole gamut of carbonate options, embracing modified GCC and PCC, as well as clay from Huber and talc from Mondo Minerals. Using a combination of these pigments, together with chemical additives from its subsidiary, Coatex, it tailors coating and filling solutions for its customers. It employs a variety of technologies to achieve the desired solution, including co-processing, pre-blending and co-structuring. Three families of products developed for different grades were introduced at the Supplier Showcase at Tappi in Atlanta GA in late April.

- As the gap between LWC and SC papers closes both in terms of performance and price, *Omyagloss*® fillers for SC papers will heighten competition between mechanical grades. Omya has developed *Omyagloss® 1000* targeting SC-B paper grades, and *Omyagloss® 2000* or *3000* for the SC-A and SC-A+ markets. In trials, formulations containing 100% *Omyagloss® 3000* achieved comparable gloss to a standard filler clay formulation, but were 10% less abrasive and offered higher brightness, opacity and porosity. In addition to superior sheet gloss, it allows SC paper manufacturers to achieve enhanced print performance.
- Omya has introduced two lines of *OmyaJet*® pigments for ink-jet papers, *Omyajet® B* for single-coated matter papers and *Omyajet® C* for improved multi-purpose office paper, specifically uncoated woodfree grades. There are currently two products in each line.
- *Omyasorb® 7500* specialty filler reduces print-through in lightweight newsprint and directory papers.

This is said to be just the start on a new drive in Omya's product development scheme.

Imerys meanwhile is building on the introduction of its *Contour Xtreme*® blended pigment to the marketplace in 2005. It continues to explore the options for combining a variety of pigments, using various particle sizes, a blend of steep and narrow particle size distribution and diverse composition. In particular it has found that mixed pigments offer superior optical

properties.

In Q1, SMI increased its sales volumes of PCC worldwide, and particularly in China, while sales increased by 7% year-on-year to $143.2 million. Sales conditions have been challenging, with high energy and raw materials costs. In March SMI was forced to close a satellite PCC in Wisconsin, following the closure of the associated paper mill, and this added to bad debt expenditure.

There have been very few signs of price increases in carbonates in **Europe** as customers renew contracts for 2006-07. Despite the size of the leading carbonates supplier, most customers have enjoyed a supportive relationship and feel that they have been treated fairly. There have been opportunities to pass on increased costs that have not been invoked. For some of the more remote mills, transport constitutes more than 50% of the cost, and customers are satisfied that their supplier has been investigating ways to minimise its logistics costs.

A number of the Finnish PCC satellite providers have a certain amount of idled capacity that the host papermakers will look to use within their system, as part of efficiency improvement programmes. Given the ongoing EU investigation of Omya's takeover of the Huber PCC satellites, no PCC supplier is willing to discuss expansion. This is particularly the case where it is a question of new capacity, which would actually expand the marketplace. Paper demand has been particularly strong in Eastern Europe and this has benefited PCC satellite operators with plants in the region.

Despite indications that a decision would be reached by mid-March, the conclusions of the referral considering Omya's takeover of the Huber satellites have now been suspended until 28 June. There is some surprise in the market that the EU Commission has been unable to reach a decision earlier. For competitors it is something of a double-edged sword: on one hand, it may make planning difficult for the party involved; on the other, it has had the effect of depressing carbonate pricing, which affects all players. One area where Omya has optimised its cost position is in logistics, and this at times leaves others struggling to compete. While logistical disadvantage may be purely inconvenient, at worst such problems can close down a mill. Customers have come to expect a certain level of quality that may at times be difficult to emulate.

European papermakers have been approached with GCC samples of unknown provenance, thought to be possibly from Eastern Europe or Asia, from trade houses. Some of the material is quite crude, whereas some of it is treated. Suppliers are sceptical, arguing that the volumes are insufficient and there is no guaranteed supply.

In **Asia**, consumption of GCC in papermaking has seen rapid growth during recent years. As China emerges as the second largest paper producing country in the world, the volumes of GCC consumption in paper applications has grown exponentially from 64,000 dmt in 1996 to 1 million dmt in 2005. In the early 1990s, volumes of kaolin and GCC in pigment formulations were broadly similar. In just over a decade, GCC has largely replaced kaolin in filler, due to technological improvements and the drive within the paper industry to remain cost-competitive. Its cost-effectiveness is above all likely to assure the rapid pace of future growth in GCC.

Currently there are more than 30 GCC producers in **China**, with a combined capacity in excess of 800,000 dmt/year. Imerys Mining has recently launched a 500,000 mt/year superfine powder calcium carbonate project in Zhongshan in the county of Hezhou, Guangxi Province. The project is funded by Imerys and represents an investment of $20 million. It includes a 500,000 mt/year heavy calcium carbonate superfine powder plant and a 500,000 mt/year mechanised mine, making full use of the marble resources in Zhongshan County. It is expected to come on stream by the end of 2006. The estimated output value will be CNY175 million/year and paper will be one of the major applications for the GCC shipped from this plant. Other applications will include construction, plastics and rubber.

Outside China, global players are also seeking to expand their GCC business. For instance, Surint Omya Chemical Vietnam is planning to build a $7 million calcium carbonate plant in Southern **Vietnam**. The plant will be built in Go Dau Industrial Park in Dong Nai Province, near Ho Chi Minh City. It will be able to produce 45,000-65,000 mt/year calcium carbonate for use in plastic, paint, paper and rubber industries, and is expected to come on stream by the end of 2006.

TITANIUM DIOXIDE

There is no sign of acceptance of the 1 January 5 cts/dry lb price increase, due for application at some accounts in the paper segment from 1 April and at a number of others with 120-day price protection from 1 May. On the contrary, there has been some easing in laminates pricing and slight erosion in paper grades. Although there are indications that DuPont's paint grade manufactured at Edge Moor is being sold in the market, it has so far failed to change the market dynamics. In the short term, customers are looking forward to some very slight concessions on price. As market leader, DuPont has a major challenge in managing surplus capacity in Edge Moor, which for so long has been entirely dedicated to a segment of the

market in decline. In common with some of the other manufacturers of rutile, DuPont is working to find a way that does not quench OBAs. Brightness can be improved by moving TiO_2 from the coating to the base-coat. In the short term, customers seem reasonably confident of maintaining flat pricing, but there is still a sentiment that the long-term trend is upwards.

US TiO_2 Prices (cts/lb fob)

Rutile (paper & board)	0.87-0.97
Laminates	1.05-1.10
Anatase (paper & board)	0.79-0.83

The paper industry is a major obstacle for TiO_2 producers, as the pigment continues to enjoy some pricing activity in paint and plastics. Any uncertainty in the marketplace surrounding DeLisle now appears to have vanished. Moreover, the 30 ft wall that DuPont plans to build to protect the DeLisle facility demonstrates the lengths to which it is prepared to go to protect a repetition of the devastation of Hurricane Katrina.

Some papermakers are investigating the possibility of using anatase in applications traditionally dominated by rutile, but find that anatase suppliers have been more successful than their rutile counterparts in raising prices. Only a very limited number of anatase suppliers can offer slurry, and those that can charge a premium. The market has clearly tightened as more Chinese rutile is consumed domestically and some producers convert from anatase to rutile. Although South Korean product is being sold, there is no means of slurrying it.

While TiO_2 offtake to the paint sector is not particularly strong, **European** demand for laminates has been excellent over the past months. TiO_2 producers have been rebuilding their inventories, and DuPont has informed its customers that the DeLisle lines are back to full capacity. This has put laminates manufacturers in a good position to negotiate a rollover and they are optimistic of seeing some decrease going forward. Contracts have been left open for renegotiation later in the quarter. Indeed there have already been some downward adjustments, of the order of €40/dmt, for sulphate rutile product. Europe's laminates customers paid increases of the order of €70-100/dmt in Q1 and are confident that they can reclaim at least half of that later in Q2.

European TiO_2 Prices (€/dmt fd)

Rutile (paper & board)	1,910-1,950
Laminates	2,100-2,140
Anatase (paper & board)	1,350-1,450

It seems that between $50/dmt and $100/dmt of the $100-150/dmt price increase posted by the international TiO_2 suppliers for the **Asian** market for Q2 is actually sticking. In line with this price increase, most of the Asian-based TiO_2 producers have indicated that they also intend to raise their prices.

As most of the anatase grades used in the paper industry are supplied from TiO_2 producers based in Asia, it looks inevitable that the continent's papermarkers will have to concede higher prices as well. Since the market has already accepted a price increase for rutile grades, it could be argued that a rise for anatase grades will be more palatable. The price differential between rutile and anatase grades is normally maintained at a constant: hence if the market accepted the price increase for rutile grades, anatase will follow that pricing trend. The impact of the initiative for the paper industry is of less significance because these customers only account for 3% of TiO_2 consumption. Furthermore there is increasing availability of cheaper functional substitutes, offering comparable performance to TiO_2.

LATEX

Latex prices remained stable this month, but there are fears that there may be a ramp-up in pricing going forward. The escalating price of crude oil has now become a major concern to the latex industry. With a run-up of more than 300% in the past two years, it is not envisaged that it will return to former levels. Even if demand for the major monomers is

comparatively low, the high oil price looks certain to push up raw material costs. As a result of the spike in oil, opinions have changed considerably over the past few weeks as to the direction of styrene. That said, the first quarter has been a period of considerable stability for latex pricing in **North America**, with only modest adjustments in monomer pricing.

North American S-B Latex Prices
(cts/dry lb fob)

0.85-0.92

Dow establishes Paper/Paperboard Expertise Center

Dow is establishing Dow Paper/Paperboard Expertise Center, staffed by specialists, in order to provide rapid technical solutions to its customers' problems. Staff will address questions on paper quality and provide samples. Over the past several years, Dow has been working to respond to developments in pigments and shifting demands for paper. With an increasing trend towards narrow particle size formulation, it has introduced a new set of lattices designed to cope with high solids formulations. Its high performance binder, which can achieve a 10-15% reduction in binder levels, has been on the market since 2005. Dow's hollow sphere product has seen its third reformulation: HS3020 has some solubility for higher gloss. The company is looking to develop products that will recapture the stiffness lost as a result of the increasing use of carbonates in paper formulations.

European coated papermakers have enjoyed comparatively stable latex pricing over the past four or five months, although suppliers have been under pressure on account of the downward direction in raw materials. This continued in April, with a modest reduction in the barge contract price of styrene for purchases in Northwest Europe to €935/mt. Over the past six months, the volatility in styrene has been limited, with prices predominantly between €900-950/mt. Thus there has been a shift in the relationship between styrene and oil pricing, resulting in a dramatic deterioration in the profitability of styrene manufacture. At the same time, while raw material prices have seen little change, latex prices have decreased. Opinions vary as to the direction in styrene prices going forward: profitability dictates an upward surge but the balance of the market might preclude a significant increase. The butadiene price increased slightly moving into Q2, increasing by €15/mt to €785/mt. Other cost components, such as energy and transport, are increasing, while manufacturing costs pursue a continual upward trend.

Producer costs are calculated to have increased by €30-40/dmt over the past year, but in that time the price of latex has eroded by 5-10%. As a result, margins are again severely squeezed. Many customers have seen prices roll over moving into Q2, although some had been anticipating a modest increase and certain producers were looking to raise prices. In the end, the market was little changed, with modest increases implemented at a few accounts, some business rolled over and some prices seeing modest downward adjustments. Arguably the overall trend was one of slight decrease, given that monthly contracts were adjusted downwards.

European Paper Latex Prices
(€/dry mt fd)

S-B: 1,400-1,450	S-A: 1,850-1,900

Although latex is around €100/dmt cheaper than it was during Q2 2005, it remains more expensive than it was two or three years ago. This is on account of the step change in raw material pricing. Producers point out that half Europe's latex producers would go bankrupt if prices remained at the level of 2003 and that sustainability has again become marginal, with margins down 3-4% in Q1. With relatively little business changing hands, pressure from customers looking to maintain their profitability would appear to have played a greater role than competitive activity.

Squeezed by inflation in hydrocarbons, Dow has reached a point where the profitability of its latex business must be addressed, and will look to raise prices by at least 10% in June. There will be a further push in July should this not be fully implemented. Some believe that the urgency of the current situation will prompt a move sooner. Having achieved sustainable reinvestment levels after the catastrophic effect of the raw material spike in Q3 2004, producers are determined that the improved profitability should not be conceded. The price of S-A latex has only seen some slight decline.

The latest set of negotiations was seen as a missed opportunity for producers and many blamed lack of leadership. Several of them had informed their customers that they were planning minor price increases, up to around €50/dmt. Latex prices that were indexed to formulae tended to decrease, and this put downward pressure on quarterly prices. Accounts that already enjoyed low pricing were rolled over or saw small increases, depending on timing, customer and competitive pressure. Elsewhere there were modest decreases, perhaps in the order of 2%. Certain producers claimed a few modest increases, but the overall mood was one of disappointment. There are warnings that customers are taking short-term cost relief, which will force producers to raise prices by €100-150/dmt at a later point in the year. Going forward, customers anticipate some regional changes. They point to over-capacity of latex in the Finnish market, where a substantial proportion of shutdowns are occurring, warning that it could easily lead to some short-term special offers. These might create temporary disparities across the European market.

Whereas in the past producers were sceptical of their customers' claims that the performance of the coated paper business was lamentable, they now have evidence that their customers are struggling to break even. European economic performance has shown some improvement, resulting in an up tick in paper demand. Opinions vary as to the development of the paper latex market: increasing use of high-strength products might accelerate an expected slight decrease, put at around 2% for S-B but double that if acrylics are included. Even with the difference in dosing, every mill that can displace latex in the pre-coat can generate thousands of Euros of savings. Before substitution became more generalised, many paper manufacturers were using starch in their fine paper machines. They are now introducing it in the pre-coat of mechanical paper machines.

In **Asia**, Modern Industrial Technology Research Institute of Wuhan in Sichuan Province has recently discovered a new latex product used for paper coating. The latex is based on monomers that are readily available in the market and relatively inexpensive compared to the conventional latex sold on the market. This latex can be used in coating applications on various paper and paperboard products and has been evaluated in a number of paper manufacturing lines in some of the provinces. It was found to show similar performance capability to vinyl acetate-ethylene copolymer, but was 15% cheaper. Details of the polymerization process and reaction conditions were not revealed.

The coating is applied in the final stage of the papermaking process and latex is the major component in the coating process for paper and paperboard. Hence, the cost of latex has a direct and significant impact on the final cost of the finished product. Furthermore, latex is the second most expensive component in a conventional coated paper formulation. Although S-B latex has a slightly lower cost structure, paper coated with S-B latex does not have the weathering and anti yellowing properties of the newly discovered latex. Currently, latex derived from styrene monomers and acrylic acid performs better, but is more costly. Modern Industrial Technology Research Institute of Wuhan claims to have found a latex that solves a problem faced by the papermaking industries.

Even though the current price level of S-B latex in Asia continues to plateau in the near term, the polymers used in the manufacturing process are petrochemicals and are directly affected by the rising price of crude oil. The polymerization plants will eventually face increasing raw material costs. Hence, the continuing efforts of government-linked research institutes in searching for a more cost effective solution to enable China's domestic papermakers to compete in both domestic and international market.

Chinese S-B Latex Prices
(CNY/lmt ex plant)

8,000-8,500

STARCH

EcoSynthetix launches nano particle biopolymer coating binder

Using the forum of the Tappi Coating Conference, EcoSynthetix (Lansing, MI), a biomaterials company founded in 1996, is introducing *EcoSphere*®, a nanotechnology for displacing latex with starch. Ecosphere nano particle biopolymer coating binder is produced by reducing 30-micron granules by a factor of 500-600. Much of EcoSynthetix's initial work has been in the substitution of petroleum-based adhesives and the company is still expanding in this field, looking to replace adhesive in corrugated board. It has branched out more recently into petroleum-based paper chemicals, including replacement of polyvinyl acetate in paper packaging and S-B latex in paper, and has been running trials.

EcoSphere® is supplied in powder form and does not require cooking, as the company has managed to remove the gel point. This eliminates certain drawbacks of cooked starch that restrict its use in certain grades of paper and paperboard. The powder is toll manufactured, and the company is currently in a position to scale up this nanotechnology. Cargill is among the company's owners and supplies it with starch. Typically cooked modified starch is substituted at a ratio of about two parts starch to one part of latex displaced. *EcoSphere*® can be substituted on a one-for-one basis, replacing 25-75% of S-B latex in trials. It can provide ultra-high sheer said to be comparable to that provided by latex and superior to that of starch. EcoSynthetix has patented a number of features of *EcoSphere*® but some patents are still pending. The price has yet to be determined but performance enhancements are promised. Potential customers are offered price stability compared with products that depend on petroleum pricing. Since it can be shipped dry and blended into the coating formulation at the mill, it offers savings on freight.

Efforts in latex substitution vary widely

Although there is an ongoing dialogue relating to the possibilities and extent of latex substitution for starch in the coated paper industry, there are companies that have not even begun to run trials. However, no manufacturer of coated paper can afford to ignore the insistence of their starch suppliers that this provides a significant avenue to cost-saving. As starch suppliers develop more innovative solutions, many papermakers are working on projects or have placed latex replacement firmly on their agendum. Many are also mindful of the warnings of their latex suppliers that quality could be compromised, and some have chosen not to pursue starch developments at this point. The cost benefits must be weighed against the risk in changing a formulation that works.

Many coated paper mills have been using starch in their formulations on a number of machines for some time. Starch producers have been conducting research in this area for years, and are devoting considerable efforts to the development of new techniques for latex substitution. However, it was the escalation in latex pricing during Q3/Q4 2004 that really stimulated the interest of customers. The pioneers in this area started their substitution efforts on the first machines approximately one year ago, with the larger users exploring mill by mill and machine by machine. Some, less far down the line, have been following the dialogue and getting ready to start trials.

While starch is typically added in the pre-coat, it can also be used in the main coating formulation on single-coated paper. Some mills have found that this causes runnability issues but trials are ongoing, and those papermakers that have not yet gone beyond the pre-coat expect to do so later in 2006 or 2007. It also leads papermakers to turn to value-added starches that perform in a more cost-efficient fashion, and they are displacing some of the native starch with dextrins or modified grades. One company that considers itself relatively conservative in this regard calculates that it has displaced approximately 5% of its latex requirements with starch. Another is not prepared to displace more than 3% in the pre-coat and does not entertain any possibility of introducing starch in the top coat. Although it may not be possible to displace the same amount again, papermakers are working to identify where additional quantities of starch can be used. There is, moreover, potential to substitute other co-binders, such as CMC and PVA.

There are those that argue that there is a window of opportunity and any quantities of latex should be switched soon. Estimates of the size of the market range widely from below 2,000 dmt/year displaced latex to some 20,000 mt/year additional starch. Latex producers to date remain dismissive of the threat of starch cannibalising their sales, pointing out that the price of starch needs to triple for it to become profitable. If it does so, they believe that volumes will switch back to latex. The clear incentive to move in this direction is the huge price differential between latex and starch. Even though latex prices have moderated, they are expected to hover around the €1,400/dmt level, which is high on an historic basis. Therefore the economics of using starch are clearly persuasive. Although starch is perceived as more sustainable than latex, two parts of starch are typically required for one part of latex. Most latex suppliers deny that they are losing any sales, although they are aware of ongoing projects. They remain confident that papermakers will continue to use substantial quantities of latex to maintain quality.

The process of feedback from the appropriate end user during the switching phase is critical. Typically, it is at the conversion stage that problems come to light. The paper will be required to meet a series of quality criteria and, if there are any areas that fall short, then paper manufacturers may discontinue their efforts. Conversion requires some upfront investment, although most papermakers are using large quantities of starch already. While the initial drive came from the coated paper industry, papermakers have found that both starch and latex suppliers have assisted them in their substitution efforts.

The overall trend in **European** starch, which started in August 2005, was towards slight increase and producers continue to make upward adjustments in pricing. Customers are generally paying more for starch than they were last year, although pricing remains on a similar level to 2004. The steep increase in energy costs has been crippling for starch producers as well as for their customers. While customers empathised with their suppliers on account of the surge in energy costs, they

found that the proposed increases in starch were punitive, given the volumes required. They were also angered by the "take it or leave it" approach of suppliers and the threat of elimination of capacity, should the price initiative fail.

Prices are still increasing, with wheat in particular showing a clear upward shift as quarterly contracts are renegotiated. The major producers remain very firm on pricing as their margins have been severely squeezed. One major area of concern for customers is the impact of the sugar regime, and this is in part related to the uncertainty of how it will influence the starch business.

European Starch Prices*
(€/mt cif)

Corn	320-350
Wheat	310-330
Potato	320-335

* These are average prices for native starch and do not take into account regional disparities in pricing, caused by freight etc.

The increases in potato starch were very minor compared to those in corn starch. The major potato starch producer is the subject of constant rumours, some of them unfounded. It does appear that high inventory levels have made it more difficult to achieve the increases required. This is putting severe pressure on the finances of producers reliant on potato starch. It may take until August, when the new campaign begins, for the price relationship with cereal starches to be restored.

If you wish to comment on or contribute to the market and industry summaries, please contact the Editor, Cathy Darwent, on Tel: +44 (0)20 7462 1866 (switchboard 1861); Fax: +44 (0)20 7462 1861; email: cathy@harriman.co.uk

PAPER MARKETS

Change and restructuring have become facts of life in **North America**, where paper manufacturers are paring down business and sharpening their focus. The market is awaiting the conclusion of a number of deals, but some capacity has changed hands this month. Cascades has expanded its **recycled boxboard** assets, with purchases from Caraustar Industries and Simkins Industries. It has agreed to pay $14.5 million for Caraustar's Sprague CT-based coated recycled board mill, which has a production capacity of almost 180,000 st/year. It will pay $12.5 million for selected paperboard assets in Ridgefield NJ, which will be shut down, and New Haven CT. Both transactions include supply deals with the seller and will help to eliminate some of the surfeit supply in the recycled board market.

International Paper (IP) has ceased **coated freesheet** production at its Courtland AL mill. This 922,000 st/year capacity will not form part of its divestiture of coated paper. The mills still up for sale are Bucksport and Jay, both ME, Quinnesec MI, Sartell MN and Inpacel, Brazil. Weyerhaeuser has also disclosed that it is in discussions to divest its **fine paper** business. This covers 11 PMs, with uncoated freesheet accounting for much of the capacity. Bowater will start producing its hybrid **uncoated freesheet** product in May, having completed the conversion of PM 4 at Calhoun TN at a cost of $80 million.

European Paper and Board Exports Down 8.2% in 2005
(in '000 mt)

Export destinations	2004	2005	% change
Other Europe	3,925	4,004	2.0
North America	3,138	2,733	-12.9
Latin America	1,123	1,209	7.7
Asia	5,297	4,583	-13.5
Rest of World	2,631	2,269	-13.8
Total	16,114	14,798	-8.2

Source: Cepi

European paper exports showed a marked 8.2% decrease in 2005 compared with 2004. There were significant drops in exports year-on-year both to Asia and North America, with exports to the latter down considerably after the first quarter. Graphic paper accounts for more than half of this total. A more detailed breakdown is given in the previous table.

Some of the shutdowns in Europe over the Easter holiday were longer than expected. Nevertheless, volumes in the **coated fine paper** segment are holding up comparatively well, and producers have been more successful in passing through price increases. Meanwhile developments in the LWC segment look to be improving somewhat after a difficult start to the year. In the uncoated grades, cut-size **uncoated woodfree** is enjoying a particularly strong performance.

Myllykoski Paper has announced its own profitability improvement programme, with a target of 15% savings on personnel costs by the end of 2006. It will result in 135 permanent employees losing their jobs.

WEPA continues to expand its **tissue** business with the acquisition of Kimberly-Clark's Hakle mill in Mainz, effective 1 April, including around 200 employees.

In **Asia**, the pace of development of paper industries in China will continue to be the major driving force that will shape the whole dynamic of the paper and pulp market in North-East Asia in particular. With a growth rate of 11.6%/year, the global focus will remain on **China**, with announcements and news of capacity buildups by major producers, such as those by Lee & Man and Stora Enso, mergers and acquisitions.

In China, the Ministry of Commerce and the Shandong Provincial Foreign Trade Bureau have approved Tianzhang Paper Mill's acquisition of Tianyi Paper and Tianyuan Paper in Yanzhou, Shandong Province. At the same time, the pace of closures of smaller paper mills is accelerating. In Hebei Province, Gao Cheng City has announced the planned closure of 34 small-scale papermaking operations that fail to comply with the environmental standards within the city's municipality. Sichuan provincial government has blacklisted 139 paper manufacturing companies that will be suspended or permanently closed unless they upgrade their effluent treatment systems to meet environmental standards.

Asia Paper Manufacturing Co Ltd announced that it has acquired Kumho Papertec Inc. Asia Paper Manufacturing Co Ltd is one of the leading manufacturers of **corrugated** and other **paper boards** in Korea and Kumho Papertec is one of the leading manufacturers of general liners and kraft linerboards in Korea. As a result, Kumho Papertec Inc will become the wholly owned subsidiary of Asia Paper Manufacturing Co. Ltd.

Tokai Pulp and Paper Co Ltd also announced that it has acquired a Shizuoka-based company which is engaged in the manufacturing and sales of paper products. As a result, the Shizuoka-based company will become the subsidiary of Tokai Pulp and Paper Co Ltd.

COATING CHEMICALS

RohmNova breaks with traditional lubricant technology

RohmNova is in the launch phase of an innovative range of paper lubricants, based on 100% active polyglyceride, under the *OmnaFlow Au™* brand, following just over a year of mill trials. This is a departure for the company in as much as the product is 100% active compared with 50-55% active content for beef tallow, and it is sold as an emulsion rather than as a dispersion. *OmnaFlow Au*™ was developed to provide an alternative to the more commoditised tallow and calcium stearate-based lubricants, differentiated from these through value and performance. Suppliers are looking to develop products to increase end use value for a market that is challenged to make money. Two products, *OmnaFlow Au4200* and *OmnaFlow Au4203* have been developed for coated paper, the second being free from alkylphenol and nonylphenol ethoxylates (APE and NPE), while *OmnaFlow Au4240* is intended for paperboard. In some markets, APE and NPE have already been banned and the global market is shifting in that direction, so papermakers had been demanding their elimination from chemicals.

While they have applications in all grades that currently require conventional lubricants, in some cases the *OmnaFlow Au*™ products are also being sold where lubricants have not previously been used. The company's aim has been to maximise efficiency and arrive at a higher level of activity. The improvement in productivity on a dry weight basis allows a 50% reduction in usage compared to calcium stearate. In some case, the *OmniFlow* products have certain advantages over calcium stearate, being easier to handle and providing enhanced performance with base-sheet gloss. *OmniFlow* lubricants provide equivalent dusting and coefficient of friction to calcium-stearate-based products. They support high temperature calendaring and are readily released from the calendar. The line has been shown to reduce formulation costs in offset and rotogravure

formulations.

RohmNova has been targeting markets where sales of calcium stearate-based products are particularly high, and has been making good in-roads in Europe and Brazil. *OmniFlow Au*™ is currently being sold as a stand-alone product. While the small volumes may mean that it is less significant from a customer perspective in terms of cost than the higher volume products, such as lattices, the risk in trialling a new lubricant is considerably less than that of testing a product that might alter the entire formulation. RohmNova has been satisfied at the acceptance of its value-selling approach, where the emphasis is on cost per use rather than price per pound.

Manufacturers seek further lowering in PFOA levels in fluorochemicals

Manufacturers of barrier chemicals in paper and board and other products have been anticipating regulatory and consumer concerns surrounding perfluorooctanoic acid (PFOA) and its anion, perfluorooctanoate. Regulators are seeking to understand how PFOA, which is known to be biopersistent, found its way into the human blood stream in low ppb levels. In the case of telomer chemistry, which has applications including the prevention of grease from penetrating paper, PFOA is not used in manufacturing but is present in trace amounts as an unintended manufacturing impurity. The Environmental Protection Agency (EPA) and Food & Drug Administration (FDA) are satisfied that the quantities are far too small to pose any human health effects, and have expressed confidence that customers can safely continue using these products. A published peer-reviewed study on consumer articles made with DuPont products showed exceptionally high margins of safety, and its barrier chemicals, *Zonyl*® and *Foraperle*® have been used in packaging for over 30 years without adverse effects. Extensive studies on toxicity carried out by the company do appear to have provided some reassurance.

While the FDA endorses these findings, stating that telomer-based products are safe, provided they are used as intended, perception is playing a larger part than regulation. Current concerns seem to come from specifiers and there are fears that end users will start to feel worried. Although producers are investigating alternative options, fluorochemicals provide a good value proposition. Efforts from other producers are ongoing to come up with a viable alternative. Among these are *HOLDOUT*™ from Cerealus Holdings LLC, which uses a biopolymer extracted from corn. This goes back to the earliest methods of obtaining oil and grease resistance, using starch, and becomes an aqueous suspension when diluted. It has been run on a number of paper machines, with applications both in the size press and in coating. The first manufacturing plant for *HOLDOUT*™ will be starting up shortly in Auburn ME, with an initial manufacturing capacity of 4 million mt/year. EvCo Research LLC is also looking to use its PVC-based technology, which provides oil and grease resistance, to replace fluorochemicals.

DuPont has taken the lead in signing up to an EPA voluntary programme, together with seven other manufacturers. This has been an industry-wide approach, with all significant manufacturers offering their perspectives on technology and how to lower emissions as part of an EPA project to tackle the problem. While all manufacturers of telomer chemistry have pledged to meet the EPA target of a 95+% reduction in PFOA by the end of 2010 and total elimination by 2020, DuPont is aiming to meet these goals by the end of 2007 and in some cases by the end of 2006. Ciba also has reduced its levels by over 90% at the current time. There is no requirement to eliminate PFOA in products and in many instances there is no technology at present that enables manufacturers to do this. DuPont has committed significant funds, including a $20 million investment in its plant at Pascagoula MS, which processes the primary intermediate for its telomer chemistry. It is evaluating the issue across its entire manufacturing supply chain. It is putting equal efforts into reducing product emissions, and will continue with its endeavours to lower emissions and educate end users. This forms part of a larger DuPont plan to identify sources of exposure from products and manufacturing, an effort that has been ongoing since the 1990s.

DYES

Clariant launches two red dyes that reduce environmental impact

Clariant has extended its line of *Cartasol*® cationic dyes developed for paper industry applications in its R&D facilities in Reinach, Switzerland to anticipate EU legislation. The red dyes, *Cartasol*® *Red K-3BN* liquid and *Cartasol*® *Scarlet K-2GL* liquid have been designed to minimise environmental impact while remaining compatible with paper industry requirements on performance and cost. With increasing concern about environmental and toxicological impact, Clariant's researchers aim to stay ahead of new legislation in the field. These latest product additions also comply with the ETAD code of ethics.

In addition to being environmentally sound, both products offer a range of performance criteria, including high substantivity, good bleedfastness, which reduces backwater coloration, excellent shade stability, and a high strike rate, making it easier

to control or change the colour.

WET-STRENGTH RESINS

Hercules' closure of its Pendlebury, UK paper chemicals manufacturing plant at the end of March creates some supply chain issues for UK customers, who will have to source their wet-strength resin requirements from France or Spain. There are changes taking place in the UK paper chemicals market related to the constriction of the UK paper manufacturing industry. It has become more difficult for the remaining papermakers to have access to technical service. Customers are more likely to be offered packages or chemicals or a parcel of several chemicals, such as sizes and OBAs.

WET-END CHEMICALS

Hercules to acquire full ownership of Shanghai Hercules Chemical Company

Hercules Inc, a leading supplier of functional, process and water treatment chemicals for paper, has agreed to buy out the outstanding 40% share of its partner, Shanghai Chlor-Alkali Chemical Company in their Chinese joint venture, Shanghai Hercules Chemical Company Ltd. Hercules will take over the running of the company with immediate effect. However, completion of the deal, terms of which were not disclosed, remains subject to the normal government and regulatory approvals.

This is a strategic move for Hercules, allowing it to strengthen its market position in China, where it has been present via joint venture since 1995, and increase its share of the growing paper market. The company is keen to invest in additional facilities to support technical functions, product development and to provide training for its technical support team in China. It also hopes to expand its existing manufacturing capacity in Shanghai, with the potential to broaden the product line to better serve the paper industries in China.

Following the establishment of Paper Technologies & Ventures as one of two business groups, Hercules has renamed its Pulp & Paper Division, which will now be known as Hercules Paper Technologies across all its global markets. The new name will be phased in gradually, and will have no impact on Hercules' service to its customers.

Buckman Laboratories consolidates its operations in Asia and Africa

Buckman Laboratories has consolidated its operations in Africa and Asia. With the retirement of the managing director in South Africa, the responsibility of Asia and Africa in the company was centralised in its Singapore office under the leadership of the General Manager of Buckman Laboratories – Asia and Africa, Leigh Mann. Under this new structure, all sales managers of the two Buckman companies in Asia and Africa will report directly to its Singapore-based General Manager. Two new Operations Manager positions were created, respectively for the Asian and African regions, to handle the day-to-day operations of each region. Both of them report to the General Manager in the Singapore office.

WATER TREATMENT

Ashland to acquire Stockhausen's Water Chemicals business from Degussa

Degussa has announced the sale of the Water Chemicals business of Stockhausen, which includes its product line paper, to Ashland Inc, the chemical and transportation construction company. The transaction covers the global assets and employees associated with this business, and is being acquired for a consideration of $144 million, including the assumption of debt. Degussa is said to have been looking for a buyer since 2003, but Ashland only entered negotiations in summer 2005; the deal is expected to close during May, and is subject to clearance by the regulatory authorities and from the Degussa board. No obstacles are envisaged as the companies are strong in different geographies. Stockhausen's paper business accounts for approximately one quarter of the activities being divested, which generated a turnover of some $250 million in 2005 against Ashland's $400 million in 2005. Stockhausen has a sales and marketing team of around 100 people dedicated to its core areas of retention and drainage and deposit control and it markets a portfolio of seven primary groups to the paper

industry. Employees involved in manufacturing across all areas of Water Chemicals number more than 550 and employees will transfer to Ashland. The deal will also bring with it applications laboratories in Krefeld, Germany, Helsinki, Finland, with a focus on the Nordic region, and China. Ashland has its own applications laboratory in the US.

With its backwards integration into polyacrylamides, polyacrylic acid and acrylic acid, Stockhausen diversified into wet-end paper chemicals in 1996. Municipal water treatment remains the biggest division within Water Chemicals and it is this which is of key interest to Ashland. Stockhausen has not looked to provide a comprehensive range of paper chemicals but to offer depth in a limited area, from raw materials to applications. Stockhausen is well positioned as paper manufacturers shift more business to emerging markets, with manufacturing facilities in Krefeld, Germany, Beijing, China, Perm, Russia, Greenboro NC and Brazil. Recently Ashland's water treatment products sold to the paper industry have simply been a small part of its industrial water treatment business, as it saw paper manufacturing shifting outside the US. Stockhausen enjoys a much higher degree of integration than Ashland, which specialises in blending. Degussa will retain other Stockhausen lines, including its key superabsorbents business.

Integration discussions are already under way and Ashland plans to form a new division within its company, Ashland Water Technologies, including the Stockhausen Water Chemicals activities, within Ashland Specialty Chemical. James O'Brien, Ashland chairman and CEO, informed shareholders in January 2006 that it was looking to expand its water treatment business via acquisition. On a geographical basis, the activities that Ashland is acquiring will be extremely complementary. Ashland currently generates 75% of its business in the US whereas the Stockhausen business being divested is less well represented in the US, but offers a good base in Europe, as well as an established presence in China, Russia and Brazil. The two companies are also a good fit from an applications standpoint, as Stockhausen's strengths are in wet-end paper chemicals, particularly synthetic organic coagulants and flocculants and bio-dispersants, whereas Ashland is less oriented towards flocculants are more towards water treatment and biocides. Stockhausen's water treatment products that have been developed for the paper industry focus on effluent treatment, whereas Ashland targets boiler water, with products including anti-scalants.

No immediate changes are expected to existing co-operation agreements between Stockhausen and other chemical suppliers, which are generally run on a customer by customer basis. Ashland will be looking at ways in which it can improve existing agreements. The combination of the two businesses may leave the company better able to confront the considerable price pressure in the market.

APPOINTMENTS

Buckman Laboratories has appointed **Leigh Mann** as its **general manager of Buckman Laboratories - Asia and Africa**, based in its Regional Head Office in Singapore. **R Ashok** was appointed **general manager-operations of Buckman Laboratories Asia** and **Junai Maharaj** was appointed **general manager-operations of Buckman Laboratories South Africa**. Ashok and Maharaj will report directly to Leigh Mann.

PLANT & PROJECTS SUMMARY

SUPPLIERS

US: Cerealus Holdings LLC has started up a 4 million mt/year manufacturing plant in Auburn ME for its *HOLDOUT*™ aqueous paper additives, developed to replace fluorinated compounds in oil and grease-resistant papers.
VIETNAM: Surint Omya Chemical Vietnam intends to invest $7 million on a calcium carbonate plant in Go Dau Industrial Park, near Ho Chi Minh City. Operation by end 2006, it will produce 45,000-60,0000 mt/year for various applications, including paper.

PAPER MANUFACTURERS

US: Boise Paper has gained board approval to proceed with a $72 million expansion plan that will almost double its capacity for pressure sensitive paper, adding 200,000 st/year at its Wallula WA site. Installation of equipment should start in June 2006, and PM 3 will close in March, while most of the work is carried out.
UK: DS Smith has closed its 150,000 mt/year capacity SC fluting mill in Sudbrook, resulting in 135 redundancies. The mill was losing some £3 million/year and profitability was further undermined by the surge in energy costs.
TURKEY: Lila Kagit has commissioned a tissue line for its mill in Corlu, including an option for a further line. In addition to the tissue machine, the order covers stock preparation equipment, assembly and training. It will have a daily capacity

of 195 mt of facial, toilet and sanitary products.
INDIA: Whitefield Paper Mills plans to invest $266 million to build a 200,000 mt/year production capacity greenfield paper mill near Kowur in the West Godavari District of Andhra Pradesh. It is scheduled to commence operations in December 2007.
Hindustan Paper Corporation (HPC) plans to set up a $277 million paper mill, with production capacity of 300,000 mt/year of special grade crème woven paper in the state of Uttar Pradesh. HPC also plans to expand and upgrade its mills in North East India. This includes investing $110 million to revive its Tuli Paper Mill in Nagaland, idled since 1992; $144 million to expand the capacity of its Naogaon Paper Mill in Assam from 100,000 mt/year to 135,000mt/year printing and writing paper. It will also upgrade its 100,000 mt/year Cacher Paper Mill in Assam and the 67,000 mt/year Nagaland Paper Mill.
CHINA: Guangzhou Paper's PM 9 CNY2 billion newsprint project has been approved by the National Development & Reform Commission after the State Environmental Protection Administration gave the go-ahead. The mill, located in Nansha District of Guangzhou City, will house a 300,000 mt/year newsprint machine, with is scheduled to start up during 1H 2008.
Stora Enso China plans to set a JV with Shandong Huatai to build a $100 million, 200,000 mt/year PM to manufacture SC and other grades of publication paper in Dongying, Shandong Province. It is scheduled to come on stream in 2007. It is also intending *to* build a 1 million mt/year capacity paper mill in Guangxi Province to produce various types of paper and paperboard.
Heze City in west Shandong Province plans to invest CNY11 billion in a forest-pulp-paper-printing integrated project, which will make the City one of the key pulp-paper production bases in China, with a production capacity of over 1.2 million mt/year.
Guizhou Integrated Pulp-Paper Project, estimated to represent a total investment of CNY3 billion, has been approved by the Chinese authorities. The project consists of a 204,000 mt/year capacity pulp production line, and a 153,000 mt/year high-end art paper production line.
Lee & Man Paper Manufacturing plans to invest CNY750 million to set up a new board mill including a 300,000 mt/year linerboard production line, in Changqing City. The project is being assessed by the State Environment Authority and will be in operation by July 2007. It has also placed orders for additional linerboard and corrugated medium PMs for its Chongqing and Hongmei mills. It is investing some €26 million on a 430,000 mt/year capacity PM 9 and around HK$121 million on each of two 300,000 mt/year capacity PMs. All the new PMs are scheduled for startup by Q4 2007, raising Lee & Man Group's total capacity of linerboard and corrugated medium to 3.03 million mt/year.
Luohe Yinhe Tissue Paper Industries plans to build a CNY 600 million paper mill in Luohe City in Henan Province. The mill will have a 100,000 mt/year production capacity, producing newsprint, specialty paper and sanitary paper.
Anhui Shanying Paper Industry plans to invest CNY1 billion on a 300,000 mt/year capacity paperboard manufacturing facility in Ma Anshan City in Anhui Province. It is scheduled for completion by end 2007, when Anhui Shanying's total paperboard production capacity will reach 1 million mt/year.
Ningxia Meili Paper plans to expand its paper production capacity by 410,000 mt/year in five years. This includes a 260,000 mt/year coated SBS production line, a 150,000 mt/year coated printing paper production line as well as associated pulp, forestland and power projects.
Hetei Paper is investing CNY193 million on the first phase of a project to raise kraft linerboard production capacity to 120,000 mt/year. It is scheduled to start up in 2007.
Zhejiang Jingxing Paper Joint Stock Co has ordered a 300,000 mt/year capacity linerboard machine for its mill in Pinghu City. It is expected to come on stream during 2007.
Yamen Qiao Sheng Paper Mill plans to invest CNY90 million to expand its production capacity by 100,000 mt/year at its mill in Jiangmen, Guangdong Province, with two additional corrugated and linerboard production lines.
Xiamen Yongxin Paper Mill plans to invest CNY1.4 billion to build a 200,000 mt/year capacity paper mill in the Sizuishan City of Ningxia Hui Autonomous Region.

FORTHCOMING MEETINGS

TITLE: Asian Paper with New Applied Technology Conference
DATE: 10-12 May
LOCATION: BITEC
CONTACT: CMP Asia Trade Fairs Pte, Doreen Lee
Tel: +65 6735 3366
Fax: +65 6738 9644
Email: Doreen_lee@cmpasia.com.sg

TITLE: 37th Annual PRIMA Conference: Beyond Operational Excellence – Creating Value in Other Ways
DATE: 17-19 May

LOCATION: Ludwigshafen, Germany
CONTACT: Tel: +43 316 5737 2088
Fax: +43 316 5737 206
Email: carmen@prima-papernetwork.org

TITLE : PIMA 2006 Leadership Conference Transformation in Industry
DATE : 21-24 May
LOCATION: Disney's Contemporary Resort, Orlando FL
CONTACT: PIMA
Tel: +1 877/375 4863
Email: info@pimaweb.org

TITLE: Paper Recycling Technology
DATE: 21-22 June
LOCATION: Hotel Diplomat, Prague, Czech Republic
CONTACT: Pira International
Tel: +44 1372 802051
Fax: +44 1372 802243
Email: paul.squires@pira-international.com

TITLE: Zellcheming: 101st Annual General Meeting and EXPO
DATE: 26-29 June
LOCATION Rhein-Main-Hallen, Wiesbaden, Germany
Zellcheming
CONTACT Tel: +49 6151 33264
Fax: +49 6151 311076
Email: zellcheming@zellcheming.de