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THE NEWSPAPER FOR THE CHEMICAL AND LIFE SCIENCES MARKETS

Markets & Companies

Continuing Profitable Growth
BASF to Diveste
Styrenics Business

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Information Technology

Pharma: Streamlining Product Development Processes Becomes A Major Priority

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Newsflow

Siemens acquires Dade Behring. Siemens is continuing to strenghten its diagnostics business. The Munich based company sold its automotive business (Siemens VDO) to tire producer Continental for app. € 11.4 bn. At the same time Siemens announced to buy diagnostics company Dade Behring for app. € 5.0 bn. Previously, Siemens had acquired Bayer´s diagnostics business for € 5.35 bn and Diagnostic Products for US-$ 1.86 bn. Siemens now has combined sales of app. € 4 bn in the diagnostics business. With the latest acquisition, Siemens is far ahead of competitor GE, whose acquisition of Abbott´s diagnostics business recently failed. The whole diagnostics industry is currently affected by numerous mergers and acquisitions with Roche trying to buy US-company Vendana and Qiagen acquiring Digene for US-$ 1.6 bn.

▶ www.siemens.com

Basell acquires Lyondell. After the failure to buy US chemical company Huntsman, the Dutch company is to acquire plastics and petrochemical group Lyondell (revenues 2006: US-$ 22.3 bn). Management and board of Lyondell both agreed to sell the company for app. US-$ 48 per share or app. US-$ 19 bn including debts. Volker Trautz, CEO of Basell, said the company will benefit from Lyondell´s activities with ethylene, propylene oxide and the company´s position in the refinery area. Meanwhile, Huntsman is being sold to Hexion for US-$ 28 per share or US-$ 10.6 bn including debts. Hexion belongs to private equity group Apollo Management.

▶ www.basell.com

Total and Sonatrach are to build a petrochemical plant in Arzew (Algeria). Heart of the plant will be a cracker fed by South Algerian oil- and gasfields. The cracker is supposed to produce 1.1 million tons of ethylene, which are further processed to 410,000 tons of mono ethylene glycol, 450,000 tons of low density polyethylene and 350,000 tons of high density polyethylene. Both companies will invest app. US-$ 3 bn and the plant is likely to be completed in 2012.

▶ www.total.com

Strong And Stable

German Chemical Industry Optimistic for 2007

On July 5, 2007 Mr Werner Wenning, President of Verband der Chemischen Industrie (VCI), presented numbers for the first half of 2007 as well as an outlook for the rest of the year.

In the 1st half of 2007 German chemical companies benefited from stable domestic growth and on world markets. This growth has several positive effects: on earnings of companies, the labour market and investments. "The current situation is more positive and stable than it has been for a long time," VCI said. Companies are able to keep up the high levels of 2006, with a production increase of 4 % in the first 6 months of the present year.

The Various Sectors in the 1st Half 2007

The positive development is not applicable for all sectors. The high production level is stable for basic chemicals, while significant output growth is achieved in the further steps of the value chain.

Werner Wenning, President of Verband der Chemischen Industrie (VCI)

In the 1st half 2007 the output of inorganic basic chemicals dropped by 1.5 % compared to the level of the previous year. However, in last year an increase of over 7% had been recorded.

From January to June 2007 there was no change in petrochemicals production. During the same period, the output of polymers grew by 1%. Manufacturers of fine and specialty chemicals were able to increase their output by 7.5%, thanks to the good business situation of industry.

In early 2007 the pharmaceutical industry production rekindled, reaching an encouraging growth of 7% compared to the 1st half 2006 by June.

In the period under review, an excellent growth rate of 10% was achieved in the production of detergents and personal care products.

▶ Continues **Page 2**

MARKET REPORT

The Chemical Industry in Turkey

Chemicals are indispensable to modern life and the development of the chemical industry has helped to elevate the standard of living, an indicator of the level of industrialization in a country. Chemical industry products contribute significantly to growth in other industrial sectors.

At the beginning of the 20th century there were a few chemical establishments, manufacturing soap, liquorice extract, valonia extract, etc, within the boundaries of the Ottoman Empire. After the establishment of the Republic of Turkey till the 1950's, these chemical works passed through a process of corporation and production began in some fields such as explosives, medicine, agricultural chemicals, detergents, printing ink and textile dyes and involved the final stages only. It was only after the 1950's, especially during the planned economy period, that the development of the chemical industry in Turkey accelerated. Between 1960 and 1980 economic policies were based on import substitution and public sector investments were directed to petrochemicals , fertilizers and basic organic and inorganic chemicals, the fields which required high investment, with low profitability whereas private sector and foreign investments were directed to pharmaceuticals, synthetic yarns, soap and detergents.

In 1980 Turkey started to follow a new export-oriented economic policy. As a result of these successful policies, production and exports of the manufacturing sector boomed. The chemical industry, likewise, benefited from the new economic policy and showed an impressive increase both in production and exports.

Today, the Turkish chemical industry with its modern technology and diversified products is the key component of the

▶ Continues **Page 8**

The Global Chemicals Sector

Strategic Scan and Credit Implications

Fitch Ratings' report "Global Chemical Producers Prepare for Weaker 2007 with Slowing Demand", the agency anticipated that 2007 would be another strong year, but also expected that it would be slightly weaker than 2006. Here, the rating agency will take a scan of the strategic issues the sector currently faces and elaborate on potential credit consequences.

Fitch considered the following angles:

- a broad review of the macroeconomic environment
- a broad review of the political and technological environment
- an analysis of international competition and the role of the Middle East
- a generic analysis of companies' strategic decisions, including
- overall strategic direction
- acquisitions and the rationale behind them
- financial policies

Based on these angles, Fitch has summarised its conclusions on key credit dimensions and elaborates on potential rating consequences.

Karsten Frankfurth, Senior Director, Fitch Ratings Inc.

Overall Macroeconomic Environment

The chemicals industry generally has a high correlation with the overall economic cycle and hence is viewed to have a high GDP sensitivity. Typical GDP multiples are 1.5x-2.0x, depending on the product and application. The high correlation is derived from the fact that many chemical company's products make their way into consumer end-products, such as plastics for consumer electronics and for automotive applications.

While growth appears to be slowing in the U.S. with Fitchs 2007 GDP forecast at now 2.1%, it still runs at a solid rate. Within the Eurozone, growth at an estimated rate of 2.7% continues. In particular, Germany, Europe's single largest economy, is showing strong growth momentum at 3.0%. Also, Asian economies are showing strong growth, with China expected to experience around 8.5% growth this year. While the overall positive year-on-year change of GDP growth maybe slightly lower, on balance, Fitch still views the economic environment for chemical producers as favourable. Accordingly, companies reported a strong start to 2007, yet disparity exists between Europe and the U.S.. In the U.S., some producers have suffered from margin compression due to lower demand from automotive and construction industries.

The USD weakness is expected to continue, which will particularly benefit U.S. producers or those that have significant U.S. sales and production exposure. On the other hand, companies with a largely EUR denominated cost base could experience some negative effects from a weak USD, in particular towards the end of the year when the current on-the run contracts have to be renegotiated. Examples of companies that Fitch views as largely EUR cost-based are Lanxess ('BBB'/'F3'/Outlook Stable), Ciba ('BBB'/'F3'/Outlook Stable) and DSM ('A-'/'F2'/Outlook Stable).

On the energy side, Fitch expects that expenses will remain at elevated levels, although some reduction was observed recently. The worst case scenario for the sector would be slowing demand while energy/raw material prices remain at high levels. Not impossible, but unlikely in Fitch's present view.

Political and Technological Environment

On the regulatory side, the most significant change that has taken place was the enacting of Reach (within the EU), following the publication of the White Book in 2001 and an extensive consultation period. At its heart, Reach requires chemicals produced or imported above a certain threshold level to be registered with a central chemicals agency and specific hazardous substances may require an authorization. Substantive documentation is to be provided to this agency. Over the last three years, Fitch has repeatedly stated that it does not view the legislation to be a severe threat to credit profiles within the universe of rated companies. This continues to be the agency's view, although it recognises that the hurdle may be significant for some smaller and medium-sized enterprises. However, the whole legislation has been softened substantially from the original intended version. Fitch also continues to believe that in the long-term, Reach can actually benefit the European manufacturers. Where the region now has the arguably most stringent

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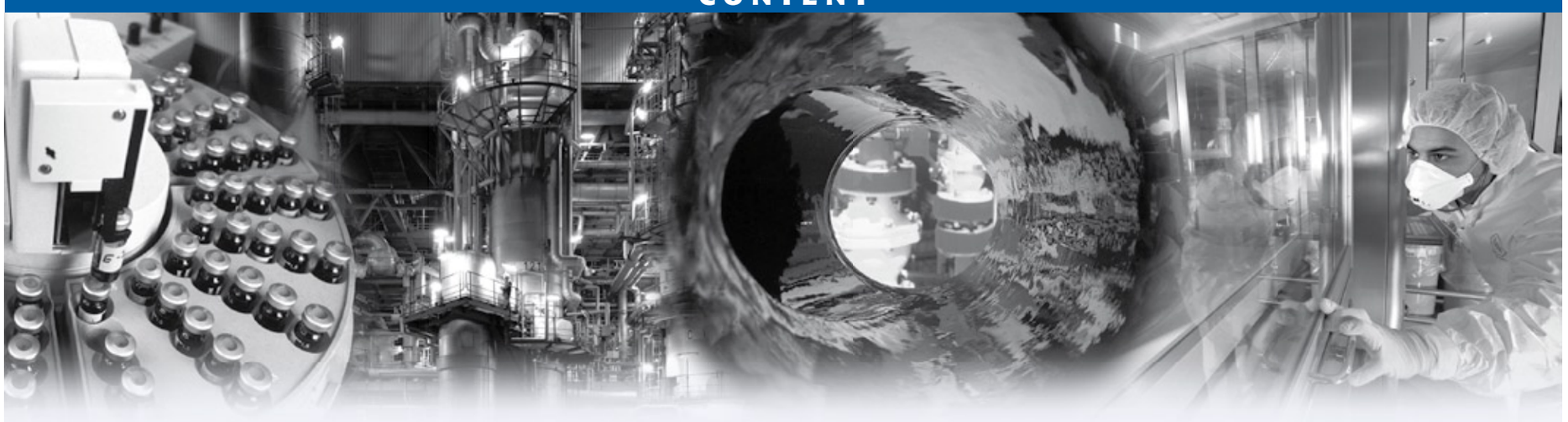

Strong And Stable

German Chemical Industry Optimistic for 2007

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Sales

In the 1st half 2007 total sales of the German chemical industry rose, according to official statistics, by 8 % to 83.8 billion Euros. Chemical business expanded equally fast in Germany and abroad. With the good economic situation on almost all foreign markets, foreign sales went up by 8 % to 46.7 billion Euros. Domestic sales increased by 8 % to 37.1 billion Euros. The main underlying reasons are the favourable situation of the industrial customers and the growing consumption propensity of private households.

Prices

In the 1st half 2007 producer prices moderately climbed 2 % on average. After a short stagnation at the beginning of this year, prices rose again in the following months, due to more expensive raw materials and higher energy costs in the 2nd quarter. This resulted in higher prices for products in sectors dependent on raw materials: petrochemistry, inorganics and polymers as well as fine and special chemicals.

Foreign Business

In the 1st half 2007 chemical exports – this term includes foreign sales by chemical companies and sales of chemical products by other industries as well as re-exports – rose by 12 % to 64 billion Euros. Thus, important impulses for the chemicals business continue to come from exports. With a growing demand in Germany, imports increased noticeably, too. By mid-2007 imports were valued at just under 45 billion Euros and had risen by 13 % in comparison to the previous year. From January to June 2007 German chemical companies contributed some 19 billion Euros to the export surplus of Germany.

Employment

The good present situation of German chemical companies also reflects in employment figures. Employment reductions of the past years were stopped. In the 1st half 2007 the German chemical industry on average employed 434,600 – as many as one year ago. Over the past years VCI reported on drops in employment figures according to official statistics. Those drops can be explained, inter alia, due to spin-offs and outsourcing of company activities such as IT, disposal services, logistics and parts of research. Consequently, jobs are not lost; they are included in the statistics for other fields.


Source: BASF

The spin-off process is continuing. Irrespective of this point, employment figures in the chemical industry are not decreasing, but have been stable from January to June 2007. The conclusion is that the chemical industry is currently back to hiring more people. But, the chemical industry's good business situation does not automatically generate new employment. In fact: in phases of economic upswing existing capacities are utilised first. This enhances productivity but not necessarily chemical industry employment. Employment figures start rising only with capacity expansions. Investments in capacity expansions fell continually to 2005 and started to increase again noticeably in 2006. Consequently, there is good reason to hope for a trend reversal in employment.

Investment

In 2007, the situation for investments is positive: Earnings are good, production capacity utilisation is high at ca. 87 %, and the demand for German products continues to grow. For these reasons, German chemical companies wish to invest vigorously in 2007. VCI is expecting total investments to amount to ca. 5.8 billion Euros. Compared with 2006, this is an investment increase of 3 %.

Figures 1st half 2007
Indicators of the German chemical industry

Change in comparison to 2006 in percent	
Production	+4.0
Producer prices	+2.0
Employment	+/- 0 (to 434,640)

Change in comparison to 2006 in percent		in bn Euros
Turnover	+8.0	83.8
Domestic	+8.0	31.7
Abroad	+8.0	46.7
Export	+12.0	64.0
Import	+13.0	44.8

Outlook

All statements on the business situation of the German chemical industry by VCI leave only one conclusion: the companies see their current business situation in a very positive light, which is reflected in the good mood in the companies. After a small down in early 2007, there is more optimism for the current year. "The economy in the USA has cooled down, but almost all other regions see economic growth, together with a dynamically rising demand for chemicals", so Werner Wenning.

In Germany, too, the economy rekindled and turns out to be remarkably robust. Leading economic research institutes assume that growth will last well into the next year.

For the year 2007 as a whole VCI is expecting, on a comparable basis, a sales increase in the range of 7.5 %.

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The Global Chemicals Sector

Strategic Scan and Credit Implications

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chemicals legislation, other countries must be expected to follow – leaving the Europeans with a first mover advantage. A further aspect to consider is the actions being taken by companies to counter global warming. Fitch views the chemical's sector exposure as Medium, while other sectors such as Steel Production are far more exposed and likely to incur additional costs.

Overall, however, the Chemicals sector will remain one that is prone to tight regulation and control. But in those countries where the chemicals industry is strong (such as Germany, France and the U.S.), the chemicals sector represents a remarkable part of the overall industrials universe, providing it with adequate influence over any legislation attempts. Fitch, therefore, views the threat of legislative action on the sector as limited.

International Competition and the Role of the Middle East

The chemicals sector is highly international, with most large-scale producers either being US companies or Europeans. Nevertheless, significant new capacity is building up in the Middle East, although some of the scheduled additions have been delayed several times. This delay provides a medium-term relief to European and US producers, but there is little doubt that the Middle East will see significant additions coming on stream. The region actually fulfils a number of distinctive advantages that are important. Cheap feedstock is available and joint-venturing with Western partners and labour is available at competitive rates. Because of this, it comes as little surprise that 80% of petrochemicals additions are stemming from the Middle East and the additions are likely to outstrip the demand from the region itself and China, making it likely that Middle Eastern products will increasingly be seen in Europe and the United States.

Although not yet internationally significant in the chemicals sector, it should not be overlooked that Russia actually shares many of the natural advantages that are also present in the Middle East. The region has abundant reserves of fossil fuels that can be leveraged for production in chemical processes. In fact, Fitch is observing that many Russian chemical manufacturers are embarking on capital expenditure programmes to take advantage of this, such as SIBUR (Long-term IDR 'BB'/Short-term IDR 'B'/Outlook Stable), Kazanorgsintez (Long-term IDR 'B'/Short-term IDR 'B'/Outlook Stable) and Nizhnekamskneftekhim (Long-term IDR 'B+'/Short-term IDR 'B'/Outlook Stable). However, Fitch believes that the threat stemming from this region towards European or even U.S. players is far less pronounced. First, Russia itself shows strong chemicals consumption growth and production is largely absorbed internally, while the region is a net importer of Chemicals. Secondly, much of the installed capacity is less advanced technologically than that of Europe and the U.S.. The capital expenditure programmes undertaken are geared to upgrade the technology, but Fitch believes they are still at a significant gap behind the facilities used in the Middle East.

Overall, margins for European and U.S. manufacturers of petrochemicals are likely to come under pressure in the medium term.

On the speciality side of the business, where performance of a product is sold rather than a standardized material, European and U.S. players are still well protected in our view. These products require substantial engineering capacities and are developed closely in collaboration with customers, which creates an important barrier to entry and high switching costs. Naturally, some commoditization takes place, but overall R&D and access to know-how still represents a significant barrier to entry.

Companies' Strategic Decisions Overall Strategic Direction

The overall strategic direction of the sector is expansionary in Fitch's view. Companies try to increase their market shares and enter into new product areas, provided that there can be some synergy potential gained with existing activities. What has become apparent is that companies are increasingly trying to focus on those activities where they can have a market leading position, usually defined as being one of the top three players. This is associated with concepts such as economies of scale and scope, as these concepts are able to bring down the relative cost position of manufacturers. This also is a typical phenomenon of mature markets, where companies can no longer grow sufficiently based on market growth rate and market share will have to come from acquisitions. The notion of a mature market is also consistent with the increasing returns to shareholders – in other words, there is a lack of internal projects where the funds could be invested at a rate sufficient to satisfy shareholders requirements.

Table 1	Company A	Company B
Sales Price Chemical Product per ton	400	400
Price Input Product p/t	200	300
Gross Profit	200	100

Acquisition Activity – Making (Non)sense Out of Them?

The sector is in the middle of a significant consolidation, in Fitch's view. Prominent examples include last year's acquisition of BOC Group by Linde (EUR 11.9bn), the acquisition of Engelhard by BASF ('AA-'/'F1+'/Rating Outlook Negative) (USD 5bn), the recently announced acquisition acquisition of Lyondell ('BB-'/Rating Watch Negative) by Basell ('BB-'/'B'/Rating Watch Negative) (USD19bn) or Sabic's ('A'/'F1'/Outlook Stable) acquisition of GE Plastics (USD 11.6bn).

The question that automatically arises is, what is driving this high level of activity? From a strategic perspective, companies have generally set themselves higher RoE requirements as a strategic goal. This may be expressed in a direct RoE figure, or more as a derivative. As such, BASF states that it intends to earn a premium on the cost of capital. However, such targets are a final goal and one could imagine several ways to get there, including improving the cost structure, reducing the equity component in the capital structure, increasing sales prices at a rate faster than cost inflation. But where does the high level of acquisition activity fit into all of this?

Appreciating that the ultimate goal of management's action in general is to enhance the company value, the specific reasons why acquisitions make sense to reach this end result stretch across a spectrum of alternatives. Fitch believes they can be classified into two categories:

- Improve operational efficiency
- Diversification of revenues

Improvements in operational efficiency can again come from several sources:

- Larger production sites
- Backward integration
- Synergies

Larger Production Sites

The first category is frequently associated with gaining a larger scale of production. Chemical processes, specifically in the commodity spectrum, are characterised by high capital intensity and high capacity utilization leading to a reduction of fixed costs per unit. However, this actually implies that post acquisition, some assets of the acquirer or the target can be used by the other party in the production process – a premise that frequently does not exist in such straight forward manner. For example, if a certain material is manufactured in a location A at a competitive price but later needs to be transported to another location B, the transportation costs may actually dilute the benefits gained by sourcing from A and saving the market profit margins. And in reality, plants are remote from each other and difficult to transport.

Backward Integration

A theme that is closely aligned to this argument is that of "backward integration". In short, what it means is that the company's activities extend into production processes of earlier stages. In a fully backward integrated scenario, a company would be able to produce all the required ingredients and materials along the production chain itself, starting with the extraction of a raw-material. Such degree of backward integration barely exists, but companies frequently attempt to integrate backwards into their main building-blocks, usually a commodity chemical (like Ethylene).

However, it is the above referenced logistics aspect that explains why acquisitions are not always the best choice when backward integration is the goal. To minimize transportation losses, a company would build the plant providing the raw-material for the production process of product A as closely as possible to this plant. For example, Sabic Europe originally intended to build a new cracker in Geleen to further enhance its backward integration. However, the subsequent acquisition of Huntsman's petrochemicals assets in the UK was the alternative chosen. While undoubtedly leading to higher transportation costs, the additional market and product exposure gained justified the step.

Fitch also cautions that there are some risks associated with backward integration. Once a company has taken a decision to backward integrate, it has another asset that needs to be utilized. At times of high demand, this may well be achieved, but if the market is down, the company may be faced with more assets running at under-capacity than a less integrated producer. Whether backward integration is economically sensible on a through-the-cycle view is at least questionable in Fitch's view. A simple example illustrates this. Assuming two companies produce a certain Chemical Product, for which they require an Input Product. It shall be assumed that company A is fully backward integrated and company B is not. The market price for the Input Product currently runs at USD300 per ton, and company A is able to produce the ton at USD200. Of these, we shall assume that USD150 are fixed costs. The sales price for the Chemical Product is USD400 per ton.

At the first glance, it is obvious that company A has a much better position than company B. But assume that the market takes a turn and that the product price for the Input Product falls dramatically. Company B is able to take full advantage of the fall, whereas company A would still be locked in with its Fixed Costs of USD 150 for the Input Product! Therefore, company B would have much more flexibility to participate in the market dynamics and would not be forced to run for capacity utilization along the value chain. Another aspect of backward integration is that it frequently is accompanied by capacity mismatches. For example, one of the major raw-materials to produce PET is PTA. However, the optimal scale size for a PET plant is smaller than that of a PTA plant. Therefore, to backward integrate, one would either actively have to sell PTA into the market (to justify a large plant), or run a backward integrated plant that is sub-optimal in terms of size.

But if there are so many ifs and buts attached to backward integration, why do companies generally aim for it? One possible explanation is that most companies do not want to be "the only one" that is fully exposed to the market forces. The swings in market prices of raw-materials can have a remarkable impact on any year's performance. That will be accepted if it is an industry phenomenon, but not in some companies where the raw-material price increases better than others. Erecting chemical assets can take considerable time, and the number of assets available is, by nature, restricted. Therefore, while recognizing that the long-term benefits of backward integration versus "free-market-exposure" may be limited, there is the risk that competitors will take advantage of the assets available and are in a better position for a period of time – which would reflect poorly on the management of the company that refrained from the backward integration.

Synergies

Achieving synergies is amongst the most frequently cited reasons for acquisitions. Effectively, what it means is gaining an advantage because certain resources can be used in several activities within the firm. This goes far beyond the simple sharing of some production technology and can range across all functions of the business. Fitch was surprised to see the synergy potential that was quoted in the merger of Linde/BOC to be so low at EUR 250m annually to be achieved by 2009 and believes it could be significantly higher than this, although the lowest is expected on the production side of things. The companies had both been significant players in industrial gases prior to the merger, but they had little geographic overlap. BOC was particularly strong in the UK and Asia, while Linde had a strong footprint in Europe, including Eastern Europe. But because the fundamentals driving the business are essen-

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Fitch Ratings – Know Your Risk!

Fitch Ratings is a leading global rating agency committed to providing the world's credit markets with independent and prospective credit opinions, research and data. Built on a foundation of organic growth and strategic acquisitions, Fitch has grown rapidly during the past decade, gaining market presence throughout the world and across all fixed income markets.

Fitch is dual-headquartered in New York and London, operating offices and joint ventures in more than 50 locations and covering entities in over 100 countries. In October 2006, Fitch established Derivative Fitch, a rating agency dedicated to providing ratings and a suite of comprehensive services for the CDO and credit derivatives markets. Another wholly-owned Fitch subsidiary is Fitch Training, a leading provider of analytical training for financial professionals.

Fitch Ratings and Derivative Fitch are part of Fitch Group, a majority-owned subsidiary of Fimalac, S.A., which is headquartered in Paris, France. Hearst Corporation acquired a 20% stake in Fitch Group in 2006. More than 2,300 people are working for the group worldwide.

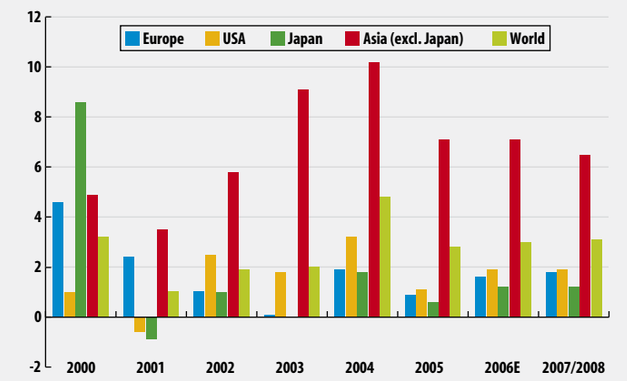
The Fitch Ratings Corporates group provides public and private ratings on companies and their debt instruments, including – bank loans, senior and subordinated debt, commercial paper and preferred stock.

The group's analytical methodology addresses the legal, regulatory and market environments in over 100 countries in which Fitch Ratings operates, with particular emphasis on debt structure. Corporates group analysts continually expand and deepen their research, combining industry expertise with the finest analytical tools to offer well-informed and timely judgments. Analysts are readily available and responsive to investors. Through our structure, our people and our process, the Corporates group provides broad coverage and exceptional service.

Like many groups within Fitch Ratings, the Corporates group places great importance on interaction with its colleagues around the world and other areas of the firm, such as the Sovereign and Structured Finance groups. This collaboration ensures a more comprehensive assessment of an entity's strategic initiatives, competitive position, financial performance and the overall dynamics of the industry in which it operates.

Estimated Growthrates World Chemical Production Graphic 1

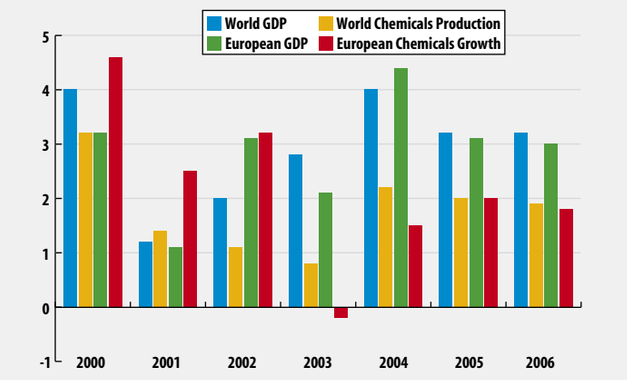
in %



Source: CEFIC, Fitch estimates, Company reports © GIT VERLAG

GDP Growth and Growth Chemical Production Graphic 2

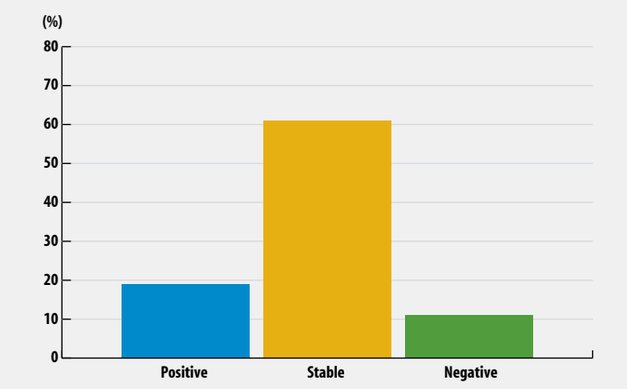
World vs. Europe in %



Source: VCI, ECB, Fitch © GIT VERLAG

Outlook Distribution Global Chemical Producers Graphic 3

May 2007



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Rating Distribution Global Chemical Producers Graphic 4

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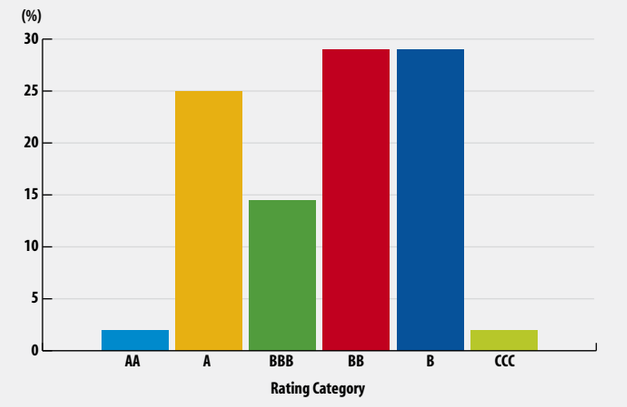

Source: Fitch © GIT VERLAG

The Global Chemicals Sector

Strategic Scan and Credit Implications

Continued Page 4

tially the same for both companies, lots of administrative functions can be shared, including market research, marketing, technology development, HR and accounting. But the relatively low figure stated for synergies indicates that growth was actually the main driver for the acquisition.

Diversification of Revenues / Moving Into New Markets

The acquisitions of Engelhard by BASF, as well as the acquisition of GE Plastics by Sabic, are good illustrations of this acquisition motive. BASF states that it wants to reduce the dependence on the cyclical markets and Sabic only recently announced its goal to achieve 20% of its revenues from specialities by 2020. While apparently making similar moves, Fitch believes that the motivations behind them are still very different.

For BASF, moving away from the cyclical parts of the business is one of its goals and via the acquisition of Engelhard, the company has become one of the world's largest producers of automotive catalyst. This is an area marked by high R&D requirements and good growth potential that is actually aided by tightening environmental standards. But why does the company move into this area, when what it is doing so far is highly successful? The company has also set itself ambitious targets in terms of percentage of sales to be generated from new products. But, again, why? Fitch believes these changes reflects the anticipation of the company's management that it is likely to become more and more difficult to compete in commodity-type chemicals with the capacity building up the cost advantaged regions, and that the growth momentum for these products in developed markets remains limited. Hence, a move to higher growth, more knowledge-intensive markets.

For Sabic, on the other hand, the story is somewhat different. The company is largely a commodity chemicals company, but it certainly does not have the problem of its products becoming less competitive. The reason is that Sabic has achieved significant operational scale while at the same time benefiting from very competitively priced feed-stock in the Middle East. Its geographic location positions it well to service high growth markets, such as China. Despite all these advantages, Sabic has decided to acquire GE Plastics for USD11.6bn, after it acquired Sabic Europe in 2002 for USD2.25bn. While the products of Sabic Europe are related to those produced by Sabic in the Kingdom of Saudi Arabia, this is by far less the case for the products of GE Plastics. Also, both Sabic Europe and GE-Plastics operate at lower margins than Sabic itself. So, why doesn't the company concentrate on its core business and instead acquires into other markets? Several factors need to be considered. For one, Sabic intends to geographically diversify its revenue-stream and it can actually leverage of it's technologically know-how in Europe. In addition, the company's profitability has been - albeit at high levels – very cyclical, driven by its mainly commodity-based product portfolio, which shows limited global growth potential. By acquiring GE Plastics, the company gained access to a high growth segment that will lower the overall cyclicality of the revenue streams. By further diversifying geographically, the company will be able to further leverage-off technological integration.

Table 2

Dimension	Direction / Impact	Comment
Competitive Environment	Deteriorating	Competition from low cost countries Slow growth in base chemicals (see shareholder distributions) Low switching costs for customers of commodities Shortening product-life cycles
Political Environment	Stable	Significant regulation exists, but no impact on credit profiles
Strategies, Financial Policies	Expansionary and Aggressive	Mature markets, "Acquire before competitor acquires" Shareholder pressure
Profitability	Slightly reduced in relative terms	Solid economic outlook, but growth slows High energy costs Transaction risk of weak dollar for some European manufacturers
Return on Equity	Increasing	Lower Equity in the Capital Structure
Debt Levels and Leverage	Increasing	Debt funded acquisitions Higher shareholder returns
Coverages	Lower	Higher debt levels Higher Interest Rates
Cash-flows	Reducing	Higher Capex, and shareholder returns

Financial Policies

The financial policies of chemical producers have become increasingly aggressive in the last two years, with companies intending to bring down their equity in the capital structure to improve the Return on Equity. Based on strong performance figures in 2004, 2005 and 2006, companies have tended to pay-out higher dividends and embarked on significant share-repurchases. BASF, for example, has raised its dividend for 2006 by 50% over the level of 2005 and announced a EUR3bn share-buyback programme. Akzo Nobel ('A-'/'F2'/Outlook Negative) has announced a EUR1.6bn share buyback and DSM EUR750m. Major US companies have also embarked on significant share buybacks, including, DuPont ('A'/'F1'/Outlook Stable) (USD5bn) and Dow Chemical ('A-'/'F2'/Outlook Stable) (USD2bn).

Also, the majority of the funds required for acquisitions are stemming from net debt and companies are increasingly re-leveraging their balance-sheets. Specifically in the LBO (leveraged buy-out) arena, companies have heavily back-loaded their amortisation profiles. This naturally provides relief in the short-term, but can lead to considerable difficulties if the final tranches of the debt become due when the market is in a downturn.

Profitability and Cash-Flows

Fitch expects profitability measures to show a slight deterioration in 2007 in relative terms and some growth in absolute terms. At the Free-Cash-Flow level, a compression across the sector is expected due to dividend increases, share-buy-backs, higher capital expenditure spending and potential further acquisitions.

Conclusion

The table below summarizes the impact of the above discussion on key credit dimensions. While the Return on Equity is obviously not a credit ratio, Fitch has included it in the table to demonstrate that, in its view, the effect of the shareholder returns will actually be one of the drivers to enhance this ratio.

Most of the dimensions actually point in a negative direction and this is the view of the agency. Nevertheless, wide ranging rating action is not expected at this point, since the current ratings factor in some headroom for deterioration. The agency has assigned its ratings on a through-the-cycle view. Hence, many companies currently operate at credit ratios that would suggest a stronger rating than the present rating level, but Fitch believes that the 2006 credit ratios are overstating the credit profiles of companies. A reversion to levels more commensurate with rating levels is envisaged based on the above discussion. However, Fitch is concerned that many companies embark on significant equity reduction programmes when the cycle is at its peak and company specific downgrades may occur.

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Fitch Global Chemicals Update - Q1/07 in Review
Overview, Major Chemical Producers (as of 4 June 2007) **Table 3**

Company	Country	IDR	Outlook	Short-Term
Air Liquide	FRA	A+	⊙	F1
Akzo Nobel N.V.	NLD	A-	-	F2
BASF AG	GER	AA-	-	F1+
Basell AF S.C.A	NLD	BB-	⊙	B
Braskem S.A.	BRA	BB+	+	
Ciba Speciality Chemicals Holdings Inc.	CHE	BBB	⊙	F3
Cognis GmbH	GER	B	⊙	
Dow Capital B.V.	USA	A-	⊙	
Dow Chemical Company	USA	A-	+	F2
E.I. Dupont de Nemours and Company	USA	A	⊙	F1
Eastman Chemical Co	USA	BBB	⊙	F2
Equistar Chemicals L.P.	USA	B+	+	
Georgia Gulf Corporation	USA	BB-	-	
Grupo Petrotemex, S.A. De C.V.	MEX	BBB	⊙	
IOI Corporation Berhad	MYS	A-	▼	
Ineos Group Holdings Plc	UK	BB-	+	
JSC SIBUR Holding	RUS	BB	⊙	B
Johnson Diversey (S.C.Johnson Commercial Markets, Inc.)	USA	B-	-	
Johnson Diversey Holdings, Inc.	USA	B-	-	
Kronos International Inc. (Valhi, Inc.Unit)	USA	BB	⊙	
Lanxess AG	GER	BBB	⊙	F3
Lubrizol Corporation (The)	USA	BBB-	⊙	
Lyondell Chemical Co.	USA	BB-	+	
Methanex Corp.	CAN	BBB	⊙	
Millennium America Inc. (Millennium Chemicals Inc's unit)	USA	B+	+	
Millennium Chemicals Inc.	USA	B+	+	
Monsanto Company	USA	A-	⊙	F2
Mosaic Colonsay ULC	USA	BB-	▼	
Mosaic Company (The)	USA	BB-	▼	
Mosaic Global Holdings Inc.	USA	BB-	▼	
Nova Chemicals Corporation	CAN	BB-	⊙	
Nalco Co.	USA	B	⊙	
Nalco Financial Holdings, Inc.	USA	B	⊙	
OAO Nizhnekamskneftekhim	RUS	B+	⊙	B
OJSC Concern Stirol	UKR	CCC	⊙	B
OJSC EuroChem Mineral and Chemical Company	RUS	BB-	⊙	B
OJSC Kazanorgsintez	RUS	B	⊙	B
Petkim Petrokimya Holdings A.S.	TUR	BB	⊙	
Phosphate Acquisition Partnership L.P.	USA	BB-	▼	
Polyone Corp.	USA	B	⊙	
Rhodia SA	FRA	BB-	+	
Rockwood Specialties Group, Inc.	USA	B	⊙	
Rohm & Haas Co	USA	A-	⊙	
Royal DSM N.V.	NLD	A-	⊙	F2
Sabic Europe B.V.	NLD	A	-	F1
Saudi Basic Industries Corporation (SABIC)	SAU	A	⊙	F1
Solvay SA	BEL	A	⊙	F1
Tata Chemicals Limited	IND	BBB-	⊙	
Terra Industries Inc.	USA	B+	+	
Terra Nitrogen, L.P.	USA	B+	+	
Tronox Finance	USA	B	⊙	
Tronox Worldwide/Finance	USA	B	⊙	
Union Carbide Corporation	USA	BBB	⊙	
Valhi, Inc.	USA	BB-	⊙	

Ideas and Know-how Shape the Future

Ticona: Now and Then

At K 2007 in Düsseldorf Ticona will present their view of the future. Under the motto "Create progress. Together", the polymer manufacturer addresses four central thematic elements encompassing precisely what motivates people and companies, now and in the future: People, Power, Safety and Life. The demand for high performance plastics continues to increase in these areas – and Ticona is strategically positioned to meet the demand.

Ticona has set a clear course for progress – and growth. "Together with our employees and customers, we have accomplished a great deal in the past, and generated continuous growth in sales over the last three years," Lyndon Cole, president of Ticona, explained at the company's pre-K 2007 press conference. Having achieved sales of US-$915 million in 2006, Ticona is striving to maintain profitable growth in the future as well. That growth relies not only on innovations and targeted investments, but above all on the contributions of a talented and dedicated workforce. "With the right people operating in the right markets, we will succeed – today and in the future," Ticona vice president Roeland H. Polet added.

Targeted Investments in Growth Regions and Relocation

At the strategic level, the company's management is ensuring the conditions necessary for achieving market leadership in strong growth regions. These include numerous investments in Asia, for instance, as well as distribution partnerships in Central and Eastern Europe. Similarly, the decision to relocate the Kelsterbach plant to the Industriepark Hoechst in the Rhine-Main area is designed to permit future capacity increases, thereby enabling the company to pursue its growth strategy. "The relocation of a major chemical works in its entirety is a huge challenge for all of us. But the concepts we are developing for this task together with our employees are every bit as targeted – and the solutions just as robust – as those we are also formulating to address the changing boundary conditions," Cole emphasized.

Lyndon Cole, President of Ticona

Carsten Wörner, European sales manager at Ticona

Close to Customers and the Market

The changes open up new growth potential for the plastics industry. Ticona has defined what it believes to be its most important growth fields, and translated these into the three overarching themes of "Power", "Safety" and "Life". These are complemented by the equally central theme of "People". "The first area highlights sustainable technologies," Carsten W. Wörner explained, European sales manager at Ticona. "This involves achieving higher efficiency in modern passenger vehicles, for example, or handling resources more efficiently, or protecting the environment." The second thematic area is right in line with the growth field "security" and the further development of relevant sensor-based systems – in automobiles, for example. The third focuses on how the quality of life can be improved further. "This relates to robots in the home, improvements in medical technology, and many other applications," Wörner said, "that are making daily life much more convenient for the most part already today."

People are the Key to Success

The fourth area to be presented at the K is entirely dedicated to the people at Ticona. "Well-educated and highly motivated, they develop new ideas (speed to concept) and implement them rapidly (speed to market) – and they do so on a worldwide basis," Polet explained. In order to achieve this goal, Ticona is consciously adopting new forms of approach to the customer. The innovation workshops it developed in-house offer participating business partners the ability to better recognize their company's strengths and to make more intensive use of them. "By taking existing corporate competences into account right from the outset in the systematic search for new business ideas, companies can apply their know-how and transfer that expertise to new ideas," Tilo Vaahs, marketing manager Americas at Ticona explained.

Along with new customer relations concepts, Ticona also has a well-established range of proven services in its portfolio. Customers appreciate the polymer manufacturer's extensive processing expertise and take advantage of the support services it offers in, for example, injection molding – designing molds or carrying out computer-aided filling simulations and designing runner and gating systems using Moldflow.

▶ www.ticona.com

Continuing Profitable Growth

BASF's Plastics Business

BASF is further expanding its strong position in the worldwide plastics business by focusing its activities on customer and market requirements. Dr. John Feldmann, Member of the Board of Executive Directors and responsible for plastics as well as oil and gas, elaborated on BASF's strategy during their pre-K 2007 press conference.

Supported by the re-organization of their portfolio BASF has been able to increase income from operations (EBIT) every year (since 2003) and is confident of achieving at least the previous year's level in 2007. The expansion of business with products offering differentiation potentials in the market is planned: "By 2010, we want to increase the share of innovative products and specialties for specific sectors and customers from about one quarter to about 40% compared to 2006", so Feldmann. The company intends to achieve this goal through partnerships with its customers. Driven by its high competence in research and development, applications technologies and logistics, BASF intends to continue on its profitable growth path in the plastics business.

Dr. John Feldmann, Member of the Board of Executive Directors, BASF AG

The plastics market will develop strongly in the future: „Plastics are energy efficiency materials and for that reason alone will continue to be in great demand", is how Feldmann sees the future trend. Examples include the automotive, packaging and construction industry in which plastics contribute to lowering energy consumption and thereby reducing emissions.

The global demand for plastics is expected to grow at an annual growth rate of about 5% up to 2015. BASF expects to see the highest growth rates in Asia, where this years consumption has outstripped total demand in Europe and NAFTA put together. „As the Asian national economies continue to develop and levels of personal prosperity rise, this demand will also grow substantially beyond 2015", forecasts Feldmann.

Feldmann explained the strategy for expanding the plastics business and highlighted the competitive advantages enjoyed by BASF:

- Concentration on areas of activity with sufficient differentiation potential in the market
- Continuous strengthening of efficiency, effectiveness and innovativeness in all areas of business
- Consistent realization of growth potentials in new applications and new customer sectors
- Full utilization of the product and service portfolio
- Positioning of plastics as energy efficiency materials

In recent years, BASF has significantly strengthened its engineering plastics and polyurethanes business through investments and acquisitions. Sales of engineering plastics are therefore expected to grow at an average annual rate of 9% up to 2010, a level significantly above the market average. With polyurethanes, BASF is continuing to expand the specialties business and strengthen backwards integration into basic products. Regarding styrenics, BASF has parted with sites and activities that are no longer competitive. A general strategy of divesting activities with high earnings volatility and low profit margins is being pursued.

„Plastics are energy efficiency materials and for that reason alone will continue to be in great demand"

BASF is a leader the field with polyurethane systems and special elastomers and also has one of the best global production structures for basic polyurethane products. BASF is currently the only producer with facilities for manufacturing PU basic products in all regions of the world, which means the company can reliably supply its worldwide customers at all times and support them with the necessary applications technology knowledge.

BASF is employing differentiated business models to allow it to tap even more profitably into the existing market segments. Polyamide intermediates, spinnable polyamides, styrene, polystyrene, ABS and styrene-based foams are being marketed with the aid of a business model in which BASF presents itself to the customer primarily as a reliable and efficient supplier. More than 70% of plastics sales are currently being generated through this business model. BASF is gaining competitive advantages with high quality, reliable delivery service and low costs based on high efficiency production operations and marketing processes.

For polyurethane basic products and innovative insulating materials like Neopor, BASF anticipates above average growth rates and is expanding its production capacities accordingly. Capacities for the production of Neopor alone are to be trebled by the end of 2008.

Besides these standard products, BASF offers a wide range of products and specific solutions for individual sectors and customers. System houses for polyurethanes and compounding plants for engineering plastics in combination with regional development centers offer scope for substantially upgrading and improving the product portfolio in cooperation with customers.

▶ www.basf.com

BASF to Divest Styrenics Business

BASF announced that it is evaluating strategic options for selected parts of its styrenics activities. The company said it has already received an initial offer for selected parts of its styrenics activities, and plans to start discussions with the interested party.

BASF's activities under consideration include its styrene monomer (SM), polystyrene (PS), styrene butadiene copolymer (SBC) and acrylonitrile butadiene styrene (ABS) businesses with plants in Antwerp, Belgium; Altamira, Mexico; São José dos Campos, Brazil; Ulsan, South Korea; and Dahej, India. These activities posted sales of about €3.2 bn in 2006 and have approximately 1,000 employees.

"Earnings in our styrenics activities have improved considerably thanks to efficiency optimization measures and fine-tuning of business models. However, further repositioning steps are necessary to meet appropriate levels of profitability," said Dr. John Feldmann, Member of the Board of Executive Directors, responsible for the Plastics as well as Oil & Gas segments. "We will now begin talks to examine this initial offer as well as consider other options to see if these activities can realize additional potential in their highly competitive markets as part of the portfolio of a company experienced in the global commodities sector."

Hans W. Reiners, President of BASF's Styrenics division, said that BASF's remaining styrenics activities will in the future focus on foams and specialties for the construction, automobile, packaging, sport and leisure industries. "This ties in with the strategy of BASF's Plastics segment to supply its customers with highly innovative, tailor-made solutions."

In the past BASF has sold its North American styrenics business to Ineos.

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High-growth Markets and Future Technologies

Market-ready Products Within Two Years

Lanxess is backing innovation and is ramping up investment in research and development following a successful round of restructuring and consolidation. "At approx. € 100 million, our R&D budget for 2007 has increased by 15% over the previous year.

With that investment, we are primarily targeting high-growth markets of the future as well as future technologies that promise a rapid return on investment," said Dr. Werner Breuers, member of the Lanxess Board of Management, at a Pre-K press conference. Performance Rubber and Engineering Plastics contributed to more than 50% of total sales in 2006.

Lanxess aims to investment in research as efficiently as possible while maintaining a consistent market focus. The company emphasizes close cooperation with customers, suppliers and academic research. According to Dr. Breuers, the continuous improvement of production processes is of crucial importance particularly because of high energy and raw material costs. This is one reason why nearly a quarter of Lanxess current R&D projects focus on process research. But efficiency in research also means strict project and risk management. "We want to achieve maximum value creation in a short period of time with minimum investments. Accordingly, we expect four-fifths of our research projects to lead to market-ready products within two years," Breuers explained. This means a focus on projects with manageable, medium-sized risks.

Lustran Polymers – Market approach successfully adapted

The Lustran Polymers business unit successfully adapted its business model, profiting from its unique position in the international market for ABS and SAN. Lustran Polymers is focusing its ABS business on products colored to meet customers' requirements and on specialties, adhering strictly to a price-before-volume strategy. They offer a wide range of products tailored to a variety of specific uses that comply with customers' exact specifications. "In doing so we are distancing ourselves from many of our competitors whose portfolios cover only a basic range and who generally leave coloring to the processor," said Dr. Hans-Joachim Kogelnik, head of Lustran Polymers.

In light of the above-average growth of ABS and SAN in India and the whole Asia region, Lustran Polymers plans to increase capacity at its Indian production sites of Moxi, Katol and Nandesari from 20,000 to 80,000 metric tons in the coming year. In Map Ta Phut in Thailand, an extra 10,000 metric tons p.a. is currently being added to the site's ABS compounding capacity.

One example of expertise in innovation and development is Triax DP 3157. The online coatable polyamide + ABS blend for automotive body parts with class A surfaces was developed in a joint project with BMW. It is used in the fenders of the BMW 3-series coupé. The material received a very positive response. Numerous projects are already running with well-known OEMs around the world."

Performance Rubber and Performance Chemicals – Problem solvers for the rubber industry Lanxess is one of the world's largest producers of synthetic rubber. Rubber materials used nowadays in technically extreme applications must meet increasingly strict requirements. Suppliers in numerous markets are facing growing cost pressure, which calls for particularly cost-effective rubber products. According to Dr. Günther Weymans, head of the Technical Rubber Products business unit, Lanxess produces rubber and rubber chemicals in eight world-scale production facilities in Europe, North America, India, South Africa and now also in China. "Our facilities are ultra-modern and take excellent advantage of economies of scale," added Weymans. At the same time, the company attaches great importance to steadily expand its strong position on the global market. With its production facilities, the company has a worldwide presence in all key markets with its technical centers and laboratories for application technology. "We are constantly expanding our worldwide research network: another center is currently in the planning for Qingdao, China," Weymans explained.

Among other new product developments in the rubber division, Weymans mentioned Nanopren in particular. This emulsion styrene butadiene rubber is a gel with a particle size in the nano range. Tires made with a tread compound enhanced with Nanoprene particles display significantly improved grip in dry road conditions and improved abrasion resistance, without compromising on rolling resistance and wet grip.

Semi-crystalline Products – Growth in the Asian Market

With Durethan and Pocan, the Semi-Crystalline Products (SCP) business unit at Lanxess ranks among the five largest suppliers of polyamides and polybutylene terephthalates worldwide. "We want to further expand our outstanding position in materials and system solutions," Dr. Hubert Fink, head of the business unit explained. The company expects strong growth for engineering plastics in the Asian market, which currently account for 7% annually – and more than 10% in China. This year, the SCP segment is already forecast to achieve over 10% of its sales in the Asia-Pacific region. "We are confident that we can increase this share to more than 25% over the next four years," said Fink. Lanxess will be putting a second compounding line on stream in Wuxi, China. The plant will double the capacity for producing Durethan and Pocan locally to about 40,000 metric tons per year.

One prerequisite for success in the market is strategic investments to strengthen innovative capability. Lanxess has set up new technical development centers in Dormagen and Wuxi in order to support customers from the initial idea to the finished component. The new Research und Development Testing Center (RDTC) in Wuxi concentrates particularly on speeding up the development of new grades of Durethan and Pocan by carrying out comprehensive material tests. "This R&D center is not only a first step towards building up an effective research network in China and Asia. It also strengthens our global chain of development," explained Fink.

One example of the innovative expertise of Semi-Crystalline Products, Fink presented new injection-molded structural inserts with Durethan as a carrier material which increase the stiffness of the body of the C4 Picasso from Citroën, thereby significantly improving passenger safety in the event of a crash. The inserts also contribute to significant weight-saving.

▶ www.lanxess.com

Lanxess to Partner with Ineos

Lanxess has found a partner for its global ABS plastics business and is establishing a joint venture with the British chemical group Ineos. Lanxess is incorporating its Lustran Polymers business unit into the joint venture and will initially hold a 49% minority interest. Lanxess will receive an initial payment of €35 million after the first closing to occur at the end of September 2007.

"The transfer of this business unit to the joint venture headed by Ineos is a key milestone in Lanxess' realignment and offers both the ABS business and its employees the best opportunities for further development," said CEO Axel C. Heitmann. „The agreed joint venture provides Ineos with strong market positions in a new portfolio of products, that complement our styrenic, polyethylene, polypropylene and PVC plastics businesses," said Jim Ratcliffe, Chairman of Ineos. „There is also a good fit with a number of our existing businesses and the JV will benefit from upstream integration into key raw materials."

It has been agreed that Ineos will take over the remaining 49% two years after the first closing. The completion of the transaction requires approval from the antitrust authorities. The parties expect the transaction to be completed at the end of September.

▶ www.lanxess.com
▶ www.ineos.com

Innovation, Growth & Efficiency

The Three Pillars of Bayer Material Science

Bayer Material Science (BMS) will present a large number of innovative developments at the K 2007, in Düsseldorf. "We will be showcasing not only marketable products and applications but also examples of the many different innovations we have in the pipeline, true to our motto: 'Vision Works – Today and Tomorrow'", Chairman of the Board Patrick Thomas said during a pre-K'2007 press conference in Düsseldorf. "

As before, this exhibition will be a demonstration of the wide-ranging achievements of our business units: Polyurethanes, Polycarbonates, Thermoplastic Polyurethanes, and Coatings, Adhesives, Sealants – units that all have leading market positions in their respective disciplines."

Focus on Forward Integration

Bayer Material Science strategy will continue to be based on three pillars: innovation, growth and efficiency. The main focus at K 2007 will be on innovation. However, he defines this term far more widely than is customary in the description of exhibits: "Innovation must be an integrated component of all corporate activities and must go clearly beyond the development of new products and applications." This includes the latest structural activities which are summed up as forward integration at BMS. By setting up largely independent; highly specialized business entities, they ensure a powerful customer focus and at the same time maintain a high level of flexibility. One example is Lyttron Technology GmbH, a start-up company established by BMS in February 2006. Lyttron started to produce electroluminescent three-dimensionally formable sheets. Another example of a customer-focused business model is the worldwide network of polyurethane systems houses under the brand name BaySystems. This is the background to the planned acquisition of the Ure-Tech Group, the leading East Asian supplier of thermoplastic polyurethanes (TPUs).

Innovative Development

Ian Paterson, the Board member of BMS with responsibility for marketing and innovation, presented a wide-ranging program of products and applications. Modern roof module concepts based on polycarbonate and polyurethane products are an important contribution to climate protection. The roof module for the new Smart fortwo, for instance, with a surface of 1.2 square meters, is so far the biggest component of its kind that has been developed for a series production vehicle using polycarbonates. Compared to a similar construction made of glass, 40% in weight and therefore quite a lot of fuel can be saved. Another development for roof modules is based on thermoplastic sheets backed by the glass-fiber reinforced polyurethane foam system Baydur STR. This technology also allows the integration of further functions, including boxes for additional storage space, such as in the panoramic roof of the Opel Zafira and aerial systems such as the roof module of the new R-class.

Increased Commitment to Climate Protection

"While being very much committed to the further improvement of customer relations, the expansion of our market position and increasing growth, environmental care is nevertheless a major priority for us. This applies particularly to climate protection," said Ian Paterson. Numerous products from BMS make a significant contribution to energy savings and offer impressive potential for a lasting reduction in carbon dioxide emissions. Examples are weight-reduced vehicles and thermal insulation for buildings and refrigerating appliances using rigid polyurethane foam.

This is also the background to gas phase phosgenation, an innovative technology developed by Bayer for the production of toluene diisocyanate (TDI), which is used for the production of flexible polyurethane foam. The new technology saves about 80% in solvents during the last stage of the TDI synthesis reaction and then 40-60% in energy in the subsequent distillation process. Compared to a conventional system of the same capacity, it saves approx. 20% in investment costs. After a very positive test with a pilot system, BMS has decided to install this new world-scale system at the integrated Shanghai site which has an annual capacity of 300,000 metric tonnes.

Tradition in Innovation

Innovation has a long tradition at Bayer. Audio CDs first appeared on the market 25 years ago, and the history of optical data storage media is far from over. With its high-tech plastic Makrolon, Bayer has been a major player from the very beginning and is also actively involved in the most recent developments. Since then HD-DVD and Blu-ray discs have become marketable, yet the demand for storage is still on the rise. The buzzword for the next generation may be near field recording which will boost storage capacities to 100 gigabytes and more per data medium. And totally new horizons will be opened up by holographic data storage whereby entire data packages are stored within the volume of a data medium. "This means that storage can be taken all the way into the terabyte range, and we will see a clear acceleration of read/write routines," said Ian Paterson. Working in a joint venture with the US start-up company In-Phase Technologies, BMS has developed a special material for such data media.

Tiny Particles

A number of unique qualities can be realized with carbon nanotubes under the Baytubes brand name, not only in sports apparatus, but also in car manufacturing and in wind power plants. The nano-scale parts display an excellent level of mechanical stability and good thermal and electrical conductivity. A new synthesis process has been developed, allowing high-purity industry-scale production of these nanotubes. "In addition to a pilot plant that is already up and running, we are planning to construct a large-scale technical production facility with a capacity of 3,000 metric tonnes per year," Ian Paterson explained. Recently, the TPU Demospan was used for the first time in sail battens during the 32nd America's Cup. The special feature of this technology is that sailors can accurately control the shape of a foresail via the air pressure in the inflatable battens. The planning and realization of research and development projects, conducted by teams from the business units at BMS and also by the New Business Department, are supported by a growing global network of Innovation Centers, Competence Centers and Technology Centers. New Innovation Centers are currently being planned for Russia, Korea, India and Taiwan.

▶ www.bayermaterialscience.com

MARKET REPORT

The Chemical Industry in Turkey

Continued Page 1

industry and integrated into supply chain of national industries, especially, textiles and automotive sectors.

Production

Turkey has been manufacturing chemicals for very long time, being a producer of many basic and intermediate chemicals and petrochemicals. The production value of the Turkish chemical sector has reached about US-$13 bn, which includes petrochemicals, inorganic and organic chemicals, fertilizers, paints, pharmaceuticals, soaps and detergents, synthetic fibers, essential oils, cosmetics and personal care products. 84% of production originates from private sector.

The chemical industry employs 77,320 people and the industry has about 4,286 companies manufacturing various chemicals. 2% of the existing companies have more than 150 employees and the rest has less than 20 employees. Most of the companies in the chemical industry, especially private sector companies, are located in Istanbul, Izmir, Kocaeli, Adana and Ankara.

The Turkish chemical industry has developed significantly in terms of quality, productivity and protection of environment and is in the process of adopting EU's Technical Standards. In addition, the responsible care, the chemical industry's trademarked non-compulsory initiative on environmental, health and safety issues, has been successfully implemented since 1992.

Turkish chemical industry has the competitive power because of various raw materials advantage. Turkey is among the main producers of soda ash, chrome and boron chemicals.

The Turkish petrochemicals industry has shown a considerable growth since 1970. The dominant organization in the Turkish petrochemical sector is Petkim Petrokimya Holding A.ş. which is a public company and under privatisation scheme at present. There are two petrochemical complexes, one is Petkim-Aliaşa complex in Izmir and the other one is Tüpraş (Turkish Petroleum Refineries Corporation)-Körfez Petrochemical and Refinery in Kocaeli. These petrochemical complexes have a total production capacity of 1,903,000 tons/year. In these two complexes a wide range of petrochemicals, all common plastics (HDPE, LDPE, PS, PVC, and PP), aromatics, ethylene glycol, phtallic anhydride, terephthalic acid, carbon black, synthetic rubber, acrylonitryl and caustic soda are produced. The total production of these petrochemicals reaches about 3.2 million tons/year, but meets about 30% of domestic demand.

Since the textile sector is a well-developed sector in Turkey, polymer production related to textiles and the production of textile chemicals have also developed simultaneously.

Beside Istanbul the main centers of the chemical Industry in Turkey are Izmir, Kocaeli, Adana and Ankara.

Source: Pixelio.de

Large plants for the production of polyamide, polyester and acrylic fibers have been built and production has been directed to both the foreign market as well as the domestic market. Almost all synthetic fibers are produced by the private sector and synthetic fiber production is around 850,000 tons/year.

The fertilizer industry is one of the key industries for Turkey, which has vast agricultural potential. The first independent fertilizer plant commenced production in 1954 and heavy fertilizer investments were realized between the years 1960-1970. Today there are seven companies producing fertilizers exclusively. Tugsaş, Igsaş, Bagfas, Toros Gübre, Ege Gübre, Akdeniz Gübre and Gübre Fabrikalari are all in the private sector. The industry has a total production capacity of 5.8 million tons/year. AN 26, AS, DAP, TSP, urea and composed fertilizers hold the largest share in fertilizer production. Turkey's fertilizer production meets domestic demand and the surplus is exported.

Pharmaceuticals, soap and detergents, soda, chromium chemicals, boron chemicals, paints, sodium sulphate and fatty acids, rose oil are the other main areas of production of the chemical industry.

The pharmaceuticals industry has become one of the leading sectors of the chemical industry and accounts for approximately 10% of the chemical industry's production. Production trends of pharmaceuticals are closely related to domestic demand. Turkish pharmaceutical companies manufacture a wide range of pharmaceutical products, mostly generic formulas. The number of pharmaceuticals on the market is 3,100. Including alternative posologies, the number is 7,200. Domestic industry meets 90% of the pharmaceutical demand but new pharmaceuticals, such as ones for cancer, vaccines and hormones are imported. The pharmaceuticals industry produces many active ingredients of pharmaceuticals, primarily antibiotics and analgesics, by using fermentation, extraction and synthesis methods. The major characteristics of the pharmaceuticals raw materials industry are that mainly private companies invest in the sector and the existing production capacity can easily be shifted to various production lines. It is worth mentioning that the Afyon Alcaloids Factory produces 20% of the morphine consumed by pharmaceuticals industries all over the world.

The Turkish soap and detergent industry has shown very good performance in terms of quality, capacity and exports. There are many companies in the soap and detergent industry, about 15 of them being the major ones; among these there are multinational groups which have worldwide reputations. Since 1990 domestic and foreign investments in the Turkish cleaning products industry have increased considerably. As a consequence, detergent production capacity has reached 1.3 bn tons and soap production capacity has reached 550 thousand tons; both have great export potential. Since Turkey has a large variety of herbs and natural products, natural soap production is also widespread and done by small size local companies throughout Turkey. World famous "laurel soaps" are produced in large quantities in Mersin, Antakya and its surrounding regions. Turkey is also among the top producers of olives, therefore natural olive oil soaps are also manufactured and exported in large quantities.

The consumption and production of cosmetics and personal care products are growing rapidly. The number of cosmetics and personal care products is increasing every year. Hair care has the largest share of the cosmetics and personal care products market in Turkey. Shampoos represented around 59% of hair care products. Men's grooming products, depilatories, bath and shower products especially bar soaps, lip and eye make-up, personal deodorants and antiperspirants, perfumes, cologne and other toilet waters, baby care products and dentifrices are the main products.

Parallel to the developments in the construction, automotive and marine industries of Turkey, the paints and coatings industry has also developed and has became one of the most dynamic sectors of the Turkish chemical industry. Today the industry produces about 500,000 tons/year of paints and coatings and is comprised of about 420 manufacturers, 20 of them being large-scale companies. In addition to meeting domestic demand, the Turkish paint sector has recently tended to export more.

Turkey has the largest soda factory in the Middle East with a total capacity of 750,000 tons/year. In addition to light and dense soda ash, refined sodium bicarbonate and sodium silicate are produced at the Mersin plant. An extremely rich trona (natural soda ash) deposit was near Ankara, at Beypazari, Turkey will have substantial export potential for soda ash in the near future. The trona (natural soda ash) reserves will be worked by Eti Soda A.ş. in 2007. About 1,000,000 tons/year soda ash will be produced between 2007 and 2008.

Being among the top five countries supplying chrome ore to world markets, Turkey produces and exports some of the most important chrome chemicals and derivatives such as sodium bichromate, basic chrome sulfate, chromic acid and chrome oxide.

Turkey also enjoys a comparative advantage in boron chemicals (borax decahydrate, borax pentahydrate, boric acid and sodium perborate) due to the size of her reserves, the quality of minerals and proximity to the consumer markets. Eti Maden Işletmeleri Genel Müdürlüşü is the dominant producer of boron minerals and boron chemicals and the sole-exclusive exporter of boron chemicals. The capacity of Eti Maden Işletmeleri Genel Müdürlüşü has reached to 1,953,000 tons in concentrate ore and to 923,000 tons in refined boron chemicals.

Turkey has developed a substantial capacity and production of sodium sulphate. In sodium sulphate production, Turkey is second largest in Europe and sixth in the world.

Owing to Turkey's climatic and ecological conditions, many medical and aromatic plants are cultivated or gathered from nature. Turkey is one of the most important rose oil exporters in the world market. The majority of these exports originate from the Isparta region. Laurel oil, thymus oil, lavander oil and origanium oil are also produced in Turkey.

In conjunction with recent industrial growth in Turkey, the consumption and production of many other chemicals are growing rapidly and the number of chemicals produced is increasing every year. The recent developments in textile and leather chemicals are also worth mentioning and many small and medium size companies have recently started to operate in these two sectors.

In the Turkish chemical industry, there are about 314 companies with foreign investment. The Turkish chemical industry has a share of 13% of total foreign capital in Turkey.

Exports

Turkey's chemical industry exports are increasing steadily. In 2006 the chemical industry was one of the important exporting sectors among total industrial exports. The value of chemical exports reached about US-$3.5 bn in 2006, or about 4% of the total exports in Turkey.

Major export products of the Turkish chemical industry were synthetic filament yarns with an export value of US-$317 million in 2006. The second major export product were medicaments consisting of mixed or unmixed products for therapeutic or prophylactic uses, in measured doses or put up for retail sale with an export value of US-$273 million. Soaps; organic surface-active products (US-$250 million), cyclic hydrocarbons (US-$180 million), organic surface-active agents (excl. soaps); surface-active preparations, washing preparations (US-$177 million), borates; peroxoborates „perborates" (US-$164 million), synthetic staple fibres (US-$160 million), synthetic filament tow (US-$138 million), polyacetate, other polyethers and epoxide resins, in primary forms (US-$107 million), shaving preparations, incl. pre-shave and after-shave products, personal deodorants, bath and shower preparations, depilatories and other perfumery (US-$106 million), acrylic polymers-in primary forms (US-$87 million), polymers of ethylene-in primary forms (US-$86 million), oxides of boron; boric acids (US-$81 million), binders for foundry moulds or cores (US-$72 million), preparations for use on the hair (US-$70 million), carbonates; peroxocarbonates „percarbonates (US-$69 million), paints and varnishes based on synthetic polymers (US-$64 million), glazier's putty, resin cement and other mastics; painter's fillings (US-$55 million), beauty or make-up preparations and skin care preparations (US-$50 million) were the other export items of Turkish chemical industry.

Turkey is now exporting various chemicals to 180 countries throughout the world. Major destinations for chemical materials were the European Union countries, Eastern Europe, the Middle East and Gulf countries, the North Africa, the Far East and Asian countries.

The Chemical Industry Exports by Countries (Value: US-$ thousand)

Countries	2005	2006
Italy	202,414	302,163
Russian Fed.	165,674	200,951
Germany	152,302	181,463
Iraq	112,615	159,593
USA	114,644	153,709
China	91,342	146,896
Spain	143,055	138,236
Egypt	136,131	118,536
Belgium	99,775	118,290
Ukraine	89,143	114,711
Romania	95,615	105,451
Iran	92,851	102,462
Netherlands	50,782	92,821
Bulgaria	77,778	90,139
Israel	69,554	80,546
Azerbaijan	62,975	76,670
UK	63,909	71,636
TRNC	62,375	65,780
Greece	39,206	65,450
France	39,269	56,206
Kazakhstan	40,242	53,461
Saudi Arabia	40,323	44,387
Algeria	52,555	44,332
Syria	38,431	42,992
Poland	36,281	41,273
Georgia	29,639	39,443
Uzbekistan	25,187	36,031
Switzerland	25,901	35,889
South Africa	23,862	29,109
Portugal	13,103	29,025
Taiwan	22,137	28,900
India	19,151	28,502
Pakistan	15,232	27,947
Turkmenistan	21,639	25,355
UAE	24,229	23,296
Jordan	17,250	23,114
Denmark	21,100	20,406
Others	518,194	604,456

Source: Undersecretariat of Foreign Trade

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Export Product Groups of Chemical Industry (Value: US-$ million)

Product Groups	2005	2006	Major Export Markets in 2005
Basic chemicals	639	868	Italy, China, Spain, USA, Netherlands
Fertilizers	48	39	Iran, Spain, Italy, Greece, TRNC
Plastics in primary forms and of synthetic rubber	253	399	France, Netherlands, Germany, Italy, Ireland
Pesticides and other agro-chemical products	28	34	Romania, Azerbaijan, Saudi Arabia, Turkmenistan, TRNC
Paints, varnishes, and similar coatings, printing ink and mastics	172	214	Russian Fed., Azerbaijan, Romania, Georgia, Iraq
Pharmaceuticals, medicinal chemicals and botanical products	341	371	Germany, Switzerland, UK, USA, TRNC
Soaps and detergents, cleaning and polishing preparations, perfumes and toilet preparations	639	752	Russian Fed., Iraq, Ukraine, Israel, Romania
Man-made fibers	580	620	Italy, Egypt, USA, Spain, Belgium
Other chemical products	246	323	Germany, Iran, Russian Fed., France, Netherlands

Source: SIS (State Institute of Statistics)

Dow and Solvay Create JV

Dow Chemical and Solvay announced an agreement to create a joint venture for the construction of a hydrogen peroxide (HP) plant in Thailand. Scheduled to be operational in 2010, the new HP plant will serve as a raw material source for the manufacture of propylene oxide (PO). The HP plant will be the largest in the world, with a capacity of over 330 kilotons per annum (KTA) of hydrogen peroxide.

In addition, Dow and BASF are advancing negotiations for the construction of 390 KTA propylene oxide (PO) manufacturing facility in Map Ta Phut, Thailand. The new plant would use the hydrogen peroxide to propylene oxide (HPPO) technology jointly developed by Dow and BASF. "This project would expand our successful cooperation with Dow and Solvay to deploy this innovative HPPO technology in Asia," said Jacques Delmoitiez, president of BASF's Polyurethanes division.

The Dow and BASF Thailand facility would be the second world-scale plant to use HPPO technology. The first, a 300 KTA Dow and BASF HPPO plant, also supplied by an HP plant based on Solvay's technology, is currently under construction in Antwerp, Belgium, and is scheduled for start-up in early 2008. Propylene oxide is used to produce propylene glycol, polyurethanes and glycol ethers.

Propylene for the proposed HPPO facility in Thailand would be supplied from the liquids cracker that Dow announced it was building jointly with The Siam Cement Group (SCG) in Thailand in October of 2006. The liquids cracker facility is expected be fully operational in 2010.

▶ www.dow.com
▶ www.solvay.com
▶ www.basf.com

Pfizer Under Pressure

Pharmaceuticals giant Pfizer is facing tremendous problems due to the expiration of patents. CNS drug Zoloft lost 82% of the revenues in Q2. Likewise, Norvasc lost 45% in the second quarter. New products like Sutent (oncology, US-$146 million, +331%) or Lyrica (CNS, US-$405 million, +49%) were not able to offset Pfizer´s decrease with blockbuster drugs. Total revenues were US-$11.1 bn (–6%). The net income plunged by 48% to US-$1.27 bn. In early 2007 Pfizer had announced a cost cutting programme to reduce costs by US-$2 bn and the number of jobs by 10,000. Meanwhile, Pfizer is about to move its German headquarter from Karlsruhe to Berlin.

Pfizer 1st half 2007

	2007 (US-$ bn)	2006 (US-$ bn)	change (%)
Total Revenues	23.56	23.48	0
Pharma	21.69	21.93	-1
Animal Health	1.22	1.09	11
Others	0.65	0.46	42
Net Income	4.66	6.53	-29

▶ www.pfizer.com

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Production
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DSM to Build New Engineering Plastics Plant in India

DSM plans to invest in a new plant for producing engineering plastics compounds in India. The new plant will triple the capacity for the production of materials used in manufacturing molded components for the automotive, electrical and electronics, consumer and industrial segments. The new facility will enable DSM to meet the growing demand from the Indian market during the next few years while its design will also allow for additional capacity expansions in the future.

▶ www.dsm.com

Linde to Increase Borsodchem Gas Supply

The Linde Group and the Hungarian chemical company BorsodChem have agreed to expand their cooperation regarding industrial gas supplies to BorsodChem's main production site in Kazincbarcika, Hungary. Linde and BorsodChem intend to enter into a long term supply agreement about the additional supply of around 150,000 t of carbon monoxide and hydrogen per year for the expansion of Borsodchem's isocyanate production.

▶ www.linde.com
▶ www.borsodchem.hu

Lubrizol to Expand Presence in China

The Lubrizol Corporation will expand its presence in China by investing approximately US-$40 million to build a facility in Songjiang, just outside of Shanghai. The new facility will include manufacturing, commercial and technical capabilities. It will be built on approximately 31,000 m² recently acquired land adjacent to the company's existing (thermoplastic polyurethane plant in the Songjiang industrial zone. The company expects to begin construction in the third quarter 2007, and to complete it in the fourth quarter 2008. Future plans for the site could include adding other laboratories and production lines.

▶ corporate.lubrizol.com

Poet to Construct Ethanol Production Facility in Ohio

Poet, formerly operating under the name of Broin, announced a location outside Marion that will become the company's 3rd ethanol production facility in the state of Ohio and their 31st construction project overall. The Northern Ohio community of Marion is located in Marion County 50 miles north of Columbus. Marion Ethanol, a US-$130 million production facility, will be located on 284 acres approximately 1.5 miles northwest of Marion on Hillman-Ford Road. Poet expects to start construction in the next 30-60 days with a construction time period of 12-14 months. At 65 million gallons of ethanol per year (MGPY), Marion Ethanol will consume 21 million bushels of locally grown corn and produce 178,000 t of premium Dakota Gold Enhanced Nutrition Distillers Products. Ethanol marketing for the facility will be provided by Ethanol Products and byproducts will be marketed by Dakota Gold Marketing, both subsidiaries of Broin Companies. The facility will utilize rail service from CSX.

▶ www.poetenergy.com
▶ www.broin.com

Customers Lead the Design Process

Stefan Gustafsson – A Pump Designer for 30 Years

Not many people can say that they played a part in a medical landmark that is still saving lives 30 years on - but Swedish born and educated, Stefan Gustafsson can. Stefan has been designing peristaltic pumps for Watson-Marlow Bredel for the last 30 years, and is still developing market leading products today - like the new Watson-Marlow 520RE Load-Sure Pump.

But what is the story behind the pump designer and how does he continue to push the boundaries of peristaltic pump design? To quote Stefan – "Inspiration is often driven from our early experiences."

Growing up on a farm, Stefan spent his younger years fixing machinery and helping to maintain the farm in general. With his youth filled with the challenge of building and fixing, Stefan wanted to understand engineering from a more technical perspective so he applied to the Swedish airforce engineer college to study mechanical and electronic engineering. "Coming from the background I did, you had to be good at making things work without the luxury of new materials or available resources – it's fun, it's a challenge. And now, with each year, I get more new technology to play with," explains Stefan.

The technology available to work with at the college was far in advance of the more traditional tools he worked with on the family farm. Laser and microwave technology were the engineering principals, pushing the boundaries of engineering to unprecedented levels. Stefan passed his course with flying colours, but wanted to continue his work with advancing technologies. "With national service a part of Swedish culture in 1962, I spent a year in the Swedish army, after which I continued my education sponsored by the Swedish Royal Airforce, at the university in Halmstad and Stockholm, and where at the time they were experimenting with microwave technology" Stefan explains. "Being able to use the most advanced engineering and technological developments available further polished my knowledge and interest in engineering design for practical use."

The Course to Watson-Marlow Bredel

As is usual in life, meeting the woman of your dreams changes everything. This particularly lady was working in Stockholm, but hailed from England. After a whirlwind romance, the couple married in 1969 and planned to live in Australia, which at the time was crying out for engineering professionals to assist in the development of the country. However, on the way to Australia the couple stopped in Mustique, one of the Windward Islands, to stay with Stefan's cousin.

The pair had an enviable lifestyle on the island and Stefan quickly got the opportunity to skipper a large charter yacht, sailing between the islands. Whilst in the Caribbean, Stefan's wife became pregnant and the pair decided to move to an area where they would settle more permanently. They chose Cornwall, where Stefan's wife had family.

In Falmouth, Cornwall, Stefan quickly took up employment with Apex Medical, where he began designing pumps. But ultimately, it was Stefan's love of sailing that led him to meet with Watson-Marlow. At one of the yacht clubs in Falmouth, Stefan met Bernard Refson, then owner of Watson-Marlow, who was himself an enthusiastic boat lover and Stefan was offered a job as a pump designer for the company.

Stefan's first project for Watson-Marlow was to develop its existing medical pump portfolio. The need in the market was to find an improved method of detecting air bubbles in dialysis machine lines, which at the time could only be done by using optical systems. Stefan was able to apply his knowledge of ultrasonic technology, which he gained whilst in Swedish defence, to develop an ultrasonic method for detecting and removing air bubbles from this process – a far more effective and reliable solution. This was a landmark medical achievement.

The Process

But how does the design process work? "Essentially the design process is simple," says Stefan. "The key to engineering design is to work backwards, taking the existing product and finding areas for improvement. First I have to know what the customer perception of the product is, and discover what can be improved and what works to the highest standard," Stefan continues. "When I have received the feedback, I go back into the workshop to get my hands dirty, as any CAD system can only do so much.

"My process is quite time and labour intensive, but I am a perfectionist. I build and rebuild and test a pump thoroughly before presenting it to customers for further feedback. However, it's not just the customer that has to be happy with the product, I do too. It's not uncommon for me to redesign a part thirty times before I am happy."

Inspiration And Development

How does Stefan keep up with new technology and innovation? "It is vital to maintain close contact with customers. It's them that lead the design process by creating demand, which often stems from a problem or need within the market. But it's also important to look outside your own industry. For example, influenced by consultancy projects I've been involved with in the motor industry, I looked at utilising the idea of brushless motors within pumps and implemented the solution with great success. My knowledge gained within defence was translated to develop successful solutions within the medical field, so to close your eyes to other areas of innovative technology and design is pure ignorance. I read magazines and visit industry exhibitions to help me maintain and grow my knowledge, keeping at the forefront of the industry."

Where Now?

Ultimately, design for every industry is paramount to its success. If a designer stands still, however successful they have been, others will forge ahead. But with Stefan Gustafsson, standing still hasn't ever been an option. He tends to prefer to ride each wave of success and then reach for the next challenge.

"The industry has been great to me. Almost every time I turn on the television I see something I have been involved with, such as the development of the pumps used in biotechnology and pharmaceutical research or at the other end of the scale, for environmental water quality testing. There is always a new challenge to meet and that keeps design exciting. I have been doing this all my life, and I want to continue in that way for a long time to come," concludes Stefan.

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Some Like It Hot

Sealing Systems for Hot Oil Pumps

In industrial heat generation, thermal oil has become a popular heat transfer medium. Compared to hot water systems thermal oil can transfer higher temperatures at lower pressures. This means that hot oil systems allow a lower pressure rating. An electrical heater or burner heats up the oil, users consume the heat, and there is a circulation pump. The trouble free operation depends primarily on a reliable circulation pump with a corresponding shaft sealing system. Every user of hot oil systems should be aware of the different sealing systems and pump concepts and their advantages. Using the cheapest pump solution often leads to high maintenance costs during operation.

Ralph Schommer, Dickow Pumpen KG

Pump Concepts

Low cost pump concepts normally use standard foot mounted ductile iron volute casings with a standard single mechanical seal that is separated from the hydraulic parts by a air cooled intermediate casing. The temperature limit is typically 350°C. However, in applications above 320°C this standard foot mounted casing can be overstressed and deformed by typically unknown forces and moments generated by the piping system during heating of the plant.

For temperatures above 320°C (up to 400°C) a pumping concept based on the chemical standard pump hydraulics is often a better solution. The pump casings can be equipped with centerline mounting, the material can be improved to cast steel and different sealing systems can be used. When cast steel is used, it is also possible to welded drain pipes which are getting more common nowadays.

Sealing Systems

Especially for low viscosity and high temperature synthetic oils (e.g. Dowtherm or Diphyl), sophisticated tandem seal arrangements or magnetic couplings are required. In order to minimize influence of solids (such as cracking particles) on the seal lifetime, the seal face combination is SiC against SiC (Silicone Carbide is a very hard ceramic material), the bellows are rotating in order to prevent clogging and the seal chamber is designed as large as possible to prevent the accumulation of the solids. The two seals (on the product and atmosphere side) are lubricated by a pressureless air cooled thermosiphon vessel which also prevents damage to the seals, even during dry running conditions. A constant lubrication and circulation flow is generated by a pump ring. Failure of the product seal can be detected by a level switch in the vessel and the atmoshere seal will prevent leakage. For applications above 350°C, it is possible to have additional water cooling with a cooling coil inside the thermosiphon vessel.

Another reliable solution is shaft sealing by magnetic coupling, which is also air cooled and is absolutely leak-free. The operating principle of the magnetic coupling is very easy. There are internal and external rotating magnets that are separated by a stationary containment shell. This special design separates the magnets with an air cooled finned casing from the hot pump casing, which means that the magnets are running at a reduced temperature level (max. 250°C). They are also additionally protected against solids because they are separated from the main circulation flow. Once again SiC against SiC is used for the fluid lubricated bearings in order to minimize wear. The standard containment shell material is Hastelloy C. Eddy current losses are generated through the rotating magnetic field and these heat up the shell. If the losses are more than 2 kW the heat radiation of the casing will be too small and must be supported by an additional air cooling loop.

The standard design can even be improved with a close coupled motor and a ceramic shell. The flanged motor prevents misalignment of the elastic coupling and the ceramic material has zero magnetic losses because it is an electrical isolator. Secondary containment with leakage monitoring device can be added for additional safety.

Field Experience / Application

In 2002 Bertrams Heatec, a leading company in heat transfer plants located in Muttenz (Switzerland) awarded contracts for several heat transfer systems with multiple heaters for polyester plants in China. The heaters have a capacity of 14 - 16 MW. The selected heat transfer agent was synthetic Dowtherm A. Every heater generated about 157,600 kg/h vapour with a temperature of 337°C and a pressure of 3.5 bar.

Pump installed in a plant

Process heating using thermal fluids in the vapour phase (flash system or secondary vaporizer) makes it possible to distribute a constant supply of heat uniformly to several users. The capacities range from 100 kW up to about 45 MW per heater, thus covering a broad spectrum of heating requirements. Even larger capacities can be achieved by combining several units in a battery, which also increases plant availability at the same time.

The circulation pumps of such a system are exposed to extraordinary conditions. At a temperature of 330°C a flow of 530 to 630 m^3/h against a head of 90 m must be circulated. The typical low cost pump with standard foot mounted casing and a single mechanical seal (as described above) proved to be too weak for this kind of application. The low viscosity synthetic oil can additionally lead to leakage of the single were selected. A robust design with centerline mounted cast steel casings and a tandem seal arrangement was selected as the sealing system. The first installed pumps have been running for over 2 years without any problems. In the meantime Bertrams have obtained several orders for similar polyester plants in China and over 20 Dickow pumps have now been installed. All the pumps are in operation and running successfully.

How can you select the right pump and sealing system?

Unfortunately there are no fixed temperature limits, it also depends on the piping and pump size, etc. In regions above 320°C and when using synthetic oils, it is strongly recommended to carefully examine the pump and seal design. When comparing double seal systems and magnetic couplings the latter is not always more expensive. In regions up to 55 kW the initial costs of magnetic coupled pumps are even lower, for larger motors however (and therefore larger couplings) the double seal systems look more attractive. The longest meantime between failures (up to 10 years) can only be reached with a proper magnetic coupled pump.

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Increasing Reliability While Reducing Cost?

Yes! It is Possible

Reliability and productivity can be improved, and costs controlled using techniques that include monitoring the condition of equipment, using diagnostic information for predictive maintenance, and changing outmoded work practices.

The need to maintain equipment reliability and increase production capacity while dealing with rising costs, shrinking maintenance teams and excessive overtime for emergencies, are issues common to industrial maintenance departments everywhere. Does anyone have a solution?

Actually, there are several solutions based on the application of some innovative condition monitoring technologies and changing work processes that frequently impede progress. They can be categorised into one or a combination of the following:

- Utilising advanced technologies to obtain field-based diagnostic information on the condition of plant assets
- Prioritising maintenance tasks
- Getting rid of unnecessary preventive maintenance tasks

Obtaining Diagnostic Information

Today the technology exists to automatically obtain field based information about the health of critically important machines. This information can be the basis for maintenance decisions leading to long-term, high-level performance. A good example of a platform for information gathering and optimising asset performance is Emerson´s AMS Suite, an integrated family of predictive maintenance applications that cover a broad scope of critical production assets.

All types of rotating machinery, including motors, pumps, fans, turbines, and compressors can be continuously monitored for changing vibration patterns – a sure sign of impending trouble. However, most monitoring systems alarm only when vibration becomes excessive, providing no in-depth information. The AMS Suite Software includes a Machinery Health Manager, which analyses data from online or portable vibration monitors, assigns a severity value, issues early warnings, and provides leads as to root causes.

The issue could be a bad bearing, radial rubbing, water induction, differential expansion, misalignment, coupling problems, imbalance, or poor lubrication. Other valuable information sources, including oil analysis, infrared thermography, and ultrasonics, can be utilised by this software to provide a true picture of the operating condition of rotating assets and their potential for failure.

A further tool: the Intelligent Device Manager is an easy, very effective means of acquiring, processing, and presenting diagnostic information generated by field instruments, including transmitters, analysers, and valve positioners. An Equipment Performance Monitor uses thermodynamic models to compare the actual performance of process equipment such as turbines, compressors, boilers, heat exchangers and variable speed pumps with their ideal performance. The data is automatically analysed, and results are presented as trends, graphs, and cost summaries showing amounts being lost due to poor performance. This type of monitoring complements the other technologies as a means of diagnosing problems in mechanical equipment.

Joe Podolsky, Emerson Process Management

The information captured can be used to extend equipment life, reduce maintenance costs, and increase overall process reliability. Plant workers gain a new perspective on the current condition of their rotating machinery, valves, and instrumentation, enabling them to respond and prevent unexpected failures and emergencies.

Maintenance Practices

At a time when two-thirds of trips to the field by maintenance personnel typically result in no corrective action an nearly one-third of all monies spent on maintenance is wasted, better practices are clearly needed. Too many plants are managed reactively, which is the most expensive of all types of maintenance. If operators suspect a problem, they react by sending a maintenance person out to check. When something fails, everyone reacts in a panic, spending whatever is necessary to get the plant up and running.

Equipment manufacturers recommend preventive maintenance as an improvement over reactive maintenance, but it´s still time consuming and expensive. Many manufacturers try to protect their own interests by recommending that their equipment receives more attention than is probably necessary.

A far more efficient system is reliability-based maintenance under which all plant assets are prioritised in order of importance to the overall mission. Certain critically important assets must be maintained for maximum reliability, but it may not be necessary to give the same level of care to every piece of equipment. When resources are employed where they are needed the most, many schedule-based maintenance tasks can be delayed or totally eliminated.

Armed with never-before-available information on the actual condition of operating equipment, plant personnel can determine with reasonable accuracy when each pump, valve, or turbine will next need maintenance in order to preserve its performance. The idea is to service equipment at the proper time to minimise physical deterioration and prevent unexpected failures while maintaining acceptable performance as long as possible. This is the essence or predictive maintenance based on the current operating condition of plant equipment.

Such information was hard to get in the past. However, the advanced software-based monitoring technologies described previously are making predictive maintenance programs much easier to execute.

Changing Procedures

Many companies invest in technology and expect a big payback without training personnel or adopting new work routines in response to the enhanced data. Emerson´s Plant Web Servcies expertise ensures that work processes take full advantage of the technology investment. Once a new technology is installed and employees are trained in its use, existing practices can be modified and tasks can be streamlined or eliminated.

Technology In Action

ABSF Antwerp implanted a predictive maintenance strategy ten years ago based on the collection and analysis of vibration data using Ermson´s CSI Machinery Health Analysers. Moving from a time-based regime to a predictive approach has resulted in significant cost savings and fewer equipment breakdowns.

BASF monitors approximately 3,000 machines and an example of a problem that was detected with the aid of Emerson´s diagnostic technologies was a defective bearing cage in a fan that was used for drying chalk. Failure of the fan could have caused a production outage and two days of lost production worth approximately €10,000.

The Rompetrol refinery in Romania needed to increase production and control maintenance costs and now uses the CSI Vibration Analysers and AMS Machinery Health Manager software. The company has also installed a comprehensive Oil Analysis Minilab. As a result, Rompetrol has saved US-$2.15 million in one incident due to early fault detection. Machinery Health Management technologies and the Delta V control system have contributed to 3 % savings on production costs. Unscheduled down times, which in the past could result in costs of US-$500,000 per month, have been significantly reduced.

By continually seeking ways to replace outmoded maintenance practices with predictive, reliability-based maintenance, plants worldwide are finding that advanced condition monitoring delivers greater equipment reliability along with reduced maintenance costs.

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Glasslined Technical Equipment

Glasslined technical equipment as an all-round material is firmly established between surface finishing materials fulfilling rather inferior demands and the special materials with to some extent very specific performance data particularly in the chemical and pharmaceutical industry but also for water supply systems and in special niches in general machine construction.

Depending upon the area of application enamel with its generally broad function profile can be adjusted to meet special demands. Whether for supplying potable water, textile chemicals or in the treatment of waste water, in soldering plant construction and in the pharmaceutical industry under the GMP conditions or to comply with hygienic design stipulations, enamel fulfils many and varied demands with different focal points by linking the structure material with the surface finish determining grades of enamel.

Typical Material Properties

The term glasslined technical equipment can be seen to be analogue with industrial ceramic. It would appear sensible to differentiate between commercial enamel for every day use in the home or for jewellery, etc., because as far as glasslined technical equipment is concerned the technological demands put on the surface finish are in the foreground. As a consequence, this term is applied for enamelling in processes in which physical and chemical stress conditions can be defined and the thus derived demands on the surface system are the main consideration.

The main typical material features of glasslined technical equipment:

- High resistance to corrosion attack, more especially in the case of acidic media even at higher processing temperatures.
- Higher resistance to wear by abrasive media
- Surface smoothness
- Easy to clean with no tendency towards adhesion
- Biological and catalytic inert behaviour

The properties of the enamel are supported by appropriate sophisticated constructive designs which strengthen the positive properties and overcome existing limitations as far as possible.

Physiochemical Compound Material

Enamel as such is outstanding when compared with other popular surface coatings and finishes such as wet paint, powder coating, lining with plastic, etc., inter alia by the given intensive physical and chemical connection with the basic material. This is marked by diffusion processes from the basic material towards the enamel and vice versa. Over and above the diffusion layer a real compounding layer forms from a few but also to some tens of micrometers thick depending on the material system.

Optimal morphology by releasing elements close to the surface and linking the substrate material in the enamel matrix is initially generated to develop the mechanical and physical connection.

The increased roughness by releasing the substrate surface in connection with the development of backcuts offers a large number of

Franz-Josef Behler, Eisenwerke Düker

anchor points for micromechanical positive connection.

This mechanism is supplemented by generating integral pressure tension in the enamel in cooled state which contributes to the further stabilisation of the mechanical compound. However, if the stress in the enamel layer is too high, this can also lead to increased sensitivity towards impact where convex surface elements are concerned.

Enlargement of the specific surface supports the development of intermolecular bonding apart from this mechanical and physical bonding mechanism. Considerable effects are achieved through Valenz and Vander-Waals bonding but nevertheless, metallic bonding in the bonding layer likewise plays a role in the iron-silicium-oxygen system.

Construction and Corrosion Resistance

The durability of high acid resistant enamel as used in chemical plant construction, for example, is marked to some extent by extremely high SiO_2 content in connection with titanium, zirconium, lithium and boroxide. Special modifications are possible if the resistance to lye has to be increased. Although in theory enamel is considered not to be stable in the case of watery solutions the wear is usually so low that it can be assumed that the technical stability of the system is given but this is not the case with phosphoric and fluoride acid. For example, the wear rate for 20 % HCl at 110 °C is 50 µm per year (equivalent to 9,000 working hours). This is to be compared with the typical coat thickness of surface enamel of about 1,000 µm. As a rule the respective wear down in the fluid phase is in a t-2 relationship (t = time).

Basic Conditions for High Quality

The quality of any enamel depends on a large number of pertinent parameters and periphery conditions. Of decisive significance is the metallurgical quality of the basic material, its microstructure, the mechanical pre-treatment it has been subject to and its surface finish.

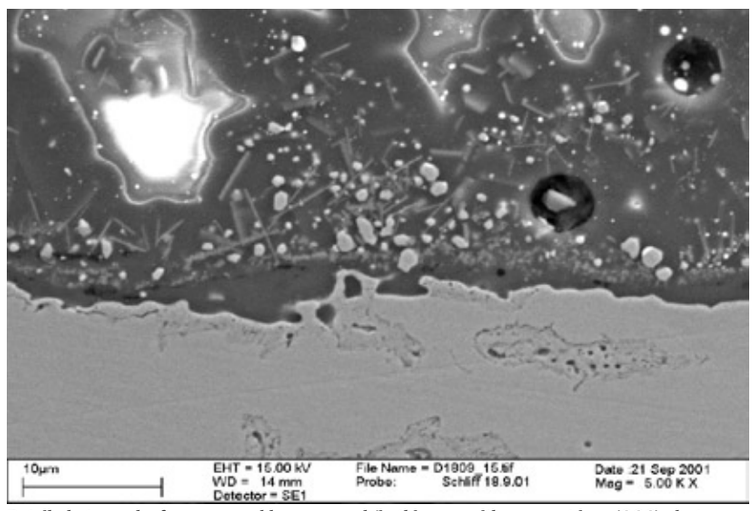
Only steels with restricted analysis can be given a high quality enamel finish. Carbon, sulphur and almost all metal accompanying elements must be limited. Clean ferritic microstructure in the periphery layer facilitates enamelling. Carbon inclusions make enamelling more difficult in the same way as micro faults which can act like hydrogen traps. This generally applies for enamelling iron foundry materials.

Thermal and mechanical preparation is subject to two main conditions. Clean, abrasive acting blasting material cleans, activates and enlarges the surface (Fig. 1–4). However, any contamination of the surface must be avoided after blasting. From this one can see the demand for a very quick production sequence, i.e. pre-treatment, application of the enamel slick, drying and firing the enamel.

Chemical and Physical Sequences While the Firing at 850 °C

During the firing operation different chemical and physical processes take place dependent on temperature and time. Initially the surface of the steel is oxidised further under the drying slick and is supported by the residual moisture of the dried slick. Water and hydrogen escape. Afterwards the oxide layer is released step by step by increasing the temperature, yet again. The chemical adhesion action takes place during this step, this being responsible for the development of the bonding zone to achieve the mechanical anchor. Also to be considered is that the enamel does not fuse at a defined temperature but the fusing process takes place within a fusing period because the different enamel components fuse at different temperatures.

The various components have a different effect on both the dissolving behaviour of the oxide coating and the viscosity of the melt. Iron oxide



Detail photograph of a compound layer enamel (in this case with grey cast iron (GGG) electron raster microscope photograph Fraunhofer-Institut ISC, Würzburg) in approx. 5000-fold magnification. Clearly visible is the (micro) roughness of the surface (bright to the bottom) with back cuts. Following to the top is a thinner homogeneous appearing seam about 2µm thick and the actual bonding layer afterwards clearly over 10 µm thick with different precipitations (ferrotitanium crystal in needle and pellet form) and inclusions.

escapes in the over saturated enamel melt and leads to faults that cannot be repaired (such as copper heads, and burn through) should the absorbability of the enamel be over stressed as a result of too long or too hot firing. Faults can occur which are also restricted locally in the case of less uniform distribution of the enamel mass.

The described sequences and effects contribute to differences in the base enamel (initial or first and second layer on the component) and the top enamel layer (and the build up of the following layer is aimed at ensuring the overall layer thickness). In function the softer less resistant basic enamel is responsible for optimal bonding to the basic material. The harder, highly resistant top enamel layer bonds very well with the base enamel and ensures the desired surface creating properties of the overall compound.

Mastered Technology, Broad Field of Application

Glasslining technical equipment from the material theory point of view, is a clearly definable and controllable process. The physical and chemical interrelationships are known and generally offer a broad range of possible optimal adjustments for the interrelationship between the basic material and the surface determining enamel within the given limits of the given load conditions.

Apart from the traditional areas of application in chemical plant construction, pharmaceutical and water supply systems, glasslined technical equipment is gaining increasing significance in general plant and machine construction. Glasslined technical equipment is a first choice material system in all those applications where marked resistance towards aggressive media is to be assured in conjunction with the mechanical strength even in the case of high process temperatures.

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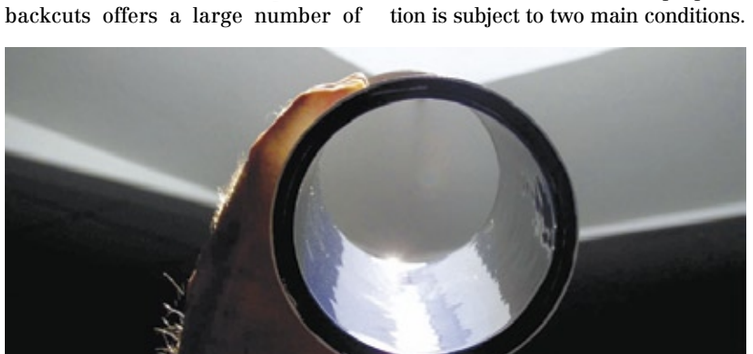

Glasslined technical equipment with extremely smooth surface finish in conjunction with high wear resistance to abrasive acting media and high resistance to corrosion. Visual counter light inspection of surface.

Good Maintenance and How to Achieve it

The chemical industry is exposed to a constantly increasing stress of competition. This demands higher productivity coupled with a simultaneous reduction in expense. Accounting for up to 50% of production costs, maintenance has a considerable impact on the cost-effectiveness and efficiency of production.

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All companies are currently stressing the importance of maintenance. Maintenance is regarded as a source of value added, key to the success of production and an economic factor. Each year, about €250 bn are spent on maintenance in Germany. At the same time, analyses show that about 18% of maintenance work is unnecessary and a further 17% ineffective. Between 10 and 30% of stoppages are thus caused by poor maintenance. In many companies stoppages cost some €50,000 per hour on average.

Poor maintenance is often the consequence of the ignorance and insufficient experience of personnel. In view of demographic changes and the growing cuts in staffing in the maintenance sector, it is becoming more and more important to investigate how to achieve good maintenance.

Good Maintenance

Many production specialists believe that good maintenance is a question of speed. In fact, however, speed is not an indicator of maintenance quality. Attitudes here will only change when error avoidance is given higher priority than error elimination.

In contrast, good maintenance is the central service that proactively improves production resources (machines, equipment and infrastructure), minimizes stoppages and errors, ensures the availability and safety as needed (industrial and plant safety, health and environmental protection, quality), at a competitive price and thus safeguards the generation of value in production.

Good Maintenance Starts at the Design Stage.
It ensures that the resources employed and persons involved are of the required quality and suitability for the respective maintenance task (quality guarantee). All services are verifiably documented and this documentation is available at all times (documentation guarantee). The required availability and safety and, in the event of malfunctions, reaction times are ensured for the specific process and project (reliability guarantee).

Good maintenance calls for in-depth knowledge and teamwork. It takes place in close cooperation between the operator, manufacturer and service provider.

Good maintenance is based on a maintenance strategy mix focused on the customer and the asset lifecycle. The intensity of use and the useful life of the assets are thus enhanced and their lifecycle costs are consequently reduced.

It prevents unscheduled shutdowns and shortens the duration of scheduled shutdowns.

Good maintenance thus increases customer benefit and customer satisfaction and contributes significantly towards the realization of company goals.

Keys to Success

The keys to good maintenance can be summed up by the „7 Rs".

The **Right Strategy** aims to integrate maintenance as a key value-adding contributor to the realization of production goals into the production strategy and to achieve cooperation beyond internal and inter-plant boundaries.

The **Right Staff** is characterized by proven technical and methodological knowledge, experience, motivation and task-related skills. They are flexible and reliable, willing and able to cooperate, and open to new ideas. They are also capable of thinking and acting strategically.

The **Right Processes** are standardized as far as possible so that comparable services can be provided at all sites. They are well planned, but can be dynamically adapted to current uses and requirements fast and without any difficulty. The processes are aimed at error prevention and the elimination of weak points. Processes for parts management and subcontractor management are also part and parcel of the relevant maintenance processes.

The **Right Methods** and Tools are the result of the strategy, the available staff and the processes. They have to be adapted to the particular requirements and opportunities. These include computer systems for the planning and (cost) control of maintenance and for condition monitoring. Knowledge management is of special importance, as it supports the sustainability of learning outcomes and the advancement of knowledge. On leaving the company, experts (experienced staff) can pass on their knowledge to successors, and the familiarization of new employees can be simplified.

The availability of the **Right Parts** is essential for achieving good maintenance. Deciding on which parts to stock is a difficult task as many stoppages are unpredictable. They can result from errors in the design, manufacturing, assembly and maintenance of the parts. Despite effective quality management, the reliability of a part today can only be estimated with a certain probability. This makes it difficult for the maintenance expert to decide on the right number of the right parts to stock.

The **Right Technologies** refer to the production resources employed. It is well-known that many weak points are purchased with the assets. Since these weak points can rarely be prevented by maintenance, attempts must be made to control their effects. Good maintenance therefore aims to exercise influence on the upstream procurement processes. This is the only way of ensuring that the production

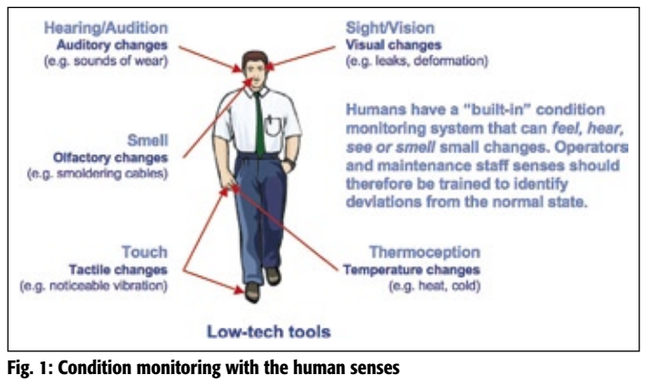

Fig. 1: Condition monitoring with the human senses

tenance is subject to constant change.

Tools

Reference is only made here to selected tools.

Condition monitoring may not be a new tool for maintenance, but it has recently become more widespread. The main reason for this is the possibility of early error detection and consequently initiating countermeasures in time. However, these do not always have to be high-tech tools. The human being himself has an „built-in" condition monitoring system which enables him to feel, hear, see or smell small changes. Operators and maintenance staff senses should therefore be trained to identify deviations from the normal state.

Another tool is mobile maintenance using RFID (radio frequency identification). For this, a transponder is attached to the maintenance object. In this way it is possible to clearly identify the object in situ, assign information such as the tasks being performed, circuit diagrams etc., and store measurement results and histories directly. Errors and mistaken identity can be avoided and a maintenance object cannot be forgotten or omitted during a service or inspection tour.

The final tool mentioned here is the Maintenance knowledge platform of Thyssenkrupp Xervon. This is organized as an assistance system that integrates itself smoothly into the processes and supports the maintenance expert in his work. The content is based on Xervon's range of services. The system also has the goal to ensure the availability of knowledge, including internal knowledge and the knowledge required from the customers, plant manufacturers and subcontractors. It is furthermore intended to promote communication. An important element is the failure database in which failures, their causes and their remedies are stored.

Conclusion

Good maintenance focuses on low overall costs and controlled processes – and not precisely the opposite. The target-oriented cooperation of humans, processes and technology results in the desired success. Achievement of objectives is supported by tools and by good training. ThyssenKrupp Xervon is focusing here on the new, yet-to-be-created training professions of multi-trade manager and maintenance provider.

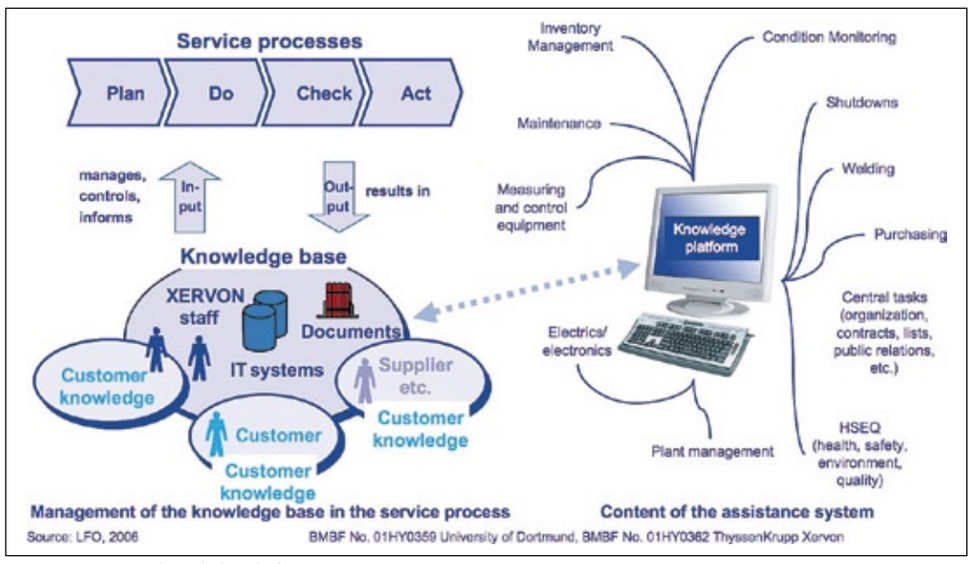

Fig. 2: Maintenance knowledge platform

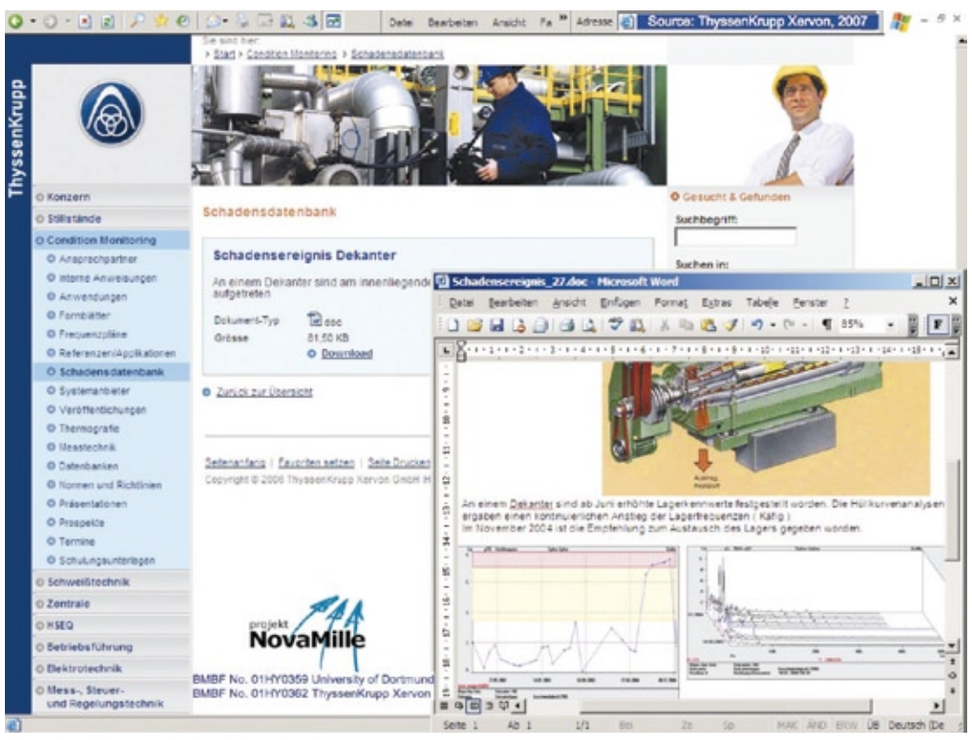

Fig. 3: Condition monitoring failure database

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Global Pressure Forces Pharma Industry

Pharma Has to Re-think Role of IT Solutions

A new report by independent market analysis firm Datamonitor highlights three key trends that will shape the pharmaceutical technology market in 2007 in the U.S., Canada and Western Europe. According to the report "2007 Trends to Watch: Pharmaceutical Technology," translational medicine will drive adoption of robust data analytic solutions among other business intelligence (BI) technologies. The report says the pharmaceutical industry's future prosperity will also depend on product lifecycle management (PLM) technology investments taken sooner rather than later while pressure to improve the effectiveness of sales and marketing will drive investments in customer relationship management (CRM) technologies.

"A silo-ed approach to the adoption of technology coupled with merging and acquisition (M&A) activity over the years has left the majority of Pharma organizations with some serious business and technological challenges ahead," says Markella Kordoyanni, pharmaceutical technology analyst at Datamonitor and author of the study. "As such, the industry will look to IT solutions to address some of those challenges and drive growth."

From Data To Drugs

Global pressures for safer drugs as well as scientific and technological advances are forcing the pharmaceutical industry to re-think the role of IT solutions during the discovery and development stages of the supply chain. The shift towards translational medicine necessitates ways of integrating IT earlier in the product life cycle.

The greatest demand on CRM is the ability to cover multiple touch points across a diverse customer base.

The goal of translational medicine is to discover new and safer drugs. Translational research requires exchanging project data and disease knowledge between scientists in the various stages of a drug project and especially bringing the learning of both successes and challenges of candidate drugs from the clinic back into preclinical discovery projects. Technical and cultural challenges often prevent discovery and clinical departments from exchanging knowledge and possibly the biggest gap there is that between science and IT. Datamonitor says technology vendors must recognize the shift towards translational medicine efforts that extend from pre-clinical all the way to post-marketing stages. Datamonitor believes that vendors will have a major impact in this nascent field delivering on its promise for more effective and safer drugs.

Product Lifecycle Management

With patent expiration looming, the pharmaceutical industry is looking for strategies to remain competitive by continuously developing new drugs and extending the indications of marketed drugs. Streamlining product development processes is now becoming a major priority for pharmaceutical companies looking to increase their market share. Implementing the right lifecycle management strategy will allow a pharmaceutical company to survive and prosper by maximizing profitability throughout the lifespan of its products. The types of PLM technologies that vendors offer must align with the customer's PLM strategy and will impact how the pharmaceutical PLM market evolves.

The Role Of CRM

As the development of a single drug requires the investment of hundreds of millions of dollars over ten to fifteen years, pharmaceutical firms are eager to invest in new technology solutions that will help them to execute a highly effective sales and marketing strategy. The very core of the pharmaceutical industry lies in the analysis of experimental data from discovery through development and even the post-marketing phase. Given the industry's inherent devotion to data, it is surprising that the pharmaceutical sector remains years behind other vertical markets in CRM.

Pressures to improve profit margins and market share are driving pharmaceutical companies to revisit their CRM strategies, which also includes improving sales force effectiveness. For the pharmaceutical industry, the greatest demand on CRM is the ability to cover multiple touch points across a diverse customer base (patient, providers and payers). In this respect, the pharmaceutical industry is unlike any other, faced with a wide and varied array of customers, each of whom interact to varying degrees and at various levels. CRM vendors and pharmaceutical companies must understand how the industry will evolve beyond traditional sales and marketing strategies and have a holistic view of the CRM landscape.

Kordoyanni Concludes:

"The sheer size and growth of the pharmaceutical market in the U.S. and Europe makes it an attractive market for technology vendors. In 2005 alone, Datamonitor estimates Big Pharma and Biotech's 2005 total sales exceeded US-$330 bn. Datamonitor forecasts pharmaceutical industry sales will increase at a modest 4.9% average annual increase between 2005–2011, although the forecast growth for the biotech market is markedly higher at 10.1% between 2005–2011. Clearly, the use of technology is an important part of enabling the continued growth of this market."

▶ www.datamonitor.com

Raising Quality Through Process Automation

MES Saves Time and Improves Production Processes

Roche´s manufacturing plant for galenicals (Leganes) is considered to be one of the most modern in Europe. Located in Madrid, Spain, it exports pharmaceutical products to over 60 countries worldwide. In 2004, Roche Leganes manufactured 550 tons in solid form and 380 tons in liquid, and packaged 34 million units. Roche Switzerland initially decided to implement the Propack Data PMX MES System on a local level. Following this successful experience, the decision was made to implement the system globally.

„In the Life Sciences Industry, quality is an absolute must", explains Esther Garcia, member of the Introductory Project Team with Roche and head of the MES systems support. Therefore, the driving force behind this entire project was an increase in the operational sequences with optimized, stable and automated processes, as well as an increase in production efficiency. This also included automatically regulated adherence to the basic legal conditions (Drive Regulatory Compliance), whereby the number of deviations should be reduced.

The primary objective was to automate the administrative processes involved in manufacturing which significantly lowered the volume of paper, in some cases, complicated manufacturing documents up to 80 pages. In this way the processes and documentation became clear and comprehensible for all involved. „The Rockwell Automation solution fulfills almost all requirements for a production plant in the Life Sciences Industry. Therefore, Propack Data PMX was our first choice from the beginning", says Garcia.

Solutions And Support

"Just as positive as the system", says Garcia was the associated support.

Source: Roche

In some areas the solution had to be adapted to our specific company processes, and sometimes the implementation was not easy. This customization was implemented in adherence to a very tight timeline, during a period of production overload and in a very complex environment. The Rockwell Automation service concept covered the conversion of the system locally, as well as the appropriate documentation, the test scenario and validation. The people involved also profited from close cooperation in other areas, such as consultant support.

Change Management And Training

It turned to be a challenge convincing the staff of the system's advantages, and establishing a new culture in production. The transition from paper to computer systems had to be made, not only in production, but in all areas, including management and quality assurance. For this purpose a person was entrusted to introduce the new processes and supervise the implementation. Accordingly, the appropriate steps were taken to further the change management process. The staff working most often with the system in each division was assigned as messengers, and were informed in regular meetings about the requirements and functionality of the system. The task of the messengers was to pass this know-how on to the remaining Users and to make improvements to the system. Meetings were also held to explain the individual function sets of Propack Data PMX to staff. Four months before deployment of the system, the staff was fully trained. The decision was made to train staff not by people from the IT department, but by colleagues with whom they work everyday. Thus, the project team intensively trained approximately 30 Key Users, who were, in turn, responsible for the training of the end users. The entire training process took over one year.

After the implementation phase, 20 of the initial Key Users became so-called "Super Users", one of Roche's post-implementation support bases. Besides their daily work in the different areas (warehouse, dispensing, manufacturing) they are actively involved in the Propack Data PMX system development: providing the first level support, training end users, suggesting improvements, and being a valuable contact point between staff, processes and system.

Results

In order to measure the efficiency of the new system, a business case was developed by Roche. It turned out that the operational sequences were radically improved and the actual results were far higher than expected. So, for example, the output capacity of the integrated weighing process could be increased by approximately 20% due to the system. The delivery times for raw materials from the warehouse to the manufacturing plant could be reduced by up to 70%. In addition the comparison of the times for discrepancy treatment brought a significant improvement with the help of the Propack Data PMX process control. For this, the visual identification was replaced by a barcode system so that the system could be examined at any time to see which materials were being used, substantially simplifying the monitoring of production. „When our manufacturing staff read the respective bar codes and examine the system, before they proceed with the components, no more errors can actually occur. So, we can obtain a higher yield in production with less expenditure", summarizes Garcia.

Further Projects

Roche is so convinced of the system that further implementations are planned in subsidiary companies. „The MES suite is an outstanding solution for us. We are very satisfied with the system, as we are with the support and the entire business relationship", concludes Garcia.

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Making Innovation Inevitable

Ontario to Boost Research, Grow Economy, Curb Climate Change

Source: Pixelio

This June, the governments of Ontario and California announced that they are joining forces to fight climate change. California Governor Arnold Schwarzenegger joined Ontario Premier Dalton McGuinty to sign a Memorandum of Understanding. Premier McGuinty said: „Canada's most populous province and America's most populous state have joined together to tackle one of our greatest challenges – as business partners, as places that share a legacy of innovation and progressive thinking, and as friends." Under the historic accord, Ontario and California are partnering to fight global warming by introducing progressive policies and encouraging innovation.

But climate change is not the only issue of mutual interest. The U.S. state and the Canadian province both are leading centres for life sciences. California is the heart of the North American biotech industry while Ontario has Canada's largest - and North America's 3rd largest - regional concentration of biotechnology firms and is a centre of the medical device and pharmaceutical industry with more than 41,000 people employed in the life sciences sector.

Research Is Top Priority

To further foster innovation, Premier McGuinty and Governor Schwarzenegger met at the MaRS (Medical and Related Sciences) Discovery District in Toronto, where they agreed to back promising new stem cell research that will help uncover new therapies for cancer. The Ontario government is investing CDN-$30 million to support the new Cancer Stem Cell Consortium, which will be headquartered at the MaRS centre. Working with colleagues in California, scientists in Ontario will investigate new therapies for cancer based on stem cell research. The Ontario Institute for Cancer Research (OICR) will oversee the collaboration efforts. Just a few weeks after that meeting, researchers at the McMaster Stem Cell and Cancer Research Institute of McMaster University in Ontario published a breakthrough stem cell discovery that according to experts will change how future research in the area is done.

Evidence for the deep commitment to innovation can be seen in the creation of a separate provincial Ministry of Research and Innovation (MRI) in 2005, and to emphasise the importance of its existence, Premier McGuinty himself serves as Minister of Research and Innovation.

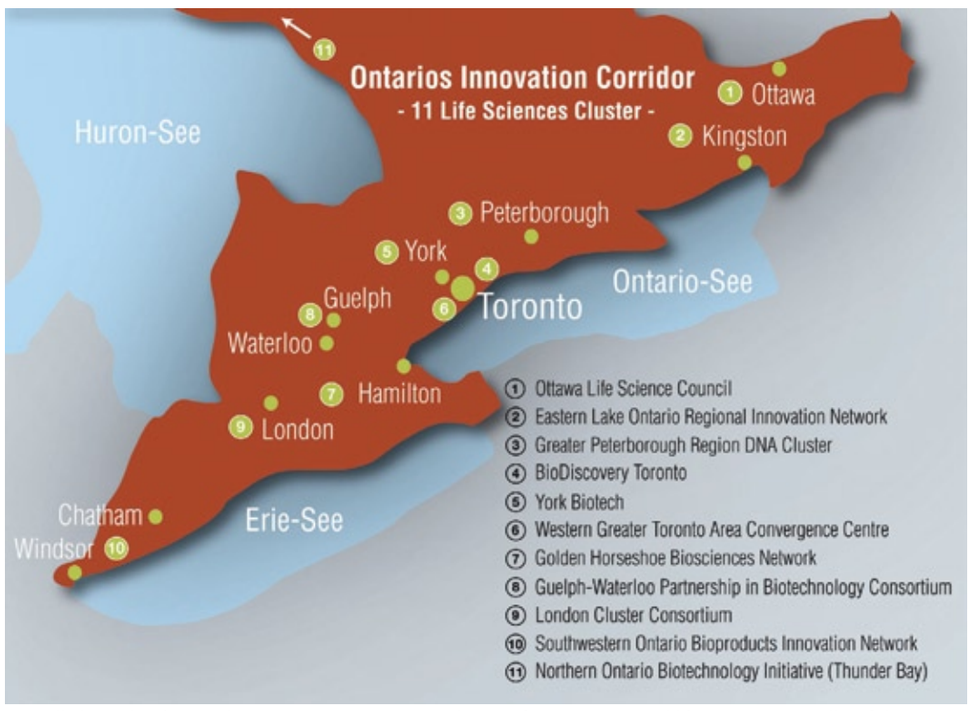
„The government of Ontario is committed to providing the support needed to get our promising ideas from the lab to the marketplace," said McGuinty. „Innovation needs to be sustained, engrained and cultivated in every sector. The goal of Ontario's Ministry of Research and Innovation is not to create instances of innovation, it is to make innovation inevitable."

This mindset has led the government to offer some of the world's most attractive tax credits for R&D. Thus, federal and provincial incentives combined can reduce R&D costs by nearly 60 % after tax.

A major goal of the MRI is to focus cross-provincial government resources. Over the next five years the government will invest nearly CDN-$1.7 billion to support research, commercialisation and outreach programs. Funding includes CDN-$ 286 million for cancer research under the Ontario Cancer Research Network and the OICR, and CDN-$ 715 million under the Ontario Research Fund to support leading-edge R&D in universities and hospitals.

Commitment To Commercialisation

Fostering a culture of innovation takes more than just research talent – it also takes investment talent. Innovative firms need capital from investors who are prepared to take on higher risks in pursuit of higher returns. To accelerate commercialisation and growth of innovative start-ups, the Ontario government is investing new funding totalling CDN-$160 million over the next four years in its Ideas to Market strategy. Provincially supported public private partnerships have been developed, as well as research parks, business centres and incubators.



Centrally located within North America, Ontario is a prime location for investment, and life sciences are a pillar of the province's future economic development. 11 Life Sciences Clusters are forming Ontario´s Innovation Corridor.

Located in Toronto's "Discovery District", the MaRS (Medical and Related Sciences) Centre connects and fosters collaboration between science, business and capital.

The Ontario Innovation Corridor, which is currently made up of 11 regional life sciences clusters and home to more than 60 research centres and five bioscience incubators, owes its genesis to the support of the government. Regional Innovation Networks such as the Guelph-Waterloo Partnership in Biotechnology, the Golden Horseshoe Biosciences Network, the Ottawa Centre for Research and Innovation (OCRI Life Sciences), and the Peterborough DNA Cluster promote the technology transfer and help to create partnerships with industry in each cluster area. Ontario Centres of Excellence, funded with CDN-$ 171 over five years, foster cooperation on joint projects between universities and industry to move innovative products and technologies from the lab to the marketplace. The government also funds Commercialisation Centres, which house start-up companies.

MaRS Phase II will add an iconic new building which will anchor the city's biomedical corridor in the Discovery District of Toronto.

Centres Of Innovation

One of the future centres of innovation will be the McMaster Innovation Park, where the government is investing CDN-$10 million in the development of a research campus. The park will house one million square feet of laboratory, office, teaching, training, and conference facilities, in support of R&D in a number of key industrial areas including materials and advanced manufacturing.

Interdisciplinary research is a key element of success. An example of interdisciplinary teamwork is the Toronto-based MaRS project which promotes the convergence of disciplines beyond "Medical and Related Sciences", including biotechnology, advanced information technology, and nanotechnology.

MaRS, like OICR, is a not-for-profit corporation founded in 2000 to improve commercial outcomes from Canada's foundation of science and technology innovation. MaRS connects and fosters collaboration between the communities of science, business and capital through co-location in the MaRS Centre, and more broadly through catalytic programs and structured networks.

Currently preparing for the development of Phase II that will see the construction of an iconic new building in the Discovery District of Toronto, MaRS is about to increase its impact on the local community, greater Ontario and Canada.

As a top-ranked Canadian province where research and innovation are given premier treatment, Ontario is a premier investment location. The fact that many leading global players in the life sciences industry, such as AstraZeneca, GlaxoSmith-Kline, Pfizer, Novartis, Amgen, Bayer, Sanofi Pasteur, GE Medical or Johnson & Johnson, have settled in Ontario is testimony to the province's position as one of the key life sciences locations in North America.

M. Reubold,
CHEManager Europe

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Ontario: www.2ontario.com
Ontario Ministry of Economic Development and Trade: www.investandtradeontario.com
Ontario Ministry of Research and Innovation: www.mri.gov.on.ca
MaRS Discovery District: www.marsdd.com

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George Iannuzzi

George Iannuzzi of Clariant has been elected to a three-year term on the Board of Directors of the Color Marketing Group. A Key Accounts Manager for the Clariant Masterbatches Packaging Group, with on-site responsibilities for the Colorworks Studio in New York City, Iannuzzi is a respected expert in the fields of packaging, plastics and special effects pigments. Iannuzzi's term begins January 1, 2008. The Color Marketing Group is an international association of 1,300 color designers who forecast the direction of color and design trends one to three years in advance for all industries, manufactured products and services.

▶ www.clariant.com


Daniel Pithois


Steve Holland

Daniel Pithois has decided to step down as Managing Director of Brenntag Holding. Brenntag CEO Stephen R. Clark: "The Board of Brenntag would like to thank Daniel for his dedication to Brenntag during his tenure and for his valuable contributions to the company. Thanks to his tireless efforts and passion Brenntag in Europe has grown significantly under his leadership. We offer our gratitude and wish him well in his new endeavors." **Steve Holland**, Managing Director of Albion Chemicals which Brenntag acquired in 2006, has been named as successor of Daniel Pithois as Managing Director. Holland, a graduate in polymer chemistry, has a distinguished career of 25 years in chemical manufacturing and distribution.

▶ www.brenntag.com


John Ramsay

John Ramsay, will succeed Domenico Scala as Chief Financial Officer of Syngenta with immediate effect. Michael Pragnell, CEO said: "John has been instrumental in the success of Syngenta since its creation in 2000 and I am delighted to announce his appointment as Chief Financial Officer. His financial acumen and experience will enable him to play an important role in Syngenta's future. John Ramsay (49) has been Group Financial Controller since 2000. Prior to that he was Zeneca Agrochemicals Finance Head Asia Pacific (1994 to 1999), Financial Controller ICI Malaysia (1990-1993) and ICI Plant Protection Regional Controller Latin America (1987 to 1990). Prior to joining ICI in 1984 he worked in Audit and Tax at KPMG.

▶ www.syngenta.com


Wilfried Eul

Dr. Wilfried Eul became head of the Exclusive Synthesis Business Line of RAG's chemical subsidiary Degussa on July 1, replacing Dr. Rudolf Hanko, who has moved on to head the Exclusive Synthesis & Catalysts Business Unit.

Wilfried Eul, who earned his doctor's degree in chemistry, started his career at Degussa in applications technology at the former Industrial and Fine Chemicals Division in 1985. His most recent position was head of strategic projects in the Exclusive Synthesis & Catalysts Business Unit, where his responsibilities included conclusion of the joint venture agreement with Lynchem, China; sale of Raylo Chemicals Inc., Canada, to Gilead Sciences as a strategic partner; and conclusion of long-term supply contracts for pharmaceutical active ingredients and intermediates.

▶ www.degussa.com


Stefan Verheyden

Stefan Verheyden was appointed Global Business Director Fine & Custom Chemistry at Thermofisher. In this position, Verheyden will be driving the overall strategy and financial performance for fine and custom business of Acros Organics, Maybridge and Fisher Chemical on a global scale.

Stefan Verheyden was targeted by Acros Organics in 2006 to take on the role of Business Director Fine & Custom Chemistry for EAME. After gaining his Clinical Chemistry degree, he spent 10 years with different divisions of Merck Belgolabo and Merck Eurolab (now VWR International).

▶ www.thermofisher.com

Sandra Beach Lin becomes President Ticona and Executive Vice President Celanese. She follows Lyndon Cole who retires but remains active for a transition period. Sandra has been Group Vice President, Specialty Materials and Converting, with Avery Dennison Corporation. Prior to that she held management positions with Alcoa and Honeywell.

▶ www.ticona.com

Fine Chemicals Reference

This Wiley book is a comprehensive reference on one of the most exciting and challenging segments of the modern chemical industry. It comprises descriptions of the leading fine chemical companies, the products, the markets, and the technologies on a global basis. It serves also as a practical guide for developing and succeeding in the US-$60 bn fine chemicals business. Author Dr. Peter Pollak, one of the foremost authorities in the field, examines not only where the industry is now, but also where it is heading.

This reference is divided into three parts:

- **Part One:** The Industry, introduces the technologies underlying the fine chemicals industry and the range of products and services it offers. The reader will learn about the different types of manufacturers and their plants and facilities. The author also explains the role of research and development and the challenges facing management.
- **Part Two:** The Business, explores the key markets for fine chemicals, such as the pharmaceutical, agrochemical, and animal health industries, and the relevant marketing strategies. One will discover the ins and outs of pricing, distribution channels, intellectual property rights, account management, and promotion.
- **Part Three:** Outlook, examines trends, including globalization and outsourcing, and forecasts future growth and development by industry segment. The author concludes with a discussion of the prerequisites for success in this field.

▶ Fine Chemicals
The Industry and the Business
Peter Pollak
Wiley, 2007
234 Pages, € 87,90, ISBN 978-0-470-05075-0

BASF Names New Executive Directors


Dr. Harald Schwager


Dr. Wolfgang Büchle

The Supervisory Board of BASF has appointed two new members to the Board of Executive Directors: Dr. Harald Schwager (47) and Dr. Wolfgang Büchele (48). The appointments will take effect on January 1, 2008. In addition, the contracts of two current members of the Board of Executive Directors – Dr. Kurt Bock (49) and Dr. Andreas Kreimeyer (52) – were extended until 2012. As a result, the Board of Executive Directors has decided to reassign responsibilities within the Board. Effective August 1, 2007, the Board of Executive Directors has appointed CFO Dr. Kurt Bock as Chairman and CEO of BASF Corporation in the US in addition to his current duties.

The new appointments to the Board were necessary due to the retirement of three current members.

Eggert Voscherau (64), who has been a member of the Board of Executive Directors since 1996 and is its Vice Chairman as well as BASF's Industrial Relations Director, will retire following the Annual Meeting on April 24, 2008.

Peter Oakley (54), a member of the Board of Executive Directors since 1998 and responsible for Agricultural Products & Nutrition, Specialty Chemicals Research and BASF Plant Science, will leave the company at his own request to pursue a new business opportunity following the transformation of BASF Aktiengesellschaft into BASF SE.

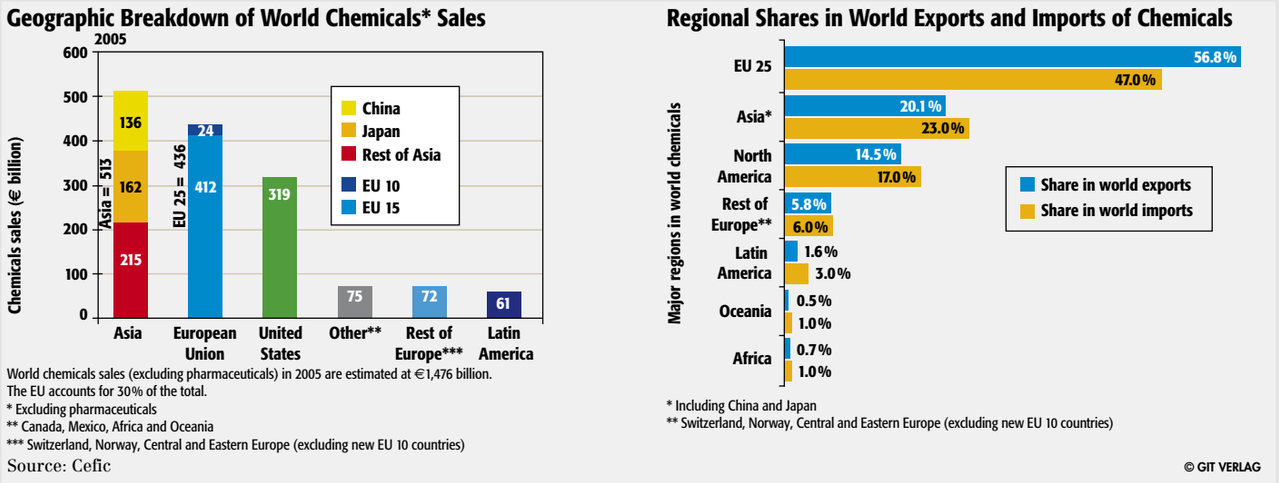
Klaus Peter Löbbe (61), who has been a member of the Board of Executive Directors since 2002 and is responsible for North America and the Catalysts division as well as being Chairman and CEO of BASF Corporation, Florham Park, New Jersey, will retire from BASF for health reasons, effective July 31, 2007. CFO Kurt Bock will assume Löbbe's U.S.-based responsibilities in addition to his current duties.

Harald Schwager will succeed Voscherau. He is a chemist and has been Verbund Site Manager Ludwigshafen since February 2006. Schwager started work at BASF in 1988 in polypropylene catalyst research. After positions in technical service for polypropylene, and marketing and sales for polyvinyl chloride (PVC), he became head of the Polyvinyl Chloride business unit headquartered in Brussels, Belgium, as well as managing director of the European companies of Solvin in Brussels. In 2003, he was appointed head of BASF's Inorganics division.

Wolfgang Büchele is also a chemist and has been responsible for the Fine Chemicals division since October 2005. He joined BASF as a researcher in 1987 and subsequently headed a research group for industrial catalysts. After working as head of regional marketing for catalysts in Asia and head of global marketing for cosmetics ingredients, he was made responsible for business management Fine Chemicals Europe. Büchele subsequently headed the Eastern Europe, Africa, West Asia regional division before being appointed head of the Performance Chemicals division in 2003.

▶ www.basf.de

Chemical Sales, Exports and Imports



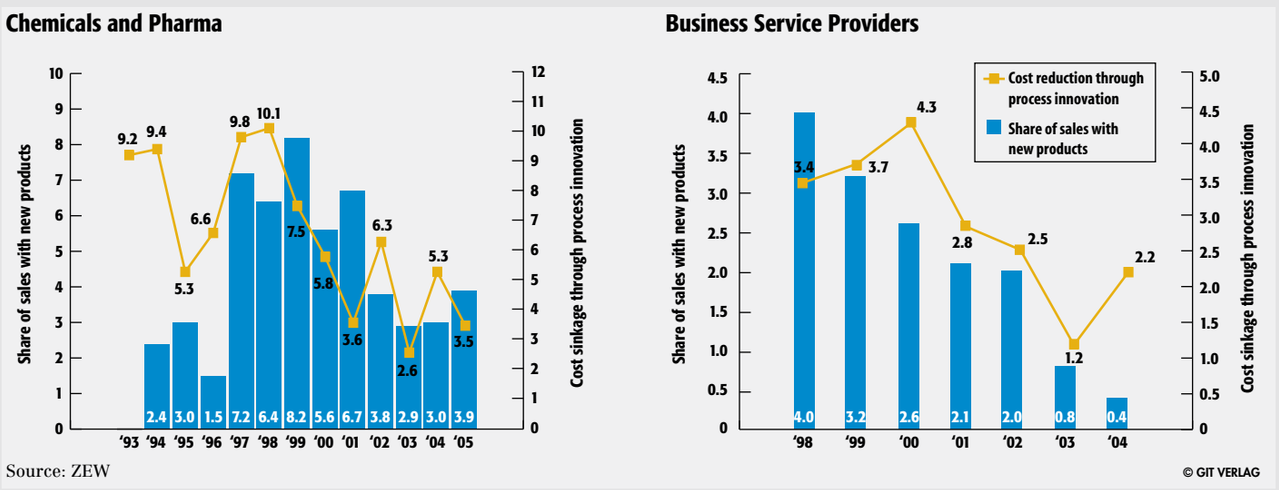
World chemicals sales (excluding pharmaceuticals) in 2005 are estimated at €1,476 billion.
The EU accounts for 30% of the total.
* Excluding pharmaceuticals
** Canada, Mexico, Africa and Oceania
*** Switzerland, Norway, Central and Eastern Europe (excluding new EU 10 countries)
Source: Cefic

* Including China and Japan
** Switzerland, Norway, Central and Eastern Europe (excluding new EU 10 countries)

The European chemical industry can still be portrayed as vibrant and strong. However, worldwide competition is getting fiercer. In 2005, world chemicals sales (excluding pharmaceuticals) were estimated at €1,476 billion.

With €436 billion, the EU chemical industry is still in a top position, but has lost its first place in the ranking to Asia (including China and Japan), mainly due to the rise of China and India. In 2005, China occupied third place in worldwide chemical sales and India ranked ninth, so both are among the world's 10 largest chemical producers. Additionally, developments in the last 10 years show that the EU was the leader in world chemicals sales but has continuously lost ground against Asia. Taken together, the EU, Asia and U.S. account for more than 4/5 of the world turnover.

Cost Reduction Through Process Innovation

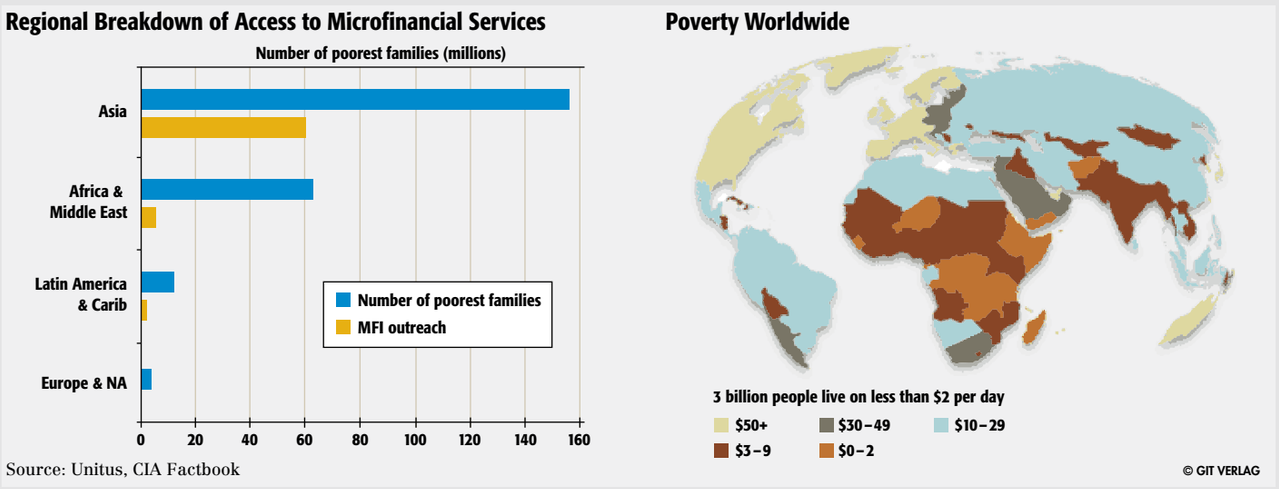


Source: ZEW

Thanks to process innovation average costs in the chemicals, pharmaceutical and mineral oil industries sank 3.5% in 2005. However, this is much less than in the 1990s, when cost sinkage was about 10%. The relatively small success in saving has been due in part to rising feedstock prices, which neutralises any increases in efficiency a company might have.

However, the share of sales with products new to the market has increased slightly to 3.9%. The reason behind the small number is long product life cycles in the industry. In 2004, business service providers were able to sink their total costs by 2.2% with process innovation. In comparison with the year before, the cost-reduction percentage was almost twice as much.

Microfinance in Underdeveloped Regions



Source: Unitus, CIA Factbook

The most common microfinance product is a microcredit loan — usually less than US-$100. Microfinance institutions exist in many forms — credit unions, commercial banks and, most often, non-governmental organisations (NGOs). Many microfinance institutions (MFIs) use social collateral in the form of peer groups to ensure loan repayment. Borrowers take out loans in groups of five to eight individuals.

If a borrower defaults on the loan, the entire group typically is penalized and sometimes barred altogether from taking further loans.

This peer pressure encourages borrowers to be very selective about their peer group members and to repay loans in full and on time, resulting in the higher than 95% repayment rates industry-wide.

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Dundee University Joins Stem Cell Programms

The Scottish University joins ITI Life Sciences' Stem Cell Technologies R&D Programme. ITI Life Sciences has reached its first technical milestone in its Stem Cell Technologies (SCT) R&D programme, and as a result Dundee University has joined the £9.5 million programme. Dundee University will join the programme's other research providers, Swedish biotech firm Cellartis and the University of Glasgow, in a collaborative effort to develop technologies that will enable automated processes to produce high volumes of high quality human stem cells. This capability does not exist anywhere in the world and its development will put Scotland at the forefront of stem cell research as well as bringing closer the use of stem cells as therapeutics.

▶ www.itilifesciences.com

Lilly Informs About Grants and Contributions

Eli Lilly and Company will begin posting all educational grant funding and other monetary contributions provided to U.S.-based organizations online. Lilly is the first pharmaceutical company to disclose its grants to U.S. organizations, which include medical societies, academic centers, patient groups and non-profit institutions. Grants are focused on therapeutic areas where Lilly has particular scientific and drug development expertise, including endocrinology, neuroscience and oncology. Lilly receives grant requests from medical associations and academic institutions to support continuing medical education and professional gatherings for the exchange of information on new advances in medical research and patient care.

▶ www.lilly.com

HSL: a Centre for Interdisciplinary Nano-Research

The Health and Safety Laboratory (HSL) launched an innovative Centre for Interdisciplinary Nano-Research (CiNR). This represents the latest step in a £1 million programme of nanotechnology research funded by HSL in partnership with the Health and Safety Executive (HSE). The HSL announcement follows the publication of a review of Government progress in the fields of NanoSciences and Nanotechnologies by the Council for Science and Technology (CST). The launch of the new CiNR will build on HSE and HSL's contribution to the wider research effort in this important area. It is envisaged that the new CiNR will directly lead to a greater understanding and subsequent control of the potential health and safety issues relating to nanotechnology.

▶ www.hsl.gov.uk
▶ www.gnn.gov.uk

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