CHEManager INTERNATIONAL

3-4/2015
MARCH

THE NEWSPAPER FOR THE CHEMICAL AND LIFE SCIENCE MARKETS

© vege - Fotolia.com

Economy

2014 results of the top 20 chemical and pharma players, plus the impact of low oil prices

Page 4–6

Materials

Polymers offer a wide spectrum for coating, construction and technical applications

Page 12–14

© bluedesign - Fotolia.com

Newsflow

M&A-News:

AbbVie has reached a final agreement to acquire compatriot Pharmacyclics for $21 billion.

Pfizer has announced that it will acquire Hospira, a manufacturer of injectable drugs, for $15.2 billion.

Tronox has announced to buy the Alkali Chemicals unit of compatriot FMC for $1.64 billion.

Platform has completed its $3.5 billion acquisition of Dublin, Ireland-based Arysta.

More on **Page 2** ▶

Investments:

BASF will invest up to €56 million in the expansion of its global polyvinylpyrrolidone (PVP) value chain to as much as 6,000 t/y.

Air Products will supply its proprietary LNG technology, equipment, and related process license for the Cameron LNG liquefaction project in Hackberry, USA.

Arkema has started up its new €200 million thiochemicals platform at Kerteh, Malaysia.

Air Liquide wants to invest around $170 million in a plant to supply oxygen for Yuhuang's planned methanol manufacturing complex in St. James Parish, USA.

More on **Pages 6 and 9** ▶

Materials:

Solvay and 3A Composites have teamed up to manufacture specialty foam materials for advanced transportation.

DSM upgrades its production facilities for waterborne resins for inks and coatings at Wilmington, USA.

More on **Page 13** ▶

People:

SABIC appointed Yousef Abdullah Al Benyan as acting CEO after Mohamed Al Mady, CEO of SABIC for 17 years, has left the company.

Sanofi announced that Olivier Brandicourt, currently CEO of Bayer HealthCare, will become its new CEO with effect from April 1, 2015.

More on **Page 15** ▶

Transforming Coatings Through Innovation

With Technology as a Strategic Driver Axalta Aspires to Deliver Innovative, Sustainable Coating Systems

In February 2013, the Carlyle Group completed its acquisition of DuPont's Performance Coatings business for $4.9 billion. Upon becoming an independent company, the business was renamed 'Axalta Coating Systems'. Headquartered in Philadelphia, Pennsylvania, USA, Axalta is a leading global coatings manufacturer with over 145 years of experience in the automotive paint business, a workforce of more than 12,000 people, 35 manufacturing plants around the world and 2014 revenues of $4.4 billion. In January 2015, Dr Barry Snyder joined the company as its chief technology officer. In this role, he oversees all of Axalta's research and development operations. Dr Snyder shares with CHEManager International how innovation will drive Axalta's growth and contribute to the quality and sustainability requirements of the company's customers.

CHEManager International: Dr Snyder, customer needs and desires are constantly evolving. This is particularly true for the coatings business. Which requirements of your customers are driving Axalta's R&D efforts?

B. Snyder: Customers in the different businesses we serve set high standards. Our goal is to bring together very different attributes into a single container of coating. We can deliver a high-performance and protective coating that holds up to challenging and different environmental extremes in different geographies all while providing a beautiful finish. We can match and deliver millions of colors. We can deliver products that withstand snow and ice, as well as scratching and chipping from sand and rocks, and from heat below ground.

Customers constantly raise the bar on performance, applications and appearance. Some of our innovations have helped to contribute to a reduced environmental footprint of our products — and for our customers who use them — by shifting to waterborne systems. Our formulations are designed to decrease application time, to diminish waste in the application process, and to reduce energy consumption. Simpler to use, more robust and superior appearance are perennial themes in our developments.

Many of these features can be characterized by the term 'sustainability', which is a major driver of the chemical industry's R&D activities. From a coatings manufacturer's view, how would you break this buzz word down into concrete areas for innovation?

B. Snyder: Sustainability can mean a lot of things as we look across the entire chain of producing and using a coating.

Continues **Page 14** ▶

Customers set high standards.

Barry Snyder, Senior Vice President and Chief Technology Officer, Axalta Coating Systems

Baumann Says He'll Fight to Keep Bayer Independent

Bayer managing board member Werner Bauman, recently named to head the HealthCare sub-group, has vowed to fight for the independence of Germany's largest drugmaker after the carve-out of its plastics unit.

Werner Baumann, Member of the Board of Management, Bayer

The German group's position in the international pharmaceutical market, its strategy to avoid being embroiled in the sector's takeover battles and possible plans for another split of the group after the upcoming separation of the MaterialScience plastics sub-group were the subject of journalist questioning at the annual results press conference on Feb. 26.

"We will always try anew every day to defend our independence through our performance and the decisions that we make," the 52-year-old executive stated, adding that Bayer does not need a merger to make it more successful, even if there are few synergies between the healthcare, veterinary drugs and crop protection businesses.

Baumann said the group was getting „good initial results" from early-stage research across its life science units, which costs a double-digit million euro amount per year, but added that this was not the reason for keeping the businesses under one roof.

„Synergies per se are no raison d'etre for organizational structures and businesses," Baumann said.

In the past, CEO Marin Dekkers – who plans to leave Bayer when his contract ends in two years – has stressed the research synergies to be gained between the various life sciences. Baumann, a former group finance chief, is seen as having played key roles in folding Roche's consumer health unit and rival drugmaker Schering into Bayer.

That Schering itself was drawn into the fold is directly attributable to an earlier wave of takeovers in the pharma industry. The Berlin-based drugmaker sought out Bayer as a "white knight" to shake free of a hostile takeover attempt by compatriot drugmaker Merck KGaA. (dw) ■

Ineos Expands Shale Portfolio

Ineos has announced plans to acquire a 50% interest in seven IGas shale gas licences, known as the Bowland licences, in northwestern England.

Gary Haywood, CEO, Ineos Upstream

With the deal, the olefins and polyolefins giant will gain a 60% interest in three Petroleum Exploration & Development Licences (PEDL's 145, 193 and EXL273) and a 50% interest in four additional licences (PEDL's 147, 184, 189 and 190).

Undaunted by the Scottish government's calls for a moratorium, Ineos also plans to acquire IGas' entire interest in PEDL 133 (the Grangemouth licence), giving it 100% ownership of the asset bordering on its mammoth Scottish production complex. Ineos also has the option to acquire 20% in two IGas East Midland shale gas licences (PEDL's 012 and 200).

The Swiss-based group is paying IGas a cash sum of £30 million and additionally committing to fund a two-phase work program of up to £138 million to develop the sites. IGas will reimburse its share of the work program to Ineos upon commencement of commercial production.

Gary Haywood, CEO of Ineos Upstream, called the arrangements "a great opportunity to acquire some first class assets that have the potential to yield significant quantities of gas in the future" and a "further significant step" in the company's plan to become the biggest player in the UK shale gas industry.

Haywood said Ineos has also committed to full consultation with all local communities before proceeding with any shale gas development, adding, "we believe shale gas could revolutionize UK manufacturing and Ineos has the resources to make it happen, the skills to extract the gas safely and the vision to realize that everyone must share in the rewards for UK shale gas to be successfully developed." (dw) ■

WILEY VCH · PF 11 05 64 · 69469 Weinheim · Pressepost · DPAG· Entgelt bezahlt · 78719

CONTENT

AbbVie to Acquire Pharmacyclics for $21 Billion

US drugmaker AbbVie has reached a final agreement to acquire compatriot Pharmacyclics and the company's flagship asset Imbruvica (ibrutinib), which it describes as "a highly effective treatment for hematologic malignancies."

AbbVie said the agreement will enhance its clinical and commercial presence in oncology, strengthen its already robust pipeline and establish its strong leadership position in hematological oncology – "an attractive and rapidly growing market, now approaching $24 billion globally."

The deal, which the Chicago-based firm said also has the potential to leverage AbbVie's immunology expertise for the development of Pharmacyclics' immunology program, values the takeover candidate at around $21 billion.

Imbruvica is a Bruton's tyrosine kinase (BTK) inhibitor approved for use in four indications to treat three different types of blood cancers. It received initial US Food and Drug Administration (FDA) approval in 2013 and is currently approved in more than 40 countries. (dw) ■

Pfizer Set to Acquire Hospira for $15 Billion

In its first major deal since the collapse of its effort to buy AstraZeneca last year, US drugmaker Pfizer has announced that it will acquire compatriot Hospira, a manufacturer of injectable drugs, for $15.2 billion.

Including debt, the deal set to close in the second half of 2016 is valued at around $17 billion. Hospira was spun off from Abbot in 2004.

Reports said Pfizer, which is looking for new sources of revenue as its drugs come off patent, is paying 20 times Hospira's EBITDA.

Global sales of Hospira's injectables are expected to reach $70 billion by 2020. The market for its biosimilars portfolio is projected to reach $20 billion in the same time period.

The announcement of the planned takeover has rekindled rumors that Pfizer is planning to split the company. While saying there are as yet no formal plans for a split, Pfizer CEO Ian Read said the drugmaker is already managing two separate businesses, one innovative, the other established.

Pfizer said the deal with Hospira should result in $400 million in annual cost saving by 2018. The drugmaker plans to finance the deal with existing cash and fresh debt. (dw) ■

Tronox to Buy FMC's Soda Ash Business

In a transaction expected to close in the first quarter, US titanium dioxide specialist Tronox has agreed to acquire the Alkali Chemicals unit of compatriot FMC for $1.64 billion. With the takeover, the company's sales will rise to about $2.6 billion annually.

FMC is considered to be the largest global producer of natural soda ash, with mining and processing facilities located at Green River, Wyoming, and annual sales of around $800 million. In September 2014, FMC announced plans to acquire agrochemicals producer Chemino-va for around $1.8 billion, saying it would divest the soda ash business to reduce acquisition-related debt and in future would focus on global agriculture, health and nutrition in high-growth markets.

Tronox plans to finance the purchase through about $1 billion in cash and about $600 million of new debt. The transaction is expected to be significantly accretive to EBITDA, free cash flow, and earnings upon closing, the company said.

FMC's soda ash business has consistently delivered EBITDA margins in excess of 20% and converted approximately 75% of its EBITDA to free cash flow, Tronox added. (dw) ■

GSK Acquires GlycoVaxyn for $212 Million

GlaxoSmithKline (GSK), the UK's largest drugmaker, has acquired Swiss-based GlycoVaxyn, a privately held specialist vaccine biopharmaceutical producer, from Edmond de Rothschild Investment Partners in an all-cash transaction valuing the vaccine maker at about $212 million.

Founded in 2004, GlycoVaxyn is a spin-off of the Swiss Polytechnic Institute of Zürich. The company has developed a biological conjugation platform which is said to enable the development of a new generation of conjugate vaccines against major bacterial infections such as pneumonia and meningitis in both children and adults. GlycoVaxyn, which signed a major collaboration agreement with GSK in 2012, is currently conducting Phase I trials with a vaccine candidate against E. coli infections and is expected to soon enter US Phase I trials for a vaccine against Shigellosis, a severe form of diarrhea.

The Swiss start-up was the second investment of BioDiscovery 3. From 2008 to 2012, the private equity firm has invested in 14 companies, with seven sold through private transactions, four publicly listed and three still privately held. (dw) ■

Platform Completes Acquisition of Arysta

Platform Specialty Products has completed its $3.5 billion acquisition of Dublin, Ireland-based Arysta LifeScience. Announced in October 2014, the deal is aimed at expanding Platform's crop protection business. The purchase price includes $2.9 billion in cash and $600 million of Series B convertible preferred stock. Arysta last reported revenue of $1.5 billion – for the year 2013.

This wraps up the third of three agrochemical acquisitions since the second half of 2014. Platform expects Arysta, Agriphar and Chemtura AgroSolutions to bring in an additional $65 million in sales – in more than 100 countries.

The company last year paid $300 million for Agriphar and $1 billion for the Chemtura unit. To finance its acquisition drive, Platform launched three initial public offerings last year, which together were expected to raise a total of $1.3 billion.

As expected, Arysta LifeScience president and CEO, Wayne Hewett, will now become president of Platform and will oversee the agrochemical business. (dw) ■

Bayer MaterialScience Buys Composites Specialist

Bayer MaterialScience (BMS) has concluded the takeover of Thermoplast Composite GmbH (TCG) in Langenfeld, near Nuremberg, which specializes in production of lightweight continuous fiber-reinforced thermoplastics. Neither an acquisition price nor sales figures for TCG were revealed.

The world market leader for polycarbonate, due to be a standalone company by mid-2016, if the Bayer holding has its way, said it will use the acquisition to expand its range of products for important industries. BMS said the acquisition of TCG gives it access to innovative technology know-how as well as key patents and facilities. All employees are to be retained.

In a first step, the Bayer sub-group plans to expand TCG's production capacity in the headquarters region. Capacities in other regions will be added subsequently. BMS is "seeing significant demand and growth opportunities for composites made from thermoplastic materials such as polycarbonate," said Markus Steilemann, member of the company's Executive Committee and head of the Polycarbonates business Unit. (dw) ■

SOLUTIONS FOR DISTRIBUTION OF SPECIALTY CHEMICALS IN EUROPE

PERSONAL CARE | HOME CARE | COATINGS
CONSTRUCTION | ADHESIVES | RUBBER | PLASTICS
FOOD | FEED | PHARMA | INDUSTRIAL PERFORMANCE

DISTRIBUTION EXCELLENCE

TER Chemicals DISTRIBUTION GROUP — TER® GROUP

HSH Chemie DISTRIBUTION GROUP

TER HELL & CO. GMBH
Ter Hell Haus · Börsenbrücke 2 · 20457 Hamburg
T +49 40 300501-0 · **F** +49 40 335050
info@terhell.com · **www.terchemicals.com**

AUSTRIA · FRANCE · GERMANY · THE NETHERLANDS · PORTUGAL
RUSSIA · SPAIN · SWITZERLAND · UNITED KINGDOM · USA · CHINA

HSH CHEMIE GMBH
Ballindamm 1 · 20095 Hamburg
T +49 40 32 32 10 0 · **F** +49 40 33 66 23
germany@hsh-chemie.com · **www.hsh-chemie.com**

BELARUS · BULGARIA · CROATIA · CZECH REPUBLIC · GERMANY · HUNGARY
POLAND · ROMANIA · SERBIA · SLOVAK REPUBLIC · SLOVENIA · UKRAINE

PLEASE VISIT OUR STAND AT IN-COSMETICS 2015 IN BARCELONA AND EUROPEAN COATING SHOW 2015 IN NUREMBERG

in-cosmetics®
Barcelona, 14 - 16 April 2015
Stand 6G20, Hall 6

EC European Coatings SHOW 2015
21 - 23 April 2015 - Nuremberg
Stand 1-546, Hall 1

Drugs Industry Battered by Currency and Competition

2014 Annual Results of Top Pharmaceutical Companies

Both European and US pharmaceutical industry players are highly research-oriented and possess very diversified portfolios. While each country has its national champions, Swiss companies rank alongside US giants as the world's largest players.


Andrew Witty, CEO, Glaxo SmithKline


Pascal Soriot, CEO, AstraZeneca


Joseph Jimenez, CEO, Novartis


Severin Schwan, CEO, Roche


Serge Weinberg, CEO, Sanofi


Alex Gorsky, CEO, Johnson & Johnson


Karl-Ludwig Kley, CEO Merck KGaA


Kenneth C. Frazier, CEO, Merck & Co.


Ian Read, CEO, Pfizer

Like chemical producers, drugmakers were dogged in 2014 by strong currency fluctuations, which curbed nominal growth figures. Growing competition in international markets led to a flurry of mergers & acquisitions as well as portfolio swaps. In 2015, the outlook appears much the same, although company chieftains stress that internal streamlining measures are laying the foundation for future growth.

Novartis Has "Transformational Year"

For Novartis, the European continent's biggest drugmaker in terms of total sales revenue, 2014 was a "transformational year," said CEO Joseph Jimenez. "We improved our execution, while taking steps to focus the company on our three leading businesses with global scale. We delivered solid sales growth with margin expansion, strengthened innovation, and advanced our quality and productivity agendas."

Figures for the last business year show net sales up 1% (3% in constant currencies) to $58 billion, with operating income up by the same margin to $10.7 billion. Core operating profit grew by 3%. For 2015, the Swiss drugmaker expects net sales to grow by a by a "mid-single digit margin" and core operating income to grow ahead of sales at a "high single-digit rate."

Roche Makes "Good Progress"

Another of Switzerland's international pharmaceutical giants, Roche, made "good progress" in 2014, said CEO Severin Schwan. "Solid growth was seen in both divisions," he said, "driven by our newly launched medicines and diagnostic tests." The company made ten targeted acquisitions to complement its existing portfolio in Pharma and Diagnostics.

Overall sales at the Swiss drugmaker rose 1% (5% in constant currencies) to 47.5 Swiss francs. The Pharmaceuticals division, driven by oncology and immunology, increased revenues by 1% to 36.7 Swiss francs, the Diagnostics division lifted sales 6%. Core operating profit sank by 1% to 17.6 Swiss francs. In 2015, sales are forecast to rise by a low-to-mid-single digit margin at constant exchange rates, with core earnings growth surpassing sales growth.

Sanofi Delivers "Strong Results"

Sanofi, France's largest drugmaker, delivered "strong financial results in 2014, making significant progress in bringing new medicines to market," said acting CEO Serge Weinberg, In 2015, he said, Sanofi's focus (under newly appointed CEO Olivier Brandicourt) will be on operational excellence, as it launches multiple new medicines and vaccines and invests in its R&D projects to maximize their potential. Business earnings-per-share are expected to be stable or rise "slightly."

Group sales last year advanced nominally by 2.5% to €33.8 billion and by nearly 5% in constant currencies. Revenues of the Pharmaceuticals segment grew by 4.4%, driven by Diabetes and Genzyme. Sales of Vaccines increased 7.2%, Animal Health by 6.7%. Business net income improved by 2.4% (6.7% in constant currencies) to €6.8 billion.

Glaxo SmithKline Faces Headwinds

Britain's biggest drugmaker, Glaxo SmithKline (GSK) reported group revenues of £23 billion excluding divestments, a decline of 3% in constant currencies or 10% in Sterling. Consumer Healthcare sales fell 1%. The company pointed to challenging trading conditions and reflecting manufacturing issues.

GSK's operating profit plunged by 40% to £691 million and core op-

Continues Page 5 ▶

Chemical Players Expect Gains on Cheap Oil and Euro

2014 Annual Results of Top Chemical Companies


Kurt Bock, CEO, BASF


Marijn Dekkers, CEO, Bayer


Klaus Engel, CEO, Evonik


Jean-Pierre Clamadieu, CEO, Solvay


Thierry LeHenaff, CEO, Arkema


Ton Büchner, CEO, AkzoNobel


Hariolf Kottmann, CEO, Clariant


Richard Ridinger, CEO, Lonza


Feike Sijbesma, CEO, DSM


Ellen Kullman, CEO, DuPont


Andrew Liveris, CEO, Dow Chemical

The worldwide chemicals economy withstood the strong headwinds battering the industry again in 2014. Financial results reported by companies in Europe and North America showed a mixed picture, but most were able to improve sales and earnings.

With uncertainty over the outlook for the world economy and the complex political situation even more heightened in 2015, most CEOs have been cautious with forecast. Those closest to the petrochemical end of the market said they expect to benefit from cheaper oil and raw materials prices. European companies see themselves as profiting from the lower parity of the euro against the dollar.

Bayer Sets New Records

Germany's Bayer set new records for sales and EBITDA before special items. „Contributing to this in particular was the continuing growth momentum in our Life Science businesses, and especially the pleasing development of our recently launched products," said CEO Marijn Dekkers, adding that plastics sub-group MaterialScience also registered encouraging gains in sales and earnings before special items.

Without adjusting for changes in portfolio and foreign exchange rates, sales rose 5.2% to €42 billion. EBITDA before special items increased 4.9% to €8.8 billion, despite negative currency effects. Life science sub-groups HealthCare and CropScience raised EBITDA before special items by 2.8% and 5% respectively, while MaterialScience, which is to be spun off or floated in 2016 – saw an EBITDA improve 10.7%.

For 2015, Bayer has forecast sales of around €46 billion and EBITDA improved by a low- to mid-single-digit figure. The softer euro is seen as boosting profitability.

BASF Achieves its Goals

"We achieved our goal. We increased earnings despite disappointing economic development in Europe. We grew profitably. We further strengthened our chemicals business and in turn improved our margins. We have our costs firmly under control," BASF said in its report on 2014.

At €74.3 billion, group sales matched the 2013 level of €74 billion, and EBIT before special items rose 4% to €7.4 billion. Volumes increased by 4%, while prices fell 3%, largely due to significant decreases in oil and gas prices. Negative currency effects dampened sales.

Despite uncertainties created by volatile raw materials and currencies, slower growth in emerging markets and global geopolitical conflict, CEO Kurt Bock said he expects EBIT before special items in 2015 to match the 2014 result, thanks not least to stronger industrial momentum triggered not least by the lower oil price.

Evonik Poised for Growth

In 2014, Evonik invested in new production capacities worldwide, further optimized its administrative and cost structure and solidified its sound financial profile," said CEO Klaus Engel. The German group is now "poised for a new phase of profitable growth."

Evonik's financial report saw annual sales 2% higher at €12.9 billion, with volumes up 3% and sales down 1%, translating into organic growth of 2%. Adjusted EBITDA inched forward to €2 billion from €1 billion, and the EBITDA margin remained firm at 14.5%.

Looking ahead to 2015, Engel predicted slightly higher sale and operating profit. Given the strong start to the year, he said he is "optimistic."

Clariant with Higher Growth

Clariant saw above-average growth again in 2014, despite a challenging economic environment, which it said was marked in particular by a continued lack of growth in Europe. The Swiss specialty chemicals group increased sales especially in high-margin markets and further improved profitability," said CEO Hariolf Kottmann.

Sales from continuing operations rose 5% in local currencies to 6.1 billion Swiss francs, but only 1% in Swiss currency. EBITDA before exceptional items from continuing operations totaled 867 million Swiss francs, up 6% in local currencies. The EBITDA margin improved to 14.2%.

For 2015, Kottmann expects continued sales growth, further margin and improvement and a stronger cash flow, "despite an increasingly volatile economic environment."

Lonza Sees Solid Performance

Lonza delivered expected core EBIT growth of 11% in local currencies and 9% in reported currency. The Swiss-based life science industry supplier said its "solid performance" stemmed from initiatives such as implemented growth projects, disciplined portfolio management and restructuring. Revenues grew by 3% in local, by 1.6 % in reported currency to 3.6 billion Swiss francs.

Lonza's transformation from a product-focused to a market-driven business progressed well in 2014 and will continue in 2015, said CEO Richard Ridinger.

"Our underlying business performance leads us to be confident we will grow sales and profits in 2015," Ridinger added. However, due to the "recent and unexpected volatility in financial and currency markets," the company will now re-evaluate its outlook. A qualitative update for Q1 2015 will be published on Apr. 28.

Arkema Impacted by Markets

"In a volatile macro-economic environment with moderate world growth," Arkema's financial performance was impacted by challenging market conditions in fluorogases and acrylics. Nevertheless, "the majority of our product lines performed well, demonstrating their sound positioning in high added value," CEO Thierry Le Hénaff said.

The French chemical producer's sales fell by 1.4% to just under €6 billion.

Volume sales rose 2.3% and prices declined by 2.4%. EBITDA fell back 13% to €784 million, but the EBITDA margin "held up well" at 13.2%.

In 2015, management expects market conditions to remain volatile, with different dynamics in geographic regions and product lines. The euro's slide against the dollar should offset low-cycle unit margins in some businesses, Arkema said.


© Sergey Nivens - Fotolia.com

Continues Page 5 ▶

Drugs Industry Battered by Currency and Competition

◀ Continued **Page 4**

erating profit by 6% to £6.6 billion. Total earnings per share fell by 1% to 95.4p. CEO Andrew Witty said some of the headwinds the group faced in 2014 will continue to adversely affect performance in 2015; however, with annualization of these factors and successful execution of our priorities, we expect a stronger performance in the second half of the year."

AstraZeneca has "Remarkable Year"

CEO Pascal Soriot said 2014 was "a remarkable year" for Swedish-British pharmaceutical manufacturer AstraZeneca. The drugmaker achieved a record six product approvals, swelling its pipeline across all main therapy areas. Growth platforms now account for more than half of sales revenue, which last year rose by 1% (3% in constant currencies) to $26.1 billion. Growth platforms "more than offset" the negative effects of patent expiries, the company said, but operating profit fell 17% to $1.6 billion.

AstraZeneca's guidance for 2015 "reflects our focus on creating value by investing in our new brands and exciting pipeline while we continue improving productivity to protect our profitability in the face of patent expiries," Soriot said, adding that the company is on track to return to growth by 2017.

Merck KGaA presents "record figures"

In Germany, leading drugmaker Merck KGaA closed 2014 with "record figures" and strong organic growth across all four divisions, said CEO Karl-Ludwig Kley. Good operating business and acquisitions boosted total sales by 5.5% to €11.3 billion, and EBITDA pre-exceptionals rose by 4% to a record €3.4 billion. Merck Serono, the company's biopharmaceutical business, recorded organic sales growth of 3.6% including negative foreign exchange effects of nearly 2%.

With the offer to acquire Sigma-Aldrich and the alliance with Pfizer in immune-oncology, Merck has laid the foundations for future growth,

the CEO said. For 2015, he forecast a "slight increase" in organic sales amid "moderately positive" foreign exchange effects. EBITDA pre exceptionals in 2015 should "at least reach the previous year's level."

Divestments Hit Merck & Co Sales

A more focused Merck & Co "has led to better, consistent execution, and our results in 2014 demonstrate the significant progress we've made," Kenneth C. Frazier, CEO of the US-based pharmaceutical group, said in presenting annual results.

While sales declined 4% to $42.2 billion, net income under US GAAP soared to $11 billion from $4.4 billion. The negative sales figure is blamed on patent expiries and divestitures, including the transfer of the $2.2 million Consumer Care business to Bayer for $14.2 million. Full-year pharmaceutical sales fell by 4% to $36 billion. Excluding the foreign currency impact, Merck expects revenues of $38.3 to $39.8 billion in 2015 and non-GAAP per share earnings of $3.32 to $3.47.

Pfizer Meets Financial Guidance

Another internationally active US pharmaceutical giant, Pfizer, met or exceeded all components of its 2014 financial guidance, said CEO Ian Read. Adjusted revenue, totaling $49.4 billion, came in well within management's forecast range, as did the earnings-per-share figure of $2.26. For 2015, Read forecast reported revenue of $44.5-46.5 billion.

In last year's fourth quarter, Pfizer's global pharmaceutical revenues fell back 7%, due to the patent expiry of Celebrex and Detrol LA in the US and of Aricept in Canada as well as the termination of a co-promotion agreement. This was partially offset by growth in emerging markets and the strong performance of a drug in Europe. Pretax income declined 9%.

"Strong Year" for Johnson & Johnson

Alex Gorsky, CEO of US pharmaceutical and consumer health major Johnson & Johnson, described 2014 as a strong year. "We delivered solid financial results while continuing to make investments to accelerate growth for the long term," he said. Sales rose 4% to $74.3 billion, with operational profit up 6.1%, including a negative currency impact of 2%. Excluding the net impact of acquisitions and divestitures, sales rose 8%. Net earnings came in at $16.3 billion.

The Pharmaceutical division saw "significant momentum," with sales of 15% to $32.3 billion, and operational growth of 16.5%. Currency translations had a negative impact of 1.6% Consumer sales receded by 1.4% to $14.5 billion, with an operational increase of 1% and a negative currency impact of 2.4%. Gorsky's guidance for 2015 foresees earnings per share of $6.12-6.27.

Dede Williams, freelance journalist, Frankfurt, Germany

Chemical Players Expect Gains on Cheap Oil and Euro

◀ Continued **Page 4**

Solvay Posts "Solid Results"

Belgium's Solvay lifted net sales by 5% to €10.2 billion, with volumes up 3.6% and prices stable. REBITDA (recurring EBITDA) increased by 11% to €1.8 billion. Margins widened to 17.5% of net sales. Adjusted EBIT was up 3.7% to € 761 million.

CEO Jean-Pierre Clamadieu said: "Solvay posted solid results throughout the year, benefiting from its ongoing transformation, its upgraded portfolio and operational delivery. We progressed in reshaping our business profile towards a high-end solutions provider. Robust demand for our innovative products and solutions boosted our growth engines. Excellence measures delivered on all fronts, compensating for a higher cost base and securing our pricing power."

The group is well-positioned to meet its 2016 ambitions, Clamadieu added.

AkzoNobel Beats Challenges

Last year was a challenging one for AkzoNobel, said CEO Ton Büchner, pointing to negative currency effects, a continued lack of growth in Europe and a slowdown in some Asian and Latin American economies. Still, he said, the Dutch chemical producer was able to achieve further improvements in operational performance, which led to a higher return on sales and investment.

Full-year figures show sales revenue down 2% to €14.6 billion, with volume sales up 1% across all business areas. EBITDA was 12% ahead of 2013 at €1.69 billion. In 2015, Büchner said the introduction of several commercial excellence initiatives will help drive organic growth. "We remain on track to deliver on our 2015 targets."

DSM Raises Sales, Earnings Decline

Dutch chemicals and life sciences group DSM reported sales of €9.2 billion, up 4% against 2013. In line with expectations, EBITDA declined by 7% to €12 billion. The group took an impairment charge of €186 million on its caprolactam business.

CEO Feike Sijbesma said DSM delivered a "relatively solid" EBITDA with good cash flow from operating activities, despite the fact that 2014 was "not an easy year " for the company due to substantial negative exchange rate effects and tough market conditions in Nutrition and caprolactam.

Sijbesma said DSM is "taking steps to address the challenging external environment" and is aiming for EBITDA in 2015 to settle slightly ahead of 2014.

Dow Chemical "Well Positioned"

Dow Chemical reported a 12% rise in adjusted EBITDA $9.34 billion. North America's largest chemical player said its operating profit increased across all business segments, led by Performance Plastics. Group sales revenue saw a 2% gain to $58.2 billion.

Commenting on the outlook for 2015, CEO Andrew Liveris said, "against the backdrop of ongoing macroeconomic, currency and energy market uncertainty, we continue to see positive underlying demand fundamentals." Due to its advantaged global cost positions, Liveris said the group sees itself "well positioned" to increase asset utilization, while selling into higher value sectors. "Tightening supply and demand is acting to offset some of the challenges that are a result of falling oil prices."

DuPont Makes Progress

DuPont delivered operating earnings of $4.01 per share, up from $3.88 per a year earlier. Earnings from continuing operations increased to $3.90 per share from $3.04 per share. Volumes, margins and earnings grew in the majority of segments, the US group said, despite significant market and macroeconomic challenges, including a weaker agriculture economy, a stronger dollar and a difficult market pricing environment.

"Our 2014 results demonstrate continued progress on our strategic plan to deliver higher growth and higher value, including ongoing portfolio refinement and steady progress on the planned separation of the Performance Chemicals business into a standalone company called Chemours, said CEO Ellen Kullman.

Dede Williams , freelance journalist, Frankfurt, Germany

Low Oil Prices and the European Chemical Industry

Uncertainties about Future Oil-Price Levels and CEFIC's Tougher Task Lobbying over Energy Costs

The sharp drop in oil prices in the second half of last year is causing some dilemmas not only for individual chemical producers in Europe, particularly those making petrochemicals and other energy-intensive chemicals, but also the region's industry as a whole.

After a decline in the price of Brent crude of over 60% from mid-2014 to a low of $48 per barrel in January, chemicals companies have to decide whether to rethink their strategies on the basis of oil prices staying well below the high levels of $100 a barrel or more which have prevailed in recent years.

In addition the industry, led by the European Chemical Industry Council (CEFIC), may be under pressure to adjust its policy on persuading the European Union and its 28 member states to take measures to bring down Europe's high energy costs.

A lot depends on what will happen to oil prices in the short and medium term—whether it will bounce back to its previous high levels or dive below $40 per barrel to as low as $20, which is seen as a possibility by a minority of analysts.

Uncertainties about Future Oil-Price Levels

The consensus at the moment is that in 2015 prices will average $60-70 per barrel, a prediction backed by BASF, the world's and Europe's largest chemicals company which is also an oil and gas producer itself.

"This expectation is based on what we see in the market, what we hear from the experts and our efforts to understand what is going on," Kurt Bock, BASF's chairman told the company's annual press conference at Ludwigshafen, Germany, at the end of February. "It's difficult to make any firm forecasts on the oil price beyond this year," he added later.

Some of Europe's larger chemical sites are reporting that companies are holding back investment decisions partly because of doubts about future oil price trends.

"They are including uncertainties about oil prices into their risk profiles of investments," says Stan Higgins, chief executive of the North East of England Process Industry Cluster (NEPIC), which based in Teesside and most of whose members are chemical companies. "What concerns them are doubts about what the oil prices will be in the long term," he adds.

By the end of February the price of Brent crude seem to be stabilizing at around $60 a barrel after a rise of over 15% through the month, the biggest monthly increase for almost six years.

However by early March analysts were warning that the crude price could soon start slipping again after data on inventories showed that storage facilities were almost full to the brim. In the US total inventories were slightly over 425 million barrels, their highest for over 80 years and around a fifth higher than the five-year average.

The large amounts of oil in storage are seen as confirmation that despite much fewer drilling rigs being in operation, particularly in the US, oil production is not yet flattening out, let alone declining.

No Significant Cutbacks in Oil Output

"The lower count for operating rigs is misleading because it is the old and inefficient ones which are being closed down," explains Paul Hodges, chairman of the London-based chemicals consultancy International eChem (IeC).

"There have been no significant cutbacks in output and it is unlikely to go down much in future either," he says. "Oil companies will want to continue producing because they need the cash flow. Oil-rich countries like Venezuela have no choice but to keep up production because it's the main source of government revenues. Even Saudi Arabia will not want to keep its oil reserves lying in the ground."

An underlying downward trend in oil prices could bring them down to the $20s range per barrel, according to Mr Hodges. Like other analysts, he believes the high oil prices above $100 were mainly a result of speculative funds pouring into the oil market after financial stimulus measures like the US government's quantitative easing.

The International Energy Agency (IEA), the Paris-based intergovernmental think-tank and energy policy advisor, warns that, at a time of overall weakening demand, oil faces increased competition from other energy sources –natural gas, coal and above all renewables. Wind and solar power and other renewables will account for nearly half of the global rise in power generation through to 2040, according to the agency.

© bluebay2014 - Fotolia.com

> *It's difficult to make any firm forecasts on the oil price beyond this year.*
> Kurt Bock, CEO, BASF

"The dynamics of global demand and the place of oil in the fuel mix are undergoing dramatic change," the agency says in its latest medium-term oil market report (MTOMR), published in February and covering the five years 2015-2020. "Emerging economies –China chief among them—have entered a new, less oil-intensive stage of development."

The global economy, now IT dependent, has become less fuel intensive with climate change concerns also reshaping government and corporate energy policies in favor of greater energy efficiency.

"And the globalization of the natural gas market, coupled with steep reductions in cost and availability, are causing oil to face a level of inter-fuel competition that would have seemed unfathomable a few years ago," the agency explains.

Once oil prices do settle, the agency reckons that they will be at "levels higher than recent lows but substantially below the highs of the last three years."

On the basis of recent average prices in the oil futures markets, the agency is assuming that prices will rise to the upper $60s per barrel in 2016-17 and then to the lower $70s by 2020.

Meanwhile the agency expects that the oil price declines from the previous highs will only have a "marginal impact" on growth in global economic demand. Projections of demand growth for oil itself are being revised downwards rather than upwards since the drop in prices.

CEFIC's Tougher Task Lobbying over Energy Costs

The European chemical industry is also not anticipating that the fall in oil prices will do much to boost demand for its products. CEFIC is still sticking to predictions made earlier last year –before the plunge in oil prices in mid-2014--of a 1.5% increase in chemicals output in Europe in 2015.

This is mainly because the oil-price decrease has not been big enough to offset the undermining of the industry's global competiveness by Europe's high energy costs.

"In its dialogue with governments and the EU, the industry must continue to highlight the huge disadvantages regarding our energy costs in comparison with other areas in the world," said Mr Bock, CEFIC's immediate past president.

Hans-Ulrich Engel, BASF's chief financial officer, pointed out that although the oil prices cut had slightly narrowed the gap between the North American and European energy costs, natural gas prices in the first quarter of this year were still around 2.5 times higher in Europe than in the US-- $7-7.5 per million British thermal units (MMBtu) against $2.88 per MMBtu.

The European industry is emphasizing that oil prices are only one among a number of factors which is contributing the high energy costs. One of the most important of these is higher electricity prices due to the subsidizing of renewables.

Oil-price levels have a big impact primarily on Western Europe's petrochemicals sector where 85% of ethylene is derived from naphtha, gas oil, and other light distillate oil-based products.

"European governments would be making a big mistake if they think that high energy costs are no longer a big issue for the industry because of the decline in oil prices," says Nick Sturgeon, energy, trade and competiveness director at the UK Chemical Industries Association (CIA).

> *There are concerns about the EU Commission's philosophy still being based on the belief that energy is too cheap in Europe.*
> Peter Botschek, energy director, CEFIC

The main objective of the European Commission over the last few years has been to put forward measures which will reduce EU energy consumption while at the same time improving the security of energy supplies in Europe.

"There are concerns about the Commission's philosophy still being based on the belief that energy is too cheap in Europe and needs to be made more expensive by pushing less competitive energy sources like renewables," says Peter Botschek, CEFIC's energy director.

Effects of the EU ETS Market Stability Reserve

Now the industry is also worried that the EU will try to compensate for low oil prices unfairly by bringing forward the introduction of a proposed scheme for raising the price of carbon allowances within the EU's Emission Trading System (ETS). The carbon price, which is supposed to benefit the development and operation of low carbon technologies, is languishing at around €7 per ton because of an excess of around 2 billion allowances on the market.

The European Parliament's powerful environment committee voted in late February to introduce the ETS Market Stability Reserve (MSR), a mechanism for reducing surplus carbon credits, at the end of 2018 instead of 2021 as proposed by the Commission. Analysts believe the MSR could almost triple the carbon price to €20 per ton by 2020.

"The MSR would effectively be a mechanism for controlling the carbon price because it would be used both to take allowances off the market and bring them back in at times of excess or lack of supplies of credits," explains Mr Botschek. "It could now be introduced as early as 2017, which is a move supported by the governments of UK, Germany and France. Our own studies have shown that a €20 carbon price would be very damaging for our industry."

The EU decision on when to start operating the MSR is likely to be influenced considerably by the future trends in oil prices.

Sean Milmo, freelance science and business journalist, Essex, United Kingdom

Shell Building $11 Billion Petchems Complex in Iraq

Shell has signed a deal with Iraq, possibly worth $11 billion, to build a petrochemicals complex in the southern oil hub of Basra.

The complex tentatively planned to start up within five to six years would make Iraq the largest petrochemical producer in the Middle East.

Industry minister Nasser al-Esawi said the complex will be one of the largest foreign investments in Iraq and the most important in the petrochemical sector in the Middle East.

According to Esawim, the new plant will have capacity to produce 1.8 million t/y of petrochemical products.

A Shell spokesman stated that the project remains at a very early stage, while declining to say when construction work would begin. "There is no timeline, no further details beyond the fact that the heads of agreement has been signed," the oil and petrochemicals giant added.

Iraq's cabinet is said to have authorized the project in mid-January.

"Shell has been working with the Iraqi ministries of industry and minerals and jointly with the ministries of oil and transport to develop a joint investment model for a world-scale petrochemical cracker and derivative complex in the south of Iraq," a spokesperson said.

Shell is one of the biggest oil companies with operations in south Iraq, where it operates the Majnoon oilfield and leads the Basra Gas Co. joint venture. (dw) ■

BASF to Expand Global PVP Output

BASF will invest up to €56 million in the expansion of its polyvinylpyrrolidone (PVP) value chain to as much as 6,000 t/y over the next four years through revamping of existing production facilities in Ludwigshafen, Germany and Geismar, Louisiana and introducing the technology at its site in Shanghai, China.

BASF is the inventor and stakes a claim as one of the market leaders for PVP. The world's largest chemical producer's global production network and technology leadership enable it to obtain "the highest levels of supply reliability" for its customers in multiple industries," said managing board member Michael Heinz.

"With this investment we are actively participating in the strongly growing PVP market, especially within the pharmaceutical industry," Saori Dubourg, president of the group's Nutrition & Health division, added.

The bulk of BASF's PVP capacities is sold to the pharmaceutical industry under the name Kollidon. The polymer is mainly used as an excipient in tablets with binding and disintegrant functionality. As a binder, BASF said, it enables the individual active ingredients of a tablet to form a homogenous entity and as a disintegrant ensures that the tablets break up in liquid and release the active ingredient quickly.

The group's PVP-based products are used in the cosmetic, detergent and food sector as well as for technical application such as in the production of membranes for dialysis and water filtration. The polymer is also used to produce specialty adhesives. (dw) ■

Air Products Tapped for Louisiana LNG Terminal

US industrial gases producer Air Products has won a contract to supply its proprietary LNG technology, equipment, and related process license for three production trains of the Cameron LNG liquefaction project in Hackberry, Louisiana, USA.

Cameron LNG is jointly owned by Sempra, GDF SUEZ, Mitsui, and Japan LNG Investment, a joint venture of Mitsubishi Corporation and Nippon Yusen Kabashiki Kaisha (NYK).

The US Department of Energy has approved the LNG terminal for exports of up to 12 million t/y. In addition to its C3MRTM technology, Air Products' contract includes its MCR Main Cryogenic Heat Exchangers, which will be installed at the heart of the proprietary propane precooled mixed refrigerant liquefaction process.

"The export market for LNG in the US is new and developing, and we have been successful in winning the business for several of the most recently announced projects," said Jim Solomon, LNG director at Air Products.

Demand for US-produced LNG has picked up considerably in the wake of the shale gas boom. "After decades of our technology operating at many locations around the world, we look forward to seeing it operating here in the US," Solomon said.

In addition to the Louisiana project, Air Products is also providing LNG technology and equipment for Freeport LNG's liquefaction and export project in Freeport, Texas, and Dominion's liquefaction project at its Cove Point LNG facility in Lusby, Maryland. (dw) ■

Roles Under REACh

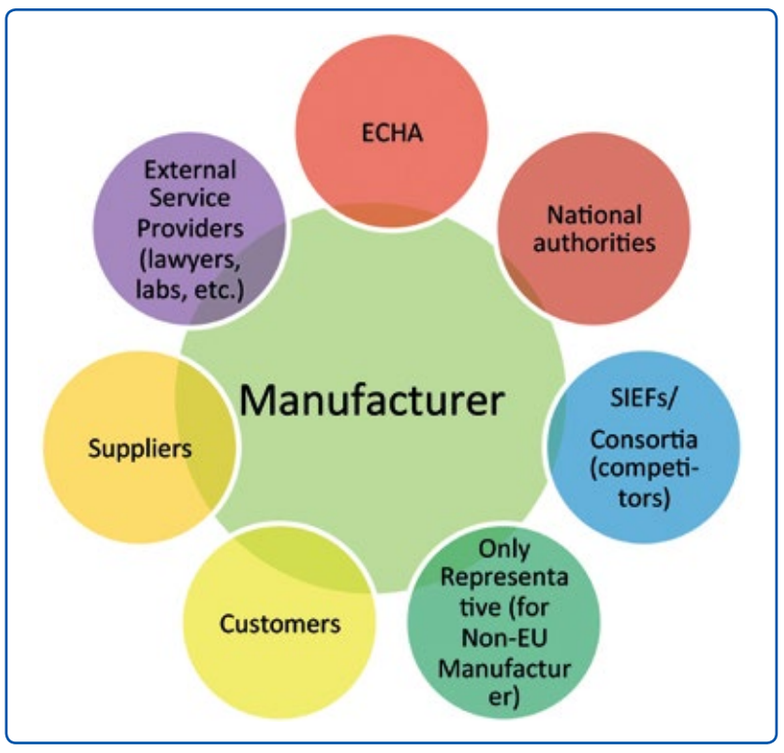
After Eight Years, Companies Still Struggle with Implementation

Regulation (EC) No. 1907/2006 of the European Parliament and of the Council, well-known as the REACh regulation, or Registration, Evaluation, Authorization and Restriction of Chemicals, was published on Dec. 18, 2006, and went into effect June 1, 2007. Since then, REACh has kept people busy — from the industry, to the European Chemicals Agency (ECHA), to national authorities, consultants, lawyers, labs and other service providers.

Dr. Susanne Kamptmann

Starting with the preregistration period until 2008 companies feared they would not be able to meet the first deadline for the registration of substances in the highest tonnage band, as well as substances with certain properties (R50/53, CMR) in lower tonnage bands in 2010. A large number of data requirements had to be fulfilled. Companies willing to register the same substance had to be brought together; consortia had to start their work with the aim to submit the registration dossiers in due time. Although timelines were tight and most dossiers were submitted in the nick of time, companies somehow managed to fulfill their registration obligations toward the first deadline. In the meantime, the second deadline for the tonnage band from 100 to 1,000 tons per annum (t/a) in 2013 passed, and industry at the moment is aiming to get things in place for the final 2018 deadline.

Companies that have to deal with REACh have relationships not only with authorities but also with competitors and actors in the supply chain. The number of interfaces (see figure) is directly connected to the number of problems and resulting tasks that may occur in daily business.



Communication Up and Down Supply Chain

REACh matters are not restricted to the cooperation with competitors within consortia, but there are also a large number of obligations in regard to communication up and down the supply chain, i.e. with suppliers and customers.

Suppliers: European companies that purchase substances may benefit from being Downstream Users when they buy from European sources. If they buy from non-European sources, first they must check whether their non-EU supplier takes care of registration obligations via an Only Representative. If so, the situation will be equal to that when they buy from European sources.

If a non-European supplier does not take care of the registration obligations under REACh, the European company will have to take the role of an importer. The situation may become a challenge if the European company did not preregister the requested substance and it is no longer allowed to do a late preregistration. In cases where no second supplier in Europe is available in the short term, the European company may have to postpone a new project or — even worse — lose a customer. Therefore it is recommended that European companies take care of such issues as soon as possible.

If the European company is a Downstream User, it will benefit from not having registration obligations on its own, but there are still some other obligations that have to be fulfilled by a Downstream User.

Downstream Users have the obligation to check whether the identified uses that are covered with the registration of each supplier also will cover the uses of their companies. If the supplier did a registration for a transported isolated intermediate only, Downstream Users will have to agree on that by signing a confirmation that they will use the substance for the synthesis of another substance by abiding by strictly controlled conditions as demanded by Article 18(4) of the REACh regulation ("Article 18(4) confirmation").

If the supplier did a standard registration, the Downstream User has the obligation to compare the identified uses with the own uses and to compare with the exposure scenarios attached as an annex to the safety data sheet issued by the supplier. This comparison very often is extremely time-consuming. If the uses of the Downstream User are not covered, further communication with the supplier is required. The Downstream User has to provide the supplier with detailed information in regard to the intended uses and corresponding exposure scenarios to make them identified uses. Afterward it is up to the supplier whether it is willing to update the registration dossier or it will categorize a certain use as a "use advised against." Again there is a certain risk that the supply with a certain substance may be interrupted and therefore will bear a business risk for the Downstream User, because it will need some time to take further action (e.g., create a Downstream User report).

Customers: First, a manufacturer of chemical substances has the obligation to pass on information on the hazards of a substance to the customers by providing a safety data sheet. In some cases there is also an obligation to attach an annex including exposure scenarios that are covered within a registration dossier for a certain substance. If a substance is registered as a transported isolated intermediate only, the registrant will ask at least all European customers for an Article 18(4) confirmation.

If the uses of the customer are covered, there is no further communication needed from the customer to the supplier. In all other cases, discussions will be started as already mentioned in this article.

Very often in daily business, communication is initiated by requests from customers or potential customers. They may even send questionnaires comprising several pages that a supplier is urged to fill in to keep business running. This can be very time-consuming and in some cases even expensive. Customers who buy articles have the right to ask their supplier about the content of substances of very high concern (SVHC) in the article. If such an article comprises numerous components, it is highly likely to be impossible to answer the question in regard to the SVHC without having a high workload. The question may be answered when the supplier of an article asks all suppliers of each single component about their statement in regard to SVHC. Alternatively it might need less effort to ask a lab to cut the requested article into small pieces and afterwards pulverize with the aim to analyze the powder for SVHC.

Processes to Achieve REACh Compliance

Within a company it is necessary to do Substance Volume Tracking at least once per calendar year. If the tonnage band of an already registered substance needs to be amended (usually based on the average of the three previous consecutive calendar years), the registrant needs to do an update of the registration.

European manufacturers that sell the manufactured substances solely under the purpose and scope of REACh can easily do Substance Volume Tracking. The task becomes more difficult, if parts of the manufactured volumes are exempted from REACh, e.g., biocides.

The situation is even worse in the case of Non-EU Manufacturers that have to split up the amounts that are delivered to European customers and other customers per calendar year. It is a demand that an Only Representative acting on behalf of a Non-EU Manufacturer needs to know at any time the volumes that were imported under REACh into the European Economic Area (EEA) in a certain calendar year. That means a Non-EU Manufacturer who registered a certain substance via an Only Representative needs to know not only which volumes of a certain substance went into the EEA, but also needs to split it into use under REACh and use as a biocide, etc.

In the past there were a lot of discussions in regard to the question whether indirect imports may be covered by the registration that was done by an Only Representative on behalf of a Non-EU Manufacturer. Maybe a Non-EU Manufacturer registered via Only Representative in the highest tonnage band and afterward sells the substance to EU customers, non-EU customers and maybe to non-EU traders. If the non-EU traders intend to sell such a substance to EU customers it is not possible to respect the competition law and at the same time provide the Only Representative with the information about volumes and the first party within EU that receives the substance; therefore, it is highly recommended that Non-EU Manufacturers do not provide registered substances to non-EU customers.

PREVIEW:

This is the third of a series of four articles from Dr. Kamptmann on the REACh legislation. Parts 1 and 2 were published in issue 11-12/2014 and 1-2/2015 of CHEManager International. Part 4 will be published in the upcoming issue of CHEManager International on May 7.

Dr. Susanne Kamptmann, Steinen, Germany

► kamptmann@web.de

Tomorrow's Pharmaceutical Market?

Manufacturing Conditions in China are Changing

There's been no trace of the original gold-digging market for a long time. The hyperbole and initial euphoria have been followed by disillusionment and stark reality. For some time now, the Steiff company with its cozy teddy bear has not been alone in recognizing that quality has its price and that perhaps producing at home would lead to more success after all.

Ralph Gengenbach, CEO, Gempex

However, the wheels of time keep grinding, and China is learning. That can be felt all too plainly in the pharmaceutical market. If yesterday cheap production was the order of the day, now the temptation is market opportunity in connection with the name "China."

GMP in China

In 2005, Gempex ventured to gain a foothold in China. It was both by chance and a tempting prospect. Joint venture Gemro Services was founded with the aim of offering good manufacturing practice (GMP) services in China.

Although GMP rules existed at that time, there were significant differences compared with Western requirements. GMP mostly focused on cleanroom technology with a cleanroom classification of 300,000. Whoever had built a cleanroom with all the related airlock systems was practically GMP suitable — but only in China.

The interest in GMP in China in those days seemed to be enormous. People wanted to learn more about Western manufacturing requirements and how to meet them. However, at the end of each discussion stood the simple question of how to get an appropriate GMP certificate as quickly as possible and how much it would cost, but no business was generated at the end of the day.

At that point in time, an estimated 5,000 companies wanted to break into the active substance market and earn a premium in the West. They were bolstered by state subsidies allowing cheap construction land and providing initial financial momentum. But on the Chinese side came the sobering realization of being not only distinctly remote from the Western concept of quality, but also having neither products nor customers.

Legal Regulations

The quality hurdle was recognized by the state, and since 2010, GMP standards have been in place that closely match European standards with only minimal differences. The Chinese government initiated an intensive training program for inspectors to qualify existing personnel. Experts predicted — and the current trend confirms — that from the original 5,000 active producers only approximately 500 reliable companies will remain.

However, the inspector training is not aimed at home country producers only. They are being trained to supervise producers hoping to serve the Chinese market from outside China. In the meantime, the program has started, so Western producers now have the dubious pleasure of greeting Chinese inspectors in their own plants.

Whereas yesterday it was Western standards that were deemed too high, it is now, paradoxically, Chinese standards that Western companies are finding themselves increasingly unable to meet. The Chinese rules for the production of excipients specifically stipulate conformance with GMP and include validation, which, in the West, is just an industry standard. For all purification and filling steps that do not take place wholly in a closed environment, active substance producers are now required to implement them in a cleanroom Class D (equal to EU GMP Class D). Also producers of primary packaging material are now confronted with the legal requirement to produce under cleanroom Class D where the air exchange rate is at least 15. Meanwhile, that is not restricted to production in China: EU standards are being raised to match those in China.

> *In the future, China will take over a leading role in the global pharmaceutical market.*

A Fast-Growing Market

A country with a population of close to 1.37 billion citizens that, in the last 10 years, has developed rapidly to a near economic and cultural No. 1 in the global market, has suddenly presented new market potential. The population earns significantly more, its prosperity has increased to being able to afford more healthcare and personal hygiene products at least and — lo and behold — the Chinese have become aware of products produced in the West or by Western companies. Those who can afford it do not look to the home market for milk or baby nutrition; imported products are in demand.

So the trend is for more and more Western companies to go again to China, now focusing on serving the Chinese market. For that reason, after nine years of — not particularly fruitful — activity in China, Gempex has also decided to extend its presence and has founded a 100% Gempex subsidiary based in Guangzhou. A team of six well-qualified and extensively experienced Chinese GMP experts together with their German colleagues will offer GMP support.

Ralph Gengenbach, CEO, Gempex, Mannheim, Germany

▶ info@gempex.com
www.gempex.com

The New K-REACh

After Reviewing its Chemical Regulations, South Korea has Drawn Up New Ones

It is on everyone's lips: Since Jan. 1, K-REACh has been the law in South Korea. With this implementation, the global chemical industry faces a list of new requirements. The good news is that by way of optimized processes, as well as an approach to other existing judicial systems, this new legislation is familiar for European chemical manufacturers. For that reason this system is aptly referred to as K-REACh.

Ariane Stoll, UMCO Umwelt Consult

The background for the new provision is the international push to implement more environmental and consumer protection. Little by little, these measures lead to stronger statutory regulation for the import and the handling of chemicals in industrialized countries. The focus is not limited to the chemical industry. Indeed, even importers and distributors of consumer products are subject to reporting to public and government agencies. These reports gather detailed information on products' chemical composition, so an appropriate response can be taken in case of emergencies.

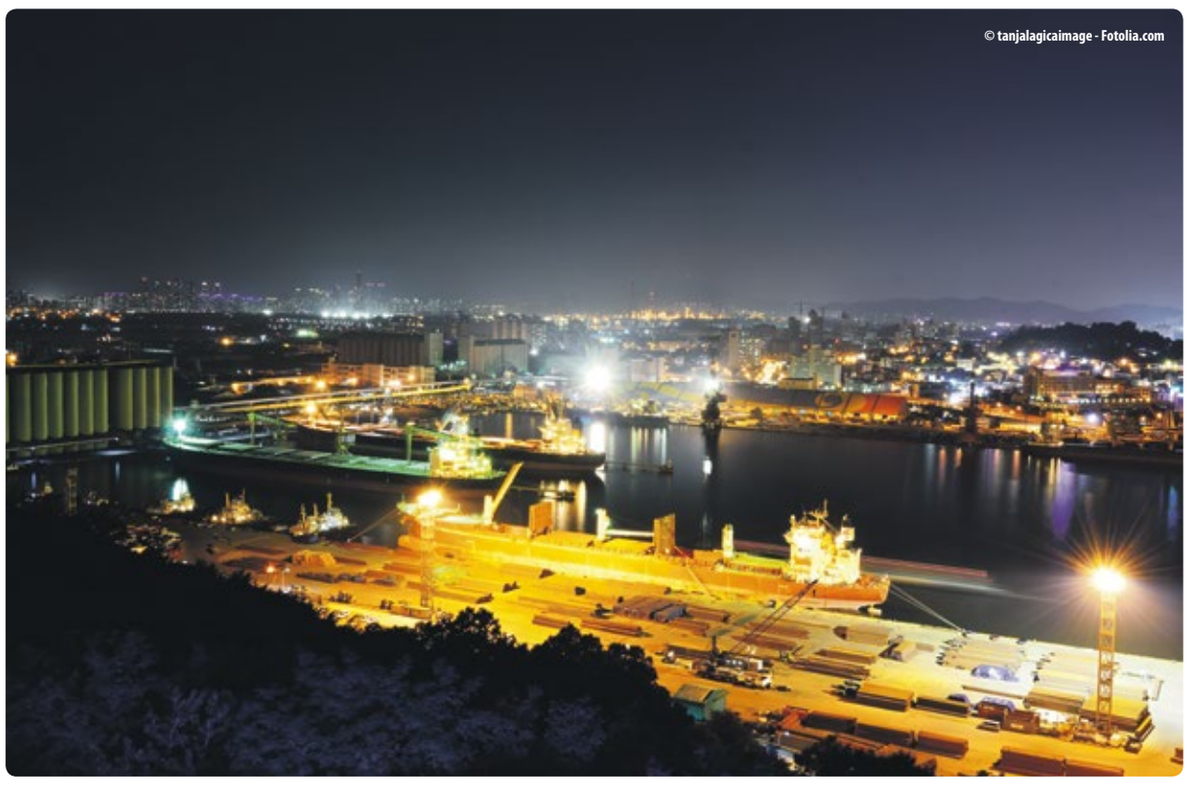
K-REACh

The foundation of K-REACh is based on four principles: reporting, registration, communication along the supply chain, as well as product notification. In order to comply with legal requirements, the appropriate steps must first be ascertained and implemented prior to every import. Just as in the EU, foreign companies may appoint an only representative (OR) for South Korea. The use of an OR is highly recommended in cases in which a foreign company that wishes to import chemicals to South Korea does not have headquarters or branch offices in South Korea. Not only will this ensure that importers comply with all K-REACh requirements, but it will also ease the hurdles that could be faced because of the language barrier. In general, only companies that have a seat in South Korea can implement all four processes.

Reporting And Registration

An important note for the future: Before the first shipment, it must be clear what materials in what amounts are to be imported into South Korea. Here the differentiation is between "new chemicals" — those that must always be reported — and "existing chemicals," which are only subject to the reporting process starting at one ton per year.

Any registration is mandatory for any new or existing chemicals listed on the priority evaluation chemicals (PEC) list. The first PEC list, which was published in October, lists 518 substances that are currently in focus. Information resulting from the registration process must be included in all communications with customers. Specifically this means that the indented use of the registered substances must be included during the sale of mixtures.



Incheon, panoramic view over the city

Notification Requirement

The sale of consumer products brings about the requirement to test the ingredients for their hazards as well as their potential exposures. For example, products such as cleaning agents or detergents mandate a notification if they contain more than 0.1% hazardous chemicals and they are imported in excess of one ton per year. A substance is considered hazardous if the Ministry of Environment (MoE) has placed it on the list of toxic substances in the Chemical Control Act (CCA) or if the substance is listed on the PEC list.

GHS-Hazard Classes

South Korea has been working on implementation of the UN Globally Harmonized System (GHS) since 2003. South Korea has adopted most of the GHS building blocks, similar to the adoption of the European Union by way of the Classification, Labeling and Packaging (CLP) regulation. Particularly European companies should note the differentiation in the hazard categories flammable gas, aerosols, aspiration hazard and hazard to the ozone layer.

South Korea currently has two agencies responsible for the classification of chemicals and the implementation of GHS. These are the previously mentioned MoE and the Ministry of Labor (MoL), whose Chemical Control Act was the first legal foundation for the classification of chemicals. Similar to the European system of classification according to index number, the CCA has an obligatory classification of 789 chemicals. The C&L inventory of the MoL should be used only in the second step, after the classification has been determined. These classification systems are currently being harmonized, in order to have a uniform scheme for the classification of hazardous chemicals.

Labeling and Safety Data Sheets

The Safety Data Sheet (SDS) in South Korea has been adopted in accordance with GHS and depicts the necessary labeling requirements of chemicals. It is highly recommended to depict the proper label on shipments. Large-scale inspections conducted by Korean regulatory agencies have shown that deficiencies are commonplace. The absence of a Safety Data Sheet at the workplace can carry a fine of up to $500, and incorrect labeling of a container can be fined up to $200 per violation.

Advice For Stakeholders

Any new regulation must first prove its functionality through practical experiences. A big advantage for companies is that similarities with the EU regulation exist and that similar test methods, namely those according to the Organization for Economic Cooperation and Development (OECD), are used for the registration of products in South Korea. As always, it is recommended to seek a business partner that is fluent in Korean, irrespective of if the partner has regional presence or is merely a consultancy. Despite the fact that South Korea is very westernized, it can be invaluable to have a solid command of the Korean language in order to fully understand the conduct and structures of authorities. If applied successfully, these can be the first steps one takes into the Korean market and the avoidance of fines of up to $100,000.

Ariane Stoll, consultant international projects, UMCO Umwelt Consult GmbH, Hamburg, Germany

▶ www.umco.de

Technology vs. Execution Expertise

Industrial Plant Manufacturers Rethink Positioning in Global Marketplace

The chemical industry is a booming sector for industrial plant manufacturers. Among other things, the shale gas bonanza in the US is inundating European and especially German industrial plant manufacturers with new projects. However, the challenges associated with increasing project size affect not only engineering, procurement and construction (EPC) suppliers but also owner's engineers at chemical companies, who are looking for new forms of collaboration.

When the chemical industry does something, it tends to do it in a big way. Chemical producers such as BASF, Bayer and Dow have launched huge projects around the world in places including Ludwigshafen, and Dormagen, Germany; Al Jubail, Saudi Arabia; and Freeport, Texas, in the US.

Assuming that figures published by the American Chemistry Council (ACC) are on the mark, worldwide investment in chemical plants and equipment will double within eight years, reaching a total of €487 billion by 2018. If that is the case, growth in chemical plant manufacturing will far outstrip the cross-industry average worldwide. The German Engineering Federation (VDMA) Large Industrial Plant Manufacturing Group (AGAB) has recorded annual growth of roughly 5% for about the last eight years. This growth is driven by global megatrends including worldwide population growth, the rise of the middle class in emerging nations and strong demand for raw materials.

This is, of course, welcome news, but it also creates a whole series of challenges for chemical industry investors and industrial plant manufacturers. In recent years, not only has the project structure continued to evolve, but role allocation between operators, owner's engineering teams and industrial plant manufacturers has also become more fluid.

"Demand volumes in the industrial plant manufacturing sector tend to remain constant, but the demand structure presents a moving target as project size continues to increase," said Professor Aldo Belloni, who has executive board responsibility for the engineering division at Linde.

This trend often creates a problem for European industrial plant manufacturers. Their traditional strength has been technological expertise, but they have only limited project execution capacity. Personnel resources for carrying out construction work are in short supply, and to take on the financial risks associated with mega projects they need a critical (turnover) mass. Not only that, industrial plant manufacturers must have the capability to install highly complex high-tech systems at increasingly inhospitable locations around the world.

Setbacks for South Korea, Inroads for China

Roughly two-thirds of all EPC projects in the Middle East are now awarded to contractors from South Korea. In the past, South Korean competitors have been willing to accept substantial risk, and their pricing has been extremely aggressive. The latest business reports show that the pricing was actually too aggressive. For example, earnings at South Korean company Daelim were down 90% year-on-year in 2013. Samsung Engineering reported a loss in excess of €220 million. As a result, the EPC supplier was merged with the heavy industries shipbuilding unit as of Dec. 1, 2014.

"We are seeing less aggressive pricing and a reduced willingness to accept risk on the part of competitors from South Korea," reported AGAB spokesman Helmut Knauthe.

However, despite the fact that recent developments have restricted the risk appetite of South Korean industrial plant manufacturers, pressure remains intense in the international EPC business. This is due in part to Chinese suppliers who have ramped up their efforts to acquire projects in the Middle East, with increasing success. Besides aggressive pricing and a willingness to accept risk, the Chinese also offer attractive financing schemes.

Industrial plants manufacturers from the Western industrialized nations are unable to offer anything comparable. In order to increase their competitiveness, these companies are looking at ways of enhancing their productivity. One strategy is intensive workflow and (industrial plant manufacturing) product standardization. A study carried out by VDMA and management consultants Maexpartners indicates that the effective use of modularization in systems engineering could reduce cost by an average 15%. This approach could even cut non-performance and warranty costs by 23%.


© khunaspix - Fotolia.com

America — Industrial Plant Manufacturing El Dorado

One of the reasons business has been good for the European and German industrial plant manufacturing industry in recent years is the shale gas bonanza in the US. There are ample supplies of oil and gas in the market, and chemical companies are now paying far less for raw materials. The industry is investing huge sums to expand its production facilities.

The market research firm HIS estimates that the exploitation of unconventional energy sources such as shale gas and shale oil will stimulate investments amounting to €79 billion in the US alone by 2025. The actual figure could even be higher than that; 126 chemical projects with a total investment volume of $66 billion were announced during 2013 in the US alone. By 2018, ACC predicts that 10% of global investment in the chemical industry will take place in the US.

The core strength of industrial plant manufacturing service providers based in Europe is the ability to deliver high-tech solutions. A division of labor between process designers and planning teams on the one hand and engineering firms, which actually build the plants, is a model commonly used in America.

However, industrial plant manufacturing projects are subject to the rules of supply and demand. Customers and EPC contractors can expect to be confronted with massive costs increases. Plant construction companies are already reporting an increase in project installation costs, particularly in the Gulf region states of Texas and Louisiana.

Owner's Engineers Seek Best Project Execution

Under the present circumstances, the engineering teams at the chemical companies need to find the right balance between internal resources and third-party engineering services, and they must decide how to allocate the roles and responsibilities. Given the current shortage of construction resources in North America, few suppliers can afford to commit themselves to a lump sum turnkey price set long before project completion. Even investors that have substantial owner's engineering capacity simply do not have the staffing to execute the projects entirely on their own.

As a result, a number of different project execution models are currently being employed in the chemical industry. The traditional approach taken by the internal engineering teams is the engineering procurement construction management (EPCM) model. In contrast to EPC contracts where the client turns over complete engineering, procurement and construction responsibility to an industrial plant manufacturer, customers using the EPCM model retain complete responsibility for, and control of, the project.

EPC and engineering partnerships are viable options on large projects. For small to medium-size projects below €100 million, EPCM is usually the only choice because these projects are low on the priority list for large EPC suppliers.

However, there is definitely demand in the global marketplace for EPC partners who are willing to take overall responsibility, and this is a factor that affects mid-tier companies in particular.

"Especially in regions like Africa, customers want EPC," said Dr. Reinhold Festge, president of the German Engineering Federation (VDMA) and partner at Haver & Boecker, a mid-tier systems provider.

Festge advocates collaboration between German and European industrial plant manufacturers to provide "EPC capability."

Mid-tier system suppliers often have an advantage compared with traditional EPC suppliers in one respect. Many already have local service organizations in the target markets (Asia, Africa, South America and Russia). Industrial plant manufacturers such as Outotec, which supplies systems for the metallurgy industry, believe that setting up local service organizations is an effective strategy for gaining a foothold in new markets, and it also compensates for the ups and downs of the project business, which is susceptible to the effects of economic cycles. (rk)

Dechema (German Society for Chemical Engineering and Biotechnology), Frankfurt am Main, Germany

► www.dechema.de

Infobox:

The article is based on a trend report commissioned by Dechema and written by international trade journalists. Dechema brings together experts from a wide range of disciplines, institutions and generations to stimulate scientific exchange in chemical engineering, process engineering and biotechnology. Dechema is globally known as the organizer of Achema (www.achema.de). The world forum and leading trade show for the process industry will again take place 15 – 19 June 2015 in Frankfurt, Germany.

Yara and BASF Building Ammonia Plant in Texas

Norwegian fertilizer producer Yara International and Germany's BASF plan to build a world scale ammonia plant at BASF's site in Freeport, Texas, using hydrogen as raw material.

The facility with a capacity of about 750,000 t/y and set to go on stream by the end of 2017, will be operated as a 68:32 joint venture of the Norwegian and German groups. Each of the partners will draw ammonia from the plant in accordance with its equity share. Yara and BASF said the hydrogen technology, compared with a traditional natural gas-based ammonia plant, will reduce capital spending, maintenance costs and carbon dioxide emissions "significantly."

Total capital investment is estimated at $600 million. Yara will additionally build an ammonia tank at the BASF terminal bringing the Norwegians' total investment to $490 million. BASF will also upgrade its current terminal and pipeline assets. (dw) ■

Sadara and German Cluster to Support Saudi Plastics Park

A partnership of Saudi Arabia's Sadara Chemical Company, a joint venture of Dow Chemical and Saudi Aramco, and Bavarian chemical park business management company Chemie-Cluster Bayern (CCB) has agreed to jointly support the development of chemical-based value chains in the PlasChem Park in Jubail, Saudi Arabia through attracting new business.

The cooperation co-initiated by the German-Saudi Arabian Liaison Office for Economic Affairs will focus primarily on finding small and medium-sized German and European chemical companies to set up shop in the park as well as unlocking potential for cooperation among smaller businesses.

It is hoped that member companies of the CCB network will be able to capitalize on downstream investment opportunities and establish or expand their manufacturing presence into the kingdom. (dw) ■

Arkema Starts Up Thiochemicals Platform in Malaysia

Arkema has started up its new €200 million thiochemicals platform at Kerteh, Malaysia. The business produces methyl mercaptan for use as a synthesis intermediate in animal feed, along with dimethyl disulfide.

The French chemical producer said the development of the Malaysian site strengthens its position as the world leader in the production of high added value sulfur derivatives.

Arkema is specialized in thiochemicals technologies with emphasis on methyl mercaptan, a key intermediate for the bio-methionine, which is produced on the same site by Korea's CJ CheilJedang. (dw) ■

Air Liquide to Build $170 Million Gases Unit for Yuhuang

Air Liquide plans to invest around $170 million in a plant to supply oxygen for Chinese petrochemical giant Yuhuang Chemical's planned methanol manufacturing complex in St. James Parish, Louisiana.

The methanol facility, set to start up in the second half of 2017, is expected to be one of the largest of its kind in the US, with a capacity of 5,500 t/d. Air Liquide agreed to supply Yuhuang Chemical with 2,400 t/d of oxygen.

The French gases producer's air separation unit will be connected to Air Liquide's Louisiana pipeline system, as well as Yuhuang Chemical's St. James site. (dw) ■

Quality and Efficiency in Pharma Manufacturing

Part 1: Process Analytical Technology as a Key to Quality by Design

The pharmaceutical industry is confronting a variety of new and complex challenges in the face of globalization and changing market dynamics. The past decade has witnessed a decline in the discovery, approval and marketing of new chemical entities with fewer blockbuster drugs making it to the market, as well as stiffer competition from generics. Stricter regulatory requirements demand continuous investment to track products and document processes.


© RGtimeline - Fotolia.com

The pharma industry stands out among manufacturing industries for the astronomical amounts it spends every year on research and development — a stark contrast to the relatively low-tech level of manufacturing.

Pharmaceutical manufacturers are addressing the challenges of manufacturing efficiency with stronger cost-containment measures and initiatives to improve operational excellence and quality. In North America, the US Food and Drug Administration (FDA) has championed one such initiative, known as Quality by Design (QbD), with the goal of improving productivity and reducing manufacturing costs for US producers. This initiative is part of a larger effort to reduce overall health-care costs based on the assumption that drug costs are high because of inefficient manufacturing.

Process analytical technology (PAT) is an enabling technology for QbD. PAT tools enable in-line measurement of critical quality attributes and process parameters in real time, allowing running processes to be adjusted on the fly. Product quality is verified in multiple steps during process execution rather than performing QC at the end of the line, helping to shorten batch-release times. In addition, correcting the course of a batch that is threatening to go out of spec can dramatically improve yield. The business benefits of PAT tools are promising: They include more efficient use of equipment, higher batch yields, less waste, shorter time-to-market, and significantly better process understanding and control.

The Problem of Quality by Testing

Quality by testing is the traditional approach to quality control that compares finished drug products to an approved specification and rejects anything that doesn't meet it. Quality is assured by testing materials before and after manufacturing, all within a strict, fixed process. This process must be tightly controlled because of the uncertainty of whether the specification alone is adequate to ensure quality. The downside is that overly stringent specifications may result in unnecessary recalls or drug shortages.

The inherent problem in this approach is that root causes of failure are poorly understood, and as a result, manufacturers risk ongoing, unexplained losses. This can continue indefinitely or until supplements are filed with a government authority to allow broader acceptance criteria. But changing validated processes is prohibitively expensive, so quality is maintained through rigid manufacturing practices and by testing end products, without considering how system and process design can ensure product quality.

This method also creates problems during the move from laboratory pilot to full-scale production. Production specifications are typically derived from test data from small batches in the laboratory environment. Scaling up to commercial production can reveal new complexities that were not evident during development. As production levels are reached, the regulatory requirement of filing supplements for minor and incremental changes to manufacturing processes makes it difficult to improve the process with closed loop feedback to achieve continuous, real-time quality assurance.

Quality by Design

One of the most talked about movements in QA in recent decades is Quality by Design (QbD), a methodology that assumes quality can be designed into a product. According to QbD, most quality problems are a result of the way quality was planned (or not planned) in the first place. Instead of raw material and end-of-line testing, QbD focuses on designing and developing manufacturing processes to ensure that predefined product quality requirements are met. This built-in quality originates with the careful design and control of these processes. The result is a well-understood product that consistently meets quality specs.

PAT refers to the measurement and evaluation tools that enable QbD. PAT tools consist of in-line sensors and analyzers (spectroscopy instruments, e.g., NIR or near-infrared) that measure substance properties during the manufacturing process and pass on these data in real time for evaluation. Software tools translate these data into product quality information (the CQAs) that infer final quality of the batch and can be used to adjust the running process to ensure that targeted quality goals are achieved. Tools for advanced process control (APC) play a role here.

In support of QbD, PAT's goal is to ensure final product quality by designing, analyzing and controlling process variability through timely measurements of critical quality and performance attributes of raw and in-process materials. This applies not only to manufacturing processes, but also to development. With in-line analytics, product developers can gain a much higher and faster understanding of the process than is possible with offline analysis (manual sampling). The real-time access to information offered by PAT is invaluable during pharmaceutical development and during the scale-up to commercial production.

> *In the pharma industry, strict regulations and regular quality checks can lead to costly delays and unnecessary scrapping of materials.*
>
> David Humphrey, research director Europe, ARC Advisory Group

PAT in Product Development

Within the QbD framework, PAT tools can be applied as early as the development phase of a new product. Once an active ingredient has been developed in the laboratory, the next step is to decide on dosage and delivery (tablet, capsule, suppository), and which excipients to use. These factors then determine the processes used to manufacture the drug product.

During development, in-line analytics allow faster and clearer understanding of process dynamics versus traditional offline analysis. Performance requirements at this stage will differ significantly from those in the later manufacturing process, but the parallel application of these tools in both areas allows a better understanding of the specific challenges of the process. It also facilitates scale-up to production levels thanks to a deeper process understanding.

PAT in Process Design

PAT is also an integral part of manufacturing process design. The use of PAT tools enables users to develop robust, well-understood processes with defined parameters that allow for real-time monitoring and adjustment of CQAs. During process development, raw materials, process parameters and CQAs are investigated to determine raw material attributes, process parameters and CQAs for each process, and to identify relationships among them. In the scale-up to commercial manufacturing, parallels to the development phase can be exploited to shorten process development and time-to-market. Knowledge is not static — rather it builds throughout the manufacturing life cycle, and the deployment of PAT tools along this cycle supports this notion.

Real-Time Release Testing

In the pharmaceutical industry, strict regulations and regular quality checks can lead to frequent, costly delays and unnecessary scrapping of materials. This creates inefficiencies that lower overall productivity. The idea of measuring product quality in real time with in-line analyzers has been talked about for a decade, but implementation is still relatively new, despite compelling business benefits.

Real-time release testing (RTRT) is defined as the ability to ensure product quality during the process based on real-time process data instead of end-of-batch QC. RTRT uses PAT tools to gather data from analyzers and other inline process measurements to generate quality information that can be used to adjust the process during batch execution. While it doesn't replace the review and quality control steps required by good manufacturing practice for batch release, RTRT can eliminate end-product quality testing, cutting out delays and streamlining the whole manufacturing process. A side benefit is that the integrated quality information automatically becomes part of the batch record.

PAT in Continuous Processes

Manufacturers often employ batch-control methods with batch sizes determined by production schedules, capacity, or specific customer orders. While continuous processing is known to have distinct advantages over batch, quality-control requirements force pharma manufacturers to think in terms of finite lot sizes. However, that mentality is changing — thanks in part to the availability of PAT tools.

By providing continuous, real-time quality information, PAT essentially turns a batch process into a continuous process, allowing constant quality checks along the way that eliminate the need for a final quality check to release a batch. Instead of producing finite quantities, manufacturers can "stream in" and "stream out" enough raw materials and finished products to meet demand. The advantages of a continuous process lie in the more efficient use of equipment, higher productivity and better quality.

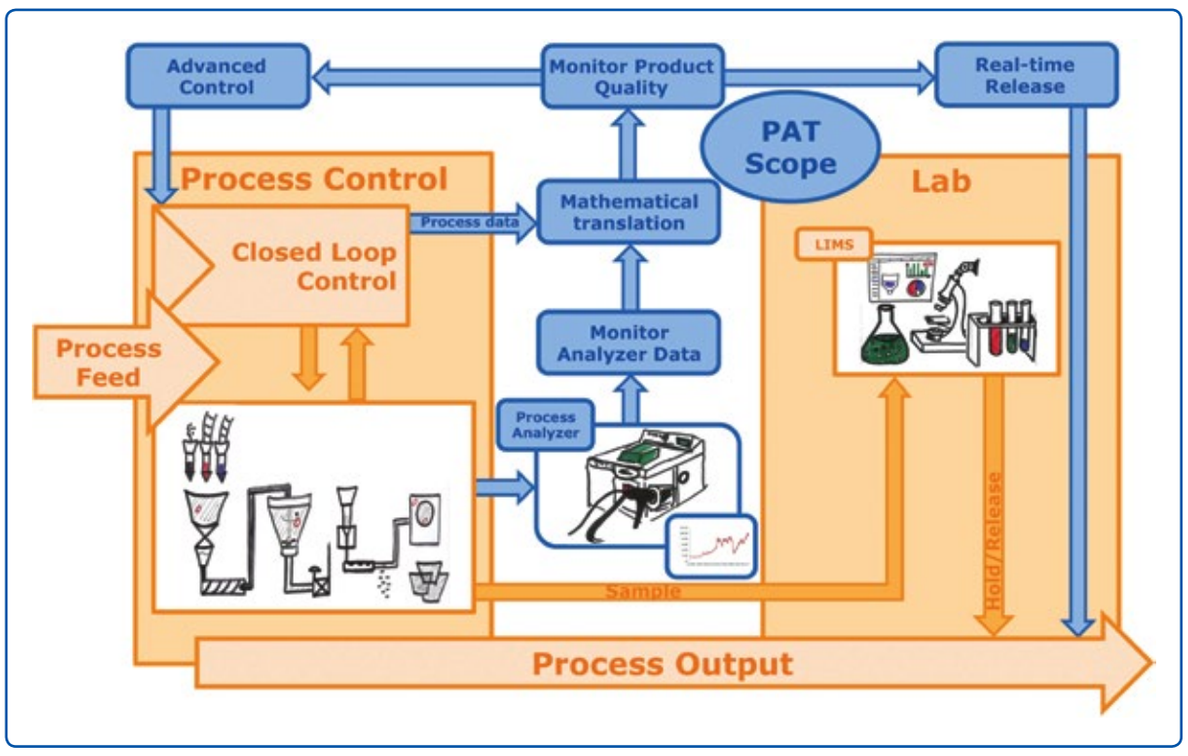
Quality by Design takes a different approach to ensure consistent levels of quality by allowing for flexibility during the manufacturing process. PAT tools play a crucial role in the implementation of QbD by providing the real-time feedback that allows operators to keep CQAs in spec by adjusting processes during operation. At the same time, quality data collected during the process can take the place of end-of-line QC, drastically cutting batch release times. The many business benefits of employing PAT tools are highly attractive.

David Humphrey,
research director Europe,
ARC Advisory Group, Munich, Germany

▶ Contact:
DHumphrey@arcweb.com
www.arcweb.com

PREVIEW:

This is the first of two articles from David Humphrey on Process Analytical Technology (PAT). Part 2 will be published in an upcoming issue of CHEManager International.



PAT tools monitor critical quality attributes and process parameters, allowing for real-time process adjustment.

Aspect	Traditional	Quality by Design
Pharmaceutical development	Empirical; typically univariate	Systematic; multivariate experiments
Manufacturingprocess	Fixed	Adjustable within design space; opportunities for innovation (PAT)
Process control	In-process testing for go/no-go; offline analysis with slow response	PAT utilized for feedback and feed forward in real time
Product specification	Primary means of quality control; based on batch data	Part of the overall quality control strategy; based on desired product performance (safety and efficacy)
Control strategy	Mainly by intermediate and end-product testing	Risk-based; controls shifted upstream; reducing product variability; real-time release
Life cyclemanagement	Reactive to problems and OOS; post-approval changes needed	Continual improvement enabled within design space

Quality by Design — a comprehensive, systematic approach to pharmaceutical development and manufacturing (Source: FDA).

General Renovation Without Shutdown

Complete "Carefree" Plant Modernization Package

Most process plants are in operation over several decades. During this time, of course, parts of the plant and individual components will repeatedly have to be replaced. The necessary work can generally be performed during the scheduled downtimes for servicing and maintenance, and sometimes even while the machines are running.

The situation gets more complicated, however, when a general renovation is on the agenda, involving the comprehensive renewal of measuring technology, distribution and control system, and power supply. But even a complex modernization can be carried out without additional downtimes, as the following example demonstrates. Experience and competence are essential prerequisites, as well as good planning and preparation — in other words, what is needed is a competent partner.

The company Cordenka is the leading manufacturer worldwide of industrial rayon yarn, sold under the brand name Cordenka. The high-strength yarn is used, for example, as reinforcing material in high-performance tires, hoses and composites. As well as manufacturing approximately 32,000 metric tons of yarn a year at the Obernburg site in Germany and the Polish site in Gorzow, about 14,000 tons of fabrics per year are produced for the tire industry. Rayon consists of 100% cellulose. In a multistage process, this natural raw material is converted into a high-tenacity multifilament yarn for technical applications. First, viscose is obtained. The cellulose is brought into solution by a reaction with caustic soda (sodium hydroxide) and carbon disulfide. After filtration and degasification, the solution is ready to spin. In the spinnery, it is extruded through spinnerets into the spin bath, where it precipitates out and forms filaments. After these have been stretched, fixed and washed, they are reeled up wet before undergoing further processing.

The Cordenka plant in Obernburg that has been modernized comprehensively.

The new exhaust air extraction system: one of the two new exhaust chimneys with emission measuring points on the 43-meter-high working platform .

Spin Bath Circuit

An important role in the production of yarn is played by the spin bath. The main circuit continuously supplies the spinnery with fresh spin bath liquor; used medium is pumped off, filtered and reconditioned by adding acid and then reheating. The recovery subcircuit removes excess water from the spin bath liquor by vaporization, and excess sodium sulfate is removed by crystallization and subsequent calcination.

The automation technology behind this circuit had given reliable service for many years. However, in order to ensure absolute reliability in the future, too, comprehensive modernization measures had become necessary. Hardware and software were no longer technological state-of-the-art; replacement parts were limited, and servicing and maintenance were becoming more and more costly and time-consuming. For these reasons the plant operator decided on a comprehensive general modernization, which was carried out from 2008 onward following a two-year planning phase.

Comprehensive Modernization Measures

In the course of the project, all the measuring devices were to be replaced by PA bus-capable components and new measuring points; modern measuring stations and operator stations were to be installed, as well as a new distribution and control system. The whole low-voltage power supply also needed to be addressed, as many distributors were exposed to a heightened corrosion risk at their installation sites — a risk the company planned to avoid in the future.

The limiting conditions for this extensive project were decidedly complex: Rayon yarn is produced around the clock, and the idea behind the project was to ensure that modernization measures did not affect continuous operation any more than absolutely necessary.

For economic reasons, avoidable downtimes are just as unacceptable for the spinnery at Obernburg as they would be in most other process plants. However, Cordenka found a competent partner for this modernization project in Rösberg Engineering, which was able to provide the necessary engineering services for detail planning and coordination of the numerous trades involved in the modernization, while hardly affecting the running of the production plant at all.

Planning and Preparation Instead of Shutdown

The essential prerequisites for this ambitious objective were comprehensive experience, precise planning and good preparation of all the necessary work stages. The modernization project involved a total of nearly 3,000 measuring points, about 200 valves, numerous cable lines, the whole of the compressed-air piping system and several transformer stations for the 400-VAC supply, the metrology bus installation using fiber-optic rings for Profibus DP, Profibus PA and Ethernet. The automation specialists from Karlsruhe took on responsibility for procurement and coordination of all the trades involved, including the necessary maintenance and production staff and the task of schedule monitoring.

Highest priority was accorded to creating the infrastructure for the complete system. In order to avoid corrosion damage in the future, all power lines were laid to — mostly newly constructed — switch rooms with air-purification systems. The whole system of power cables both inside and outside the building was then built up parallel to the existing system, in order not to interrupt production. The same approach was followed with the control wiring and the signal wiring. In most cases the new control rooms including fittings, air conditioning and air-purification systems, were built up next to the existing control rooms, which were still equipped with conventional instrument panels.

Following these preparatory infrastructural measures, modernization of the production plant — i.e., the spin bath circuit — was tackled in several steps. In order to interfere as little as possible with production, the automation specialists first drew up detailed time schedules for the electrical, measurement and control installations. In each case, instrumentation was then integrated into the routine cleaning cycles for the individual plant components.

Particular care needed to be taken when replacing the inline devices. New components such as valves or flowmeters had different dimensions and different installation requirements from the existing devices. The corresponding changes in the piping were already described in the specifications for the electrical, controlling and instrumentation installations and were able to be efficiently and speedily implemented. Thus the detailed preparatory work and methodical procedure really paid off, and for the plant operator the modernization of the spin bath system turned out to be a complete "carefree" package. As in most real-life situations, a few smaller projects were also generated, and these were carried out with the same care and attention.

Energy Efficiency Measures and New Exhaust Air Extraction System

It proved possible to cut electricity consumption considerably, by integrating more than 50 frequency converters regulated by the new control system. At the same time, the introduction of these controls optimized process conditions — which minimized the cooling water requirement, among other benefits.

Another project was the installation of a new exhaust air extraction system. For this purpose a new control room was built, a new visualization system was installed, and two chimneys with emission measurement points were erected. Here, too, the Karlsruhe automation specialists supervised all the trades involved, were in charge of work on the building site — including safety instruction for external companies in accordance with the plant operator's regulations — and of course they also took care of the acceptance protocols of work by external firms (activity reports) which were then imported into SAP.

Thus the complex modernization of the Obernburg plant, which was completed early in 2014, was carried out over six years without any loss of production, and at reasonable cost to the plant operator.

Claus Wolff, project leader, Rösberg Engineering GmbH, Karlsruhe, Germany

▶ Contact:
info.ka@roesberg.com
www.roesberg.com

Bitte besuchen Sie uns: Halle 6.1/5.1 Stand B8

Coatings in China: Present and Future

Market Demands Faster, Smarter, Stronger Products

Lacquer derived from tree sap originated in China about 7,000 years ago. This lacquer gave objects a hard protective coating that provided water resistance. Indeed, most of the early lacquer objects found in China reportedly come from flooded tombs. From these early origins, coatings in China have come a long way. In 2013, China accounted for slightly more than one-quarter of the total global coatings market, or about 13 million tons. For the years to 2020, the China National Coatings Industry Association forecasts an annual growth of 7%. This would result in a production volume of about 20 million tons in 2020.

Dr. Kai Pflug, CEO,
Management Consulting — Chemicals

Coatings Segments

In China, architectural coatings are by far the biggest segment, accounting for more than a third of total coatings volume (fig. 1).

Foreign-owned companies play a major role in the industry, accounting for about 50% of coatings sales. Relying on strong brands and technology, they traditionally focus on high-end coatings. In contrast, domestic companies (both state-owned and private) dominate the low end of the market. The middle level is the most interesting in terms of competition, with domestic companies entering from below via improved products and R&D, and multinationals entering via more localized products and corresponding cost and price level, often in combination with an acquisition of a local company.

Trends

The coatings industry in China is undergoing more rapid changes than in more mature markets. Key drivers of these changes are three major market trends. The first is the move toward more environmentally friendly coatings in all phases of their life cycle from production to application, their useful lifetime and their final disposal. The second is the ever-increasing number of requirements for the functions and application properties of coatings. The third is the slower market growth in China (fig. 2).

Increasing importance of environmental issues: An improved environmental performance of China's coatings industry was a goal outlined in the 12th Five-Year Plan. The plan calls for a focus on the development of waterborne coatings, powder coatings, high solid coatings, radiation curable coatings and other environmentally friendly products. For example, the government goal was to increase the market share of waterborne coatings from 5% to 15% from 2011 to 2015, a goal that likely will be achieved. China thus follows the development in Western markets, where the replacement of solvent-borne coatings is already much more advanced.

Increasing requirements for coatings properties: As in the global market for coatings, customers continuously demand a higher level of performance and ease of application. In China, this effect is even more pronounced as the starting level of coatings properties is fairly low. Increased coatings requirements include the following:

- Faster application (e.g., single layer is sufficient)
- Faster curing times (particularly for industrial coatings)
- "Smart" properties such as self-cleaning, mold-preventing, etc.
- Photo catalytic properties (to destroy toxic chemicals)
- Improved resistance to chemicals, weather, etc.
- Lengthened intervals between reapplication
- Longer pot times
- New special effects (to allow differentiated branding, e.g., in aerospace coatings)

Research & Development

To achieve these properties, coatings companies engage in research and development. By now most major international coatings companies have some local research established in China. Domestic companies have also strengthened their R&D and are generally somewhat better at leveraging the coatings knowledge available at China's universities.

Slower market growth: The coatings industry has had a very good past decade with an annual growth rate of 18%. However, there is a need for some realism in preparing for the future. With China's growth likely to be in the range of 5% – 7% in the upcoming years rather than 10% – 12%, the overall coatings industry almost certainly will exhibit a similar reduction in growth. Even if some coatings segments keep growing much faster than gross domestic product, others will struggle to achieve just that. The coatings industry as a whole is simply too broad and too mature to grow at a very different rate from GDP. Overall, however, China's coatings market still grows fast compared with mature markets.

Risks

The overall Chinese coatings market covers a vast area of customer industries including both investment and consumer segments. The biggest risk for coatings manufacturers therefore is a significant slowdown of the economy.

Overcapacity is somewhat less of a risk in the coatings segment. This is mainly because capital investment on coatings production capacity is fairly low, and thus spare capacity will not necessarily lead to losses at coatings producers. However, overcapacity is a bigger threat for the producers of coatings raw materials, such as producers of resins, pigments and solvents.

Multinationals face increasing competition from local companies with a lower cost base and increasing product quality. They will have to reduce their cost base, particularly via localization of cost-intensive steps, and further localize their product development. Conversely, domestic producers need to be careful not to simply rely on low prices. For small domestic players, the route to success may be to focus on small, China-specific market niches. Large domestic players will need to further improve their product quality while retaining their cost advantage.

Opportunities

Markets: Most coatings producers currently do not cover all markets within their application segments. Multinational players thus have opportunities in expanding their product range at the lower end, while domestic companies can move further upmarket with more technologically advanced products.

Products: Coatings still have substantial room for development. The demand for environmentally friendly coatings will increase further, driven not only by government regulation but also by growing environmental and health concerns of end customers. The increased coatings requirements listed above offer many other opportunities for improved products.

Marketing: Most local brands are still fairly weak and require stronger branding efforts to compete with foreign brands. Conversely, multinational companies may consider establishing second brands in order to better target the medium and lower end of the market without diluting the brand image of their global high-end brands. In some segments, such as architectural coatings, marketing efforts will have to be somewhat redirected regionally, with the focus shifting from eastern to central and western China, and from first- and second-tier cities to third- and fourth-tier ones.

Service: In Europe, coatings producers are more active in providing services than in China, for example, by taking over complete coatings tasks instead of just providing materials. Producers in China may consider a similar approach. In addition, add-on services such as analytical services, vendor-managed inventory, financing, etc., may in the future become more widespread not only for coatings producers themselves, but also for their suppliers, e.g., the producers of solvents, resins, additives and pigments.

An Attractive Market

Despite the gradual slowdown of the Chinese economy, coatings in China are and will remain an attractive market. The many recent investments by both multinational and domestic companies show that this perception is widely shared. The coatings producers active in China will continue to expand their businesses, and will seek to actively improve their market position.

Dr. Kai Pflug, CEO, Management Consulting — Chemicals, Hong Kong, China

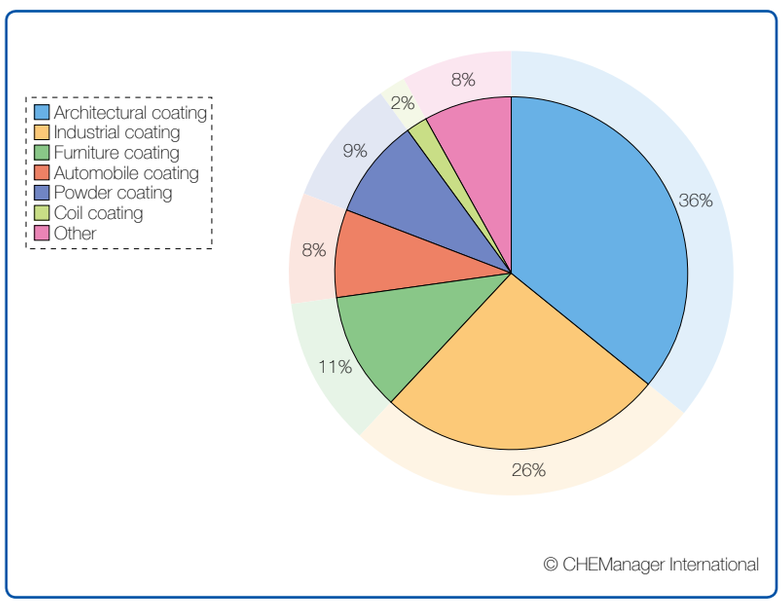


Fig. 1: Application segments in Chinese coatings market by volume share, 2012 (Source: National Paint & Coatings Information Center)

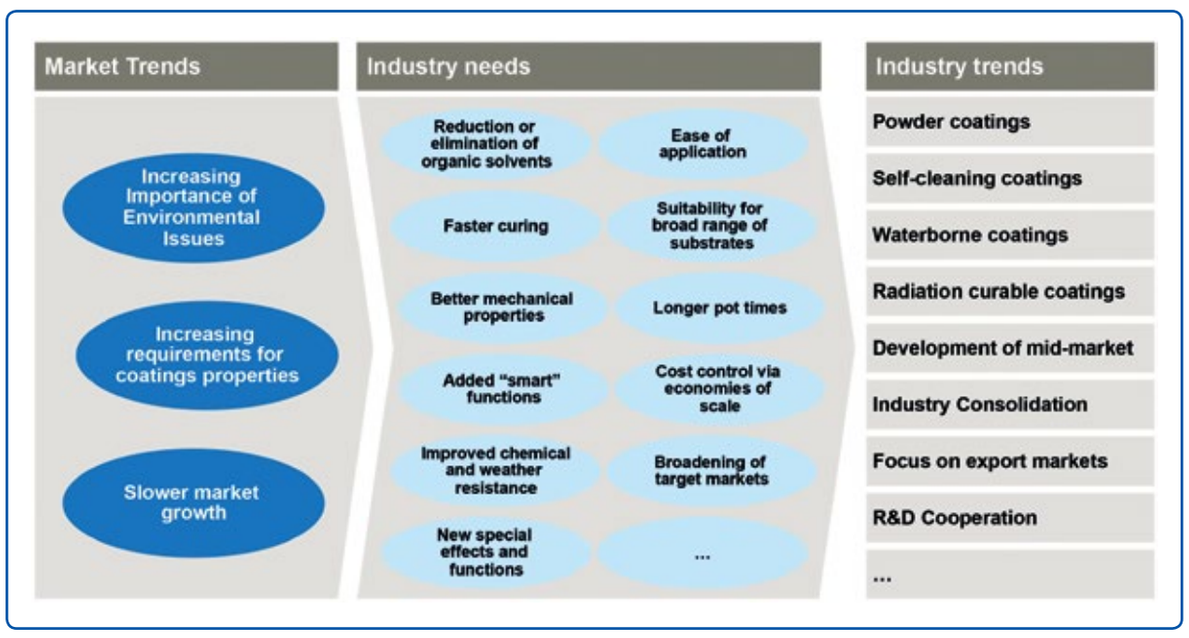


Fig. 2: Trends in the Chinese coatings industry

▶ Contact:
kai.pflug@mc-chemicals.com
www.mc-chemicals.com

Energy Efficient Building

Plastics in Building Envelopes

The energy consumption in Germany based on buildings is approximately a third part of the total amount. This reflects the strong need for sustainability in construction products, to support the reduction of 40% greenhouse gases on the level of 1990 by requirement of the German government.

Gudrun Pfahl, Stephan Nicolay IBK

Today's architectural building conceptions not only represent creative designs and urban planning, the detailed planning of functionality regarding content and energetic aspects is also enclosed. This generates a new field of activity for planners concerning the deep down involvement of all construction materials in use of building elements.

The Third Skin

The building envelope, in architecture nick-named "third skin", is the most crucial element in regulating the energetic needs of buildings. On the one hand the "third skin" has to protect, as a barrier, the indoor climate against outside weather condition. On the other hand this "third skin" has to be permeable, because of climate exchange (e.g. fresh air, vapor diffusion) between indoor and outdoor. And on top it should be suitable in all different worldwide regions and building designs.

The protection against cold and heat in building envelopes is mainly rated with the λ-value (U-value in building elements) on thermal conductivity for insulating materials. Plastic foams, e.g. EPS, PU, et al. are very efficient in thermal insulation systems and reduces the energy consumption enormously.

This aspect contains the strong opportunity for the reduction of energy consumption in buildings and lowering the worldwide greenhouse effect. Buildings will be more insulated in future following the motto "the more, the better"! The result of this generates an enhanced technical support in ventilation, because we — the residents — produce emissions (e.g. humidity, CO_2, waste heat, smell, etc.), which have to be deleted to sustain a comfortable healthy indoor climate environment.

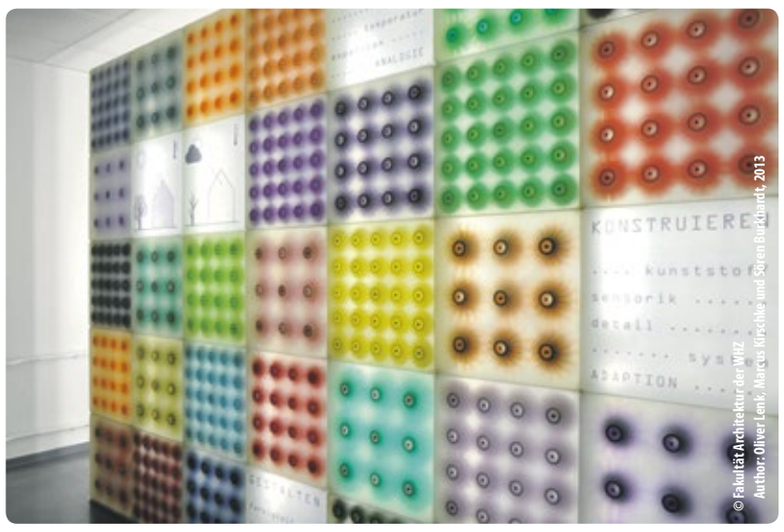


Fig.1: Wall 30 Chamaeleons

In-house Facilities vs. Building Envelopes

Individually and mechanically ventilation systems will be the basis for low-energy and passive houses. Building envelopes and in-house facilities have to be understood as a common system. Indoor and outdoor sensor technology control the environment for a comfortable indoor climate and the building envelope transfers the corresponding needs, e.g. exchange of air, between indoor and outdoor.

We used to have a standard indoor climate year round. Opening a window to ventilate the room as a regulatory measure, is a relict of the past. Today, we, as residents, can destroy the automatic control engineered climate system by opening windows.

Smart Building Envelopes, an Opportunity?

Intelligent and reactive facades could implement the control engineering for ventilation and air conditioning beside the protection and insulation against bad weather conditions. Plastics can implement reactive properties (e.g. thermal-reactive properties). Could a smart building envelope based on polymers react to environmental influences independently like our skin and what would it look like?

In 2014, the exhibition series "LABORE 1" of the gallery of the "Bundes Deutscher Architekten" (BDA) in Berlin, presented a concept for intelligent facade systems, the result of an integrative teaching and research project named "30 CHAMAELEONS" by the architectural faculty of the "Westsächsischen Hochschule Zwickau" (WHZ) dept. of Prof. Frank Schüler in cooperation with faculty mechanical and production engineering and "Das Kunststoff-Zentrum" (SKZ) represented by Thoralf Krause. (see fig. 1)

On exhibition, modules of glass fiber reinforced plastic boxes which imitate the functionality of a chameleon skin. Paraffin filled containers, used as a „stretch-element", expand under the influence of heat, push a piston out of the container and press artificial pigment cells. The system adapts to light transmission and color intensity of sunlight as well as temperature.

An additional project at the architectural faculty WHZ is the "Kiemenbox" taken from gills of a fish. The building skin uses the different thermal expansion of polymers due to different thermal expansion coefficients. The bonded plastic material changes its length if temperature changes. The slit within the facade membrane opens and closes gill-like and is steered only by environmental temperature for the air exchange between indoor and outdoor (see fig. 2).

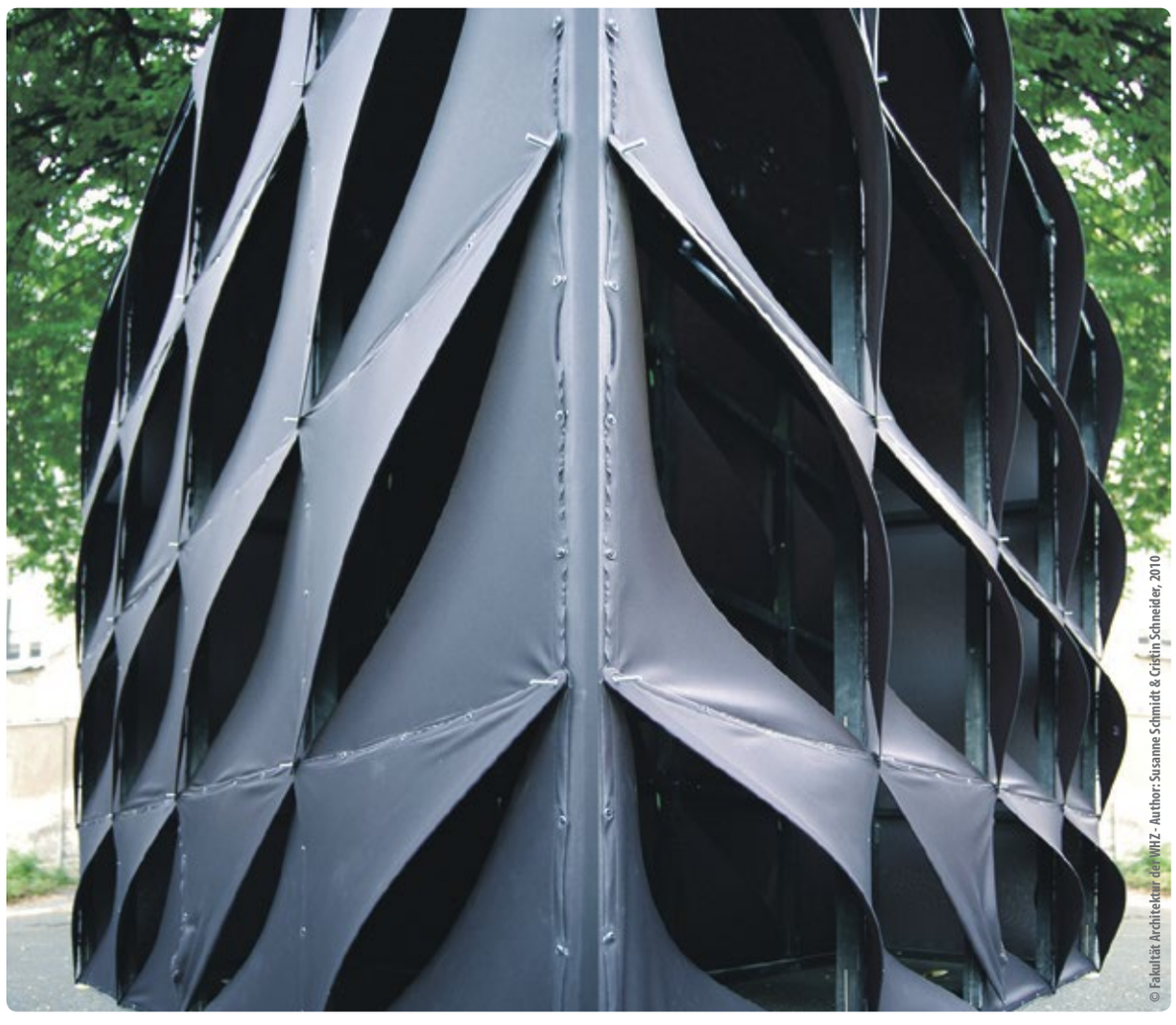


Fig.2: "Kiemenbox": the German word "Kiemen" means "gills of a fish". The slit within the facade membrane opens and closes gill-like.

These examples show the possibilities of smart materials and building elements within building envelopes, which integrate their own regulatory mechanisms — an approach for a real "Third Skin"! Plastic materials are first in row in the field of smart materials in buildings, because of their adjustable and controllable properties and consistent quality within an industrial production process.

This knowledge about materials — especially plastics — will increasingly be required by architects and civil engineers, generating use in sustainable building designs. These competences must be integrated within the learning process and supported by relevant industries. The "institute for construction with synthetic materials – IBK" (Institut für Bauen mit Kunststoffen) supports universities by lectureships about "plastics in architecture". By these means, the IBK combines polymer-, material- and engineering science in context with architectural designs to generate sustainable buildings in the future.

Stephan Nicolay, chairman, and Gudrun Pfahl, public relations, Institut für das Bauen mit Kunststoffen (IBK), Frankfurt, Germany

▶ Contact:
Gudrun Pfahl
gudrun.pfahl@ibk-darmstadt.de
www.ibk-darmstadt.de

Solvay and 3A Composites in Global Foams Alliance

Solvay and 3A Composites have teamed up to manufacture specialty foam materials for advanced transportation. The companies said they will offer for the first time on a large and worldwide scale "a tailored, cost-effective substitute to traditional, labor-intense materials used to reduce the weight of applications."

Their world-scale manufacturing capability will combine 3A Composites' know-how in industrial process development and high-volume fabrication of foams, with Solvay's leading position in high- and ultra-performing plastics materials.

Work will first build on Solvay's Radel foam and so-called sandwich materials, used on Airbus A350 and Solar Impulse and will later expand to products that the Belgian group is developing. (dw) ■

Arkema to Expand PEKK Output in France and the US

To meet growing demand from the carbon fiber composites industry and the 3D printing sector, Arkema plans to double production capacities in France for its new Kepstan PEKK (polyether-ketone-ketone) ultra-high performance polymer by the first half of 2016.

The French chemical producer also has announced plans to build a world-scale PEKK plant at its Mobile, Alabama, site on the US Gulf Coast. This unit is scheduled to come on stream in the second half of 2018.

PEKK, which Arkema said stands out from the PAEK (polyaryl-etherketone) family by its extensive range of processing technologies and excellent thermo-mechanical behavior, complements the company's portfolio of thermoplastic resins and broadens its range of products for the aerospace, energy and electronics sectors. (dw) ■

Axalta Building New Waterborne Coatings Plant in China

Axalta Coating Systems is building a new plant for waterborne coatings at Shanghai to supply China's growing automobile market. The company said construction of the plant, one of its most advanced waterborne production facilities, in Shanghai reflects the key role China plays in its global strategy, which is focused on providing sustainable coating products and application systems for customers while reducing the environmental impact of the production process.

With the new capacity, the business that once belonged to DuPont and before that to Herberts, a subsidiary of Germany's former Hoechst group, will double its output capability in China. The new highly automated facility is designed to maximize the use of raw materials and accelerate manufacturing cycle time, the company said. (dw) ■

BASF to Lift Chromate Pigment Capacities

BASF plans to "significantly increase" production capacities for bismuth vanadate pigments at Besigheim, Germany, near Stuttgart, from 2017.

The German chemical giant markets the yellow pigments with a special greenish color tone used to formulate paints and coatings under the Sicopal and Paliotan brand names.

BASF said its bismuth vanadate pigments are a high performance inorganic alternative to pigments containing lead chromate, which, according to the EU chemicals legislation REACh are classified as CMR substances (carcinogenic, mutagenic or toxic for reproduction).

Starting this year, BASF will no longer produce pigments containing lead chromate. "We are committed to offering our customers innovative products that enable them to develop sustainable solutions," said Alexander Haunschild, senior vice president of BASF's business unit Pigments & Resins Europe. (dw) ■

Wacker Widens US Capacity for Dispersions

Germany's Wacker Chemie is expanding its vinyl acetate-ethylene copolymer (VAE) dispersions production facilities by 85,000 t/y at its Calvert City, Kentucky site in the US. The additional capacity is expected to be in the market in the second half of this year.

The €50 million investment by the Munich-based chemical company, including a new reactor scheduled to come on stream in mid-2015 and infrastructure improvements, will make the complex the largest of its kind in the Americas, Wacker said.

The additional annual capacity will be used for applications in the paints and coatings, adhesives, construction, paper, carpet and nonwoven industries.

Wacker has also added an ethylene pipeline to the Calvert City facility to increase the long-term reliability of raw material supply at the site.(dw) ■

DSM Upgrades US Waterborne Coatings Facility

DSM is investing an undisclosed "substantial" sum to upgrade its production facilities for waterborne resins for inks and coatings at Wilmington, Massachusetts in the US.

The Dutch chemical producer said trends toward environmentally friendly and renewable products call for novel resin technologies that enable customers to stay ahead of expected environmental and regulatory challenges without sacrificing performance.

"We believe that, together with our industry partners, we can transform the coatings market towards healthy and environmentally-friendly technologies and solutions. Introducing waterborne products that deliver on sustainability as well as improved performance, creates significant growth opportunities for our customers," said Patrick Niels, president of DSM Resins & Functional Materials. (dw) ■

Transforming Coatings Through Innovation

Continued Page 1

Given that the job of a coating is to protect and to beautify, sustainability can mean that an electrocoat, which is designed to prevent corrosion, can extend the life of the products to which it is applied and sustain the product's lifespan. Sustainability can mean reducing the total amount of energy required to dry and to cure a paint film at an OEM by eliminating curing steps in the application process. In a body shop, it can mean improving productivity with faster and more accurate color matching. In the oil and gas arena, it can mean coating pipes to help them withstand higher temperatures that enable wells to go deeper and to run more efficiently. Finally, sustainability can mean sourcing raw materials with a lower environmental footprint, or selecting pigments that are mined in a socially and environmentally sensitive manner.

New raw materials for coating substrates, products that are less harmful to health and environment, more energy efficient application systems or other challenges: Where do you see the biggest potential for innovation?

B. Snyder: Today we deliver a combination of beauty and protection. As our customers innovate, we are driven to expand our range of solutions. Some of the toughest challenges come from the need to offer a consistent appearance across a single vehicle assembled from a combination of steel, aluminum, carbon fiber, polypropylene and various other materials. I can envision that we will continue to strive for more functionality in coatings beyond appearance and protection. Light-weighting, for example, drives a broadening range of substrates today. Continuing to reduce weight not only introduces new substrates but also moves in the direction of asking the coating to play a structural role. New challenges will come from the need to integrate coatings more into vehicles, machines or devices. Our customers will be looking for us to help them incorporate functionality that doesn't exist today. Conductive coatings, for example, may participate in the solar collection array that is integrated into a vehicle.

How do the innovation areas mentioned trigger investments in projects or assets?

B. Snyder: We continue to be very active in developing waterborne products that meet our customers' needs. We just opened an expanded waterborne production facility in China and we are also expanding waterborne production capacity in Germany. We have taken steps to reduce the volume of paint it takes to do the same job and to reduce the amount of energy required to dry and to cure our products. And our continuous drive to improve corrosion protection with our electrocoat products means longer life for the products we coat.

According to Axalta's CEO, Charlie Shaver, developing new products based on leading-edge coating technology will be a key engine for Axalta's growth. What is the vision for the company?

B. Snyder: Axalta's vision is to be the leading supplier of coating products for automotive and industrial customers. We focus on understanding our customers' needs and delivering products and services that help them make their businesses better. We are one of the technology leaders in this space and will continue to invest in technology to maintain that leading position.

Axalta, with over 145 years of experience in the paint business, today not only supplies vehicle manufacturers like BMW but also industrial customers in a wide range of applications with a wide variety of liquid and powder coatings.

> Axalta is positioned for growth.

Axalta is positioned for growth. Our worldwide technology footprint starts with seven principal R&D centers that are complemented by another dozen regional technical facilities and a network of 45 customer training centers. Our R&D center in Wuppertal, Germany, is close to a number of our important customers in the Europe. Our strong position in China and other fast-growth emerging economies gives us ground floor access as our customers expand their businesses. We have leading market positions in key applications that we believe can be platforms for further growth. Beyond share gains in automotive OEM and refinish segments, we have opportunities to globalize our positions with manufacturers of commercial vehicles, such as buses, trains and agricultural and construction equipment, to expand our scope in electrical insulation systems and to build on new and existing technologies for many other challenging applications like architectural applications, oil and gas pipelines, rebar, and different automotive components, such as wheels and springs.

How much does Axalta invest in R&D and how will innovation support the future growth of the company?

B. Snyder: In 2013, we allocated over $165 million to combined R&D and technology projects to keep us at the leading edge of the coatings industry. Axalta's technology organization spans the globe with technology centers in each of our key markets. We have seven major centers in the US, Mexico, Germany, France, Belgium and China. Additional labs enable us to deliver technology and local support to customers in the Americas, Europe and across Asia Pacific. We have a technical staff of over 1,300 highly trained individuals.

Before joining Axalta you served as chief innovation officer at Orion Engineered Carbons, chief technology officer at HB Fuller, global technology director for Celanese and you held a number of positions at Rohm and Haas. What led you to choose Axalta as your new professional challenge?

B. Snyder: Several factors make Axalta a great workplace and career choice for many people. Axalta is a truly global company and one of the leaders in technology-intensive markets, such as automotive, commercial vehicle and industrial coatings. The company has a long tradition of being a technology leader with a track record of transforming coatings through innovation. Since becoming an independent company, Axalta has been on a growth path and is investing to achieve this growth. Most exciting for me is that technology is a key strategic driver. I feel honored to have the opportunity to lead this function for the company.

Dr. Michael Reubold, CHEManager International

► www.axaltacoatingsystems.com

Pushing Materials to Their Limits

Silicone Rubbers Find Use in Applications that Enhance the Performance of Other Materials

The global silicones market is estimated to be worth more than €11 billion and is growing at 6% a year. Wacker, one of the leading manufacturers of silicones, polymers and bioengineered chemicals, is keen to share in this growth, especially with its new specialist silicone rubber grades. With over 4,000 employees generating more than one-third of Group sales, Silicones is the Munich, Germany-based company's largest business division and a market leader in many application areas. Dr. Michael Reubold asked Peter Summo, head of the Engineering Silicones business unit at Wacker, to explain the growth strategy.

CHEManager International: Mr Summo, what are the most fascinating opportunities that can be realized with silicone materials?

P. Summo: Among the most fascinating recent developments are ultrathin silicone films. When electricity is applied, they deform. This property can be used for various purposes, for example for the development of sensors and actuators in medical devices or for new types of generators. In an initiative project with Bosch, we are currently testing a facility that harvests the movement of ocean waves to generate electricity. Here, the films are compressed and then stretched again a million times like an accordion. Only a material like silicone can withstand such permanent stress without fatigue.

Which application sectors offer above-average growth potential for your silicone-rubber product portfolio?

P. Summo: Our sales-volume growth is strongest in the automotive, electronics, lighting and medical-technology sectors. In some cases, sales revenues have risen by double digits. Our strongest growth region is Asia. Over recent years, we have set up and expanded our technical centers there and are thus are able to offer our customers even better local service. This additionally stimulates our business.

Are your R&D activities more customer-oriented or innovation-driven?

P. Summo: We do both. Our research is innovation-driven and customer focused. After all, the best product innovation is useless if customers have no need for it. What matters is therefore the benefit derived by the customer, and that can vary from one to the next. There are customers who are looking for an innovative solution to a technical problem. Others are seeking a material that offers additional properties or possible applications. And yet others would like to use silicones to boost their production economics. Thanks to our R&D and our application technology, we can offer our customers not only innovative products and solutions but also process engineering and applications expertise.

Peter Summo, head of the Engineering Silicones business unit at Wacker

Are your customers willing to pay a premium for products that are vital as enablers or problem solvers in special applications?

P. Summo: Wherever our silicones are indispensable and offer definite added value, our customers are happy to pay a premium. However, there are applications that do not pose special demands on the materials used and where the price plays a more important part. That's why we have a large range of standard silicones for price-sensitive applications and markets. While silicones are slightly more expensive than many other rubber grades, they are subject to fewer price fluctuations. Oil and gas prices have considerably less influence on their manufacture than on organic rubber grades.

More pessimistic growth forecasts for emerging markets, such as China and Brazil, have slowed down the global economy. How important are these markets of the future?

P. Summo: In the medium to long term, Asia, in particular, will experience strong growth. All leading economic institutes are predicting this. By 2018, Asia's gross domestic product will increase by 7%. That's the strongest growth worldwide. Southeast Asia has particularly strong momentum. The region is catching up quickly and will achieve the same gross domestic product as Brazil, India or Russia over the coming years. Asia is thus a very important market for us. We are already generating more than 40% of Group sales there now.

Are you targeting expected volume growth or do you anticipate better chances in niches that create high added value?

P. Summo: We want to grow in both the volume market and in specialty products. Being the second-largest silicone manufacturer in the world, both markets are important for us. Of course, niche applications represent greater added value and yield higher margins, but they also involve increased development and resource spending. For this kind of market, you have to offer two things if you want to be successful: products and solutions that really work, and customer proximity. And that is exactly what we do. Wacker operates 21 technical centers around the world, which offer expertise and technical support right at the doorstep of our customers. One could say, customer intimacy is part of our business DNA and a major differentiator.

> We want to grow in both the volume market and in specialty products.

Which sectors offer market opportunities due to special material requirements that silicone rubber can fulfill?

P. Summo: Silicones particularly find use in applications that push other materials to their limits, for example, in LEDs, in display technology, and in cars. Since engines are becoming ever more compact and must increasingly share space with additional components, the temperature under the hood is constantly rising. 90 °C in the radiator is no longer an exception. This can be problematic for organic-rubber gaskets, but not for silicone ones. Our new silicones maintain a good seal up to 125 °C. The same applies to turbocharger hoses and exhaust-pipe suspensions. Here, too, only silicones are able to withstand the increasing temperatures and mechanical stress over the long term. Another example is medical technology. Adhesive plasters are increasingly made of silicone. They promote healing, because they are breathable and do not adhere to the wound. Furthermore, tubes and catheters are almost exclusively made from silicone nowadays, because they are compatible with the skin and easy to sterilize. And in outer space, where extreme conditions prevail, silicones have long established themselves as high-performance adhesives.

► www.wacker.com

People

Mohamed Al Mady, CEO of SABIC for 17 years, has left the Saudi petrochemicals giant to become president of the country's Military Industries Corp. at the request of new King Salman. He will report directly to the minister of defense. With effect from 15 February, **Yousef Abdullah Al Benyan** was appointed acting CEO of SABIC, and is thought likely to stay in this position. The CEO of the state-owned company is appointed by the Saudi cabinet or council of ministers. The new interim chief had only recently been named executive vice president for Finance at SABIC, replacing **Mutlaq Al Morished**, who became CEO of National Industrialization Co. (Tasnee) in December. In the past, Al Benyan served as executive vice president for Chemicals and Human Resources. He also served as general manager of SABIC Americas as well as general manager SABIC Asia-Pacific.

Olivier Brandicourt, currently CEO of Bayer HealthCare, will leave the company at the end of March and become new CEO of French pharma giant Sanofi from the beginning of April. Simultaneously, Bayer holding board member **Werner Baumann** will take over as head of the HealthCare subgroup. Sanofi is currently being managed by supervisory board chairman **Serge Weinberg**, who took responsibility for the October 2014 abrupt dismissal of **Christopher Viehbacher**, the company's first non-French CEO. Brandicourt has been chairman of the Bayer HealthCare executive committee since November 1, 2013. He studied medicine and biology in Paris. Having begun his industrial career in 1987 at Parke-Davis/Warner-Lambert, he subsequently joined Pfizer, where he held positions of increasing responsibility, becoming a member of its executive leadership Team in 2010.

Bernard Pinatel, CEO of Bostik, has been appointed a member of Arkema's Executive Committee, effective 3 February. He succeeds **Pierre Chanoine** who is retiring. Following the acquisition of Bostik, the company constitutes a new unit (Specialty Adhesives) within structure of Arkema's High Performance Materials segment, now headed by Pinatel. Born in 1962, Pinatel is a graduate of École Polytechnique and Institut d'Études Politiques (IEP) in Paris, and holds an MBA from the European Institute of Business Administration (INSEAD). He began his career at Booz Allen & Hamilton, later joining the Total Group in 1991 and has served as chairman and CEO of Bostik since 2010.

Karyn Ovelmen announced in February to step down as chief financial officer of LyondellBasell, two months after a new CEO took the reins at the petrochemical company. Ovelmen will continue in her current role for up to three months while the company searches for a successor. LyondellBasell said it has reached a separation agreement with its CFO, but no reasons were disclosed for the separation. Ovelmen joined LyondellBasell in 2011, replacing the retiring Kent Potter. Previously, she was CFO of European petroleum refiner Petroplus and held other positions in the energy sector. In December, 2014, **Bhavesh V. (Bob) Patel**, previously executive vice president of the LyondellBasell olefins and polyolefins business segment, replaced James L. Gallogly as CEO.

Timothy D. Roberts, Patrick D. Quarles and **Kevin W. Brown**, all senior executives at LyondellBasell, have been promoted to new positions. Roberts, formerly executive vice president (EVP) of the Olefins & Polyolefins (O&P) Americas division and on the company's management board since April 2014, now has responsibility for the division's businesses worldwide as EVP Global O&P. Quarles, Senior VP of the Intermediates and Derivatives (I&D) division since 2009, has been promoted to EVP for I&D, Supply Chain and Procurement. In addition to his role as business leader of the global I&D business, Quarles — on the board since April 2014 — will now manage the company's supply chain and procurement functions. Brown, SVP of the Refining division since 2009, has been promoted to EVP for Manufacturing and Refining. Along with leading the refining business, Global Engineering Services and Global Projects, will now be responsible for all of the group's manufacturing sites worldwide.

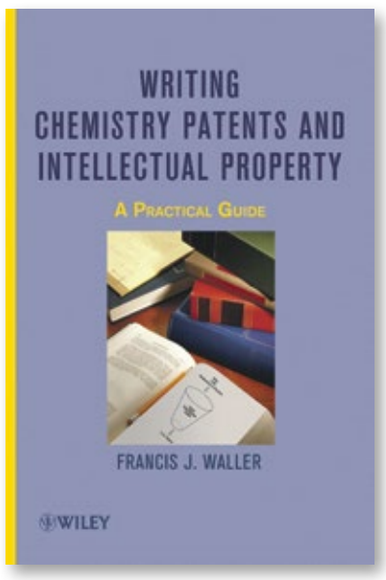
Joanna Stephenson has joined Cornelius Group as non-executive director, responsible for driving the marketing and strategic development of the Group. Joanna is a former vice president of Marketing of Linpac and is managing director of PHD Marketing & Strategy. The UK-based distributor of specialty chemicals and ingredients has announced further management changes to support its 2025 vision for growth. Long term Board directors **David Brown** and **Richard Herring** remain with the group in new non-executive director roles. Brown is now responsible for developing the Cornelius sourcing and international business strategy working with **Darren Spiby**, managing director, who takes over responsibility for the overall UK & international business. Herring will remain in a consulting role for the Human Resources function.

Burkhard Quellenberg (47) is Oxea's new global director Human Resources. His previous career has included management positions at IT multinational Bull and mechanical engineers Manitowoc Germany. An occupational and organizational psychologist by trade, Quellenberg held a number of positions at SABIC Europe, most recently HR director Business & Functions Europe, before moving to Oxea. Strategically, Quellenberg prioritizes human resource development. Over the last few years, Oxea has been recognized time and again as an exceptionally employee-focused business. Employing over 1,400 people, Oxea is one of the world's key producers of oxo chemicals.

Thomas Arnold (54) has been appointed as CEO of German chemical distributor Biesterfeld with effect of April 1, 2015. Arnold, currently member of the board of Biesterfeld and managing director of Biesterfeld Spezialchemie, takes over from **Birger Kuck**, who will retire after eleven years as CEO and a total of 35 years with the company on March 31, 2015. Arnold joined Biesterfeld in May 2013 and was appointed to the board of Biesterfeld in July 2014. Prior to this he held management positions in various renowned, international companies in the trade.

Writing Chemistry Patents and Intellectual Property

Intellectual property is constantly at risk, and the protection of chemical science and technology through the patenting process allows individuals and companies to protect their hard work. But in order to truly be able to protect your ideas, you need to understand the basics of patenting for yourself. A practical handbook designed to empower inventors like you to write your own patent application drafts in conjunction with an attorney, Writing Chemistry Patents and Intellectual Property: A Practical Guide presents a brand new methodology for success.



The book teaches you how to structure a literature search, to educate the patent examiner on your work, to prepare an application that can be easily duplicated, and to understand what goes on behind the scenes during the patent examiner's rejection process. Providing essential insights, invaluable strategies, and applicable, real-world examples designed to maximize the chances that a patent will be accepted by the United States Patent and Trademark Office, Writing Chemistry Patents and Intellectual Property is the book you need if you want to keep your work protected.

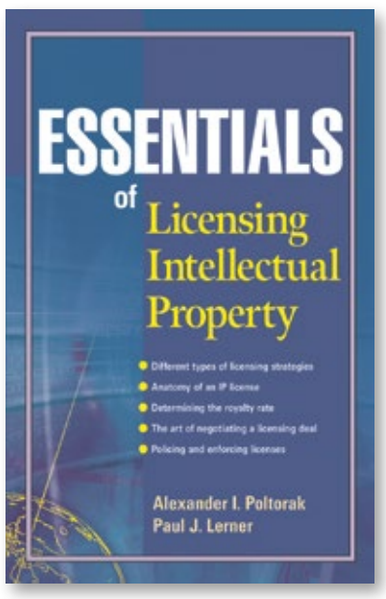
- Writing Chemistry Patents and Intellectual Property
  Francis J. Waller
  John Wiley & Sons
  Price: € 71.90
  ISBN: 978-0-470-49740-1

Lean Supply Chain Planning

"Lean Supply Chain Planning — The New Supply Chain Management Paradigm for Process Industries to Master Today's VUCA World" introduces a new and innovative approach to managing variability, uncertainty, and complexity in today's planning processes and systems. Presenting a cutting-edge supply chain management concept that addresses current problems in the process industry's supply chains, it introduces powerful methods developed by leading research institutes, process industry champions, and supply chain experts. It explains how companies can adapt their current supply chain practices to achieve higher cost efficiency while maintaining agility and resilience to withstand today's turbulent business environment.

- Lean Supply Chain Planning
  Josef Packowski
  Productivity PR
  Price: £ 59.99
  ISBN: 978-1482205336

Essentials of Licensing Intellectual Property



Full of valuable tips, techniques, illustrative real-world examples, exhibits, and best practices, this handy and concise paperback will help you stay up to date on the newest thinking, strategies, developments, and technologies in licensing intellectual property. Alexander I. Poltorak, PhD, is founder and chief executive officer of General Patent Corporation. Paul J. Lerner is senior vice president and general counsel of General Patent Corporation.

- Essentials of Licensing Intellectual Property
  Alexander I. Poltorak, Paul J. Lerner
  John Wiley & Sons
  Price: € 31.90
  ISBN: 978-0-471-43233-3

Events

LogiChem 2015, 21 – 23 April, 2015, Antwerp, Belgium
In its 14th year, LogiChem attracts over 200 supply chain and logistics managers from the largest chemical companies+ in Europe. As they look to achieve commercial and supply chain excellence, LogiChem's new advisory board has added more interactive formats including breakout workshops, case study revolutions, panel debates and customer insight forums to the agenda. For instance, attendees will learn how to optimize transportation strategies to deliver maximum business benefit and navigate increasing complexities to reach the optimal logistics network design and hear from innovative thought leaders on how to collaborate more effectively with suppliers to deliver additional value and innovation whilst minimizing costs.

- www.logichemeurope.com

ISPE 2015 Europe Annual Conference, 4 – 6 May 2015, Frankfurt, Germany
The 2015 ISPE Europe Conference – Driving Effectiveness in Pharmaceutical Operations with Integrated Quality will address current industry trends and new regulatory updates by pharmaceutical experts, regulators and inspectors from various European countries through keynote sessions, four separate conference tracks and an Executive Forum. In addition, the means to improve the Pharmaceutical Industry's operational efficiency will be discussed both at strategic and managerial levels. At the Executive Forum, companies such as Nestlé, and the Benchmarking of European Medicines Agencies Steering Group (BEMA) will discuss how to maintain quality in global operations.

- www.ISPE.org/2015-Europe-Annual-Conference

FECC Annual Congress 2015, 6 – 8 May, 2015 Athens, Greece
The FECC Annual Congress is the first choice for leaders from the chemical distribution industry for networking to generate new business and reinforce existing relationships, while also learning new methods to improve their performance. Hundreds of delegates, from business leaders to stakeholders, attend the congress every year. This year's theme "Towards a Sustainable Future" serves as umbrella for a variety of sessions which include a global perspective of the chemical distribution market, new developing markets, governance in family owned companies, and crisis management. The congress also tries to put the buzz word sustainability in perspective. This year's program includes Marc Woods, Gold Medalist Paralympics and cancer survivor, as inspirational speaker.

- www.fecc-congress.com

CESIO 2015, 1 – 3 June 2015, Istanbul, Turkey
The 10th CESIO congress will showcase an extensive scientific program on the main theme "Surfactants in a Globalising World — Creating new Possibilities". In addition, business convention facilities will be offered to all participants and their companies to do business effectively and efficiently. Sessions, posters and exhibition will cover the scientific, economic, technical, as well as safety and regulatory aspects of surfactants and surfactant applications in the industry and consumer products. The CESIO Congress provides a good opportunity to meet with key contacts along the surfactant value chain to exchange information associated with technical, application and regulatory matters on the basis of the functionalities of surfactants.

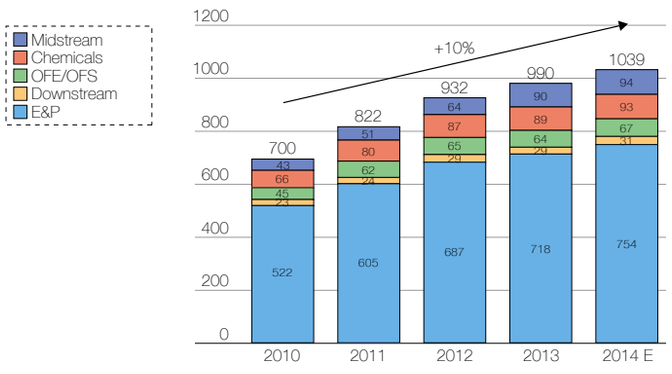
- www.cesio-congress.eu

Achema 2015, 15 – 19 June 2015, Frankfurt, Germany
With 3,800+ exhibitors and almost 170,000 participants, Achema is the leading international exhibition congress on Chemical Engineering, Environmental Protection and Biotechnology. After a successfull and a more international event ever in 2012, the industry is now looking foward to Achema 2015. Environmental Protection and Biotechnology are integral general topics at Achema, both exploit the technological solutions enabled by process engineering. As a result, the synergistic concept of production-integrated environmental protection has become one of the hallmarks of Achema. In answer to the great demand, the event offers additional exhibition space for Pharmaceutical, Packaging and Storage Techniques.

- www.achema.com

Global Oil & Gas Industry Needs to Adopt a Cost Culture

Oil & Gas Industry CAPEX Spending Trends, Public Companies, Global (USD Bn)

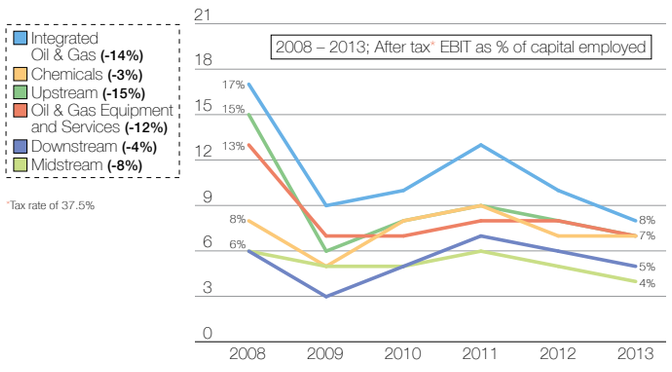


Source: Bloomberg, AlixPartners © CHEManager International

Abundance of capital investment

With the recent fall-off in oil prices, companies in virtually all sectors of the oil, gas and chemicals (OGC) industry worldwide are going to have to plan and manage their projects for greater capital productivity and along the way create a "cost culture" inside their companies. Prior to the crash in prices "improving throughput" was the single-most important focus for improving capital productivity. That's according to a study conducted by AlixPartners and Oxford Research, which includes a survey of 250 high-level industry executives. Since the late-2000s, higher energy prices and the unconventional-energy boom attracted an abundance of capital investment into the industry globally (fig. 1).

Return on Capital Employed Trends for Public Oil & Gas Companies Globally Prior to 2014 Oil Price Decline



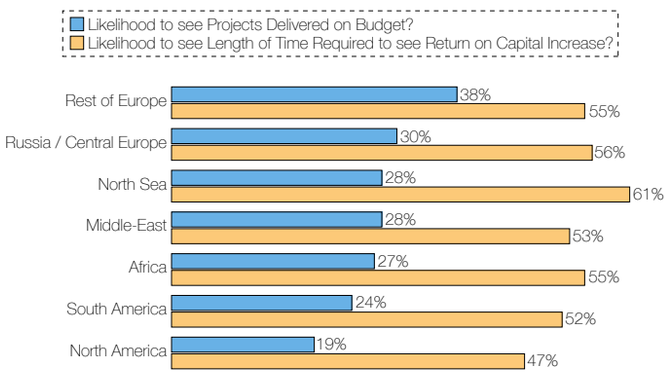
*Tax rate of 37.5%

Source: Capital IQ; AlixPartners analysis © CHEManager International

ROCE trends

Compounded ROCE (return on capital employed) averages for all major sectors of the industry were negative for the period 2008-2013 — i.e., even before the recent drops in energy prices. Meanwhile, average returns across all sectors deteriorated, with the E&P sector having some of the most significant declines, from 17% ROCE in 2010 to 6-7% currently (fig. 2). However, within sectors there is a wide dispersion of performance, suggesting that some companies have implemented superior operating models and are able to generate above-average returns, while others struggle. Despite the overall downward trend in capital returns over the past few years there is still an abundance of capital available for companies to invest.

Returns are lower than Expectations, and Slow to Materialize



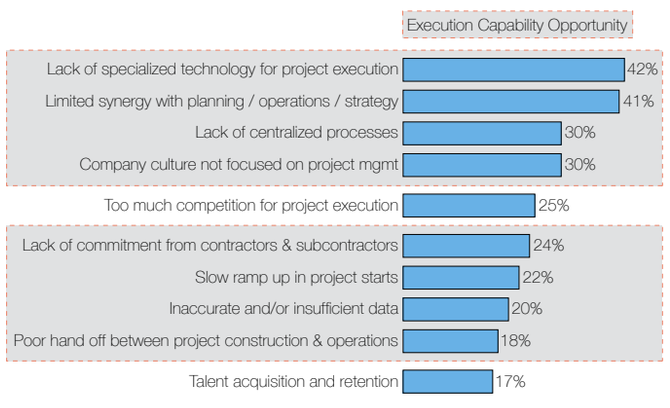
Source: AlixPartners © CHEManager International

Sustainable returns

According to the study, virtually all executives are frustrated that actual returns are lower than their expectations and that it is taking longer to generate target returns. In North America only 19% of the projects are likely to be delivered on budget, while — depending on the region where projects are managed — 47-61% take longer than expected to generate expected ROI (fig. 3). Only 39% of total respondents said they had a strong series of checks and balances to ensure projects stay on track, and only 11% reported using a stage-gated process to assess project viability. The study concludes that the industry is at an inflection point: to generate sustainable returns, companies need to find a balance of production growth and cost control.

Lack of Execution Capability is affecting Project Delivery

In what ways are you most challenged in keeping projects on time?



Source: AlixPartners © CHEManager International

Room for improvement

Overall, when asked to name major challenges to keep projects on budget (fig. 4), the top reason chosen (by 42% of all respondents) was "lack of specialized technology for project execution." 41% of total respondents said they are challenged by "limited synergy with planning and operations" for getting projects completed on time. 30% of all respondents stated that "company culture istn't focused on project management." These results show that there is room for improvement in project management, particularly in terms of project execution. The study concludes that in the current environment of falling prices, plus increasing geologic and technical challenges, the creation of an overall cost culture seems to be mandatory. (rk)

Historical Beer from 1840s Lives Again


© Dmytro Sukharevskyy - Fotolia.com

Researchers in Finland and Germany have analyzed samples of 170-year-old beer recovered from a shipwreck to discover more about how the beverage, and the process of making it, has changed through the ages. The samples came from corked glass bottles found on the wreck of a schooner that was discovered in 2010 in the Baltic Sea, close to an archipelago belonging to Finland known as the Åland Islands. Not a lot is known about what happened to the ship, but the beers probably belonged to 19th century merchants.

The bottles were brought to the Technical Research Center of Finland where a team of researchers decided to analyze the chemical composition of two of them. The same measurements were made in six modern beers for comparison.

Unsurprisingly, 170 years under the sea took its toll on the beers, and the researchers reported some deterioration in quality caused by enzymes and microorganisms. The beers also may have become diluted by sea water by up to 30%, the researchers said. A modern beer of regular strength will have a flavor life of about three to four months.

While the historical samples still retained the aesthetics of beer with a bright golden yellow coloration and little haze, they certainly didn't smell like it. Both of them smelt like a tempting combination of Bakelite—an early synthetic plastic renowned for its fishy smell—burnt rubber, overly-ripe cheese, goat and dimethyl sulfide, which is commonly likened to rotting cabbage. These undesirable notes are likely attributable to the growth of bacteria inside the bottles, which would have produced a lot of organic acids.

Although it's impossible to know the precise original taste, their chemical compositions gave some hints. For example, both were made with hops, but one contained more and was thus more bitter. Both beers had high levels of a compound that gives an apple flavor, and the less bitter beer was particularly high in compounds that bestow rose and sweet apple flavors. Interestingly, they had unusually low concentrations of one of the major flavor components of fermented alcoholic beverages, 3-Methylbuty acetate, which gives banana or pear drops flavor. Overall, they probably would have been pretty similar in taste to modern day beers, the researchers concluded.

One of the project's original aims was to try and recreate the beer, and fortunately the team were able to produce enough data for a Finnish brewery to give it a try – albeit with a bit of guesswork and some artistic license. The result is a mild ale, quite complex with fruity flavors. Like those found on the wreck, bottles of '1843' – named after the year the ship is thought to have sunk – are sealed with a cork. (rk) ■


© Edag Group

LED It Shine — German engineering firm Edag developed a concept car with a fully bionically optimised, additively manufactured (3D-printed) vehicle structure. The 'Light Cocoon' focuses on lightweight construction and to this end takes inspiration from nature. The concept features an organic-looking, lattice-like passenger cage covered with a weatherproof textile outer skin panel, produced by outdoor specialists Jack Wolfskin. LED lighting technology installed behind the outer skin panel makes the vehicle's skeleton-like structure visible. The color of the outer skin can be changed at will, according to the driver's taste. Despite the fact that material has only been used in areas where it was necessary for function, safety and stiffness, all requirements imposed on structurally relevant components are met. (rk)

This issue of CHEManager International contains an insert of the TER Chemicals Distribution Group. We kindly ask you to pay attention.

Imprint

Publisher:
Wiley-VCH Verlag GmbH & Co. KGaA
GIT VERLAG
A Company of John Wiley & Sons, Inc.

Geschäftsführer
Dr. Jon Walmsley, Sabine Steinbach

Director
Roy Opie

Managing Editor
Dr. Michael Reubold (mr)
Tel.: +49 6201 606 745
michael.reubold@wiley.com

Editor in Chief
Dr. Ralf Kempf (rk)
Tel.: +49 6201 606 755
ralf.kempf@wiley.com

Editor
Dr. Roy Fox (rf)
Tel.: +49 6201 606 714
roy.fox@wiley.com

Media Consultants
Corinna Matz-Grund
Tel.: +49 6201 606 735
corinna.matz-grund@wiley.com

Thorsten Kritzer
Tel.: +49 6201 606 730
thorsten.kritzer@wiley.com

Jan Kaeppler
Tel.: +49 6201 606 522
jan.kaeppler@wiley.com

Roland Thomé
Tel.: +49 6201 606 757
roland.thome@wiley.com

Marion Schulz
Tel.: +49 6201 606 565
marion.schulz@wiley.com

Team Assistants
Bettina Wagenhals
Tel.: +49 6201 606 764
bettina.wagenhals@wiley.com

Jörg Stenger
Tel.: +49 6201 606 742
joerg.stenger@wiley.com

Freelancers
Dr. Sonja Andres
Dede Williams (dw)
Miranda Kennedy
Dr. Volker Oestreich
Sean Milmo (sm)
Björn Schuster

Production Managers
Christiane Potthast
Claudia Vogel (Advertising)
Ramona Kreimes (Litho)
Oliver Haja (Layout)

Reprints
Dr. Katja Habermüller
Tel.: +49 6201 606 719
katja-carola.habermueller@wiley.com

Subscription/Reader Service:
Silvia Amend
Fax: +49 6201 606 100
silvia.amend@wiley.com

Bank Account
Commerzbank AG Mannheim, Germany
Account No. 07 511 188 00,
Routing No. 670 800 50
BIC: DRESDEFF670
IBAN: DE94 6708 0050 0751 1188 00

The current price list is valid from 1st October 2014

CHEManager International appears 8 times in 2015.

Print run: 20,000
(IVW Report Q4 2014: 19472 tvA)
Eleventh year 2015
Subscriptions 2015
8 issues €87.00
incl. postage
single copy €43.50
plus postage

Students receive a discount of 50% upon presentation of a valid certificate. Subscription orders can be canceled within 1 week in writing. Dispatch complaints are possible only within 4 weeks after publishing date. Subscription cancellations are accepted 6 weeks before end of year.

Original Articles
Specially identified contributions are the responsibility of the author. Manuscripts should be addressed to the editorial office. Instructions for authors may be requested from the publishing company. We assume no liability for unsolicited, submitted manuscripts. Reproduction, including excerpts, is permitted only with the permission of the editorial office and with citation of the source. The publishing company is granted the exclusive, space and content restricted right to arbitrarily use the unmodified work/editorial contribution for all purposes for itself and for businesses that have an interest in the publishing company as defined by company law as well as to transfer the right of use to third parties. This right of use applies to both print and electronic media including the internet and data banks/data media of all types.

Printed by
DSW GmbH
Flomersheimer Straße 2-4
67071 Ludwigshafen

Printed in Germany
ISSN 1861-0404

GIT VERLAG
A Wiley Brand

Index