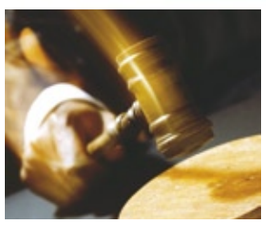
CHEManager EUROPE

4/2007 May

THE NEWSPAPER FOR THE CHEMICAL AND LIFE SCIENCES MARKETS



Markets & Companies

Intellectual property auction to take place in May in Munich

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Production

Dispersion of nano-sized particles

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Newsflow

Air Liquide has acquired the engineering firm Lurgi, which is owned by Global Engineering Alliance (GEA Group), based on an equity value of approximately €550 million, which is equivalent to an enterprise value of €200 million after including the assumption of Lurgi's cash position as well as its pension and other liabilities. The transaction is subject to approval by the European and American competition authorities.

With nearly 1,300 employees and total sales of around €850 million in 2006, Lurgi, a German-based company, has a particularly large portfolio of technologies, from producing hydrogen and synthesis gas to biofuel production processes (bio-ethanol, bio-diesel). Its main engineering centres are situated in Germany, Poland, United States, India and South Africa.

▶ www.airliquide.com
▶ www.lurgi.com

BASF Future Business is extending its technology portfolio and cooperation network in the printed electronics sector by starting a collaboration with the U.S. company Polyera Corporation, Illinois. The partnership will focus on the development and commercialization of new organic semiconductors and dielectrics for use in CMOS-analog printed circuits. The partners intend to develop these materials as well as a printed prototype CMOS circuit within the next three years.

▶ www.basf-fb.de
▶ www.polyera.com

Aker Kvaerner has been selected for the basic and detailed engineering design and for the provision of offshore procurement services for PetroquímicaSuape's new Purified Terephthalic Acid (PTA) plant, to be built at the Port of Suape, Pernambuco, in North East Brazil. Aker Kvaerner has signed an Early Works Contract with PetroquímicaSuape for the development of purchase orders for the long delivery equipment items and technical advisory services. The new plant will produce 640,000 t/y of PTA. The project commences immediately, and start-up of the new plant is scheduled for the end of 2009.

▶ www.akerkvaerner.com

Young Company, Big Plans

The Arkema Group Has Set the Bar High

The Arkema Group was created in October 2004 from the reorganisation of Total's Chemicals branch. Divided into three business segments – vinyl products, industrial chemicals and performance products – the company initially struggled with profitability problems. Arkema's executive vice president for strategy, Bernhard Boyer, said that the company has now "turned a corner" and has ambitious plans for growth through 2010. Brandi Schuster spoke to him about the company's future, its presence on the Parisian stock exchange and its plans for upcoming acquisitions.

Bernhard Boyer
Arkema's executive vice president for strategy

CHEManager Europe: How has Arkema grown since being spun off from Total in 2006?

B. Boyer: Arkema was created in October 2004 and spun off in May 2006. When the management was appointed, the company had low profitability. Today we believe we have turned the corner and we can be proud of our achievements in 2006. We had set a target of an EBITDA growth between 10 and 15% per year between 2005 and 2008. In 2006, we have been able to increase our EBITDA by 20% at €425 million, which is well above our objective. Also our net income, following three years of losses, is positive and amounts to €45 million. We currently have a large number of on going projects relating to the different businesses and geographies to transform our group.

We are building Arkema step-by-step: Since its creation in 2004 Arkema has become a much stronger company, and we want to turn it into a competitive and growing leading chemical company by 2010. We are today confident in the potential of Arkema and its capacity to meet its objectives.

▶ Continues Page 4

MARKET REPORT

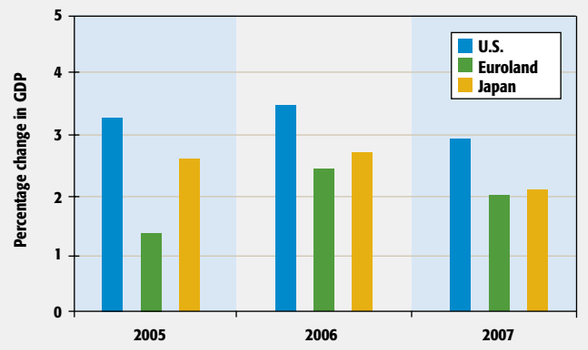
Japanese Pharma Market

Study by PriceWaterhouseCoopers

Japan has the world's second-biggest economy after the U.S., with GDP reaching nearly US-$5 trillion in 2005. Between the 1960s and 1980s, the country's real economic growth was spectacular, but the pace slowed dramatically in the 1990s, as the after-effects of over-investment in the late 1980s and domestic policies intended to extract speculative excesses from the stock and real estate markets began to bite. The global economic downturn at the start of the decade exacerbated Japan's woes, but it now seems to be recovering.

Soaring exports and solid consumer spending saw the economy grow 2.6% in 2005 – its best performance since 2000 and

Japan's economy is growing faster than that of Euroland **Figure 1**



Source: International Monetary Fund, World Economic Outlook Database, September 2006

▶ Continues Page 3

'Disruptive' Behaviour New Dynamic Growth

Dow Corning's Innovative Business Model

After decades in the business, Dow Corning realised a few years ago that they were not effectively serving their customers needs. The company responded by created a web-based business model, Xiameter, a no-frills platform for customers looking for good quality at a good price. Brandi Schuster spoke to Eric Peeters, executive director sealants and adhesives, Core Products Business at Dow Corning about the company's business model and how it has affected business.

Eric Peeters
Executive director sealants and adhesives, Core Products Business at Dow Corning

CHEManager Europe: Mr. Peeters, Dow Corning has incorporated what is described as a "disruptive" business model. What does that mean?

E. Peeters: Several years ago, we conducted a study that looked at segmenting our customers based on their different needs. That showed clearly there was a market segment we were not serving sufficiently – price-seeker customers. So we created a web-based business model, called Xiameter, to offer mature products online at market-driven prices. The business rules we established for Xiameter require large-volume purchases, specific lead times and certain payment terms. Xiameter allows us to offer a new choice for people who know how to use silicone materials but don't need additional technical service and expertise.

What made this business model potentially "disruptive" – a term developed by the firm Innosight which helps companies understand and overcome disruptive innovation challenges – is that it could have competed with Dow Corning's traditional, premium offering. So differentiating the two brands was critical. In addition, it was the first time such a business

▶ Continues Page 15

Start-ups Need Innovation, Not Administration

The "Bayer Chemical Start-up Initiative" launched by Bayer Industry Services (BIS) in 2003 is a comprehensive service for new companies. This BIS initiative is aimed at providing support for new chemical-related businesses looking to move to one of the Bayer Chemical Park sites in Leverkusen, Dormagen or Krefeld-Uerdingen. CHEManager Europe spoke to Dr. Volker Wege, Manager of the Bayer Chemical Start-up Initiative, about promoting innovation and how new companies fare in Germany compared with the rest of the world.

Dr. Volker Wege
Manager of the Bayer Chemical Start-up Initiative

CHEManager Europe: Dr. Wege, when Bayer Industry Services launched its start-up initiative about four years ago, Germany's reputation as an industrial location was not that good. Has the country's reputation improved since then?

V. Wege: The economic barometer is definitely showing an upwards trend for Germany at the moment, but actually, Germany has always been an ideal location for a chemical-related start-up. A critical success factor in the start-up phase is having reliable partners when it comes to technical know-how, finance, marketing and networking. And Germany certainly has large reserves of expert knowledge to call on – which is the most important resource in terms of start-up support – in order to draw up an effective long-term business plan that will ultimately pave the way for a successful market launch.

How does Germany compare with other countries in terms of the opportunities it offers for start-ups?

V. Wege: The conditions are actually excellent in Germany because of the country's innovation-oriented structures, such

▶ Continues Page 10

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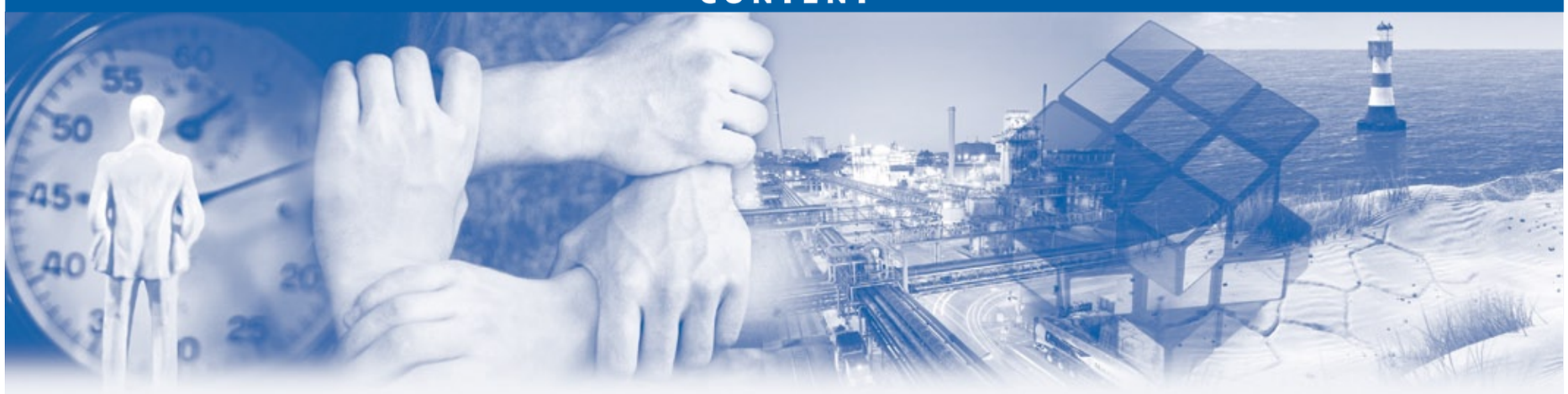

Dow Chemical Fires Two Senior Executives

Dow Chemical said it has fired two executives, including the former finance chief, who it said had held unauthorised discussions to sell the company. A board member, Pedro Reinhard, who retired as chief financial officer in 2005 after 10 years, and Romeo Kreinberg, executive vice president of performance businesses, "were engaged in business activity that was highly inappropriate," Dow Chemical said.


Andrew Liveris
Dow CEO

The company said the board voted to fire the executives after disclosure of the talks. Dow spokeman Chris Huntley said Reinhard will remain on the board until a vote by shareholders on his position.

Kreinberg, who is accused of "conspiring with banks and foreign governments to acquire the company" deined the charges. He told The Associated Press, "The behavior of the company is very unusual, and the accusations have absolutely no substance and are highly damaging to my reputation after 30 years of employment."

"The values of integrity and respect for people are at the very core of our company," said Andrew Liveris, Dow chairman and CEO. "I think I speak for all employees when I say we are greatly saddened by the disrespect shown by our former colleagues."

Despite speculative reports that U.S. buyout firms and Middle Eastern investors were preparing a takeover bid for the company of at least US-$50 billion, the company reiterated that Dow has had no talks to be acquired.

Dow said it had received information about the actions of the executive and the board member from a source, whom it would not identify. "These employees went to great lengths to hide this from us," Huntley said. "We have no idea in terms of what their motivations were."

> ***"We are greatly saddened by the disrespect shown by our former colleagues."***

▶ www.dow.com

Chemtura Announces Restructuring

Chemtura Corporation announced that it is implementing an industry-based business model in order to improve performance and accelerate growth. By focusing on end-use markets, the company said it will be better able to serve current customer needs, anticipate their future requirements and target rapidly growing industry segments. Chemtura will simplify its financial reporting structure from the current six units to four, as shown on the attached organization chart, each led by a group president:


Robert Wood
Chemtura CEO

Polymer Additives, which will include the former Plastic Additives and Flame Retardants business units and will be led by Anne Noonan; Performance Specialties, which will include the former Petroleum Additives, Urethanes, Optical Monomers and Fluorine Specialties and will be led by Bob Wedinger; Consumer Products, led in the interim by Kim Nicholson; and Crop Protection, led in the interim by Greg McDaniel.

> ***"We will present a more coordinated face to customers and have better insight into their current and future needs."***

"We are excited about the impact we expect these changes to have on our growth prospects and long-term competitive position," said Robert Wood, chairman and chief executive officer. "As we evolve from a functional to an industry-focused commercial organisation, we will present a more coordinated face to customers and have better insight into their current and future needs. The marketplace has been very clear in defining what constitutes a preferred, valued-added supplier and our business leaders will be accountable for partnering with customers to meet those demanding standards."

Organisational streamlining is expected to result in a reduction of the company's global workforce by approximately 10% (620 positions), resulting in an annualized cost reduction of approximately US-$50 million beginning in 2008. The company expects to record charges related to the restructuring in the range of US-$25 – 35 million.

▶ www.chemtura.com

Schwarz Pharma, UCB Agree on Compensation

Schwarz Pharma's executive board and the managing directors of UCB have agreed upon the terms and conditions of the domination and profit transfer agreement and signed the contract. UCB said it guarantees the outside shareholders of Schwarz Pharma an adequate guaranteed dividend in the form of a recurring cash payment. The guaranteed dividend shall add up to a gross amount of €3.43 (net amount: €3.18) per no-par value share for each full financial year. In addition, UCP undertakes to acquire upon demand the shares of any outside shareholder in return for a cash compensation of €104.60 per share. The domination and profit transfer agreement require approval by the shareholders' Schwarz Pharma. The Belgian drug maker announced last September that it would pay over €4.4 billion for Schwarz Pharma. UCB currently holds 87.6% of Schwarz Pharma's stock.

▶ www.ucb.com
▶ www.schwarzpharma.com

ABB Wins US-$110 Million in Marine Orders

ABB has signed contracts worth more than US-$110 million to supply Azipod propulsion, power-generation and power-distribution systems for 19 new vessels being built in Europe and Asia. Deliveries for the new vessels range from late 2007 through 2009.

▶ www.abb.com

CORRECTION

CHEManager Europe 3/2007, "A Lanxess Growth Story: Turnaround after Successful Portfolio Adjustment.": The Ion Exchange Reins Business Unit makes up roughly 10% of the overall turnover for the Lanxess' Performance Chemicals business unit, not for the entire company. CHEManager Europe regrets this error.

MARKET REPORT

Japanese Pharma Market

Continued Page 1

a showing that far surpassed the level of growth in Euroland (fig. 1). The 44% rise in the Nikkei Index since January 2005 reflects this improvement in Japan's prospects, and most economists believe it has now turned the corner. The OECD predicts that the economy will grow 2.5% this year, while the International Monetary Fund forecasts an increase of 2.7%. With the appointment of new Prime Minister Shinzo Abe in September 2006, any fears that old-guard politicians and entrenched business interests might impede the country's economic progress have also been put to rest. Abe has already indicated that he intends to continue the fiscal reforms instigated by his predecessor, Junichiro Koizumi.

A Large Pharmaceuticals Market

Despite the economic difficulties of the past decade, Japan remains one of the wealthiest countries in the world, with GDP per capita of US-$30,400. It also has a highly developed healthcare system providing universal coverage, both factors which help to explain why the market for prescription products is second only to that of the U.S. The latest figures from IMS Health show that, in 2005, the Japanese pharmaceuticals market reached US-$60.3 billion and saw its highest year-on-year increase since 1991, with sales rising 6.8%.

Demographic trends will play a large part in boosting future sales. The United Nations Population Division predicts that the population will fall from 128 million to 112.2 million over the next 45 years. The proportion of the populace aged 65 or more will rise from 19.7% to 35.9% over the same period – thanks to an average lifespan of 82 years, the highest in the world.

Consumers have also played a large part in sustaining the over-the-counter (OTC) market, which was worth nearly US-$10 billion in the fiscal year ending March 2006. Although demand for many OTC products has stagnated for the past four years, sales of vitamins, dietary supplements and beauty/healthcare goods targeted at middle-aged women have completely bucked this trend.

The Japanese pharmaceuticals market is expected to grow quite slowly over the next few years. Datamonitor estimates that it expanded at a compound annual growth rate of just 1.8% between 2001 and 2005, and predicts that the rate of growth will slow down still further over the next five years, bringing the market to $70.8 billion by the end of 2010.

The top 10 pharmaceutical companies in Japan Figure 2

Ranking	Company	Japan sales*	Growth %**
	Japanese market	60,289	7
1	Daiichi-Sankyo	4,107	2
2	Takeda	3,892	10
3	Pfizer	3,451	6
4	Astellas	2,768	0
5	Roche	2,697	16
6	Otsuka	2,480	7
7	Novartis	2,294	10
8	Eisai	2,072	8
9	Dainippon Sumitomo	1,725	6
10	Mitsubishi Pharma	1,538	3
	Total top 10	**27,024**	
	Total others	**33,265**	

Note: * 12 months Q4 2005 (US-$bn) ** at fixed rate 12 months Q4 2005
Source: IMS Health

New Regulations For Old

But though the Japanese market may be growing more slowly than many emerging markets, it is also opening up to a much greater extent than before. One major turning point was the revision of the Pharmaceutical Affairs Law in July 2002. The key changes, which came into effect between July 2003 and April 2005, include new regulations covering biologics; the introduction of post-marketing surveillance; and the amendment of the drug marketing and manufacturing approval system to let companies outsource the manufacturing process. This last change is particularly significant, since it means that pharmaceutical companies can market their drugs in Japan without operating their own production facilities.

In April 2004, the system for regulating drugs was also overhauled. The three main regulatory agencies – the Pharmaceuticals and Medical Devices Evaluation Centre, Japanese Association for the Advancement of Medical Equipment and Organisation of Pharmaceutical Safety and Research – were merged to form a single administrative body, which is responsible for all clinical testing consultation, drug reviews and approvals, and postmarketing surveillance.

One of the primary aims of the new Pharmaceutical and Medical Devices Agency (PDMA) is to accelerate the approvals process. In 2003, the average time from submission to approval of a new chemical entity was about 19 months in Japan, compared with an average of about 12 months in the U.S. and Europe. By 2009, the PDMA plans to review 80% of all new drugs within 12 months. It also intends to introduce a fast-track process for reviewing new drugs with significant clinical benefits.

These improvements will make it easier for multinationals to bring their products to market, and maximise the sales they generate before the patents expire. Moreover, the potential backlog of new drugs is huge. According to IMS Health, only 48 of the 168 new chemical entities launched worldwide between 2000 and 2004, and showing December 2004 sales, had been approved in Japan.

Growing Western Pharmaceutical Presence

A growing number of Western pharmaceutical firms have already responded to this more liberal environment by increasing their presence in Japan. Foreign multinationals now account for 34% of the market, and three of them rank amongst the top 10 drug makers in the country, measured by sales (fig. 2). Roche was one of the earliest entrants. In late 2002, it acquired a 51% stake in Japanese pharmaceuticals manufacturer Chugai, which merged with its local subsidiary, Nippon Roche. The move propelled Roche into fourth place in the Japanese market. But Pfizer, Novartis and Merck have also invested heavily; and AstraZeneca, Johnson & Johnson and Eli Lilly Japan are rapidly moving up the league table, on the back of strong sales.

Just how serious the industry leaders are is clear from the size of their sales forces; IMS Health reports that the top five foreign companies had a combined Japanese sales force of 9,030 in early 2004, compared with 6,500 for the top domestic manufacturers.

Opportunities For Generics Producers

The relatively underdeveloped generics market could likewise offer some substantial opportunities for generics manufacturers. According to the MHLW, generics accounted for just 16.4% of the Japanese pharmaceuticals market in 2005, compared with 55% in the UK, 53% in the US and 41% in Germany.

Two factors explain this poor take-up: Many Japanese doctors believe that generics are inferior to branded products; and wholesalers receive rebates that are based on the prices of the drugs they distribute, so they have little incentive to sell cheaper generics. However, drugs currently account for about 20% of the Japanese National Health Insurance scheme's total expenditure, and the government is eager to promote the use of generics.

In July 2005, the MHLW proposed a scheme under which patients could choose generics rather than brand-name drugs, if the prescribing doctor ticked a box on the prescription stating that generic substitution was permissible. This scheme has now been adopted, although most doctors will take some persuading to use it. The MHLW also plans to improve generic supplies by making the manufacturers produce the same range of dosing strengths as those in which the original brands are available, rather than cherry picking the most popular formulations.

The Japanese pharmaceuticals market is expected to grow quite slowly over the next few years.

Several leading foreign generics producers certainly seem to think that the climate will soon become much more favourable. In November 2005, for example, India's Ranbaxy Laboratories increased its stake in Nihon Pharmaceutical Industry, a joint venture with Nippon Chemiphar, and is clearly positioning itself to capitalise on the expansion of the generics space.

Tapping Into the Japanese Market

So how should foreign pharmaceutical firms set about entering Japan or securing a stronger footing there? We believe that, for all the cultural difficulties associated with acquisitions, new market entrants would do better to buy than to build – and, preferably, to focus on niche areas. Over the past few years, there has been a marked trend away from mega-companies covering every line of business; this is especially true of the biopharmaceuticals arena. So, although some opportunities for broad alliances like the joint venture between Roche and Chugai still remain, there are now greater opportunities for deal-making at the more specialised end of the spectrum.

We expect this trend to continue, with a number of companies in the chemicals and food and beverage sectors selling off their pharmaceuticals divisions to concentrate on their core activities and increasing private equity participation in the area. In the short term, this may boost the competition for attractive targets, but in the longer term it should generate further merger and acquisition opportunities as financial investors seek to realise their profits.

Conversely, for companies with healthy pipelines which have already established a presence in Japan the potential for organic growth is now considerable. Most of the multinationals began by out-licensing or co-promoting products – largely because, until 1985, foreign companies could not file new drug applications. Some of the industry leaders have since set up joint ventures or wholly-owned subsidiaries, and the most successful firms have typically been those that focused on marketing novel therapies rather than trying to compete in overcrowded therapeutic areas.

It is also essential for such companies to develop a strategy that integrates their Japanese operations with their remaining activities, and to drive that strategy from the top, since it is the strength of the corporate head office rather than that of the Japanese affiliate which plays the bigger part in determining a foreign company's success. Lastly, while it is important to be attuned to Japanese culture, foreign firms should never try to be more Japanese than the Japanese.

Conclusion

In short, Japan cannot be described as an emerging market in any conventional sense; on the contrary, it is one of the strongest and most highly industrialised countries in the world. But for many Western drug manufacturers, it still represents comparatively new ground. That ground is becoming increasingly attractive, with the removal of the obligation to manufacture locally, the introduction of a faster system for approving new drug applications, the promise of better prices for truly innovative drugs, government interest in promoting generics and an aging, educated population with high healthcare expectations. However, any company that wants to do business in Japan should be aware of the political and legal restrictions and sensitive to different cultural mores.

▶ www.pwc.com

PORTFOLIO

Kemira to Acquire Arkema Business Kemira Water has agreed to acquire Arkema's coagulants business for water treatment. In 2006, the revenue of Arkema's coagulants business for water treatment totaled about €19 million. Arkema's coagulants business for water treatment includes three production units located in France and Spain. By this acquisition Kemira said it would improve its market position for coagulants in France and Spain. This acquisition is subject to information and consultation of Arkema's personnel representatives and to the approval of the relevant antitrust authorities.

▶ www.kemira.com
▶ www.arkema.com

Beckman Coulter to Acquire Biosite Beckman Coulter and Biosite Incorporated have entered into a definitive merger agreement under which Beckman Coulter will acquire all of Biosite's outstanding common stock in a cash tender offer of US-$85 per share, or approximately US-$1.55 billion on a fully diluted share basis. The proposed transaction is expected to immediately accelerate Beckman Coulter's revenue growth, improve operating margins and be accretive to GAAP earnings in 2008 and beyond. The transaction is expected to close in the second quarter of 2007.

▶ www.beckmancoulter.com
▶ www.biosite.com

Glenmark to Acquire Medicamenta Glenmark, a wholly owned Swiss subsidiary of Glenmark Pharmaceuticals, has concluded a deal to acquire a majority shareholding of the company Medicamenta. This would be Glenmark's first commercial foothold in the European market. Under Czech Law, a holding of more than 90% shares in a company will trigger a mandatory takeover bid for the remaining shares. Details of the acquisition were not disclosed.

▶ www.glenmarkpharma.com

3M to Acquire E Wood Holdings 3M and E Wood Holdings PLC announced an offer to acquire the entire issued and to be issued share capital of E Wood Holdings, a North Yorkshire, UK-based manufacturer of high performance protective coatings for oil, gas, water, rail and automotive industries. The board of E Wood has recommended the offer to E Wood shareholders. The offer values E Wood shares at approximately US-$78 million. 3M has offered US-$6.28 per E Wood share. The transaction is expected to close in April, subject to customary closing conditions, regulatory approvals, and obtaining the requisite E Wood shareholder acceptances.

▶ www.3m.com
▶ www.ewoodholdings.com

Roche to Acquire THP Roche has acquired Therapeutic Human Polyclonals (THP) a privately-owned biotechnology company based in California and Germany. The company paid US-$56.5 million in cash to acquire 100% ownership of THP and plans to fully integrate THP into the Roche Pharma Centre of Excellence for Protein Research in Penzberg, Germany.

▶ www.roche.com

Solvay Acquires Quality Plastics Pipelife, Solvay's 50:50 joint venture with Wienerberger, has acquired Ireland's Quality Plastics, a manufacturer of specialty pipes and fittings. Pipelife intends to serve clients with these products and technologies throughout Europe. Quality Plastics operates two factories near Cork in Ireland achieving sales of €42 million with 174 employees in the latest business year.

▶ www.solvay.com
▶ www.wienerberger.de

Akzo Nobel Sells MACC Unit to Balchem Akzo Nobel has agreed to sell its Methylamines and Choline Chloride (MACC) unit to the New York-based Balchem Corporation for an undisclosed sum.The deal completes Akzo Nobel's chemicals divestment program. Balchem Corporation's European subsidiary, Balchem, BV, will acquire MACC, which is located in Marano Ticino, Italy. Under the terms of the deal, MACC's operations in Marano and approximately 80 employees will be transferred to the new owner.

▶ www.akzonobel.com
▶ www.balchem.com

Cerep Agreement with Lilly Renewed for 2007 Cerep has renewed its scientific agreement signed with Eli Lilly and Company for the year 2007. This collaboration agreement was originally signed in 2003. Through this agreement Lilly will continue to utilize Cerep's extensive experience in high throughput compound profiling to enhance the fundamental understanding of the relationships between chemical structure and biological activity. Financial terms are not disclosed.

▶ www.cerep.fr
▶ www.lilly.com

Biesterfeld Petroplas to Distribute Ineos Products Biesterfeld Petroplas, UK, as with immediate effect has been appointed by Ineos as its Distributor for LDPE and LLDPE for the mainland UK market. Biesterfeld Plastic Germany is Ineos Polyolefins' largest European distribution partner. The distributor offers Ineos products in continental European markets including France, Germany, Spain, Portugal, Austria, Switzerland, Italy and Central Eastern Europe. Biesterfeld extended its reach into the UK in March 2006 via a 50:50 JV with the former Petroplas. The objective was to offer products and services to the UK Polymer Industry, which is the fourth biggest polymer market in Europe.

▶ www.biesterfeld.com
▶ www.ineos.com

HPD to Supply for MagMinerals HPD has been selected to provide evaporation and crystallization technology for the Kouilou Potash Project located in the Republic of Congo, 15 kilometers from the Atlantic port city of Pointe-Noire. The project, which will produce 580,000 t of potash per year, is owned by MagMinerals, a wholly owned subsidiary of MagIndustries of Toronto, Canada. The production process will produce potassium chloride from solution-mined carnallite. HPD will provide a brine concentration system to reconstitute the carnallite directly from solution mining operations. The concentrated carnallite will then be processed in a five-stage crystallization system that shall produce the expected capacity of 580,000 t/y potash to the quality specified by MagMinerals.

▶ www.hpdsystems.com
▶ www.magindustries.com

Young Company, Big Plans

The Arkema Group Has Set the Bar High

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Arkema's site in Changshu, China

Arkema was listed on the Parisian stock exchange in May 2006. How has that helped business?

B. Boyer: Our stock market listing has considerably accelerated our transformation. Today, with a new streamlined and decentralized organisation, we are more reactive, flexible and focussed in the way we run our business, we develop the company and we serve our customers.

In addition, as an independent company we can implement our strategy at an accelerated pace in order to improve our performances, develop the best product lines and create value for our shareholders.

How has the stock been performing?

B. Boyer: Nine months after the spin off, the share price has increased by approximately 40%. This excellent performance is largely due to all the progress accomplished since the creation of Arkema. The good set of 2006 figures confirms that the transformation of the company is well on track.

Thierry Le Henaff, Arkemas's CEO, has said the group is considering making targeted acquisitions over the next two to three years to add €500–800 million of sales. What markets would be interesting for Arkema?

B. Boyer: We are thinking of small- to medium-size targeted acquisitions, in particular in the downstream of industrial chemicals, such as acrylics and fluorochemicals, and in high-added value technical polymers or specialty chemicals. The objective is to reinforce the best product lines of Arkema, reduce the cyclicality of its portfolio and move toward less capital-intensive businesses. Given the ongoing disposal of non-core assets and our capacity to generate cash we are confident to achieve this acquisition plan without downgrading the quality of our balance sheet.

The company is made up of three business units: vinyl products, industrial chemicals and performance products. In which area do you see the most potential? Where are investments being made?

B. Boyer: For the vinyl products, our strategy is to reduce the cost base and improve the overall competitiveness. All the investments in that segment are dedicated to the on-going restructuring plan. We are confident in the improvement of EBITDA margins but have no plan to expand our existing capacity.

In industrial chemicals, we are among the global leaders in growing markets for most of our product lines. We definitely want to take advantage of this favourable position to create value through selective growth. We have a number of attractive investment opportunities in this segment to either expand the capacity of our best sites in Europe and in the U.S. or create new capacity in Asia. In both cases we see a good potential even if the approach will remain selective.

In performance products, the key objective is to improve profitability. To this end we are rolling out a strategy based on a combination of innovation, selective growth, restructuring and portfolio management. The progress already accomplished in 2006 shows that we are well on track to transform this business segment and improve its profitability.

Tell us about the reorganisation of activities in Rhône-Alpes and Arkema's ambition to turn it into a competitive European site in fluorochemicals.

B. Boyer: The main issue at Pierre-Bénite was a lack of competitiveness in our fluorochemicals upstream activities. Our objective today is to focus on profitable activities, fluorochemical intermediates and downstream products, for which we have a strong development potential. Investments are planned to improve processes and industrial reliability, to rationalise existing equipments and to optimise energy consumption.

Arkema has announced that it will double its high performance polyamides capacity at its Changshu; the increase is expected to come on stream by September. How important is the Asian market for business?

B. Boyer: Asia is an integral part of our strategy. In addition to the announcements regarding performance polyamides, we started up an organic peroxides production unit in 2005, and we have increased by 50% our production capacity in fluorochemicals at Changshu. We are also in the process of doubling our H_2O_2 plant near Shanghai. In January this year, we announced the signing of a memorandum of understanding with the Indian group ESSAR with the objective to build a world-scale acrylic acid production plant in India.

Asia represents today 13% of Arkema's sales, and 8% of our employees. We will continue to increase our sales significantly in the next few years. We are planning to spend over the next three years around €50 million per year in capital expenditures in Asia.

Where do you see future markets? What are your activities in the Mid-east, for example?

B. Boyer: Obviously in Europe and in the U.S. we are focusing on the most promising product lines and markets to grow our business. Regarding emerging markets we are concentrating our efforts on Asia and in particular China and India. In other emerging economies we will have a selective and opportunistic approach.

Other large plastics producers won't be participating in the K 2007. How relevant is this show for Arkema? What are your expectations? Will you present new innovations?

B. Boyer: We will indeed be exhibiting at the K 2007 trade fair with all our plastics activities – PVC, PMMA, technical polymers, functional additives). K2007 will give us the opportunity to showcase new applications in PMMA, in particular for flat television screens. We will also have new developments in technical polymers, in particular in Rilsan and Pebax product ranges.

What do you consider to be the greatest challenges facing the European chemical industry in the next decade?

B. Boyer: The European chemical industry has always been confronted to many challenges and opportunities. Today, in order to be successful in the long term, the industry will have among other things to adapt to a high pricing environment for energy and raw materials, to take advantage of sustainable development opportunities, to deal with more and more stringent regulations, and to preserve its competitiveness especially in front of emerging low cost producers.

We are convinced that Arkema has the right assets, resources and strategy to face these challenges and we are confident in its capacity to meet the objectives which have recently been set for 2010.

▶ www.arkema.com

Linde Sells Business to Airgas

The Linde Group has signed a definitive agreement to sell its packaged gases business with retail stores in the U.S. to the industrial gases company Airgas Inc. at an enterprise value of US-$310 million. Linde will retain certain packaged gases accounts related to its independent distributors, including acetylene production sites and filling plants.

The business to be divested had sales of US-$346 million and EBITDA of around US-$36 million in the financial year 2006, with a workforce of approximately 1,400. The closing of the transaction is subject to regulatory approval and customary conditions.

▶ www.linde.com

Symrise Alliance with Brain, AnalytiCon

Symrise, a fragrance and flavourings supplier, said it has entered a strategic partnership with biotech specialists Brain and AnalytiCon Discovery. The partnership will allow Symrise to expand its development of new active ingredients for use in cosmetics. Financial details were not disclosed.

▶ www.symrise.com
▶ www.brain-biotech.de
▶ www.ac-discovery.com

Aspectrics, Thermo Fisher Collaborate

Aspectrics has entered into an exclusive agreement with Thermo Fisher Scientific to seamlessly integrate Thermo Scientific GRAMS spectroscopy software with Aspectrics' Encoded Photometric Near Infrared (EP-NIR) process analyzers. According to the company, Aspectrics' EP-NIR analyzers offer a more efficient alternative to traditional NIR systems, with a spectral range extending further than the common 2,100nm and achieving a range of 1,375–2,750 nm.

▶ www.aspectrics.com
▶ www.thermo.com

EnBioTec, Peakdale Enter Agreement

Peakdale Molecular (UK) has entered into an agreement with EnBioTec Laboratories (Japan) to co-develop nuclear receptor based lead compounds for drug discovery. EnBioTec Laboratories has developed the Receptor Cofactor Assay System (RCAS) to investigate the interactions between nuclear hormone receptors, co-factors, and ligands. The system is cell-free, highly sensitive and is able to distinguish between agonist and antagonist compounds. Peakdale Molecular will provide a targeted set of compounds for RCAS and functional assay testing and will work with EnBioTec to custom synthesize novel compounds based on the subsequent test results.

▶ www.peakdale.co.uk
▶ www.enbiotec.co.jp/en

Givaudan, ChemCom JV for Research

Givaudan has entered into a joint venture agreement with Chemcom, a company in the field of olfactory receptor technology. The new company, named TecnoScent, will build on ChemCom's proprietary receptor technology and focus on the discovery and development of innovative fragrance ingredients. This partnership shall strengthen Givaudan's sensory innovation and technology platform by creating a unique center of expertise combining biotechnology and leading fragrance expertise and experience.

▶ www.givaudan.com
▶ www.chemcon.be

Parker Hannifin Acquires Rectus

Parker Hannifin, producer of motion and control technologies, has acquired Rectus, manufacturer of quick disconnect couplings and related products for pneumatic, hydraulic, medical and chemical processing applications. The company employs approximately 380 people worldwide including its headquarters in Nussdorf, Germany, its Nycoil operation in Randleman, NC (U.S.), its TEMA operation in Skovde, Sweden and several international sales offices. Rectus' revenues were approximately US-$115 million in 2006. Earnings are expected to be accretive to Parker in the first full year. Terms of the deal were not disclosed.

▶ www.parker.com
▶ www.rectus.com

chemanager@gitverlag.com

Teammates as Well as Targets

A Case for Rethinking Pharmaceutical eStrategy

In developed healthcare markets such as the U.S., western EU and Japan, it may soon become easier to find a primary care doctor who does not own a stethoscope than to find one who does not have access to the internet. While slower to develop online strategies than many other industries, pharmaceutical companies ultimately recognised the potential of the internet to reach prescribers and patients. Many major pharmaceutical manufacturers created dedicated eBusiness teams and nearly all invested heavily in exploring the potential of Web-enabled sales practices such as eDetailing and eSampling.

However, as highlighted in a recent report from independent market analyst Datamonitor (DTM.L), reaching target audiences online has proved to be more problematic than planned and few companies achieved the expected return on their initial investments. Despite this, a strong case can be made for moving forward with a pharmaceutical eStrategy, particularly in the U.S., said Datamonitor senior analyst Kimberly O'Malley, provided that the pharmaceutical industry is willing to rethink its approach.

Millions of Internet Users Can't Be Wrong

If designing an effective marketing strategy is indeed a numbers game, then the 211 million internet-users in the U.S. should translate into sure success. However, the nature of the internet – as a pull rather than a push medium – has proven to be a significant barrier for the pharmaceutical industry. With internet penetration rates among the general population ranging from 60–70% in the U.S., the UK and Japan, the internet has created a consumer who demands not only more sophisticated information, but also a bigger role in how that information is applied to their lives. While physicians are still the ones making the final decision about whether to prescribe a specific drug, Datamonitor finds that physicians now report that patient requests for specific medications at the point-of-care are as influential as office visits from pharmaceutical sales representatives.

The patient-physician relationship is rapidly evolving, with dramatic changes due to increased internet-access becoming increasingly evident in the last few years. Online information has permanently altered the patient-physician relationship by enabling patients to become better informed about their healthcare options.

As a result, the knowledge gap between healthcare professionals and patients has decreased. Empowered with greater access to information and education, patients have begun to play a more significant role in the healthcare decision-making process. While initial predictions warned that patient empowerment would ultimately undermine the medical establishment, it appears that the opposite is true, O'Malley said. "The level and quality of interactions between patient and physician has improved which has, in turn, both enhanced patient satisfaction and had a positive effect on clinical outcomes."

A key point to remember in the face of several years of disappointing returns on investments (ROIs) is the fact that the internet is actually highly influential. To be successful brand teams must keep in mind that not only are web users highly goal-driven, but the goal they have is rarely the same as the company that wants to reach them. You can have a highly effective drug and the right patient clicking the mouse, but if the message you deliver fails to answer his or her specific information needs you have little chance of being heard. "On the other hand", O'Malley said, "if the information provided by a company does meet a specific need, it is growing increasingly likely that consumers will take that information to the physician during an office visit, which may impact the physician's prescribing decision."

Failure To Focus

If consumers are looking for information pertaining to their health online and pharmaceutical companies are investing in providing online disease- and drug-focused content, then why have pharmaceutical eStrategies not been more effective? Generally speaking, there is a failure to truly focus on the needs of the end user, O'Malley says. "High-quality online content that is targeted towards groups of physicians or consumers is being developed. However, the true advantage of the internet over other channels of communication is that brand teams can move beyond reaching groups of individuals to build a relationship with the individuals themselves through tailored information and services online."

At the core of every unsuccessful online campaign is a failure to meet the needs of the end-user, she says. "The central goal has to be to make it easier for individuals to either gather information or make a decision. Although it is hard to believe, it has only been very recently that brand teams have begun to really consider the needs of the individual in front of the computer screen."

We see a very similar pattern in the healthcare technology industry as well, O'Malley says. "Take electronic health records systems, for example. Most healthcare professionals would agree that electronic records are needed in order to improve patient safety and modernize the delivery of healthcare; yet adoption rates remain surprisingly low. The problem is that software vendors aim for what is possible instead of what is feasible given the way doctors and nurses work."

Towards this end, pharmaceutical companies need to work more closely with healthcare professionals to develop online content and services that make sense not only for prescribers, but also for the patients they are caring for. In fact, there is a significant opportunity for pharmaceutical companies to build brand loyalty by investing in disease management and compliance programs. Physicians are very interested in expanding their use of disease management programs, O'Malley says, however few have the time or the resources necessary to design or support their own programs on an ongoing basis. "The industry should work closely with physicians to design programs that focus on enhancing patient compliance, which everyone benefits from. There is a lot to be gained by treating physicians as teammates in patient care instead of solely as sales targets."

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DuPont, Honeywell Enter JV

DuPont and Honeywell announced a global joint development agreement to accelerate the development and commercialization of next generation, low global warming refrigerants for the automotive air conditioning industry. The new refrigerants would enable automakers to meet new regulations in Europe that require the use of low global warming potential (GWP) refrigerants in mobile air conditioning (AC) applications. Today's automotive air conditioners use hydrofluorocarbon (HFC)-134a. The new regulation is scheduled to take effect in 2011 for new model automobiles, with the transition complete by 2017.

Under the agreement, DuPont and Honeywell will jointly identify, develop, test and qualify new low GWP refrigerants that are cost-effective alternatives to other technologies being considered by the auto industry. Automakers are currently evaluating mobile AC systems that use such technologies. Ideally, automakers are seeking a commercially viable fluorinated gas solution that is compatible with conventional HFC-134a mobile air conditioning system technology and offers a more cost-effective industry transition versus CO_2 technology.

▶ www.dupont.com
▶ www.honeywell.com

Dow, Chevron Phillips Chemical Form Styrenics JV

The Dow Chemical Company and Chevron Phillips Chemical Company LP have signed a non-binding Memorandum of Understanding relating to the formation of a joint venture involving assets from their polystyrene and styrene monomer businesses in the Americas. The new venture is subject to customary regulatory review, due diligence, completion of definitive agreements, and corporate and other approvals. Upon the necessary approvals, the parties would expect the transaction to close in the second half of 2007.

The 50:50 joint venture is expected to establish the competitive model for an integrated producer of polystyrene in the Americas. Subject to due diligence, the parties intend to contribute the following assets to the venture. Dow intends to contribute: a styrene monomer plant (Camacari, Brazil) and six polystyrene plants (Gales Ferry, Connecticut; Ironton, Ohio; Joliet, Illinois; Torrance, California; Cartagena, Colombia; and Guaruja, Brazil). Chevron Phillips Chemical intends to contribute a styrene monomer plant (St. James, Louisiana) and a polystyrene plant (Marietta, Ohio).

▶ www.dow.com
▶ www.cpchem.com

EU Introduces Import Tariffs

The EU has imposed tariffs of as high as 67.4% on imports from the U.S., China and Taiwan of a chemical used for treating water and metals, seeking to protect German manufacturers, including Degussa. The EU has accused U.S., Chinese and Taiwanese peroxosulfate exporters – including FMC and DuPont – of price dumping. The duties, which amount to 39% against FMC and 10.6% against DuPont, are for six months and may be prolonged for five years. According to the European Commission, EU peroxosulfate producers that also include RheinPerChemie suffered "material injury" as a result of a "substantial increase" in imports at „very low and dumped prices" from the U.S., China and Taiwan. The levies, which are 22.6% against Taiwan and as much as 67.4% against China, are in effect.

According to a report from Bloomberg, the EU is seeking to stem imports from around the world of commodities including chemicals to shield higher-cost producers in Europe. The bloc uses anti-dumping duties to try to prevent imports from undercutting European manufacturers.

Bloomberg also reported that China, Taiwan and the U.S. increased their combined share of the EU peroxosulfate market to 30.2% in the 12 months through last June from 22.6% in 2003. China expanded its hold on the European market to 14.9% from 8.3%, Taiwan increased its share to 5.9% from 5.3% and the U.S. raised its share to 9.3% from 9% percent over that period, the commission said. The six-month anti-dumping duties follow a dumping complaint last May by Cefic and an investigation begun last July by the commission. Under EU rules, the commission can introduce provisional anti-dumping duties for six months.

– compiled from wire reports

▶ www.europa.eu

Bayer Schering Buys Novartis Plant

Bayer Schering Pharma said it bought a U.S. biologics plant from Novartis. The plant is currently used to make multiple sclerosis drug Betaseron; the deal is worth around €110 million. Under the deal, Bayer Schering will stop paying Novartis current royalties on Betaseron (interferon beta-1b) from October 2008. Bayer Schering also said it will allow Novartis to develop its own brand of interferon beta-1b. Once the new brand is approved by regulators, Bayer Schering will manufacture it for Novartis beginning in 2009, receiving in return double-digit royalty payments from Novartis.

▶ www.bayer.com
▶ www.novartis.com

What Am I Bid?

Intellectual Property to be Auctioned Off in May

What will take place on 15 May in Munich, Germany, is something relatively new to Europe: an auction for patents, licences and trademarks. Over the past years, intellectual property (IP) ownership rights have become more and more important for global business. The IP Bewertungs AG – a European IP service provider – recognised this trend and founded IP Auctions (IPA). IPA will be conducting the auction in May with the goal of commercialising first-class IP rights through auctions The auction will feature patents from many fields, including mechanical engineering, process automation, IT, chemical engineering and life science. Brandi Schuster spoke to Dr. Manfred Petri, IPA's general agent, about the auction and what can be expected from this event.

Dr. Manfred Petri
IPA's general agent

CHEManager Europe: Dr. Petri, were there any legal issues that had to be sorted out to see if this kind of auction is legal in Europe?

M. Petri: Legal issues were not a problem at all. The American auctions so far have been dealing with U.S. patents to U.S. customers. In Europe, there is traditionally a certain reserve against auctioning patents, which is why we decided to sell patents of European origin to an international audience. This makes a big difference, and it takes some time to build up a customer base internationally for IP rights. This is also one of the major reasons why we did not start at the same time to promote and carry out this idea as in the U.S.

How long has the planning phase been for this auction?

M. Petri: The planning phase was rather short – about six months. It is very important to create an international basis for these kinds of patents which mainly address those who are manufacturing and those who are providing services. This is the main target – the main range of customers we want to have.

What countries will be participating in the auction?

M. Petri: We've done some research and marketing in countries like India, China and Southeast Asia. We have seen a huge amount of interest especially in China, and we certainly expect some companies from China to participate in the auction.

Is there an overview of what countries are selling patents? Can you say that there is a definite group from one country or is it pretty much spread over Europe?

M. Petri: Here we have to make a differentiation. Individual inventors are coming from the U.S. and Europe. Research institutes are coming from Germany only, and then we have the international companies like Rolls Royce, like Bayer Patent GmbH. It's difficult to say that something is merely German when the inventors are multinational. It is international as far as the submitters or as far as the sellers are concerned. And we are putting a lot of effort now in getting the bidders side.

What are you doing to get bidders? What are you doing to generate interest in this auction?

M. Petri: We have two ways of doing that. The first is an intensive press work. The other thing is we go there directly. It's about creating the atmosphere by press releases, creating the attention and then going to individual companies and addressing them really one by one – which is tough work, sure, but selling stuff is tough work.

How has the response been?

M. Petri: It differs. People in India are interested, but this is a brand-new concept for them. The Chinese are very interested because they are facing several problems: The time when they were forging things is apparently over – or at least the peak of this time is over. Those companies in China who have agreements with international companies know that without patents and without new ideas, they cannot survive the next 10 years. There are other nations, like Vietnam and Cambodia, who are manufacturing much cheaper than they are. What surprised me most is that among the top three priorities of this interest was green technology or environmental technology.

What was surprising? Just the Chinese interest in green technology or in general?

M. Petri: In general in green technology but the main interest came from China. The first thing they asked for was mechanical engineering, the second was medical science and the third priority was green technology. And this reflects the kinds of patents that are going to be auctioned.

What kinds of patents are going to be auctioned off?

M. Petri: We have 79 lots containing about 395 patents. The strongest group is mechanical engineering. Then we have automotive, we have medical science and we have material science. This is different from what I remember from American auctions where in the past they focussed on consumer electronics, microelectronics, IT. The difference most likely comes from the fact that Europe is traditionally is focussed on these technologies

It's a little difficult to picture an auction for non-physical items. How can we picture what this auction is going to look like?

M. Petri: Of course we will not have any Renoirs or Chagalls hanging around or antique tables from 17th century Spain; however we will have a kind of bill board where the lot description is reflected and otherwise it will be exactly like a Christies' or Sotheby's auction.

The Chicago-based patent consulting firm Ocean Tomo held an IP auction last year in the U.S. that wasn't as successful as they had hoped; many of the sellers got less money for their patents than they expected. What are your expectations for this auction in May?

M. Petri: I wouldn't say that people were disappointed with Ocean Tomo's auction. It's always very tough to introduce a new idea into the market, and one should give this idea time to let it grow. And what's a disappointment? The first auction brought in about US-$3 million plus the results in the post auction time, which ended up at US-$9 million altogether. I think it is going too fast to say that this is good or bad or disappointing.

Ocean Tomo complained that a lot of the sellers had unrealistic price wishes for their lots. What measures are you taking to prevent sellers from being unrealistic with their starting prices?

M. Petri: We have introduced a limit-related fee as 3% of the requested limit of the seller. This should force the seller to think about the height of the limit. If the seller insists that the limit is absolutely realistic and the patent is indeed auctioned, they will then get this fee back. This worked out well. We had a couple of sellers who had skyrocketing ideas and when they heard they had to pay 3% in advance, they came down and down and finally dropped out. It worked perfectly. We wanted to make it very clear that this is not a platform for somebody to test the market.

How much money can somebody get for a patent?

M. Petri: As much as the market is willing to pay.

I can't even imagine where that would begin. Can you give me a ball park figure?

M. Petri: I could give you a couple of examples of how the pricing, especially the first calling price, is calculated. If the seller sets a reserve price, then the first calling price is more or less defined by the reserve price. If the seller does not have any idea what his patent is worth, it starts at a minimum of €25,000. And in between there is everything possible. The sky's the limit.

There is also opportunity for interested parties to do due diligence, that they can look at the option documents beforehand in order to inform themselves. Do you think that this is enough for a layperson to estimate the validity and the application range of a patent?

M. Petri: I would not say that a layperson is the normal or the average bidder. Especially in the IT area there are very specialised people who are interested in these patents. They are experts and these experts have certain questions because they have dug in so deep into the matter. The online due diligence is designed to give them sufficient time to ask the inventor or to ask the owner of the patent his specific questions online; therefore, we have a dialogue on legal and technical matters. This is the difference between eBay and us.

What are the advantages of auctioning off these patents like you will be doing in May as opposed to trading them over the internet?

M. Petri: A live auction has the advantage that on 15 May at 4:30 in the afternoon you know exactly: I do have the patent or I do not have it. On the internet, it is very difficult because there isn't a fixed period of time. The timeframe is much larger than a live bid, and there is no chance for due diligence. This quite a difference. We can provide a fixed period of time with ample time for due diligence, and so we reduce the transaction costs by keeping up transparency at the same time.

Is there a difference between patents which are being auctioned that were issued by the European Patent Office and those that were issued by the German Patent Office?

M. Petri: There might be a difference as far as the validity is concerned, i.e. the area where the patent is protected. The European Patent Office is allowed to give protection in all European member countries whereas the German Patent Office is only allowed to give protection in Germany.

And there are patents of both kinds being auctioned, i.e. European Patent Office patents and German patents?

M. Petri: Yes we have a few patents that only have protection in Germany. The majority is at least protected in European member states of the EPO and again a large number is also protected in nations like Japan or the U.S.

▶ www.ip-auction.eu

chemanager@gitverlag.com

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Production
Mineral fibre insulation goes green
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Reach
Deep innovation in a post-Reach world
Page 11

Air Products to Build Hydrogen Facility

Hydrogen provider Air Products will build a hydrogen production facility in Garyville, La. (U.S.). to help support the planned expansion of a local refinery. The company said the new facility will expand the capacity of its Louisiana pipeline and will supply the Garyville crude oil refinery of Marathon Petroleum Company, a subsidiary of Marathon Oil Corp. Air Products expects the facility to come online in late 2009 in conjunction with Marathon's refinery expansion project. Marathon plans to increase its refining capacity at its facility to 425,000 barrels per day from 245,000 barrels per day, Air Products said.

▶ www.airproducts.com

Dow Chemical to Build Epoxy Facilities in Shanghai

Dow Chemical said it will build two epoxy plants in Shanghai. The company will build a 150,000 t/y glycerine-to-epichlorohydrin plant (GTE) and a 100,000 t/y liquid epoxy resins plant at the Shanghai Chemical Industry Park. Both are due to start operations in 2009-10. The GTE facility will use patented technology to convert bio-diesel derived glycerine into epichlorohydrin. Epoxy products are used in a wide range of applications, including coatings for marine, automotive and packaging products as well as in electrical laminates, adhesives and civil engineering. Dow did not disclose the investment involved for the projects. The company announced plans in August to invest more than US-$200 million in China's epoxy market over the next five years (CHEManager Europe 6/2006).

▶ www.dow.com

Shell Launches Project In Singapore

Shell Eastern Petroleum has taken a final investment decision to proceed with the construction of a new butadiene extraction unit on Pulau Bukom (or Bukom Island), Singapore. The project will have an initial capacity of 155 kt/y and is part of the world-scale Shell Eastern Petrochemicals Complex (SEPC), targeted for start-up in 2009-2010. According to the company, the project will now enter the implementation phase.

▶ www.shell.com

Sasol to Build Second MIBK Plant in South Africa

Sasol announced that it is to proceed with construction of a second methyl isobutyl ketone (MIBK) production plant in Sasolburg, South Africa. MIBK is manufactured from acetone and hydrogen and is used as a solvent in surface coating, adhesives and pharmaceuticals. The new plant will double MIBK output to almost 60,000 t/y, which the company said will make it the second largest producer in the world. The plant is expected to come on stream in the first half of 2009.

▶ www.sasol.com

Solvay, BASF to Built PVDC Latex Production Unit

SolVin, a joint venture between Solvay and BASF, is planning to build a second production unit of Polyvinylidene chloride (PVDC) latex in response to growing global demand. PVDC latex is a specialty barrier material used as coating in packaging applications where the integrity of the goods is critical - essentially in the food and pharmaceutical sectors. SolVin currently serves PVDC latex clients out of its production unit in Tavaux (France) and is now considering the creation of a new unit with an annual production capacity of 10,000 t, to be located possibly in Asia – for instance in Map Tha Put, Thailand. The company is expecting to make a decision by the third quarter of 2007 and to start construction work subsequently.

▶ www.solvay.com
▶ www.basf.com

Boehringer Ingelheim to Expand Capacity

Boehringer Ingelheim microParts has begun building an additional production building at the site in Dortmund, Germany. The new building – a state-of-the-art factory for the worldwide inhaler production – is set to cost a total of €70 million. With this investment, Boehringer Ingelheim said will further expand the production capacity of Boehringer Ingelheim microParts. The new, four-storey production building will be built on the company's premises in Dortmund's science park. The facility will have 12,000 m² of floor space, 4,000 m² of which will be clean-room areas. A high stacker warehouse is to be built alongside the new production building to deal with the increased material flows. The building is scheduled for completion mid-2008 and for commissioning mid-2009.

▶ www.boehringer-ingelheim.de

Dispersing Nanosized Particles

Characterisation of Different Machines

In many cases, nanoscaled particles are produced through pyrolysis as dry powder or in precipitation processes with drying afterwards. Main target of producing nanosized particles are properties which are determined particularly by the high surface to volume ratio for example attractive forces, their transparency or their size itself. In most cases nanosized particles are produced not as single primary particles but rather as particle collectives (e.g. agglomerates or aggregates), consisting of several primary particles.

The particle collectives can be distinguished in aggregates, agglomerates and flocculates. Aggregates are conjoined plane bedded and normally coalesced primary particles are linked by solid bonding. The aggregate's surface is less than the sum of all primary particles surfaces. Agglomerates are composed of primary particles or aggregates, which are attached at corners and edges and are held mainly together through nonpolar, polar or electrostatic interactions, especially by Van der Waal's forces. The agglomerates' surface is little smaller than the sum of all primary particle surfaces. A flocculate is an agglomerate, which accumulates in suspension and can be separated by a low shear force. The strength of particle collectives depends on the elementary structure and the size. The strength of particle collectives increases with decreasing particle size, since with decreasing particle size the bonding force between the particles collectives decreases less than inertia and other forces. The higher the strength of the particle collectives, the higher the required stress intensity to disperse the agglomerates, aggregates or flocculates is.

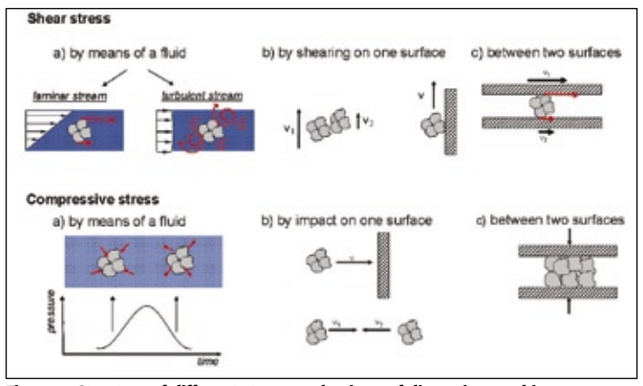

Figure 1: Structure of different stress mechanisms of dispersing machines

Stress Mechanisms

The required stress intensity in fluids can be transferred through different machines and, thus, different stress mechanisms. A classification of these different stress mechanisms, which are often used in combined form, is possible on the basis of different criteria. Figure 1 shows different stress mechanisms on basis of direction of force or energy initiation, like shear or compressive stress, and the type of force transmission, for example stress by fluid, on one or between two surfaces. These different stress mechanisms occur with varying frequency and intensity in different dispersing machines. Different machines show a different dispersing behaviour.

The intention of this study is to characterise the dispersing process comparing the different dispersing machines: kneader (HKD-T 0,6; IKA), 3-roller mill (Exakt 80 SE; Exakt), lab dissolver (Dispermat CA C60; VMA-Getzmann GmbH) and stirred media mill (PM 1; Drais). The dispersive effect of each machine was determined on the base of dispersing an aqueous nanoparticulate aluminium oxide For each machine the changes in median particle size as function of specific energy input was analysed. The specific energy is defined as the quotient of total net energy input into the process volume and the stressed solid mass of the product. The division the power input of the machines by the specific energy results in the production rate or mass flow rate of the machine. Moreover, operating parameters and the mass concentration was varied in order to characterise the dispersing process regarding the stress intensity and frequency.

Dispersing of Nanostructured Aluminium Oxide

It can be noticed that machines in which high shear rates are realised have a high specific energy requirement. Especially the dissolver needs much more specific energy and produces a lower product fineness than the other machines. The reason for the high specific energy requirement is the high percentage of energy dissipated into heat through friction inside the fluid. Moreover, the stress intensity in the dissolver is comparatively low. Therefore, the produced product fineness per load and the energy efficiency are relatively low. In contrast to the dissolver, in the size range above 100 nm the dispersing process in a kneader and a 3-roller mill are very efficient regarding specific energy requirement if the suspension viscosity is high enough. In the size range below 100 nm, stirred media mills can reduce the particle size very efficiently because within the mills the stress intensity clearly increases with decreasing particle size whereas in the other three machines the stress intensity is independent of particle size or even decreases with decreasing particle size. Therefore, for stressing in a fluid a dispersing limit exists since the strength of the particle aggregates or agglomerates increases with decreasing size.

In order to quantify the influence of the stress intensity on the median particle size, the value of the shear stress acting on agglomerates or aggregates has to be estimated for each dispersing machine. In case of dispersing with a dissolver the shear stress acting on the agglomerates is estimated adopting the Kolmogorov theory of turbulence. For dispersing with a kneader and a 3-roller mill and assuming that laminar state flow prevails in the gap between the dispersing tools, the shear stress acting on the agglomerates can be estimated by adopting the model of Rumpf and Raasch. Figure 2 illustrates the progression of the maximum reached particle size as function of the shear stress for the dissolver, the kneader and the 3-roller mill. The higher the shear stress and, thus, the higher the stress intensities, the higher the maximum reachable product fineness is. The shear stresses generated in the dissolver are relatively low compared to the kneader and 3-roller mill as postulated before. The decrease of the maximum particle size by an increase of the shear stress in the 3-roller mill by varying the gap width and the peripheral velocity is significantly lower than the decrease of the final particle size in the other machines. The reason for this effect is the raise of the wall gliding between the roles and the suspension by increasing the shear rate in the gap of the 3-roller mill. Therefore, the theoretical shear rate is much higher than the effective shear rate in the gap.

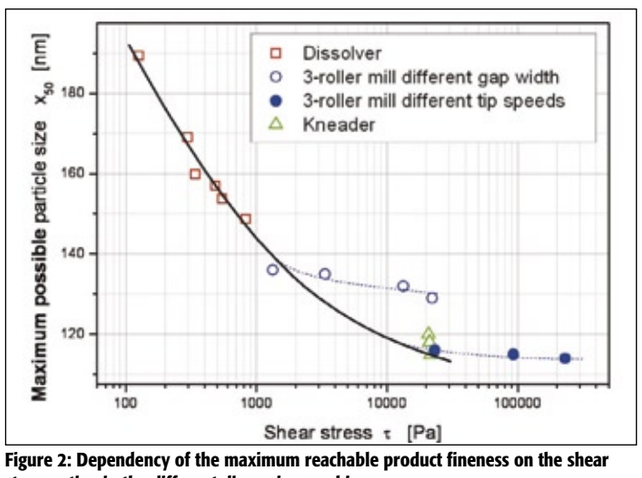

Figure 2: Dependency of the maximum reachable product fineness on the shear stress acting in the different dispersing machines

Conclusion

The efficiency of the dispersing process strongly depends on the stress intensity acting on the particles. The estimation of the shear stress acting on the surface of the agglomerates shows an increase of the end product fineness by increasing the stress intensity. In the range below 100 nm, very high shear stresses are necessary to break up the agglomerates. In this range, stirred media mills are capable of reducing the particle size to below 100 nm. The dispersing process in kneaders and 3-roller mills for particle size range above 100 nm and high viscosities is very efficient regarding specific energy requirement.

References are available on request from the author.

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Eco-efficiency Analysis of Colorant Systems

More Sustainability by Using Modern Management Tools

Currently, ecological considerations are high on the agenda of most key decision makers. An eco-efficiency analysis is seen as a life-cycle management tool and involves assessment of the entire product life-cycle – from concept development, to design and implementation, further to marketing, and finally, end-of-life issues. The analysis may incorporate both economic and environmental aspects and lead to a comprehensive evaluation of products and processes over their entire life-cycle.

For the calculation and comparison of the environmental position of each alternative, data from the different production methods are assimilated and analysed to provide a value for energy consumption, raw-material consumption, emissions, use of area, risk potential and toxicity potential. All materials required in the process – and how these are derived – are factored into the study, as are the steps required to bring the product to the end-user.

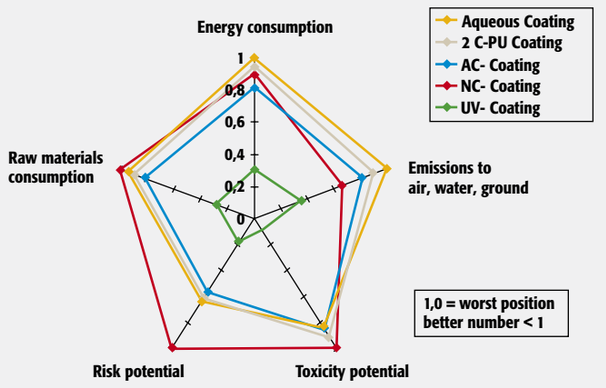
In the same manner, economical data from the life-cycle chain of a product application or process evaluation may also be calculated and summarised. At the end, this analysis can lead to better decisions with regard to product design, material utilisation and capital investment. The rationale behind this assessment tool has been described by Saling et al. (2002) and by Landsiedel and Saling (2002).

The aim of a life cycle assessment is to portray the environmental pollution that products generate on their "lifetime" from production and use to disposal and thus analyse the associated effects of such environmental influences. This creates an assessment basis for all products. The precise procedure for drawing up LCA sheets is described in the standards of ISO 14040. The entire product lifetime and the ecological impacts of all the stages of that lifetime must be considered as comprehensively as possible. "Cut-off" criteria must be defined and verified.

BASF's eco-efficiency analysis looks at the entire lifecycle of a product, "from the cradle to the grave," starting from the extraction of raw materials to using the product and ending with recycling or disposal after use. Such an analysis allows both economic and environmental aspects to be considered when developing and optimising products and processes and makes it possible to determine the most eco-efficient of the various alternatives. The aim is to offer the best possible cost-effective products with good environmental performance.

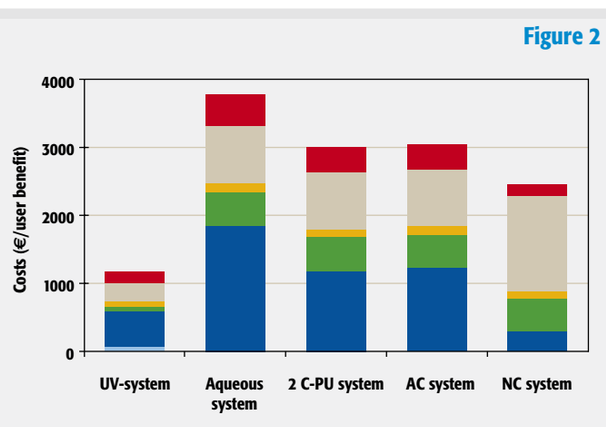
In order to be able to illustrate eco-efficiency, BASF has developed the eco-efficiency portfolio shown (fig. 3). The values calculated from the ecology fingerprint are multiplied by weighting factors that are related to the relative importance of economic versus environmental effects in a particular study. The higher up on the portfolio an alternative lays, the lower the environmental impacts. The further to the right, the lower are the costs. The position of an alternative relative to the diagonal line in the portfolio is a measure of eco-efficiency. Thus, alternatives having different economic and environmental scores can be identical in eco-efficiency provided that their distance from the diagonal is the same.

Figure 1



Environmental fingerprint for alternative curing systems.

Figure 2



Life cycle cost calculation of alternative curing systems.

Case Studies

Coating of 1,000 wooden doors with a semi gloss, transparent texture

The coating of 1,000 wooden door fronts with different coating technologies was investigated. It should also be noted that the technical performance and the lifetime of the doors have no difference and was therefore not considered in study. The UV system in the focus of the analysis was a UV formulation based on low viscous polyether acrylates. Alternatives to the UV-technology in the following eco-efficiency analysis are aqueous varnish, 2C-PU varnish, acid curing varnish and nitro cellulose varnish.

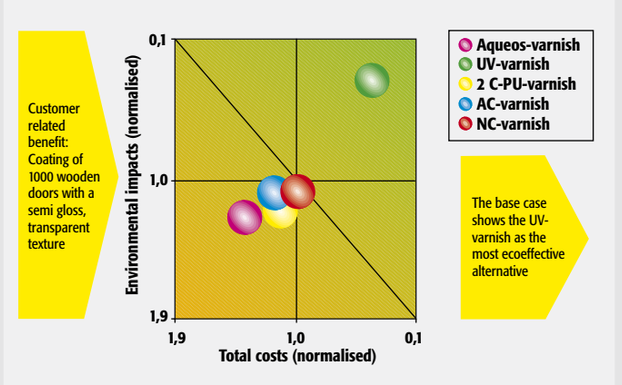
The environmental fingerprint (fig. 1) shows that the UV-roller coating has the best results in all environmentally categories. The low film weight and the absence of a need for thermal drying results in high productivity and the lowest production costs (fig. 2).

This overall result is shown in the eco-efficiency portfolio in figure 3. The alternative with the highest eco-efficiency is in this case the UV-curing alternative. It might be different in other applications, so a case-by-case decision is necessary. Many scenarios are evaluated in such studies and will guide to an effective process development. To give an example: Even if the energy consumption rate is doubled, the UV system is still the most eco-efficient alternative.

UV-Primer for automotive application

Here, application and curing of primer on 1 m² of automobile surface area is considered. The study encompasses production, application and curing of the coatings, cleaning of application equipment between applications, and fuel consumption of the automobile over its lifetime, resulting from the weight of coating on the vehicle.

Figure 3



Eco-efficiency portfolio for alternative curing systems.

The eco-efficiency analysis showed that the new primer cures 10 times faster than conventional thermally cured products. Since UV-curing is light-activated and does not rely on heat, it eliminates the need for bake ovens. As a result the energy consumption in a body shop is reduced by approximately 80 % Furthermore it is less cost-intensive, which results in the highest eco-efficiency for this product.

Printing processes

Another eco-efficiency analysis compared various printing processes. The basis of the analysis was the printing of 1,000 m² of folding boxboard. The result shows that UV offset printing inks, conventional petroleum-based offset printing inks and UV flexographic inks represent eco-efficient alternatives for folding box printing. They feature a good environmental profile and an excellent cost structure. Water-based flexographic printing inks, on the other hand, exhibit the least eco-efficiency. The significantly lower emissions, particularly in terms of air emissions, are the key to the favourable environmental rating of UV and petroleum-based offset printing inks and UV flexographic printing inks. In this case, the VOC emissions of the water-based ink feature particularly highly. There are also considerable differences in terms of toxicity potential, with the former systems earning particular plus points in the eco-toxicity stakes. The less favourable status of the water-based inks is due to the use of oil in the printing process. With the exception of the space requirement, water-based inks occupy the least favourable position in all of the environmental categories compared to the alternative systems in the comparison.

Summary

The Eco-Efficiency studies presented in this publication were initiated by BASF in order to obtain information on the sustainability of various coating and printing systems. Sustainable development is one of the strategic building blocks, which pays particular attention. The eco-efficiency analysis is an important tool for bringing together a wealth of data, evaluating it and implementing it in market strategies as well as in research and development activities. Over 300 studies in different industrial areas have been performed.

A list of references can be requested from the author.

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Shear-free Dispersion Process

Eliminating Agglomerates From Batches

For as long as man has attempted to mix solids with liquids, he has struggled to avoid an annoying, if not wholly unacceptable, by product – lumps, or more scientifically, agglomerates. In the case of a single serving of a food product, as in your morning coffee when you add powdered creamer, these agglomerates may be merely objectionable. In the case of a large batch of high-value product, such as pharmaceuticals or fumed silica slurries, agglomerates can render the product useless, or greatly increase production time by creating the need for a grinding or pulverization process.

Starting with the fundamental idea of wetting finely dispersed powder in a large liquid surface, the inline disperser Ψ-Mix was developed by Netzsch-Feinmahltechnik. Effective wetting of solid particles by high-quality dispersion improves quality and enables unmatched operation of the machine at high production rates. The Ψ-Mix combines a new dispersion method with an emission- and dust-free inline process. The solid components are dispersed on a large liquid surface created by the pre-loaded liquid in the batch tank. Since the new machine is capable of processing both low- and high-viscosity suspensions, the entire application range of dispersion technology is covered. Applications for temperature-sensitive

Fig. 1: Micro Ψ-Mix

or shear-thickening materials are easily processed within the design of the process chamber.

Compared to conventional rotor-stator systems, this machine uses significantly less energy for dispersion. Temperature-sensitive products and materials with a broad viscosity range can be processed. The Ψ-Mix can be easily integrated into automated plants that process large batches and is especially suited for emission-free and explosion-proof operations. The design of the machine is distinguished by the fact that foreign bodies in the pigment suspension do not cause damage to the system. A further significant feature of the Ψ-Mix that contributes to its success is the deaeration function that occurs automatically within the operating method of this new machine. This is a major improvement for processing water-borne suspensions.

For batch sizes starting from 15 l up to 700 l of suspension, the pilot plant and small batch version Micro Ψ-Mix (fig. 1) was recently developed. With this machine being designed for tests and the production of small batches, a safe scale-up to the production machine guarantees a high degree of safety and flexibility. On the production sized machine batch sizes between 100 and 15,000 l can be processed.

Comparison of Different Methods for Dispersion

When comparing the variety of different dispersing systems the relevant literature is not supporting production parameters. Equations mainly support mechanic layout of mixing systems to determine power requirements. The field of efficiency linked to the applications and information about specific energy remain undefined. Figure 2 shows the most common system groups with saw disks and butterfly tools in comparison to the Ψ-Mix, specified by installed power, which seems to be an indication for installation and running costs.

The energy input on the Ψ-Mix relates only to the powder feeding time. The volumetric dosing rate of up to 5 m^3/h together with the bulk density of the dry components results in the batch time. Additional rework, in most cases, is not necessary.

Most methods are based on producing wet agglomerates, which should be broken apart by mechanical energy input via rotation. One of the problems with conventional technology is the broad size distribution

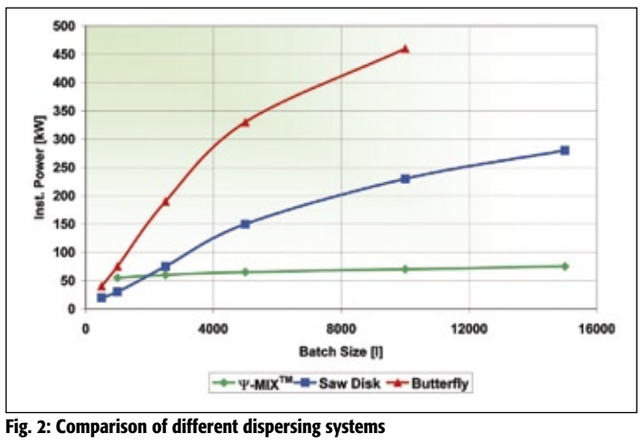

Fig. 2: Comparison of different dispersing systems

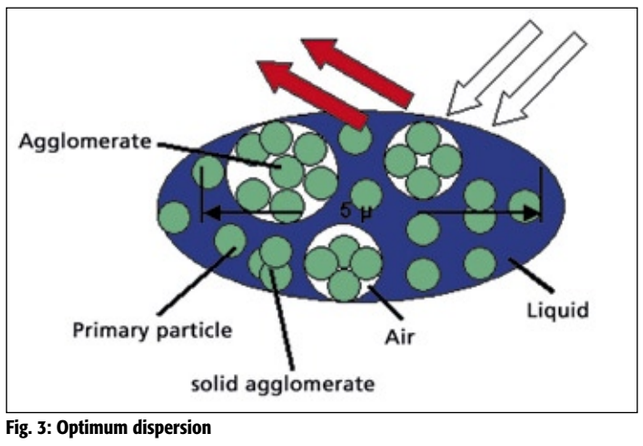

Fig. 3: Optimum dispersion

of the agglomerated particles initially produced by the wetting process, from 10 microns (µm) to 2.0 mm and more. The request for more dust-free and process reliable powder handling leads to granulates and palletised raw materials, which is not supporting the basic of wetting micronised primary particles at all.

This wide distribution of dry agglomerates results in an obvious difference in the required specific energy input to achieve a specific degree of dispersion. Considering the processes that may follow, i.e. fine grinding (fine dispersion) on bead mills, the energetic differences inherent in the type of pre-dispersion process become even more obvious. An optimum pre-dispersion reduces the running time on a mill considerably and possibly eliminates the need of fine grinding.

Background of the Ψ-Mix

The advantages of in-line processing of solids into liquids are well known. What is new on this machine is the treatment of the solids and liquids during initial wetting. A design criterion was the controlled formation of wet agglomerates, with the aim of an "optimum dispersion" (fig. 3), i.e. to achieve the required degree of dispersion. In contrast, one could define an "ideal dispersion" where every primary particle is completely wetted. In most cases, the ideal dispersion is not the same as the quality specification, i.e. the required degree of dispersion or fineness of grind that has been developed by conventional methods.

One problem for an effective wetting process is the quantity of micro air included in the charge of solid components. This air is inherent in the dry agglomerates. When the dry agglomerate is immersed into the liquid, the capillary path on the exterior of the particle is filled, sealing the interior of the dry agglomerate. In the core, an air pocket is created that stops the wetting process. High shearing speeds break apart these stable, wet agglomerates. Sub-level vacuum feeding or the condensation principle with gas exchange can be an acceptable solution to this problem.

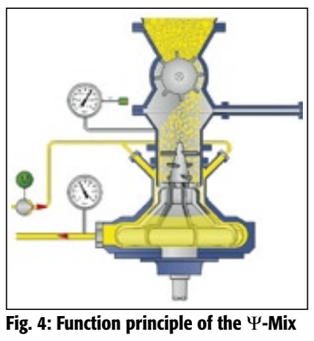

Fig. 4: Function principle of the Ψ-Mix

Summary

Innovative dispersion technology sets new benchmarks for modern production processes in all fields where micronised, pulverised solids have to be mixed as fine and as homogenously as possible. If the impression within the industry is that the development of dispersion technology has reached a standstill, the invention of the Ψ-Mix shows promise for the future. It may be difficult to fully integrate the concept of this new invention, but from a technical point of view there are no objections. This new concept may raise some conflicts with conventional mixing systems. For established dispersion systems, it may define a new era in the market for dispersing equipment, and manufacturers of mills will need to make adaptations to accommodate the higher throughput rates. This concept should prompt one to do some rethinking about the dispersion process and to look at an innovative dispersion technology.

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Mineral Fibre Insulation Goes Green

New Acrylic Binder Exemplifies Environmentally Advanced Technology

The manufacturing of mineral fibre insulation requires two main materials: filaments of fibre spun from molten sand or stone, plus something that binds the chopped fibre filaments together. For decades, that "something" has been formaldehyde-containing resin, the use of which produces a stiff yet fluffy and moldable batt that insulates the walls and roofs of homes and commercial buildings and reduces the amount of energy required for heating and cooling. New technology, spurred by advances in acrylic polymer chemistry and increasingly strict environmental regulations worldwide, has resulted in a major development in the composition of mineral fibre insulation: the use of an environmentally advanced, water-based binder – made without formaldehyde or formaldehyde-generating materials – that helps manufacturers offer mineral fibre insulation with comparable performance to insulation made with formaldehyde-containing resins.

Over the years, mineral fibre batting has proven to be an excellent insulator that contributes to an overall reduction in air leakage into and out of a home or commercial building. In fact, it is estimated that a home with appropriate and properly installed insulation will have an energy bill that is 30 to 40% less than a home where materials and installation are deficient. In an effort to maximise energy savings, builders often strive to make a home as "tight" as they can, allowing as little air leakage as possible. An unintended consequence of this practice is what has become known as "sick building syndrome."

A Step Toward Reducing Total Emissions

There are many products inside a home or commercial building that produce emissions affecting indoor air quality. "Tight" buildings – although they do significantly reduce the amount of energy used for heating and cooling as well as the emissions associated with such energy use – trap these emissions inside, where occupants breathe the same air over and over again. In isolation, emissions from carpeting or from lacquered furniture, for example, are generally not considered a major concern. However, there is increasing concern, especially in countries rapidly adopting stricter environmental regulations, about the cumulative effect of anything that might contribute to poor indoor air quality. A step toward reducing the overall burden of emissions is certain to be welcome, and that is why insulation made with an environmentally advanced binder is capturing the interest of the building industry worldwide.

Of course, to be seriously considered as a replacement for traditional formaldehyde-containing resin, an environmentally advanced product used to bind the mineral fibre filaments would have to provide at least comparable performance under the same conditions all across the board: in the manufacturing process, shipping, installation, and end use. This is proving to be the case.

Comparable Performance Across the Board

In the manufacturing plant, the environmentally advanced acrylic polymer binder is supplied in water, then diluted and sprayed on layers of mineral fibre filaments. This may require an adjustment to existing equipment. During the curing process, the acrylic polymer produces water rather than formaldehyde emissions. And unlike a formaldehyde-containing resin that needs to be refrigerated before use, binder without formaldehyde is stable for long periods of time at room temperature.

Shipping accounts for approximately one-third the cost of mineral fibre insulation, so how well batting made with an environmentally advanced binder ships is critical. It is noteworthy, therefore, that such insulation has been found to compress during shipping and – perhaps more important – "recover" or fluff up after shipping in a manner that is comparable to formaldehyde-containing insulation.

The major concern during installation is whether the mineral fibre batting will resist sagging and stay in place. The use of an environmentally advanced binder appears to have no negative effect on this measure of comparison.

Once installed, the mineral fibre batting can be expected to provide excellent insulation for decades to come. Therefore, occupants of homes or buildings will be better served by the use of an environmentally advanced binder in their insulation.

Environmental Progress Through Innovation

The development of an environmentally advanced binder is a recent example of the innovation that characterizes the most successful chemical companies. Other examples include the move from 100% solvent-based house paint in the 1950s to the top-performing, more environmentally advanced water-based paints we know today, as well as the more recent move to water-based acrylic paints for traffic markings. And in the near future, the same environmentally advanced technology used for mineral fibre insulation may find application in a host of other building products the same way it has already found application in automotive liners, another area where indoor air quality is critical.

This new environmentally advanced technology, Aquaset acrylic thermosetting binder from Rohm and Haas, was recognized by the American Chemical Society (ACS) with a 2006 Heroes of Chemistry award. Each year, this ACS award program recognises the vital role of industrial chemical scientists and their companies in improving human welfare through successful commercial innovations and products.

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Wacker Expands Silicone Rubber Capacity

Wacker Silicones is expanding its capacity for ready-to-use silicone rubber compounds. The expansion involves the company setting up a new finishing plant in Plzeň, under the management of its Czech subsidiary, Wacker Chemie. The new Plzeň-based plant is scheduled to start up in the next few weeks. With about 20 employees, it will produce an increasing share of the compounds previously manufactured in Burghausen. The company plans to raise capacity gradually, ensuring the high quality of its ready-to-use silicone rubber grades.

▶ www.wacker.com

Degussa Gets Approval to Build Facility

Degussa has received approval from the Chinese National Development and Reform Commission (NDRC) to construct an integrated production facility for methyl methacrylate (MMA) and methacrylic specialties in Shanghai. The official starting shot for the specialty chemicals group's currently largest individual investment measure is expected in a few months' time. The investment volume for the entire plant including all preliminary stages is about €250 million. The world-scale plant is to go into operation in the course of 2009, after a construction period of two years. Degussa's Methacrylates Business Unit is responsible for planning, constructing and operating the plant, which gives it production facilities in Asia, North America, Central and Eastern Europe.

The production complex operates on the basis of C4 technology and is being built at Degussa's multi-user site at Shanghai Chemical Industry Park Development. The integrated MMA plant is designed to provide an annual capacity of some 100,000 mt and to supply raw materials for downstream monomer and polymer specialties for applications in optoelectronics, the adhesives and coatings industries and automotive construction.

▶ www.degussa.com

Lonza, Bio One Capital to Built Cell Culture Plant

Lonza Group and BioOne Capital broke ground for their large-scale commercial mammalian cell culture manufacturing facility at Tuas Biomedical Park. This will be the second large-scale mammalian manufacturing plant in Singapore, and the third one globally that Lonza has built. The final build-out of the facility, will be completed and become fully operational, at the latest in 2011, in line with customer commitments. Depending upon customer request, the capital investment could amount up to US-$350 million. Lonza Biologics Tuas will have up to four mammalian bioreactor trains, each with a flexible capacity of 1,000 up to 20,000 l and is inclusive of the respective purification units.

▶ www.lonza.com
▶ www.bio1capital.com

BASF to Discontinue Lysine Business

BASF said it is discontinuing its lysine business and will shut down its production facility in Gunsan, South Korea, by mid-2007 to concentrate on its non-amino acids business. Lysine is the only amino acid in BASF's nutrition portfolio. The closure is part of the ongoing restructuring program of BASF's fine chemicals business, initiated in January 2006. Among other measures, this program includes the merging of the human nutrition and animal nutrition businesses into one Nutrition unit as of November 2006 and the divestment of the global premix business. In February 2007, BASF sold a major part of its premix business to a Dutch company, Nutreco.

▶ www.basf.com

New Dynamic Growth

Start-ups Need Innovation, Not Administration

Continued Page 1

as outstanding further education, a strong midsize industrial sector with an enterprise-driven approach, product-oriented companies and besides that, much more. Traditionally, Germany more than compensates for its supposed disadvantage of having few raw materials by its inventiveness and initiative. As well as establishing whole industries, we in Germany have always been successful in launching technical and product-oriented developments. The German chemical industry, with a firm footing on the international stage since the 1960s, is a classic example of this.

Does this still apply today? The economy has become more complex in many respects since then.

V. Wege: That's true. Today's challenge is to actually put into practice the wide-ranging innovations that already exist. I believe this can only succeed by networking industrial structures with existing potential inventors and developers. BIS hopes to help push things in this direction with the start-up initiative.

A recent successful example that has provided a major boost for the German national economy is the solar industry. Thanks to broad-based political support, this new branch of industry has already become a success story. Its developments offer enormous potential for the provision of high-quality energy. The international market potential for this know-how from a country lacking in raw materials is very great and promises to generate wealth and help provide a reliable source of income for many German citizens. The solar industry is a good example of how different disciplines can come together to create new products through a combination of networking and cooperation.

How has the situation improved in terms of the political framework over the last few years?

V. Wege: In recent years, politicians have responded to the changed conditions of a globalised world by encouraging those starting new companies to take responsibility for implementing new product developments. This could spark off a new wave of dynamic growth in the midterm. Politicians have also provided a model in the form of high-tech founder funds with the support of the industrial sector. The promotion of existing key areas in the chemical and chemical-related industries will help boost success even further.

You cited solar technology as an example. In what other technologies and scientific disciplines does Germany offer an attractive environment for start-ups?

V. Wege: In recent years, we have seen interesting new nanotechnology applications, and start-up companies in Germany have been offering outstanding quality – to global standards. Over the next few years, I believe we will see dynamic growth and some pleasant surprises, particularly in the field of medicine.

I think that in addition to nanotechnology, key areas for innovation also include surface/coating technology, energy systems, biotechnology and security technology. As yet undreamt-of new developments and applications may emerge from within the powerful sphere of these particular disciplines. The right approach here is to reinforce strengths by promoting emerging research focuses.

We also need a philosophy and culture where failure can also mean a new beginning, and this approach needs to be supported by the political framework. Target-oriented realization of innovations by founders of new businesses and developers in corporate environments need to be rewarded with greater financial support and by increased recognition.

This surely requires a change of mentality, not to mention a different approach to bureaucracy.

V. Wege: Definitely. Unfortunately, we in Germany have a tendency to over-organize and over-manage. We would often rather look for mistakes and give reasons not to go ahead with a particular development than create an innovation-friendly environment. Someone once said: "By avoiding every risk, you destroy every opportunity." This kind of support for the protection of vested interests might have been useful in the past, but today it would have devastating long-term consequences for an economic region in the face of global competition.

What examples from abroad could serve as models for promoting the founding and establishment of start-ups?

V. Wege: There is a different entrepreneurial tradition in the U.S. The concept of venturing in the sense of venture capital is related to the term "adventure" and does not simply represent a form of bank credit seen from a purely financial perspective.

> ***"We need a culture where failure can also mean a new beginning."***

Key models for the establishment of start-ups include linking up existing regional strengths with a financial tool. This might, for example, be a foundation that provides a company with capital resources and is linked to setting up the company at a suitable location. I also believe that the philosophy of successful companies reinvesting part of the capital they have earned in new developments is a very sensible idea.

Which incentives does BIS offer new companies above and beyond state-run promotional initiatives?

V. Wege: The Bayer Chemical Start-up Initiative offers companies access to a professional industrial innovation environment where they can network and become integrated into an infrastructure of material sciences, chemistry, life sciences and technical systems, assuming, that is, that the participants are pro-active. I believe the existing innovation network is very well positioned in Germany and possibly throughout the world in terms of the combination it offers. Relatively new technology, research and development companies can implement developments and offer services in cooperation with established companies. Opportunities for gaining access to the market can be created flexibly on equal terms between companies working in partnership. Further benefits include a combination of flexibility, short decision-making processes for start-up partners and the opportunities and resources of a global company. One example is the range of possibilities offered by an outstandingly comprehensive analytical framework characterized by professional support for product developments. In short, synergies occur and existing strengths are reinforced. BIS also helps these companies by offering special start-up rental terms.

Why should a new company base itself in a chemical park with large established companies when there are many smaller technology parks it could go to?

V. Wege: Our start-up partners benefit from numerous cooperation opportunities with established Chemical Park partners. As part of a network of around 10,000 products, they are able to harness considerable synergy potential for developing products or supporting these processes. The Chemical Park and North Rhine-Westphalia region are also excellent sales markets. This is, after all, Europe's key chemical region with very good rail, road, river and air connections. What's more, some of our new Chemical Park partners are already establishing mutually beneficial business relationships and provide one another with support.

How many new companies have you won over so far? What industries are represented?

V. Wege: With the help of the initiative, eleven start-up and R&D companies in the chemical, material science, technical systems and life sciences sectors have moved into the Bayer Chemical Parks. But it's not about quantity for quantity's sake. We want to concentrate on quality and promote consistent development rather than just attract a mass influx of new companies. After all, the established companies at the Chemical Park sites only benefit from the start-ups if they are successful and enrich the life of the Chemical Park as a whole.

How do you see things developing in future as the new businesses move in?

V. Wege: I see the future absolutely positive. The success to date shows that we can attractively position the Bayer Chemical Start-up Initiative in the market. This will of course act as a magnet for other interested parties. We are currently involved in some very interesting discussions and are fully committed to these potential new partners. As operators and managers, we are constantly developing the Bayer Chemical Park sites and searching for opportunities for further start-ups.

What qualities does a person starting a new company need to have in order to really benefit from the support of the Bayer Chemical Start-up Initiative?

V. Wege: An innovative or at least research-oriented business idea in the chemical or chemical-related sector of course is important. The company founder should also be well versed in the challenges involved in gaining a foothold on the market. The primary qualities this person must have are a willingness to learn, determination and persistence in dealing with problems that arise and, most importantly, passion for their idea and its realization. The main hurdles to be overcome are usually the professional business plan and the search for suitable financing. The business plan is where the BIS support really comes into its own. Our experienced experts know exactly what's required as well as the critical success factors. We also support new companies in acquiring the necessary financial aid, although we do not undertake any financial involvement with the start-ups ourselves as this is not part of our core remit. Once the capital has been acquired, the business plan can then be put into effect systematically.

In cases where you are able to help new companies, what support do you offer during the start-up process?

V. Wege: The Bayer Chemical Start-up Initiative discusses the whole process from optimizing the business plan to actually setting up at the Chemical Park with the start-up company. We

> ***"It is not about quantity for quantity's sake."***

then look at all aspects in detail from the business idea to markets, market launches, marketing, communication channels and sales strategies. We help the company decide where it should be based, what space it needs, and how to manage supply and waste volumes. We also assess the logistics outlay and provide tips on the basic equipment the business requires.

What infrastructure can you offer new companies?

V. Wege: The Bayer Chemical Start-up Initiative provides comprehensive advice and implementation within an established commercial environment – this combination offers tremendous potential for success. We provide tailor-made laboratory modules to technical service center standards and a full portfolio of services including research, development and production – from supply, logistics and acquisition to materials, analysis and waste management. All this is available right from day one as part of a highly reliable service. In tandem with the consulting service, the technical and logistical framework forms a compact unit that the start-ups can rely on in order to get their business idea off to a flying start.

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Brave New World

Deep Innovation Post-Reach

Many ingredients will disappear with the implementation of Reach. It is tempting to simply find a suitable substitute and carry on as before. However, when the full costs of substitution are included this "shallow" innovation is less attractive. "Deep" innovation rethinks the product in the context of its application. Incorporating life-cycle thinking into the innovation process you can develop concepts that perform better and have lower impact.

There is one certain outcome of Reach; we will not be using the same chemicals and materials in our products in the future. Some will disappear because of genuine safety issues, others will vanish for economic reasons – the available market doesn't warrant the cost of registration.

For some application areas, the number of ingredients that might be lost is large. For example, more than 5,000 ingredients are used in formulating adhesives and sealants, and more than 10,000 in coatings. Many of these are used in small quantities and are vulnerable. A formulator estimated that they could lose up to 58% of their profit through increased prices for ingredients due to registration, and a chemical company estimated that 20% of their gross margin depended on ingredients with a high risk of not being registered. German paint manufacturers have suggested between 20% and 40% of current materials could become unavailable.

Whatever the final number, is it will be large. Reach represents a major market disruption; it is a wave of change passing through industry that reshapes products and processes, fundamentally changing the technologies we use. Any market disruption is an opportunity for the inventive, the flexible and those quick to respond. Our challenge is not merely to comply with Reach, but to use it as a springboard to products and services that better meet the needs of our customers. The obvious solution to losing current ingredients is to find a Reach-registered substitute. This might require some tweaking of the formulation, but surely it is the quickest and most cost-effective solution? Unfortunately, the cost of simple substitution can be very high. The British Coating Federation showed that a simple substitution of a single ingredient in an aircraft coating could cost nine man-years of effort just to get back to where you were before.

Shallow And Deep Innovation

Simple substitution is an example of shallow innovation. You fix the problem, but don't offer any new benefits to the customer. There are other strategies. Deep innovation reconsiders the entire system; looking beyond substitution to product redesign, delivering functionality in a new way, and redesigning the complete business system. This offers bigger improvements in the environmental impact and better solutions for the user. Since shallow innovation can be costly, deep innovation offers market differentiation at a comparable price. Consider the alternative approaches taken by industry to eliminate the most dangerous fire-retardants in electronic applications (fig. 1).

Brominated fire-retardants such as polybrominated biphenyl (PBB) and pentabromodiphenylether (PBDE) are under threat. A simple substitution replaces them with tetrabromobisphenol-A (TBBA). This has a much lower toxicity, but is still a brominated fire-retardant. Better is polymerised TBBA, which is less likely to escape into the environment. Phosphorus and mineral based retardants are a shift to a totally different mode of action to avoid health risks, but they bring their own difficulties.

Circuit boards can be also be redesigned to use flame-resistant materials. The industry has also changed the design of the equipment to separate high and low voltages, reducing the area in a product that needs to be protected, or by eliminating the use of high voltages altogether. There is a continuum of ideas from redesigning the substance, through materials to the product itself. Each level increasing the innovation depth and the potential for customer benefit and market differentiation. The challenge is how to encourage R&D staff to identify the opportunities from deep innovation and not to focus on solving the immediate problem.

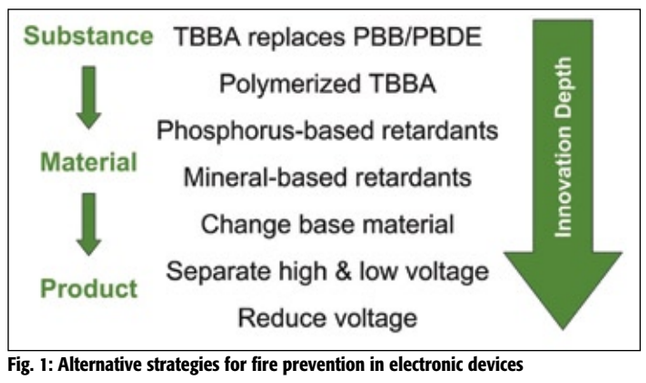

Fig. 1: Alternative strategies for fire prevention in electronic devices

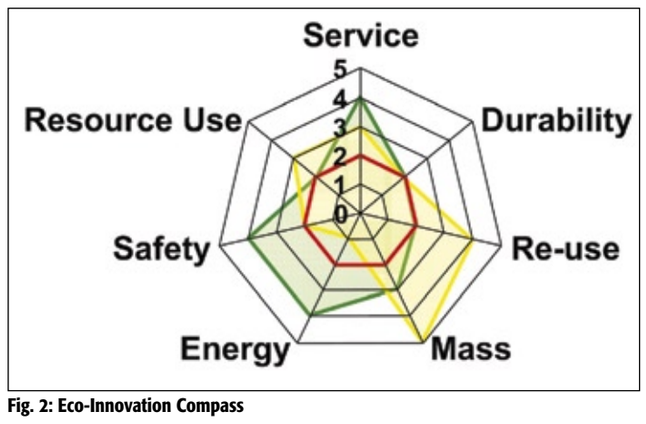

Fig. 2: Eco-Innovation Compass

Green Product Design

A successful approach to encouraging deep innovation where there are environmental and /or health and safety issues is green product design. This means designing a product or service to reduce overall environmental impact whilst maintaining or improving economic, technical and social performance. The goal is to develop products that are commercially successful and create sustainable competitive advantage, not to win eco-awards.

A lot of green product design is the same as any good new product development process. The key that enables green product design is a way of thinking; asking different questions and looking at the problem from a different perspective.

The Eco-Innovation Compass

It helps to have tools that prompt the right questions. The Eco-Innovation Compass, developed by Dow and the World Business Council for Sustainable Development, is a good way of exploring options for new products (fig. 2). The compass defines seven directions in which you can innovate to improve environmental impact. An existing product is given a score of two on each axis. Alternative concepts are compared with this baseline; higher scores mean better performance, lower scores worse. Different options can be compared as spider diagrams to show the tradeoffs between. The different dimensions of the compass encourage a team to think hard about the current form and function of a specific product, looking for new ideas.

The seven dimensions are:

- Convert the product into a service so that more value comes from the intangible part of the product. The flooring company Interface has converted carpets into a service. Under their Evergreen contract, Interface will install a carpet, maintain it, replace it when you want a new one and recycle the old carpet. Interface redesigned all aspects of the system, including the carpet itself, to support this model.
- Improve the durability of the product so that the financial and environmental costs of disposal and replacement are cut. Most small laser printers combine the imaging drum with the toner cartridge. This is quick and convenient, but creates a lot of waste. The Kyocera Ecosys laser printer system uses a separate imaging drum with a much longer a life than the toner cartridge. This cuts waste and reduces the cost per page by about 50%.
- Design the product for reuse, remanufacture and recycling to reduce the impact on disposal. Disposable cameras are not thrown away, but are reused. The film is removed, new film put in and a new cardboard cover provided. Any components that are worn or damaged are scrapped and recycled. The average camera goes round the cycle a minimum of five times before the main case components are recycled.
- Reduce the mass intensity per unit of service of the product. The Dow Sentricon termite treatment puts the toxic bait exactly where it is needed and protects it from weather and exposure to humans or animals. This reduces the amount of pesticide needed 1,000 times. The product is safer, cheaper and more effective.
- Reduce the energy intensity per unit of service of the product. New automobile lubricants have a dramatically lower viscosity on cold start. This means lower fuel consumption during winter commuting in Northern Europe and lower tailpipe emissions.
- Improve the human and environmental safety of the product by reducing toxic materials and avoiding emissions. Printers use volatile solvents to clean ink from the machines leading to human health risks and VOC emissions. Non volatile solvents produced from plant oils eliminate almost all atmospheric VOC emissions, and are much safer to use.
- Improve resource use by conserving depleting resources and using renewables or recycled materials where possible. Sanyo will use renewable Poly-Lactic Acid (PLA) for their MildDisc biodegradable CDs and DVDs, and a range of biopolymers are now used for packaging.

Reach will bring change. Existing technologies and materials will disappear and be replaced by new ideas. Existing products and services will be replaced by new and better alternatives. Smart companies will take advantage of the wave of change; positioning themselves to lead it and not be overwhelmed.

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CBA: Reach Could Be Too Complex for SMEs

The Chemical Business Association (CBA) has expressed concern that the six Reach Implementation Projects (RIPs) could make Reach too complex for smaller and medium-sized enterprises (SMEs).

"We have repeatedly pointed out that simplicity is the key to Reach compliance for SMEs with limited technical and financial resources – and SMEs account for more than 95% of the European chemical industry," said CBA Director Peter Newport. "It is becoming increasingly clear that this message is being lost within the RIPs which seem intent on over-complicating the Reach regulations," he added.

CBA's said its viewpoint is mirrored by other published concerns about various aspects of Reach's development:

Photo: Pixelio

- According to contract research firm RCC, "Small volume producers and exporters with multiple products are likely to see Reach costs of more the US-$1 million."
- Reach "may turn out to be a nightmare" for smaller companies; the newly-created European Chemicals Agency "may be overwhelmed with applications to the point where it can't do its work properly"; and "smaller companies are worried about many obligations to publish or communicate information and fear a loss of intellectual property," German MEP, Alexander Graf Lambsdorff, said.
- More than 50% of SMEs in Japan were unaware of Reach and its implications, according to a recent survey of the chemical sector by Japan's Ministry of the Environment.

> ***"From an SME's perspective, the only way forward for Reach is to keep it simple and minimise the bureaucracy and complexity."***
>
> **Peter Newport, CBA director**

"From an SME's perspective, the only way forward for Reach is to keep it simple and minimise the bureaucracy and complexity," Newport said. "This does not imply a weakening of the new regulations – but it will improve their effectiveness. Applying simplified use and exposure categories, for example, would be a major step forward and would ease the compliance burden for SMEs."

▶ www.chemical.org.uk

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Reaching A Dialogue

Communication Important Between Suppliers and Downstream Users of Chemical Substances

Under Reach, more accurate information on how chemicals can be used safely will be generated by the manufacturer or importer of chemical substances; this information will be included in safety data sheets and other information provided to downstream users helping them to meet their obligations under the new Reach regulation. The largest customer of the chemical industry is the chemical industry itself. Most, if not all manufacturers and many importers of substances are therefore likewise downstream users in the definition of Reach, i.e. they buy substances (or preparations) from manufacturers or importers established within the EU.

Most of the current legal requirements on the use of substances and preparations will remain unchanged under Reach, but there will be some new requirements for downstream users. Major new obligations are that downstream users have to ensure that they use chemical substances and preparations safely. Suppliers will provide information on the safe use for dangerous substances and preparations in a safety data sheet (SDS) as today. In some cases, the safety data sheet will include an annex containing one or more exposure scenarios describing how the substance or preparation is to be used in fact safely. Downstream users must ensure that the way they use the substance or preparation is covered by the conditions listed in the exposure scenario and implement the recommended risk management measures. Suppliers will also provide information on risk management for non-dangerous substances, probably in a form similar to a SDS.

Formulators who place dangerous substances or preparations on the market for other downstream users have to provide a safety data sheet (this is a current requirement) and an exposure scenario where relevant. In some specific cases, they will have to consolidate the information obtained from their suppliers and develop a new exposure scenario with the safety data sheet for their customers. If the preparations are not dangerous, information on safe handling must also be provided, yet not necessarily in a safety data sheet.

Due to the need to know more about the use of substances, communication along the supply chain is likely to increase significantly. Downstream users are required to pass information they hold, or which is provided by their suppliers or customers, up or down the supply chain.

Phase-in and the Downstream User

Before and during the phase-in period beginning in the second half of 2008, manufacturers and importers of substances will be seeking information to enable them to prepare a registration for their substances. During this period, downstream users may provide information to assist in the preparation of a registration. Downstream users may be contacted by suppliers searching for information pertaining to registration. They may also wish to be proactive, in contacting their suppliers to offer information or assistance associated with the registration process. This may have business benefits for a downstream user, ensuring that substances he uses will be registered for his particular use.

However, downstream users will wish to balance the benefits of pro-active involvement against the work required and that needs to be protected as confidential business information. Once the phase-in date has elapsed, downstream users have mandatory duties under Reach.

Throughout the phase-in period, all actors in the supply chain will need to communicate with each other to ensure that, as far as possible, registrations of substances take account of all the uses of a substance. The obligation of registering, however, lies with the manufacturer or importer.

Under Reach, suppliers of substances to downstream users solely have an obligation to provide the new information required under Reach to downstream users once registration is complete. After this, they must draw up a revised safety data sheet (or other information) with the next delivery of the substance or preparation at the latest. Within 12 months, the downstream user must only use the substance in line with the conditions set out in the safety data sheet or other information.

Downstream users have to ensure that they use chemical substances and preparations safely.

If the substance is not registered for the use to which the downstream user puts it, or there are authorisation conditions or restrictions which he does not meet, this may require significant changes by the downstream user. It may be difficult for a downstream user to make these changes within the 12 months' period, especially if he needs to make changes to his process or to substitute a use of the substance. Timely contact with suppliers, to establish what uses they intend to register the substance for and whether it is likely to be subject to authorisation or restriction, can help the downstream user to plan more effectively for the requirements of Reach.

Providing information will benefit downstream users as it will make it more likely that their use will be included as an identified use within the registration of the substance. However, downstream users will need to weigh these advantages against any concerns that confidential business information would need to be provided to suppliers. The alternative will be for a downstream user to prepare their own chemical safety report. This process may also require some preparation by the downstream user, so it may be advantageous to hold early discussions with suppliers to establish whether this step is likely to be necessary.

Currently standard questionnaires are under development and are being discussed by European and national chemical industry organisations. These normative questionnaires are intended to help purchasers and suppliers in an adequate exchange of information for registration purposes, without overly specific details on uses or product composition, i.e. confidential business information is respected. These questionnaires offer the potentiality to defer answering to a later point of time. A careful completion of the questionnaires will take some time, because in many cases requests for information will have to be sent to sellers' suppliers or to purchasers' downstream users. The currently discussed questionnaires might be updated in the months to come, because more definitive information may become available about the definition of downstream uses. The Reach Implementation Project (RIP) 3.2 (generation of a Chemical Safety Report) deals with this subject, but will not be finalised before June.

Communication Upstream

Under Reach, downstream users have the right or are required to communicate a certain information upstream. This includes the right to request a use to become an identified use, with the aim of having it included in the suppliers' exposure scenario, the requirement to inform suppliers of additional or new information on substance hazards and the requirement to inform the supplier of inappropriateness of risk management measures applied.

Downstream users have the right to make a use known in writing to their immediate supplier of a substance or preparation, with the aim of making this an identified use (Art 34.2). For phase-in substance, the request must be made at least 12 months before the deadline for registration of the substance. In communicating a use, the downstream user should provide sufficient information enabling the supplier the preparation of an exposure scenario for that use thus including it in the chemicals safety assessment. If the immediate supplier is not the manufacturer or importer, for example another downstream user or a distributor, they are compelled to pass this request on to their supplier.

Under Reach, downstream users may (but are not obliged to) provide information to their suppliers to assist in the process of registration (Reach Art 34.1). During the phase-in period, a supplier may request information from a downstream user to help him to complete registration of a substance as such or in a preparation. If the downstream user does not respond, the supplier may choose not to include the downstream user's use in his registration.

Communication Downstream

Active communication of information to downstream users is required whenever a substance or preparation is supplied to a customer. A safety data sheet for a preparation which is not classified as dangerous (according to Directive 99/45/EC) must be furnished to downstream users on request. Information to be forwarded includes: all registration numbers which are given in Section 1.2 of the safety data sheets of the individual components of the preparation; whether the substance is subject to authorisation and details of any authorisation granted or denied in this supply chain; and any other available and relevant information about the substance that is necessary rendering possible the appropriate risk management measures to be identified and applied. It is likely for the information to be provided in a safety data sheet format, even if no safety data sheet is required (this is the current practice of many chemical suppliers).

The manufacturer should check whether he has sufficient information on each downstream process/application to prepare an exposure scenario (both for making a downstream user chemical safety assessment or to identify a use). The information is sufficient when it allows determination of a safe exposure level for human health and the environment from that use. Potential sources of information include the safety data sheet of suppliers, experience, emission scenario documents, workers' health information, etc.

The manufacturer may decide to interview some of his customers to verify his assumptions on the "average client" or to collect further information. As the exposure scenario is also a tool to influence how a substance is used downstream, the manufacturer may wish to recommend changes to the current way of handling the substance or preparation, to reduce risks further. The safety assessment or identification of use may include not only the uses of the immediate customers, but also uses further down the supply chain. In this case the manufacturer should involve his direct customer in the collection of information of the uses further downstream.

The descriptions of average operational conditions of use and standard risk management measures for different processes may be developed by downstream user industry organisations, e.g. in the form of a set of standard exposure scenarios covering different uses within the sector in question.

A supplier has no liability as to how the substance/preparation is used by his customers, he is only required to provide guidance on safe use if an exposure scenario is required. Moreover, the manufacturer/importer has the right not to include a certain use in the exposure scenario, i.e. not to support the use.

Summary

Downstream users are concerned that some of the chemical substances may not be registered by their suppliers, for whatever reason. In preparing Reach, some downstream users have approached, or plan to approach, their suppliers and request information about the intentions of their suppliers or even demand commitments in written form from their suppliers to continue supply in any circumstance.

Nevertheless, initiating a dialogue between suppliers and their customers is a prudent commercial behaviour. It is suggested to prioritise and focus these discussions on materials of strategic importance. Substances that may become subject to authorisation may also be a priority, especially the substances that are carcinogenic, mutagenic, or toxic for reproduction.

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Stuck In The Middle

Impact of Reach on Mid-sized Companies Importing from Outside the EU

Reach, which will come into force in June, will especially impact small- and middle-sized companies in the European Union, particularly because such companies import raw materials or substance from outside the EU. Consequently, it is very important to know what this importing role means for a company. Lehmann & Voss (Hamburg), which is a mid-sized chemical company with activities in the coatings sector, has been preparing itself for Reach since 2003. The resulting activities will be illustrated, with focal point on activities for imported materials.

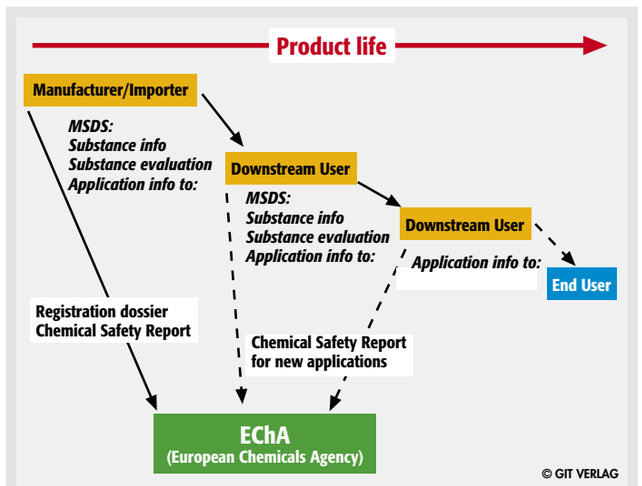

Fig. 1: General roles and obligations under Reach

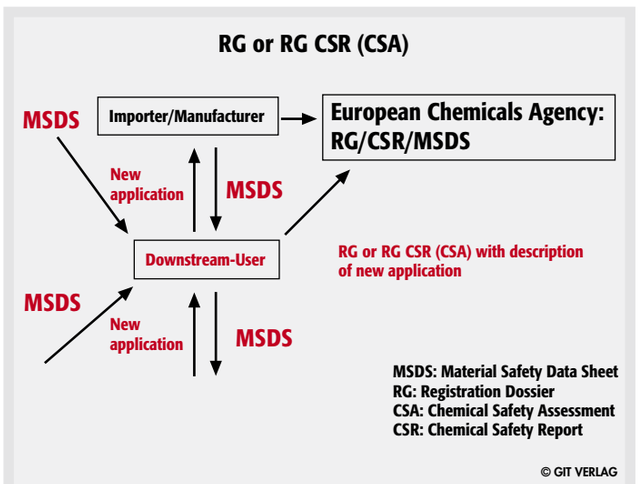

Fig. 2: Role of downstream users under Reach

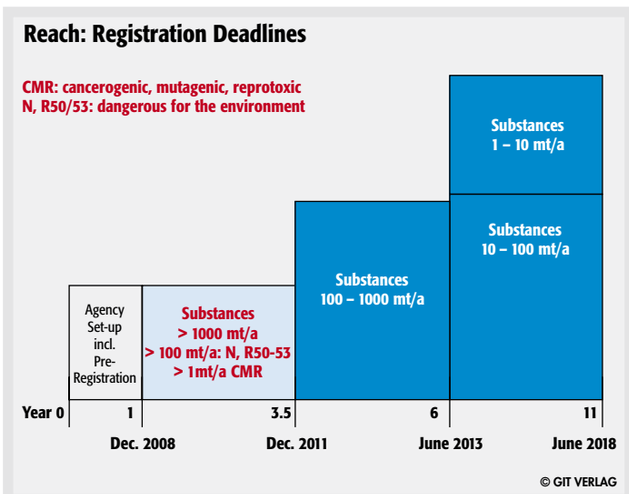

Fig. 3: Registration deadlines under Reach

Reach will have enormous influence and effects on the chemical industry in Europe. Especially small- and middle-sized companies have, in many cases, to adapt and to check their own role because often these companies are importing raw materials or substances from outside the EU. Due to the Reach regulation importers have the same obligations as manufacturers/producers. The resulting registration dossier and a chemical safety report that have to be sent to the European Chemicals Agency (ECA) in Helsinki.

How to Prepare for Reach

First of all it is very important to check the product portfolio using e.g. the following scheme:

- What are my imported – or manufactured – substances?
- Are these substances imported or manufactured <1 mt/a? Unless they fall into the categories of CMR, PBT and/or vPvB, they are not relevant under Reach.
- Does my product portfolio contain exemptions from registration (e.g. minerals, ores, ore concentrates, substances occurring in nature that are not classified as hazardous)? Here, one must refer to annex IV and V of the Reach regulation.
- Will the applications of my substances be described by my supplier? If not, the supplier can be asked to integrate it into his application descriptions or (if the supplier should not be informed about new applications) an additional registration must be submitted to the ECA (see fig. 2).

For many other small- and middle-sized companies, there are some remaining substances to be relevant under Reach, especially those that are imported. Consequently, a well-organised preparation for Reach is important.

Preparation: What Does It Mean for a Mid-sized Company?

It is very important to know Reach in general so that discussions and exchange of information is possible, especially with suppliers and customers. In addition it is vital that a company department or specific persons are determined to deal with Reach; these Reach-responsible people or departments should know the company substances and the Reach processes and obligation.

It is also necessary to know your own Reach time table as the registration process has clearly set deadlines (fig. 3). At first the hazardous and high-volume substances have to be registered; so many small- and middle-sized companies are not obliged to start the registration in the first three years.

Pre-registration Steps

The Reach process in detail will start with the pre-registration process. This means to register some basic information about the substance and the company (see Title III, chapter 3, article 28 in the Reach regulation) in a new database (using the software IUCLID 5 being available for all companies during 2007 for free, available on the official EU website http://ecb.jrc.it/iuclid5/). Consequently, it is important for every company to decide during 2007 and 2008 what substances should or must be registered. At this point, it would be advisable to register all important and/or necessary substances for a company; further steps are possible only after pre-registration.

Lehmann & Voss has decided to carry out a Reach project in 2007 and 2008; at the end of this project, the pre-registration of all substances being imported should be finished. During such pre-registration

▶ Continues Page 13

Be Prepared

TÜV Rheinland Certificate for Good Reach Preparations at Biesterfeld

ADVERTORIAL **Preparing for the new Reach regulation is a challenge, especially for the chemical retail industry. Trading houses need to tackle the new challenges now in order to ensure that they will remain capable of supplying their customers in the future. The company TÜVRheinland BioTech certifies Reach processes in a multi-stage procedure.**

A pilot project at the chemicals trading firm Biesterfeld in Hamburg highlights the background to these new developments. The chemical industry expects more from its distributors than just on-time deliveries. Particularly in the field of specialist chemicals, dealers like the Hamburg company Biesterfeld score by not only selling chemicals, but by also offering a range of services including tailor-made consultation services.

This approach in particular demands that dealers are comprehensively prepared for the Reach legislation, and it is also the reason why Biesterfeld opted for a co-operation with TÜVRheinland BioTech in October 2006. The latter is well-equipped with subject-related and strategic expertise in relation to Reach, having for example developed the software SimReach, which can be used to calculate the best and worst-case scenarios for how the new chemicals legislation will impact on individual companies.

This expertise was also the deciding factor for the chemicals trading firm Biesterfeld in Hamburg.

"Our goal is to achieve a significant and lasting growth in turnover within our group of companies in the next three years," said Jürgen Krohn, director of Biesterfeld Spezialchemie, one of the companies in the Biesterfeld Group. "We can only manage this if we are prepared for Reach in the best possible way, as this is the only way to guarantee to our customers that even with the new Reach regulations, we will remain in a position where we can offer totally reliable deliveries and the expertise necessary to substitute products if required."

Jens-Uwe Pietrock, also director of Biesterfeld Spezialchemie, has responded by setting up an inter-departmental project within the group of companies extending to senior management as well as to the areas of product safety, sales and purchasing, development and production, legal departments and human resources, communications and marketing as well as controlling and IT/systems. TÜVRheinland BioTech has accompanied the project through every phase in the process, offering specialist expertise on the new chemicals legislation.

Mr. Pietrock (Biesterfeld Spezialchemie GmbH) and Mrs. Zimmermann (TÜVRheinland BioTech GmbH) at the handover of the project papers.

Defining Concrete Project Goals and Schedules

The first aim of this project was to integrate Reach in the management systems already being used within the company. This was done on the basis of an information and monitoring system that monitors compliance with defined project steps in the various organisation units. After the subject has been anchored in the different areas of the company, the next step was to analyse all of the products which are traded by the company. It was important here that products which are only used in certain areas or on a short-term basis are not forgotten during the analysis. This made it possible to create the basis for pre-registration at an early stage.

Biesterfeld Spezialchemie operates also outside the European Union, with offices in Russia, Croatia and Ukraine. This therefore means that, as part of the preparations for Reach, part of the challenge is to integrate a widely distributed network of sites into the process together with all of the purchasing and sales departments. It has proved helpful here for all of the different sites to be linked with online IT networks. This direct online access to information, which – on a day-to-day basis – makes it possible to make products available at short notice via central or regional storage warehouses, also makes it easier to access information which is relevant in the context of Reach.

However, Reach also requires more far-reaching information in addition to this. According to Ewald Langenohl, director of TÜVRheinland BioTech, "difficulties may for example arise in cases where the exact quantities of the constituents of imported preparations need to be determined, or in cases where varying qualities can have a bearing on the conclusions of toxicological studies."

TÜVRheinland BioTech GmbH Consultancy firm and test institute for the implementation of Reach.
Services in the context of Reach:
- Project monitoring and control
- Cost-effective analysis of the substance portfolio
- Reach impact assessment
- Consortium support
- Full performance of registrations
- Cost reduction strategies

TÜVRheinland BioTech sees its role in the development of strategies, additional resources and testing systems which are used to support the industry. As an independent third party, they focus on standards and set performance benchmarks for professional and cost-effective implementation of Reach.

Costs Of Registration

How much will it cost a company to register all the substances it trades in? One of the important sub-goals of any Reach project is to calculate the costs arising as a result of registration. For this purpose, potential consortium partners will need to be found who can share the burden of the registration costs. Key areas here include the gathering of available information about substances for non-European suppliers and the clarification of copyright issues in relation to this data.

In this context, the expert system SimReach from TÜVRheinland BioTech allows companies to prepare strategic corporate decisions by simulating registration scenarios. The toxicological expertise contained in this system results in realistic assessments of the costs for each import product. This in turn allows senior management and financial control departments to incorporate the capital requirements resulting from European legislation into their strategic planning.

Biesterfeld Spezialchemie is a high-growth European distributor of products in the areas of LifeScience, Food Ingredients and CASE which are subject to declaration. As a partner of leading global suppliers, the company presently employs 100 members of staff at 14 European sites and distributes a broad range of specialist chemical products and food additives. Beyond the role of a traditional distributor, the company also offers its partners a high level of both application-specific and market-driven expertise.

Intensive Dialogue With Customers

TÜVRheinland BioTech concludes the monitoring of the project by awarding a multi-level certificate. The "Reach-Approved" seal of approval to the company. This will offer Biesterfeld a significant time advantage in terms of communications with customers, as the "Reach-Approved" status demonstrates to the executive board and to the customers that the company has prepared itself intensively for the new Reach legislation and that everything is on track in relation to the Reach schedule. Of course, this is then monitored over longer periods of time as part of the ongoing monitoring of the project. Ultimately, the goal is to ensure that distribution routes and product availability remain intact.

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Stuck In The Middle

▶ Continued **Page 12**

preparation the following check list could be used:
- Aspects that should be checked for every substance being imported.
- Does the non-European supplier enough available data, or is more detailed contact with supplier necessary?
- What are the detailed applications of the substances? Are there differences between supplier and customer use (fig. 2)?
- Are there known competitors for the substance that could be participant of a consortium?
- Are there possible European suppliers that could be used?
- Are there import substances that will be exempt from registration?
- Which import substances should be pre-registered?

For most of the small- and middle-sized companies, the registration process is only possible by joining consortia. The purpose of a consortium is to avoid unnecessary testings (on animals etc.) and costs for the companies; and cost sharing based e.g. on the market share of a company.

All participating companies must be registered at the ECA. The companies can decide on their own if additional information (like chemical safety report or guidelines for safe handling etc.) will be prepared individually. The consortial contract can be prepared individually, as the Reach legislation does not call for a specific contract form. It is very important for small- and middle-sized companies to consider the consortia-forming process during preparation. This will probably be the most likely way to fulfil the registration obligations.

In addition, it could be wise to provide customers and/or suppliers with active information, such as a one-page handout describing Reach in short and your company's Reach. This will increase the necessary communication of all participants in the process.

Summary

Small- and middle-sized companies have to check their own role in the Reach process; often these companies are importing raw materials or substances from outside the EU. Importers have the same obligations as manufactures and proper preparation is necessary.

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Learning To Share Data

Opportunities and Obligations Under Reach

When the Reach regulation enters into force on 1 June, manufacturers and importers of chemicals will have new responsibilities concerning their safety data. Companies taking part in the registration process will be obliged to share any data they have, and refusal to share may result in exclusion from the Reach process and consequent loss of market. Even companies who have decided not to support a substance in the process may still have useful data, and may even find it has a market value.

In the early stages of the development of the Reach regulation, the commission was extensively lobbied to ensure the minimal use of vertebrates,

Terrestrial ecotoxicology

to reduce the testing burden generally and to encourage help for SME's. The end result of this lobbying was the principle of "one substance, one registration." This principle means that the registration process will operate with one registration per substance, rather than a registration for each manufacturer/importer.

The regulation is also very strong with regards to vertebrate animal testing. For example Article 23 states, "… testing on vertebrate animals for the purposes of this regulation shall be undertaken only as a last resort". At higher substance tonnage levels, animal testing can only be conducted following approval by the European Chemicals Agency (ECA). To save money on testing and administration and to reduce vertebrate testing, companies will be strongly encouraged to work together in consortia or task forces.

Substance Information Exchange Forum

Since it is estimated that there are 30,000 substances which may fall into the scope of Reach, it is conceivable that there may be significantly more pre-registrations submitted to the ECA. It is highly likely some substances could have a dozen or more registrants. To manage this, the agency will create a Substance Information Exchange Forum (SIEF) for each substance. The purpose of which will be to put all manufacturers/importers of a substance into contact with each other. Registrants can then discuss what data is available and what data need to be generated on a shared basis. The members of a SIEF can then submit a joint registration using shared data.

When considering co-operating with members of a SIEF or forming a consortium, it is important to seek legal advice to protect both the company's interests and ensure compliance with competition law. Legal advice is outside the scope of this article but data sharing, protection, confidentiality and compensation will be discussed.

What Is Data?

Before considering the issues of sharing data it is important to understand what is meant by data in the context of registrations under Reach. Article 3 (27) defines a full-study report as "a complete and comprehensive description of the activity performed to generate the information. This covers the complete scientific paper as published in the literature describing the study performed or the full report prepared by the test house describing the study performed". Article 10 (a) is also very clear; "…the registrant shall be in legitimate possession of, or have permission to refer to the full study report…"

These articles imply that a registrant cannot simply copy end-points from the internet or use summarised data from other legislative programmes (e.g. EPA Registration Eligibility Decisions (RED) or high production volume ((hpv)) programmes).

New or Non Phase-in Substances

The Reach regulation applies to new as well as existing substances. Existing substances, provided they are pre-registered, will be evaluated in a phased process and so are therefore called phase-in substances. New substances, or those for which pre-registrations were not submitted, will, therefore, be non phase-in substances. Within Reach, certain aspects of data sharing are dealt with differently for phase-in and non phase-in substances.

Vertebrate studies may be a valuable commodity.

Sharing, and the payment of compensation, will be mandatory for non phase-in substances. This means that if a substance has been registered by company A and another company (B) wishes to manufacturer or import the same substance, company B will be required to register it as well. To avoid repeat animal testing, the agency will be obliged to use vertebrate data from the original registration (made by company A) to support the second registration, provided company B compensates company A.

Unlike the arrangements that are in place for Directives 91/414/EEC and 98/8/EC (plant protection and biocides directives), companies do not retain exclusive access rights, and will be obliged to come to an agreement on compensation and will have only a month to do so. An arbitration board may be put in place to assist in this process, but if they still cannot agree then the agency may grant company B access if company B pays a proportionate part of the price to the data owner (company A). It will be possible to appeal against this decision. Submitting data and allowing other companies to use it only with permission is called protection. Protection lasts 12 years, so if company B applies 12 years after the original submission of data then access to it is free. Note that access in this case allows the agency to use the results of the study, but it does not confer on company B any rights of ownership i.e. the right to possess, copy or use it for other regulatory purposes. Supply of reports and permission for other purposes can, of course, be negotiated with the data owner. It is also allowable, but not mandatory, to agree compensation for non-vertebrate data.

Existing or Phase-in Substances

For registration of phase-in substances, the SIEF will be in operation. It will be mandatory to share existing vertebrate data, and it is allowable to agree compensation for non-vertebrate data. Companies are obliged to inform the other members of a SIEF of any/all data they possess on request. If they possess a study then they will also be obliged to provide the proof of its cost to the requesting participant. If data do not exist, then companies simply share the costs of generating it.

If a company owns a vertebrate study but refuses to share it with other participants, that company cannot continue its own registration. An appeals process against the agency will be put in place and penalties can be imposed by Member States.

In both phase-in and non phase-in situations, a company has little opportunity to fully protect its vertebrate data. The obligation to share non-vertebrate data exists only if the prospective registrant requires such data (in which case the owner of non vertebrate data is obliged to share).

Compensation

For companies who will be in a position to share data, there is the issue of compensation. The articles in Reach regulation indicate that fair compensation should be paid in the case of data sharing. The regulation indicates that for non phase-in substances, companies "shall make every effort to ensure that the costs of sharing the information are determined in a fair, transparent and non-discriminatory way." Similarly for phase-in substances, the owner of a study is obliged to provide proof of its cost to the other sharing members of the SIEF. Participants are expected to agree sharing in a fair, transparent and non-discriminatory way. If they cannot reach an agreement, costs shall be shared equally – there is a question here over the motivation to reach agreement in this situation. The guidance on data sharing and compensation is being drafted by one of the Reach implementation projects (RIP 3.4), which is due to report shortly.

The requirements to share and to compensate owners of data, opens up a potential market for good quality test data, particularly from vertebrate testing, where studies cannot be performed if data already exists. For example, if a company is not intending to support a particular substance but owns vertebrate data obtained from it, then there is a market to sell the study to a company who is supporting that substance.

Competing companies, tend to keep their business information as confidential as possible. In recognition of this, Reach allows a third party representative to anonymously represent companies in consortia thus providing some degree of confidentiality.

Summary

Under Reach, registrants will be obliged to share data and compensate each other. The cost of generating new data will also be shared. Ownership of data may remain with the original owner but newly generated shared data could be owned by all parties who co-operated to commission the study. Data submitted for non phase-in substances will have 12 years protection but only in as much that competitors will have to pay compensation to make use of it; data is not fully protected from use by competitors.

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A Small Business Perspective

Technology Transfer Between Academia and Industry

Small companies have advantages and disadvantages when engaged in technology transfer. Limited resources, being the norm rather than the exception, means their criteria for technology transfer must be exact so failure is not an option. This paper covers a company, whose very existence resulted from technology transfer from academia, with examples and case studies of some past opportunities. New product development ideas come from many sources, including literature, direct contact, referrals, brokers, internet searches and academia, but here we deal with technology transfer from academia.

As Manager of new product development at Madison-Kipp Corporation (MKC), over 25 years ago, my department was responsible for developing new products with US-$5,000,000 in annual sales. Being close to the University of Wisconsin (UW), we contacted the Wisconsin Alumni Research Foundation (WARF); responsible for matching existing UW patents with potential companies who would commercialise products from these patents. We offered a US-$5,000 "finder's fee" to students and employees in UW engineering departments whose ideas or prototypes might result in viable new products.

One idea of interest resulted from a prototype, fluid surface tensiometer built by a chemical engineering student, based on a 50-years-old idea. As no patent had been applied for, WARF felt no need for involvement and pursuit of a patent was left to MKC, following the award of the finder's fee, split between the graduate student and his chemical engineering professor.

Unfavourable new product market research and recessionary times for MKC resulted in eventual abandonment of this new product, even though it was pursued into patent application, prototype, and final product development. I decided to pursue this new product and negotiated a licensing agreement for the technology and patent rights. The resulting new company was SensaDyne Instruments. We commercialised the world's first dynamic surface tension measuring instrument, and are in business today, with computer-interfaced laboratory Tensiometers using Windows OS platforms and embedded CPU, standalone, in-process Tensiometers.

Small Company Limitations & Advantages

Small companies typically have limited product development capital, time, personnel, and physical resources. Capital is needed for one-time fees, patent and licensing costs, prototype and production development, and market research. Limited personnel can sometimes be balanced by multi-talented or multi-technical personnel, but if additional requirements for marketing, sales, safely, and legal expertise is not in-house, there are extra costs for outsourcing these functions. Manufacturing resources must be stretched or upgraded for both prototyping and production.

Small companies should respond faster to new opportunities as they usually lack layers of bureaucracy, have greater open mindedness and less product tunnel vision. There may be less competition among fewer new product ideas, and potentially faster product evaluation and market research.

New Product Criteria

Criteria for successful new product development must be exactly defined for small companies, since one or two failures can cripple or bankrupt them. Knowing what and where the market is on a global, regional, and local level must be thoroughly researched, as well as the patentability or proprietary know how of products. Understanding product and technological life, new product features, and applications is essential. There has to

be thorough understanding of existing and future domestic and foreign competition.

A small company needs to be particularly cogniscent of product compatibility with existing manufacturing capabilities, existing product costs, and pricing. Can the new product be produced with existing production technology? Is there compatibility with existing costs and profit margin levels with which the company has been successful to date? Are overhead, patent, licensing, sales, manufacturing, marketing, warehousing, and distribution costs in line with existing products?

A small company must evaluate the simplicity or complexity of product manufacturing, and if there is any compatibility with existing product lines, customers, and industries. It must evaluate safety and product liability, training and support for staff, distributors, and customers, on-site and remote. There must be recognition of how the new product might effect ongoing relationships and support for existing customers and distributors. Finally, is this something that the company will enjoy doing?

University Techology Transfer – Arizona State University

One example of how a university transfers their patented ideas to industry is Arizona Technology Enterprises (ATE), established by Arizona State University (ASU) in 2003 to replace the ASU Office of Technology, Collaborations & Licensing. ATE's primary functions are to apply for patents, market ASU inventions, and negotiate licensing deals with commercial partners. As a limited liability corporation, a private enterprise, it can more closely mirror how business transactions occur with a commercial partner. It decides whether to license technology to other users or start a company, in most cases with outside management, and whether to spin out companies if there is really strong platform technology.

In fiscal year 2004, 137 institutions at ASU introduced 567 products. Between fiscal year 2004 and 2006 ATE generated $7.8 million in licensing revenue. In fiscal year 2004 through 2006 ATE applied for 289 patents and obtained 59, and was involved in 80 licensing agreements. ATE spun off 15 companies, of which 5 were acquired by other firms. This year 13 companies were selected from 70 applicants for presentations before accredited investors at the 2007 Southwest Capital Conference, an annual event.

Direct University Contact

Several years ago, a university professor and SensaDyne Tensiometer user, at his university's Institute for Applied Surfactant Research contacted me regarding an idea for a patented static surface and interfacial tension device. A chemistry graduate student's idea, using a cylindrical rod and a standard analytical balance, it could be manual or automatic. Mathematics was developed and concept tested. It was low cost and low technology, and could be sold as an auxiliary product for existing top-loading, analytical, balances or as a new product with a new balance. At the time, our Italian representative manufactured top-loading balances, providing us with a known source.

Financial requirements were: one-time fee of US-$5,000; 15% royalty per instrument sold; minimum semi-annual payments of US-$7,500; a three-year exclusive license; termination after three years by either party if not satisfied; and reasonable development budget funded by SensaDyne. Development requirements were: all R&D and development done close to the university's location; marketing and manufacturing by SensaDyne; and new patents to be jointly owned. This came to a base, three year, US-$50,000 investment cost.

We declined and have never seen this device come to market.

Indirect University Contact

A SensaDyne user at a U.S. brewing company (BC) contacted us regarding a patented Relative Dynamic Liquid Surface Activity Detector, the rights having been given to Research & Resources, Inc. (RRI), a for-profit subsidiary of the Medical College of Wisconsin.

Financial requirements were: one-time fee of US-$5,000; 5% royalty of net sales with a minimum of US-$26,500 over the initial five years: US-$300, US-$1,200, US-$2,250, US-$4,500, and US$5,000, from year one to year five, payable semi-annually; and US-$5,000. semi-annual payments after the fifth year. Any sub-licensee to pay the same 5% royalty. The royalty split was 1/3rd RRI and 2/3rd BC. In addition BC "will have the right, but not the obligation to take appropriate action to defend its patent rights" against third party infringers. "If appropriate action is taken, royalties are still due. If not, SensaDyne can take action with costs deducted from royalties. If no action by either, all terms are still in force." Agreement terminates with patent expiration. With no marketing study, minimum R&D and development control, and minimum five year investment of US-$50,000, we declined and have never seen this product come to market.

Summary

The old maxim of "buyer beware and seller take care" is particularly true for small companies involved in technology transfer, in that the company shoulders all of the monetary risk. But if a small company understands its limitations and advantages, and has fully defined new product criteria, it can use its limited resources to expand its products and profitability. The selected case studies presented should give important evaluation criteria when dealing with academia in technology transfer situations.

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‘Disruptive’ Behaviour

Dow Corning’s Innovative Business Model

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model had been introduced into the silicones market.

At the same time, we realised that Dow Corning could use its expertise in other areas to revitalise our Dow Corning Brand and help customers solve problems or seize new opportunities. So we re-focused our corporate strategy to place a greater emphasis on our solutions and ability to innovate with our customers. For example, we introduced solutions to help customers create new markets, to expand into new geographies, to create new formulations, and to strengthen their supply chains and manufacturing processes. We also provide access to knowledge about regulations in countries around the world and environment health and safety practices. Our solutions business model has become a strong differentiator for Dow Corning and has provided a new source of revenue for the company.

How did Dow Corning align the entire company behind the new strategy?

E. Peeters: The first step was to have a clear corporate strategy and a corporate culture in which rewards and recognition were aligned with strategy. At Dow Corning, we also found it helpful to involve all employees in innovation processes. One of the key activities for us was the training we gave to employees to ensure their behaviours match our “brand promise.”

Dow Corning employees had to learn how to become better consultants. For them, we implemented mentor and ambassadors programs and offered training to guide customer interactions. We’ve also encouraged these employees to share their success stories. Xiameter employees had to learn to provide exactly what their customers wanted and were willing to pay for – no more and no less.

These changes transformed our internal culture. Employees now are more involved with customers and feel more connected to the marketplace, since they are constantly listening to customers in order to match our services up to their needs. We now focus on the unique needs of each customer and customize our offerings accordingly – in other words we listen, understand, and then act exactly according to customer needs.

What effect have the new models had on business?

E. Peeters: The introduction of solutions has transformed the customer’s experience of our company. We’ve established ties to customers on many different levels, and they turn to us for an increasingly broad range of requirements. We have, in effect, transformed our company from a product-focused supplier into a solution company.

Another result worth noting – in 2002 Dow Corning had virtually zero sales online. By 2006, 30% of our combined Xiameter and Dow Corning sales were online.

How can other companies integrate this plan into their own businesses?

E. Peeters: We all know how important innovation is – but it’s often quite a challenge to make it an integral part of your business. What our experience has shown is that you need to create systems to integrate innovation into everything your company does. From your corporate priorities and employee training programs to the way the company leaders communicate and build commitment to the way you allocate resources. Everything should reinforce that innovation is a business imperative – during years of expansion and down years as well.

A critical factor is getting regular customer feedback to monitor your progress and to stay in close touch with market requirements. At Dow Corning, we pay close attention to how our customers view us. Through global customer surveys, we utilize the insight from the “voice of the customer” as part of our decision making processes. This insight from customers impacts how we allocate resources, for example. Most importantly, companies need to consider how they can use innovation to meet customers’ needs in new ways and to set their companies apart from competitors.

How has customer satisfaction helped your company’s growth?

E. Peeters: We have been very pleased with our progress – in fact we’ve recorded double-digit growth every year since 2002. Offering business solutions, in addition to our traditional products and services, has been a key growth strategy. We have also been growing geographically into developing countries in Asia and Eastern Europe – most aggressively in China. And we’ve expanded our offerings into new areas such as solar solutions, photonics, and plasma solutions. Annually, we invest approximately 6% of revenue in R&D to develop technologies to spur growth. We are also exploring opportunities in silicon biotechnology, with our partner Genencor International. Together, we have created a new, proprietary silicon biotechnology platform. We pursue opportunities in the performance enhancing materials industry as well.

How has the business environment changed since Dow Corning was established in 1943? What should companies do to grow with the times?

E. Peeters: The business environment has changed dramatically. For our first five decades in business, Dow Corning and the industry were “inside-out” driven. Customers were eager to buy all the new products we could invent. Then in the 1990s, the industry flattened out and languished. The days of “invent it and they will buy it” were over. We recognized that we needed a new business strategy.

Our segmentation research and introduction of a solutions-driven approach led us to an “outside-in” perspective. In this way, we are listening to customers and designing our offerings to address customers’ goals and needs.

Dow Corning has a culture of “smart innovation.” How does this differ from the industry’s current understanding of innovation?

E. Peeters: Our culture of “Smart Innovation” takes innovation beyond our laboratories and our scientists. It now is reflected in everything we do, everyday. This approach aligns employees’ efforts as problem solvers with market needs.

As we look to the future, our European operations will continue to play a key role in innovation in such fast-growing industries as personal care, textiles, automotive, and construction. Europe is an important geography for a variety of initiatives, including everything from plasma technology to solar offerings. In addition, developing markets in Eastern European and Mediterranean population centres offer Dow Corning tremendous opportunities to bring innovation and other benefits of silicon.

The objective of the European Union’s Lisbon Strategy is to make the EU the most dynamic and competitive knowledge-based economy in the world, and this Seventh Framework Programme has a budget of over €50 billion. What do you consider to be the best way to boost innovation in Europe?

E. Peeters: There is no magic answer or single action – rather I think it’s going to take a combination of factors. Education is among the most important factors – and it starts from an early age. We need to ensure that young people have opportunities to experience science and that our universities and academic institutions encourage innovation. Within companies, we need to create an atmosphere and incentives that encourage our employees to have a passion for innovation.

A 2004 survey showed that innovation gap between the EU and the U.S. had not been reduced since the adoption of the Lisbon agenda, despite the fact that the U.S. does not have an explicit national innovation policy and U.S. federal funding for R&D has declined significantly as a proportion of GDP. How would you explain this? What can Europe learn from the U.S. in terms of innovation?

E. Peeters: Clearly the goal to turn the European Union into a dynamic, outward looking knowledge economy through the Lisbon Strategy is admirable. The U.S. may benefit from an educational system and industries that have had a long-term focus on innovation and substantial funding to support them. If Europe is to thrive in what is an increasingly competitive global marketplace, innovation will have to be at the heart of efforts to modernise the region. Clearly, regional leaders believe that sustainable growth, employment opportunities, and a healthy economy are all important drivers in the pursuit of more competitive, knowledge-based EU industries.

I don’t think it is a question of what Europe can learn from the U.S. in terms of innovation, although I notice that European Commission President, Jose Manuel Barroso, spoke about this to the European Parliament recently. He pointed to the benefits of dynamism and being more “flexible and business friendly” in Europe. The EU’s commitment to innovation and research and development is certainly a positive development.

Where do you see Europe in terms of innovation in the next 10 years?

E. Peeters: The region certainly has all the ingredients required for innovation success. In the next decade and until the end of the century, we believe that innovation will be one of the most important factors in determining sustainable business success.

▶ www.dowcorning.com

The Clock Is Running

The Impact of Reach on Coating Suppliers

Valspar, a U.S.-based paint company, has a wide European product range, covering coatings for light metal packaging, general industrial, coil, vehicle refinishing to name but a few. Most of the customers are industrial users, but the company also supplies aerosol paints to a number of different retail outlets. In addition some resins, substances and intermediates are manufactured in-house. In the context of Reach, a number of very specific issues arise due to the different businesses and their structures. The company manufactures coatings based on EU sourced raw materials, but it also imports coatings based on non-EU raw materials.

For metal packaging, a joint industry group (JIG) involving all in the supply chain was formed in 1996 to address food contact issues. In some of the other industry sectors the supply chain doesn’t appear to be as well co-ordinated. Most of the other business sectors we are involved in consist of many more players than those in the JIG, both suppliers and customers, and there are smaller companies involved. Thus some of the many questions facing my company and other coating companies today include:

- Which of our raw materials will be registered by their suppliers or in many instances their supplier’s?
- Can we believe our suppliers when they say they will register their raw materials?
- Are our smaller suppliers, particularly of some additives, going to be able to support the cost and administrative burden of Reach?
- Where is the definitive list of the end uses we need in order to contact our customers to ensure that our suppliers cover them in their exposure scenarios?
- How are multiple substance exposure scenarios going to be handled?
- When are many parts of the Reach regulation going to be clarified?
- When are we going to be in a position to say that we are Reach compliant as many customers are demanding today?
- What is Reach complaint?

Similar to many companies, we are actively contacting suppliers and building an internal structure to handle Reach. We don’t want to duplicate efforts or waste limited resources; thus, we have ascertained what we can do today and if and how we can influence any of the procedures in the interim, through trade association activities etc. Reading the Reach regulation doesn’t clarify the situation for downstream users such as paint companies and, more importantly, their customers. Indeed, it could be argued that Reach wasn’t written with the downstream user in mind. Multiple substances which are invariably used are, arguably, not considered at all. It is appreciated that many of the issues raised are currently being addressed, but with it being very difficult to navigate through all of the different initiatives, this article is a snapshot in time.

Unclear Terminology

To many in the coatings industry, the terminology “intermediate” has a different meaning to that under Reach. Clarification of the definitions of intermediates is required. If a coating forms a dry film (cures) by a chemical reaction such as cross linking rather than by evaporation of solvent, is that coating, which is itself a preparation, an intermediate or a polymer?

There seems to be some degree of confusion along the supply chain as to whether monomers which are CMR Class 1 or 2 need authorisation, particularly if they are made and polymerised in the same or adjoining plants. Two such examples could be PVC made from VCM (vinyl chloride monomer) and epoxy resins made from ECH (epichlorohydrin). Both are CMRs and arguably need authorisation, which means to some downstream users, correctly or incorrectly, that end uses of the PVC or epoxy resins will have to be authorised. However there are justifiable claims that as they are non-isolated intermediates, and due to the current self contained handling procedures necessary for these monomers, neither they nor polymers made from them need authorisation. Downstream users need to know as soon as possible the interpretation of the European Chemicals Agency (ECA).

Publishing a list of pre-registered substances by 1 January 2009 seems to resolve many issues at first sight, particularly with the apparently perfect option of a downstream user being able to ask for alternative suppliers for non-pre-registered substances using the ECA web site. Many of the coating industry raw materials are not substances, but rather mixtures of substances. How does one find if a raw material rather than a substance has been pre-registered when some suppliers will not tell their customers the identity of the substances in the raw materials which they purchase? A list of pre-registered substances doesn’t help. For EU-based suppliers, the pre-registration should not be an issue, as the requirements are not onerous and buys the supplier time, but what about non-EU suppliers?

Letting The Customers Know

In the Reach regulation, it states that Reach, manufacturers or importers shall be encouraged to let their customers know whether they intend to register the substance and such information should be given to them sufficiently in advance of the registration deadline in order

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The Clock Is Running

The Impact of Reach on Coating Suppliers

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to enable them to look for alternatives. However, there is no definition of "sufficiently in advance" or any potential penalty for failing to comply. In coatings for metal packaging, shelf lives of 3–5 years are not uncommon, and pack tests need to reflect this before a coating is approved. As it normally takes a minimum of 1–2 years to substitute an alternative – in the best-case scenario – our industry needs at least 7–10 years notification if a raw material isn't going to be registered in order to find a viable alternative. The argument that food contact substances are exempt from certain requirements of Reach is accepted, but few, if any, substances are solely used for coatings for food contact. Therefore, for their continued usage, it was necessary to know a few years ago whether they would be supported. The same time frame or longer applies to other areas, such as coil coatings. How can anyone substitute a raw material and obtain the relevant performance data necessary if they only know weeks before the withdrawal of a raw material? We are satisfied today that the large multinational suppliers of large volume chemicals will register them. Indeed many started the preparatory work years ago.

Reach wasn't written with the downstream user in mind.

A Substitution Nightmare

All coatings need additives which are typically used in fractions of 1 % and a number are present in any coating formulation as an "additive cocktail." Normally, it is this cocktail that gives the coating its unique performance characteristics, with each additive complementing the effects of others present in the cocktail. One additive could be present in numerous coatings, and it may be used with others that are different in each "cocktail"; therefore, substitution is difficult. One of the coating industry's concerns is the continued supply of additives, which by definition are typically small volume raw materials. Every formulator has their own favourites, and the substitution of additives will be a nightmare, because one can expect that some suppliers may use Reach to rationalise their product ranges. Coating suppliers need to know today which additives will be supported, in order to promote their use, even though the registration deadline for some additives may be 2018, because it takes a long time to develop alternative additive cocktails.

Consider a manufacturer or importer just below a threshold. They may decide not to increase volume so that they do not exceed that threshold. In many respects, allocation is worse than product withdrawal, because whilst it may be possible to continue to supply existing volumes to customers, increased volumes cannot be delivered. Product withdrawal forces one to re-formulate with raw materials which will be fully supported under Reach.

Consider a manufacturer with two EU sites as separate EU legal entities, manufacturing just below two different thresholds. The registration dossier data for the larger manufacture can be used for the smaller one. Whilst the substances may be chemically identical, they may differ in a physical property that impacts a critical property of a coating. If the larger tonnage product is the preferred one for the coating manufacturer, will that producer increase this production and exceed the threshold, with associated cost, or increase the production at their smaller site until it approaches that of the larger one?

No De Minimus Principle

There may be an issue surrounding release of substances from an article. There is neither a definition of "release" and nor a de minimus principle for an authorised substance. In reality, most coated articles will release at least one or more molecules at some point in their lifetime, particularly if land fill sites are considered. Until "release" is quantified, one hopes that common sense would prevail and the interpretation would be intentional release, such as that from a printer ink cartridge rather than the release from a coated table. This may seem trivial to some, but if any of the substances released even at low levels are suspected endocrine disruptors for example, then there could be problems due to alleged low dose affects and the potential for them to be treated as authorised substances.

Different Interpretations

It could be argued that the use of the word "use" in the Reach regulation has many different interpretations depending upon its context within Reach. Thus it is very important for agreement of the interpretation of "use" every time it appears in Reach. Whilst end use definitions are actively being progressed, they are currently a problem. In order to prepare efficiently for Reach, coating suppliers need to be working with their customers today in order to obtain information for their suppliers to use in their exposure scenarios. We desperately and urgently need a standardised set of "end uses" agreed in order that individuals do not use different terms for the same end use. These uses also need to be as generic as possible otherwise we will be in an unworkable situation.

It is understood that the safety data sheet (SDS) is the primary mechanism for transfer of information. However, many of the raw materials used are mixtures of substances. Do we get numerous SDSs per raw material? Do we then have to take the individual SDSs of all of our raw materials and attach them to the SDS for my product? For each coating the SDS will consist of numerous pages. Obviously for us and our customers a short SDS is preferable. Indeed I would argue that as we should know the end use for a customer we could leave all other uses and their respective exposure scenarios off the SDS for that customer.

The clock is running, and we don't want to have to condense our activities into a frantic few months.

Today Reach doesn't contain enough detail for any downstream user to fully understand their obligations. Over the next few months, the situation will become clearer, but for conscientious companies such as mine, the earlier the better in order to be ready ahead of time. The only certainty today is that:

- Some of our raw materials will disappear
- All of our raw materials will increase in cost
- There will be a significant increase in administrative burden on us, our customers and our suppliers
- Some raw materials may be subject to allocation
- We need our customer's help in order to transfer information to our suppliers.

It is clear that there are many unresolved issues and important gaps in the legislation. It appears that Reach was not written considering the needs of the downstream user. It seems to have been written without many of the rules being in place. There is an urgent need for the missing information and a greater degree of clarity to be made available. The clock is running, and we don't want to have to condense our activities into a frantic few months. Whilst the objectives of Reach are commendable, there are serious issues for downstream industry.

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Journey to the Copper Age

Advances in Dual Damascene Copper Deposition Technologies

In 1997 and 1998, the electro-deposition of copper for advanced semiconductor devices were reported as a solution for the need of copper metalization necessary for advances devices. Advanced devices are defined as semiconductors with high current load, high operating frequencies and further scalable small geometries. However, the shrinkage of the geometries the resistivity of the metal lines affect the gate delay of the connected transistors. Copper has demonstrated around 40 % reduction in resistance compared to Aluminum the main metalization material of the past.

This gate delay is mainly influenced by the resistance behaviour of the material, which will further increase with further decreasing feature sizes. The electrical resistance of the structured material is proportional to the length of the wiring and inversely proportional to its cross-sectional area. Overall, as the radius of the wiring decreases the interconnect time delay increases which is the opposite what the technology is asking for. The metalization for devices above 130 nm technology showed the need for a technical solution while devices at or below 130 nm require solutions to this limitations in order to achieve the performance targets.

Alternatives To Aluminium

Significant effort has been put in the development of alternative materials to aluminium (resistivity is of 2.65 µOhm cm) for many years. As alternative materials copper offered a resistivity of 1.68 µOhm cm and demonstrated to fulfill all electrical needs best. As an option, silver with resistivity of 1.50 uOhm cm was evaluated as well but showed limitations in the electro- and stress-migration performance.

Copper (Cu) performs overall best in comparison for gate time delay and reliability robustness and can be managed to most users needs. At the beginning of the development of aluminum alternatives, different deposition technologies were evaluated for their capabilities. Chemical vapour deposition process (CVD) was a potential candidate, but high aspect ratio and small geometry plating could not be accomplished at low defect levels. High vacuum sputter technology was also not achievable for thickness around 1 µm. Finally, the combination of a sputtered Cu-seed layer of ~100 nm and further enhanced to around 1.2 µm by electroplating showed the best results for volume production.

However the wet chemistry electroplating technology has changed a lot since the beginning and is still looking for further enhancements to optimise the process results. The challenging requirements of yield- and reliability-performance of to days and future devices allow innovative solutions to be introduced into manufacturing.

The electromigration performance of copper over aluminium has been published to range from 10x to 100x but even further enhancements are needed for future metalization technologies.

The Start-up Copper Deposition Technology

Copper electrolytes for metal plating contain a inorganic matrix based mainly sulfuric-acid based at low concentrations. Specific organic additives have been added to influence and control the deposition behaviour in the structures on the wafer. They balance copper deposition acceleration with inhibitation across the chip structures and so across the whole wafer.

For the small geometries used with the dual damascene technology, a bottom up filling capability is essential in order to avoid holes or seam defects in the middle of the plated structure. Due to the variable current density on the structures, the additives play a key role to support this task. The selection of additives depends on the equipment concept used, the mode of operation and the structure of the devices.

Due to the device design and its use in different applications the variable geometries range from large to small and to variable size-geometries next to each other. The copper deposition mechanisms are influenced by the size and the layout of the geometries and range from mass transport to diffusion controlled. This leads to variation in the texture and the performance of the deposit across the chip structures. However, thickness distribution of ~2 % is achievable today.

With mass production soluble copper anodes, mostly doped with phosphorous, has been used in combination with the sulfuric based electrolyte. This combination offers the necessary conductivity and the solubility of the copper for the plating process. Limitations in the concentrations are defined in the defect density, which increases at higher concentrations of the sulfuric acid. For wafer metalization technology, the fountain plater equipment demonstrated overall the best results. The fluid dynamics can be controlled best and so within wafer and wafer to wafer variations minimized. The wafer edge contacts, rotation and the cup overflow are the key variables in the design approach.

Several chemical companies offer plating chemistries (electrolytes), including dosing concepts for the organic additive systems. Therefore, a wafer-product tailored chemistry can be offered which fulfils the device requirements in a volume production environment. However, what chemistry should be used has been widely influenced by equipment companies who offer the "total solution concept." These concepts contain the equipment, the chemistry and pre-evaluated/qualified operation conditions.

This concept was implemented in the first generation of tools where soluble copper anode and a separate tank for the electrolyte was used to feed the plating cells while etching and cleaning cells where added into the equipment as well.

The Second Step in Technology

With the production implementation of the Cu-soluble anode, the product and operation database has been significant enlarged and several surprises has been supported by better statistical bases. Most significant was the need of a anode burn in and the absorption of organic additives from the electrolyte solution on the surface of the copper anode. This however created a "burst of particles" with every start of the plating mode and in particular after a longer stand by time of the tool. The adsorbed organic material was de-composed and could be measured as fine particles via optical laser counters (OLC) in-situ and within the plating cell.

Several defects have been found leading to the conclusion that this effect is the main contributor due to the adsorption of the fine particles on the surface of the wafer structure. These defects, however, create a risk of limiting yield- and reliability-results. To overcome this disadvantage, the soluble copper anode has been substituted by inert anode concepts where the copper source was placed outside the plating chamber.

This reduces the adsorption of additives and so the particle generation. However, the disadvantage of decomposing water (H_2O) of the electrolyte became a risk; gas bubbles were formed, which was then trapped on the wafer surface like small particles.

This disadvantage, especially at higher current densities, can be minimised at reduced current density and or by adding a "gas bubble trap," separating the anode and the cathode room e.g. a membrane material. Gas bubbles and small particles can be kept away from the wafer surface and offer so a feature to control defects. However, this lowers the current density reduces the deposition rate, the chemistry flow towards the wafer surface and requires additional maintenance in the "heart of the equipment."

The Third Step in Technology

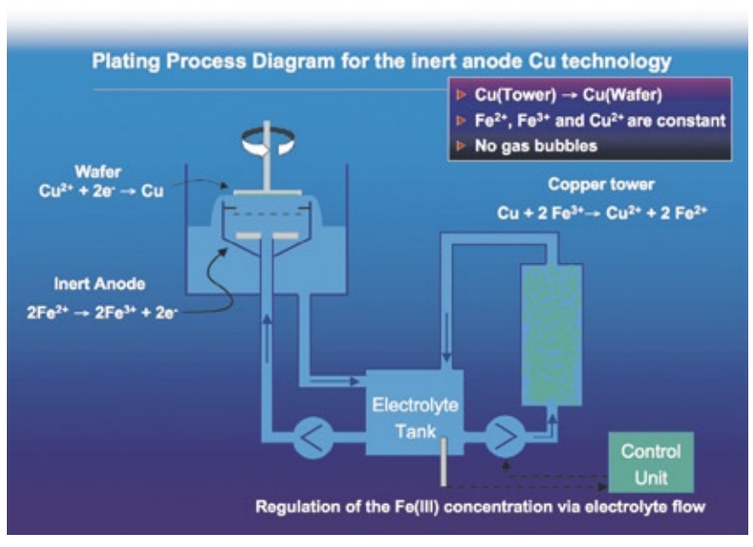
To overcome the limitation of gas bubble formation by de-composition of water during the plating, Atotech introduced a patented new concept by adding an iron redox-mediator system into the copper electrolyte. This concept allows to plate directly from the anode to the cathode without using a membrane or any other gas bubble "trapping devices."

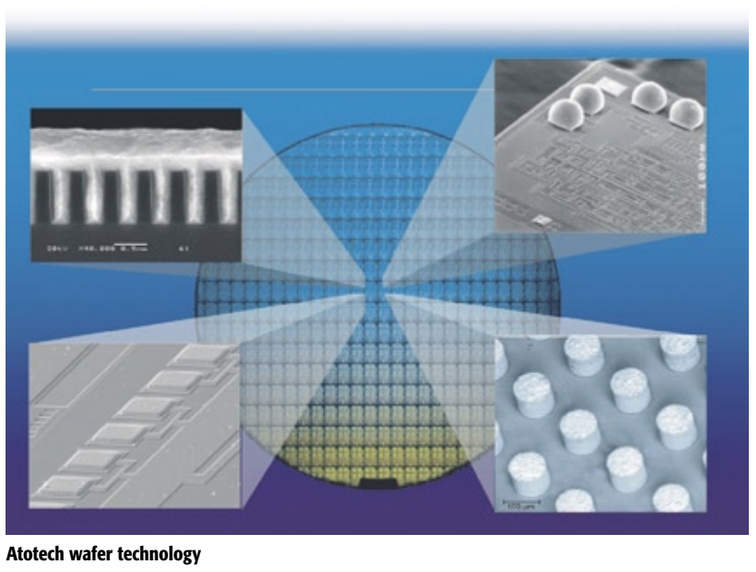
The reaction of the Iron mediator prevents in the a certain range of current densities that the water is decomposed and so no gas bubbles are formed. Thus techniques allow higher current densities and so higher deposition rates. However, extensive characterisation of the reliability data and the deposited copper showed, that traces of Iron has been incorporated into the copper film as well, but the iron seems to take "dangling bonds" of the copper crystal structure away leading to a more perfect and robust copper structure. Several parameter results support this conclusion.

The resistivity (Rs) has been found in a 1:1 comparison to be lower compared to the other described deposition techniques. Reliability stress-measurements in different applications have shown up to 7 % lower failure rates for early- and end of life failures. Most significant are better electro-migration and stress migration results. It should be mentioned that the comparison of reliability results are very difficult due to the sensitivity of the failure mode and the test device used. Therefore, different chemistries where used in this comparison as close as possible comparison from the equipment- and device- and test condition- point of view.

Industrial Usage

The first industrial use of the concept was introduced in 2002 for semiconductors qualified to automotive reliability specifications and is still




Atotech wafer technology

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More For Less

Comments on the Chemical Distribution Consolidation Trends

The chemical industry has recently entered again into an intense restructuring phase, without having reached yet the bottom of the business cycle. This new shake up results from a combination of several factors such as higher energy costs, slower growth on the mature European and North American markets, growing environmental compliance costs and increasing Asian competition for specialty and fine chemicals, as well as newly built petrochemical plants in the Middle East.

This restructuring takes the form of inefficient capacities shut down, new investments near the fast growing consumer markets and significant M&A activities. These activities are facilitated by the easy access to cheap financing and the dynamism of private equity investors. In turn, the chemical distribution sector mirrors precisely all these trends in a significant and sometimes spectacular manner. In this article, we will focus on the impact of these trends on this important sector of the chemical industry highlighting the consolidation trends, producers' new strategies and the reshaping of the chemical distribution industry.

Endless Consolidation Trends

The main reasons behind the chemical distribution consolidation trends are known:

- Increasing costs to stay in business due to more complex health, safety and environmental legislation
- Unsolved succession issues in privately owned companies
- Customers' increasing requirements for expertise, product portfolio and services
- Larger producers' growing support to companies offering them wider geographical coverage, sufficient people resources and cost optimisation opportunities.
- Channel internationalisation and the need for critical mass stimulate the growth of bigger distributors at the expense of smaller ones.

All these factors will continue to dominate the chemical distributor scene and contribute to its further consolidation, while giving a new competitive scenario.

In 2000, the total amount spent in M&A in chemical distribution reached an all time record above €1 billion, in 2003 we reached €2 billion. In 2006 the total amount of M&A in chemical and polymer distribution reached globally circa €4 billion and in the first quarter of 2007, we already reached the same level as in 2000. The total number of 2006 identified and publicised transactions is above 30, of which about half had a global dimension and some saw the arrival of new players.

In 2006, the Noble Group of Singapore acquired Dutch trader and distributor Oxide Chemicals and Gadot of Israel bought Bax Chemicals. Brenntag simultaneously strengthened their positions in the U.S. with LA and Quadra acquisitions and in Europe with Albion, Schweizerhall and Herkommer und Bangerter. Brenntag also set foot in North Africa with the acquisition of Groupe Alliance. Univar acquired a small distributor in Shanghai called Shanghai Jixing. IMCD already present in Australia and New Zealand bought Solvadis in South Africa. Azelis changed hands for the third time since 2001 by being acquired by 3i Equity.

On the polymer side, Ravago investment into Mulhstein Corporation creates a global US-$5 billion group of companies involved in polymer distribution, trading, compounding and recycling with a comprehensive polymer portfolio, including commodity, specialty and technical polymers, in addition to their own manufactured compounds.

In the first quarter of 2007, we already saw about 10 M&A of chemical distributors. Brenntag acquired Lawrence Chemicals and Ulrich in North America. By acquiring the number four U.S. distributor Chemcentral, Univar regained globally its number 1 in chemical distribution and strengthened significantly its position in North America. Brenntag mingled into the Chemcentral acquisition process by bidding over the Univar US-$600 million firm offer by offering late in the game US-$100 million more. In addition, Univar had cleverly negotiated a bitter pill of US-$22 millions which a challenger would have had to pay before entering into the negotiation. Univar is paying the final price of US-$650 million to the shareholders in cash based on a 9.3 EBITDA multiplier.

Behind the cards, we saw here the battle for the North American and global industry leadership as well as Brenntag's positioning for their intended IPO.

Producers' Strategies

In this changing environment, it is essential for us to understand chemical producers' strategies as they impact significantly the distributor scene. Producers have a significant influence on the chemical distribution market, particularly when they take a strategic approach to channel management and increase their business with a smaller number of selected distributors. They have a direct influence on the distributors' margins through their pricing policies and they may also grant distribution rights for new products and formulations to their partners. Conversely, they may cancel distribution rights when necessary or when a company is taken over. They can also support their strategic partners in their M&A activities by identifying acquisition targets and supporting their partners commercially by channeling more business to the recently merged or acquired companies. The involvement and support of some producers was visible in the Chemcentral process.

This happened also recently when European distributors expanded their market coverage in Central Europe and in Turkey. In Central Europe, chemical distribution is significantly dominated by subsidiaries of foreign distributors. The local or national distribution concept was not in place there in the nineties and did not significantly materialize thereafter.

Reasons for consolidation in the chemical distribution industry include increasing costs, high customer expectations and range of coverage.

Shaping Up The Distributor Markets

We are facing two very distinct market situations, namely for commodity or liquid chemicals where a few distributors lead the market and for specialty or factory packed materials where chemical manufacturers have apparently more channel options and influence.

For bulk or commodity chemicals, the European market scene was shaped up in the 1990s with the result that the number of companies involved in bulk chemicals distribution has been drastically reduced. In most countries the number of distributors able to buy and receive bulk chemicals on their own sites and ship them as bulk chemicals in small trucks, returnable containers or IBC's is never above ten. In smaller countries, this number is rarely above five. It is also safe to assume that within a few years most independent bulk commodity distributors will be part of bigger international groups or will survive as large national organizations such as Quimidroga or Penta, which have enough regional critical mass to carry on.

On bulk chemicals, producers have no other alternative than closely cooperating with Brenntag, Penta or Univar, which are the only companies operating many bulk and hazardous chemicals sites across several European countries. Brenntag operates around 150 sites in Europe, Univar 50 sites and Penta around 60 sites. As a result of this recent consolidation, the few remaining commodity chemical distributors dominate the market and are able to directly influence their suppliers' policies and strategies. In the near future, we will witness the final bulk chemicals distribution consolidation phase.

On specialty chemicals, the market looks more fragmented and producers are still influencing this market as they have many more channel options than for commodity chemicals. Some leading European players like Brenntag, Univar, IMCD or Azelis are already leading the market and some other international companies like Omya, Warwick, Keyser and Mackay, Nordmann Rassmann, Grolmann or Biesterfeld Spezialchemie play a major role.

In addition, we find in each country some well managed national distributors like Unipex in France, Quimidroga or Indukern in Spain, Eigenmann and Veronelli in Italy, Algol in Scandinavia or Lehman und Voss in Germany who among many others have a strong market position and offer their suppliers regional alternatives to the transnational companies.

The chemical distribution market looks fragmented when we only look at the total number of companies involved in chemical distribution in each country; this is well highlighted on www.chemagility.com, an internet search engine and directory focused on chemical distribution.

However, when we analyse the position of the five top distributors in each country serving the main industry sectors, namely coatings; adhesives and sealants; cosmetics; rubber; food and feed additives; and composites, we realise that the market is less fragmented than what we initially thought.

Due to the rising Reach compliance costs and other complexities, it is predictable that many smaller distributors will seek an exit by selling their operations to the best bidders. Many of them are struggling to keep their business even as they must run all the time finding new suppliers only to compensate the loss of old ones. Medium-size or larger national distributors have the option to carry on their business or seek an exit with a strategic buyer, which is more problematic when they already have a size over €100 million.

More For Less

The ongoing chemical distributor market consolidation and restructuring will reduce the number of channel options available to suppliers and customers. The chemical distributors, who have the resources to cope with increasing operational and environmental costs, will operate in a less fragmented and more profitable competitive environment. It is partly this growing perception which is gradually pushing up the value of the well positioned distributors now for sale.

It seems safe to assume that chemical distribution is gradually moving in the same direction than polymer distribution did recently, where seven European polymer distributors control 50% of the polymer distribution market. Knowing who those 10–15 chemical distribution companies will be in 2015 is still an unanswered question, but not for long.

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Journey to the Copper Age

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successfully used. Since then, other applications and evaluations at institutes and customers have confirmed the superior performance.

Looking from a different angle to the inert anode/redox system, a lower and slower decomposition of the additives in the solution can be stated as significant. Therefore, the concept also can be seen also as a cost advantage of >30% based on the lower additive consumption. Less by-products are formed and so not enriched in the electrolyte solution. Lower impurity levels are detected via SIMS analysis leading to the conclusion that the copper technology using a redox mediator concept offers significant technical and commercial advantages as well.

Today several different base electrolytes are available tailored to fulfil individual device requirements. Reliability targets can be met and influenced by varying the different acid levels, Copper concentrations or additive systems optimized for the use in inert anode/redox mediator concept equipments. The redox-mediator is in trace quantities added and can be controlled via the online analytical system which is available to monitor and control the entire process within the settings of process windows.

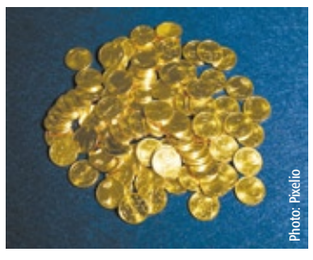

Photo: Pixelio

With the introduction of a inert anode/redox mediator controlled copper electrolyte, Atotech has introduced a new generation of chemistries tailored to high performance reliability robustness for copper depositions at reduced operating cost. Several base electrolytes are available and qualified for different semiconductor applications showing superior reliability performance results. Lower resistivity and lower additive consumption are positive side effects beside a significant gain in electro-migration and stress migration results, generated within different reliability specifications.

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The German Drug Market

Reforms Could Endanger Pharmaceutical Innovation

The drug market has been rigidly controlled by regulations for many years now, both nationally in Germany and internationally. Pharmaceutical companies nevertheless have experienced a significant growth if highly specialised biotech innovations in niche markets have been a part of their portfolio. However, the current German government wants to particularly control the increasing health care expenditure in this market of biotech innovations, which is a key driver of economic growth in Germany. The annual drug expenditure increase amounted to about €1 billion – or 4% of the total market. As the other market segments of generics, OTC-drugs and analogue drugs are already highly regulated, the only remaining growth opportunity in the German drug market is at risk.

If the government decides to introduce the cost-benefit assessment proposed by the German Institute for Quality and Efficiency in Health Care (IQWIG), which is associated with a mandate to the Federal Joint Committee to assign maximum reimbursement prices, it will be obvious that the political paradigm to save on old drugs and invest into innovations no longer will hold true for Germany. Quite the contrary: Innovation will become a prime focus for cost containment exercises. German pharmaceutical industry is facing a tougher environment, and German patients are facing an even harder access to new medicines as in the past, either because co-payments will rise if industry does not accept the maximum reimbursement prices, or because new drugs, such as inhaled insulin, will be totally excluded from reimbursement.

The time to re-think the cost-containment policy and to deregulate the drug market has come. The German health policy must commit itself more decisively to the value of innovations in order not to further damage the German drug market's reputation.

The Challenge for Innovative Enterprises

Many of the discussions taking place in Germany as to the role of medication in health care focus on short-term costs. Efforts are constantly being made to cut down costs spent on medication – with 10 reform laws in the last 10 years alone – in order to contain medication costs that are increasing at an exponential rate. At the same time, a growing number of voices are proclaiming that patients will have little or no access to new medications in the future, becoming effectively cut off from medical progress.

From the industry's point of view, modern medical care is caught up in conflict between increasing research costs and longer periods of development on the one hand, and sinking medical reimbursement coverage and increasing uncertain market access on the other. One of the main reasons for the new uncertainty in Germany is the recent critical decisions made by the German Institute for Quality and Efficiency in Health Care (IQWiG). These evaluations listed individual types of therapy as being not recommendable for statutory health insurance coverage due to what the institute determined to be an unsatisfactory amount of evidence based medical data.

From April onwards, the new legislations for negotiating reimbursement prices of innovative therapies after or instead of a cost-benefit assessment will end the paradigm of the "wishful innovation," as from then onwards "true innovations" will be exposed to detailed scrutiny in the review process. A not-too-unlikely scenario: If the cost-benefit evaluation of a new drug ends without showing cost-benefit, and the manufacturer does not accept the proposed reimbursement price, patients will face significant co-payments, or must abstain from the treatment opportunity.

Conflict Between Expectation and Ability

True innovations have widespread societal acceptance. Economic politics treats innovations with special patent protection provisions, and the true innovations have in the past in Germany been exempted from the establishment of reference prices. The new reform to be enacted in April continues to exclude these drugs from maximum reimbursement levels if they are unable to prove their cost-benefit in the IQWIG assessment. However, so far no new drug has managed to show additional benefit according to IQWIG, making the hurdle to show better cost-benefit for innovations almost insurmountable.

The real problem is the varying opinion about what constitutes a true innovation. The "good" true innovations are those that have revolutionised the therapy of multiple sclerosis and rheumatoid arthritis, have created new treatment options for patients with cancer and have helped to treat and avoid infectious diseases. True innovations, very often of biotechnological origin, have launched a medical revolution by creating unexpected new perspectives for patients. For those pharmaceutical companies that have deliberately taken on the risk of researching true, biotech-innovations, their products have on occasion brought them financial success – much to the likes of industrial and health care politics, which have always emphasised their desire to amply remunerate true innovation, as the true risk in taking on biotech-research is an up to 50% higher investment than those required for chemical innovation. Consequently the reward for investing about US-$1.2 billion should reflect these additional risks.

The national origin of a company plays little or no role in forecasting its future financial success on the German market. What is considerably more remarkable is that those companies who played the biotech innovations card quite early in the game have experienced more success. In comparison, the classic small molecules-focused chemical corporations were not nearly as able to update their success story of the previous years. Active industrial politics in Germany therefore means actively supporting biotechnological innovations in economic politics and health care legislature, and improving their market access – in the best interest of the patient.

Innovation Catch-22

At the same time, a significant concentration process of research and development is taking place in the industry, as only an oligopoly of manufacturers can support the evermore-intensive research costs. The industry is caught up in an "innovation-Catch-22": corporations' necessity to achieve great success in research, which continues to become more pressing due to the tremendous increase in research and development costs, while simultaneously the chance to earn the money spent on research back from the market is sinking. It also seems extremely difficult to replace the highly profitable, older blockbuster drugs with new substances from the pipeline. In fact, the increasing innovative competition is basically requiring companies with their own research and development departments to change their course about every ten years, as their already-patented substances eventually become completely substituted with generic brands. At the same time, the expected dynamic development demanded by international markets becomes more and more difficult to attain.

The necessity for success in research (and therefore capital success) has started an unprecedented wave of corporate consolidations in the pharmaceutical sector. The mergers haven't been prompted by a voluntary addiction to bigger dimensions, but rather from a necessity to manage the growing risk associated with research and the accompanying risk-related investments. This new corporate focus on the few blockbuster molecules can mean considerable business risks when drugs experience a change of their risk-benefit-equation over time. Numerous examples from the past several years show the immense impact that it can have on a business when blockbuster molecules lose their approval for use or have it significantly limited (examples include COX-2 inhibitors, statins, and natalizumab). Affected corporations not only lose immediately up to 20% of their net worth – which means significant corporate restructuring at the very least.

The increasing oligopolization of medicinal research is leading to even more intense research competition: the phase of relative exclusivity on the market for new approvals in medical innovation (NCEs) is shorter, as research steadily becomes more efficient. Corporations are constantly being forced to ponder whether or not they should seek quicker market approval by keeping the drug's area of application more limited than it would necessarily have to be, or if they should continue collecting data in order to widen the registered therapeutic areas. The call for long-term outcome data makes the development of drug therapies even more expensive, as the innovation's access to the market is delayed. In this regard, the required collection of the outcome data will lead ultimately to the further consolidation of the industry. The important question for the industry is not whether data can be collected or not, but rather, if reimbursement is ensured throughout the period of 'long-term outcome-data collection' – for example after conditional reimbursement within the framework of post-approval studies and drug registries. If the answer is no, the investment risk becomes even greater, threatening to suffocate the almost 100%-privately financed research.

From the industry's point-of-view, it is extremely important that the general requirements for the drug evaluation are not only possible to plan, but that they remain consistent over the approximately 10-year-long development cycle and are not changed one-sidedly. It is interesting to observe that for certain substance groups such as antidepressants new requirements have been introduced by new Health Technology Assessment (HTA)-agencies (that have, in the meantime, been established) 20 years after beginning of the research that were completely not foreseeable at the time of clinical development. The argument for unchanging criteria includes the rejection of previously accepted surrogate parameters, despite the fact that they were used as a dependable clinical proxy within the development process towards approval.

The high expenditure for research and development of about 15% of turnover raises high expectations for investors on their return on investments. Grabowski and Vernon (2000) compare i.e. the risk of investing in drug research with that of investing in a company start-up. The return for capital investors in drug research ought to be comparable to the returns of the venture-capital investors. On a long-term scale, private research can only remain feasible if the investment in research and development can be refinanced on the health care market. If innovative drugs are worth their price (i.e. they offer a value for the money), it has to be equally possible for those companies to refinance their investments (i.e. receive money for value). Cost-cutting politics run by sheer fiscal thinking and focusing on the reimbursement of innovations as being at the heart of industry policy, is of danger of damaging the prospects of German industry. Limiting the reimbursement of innovations always carries the risk of damaging the German pharmaceutical industry and could end up with exporting not only highly qualified jobs but also expertise to other countries.

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Part 2 of this series will cover true innovation

Dow: Capital Investments Planned

Dow Polyurethanes, a business unit of The Dow Chemical Company, announced that it plans to further invest in Europe by expanding capacity at two of its facilities over the next two years. The company plans to increase name-plate capacity at its polyols plant in Terneuzen, The Netherlands, by 180 kt/y and at its propylene glycol (PG) facility in Stade, Germany, by 80 kt/y.Dow recently completed a year-long feasibility study to evaluate the expansion of all polyol product lines at its existing facility at Terneuzen. Based on the results of that evaluation, the company will expand polyols name-plate capacity at the site by 180 kt/y.

Dow has also implemented an incremental, world-scale capacity increase at its propylene glycol (PG) manufacturing facility at Stade, Germany. The project, which was completed in 2007, increased capacity at the facility from 190 kt/y to 225 kt/y. A second expansion project, which will be completed in 2009, will add another 45 kt/y of PG capacity to the plant. By year-end 2009, PG capacity at the site will total 270 kt/y, making Dow's Stade plant the world's largest PG facility.

▶ www.dow.com

The Future of Device Integration

For device operation two technologies with a high level of overlapping and yet different philosophies are currently established. While both EDDL (Electronic Device Description Language) and FDT (Field Device Tool) hold their specific advantages the situation for system vendors, device manufacturers and especially end users is extremely unsatisfying. Therefore, the Institute for Information Technology in Mechanical Engineering (ITM) developed a novel concept that integrates the advantages of EDDL and FDT into one universal and clearly structured architecture.

The attention that the presentation of the concept raised during the general meeting of Namur emphasises how topical and important this issue is. To further detail the concept ITM developed a white paper and issued it to ECT (EDDL Cooperation Team) and FDT Group respectively in order to get their opinions. The positive comments of both organisations mark a milestone in the field of device integration as they show such an amount of agreement that the chances for a joint solution are very good.

▶ www.itm.tum.de


John M. Steitz

Albemarle Corporation Names VP and CEO Albemarle Corporation said that its board of directors has named John M. Steitz as executive vice president and chief operating officer of the company. Steitz will oversee all aspects of Albemarle's marketing, sales, research and supply chain activities. He will maintain his focus on improving margins, increasing cost efficiencies, promoting innovation in new product development and ensuring premier service to Albemarle's clients around the globe.

▶ www.albemarle.com


Stephen C. Forsyth

Chemtura Names Stephen Forsyth CFO Chemtura Corporation has appointed Stephen C. Forsyth as executive vice president and chief financial officer, effective 30 April. Forsyth will succeed Karen R. Osar as executive vice president and chief financial officer, whose retirement from the company was effective in March.

Kevin V. Mahoney, Chemtura's senior vice president and corporate controller, is serving as interim CFO pending Forsyth's arrival from Hexcel Corporation, where he most recently served as executive vice president and chief financial officer. Forsyth has 16 years of operating management experience with Hexcel, including serving as vice president of international operations, responsible for one third of Hexcel's sales, assets and employees, and serving as manager of various resins and chemicals businesses and international divisions.

▶ www.chemtura.com

Arkema Announces New Appointments Arkema is reorganising its Vinyl Products business segment by splitting its Chlorochemicals and PVC business unit into two separate business units: Chlorine/Soda and PVC. The other two business units, Vinyl Compounds and Pipes/Profiles (Alphacan), remain unchanged. Moreover, the Vinyl Products business segment will have its own industrial management structure for its entire activity. As part of this reorganisation, Otto Takken, Vinyl Products Vice President, has announced the following appointments: Frédéric Marot-Achillas, Group President PVC business unit; Denis Tual, Group President Chlorine/Soda business unit; and Gérard Robert, Industrial Director for the Vinyl Products business segment.

▶ www.arkema.com


Stephan B. Tanda

DSM Announces Appointments Wei-Ming Jiang, currently senior vice president strategic projects Asia at DSM's Corporate Planning Department, has been appointed president DSM China as of 1 May. He will succeed Stefan Sommer, who will continue his assignment as strategic advisor to DSM's managing board. Stephan B. Tanda has been appointed as member of the managing board of DSM as of 1 May. Tanda started his career in 1991 with DuPont in Switzerland.

▶ www.dsm.com

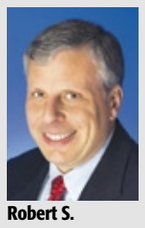
Changes in Chemson Executive Board The executive board of Chemson group, extended for the restructuring of the Chemson Europe, leads back again into the previous number of members of the board. Peter Haidenek has stepped down from his executive committee position at Chemson and has left the company after conclusion of the substantial restructuring measures.

▶ www.chemson.com


Eriko Sakurai

Dow Corning Names New Group Director Eriko Sakurai has been named global industry executive director for the Dow Corning Expertise-Based Industry Group. Sakurai will be responsible for all aspects of customer relations, sales, technical support, marketing, channel management, product line and technology development. Previously, she served as the global industry marketing director for the Dow Corning Life Sciences industry.

▶ www.dow.com


Robert S. Wedinger

Chemtura Names New Group President Chemtura Corporation has named Robert S. Wedinger to the position of group president, performance specialties (Petroleum Additives, Urethanes, Polyurethane Dispersions, Fluorine, and Optical Monomers). Dr. Wedinger also serves as Chief of Staff, Chemtura Corporation. He joined Chemtura in May 2006 with responsibility for the rubber chemicals and EPDM polymers businesses.

▶ www.chemtura.com

Pharmaceutical Outsourcing Conference

Strategic Research Institute's 11th Annual Pharmaceutical Outsourcing of Discovery Chemistry, Advanced Intermediates & APIs will be held on 16-17 July at the Hyatt Regency in New Brunswick, New Jersey (U.S.). The conference features issues pertinent to all sized pharmaceutical and biotech companies, CROs, CMOs and other types of suppliers. Through comprehensive global coverage, the conference caters to a unique blend of business development, senior level executive and scientists with interest and expertise in contracting pre-clinical and clinical drug development services, primarily in chemistry and manufacturing.

▶ www.srinstitute.com/outsourcing

Pharma Today – Pharma Tomorrow?

The symposium "Pharma today – Pharma tomorrow" on 5 June at the Frankfurt International Airport deals with the development of the pharmaceutical industry beyond the present. Speakers from the regulatory affairs, operational, design and plant construction as well as from a totally different industry, the automobile industry, offer the participants an overview over the future of the pharmaceutical industry. Lectures will be in German.

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Don't miss the next exciting issue of CHEManager Europe! Out on 25 May!

Arkema Awarded Prize

Arkema, through its subsidiary CECA, has been awarded a medal for the Pierre Potier prize in the category "chemistry at the service of the environment" in recognition of its formulations for bitumen blends. According to Arkema, this major innovation helps reduce energy consumption on road construction sites, while significantly improving environmental impact and working conditions.

Arkema's Centre de Recherche Rhône-Alpes has developed for CECA, the Company's Specialty Chemicals subsidiary, a surfactant additive based on at least 50% renewable raw materials which, blended with the bitumen, helps lower by some 50 °C the application temperature of the road surfacing material without impairing its performance. Compared with the traditional road surfacing process, the use of this additive cuts down energy consumption by up to 50%, leading to a drop in gaz emissions, and generates considerably less dust.

The Pierre Potier prize, set up in 2006 on the initiative of François Loos, Deputy Minister for Industry, rewards every year chemical manufacturers who engage in "innovation in chemistry for the benefit of the environment."

▶ www.arkema.com

Heinrich Emanuel Merck Award 2007

The Heinrich Emanuel Merck Award 2007 for Analytical Chemistry will be bestowed this year on two leading scientists – Professor Dr. Shuming Nie, the Wallace H. Coulter Distinguished Chair Professor of Biomedical Engineering (Emory University and Georgia Institute of Technology, Atlanta, USA), and Dr. Alexander A. Makarov with Thermo Electron in Bremen, Germany.

Each winner will receive €10,000. The award is intended for chemists aged 45 or younger who are developing new methods of chemical analysis with applications that will benefit mankind. The work should be directed toward the improvement of the human condition, providing solutions to analytical problems in the areas of life sciences, material sciences or the environment.

Professor Nie is being honored for the development of multi-functional nano-particle probes based on semiconductor dots for cancer targeting and imaging. He is known for his numerous contributions to the field of application of quantum-confined particles. Because of their broad excitation profiles and narrow emission spectra, quantum dots are best suited to optical multiplexing to address genes, proteins and small-molecule libraries.

Dr. Makarov is receiving the award for the design and construction of a hybrid mass spectrometer based on a novel electrostatic mass analyzer of the orbitrap type. In this instrument, a linear ion trap mass spectrometer is coupled to an orbitrap mass analyzer via an rf-only trapping quadrupole with a curved axis. The whole configuration allows wide mass range analysis with high resolving power, mass accuracy, sensitivity and dynamic range for a wide range of analyses, from small molecules to proteins.

▶ www.merck.de

Vetter Wins International Innovation Award

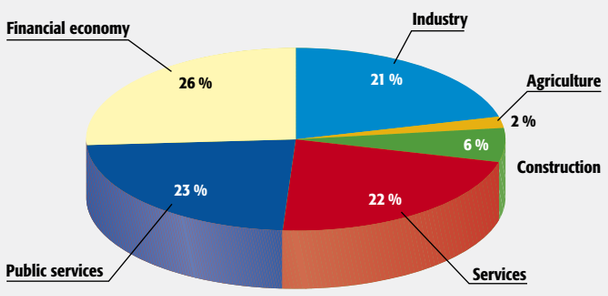
Vetter Pharma-Fertigung was announced as the winner in the Process Innovation category of the third annual Facility of the Year Awards (FOYA). The contract manufacturer from Ravensburg, Germany, was commended for its new facility, Ravensburg Vetter South, which took 36 months from start of detailed design to complete validation. The new production site maximises the use of automation and maintains the highest standards in terms of sterility, safety, and quality. The two filling lines feature brand new Restricted Access Barrier System (RABS), with plans for a further two lines in the near future. The site, which was completed in October 2006 is completely self-sufficient with its own utility and power supply and has a capacity of 90 million units per year.

The FOYA are sponsored by the International Society for Pharmaceutical Engineering (ISPE), Interphex and Pharmaceutical Processing Magazine, and represent a cross-section of a global industry, with this year's winners spanning the U.S., Japan, China and Germany.

▶ www.vetter-pharma.com

The Chemical Industry in Europe

Contribution to the EU Economy

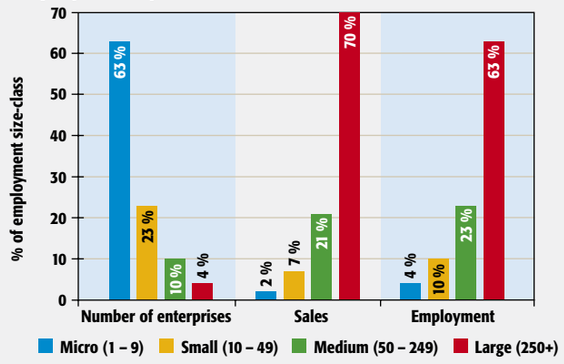


% of GDP

Source: Cefic and Eurostat

The chemical industry's contribution to the EU gross domestic product amounts to 2%. This may seem small at first sight, but should be re-assessed taking into consideration both the shrinking contribution of industry as a whole to GDP in advanced economies (21% in the EU) along with a rise in services and the wide contribution of chemical products into all branches of the economy. Additionally, one job in the chemical industry creates two jobs outside the chemical industry.

Number of EU chemical industry* enterprises, sales and employment by size-class

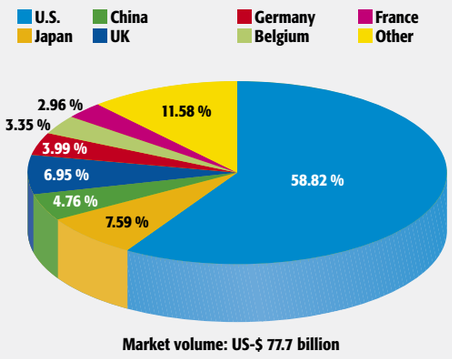


* Excluding pharmaceuticals

The EU chemical industry (excluding pharmaceuticals) comprises about 27,000 enterprises (data covering firms with no employees are excluded), 96% of which have less than 250 employees and may be considered as small and medium-sized enterprises. These account for 30% of sales and 37% of employment. Only 4% of the EU enterprises employ more than 249 employees and generate 70% of total chemicals sales.

Biotechnology

Biotechnology for medical use



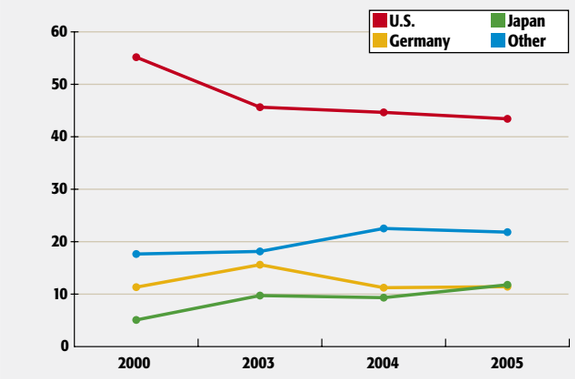
Market volume: US-$ 77.7 billion

Source: Datamonitor

Biotechnology is considered to be one of the key technologies of the 21st century. It covers all methods, techniques and products that use living organisms or their cells, sub-cells or molecular components. A part of red biotechnology is the production of medicines, vaccines and diagnostics. Biotech companies had a turnover of US-$126.3 billion in 2005 worldwide; of that, 61.5% (US-$77.7 billion) was in medical use.

Patent registration for genetically engineered drugs

(in %)



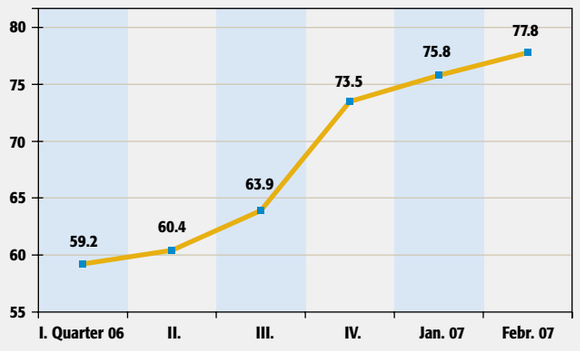
Source: German Patent Office 2006

Although the biotechnology branch currently enjoys a good position, companies also face the challenge of increasing productivity in terms of research and development. The ability for this branch to grow has been hampered in past years due to dramatic increases in development times and costs, although demand has remained the same. The number of registered patents from the U.S. and Germany have gone down or stagnated in recent years, whereas the numbers have gone up in Asia.

You've Got Spam

Amount of spam* in all e-mails

(in %)



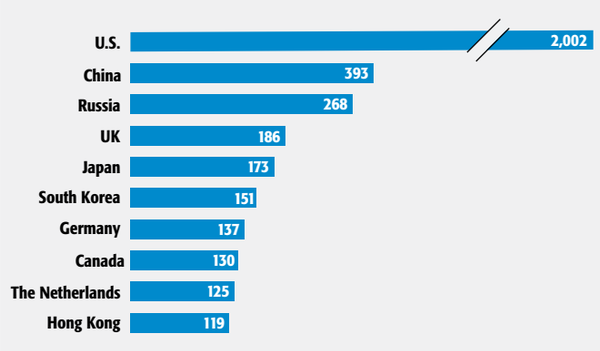
* after notorious spammers filtered out

Source: Der Spiegel/Message Labs

Spam continues to be a major threat to all businesses; global spam levels reached 74% of all emails last November, the highest level observed since early 2005. Business sector analysis by MessageLabs reveals that increased attention is given to small business employees who receive almost twice as many spam messages as medium-sized companies per user per month and 60% more virus traffic per user per month than large enterprise organizations. Restricted by limited IT resources and budget, and lack of depth of security expertise available and also due to the vast amount of companies of this size, smaller companies are easier prey for cyber criminals and more likely to be deceived by sophisticated techniques and high volumes of threats.

The Biggest Spam Culprits

Known as spam sources, mid-March 2007



Source: Der Spiegel/Spamhouse

The Key for Clean Air

In addition to nitrogen oxides and sulfur oxides, many volatile organic compounds (VOCs) in air contribute to smog and high ozone levels, as well as potentially damaging human health. Clean-air laws are thus rightly continuing to become stricter. Most modern air-purification systems are based on photocatalysts, adsorbents such as activated charcoal, or ozonolysis. However, these classic systems are not particularly good at breaking down organic pollutants at room temperature. Japanese researchers have now developed a new material that very effectively removes VOCs as well as nitrogen- and sulfur oxides from air at room temperature. As they report in the journal Angewandte Chemie, their system involves a highly porous manganese oxide with gold nanoparticles grown into it.

To prove the effectiveness of their new catalyst, the research team headed by Anil K. Sinha at the Toyota Central R&D Labs carried out tests with acetaldehyde, toluene, and hexane. These three major components of organic air pollution play a role indoors as well as out. All three of these pollutants were very effectively removed from air and degraded by the catalyst – significantly better than with conventional catalyst systems.

One secret to the success of this new material is the extremely large inner surface area of the porous manganese oxide, which is higher than all previously known manganese oxide compounds. This large surface area offers the volatile molecules a large number of adsorption sites. Moreover, the adsorbed pollutants are very effectively broken down. There is clearly plenty of oxygen available for oxidation processes within the manganese oxide lattice. Degradation on the surface is highly effective because free radicals are present there. Presumably, oxygen from air dissociates on the gold surface to replace the consumed oxygen atoms in the lattice structure. This process only works if the material is produced in a very specific manner: The gold must be deposited onto the manganese oxide by means of vacuum-UV laser ablation. In this technique, a gold surface is irradiated with a special laser, which dislodges gold particles through evaporation. These gold particles have unusually high energy, which allows them to drive relatively deep into the surface of the manganese oxide. This process is the only way to induce sufficiently strong interactions between the little clumps of gold and the manganese oxide support.

Original publication: Author: Anil K. Sinha *et al.*; "Mesostructured Manganese Oxide/Gold Nanoparticle Composites for Extensive Air Purification"; Angewandte Chemie International Edition 2007, 46, No. 16, 2891-2894.

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- Technology transfer: Doing business in China
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