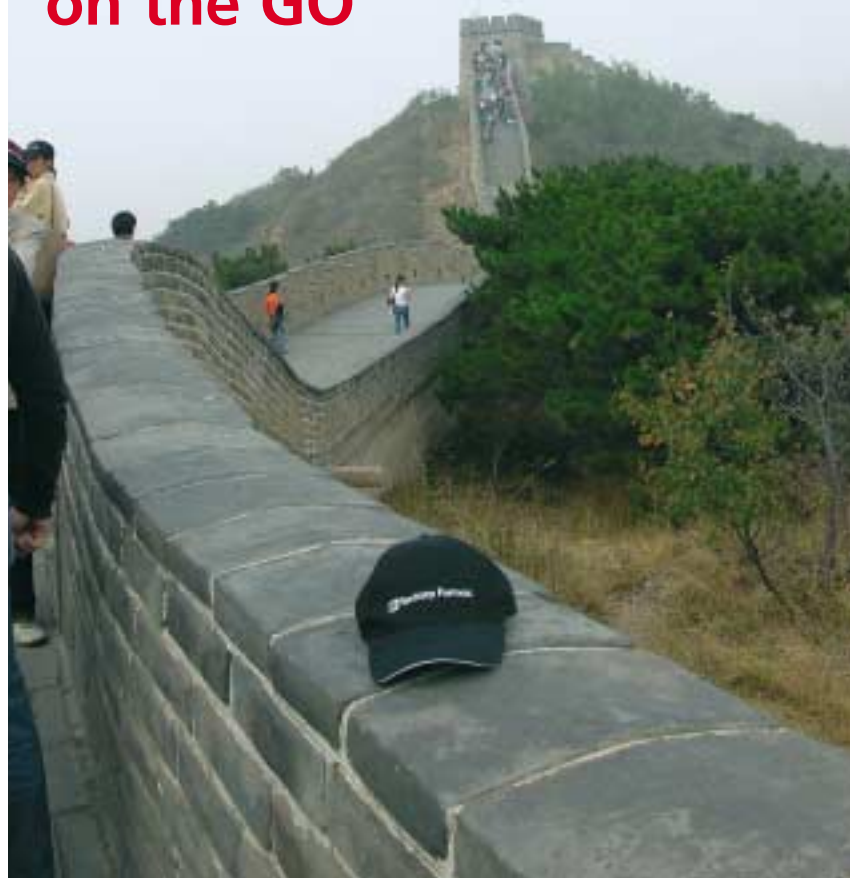


## China

SPECIAL FEATURE

on the GO



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## Growing with you

It's always a special occasion for us when a customer orders a plant. But when the same customer orders a *second* plant, there are two things that are extra gratifying. One is the obvious vote of confidence it represents. The other is the clear implication that the customer's business is prospering.

This issue of *informally speaking* places special focus on one of the world's truly great growth markets: China. I spent over two months there this autumn to gain a better understanding of what has become our biggest single market for plants (for catalyst it is still North America), and I feel I learned much more than any second-hand source of information could ever give.

As part of this China feature, Stan visited four growing customers, all of whom have now purchased at least two plants in China from us.

But this issue isn't only about China. You'll also find a number of interesting articles with ideas for boosting your plant performance and growing your profits.

You'll find an update and projection on the methanol market – and indirectly, further emphasis on the importance of plant and process efficiency.

There's also a report on a just-completed scientific study relating to the reclassification of formaldehyde, and the results appear to be leading in the direction of good news for all of us.

Finally, I would like to thank all of our customers for your confidence in us, and for making 2006 a truly memorable, record-breaking and busy year. We're always glad to see you grow your business. And we don't really mind growing with you.

*Mikael Ekblad*

Mikael Ekblad  
General Manager  
Perstorp Formox



# Talk about growth!

Remember the 80s? To most readers, perhaps, it may not seem that long ago. But who 20 years ago could have guessed that China would be regarded by many as the greatest economic powerhouse in the world today? It's high time to start believing. With an annual growth rate approaching 10% over the past five years, China is reinventing itself year by year – and totally changing the financial balance of the world in the process.

It has taken the entire history of the United States (almost the identical geographical size of China) to reach a population of 300 million. That is the amount by which China's population has grown in the past 20 years – from 1 billion to 1.3 billion! (The population is expected to peak in 2025-2030 at 1.4-1.5 billion, then start to decline – as the effect of China's "1-child policy" kicks in.)

Fortunately, China's economic growth rate is considerably higher than its population growth, and China has not only become a principal supplier to the world, but a major customer as well, making trade an ever freer and more open two-way superhighway.

## The big opening

It was China's former leader Deng Xiaoping who opened the window in 1979, by making personal private business possible for everyone, then opening up 14 "special development zones", e.g. Shenzhen, in the early 80s. Today China considers its markets to be fully open to the world.

In early opening stages, growth was slow, then sped up considerably from the mid-80s to the mid-90s. There was a brief "slowdown" (to a mere 7%!) during the so-called Asian financial crisis in the late 90s, but growth has returned to more than 9% since then. In fact, the government is currently considering certain measures to slow down the economy a bit – to prevent a "bubble", especially in housing – and to assure a "soft landing".

## Pragmatic approach

China's open system will probably continue – simply because it works in pragmatic China. The economy is therefore expected to continue to grow for another 20-30 years at a rather high rate – though perhaps not quite at the rate we say today. The biggest current challenge for



state-owned companies is to compete with the private sector – and with no guarantees of survival.

For the past 2 years, China has been one of the world's biggest oil-purchasing nations, and has a three-times-higher ratio of GDP growth to energy consumption. This entails a potential vulnerability, so the government is working to shift industry to a higher technology level, while lowering energy consumption. Failure to do so could have a major impact, since China does not have enough domestic oil production to meet its own needs.

One of the strategic, government-sponsored projects underway involves exploiting China's huge coal reserves to extract gas & oil (coal gasification). Other projects now being explored involve the use of alternative energy (e.g. biodiesel) sources.

### Focus on technology

One of the main drivers in China's transformation is the enormous focus on technology – building their own *and* bringing in the best available where needed. In this context, the chemical industry is a bit special, since it is considered a core industry for the country's vital interests. Chemical companies are still mainly state-owned – but must show profit, make their own investment decisions, and compete with each other. This is one of the features of China's so-called “market-adjusted planned economy”. (It is noteworthy that the Chinese government specifies a

minimum of 10 years' depreciation on plant investments.)

In the light of these developments, it is perhaps not surprising that China's formaldehyde industry is also changing rapidly. Though there are still many small producers (over 400 at the last count), there are some signs of rationalization, and several truly big-time players are gradually emerging, particularly to support the sophisticated downstream industry.

### Meet a few

Among these top players, this issue of *informally speaking* will be looking at four (located at the 4 sites marked on the map of China below) who have one thing in common: they all use Perstorp Formox technology – and not just in one plant or production line in China, but in at least two (some of which are currently under construction). The interviews appear in the order that the editor of *informally speaking* visited them in October.

The very first Perstorp Formox plant supplied to a client in China went on stream as recently as 1996. Today, the 12<sup>th</sup> plant for China has been ordered. These plants represent a combined capacity of about 1.5 million TPA, thereby already moving China into the number one spot in terms of annual capacity of Perstorp Formox plants to a single country. In just 10 years! Talk about growth!



# Stronger than ever

Nantong Jiangtian was featured in **informally speaking** precisely four years ago, in this publication's first-ever presentation of the Chinese formaldehyde market (see the autumn/winter 2002 issue). The company had purchased its first Perstorp Formox plant two years before (in 2000), and had just boosted the capacity of the plant by some 25% through pressurization.

At that time, few of the delegates of the Chinese Formaldehyde Producers' Association who visited the plant in connection with the conference held in Nantong were prepared to find that a formaldehyde plant could be so beautiful... In October this year, we visited Nantong Jiangtian again and spoke with General Manager **Cai Jianguo** and Plant Vice General Manager **Zhu Hui** to get an update on what's been happening since 2002.



Mr Cai

## You were growing in 2002. Are you still growing?

Mr Zhu: "We certainly are! In terms of turnover, we were at CNY 25 million [Editor's note: 100 Chinese Yuan Renminbi (CNY) ≈ US\$ 12.7] in 2001. Now we're at CNY 150 million for the current year. This translates to 600% over five years. We attribute this to strong demand for our product, and to the fact that we have good, loyal clients who are also expanding – forcing us to keep up."

## What about your future growth – and China's?

Mr Zhu: "China as a whole has been averaging nearly 10% per year for the past five years, which is extremely high in global terms. And I'm pleased to say that our company is on the high end of that – we're expecting to have grown 10-fold in the next 10 years!"

## Has anything changed in terms of environmental considerations?

Mr Zhu: "The Chinese government has had very clear and strict rules on emissions. And now new, harsher regulations are underway, following a recent explosion in a Chinese chemical plant. Even though the plant in ques-

tion was unrelated to formaldehyde, it is causing tightened regulations across the board, affecting all kinds of chemical plants.

"Fortunately, since we are already well within the limits set, we are not directly affected, but see this as a useful reminder to maintain diligence."

## How are you able to grow at a smooth pace when you're talking about increments of 200 TPD formaldehyde plants?

Mr Zhu: "One of the exceptional features of Perstorp Formox technology is flexibility. You're constantly developing your technology – and looking over your shoulder, making it possible to upgrade. We first added pressurization to our original plant, giving us 25% more capacity. Then we were able to add High Inlet without major modifications, giving us another 20%. These two upgrades have really helped us generate our growth."

## And now you've ordered plant #2. Why?

Mr Zhu: "A Perstorp Formox plant means a higher investment cost than some of the alternatives. But the return is even higher. There's the built-in flexibility. There's the



Nantong's first Perstorp Formox plant

great technical support. And the Perstorp Formox process produces much more steam, which is also a big advantage.

"If we look at what the value of steam means in figures, we've seen an increase from CNY 86/ton in 2001 to CNY 105/ton today, so it's becoming an increasingly important competitive advantage. The steam really adds value. And remember that our growth targets are pretty high...."

#### Have you had good cooperation with Perstorp Formox all along?

Mr. Cai: "Outstanding! Every problem gets solved – and there's never a problem with the teamwork! We really appreciate the close, friendly cooperation and dedication to solving every problem.

"We also appreciate the good plant, the good quality, and the continuous improvement. Our first Perstorp Formox plant – and the favorable publicity generated by the visit from all of the delegates of the Chinese Formaldehyde Producers' Association – helped build our company's reputation. Everyone got to see what a fantastic plant we have! And I think we inspired some Chinese producers by our good results and teamwork with Perstorp Formox."

#### As the editor of *informally speaking*, you place me in the same dilemma as four years ago. Who will believe I'm not making up all of the fine things you're saying about us?

Mr Cai: "If people don't believe it, just send them to me! I said in my interview with you four years ago that a Perstorp Formox plant works like a fully automatic camera. Six years' experience has proved it! Others are welcome to visit us – seeing is believing!" [Editor's note: Nantong Jiangtian has in fact served as a reference plant for Perstorp Formox on numerous occasions.]



A silver isolite plate commemorating the 100<sup>th</sup> Perstorp Formox plant sold was presented to Nantong in October. Here we see (left to right) Mr Zhu, Mikael Ekblad, Mr Cai and Zhao Dayang.



Nantong by night



Construction of the new 100-milestone plant was already well underway in October.

Facts about NANTONG JIANGTIAN CHEMICAL CO., LTD.	
Founded	1999
# of employees	Currently 87 (25 in 1999)
Perstorp Formox plants	First plant in 2000 (200 TPD/ 70,000 TPA), pressurized in 2002 (250 TPD), high inlet in 2004 (295 TPD). Second plant (the 100 <sup>th</sup> Perstorp Formox plant ordered!!) is scheduled for start-up in Q1 2007.
Total capacity	190,000 TPA (including the new plant)
Downstream products	Agricultural pesticides (pyridine), UF resins, pharmaceutical products, paraformaldehyde, additives
Other group business	The main business of the parent company is pesticides.
Location	Nantong, about 100 km northwest of Shanghai

# From coal to BDO

Located in the heart of China's vast coal-producing region, Shanxi Sanwei is far from the beaten track of tourists, but very important to the growing Chinese chemical industry. We met with Vice General Manager Mr **Sun Zijin** and Mr **Yang Xueying**, Vice Chairman of the Board, to look into the role Sanwei plays in the Chinese market today.

## What is your principal downstream product from formaldehyde?

"BDO [1,4-butanediol, mainly used in production of PU (polyurethane) and GBL ( $\gamma$ -butyrolactone)]. We are in fact China's leading producer of BDO, with an output of some 80,000 TPA, or 215 TPD, which accounts for 20-25% of the total Chinese market share. And the market is growing. China is still importing some 120,000 TPA of BDO, but we aim to close that gap considerably."

## Is that why you'll soon be starting up your second Perstorp Formox plant?

"That's one reason. Production of 80,000 TPA BDO needs 160,000 TPA HCHO. We only produce 80,000 TPA HCHO ourselves, so we have to purchase an additional 80,000 TPA from the market to meet the demand from BDO production. When our new Perstorp Formox plant goes on stream early next year [scheduled for February 2007], we'll be boosting our BDO production capacity by around 30%."

"Meanwhile, we'll also be able to resume some other core products like paraformaldehyde, pentaerythritol and re-dispersible powdered resin products that have been in great demand. However, we've been obliged to put them 'on hold' due to the necessity of pouring all of our HCHO capacity into BDO – and even that is not enough."

## So how are you coping?

"We've been forced to purchase extra HCHO externally, but the only available supply is 37% concentration, which is too low for BDO production. We need 45% concentration and high quality HCHO to produce BDO, so we have to mix the externally purchased HCHO with our HCHO in tanks, which we constantly test and regulate. Using lower concentration creates problems downstream!"

"The mixing step is a condition we have to live with for the time being, but only until our new HCHO plant goes on stream early next year."



Mr Sun

## You'll also soon be opening a BDO plant based on maleic anhydride. Why?

"This MA-based process enjoys the superiority of higher purity (99.95% vs. 99.5% produced today in our plant) that is needed to meet certain downstream customer demands, although it also entails significantly higher production costs. With the maturity of China's market and augmentation of capacity in the whole BDO industry, the competition will be even fiercer, and customers will prefer a high-quality BDO product, especially some high-tech clients such as PBT (polybutylene terephthalate) manufacturers. With BDO product from the Reppe process, it's very hard to meet their high quality requirements. So we'll continue to apply both paths – one for volume (low production costs), and one for purity (higher production costs, but higher product prices)."

"However, we can source MA at low cost thanks to local availability. The supply is currently much greater than the demand, and we're the biggest customer...."

"At the same time, we're working on modifications of our Reppe-based plant to further improve BDO quality, which, if successful, will make the Reppe process the path we'll go for."

"When our second Perstorp Formox plant and our new MA-based process are both on stream, we'll rank as the #3 in the world in BDO production, with a capacity of 180,000 TPA."

## You place a high value on steam, don't you?

"Yes, there's a very strong demand for steam in BDO production. The Perstorp Formox plant will generate plenty of steam, which is also one of its big advantages."



Sanwei's second Perstorp Formox plant (far right) is now under construction, next door to the first one (left). The sign above the road reads "Quality is the core of our business".



Left to right: BDO, PTMEG, THF, GBL and P3OH

We have very high steam consumption. We use steam to separate by-products that generate even higher value.”

#### What is Sanwei's position regarding the downstream products of BDO?

“There's THF [tetrahydrofuran], mainly used in pharmaceutical production, where the THF from our company has ranked #1 in the world in quality, with 99.995% purity.

“There's GBL, also used in the pharmaceutical industry as well as the chemical industry, where we're currently one of the best.

“Then we have PTMEG [polytetramethylene ether glycol], mainly used in spandex fiber production, where we are the 'super supplier' to the Chinese spandex industry – which happens to be the biggest supplier of spandex in the world. Today no one is better than us in quality in any of these three products. Tomorrow I'm confident that our products will be better than anyone through our unswerving efforts.”

#### You also have a couple of other downstream products?

“Yes, we also produce the by-products propargyl alcohol and butanol, which enjoy excellent market reputation and high profit.”

#### Do you produce only for the domestic Chinese market?

“In today's global market, it doesn't matter whether you produce for the domestic or overseas market. We also have received a number of enquiries from abroad to supply BDO and its downstream products, but we can't meet their requirement because we currently lack the capacity to deliver. Even the domestic market still can not be filled. But that's going to change once our new capacity BDO plant goes on stream. We're already preparing to meet export demands. By then, we won't be prioritizing the domestic market, but will be market-driven, going with the highest bidder.”

#### Why did you choose to invest in Perstorp Formox technology?

“The original decision in 2000 was based on market investigation and visits to different plants. We found Perstorp Formox to be the best; you had better performance figures and an established high reputation among other BDO producers.

“If we hadn't been happy with our decision, we wouldn't be building a second Perstorp Formox plant right now! And you have the best catalyst in the world.

“We're also very happy with the good cooperation we've had. You listen to feedback and solve any problems that arise.”



Mr Sun and Mr Yang at the company office complex.

#### Facts about SHANXI SANWEI GROUP CO., LTD.

Founded	1970
# of employees	4000 (10 of whom are in HCHO production)
Perstorp Formox plants	First plant in 2000, second plant (FS2.5 = 100,000 MTPA) scheduled to go on stream in February 2007.
Total capacity	190,000 TPA (including the new plant)
Downstream products	China's leading supplier of BDO (80,000 TPA), THF (15,000 TPA), PTMEG (15,000 TPA), GBL (10,000 TPA), PVA (80,000 TPA), PVAc White emulsion (35,000 TPA), Re-dispersible emulsion powder (25,000 TPA)
Other group business	Also involved in production and sales of 1,4-butyne diol, propargyl alcohol, food-grade sodium diacetate, ethyl acetate, butyl acetate, isopropyl acetate, dibutyl ester, Pentaerythritol, paraformaldehyde, urea aldehyde resin, packing steel drums.
Location	In Zhaocheng, Hongtong county, Linfen city, Shanxi Province, about 860 km southwest of Beijing

# A garden for growth

Probably the first thing that strikes a visitor to Ningbo Wanhua is the amazing tidiness of the entire complex. The HCHO plant manager Mr **Sun Kunpeng**, calls it “an industrial garden”, which is no exaggeration. As we stroll around, he automatically reacts to the single scrap of paper in sight by scooping it up and seeing that it’s properly disposed of. It quickly becomes obvious that this is a company that every employee is proud of. The general manager Mr **Liao Zengtai**, tells a bit about the company’s past, present and future.



## Ningbo Wanhua is very big in MDI (methylene diphenyl diisocyanate). Do you see a lot of growth here?

“Yes indeed. We’re currently the only Chinese player in the Chinese MDI market. However, a number of foreign players, as well as some foreign joint ventures, have started up in the past year or so. But even though there are more MDI players in China today, the total market is also much bigger.

“Our estimated turnover for 2006 is around CNY 2.6 billion, which is based on the current MDI capacity of 160,000 TPA. By 2010, we’re expecting to have reached a capacity of around 600,000 TPA.”

## That’s impressive! Will you be moving into any other areas?

“Once our new HCHO line goes on stream, we can achieve 500,000 TPA of MDI, as well as some BDO and paraformaldehyde. We have a very high focus on MDI expansion, with some very ambitious targets that we’re fully confident of reaching. Although we’re optimistic, we see these targets as completely realistic.”

## How do you account for your strong position?

“We feel that we have three main competitive advantages. Low cost – throughout the value chain – is one. Our strong service and technical support to our customers is

### Facts about

#### NINGBO WANHUA POLYURETHANES CO., LTD.

Founded	Yantai Wanhua in 1983 Ningbo Wanhua in 2003
# of employees	390 in Ningbo, some 1300 in the Group
Perstorp Formox plants	First plant (in Yantai) in 2002. Second plant (in Ningbo) in September 2005 (FFS3, 120,000 TPA, expandable to 240,000 TPA). That expansion is scheduled to go on stream late next summer.
Total capacity	180,000 TPA
Downstream products	MDI, paraformaldehyde
Other group business	Part of Yantai Wanhua (the parent company) Turnover: US\$500 million (half of which is from Ningbo)
Location	On Daxie Island, just outside Ningbo, which is on a peninsula about 200 km south of Shanghai. The Yantai plant is located in Yantai City in Shandong province.



The entire plant area is like a very well-kept park.

another. And then we have a well-balanced management approach.

“But we’re not satisfied. We’re putting in even more efforts to improve the MDI process itself, to reduce consumption of resources and utilities, and to cut costs at both ends.”

## Who are your customers, or where are your markets?

“Most of our product goes to our domestic Chinese market. The rest goes to different countries all over the world, so I guess you could say we have a global market.

“The growth in our market will come from increased sales, mostly to China. This is because the growth rate of the Chinese downstream industry is about three times higher than in the rest of the world.



Ningbo Wanhua is certainly world-class in tidiness! The spacious control room is just as tidy.

“Our downstream customers tend to be very different from each other, so there’s no clear profile, but we do see an increasing number of foreign joint ventures here as well.”

#### How do things look upstream?

“The methanol supply is what it is, and we have to live with it – like most other formaldehyde producers. So having an efficient process is also a competitive advantage.”

#### What has been the nature of your cooperation with Perstorp Formox?

“We chose Perstorp Formox after investigating different suppliers and technologies. The crucial factors were the much better process performance and the support approach, which has led to smooth, successful and happy cooperation. We get very good service – both comprehensive and long-term. And our start-up was smooth and successful.

“In our Group’s first project, in Yantai, the Perstorp Formox team was like a breath of fresh air – in addition to excellent teamwork and close cooperation, you taught us some good management skills. Your service concept is obviously steered entirely by customer demands. Your guys worked day and night to secure a smooth start-up

even in cold weather conditions. Your comprehensive, systematic approach to startup was very impressive!

“The second plant here in Ningbo went just as smoothly, as I’m sure the third will. We’re very grateful to our friends at Perstorp Formox. Your technology, which is the best in the world, has supported and inspired us to give the best possible benefit to our customers.”

#### How important are environmental issues for Ningbo Wanhua?

“There are both stricter governmental regulations and stricter implementation, but our ambition is to be much better than the requirements, to assure a better environment for the society we work in. We’ve already achieved this.

“Environment, health and safety issues are the concern of the whole company – every single employee. If we can’t do a good job on these issues, our company cannot grow!

“We’ve invested a lot in what’s called the ‘3 zeros’ safety system [= 0 accidents, 0 injuries, 0 discharge], and we’re working on the new comprehensive ISO and OHSAS certification.

“This can in fact also give us another competitive advantage. Some downstream clients – both Chinese and foreign joint ventures – ask about our environmental performance and visit us before signing any agreements.”

#### Are there any other messages you would like to pass along to the world’s formaldehyde producers?

“We see ourselves as having an important social responsibility, not purely company interests. Our vision is to be a responsible company towards society, a company that each and every employee can be proud of. I am very grateful to all the friends – domestic and overseas – who have helped us. I hope all chemical companies will do their best to contribute to the wonderful life of human beings in a safer, more environmental way.”



Mr Liao and Mr Sun at the huge new MDI plant.

The HCHO plant site is already prepared for the second line (right foreground of the plant).



# Growing with a mighty flow

Chengdu, China's third largest city (around 10 million), capital of the southern Sechzuan (Sichuan) province (famous for its tasty, spicy food), is the closest major airport to Shuifu, where the site of Yuntianhua is located. Chengdu is about a 2½-hour flight from Beijing. Shuifu is about a 4-hour drive (at breakneck speed) from Chengdu. Yuntianhua's other site is in Chongqing. Never heard of it? The greater municipality is alleged to have a population well in excess of 30 million, making it one of the largest cities on earth! Chongqing and Shuifu have more in common than being the sites of Yuntianhua. Shuifu straddles the mighty Yangtze River, Chongqing is along a tributary. The Chinese say that "the Great Wall is our backbone, the Yangtze is our blood."

In the space of 10 years, Yuntianhua has purchased three (3) Perstorp Formox plants, the third equal in capacity to the first two combined. We spoke with Vice General Manager **Chen Lin** about the company's amazing growth.



Mr Chen

## What are the reasons for your location in Shuifu and Chongqing?

"In Shuifu, we have a local supply of natural gas, plus a site right on the bank of the Yangtze, which gives us excellent transport and logistical convenience. We can produce 30,000 TPA of methanol from this local supply, which makes a nice complement to our total needs, but we still have to purchase methanol, since the local supply is tight.

"Our site in Chongqing is also close to the river, and it's a bigger site, with more room to grow and expand. Plus we've already had major production of glass fiber there for some years."

## What is the main business of Yunnan Yuntianhua Co., Ltd?

"We have been working in two main areas: fertilizers and construction material (glass fiber). A third main area – fine

*The formaldehyde producer's dream? Two Perstorp Formox plants (left and right) flanking the company's own MeOH plant (center).*



chemicals, particularly POM [polyoxymethylene] – will soon be joining the ranks of our main product areas, once our new plant in Chongqing goes on stream early next year.

“Looking to the future, we expect glass fiber to grow and become equal to fertilizer. Fine chemicals will also have a high growth rate, but will probably remain at a lower percentage of our total business.”

### What kind of growth rate are we talking about?

“We had a turnover of CNY 1 billion in 1995. Today we’re at 4 billion. And our growth this year is 30%, thanks to some new plants now in operation. We’re fully expecting that level of growth when the new formaldehyde and POM plants in Chongqing are up and running next year.

“We’re always looking for new development and growth, and we aim for at least 10% annual growth. So far, this has been fully achievable.”

### Where is your market for POM?

“Our main customers are in the south and east of China, which gives us an advantage of being able to use the river for a lot of our transport. We expect China’s rapidly growing automotive industry to be the main customer for POM – and we aim to be the main supplier!

“A lot of POM is currently being imported, and there’s strong competition from foreign investment. Right now, we’re the only Chinese-owned producer, but we feel we’ve got a number of key strengths: lower production costs, good service and continuous improvement in service and quality.

“Up to now we’ve mostly been producing general-purpose POM. But many downstream products of POM are special formulations. We’ll soon be producing those.

“We foresee some growth in export volumes, but not necessarily in proportion to our total production. Glass fiber, penta and POM are exported, but fertilizer is largely for domestic use, since fertilizer is classed by the government as a strategic product, which means that export is discouraged.”

### What made you choose Perstorp Formox technology for your formaldehyde production?

“For the first project [in 1996] we conducted a comparative study and found that you had the most advanced process and the most experience. For the second and third projects, we could rely on our own good experience.

“We’ve had excellent cooperation and teamwork with you. [The start-up phase of Yuntianhua’s 2<sup>nd</sup> plant was completed in a record-breaking 3 weeks!] And we also appreciate your impressive skill, high level of technical support and continuous development – which has been very noticeable from pro-



*The mighty Yangtze river flows right along the plant site.*

ject to project – and the fact that you pass on the benefits to your customers. Which we can then do to ours.

“We hope you will continue along this road, and that our close cooperation will become even closer!”

### What are your views on environmental and safety issues?

“The environment is very important! Our plant in Shuifu is very close to residential areas, right on the bank of the Yangtze River. We’ve installed in-line monitoring on many critical production points, and the local authorities make regular checks, 2-3 times a year. Plus they have immediate access to our figures.

“Regarding the reclassification of HCHO to carcinogenic, we kind of see this as a non-issue. We’ve always understood the potential hazards of formaldehyde and handled it accordingly, so reclassification hasn’t changed our already high level of safety precautions.”

#### Facts about YUNTIANHUA GROUP CO., LTD.

Founded	In 1974
# of employees	About 1000 in 1974, today over 5600
Perstorp Formox plants	1 <sup>st</sup> in 1996, 2 <sup>nd</sup> in 2004, 3 <sup>rd</sup> scheduled for early 2007
Total capacity	Soon to be 400,000 TPA (the new 3 <sup>rd</sup> plant will have a capacity equal to the first two plants combined)
Downstream products	POM and penta
Other group business	Ammonia, urea, ammonium nitrate, fertilizer and glass fiber.
Locations	Plants 1 & 2 in Shuifu, plant 3 in Chongqing, both along the Yangtze River system.



## Meet the Perstorp Formox representatives in China!

Perstorp Formox has had its own office in Beijing since early 2003. At that time it was manned solely by **Zhao Dayang**, who had already been working with Perstorp Formox for more than 4 years. Today we have a full-time staff of three people – backed by our technical support team in Sweden, of course. Dayang provides some insights and advice:

“Working out of our new office in Beijing, our tasks include developing the market, giving customer support in the form of daily technical support, after-sales service and catalyst supply. We also provide project execution support and serve as a liaison with Perstorp Formox in Sweden. And we are responsible for publishing the Chinese version of *informally speaking*.”

“Our ambition is that someone from our Beijing office will visit each customer at regular intervals every year. And when any Chinese customer has a question or a problem, they should always contact us in

Beijing first. Then we contact Sweden when needed. In principle, we’re available nearly 24/7. In fact, my phone is only off during flights!

“I’d like to take this opportunity to encourage all of our clients to be frank! We certainly value our close friendship with each client, but that should never prevent anyone from telling us face to face if something needs improvement. The fact is, we really want to be better and better, to give each client the highest possible support and care that lead to a higher level of customer satisfaction!

“I’m very glad to have a couple of great people on my team now. **Cao Ping** handles a great deal of our commercial transactions and credit sales. Ping also assists in contract negotiations, and serves as our coordinator and office administrator, helping to make everything run smoothly.

“**Zhang Chenggang**, the newest member of our team, is mainly involved in technical support, solving technical problems and providing

project execution assistance. With Chenggang’s excellent educational background in chemical engineering, complemented by focused training from Perstorp Formox in Sweden (and with more to come), he’s a valuable resource for us and our clients.

“Finally, I’d like to say that I hope more of our Chinese clients will attend the Perstorp Formox seminars. It’s always good to meet other players in the global formaldehyde industry. There’s nothing like direct contact – it can add value to your business, plus you get so much good technical and market information. And bear in mind that our people from the Beijing office will attend to overcome the language barrier!”

### New trading company

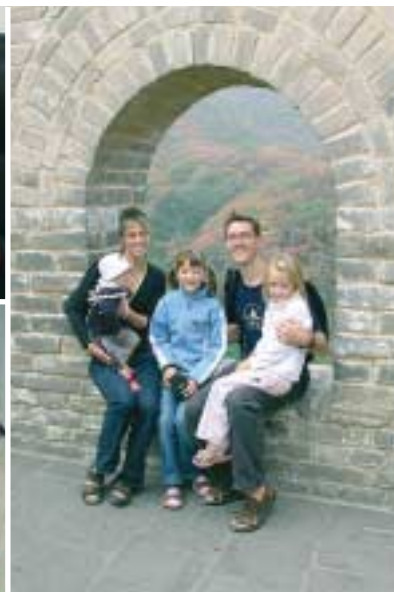
Perstorp Formox has also started a trading company in China in order to be able to utilize the services of a number of approved local suppliers, thereby cutting delivery times and freight costs for our Chinese customers.

## Mikael in China

In just a few short years China has emerged as a major market for Perstorp Formox; indeed, with so many new ongoing projects it’s the largest single market!

In many ways, the Chinese formaldehyde market is quite different from all others: a large installed base of small, old plants combined with a roaring economy, coupled with foreign trade policies that have changed radically and dramatically in recent years. All of these factors give rise to apparent contradictions and urgent questions. So Mikael Ekblad, the General Manager of Perstorp Formox, spent more than two months in China this autumn – together with his family – to learn more, to meet our customers and to discover new approaches that would enable Perstorp Formox to better meet the needs of this rapidly changing sector.

*At the office in Beijing; visiting a customer; with family at the Great Wall*



# Methanol market update

The following update was kindly provided by **Paul Daoust** of Methanex in early November.



Over the past few years, strong global methanol demand led by robust growth in Asia Pacific has combined with limited new methanol supply capacity additions and shut-down of high-cost capacity to result in a balanced-to-tight market and the draw-down of industry inventories to uncomfortably low levels.

The current methanol industry environment is becoming more challenging, with demand outstripping supply and pulling inventory levels down to critical levels. In 2005, the US passed new energy legislation (EPACT 2005), which contains provisions to waive the federal oxygenate standard for gasoline effective May 2006 and did not provide US MTBE producers and blenders with defective product liability protection. As a result, many such producers and blenders began shutting down production. The net impact of the MTBE reduced production in North America was a loss of approximately 1.5 million MTPA on an annualized basis. However, during 2006 the methanol market has remained firm as the lost MTBE demand has been offset by reduced methanol production (due to rising energy costs & supply disruptions) and continued global demand growth.

During 2006 we saw the shut-down of methanol capacity at various locations due to high energy prices, with significant shutdown announcements including Methanor (Netherlands) and the announced shutdown of Celanese's unit in Canada by year end. Additional capacity has not been forthcoming during 2006, apart from some small debottlenecks. Also, the expected start-up of various projects (e.g. Iran's NPC4, the Togliatti plant in Russia, and the

Hainan Island plant in China) have experience delays and we believe that most of these plants will not have commercial product available until 2007.

Entering the 3Q of this year, we noted that inventory levels were well below industry target levels and that a number of planned outages would keep the industry balanced to tight over the second half of the year. The combination of a number of unplanned, serious outages during the quarter (and below normal inventory levels) resulted in multiple producers declaring Force Majeure and a steep rise in contract price to the current levels > \$US 500/MT. In some cases, consumers could not get methanol and were forced to reduce rates, and in a couple of instances had to declare Force Majeure to their customers. As we head into 4Q, we believe that global inventory levels are approximately 1.5 million MTPA below normal levels and an extended period of high operating rates will be required to balance supply and demand.

Another growing industry trend is the use of methanol for energy applications. There is increasing interest, due to persistently high energy prices, to use methanol in energy applications such as blending in fuels and the production of Dimethyl Ether (DME). There has been progress on several projects in various regions of the world for fuel blending and DME projects, and we expect to see new non-traditional demand for these energy applications during 2007.

In summary, we believe that global inventories are well below normal levels and the industry will need an extended period of high operating rates to balance supply and demand. Although new production capacity will provide some much-needed relief in 2007, we expect that continuation of strong demand growth (especially in new energy applications) and further industry restructuring will offset a significant portion of this new capacity. We believe that supply/demand fundamentals will be balanced-to-tight during 2007 and that this type of environment is conducive to above-average methanol prices which will be underpinned by global energy prices.

**Methanex Disclaimer:** This article contains forward-looking statements which, by their nature, involve risks and uncertainties that could cause actual results to differ materially from those contemplated. Please see the Methanex Corporation 2005 Annual Report for more information.

*The Methanex plants in Trinidad (left) and Chile*



Photos courtesy of Methanex

# Reclassification update

In the previous issue of **informally speaking** (spring/summer 2006), **Dr. Detlev Clajus** of FormaCare (see box) promised to update us on the results of the latest scientific studies relating to formaldehyde safety – and the reclassification of HCHO by the NCI/IARC in 2004. He has, and the results that have come in since then point to good news for formaldehyde producers – and for the general public, in view of the fact that although formaldehyde must always be treated with the greatest caution, it is an irreplaceable building block for so many vital products that are part of our daily lives.



One of the major studies everyone has been waiting for is the just-released (in October) comprehensive study\* published by Hans-Olov Adami (of Karolinska Institutet in Stockholm, Harvard University and the National University of Singapore) and Ellen T. Chang (of the Northern California Cancer Center and Stanford University). Nasopharyngeal carcinoma (NPC) is a rare form of cancer – and the only one ever alleged to be associated with formaldehyde.

## Rare in most places

The study included “a thorough review of the literature related to the etiology of NPC..., starting with a Medline search from 1966 onward.” It was found that “NPC is a rare malignancy throughout most of the world, ...[but] endemic in a few well-defined populations” like Hong Kong and the Cantonese population of Southern China, and in native populations in the Arctic, North Africa and the Middle East.

The major risk factors for NPC were identified as the Epstein-Barr virus (EBV), which is particularly rampant in South East Asia and parts of China; frequent eating of salt-preserved fish, also common in these regions; as well as tobacco and other smoke. A high consumption of fresh fruits and vegetables (which incidentally contain formaldehyde naturally) is thought to help *prevent* NPC!

## What about HCHO?

According to the Adami-Chang study, the risk of NPC due to HCHO exposure “is supported by experimental observations in rodents, but epidemiological evidence in humans is limited, ...[and] most case-controlled studies in high- and low-incidence areas, as well as occupational cohort studies in nonendemic areas found no significant association of formaldehyde exposure to overall NPC risk.”

In fact, the only documented cases of NPC that have ever pointed to a possible link between HCHO and NPC were from a single plant in Connecticut more than half a

## About FormaCare

As a sector group of Cefic (the European Chemical Industry Council), FormaCare aims to promote the sustainable use of formaldehyde and formaldehyde-based products among its European members and their customers, with due regard to health and environmental care. FormaCare strongly believes in formaldehyde as a safe and widely used chemical that society benefits from in a great variety of everyday products. FormaCare advocates a regulatory policy based on balanced scientific evaluation. Creating an open and effective dialogue with both European and national authorities and downstream users is therefore one of FormaCare's key goals.

FormaCare supports and drives various scientific studies relating to formaldehyde, including a recent reanalysis of the Hauptmann NCI study. The results obtained by Prof. G. Marsh, Dr. P. Morfeld and Dr. A. Younk did not support NCI's suggestion of a causal relationship between HCHO exposure and NPC, indicating that decision of the IARC working group to reclassify formaldehyde needs to be reconsidered.

FormaCare will also be teaming up with European trade unions, policymakers and industry in a series of events to gain an inside look at safety in the workplace, while examining the important role formaldehyde plays in employing more than 4 million Europeans.

FormaCare cooperates closely with its North American counterpart, the Formaldehyde Council Inc. (FCI). For further information about the studies mentioned here, the role of formaldehyde and the activities of FormaCare, readers of **informally speaking** are advised to visit [www.formacare.org](http://www.formacare.org) as well as FCI ([www.formaldehyde.org](http://www.formaldehyde.org)).

century ago, where “occupational or nonoccupational exposures other than formaldehyde may have been responsible for excess of NPC mortality among the workers in Connecticut.”

## What conclusion?

In summary, the authors place formaldehyde in the weakest association category (weak to moderate) as an NPC risk factor, also ranking it as “inconsistent” with association. “Currently, the most feasible means of lowering one's risk of NPC seems to be dietary modification, especially reduced consumption of ... salt-preserved fish, and perhaps increased intake of fresh fruits and vegetables.” And you might want to quit smoking!

\*All quotes in this article refer to “The Enigmatic Epidemiology of Nasopharyngeal Carcinoma”, published in *Cancer Epidemiol Biomarkers Prev* 2006, 15(10), October 2006.



Eat more fruits & vegetables!  
Forget about smoking!  
Work safely in your HCHO plant!

## Making a clean drum of it

As anyone with ISO 14001 certification knows, constant improvement of one's environmental performance is a fundamental principle. Such performance is not only about emissions, but also about how we utilize natural resources. The basic principle is this: If you can't renew it, then reuse it. If you can't reuse it, then recycle it.

In the light of this principle (and our life-cycle commitment to reprocessing spent catalyst), we've been looking into ways of improving the handling of our catalyst and inerts in those plastic drums that are so familiar to most of you. Plastic comes from non-renewable sources, so there's nothing feasible to do about that. But what about reusing them?

This is precisely what we set out to investigate. We found that most of the drums coming back to us from our customers are still in very good shape. But they need washing. So we see that drums are cleaned to assure that no foreign substances remain of, then use the drums again, for shipping inerts. All drums that are damaged go to recycling.

As a result, you may find that some of the inert drums you get from us look like they've been used before. They probably have. But they still serve their purpose 100% – and help reduce the impact all of us make on the environment. That sounds pretty win-win to us!

### The life of a plastic drum

1. A new drum is filled with fresh catalyst.
2. The customer empties the drum.
3. The customer fills the drum with spent catalyst.
4. We empty the drum in our spent catalyst line.
5. The empty drums are inspected and sorted (for washing/reuse or recycling).
6. Washed (and dried!) drums are filled with the customer's inerts.
7. The customer empties the drum with inerts.
8. Back to step 3.



## You can cut your power costs

The price of electricity, like that of methanol, is firmly linked to the oil and gas prices – and most commentators are predicting an increasing trend over the long term, albeit from different base levels, depending on your location. In some parts of the world, the unit cost of electricity can be as low as € 0.02/kWh, but in most countries the cost is at least € 0.06/kWh. (The power cost in Sweden has increased more than 50% during the past year, and is now almost 3 times higher than 5 years ago.)

So what can we do? Luckily, power costs account for at most 5% of the variable cost of producing formaldehyde. Even so, a penny saved is a penny earned... (or to put it another way, you don't get rich just on a high income, but on low expenditure).

To save power, you should operate your plant at as high methanol inlet as possible and with as little process gas flow as you can get away with. The specific power consumption is reduced by 10-15% when operating at 10% methanol inlet, compared to 8.5%. If you don't need the additional production capacity that the higher inlet results in, you can either run continuously at a reduced process gas flow rate (if you can control the airflow using, for example, frequency converters)

or operate at full rate on a campaign basis. A reduction in process gas will give additional savings – operating at 70% of normal gas flow, you will reduce the specific power consumption to 70%.

There are also many small things (maintenance activities etc) that might reduce your power consumption. How often do you check the condition of your equipment? Scaling (on the water side) and paraformaldehyde in heat exchangers, absorbers, silencers etc can increase the pressure drop by several millibars. This might seem inconsequential, but it can mean a substantial cost in the long run. The inspection and cleaning activities necessary to overcome such problems can be undertaken during a catalyst reloading and will be paid off very quickly. A real example is the paraformaldehyde we found in the recycle blower silencer in one of our own formaldehyde plants in Perstorp, Sweden. The design of this particular silencer was not optimized for formaldehyde application and had to be modified to prevent further para formation, thus enabling us to decrease power costs.

Even in a world where the greatest proportion of your plant cost is governed by the price of one commodity that you can't control – methanol – it continues to make sense to attend to everything that you *can* influence. To summarize, rank the things that most affect your utilization of electricity: methanol inlet concentration, process gas flow, and miscellaneous resistances in your fluid systems. Give these things your attention, and whether you're producing 50 tonnes per day or 500, that's the figure by which you can multiply your reward!



# The high price of low performance or, Don't fool yourself...

Methanol prices have been rising dramatically, to above €400/T. Molybdenum prices are slightly lower than last year, but remain high. Energy prices are up. All this means that the cost of producing HCHO is increasing, and this is beyond our control. But we can do a lot to control the performance of our plants – and save big money!

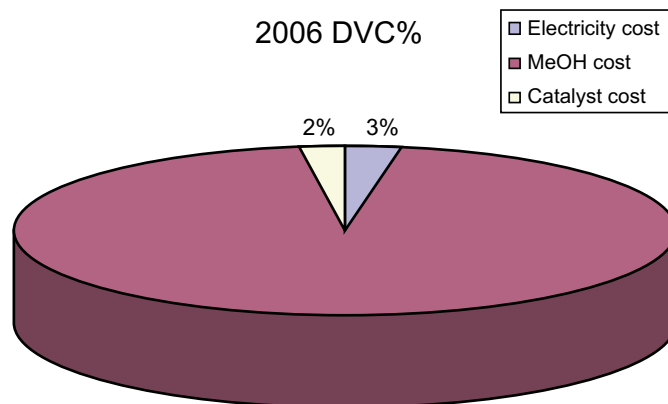
As a catalyst load ages, yield typically decreases and power consumption goes up. In our experience, a yield of 92.5% is typical for the first 22 tons of specific production, then drops to 91.5% for the next two tons, and to only 90.5% for SP tons 24-26.

Formaldehyde producers tend to address this in either of two ways:

1. A *low investment cost* has top priority, so the *longest catalyst lifetime* equals the best performance. By prolonging the catalyst lifetime from SP 22 to SP 26, you save ~€ 0.3 /ton of produced HCHO on lower catalyst cost. Producing 100,000 TPA saves you € 28,000.
2. The focus is on *low overall cost* to your company, so the *best yield* equals the best performance. By reloading already at SP 22 instead of at SP 26, the average MeOH cost per ton of produced HCHO is about € 0.43 lower. If you produce 100,000 T per year, this means a yearly savings of € 43,000.

Specific production	Added ave. MeOH cost, €/ton 37% HCHO	Savings in ave. catalyst cost, €/ton 37% HCHO	Yearly savings/loss for a 100,000 TPA 37% HCHO plant, €
SP 22	0	0	0
SP 24	0.16	0.15	-1000
SP 26	0.43	0.28	- 15 000

2006 DVC%



Which approach is best for your company? You might want to start by asking yourself whether it's better to save more money on methanol and spend some of it on catalyst than to save on catalyst but spend quite a bit more than the savings on methanol? In other words, are you really sure you want to prolong the catalyst lifetime beyond good yield so that you end up losing more money on the methanol than what you save on catalyst?

With Perstorp Formox's "Time To Reload" spreadsheet – available free of charge from your Perstorp Formox representative – the average DVC can be calculated as a function of the specific production. The input to the spreadsheet is your real and projected data for consumable prices, consumption figures and reloading costs. Please contact your Perstorp Formox representative, and we'll be pleased to help optimize your performance and discuss the most economical lifetime of your load!



## Send us your data!

If you're a Perstorp Formox customer, you're invited, encouraged and advised (all three!) to send us your process data on a regular basis. This enables us to give you feedback on how to adjust your operating parameters to achieve the best possible performance from your plant as well as your catalyst. It also enables us to serve you better.

You have a lot to gain and nothing to lose. Looking at your data through the eyes of our unique technical know-how and experience, we may be able to provide advice that will improve your yield, prolong your catalyst lifetime, boost your product quality, cut your energy costs and reduce your maintenance requirements.

The review of and commenting on your process data is part of Perstorp Formox technical support – it's included in our scope. Many of our customers utilize this service regularly – including some who have long experience of their own, but who want a "second opinion". It should be noted that all information provided by a Perstorp Formox customer (including

any other non-public information from the customer) is treated with the strictest confidentiality.

We base our answers on the combined know-how we have acquired over decades of designing, supplying and running our own plants, as well as processing data from hundreds of customer plants, including those designed by others. All data are fed into our software application Perstorp Formox Process Control, where we can analyze it, compare trends and generate reports.

We provide report templates (paper or spreadsheet), or you can submit your own spreadsheets/charts. We suggest compiling data for each week of operation. If you're experiencing any problems or have questions, you can send us your reports weekly. Otherwise, it's enough to send your weekly reports to your Perstorp Formox Representative once a month.

We'll reply in a format agreed upon with you, the one that's easiest for you to use: email or fax, with or without graphs. The report can be sent to you personally, and/or to anyone else you designate, e.g. your shift foreman.

By the way, this service is free of charge! So how can you afford not to use it?



# Don't burn your candle at both ends!

Candles should burn from the top downwards. The same goes for your catalyst! This article is about how to ramp up faster.

When operating with a mixed layer or the extension of the mixed layer (CAP), the HTF (heat transfer fluid) temperature ramp is different compared to operating a load with only pure catalyst. You need to ramp up faster in the beginning.

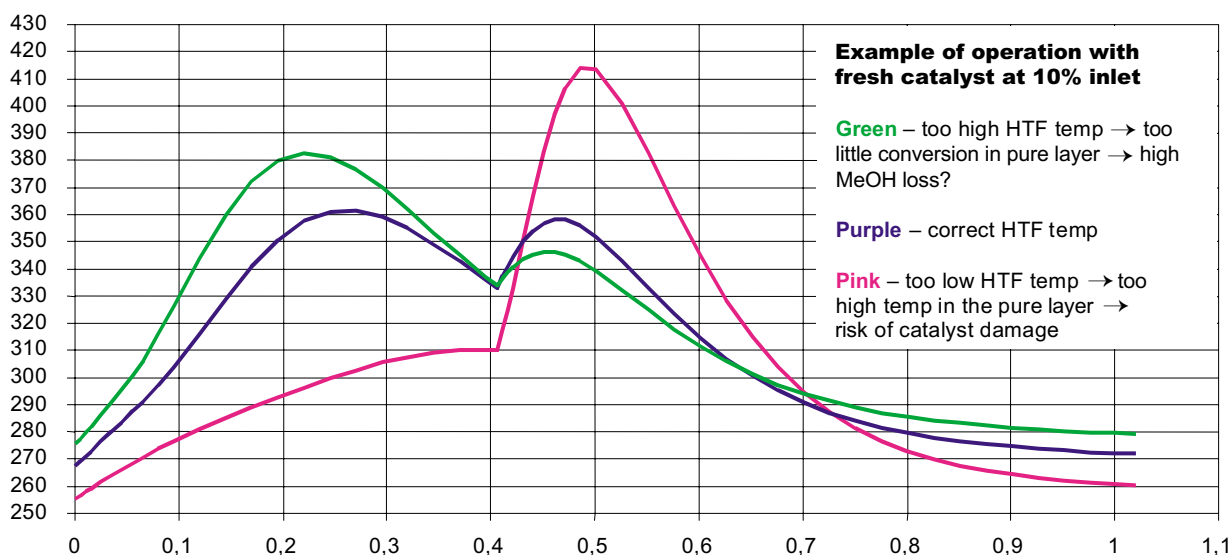
Ramping up too slowly results in problems later in the run. Since the catalyst in the top has not been fully utilized, hotspot positions will jump back up into the mix layer when the HTF temperature is increased later in the run, and this will result in high CO formation and poor yield.

Ramping up too slowly also results in problems with fresh catalyst. Too low temperature in the mix layer will result in too low conversion of the methanol, and with too much methanol entering the pure layer the tempera-

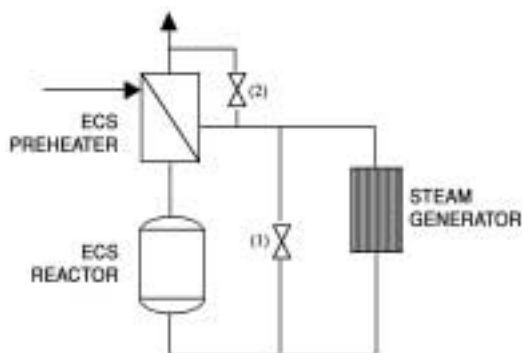
ture will be too high, thus risking damage/sintering the catalyst in the pure layer.

Too high HTF temperature may damage your catalyst and shorten the catalyst lifetime. And, as explained above, the same goes when the HTF temperature is too low, so it's essential to monitor the performance and follow the development of the hotspot temperatures and positions.

Please contact your Perstorp Formox representative for a recommended HTF ramp and loading profile for your plant, or for comments on your current HTF and hotspot temperatures and positions.



## High temperatures in your ECS?



### Have you checked that...

...the bypass valve (1) over the steam generator unit is fully closed?

...the plant yield is OK?

...the oxygen analyzers have been calibrated recently?

...the process gas and methanol flow rates are correct?

...the bypass valve (2) over the ECS preheater is fully open?

### Consider this!

Could there be leakage past the bypass valve?

A high  $\Delta T$  over the ECS reactor can indicate poor yield.

A low oxygen content after the recycle blower results in more concentrated VOC gases being delivered to the ECS; operating with ~1 vol.% lower oxygen content will result in ~20°C higher  $\Delta T$ .

A higher methanol inlet results in higher  $\Delta T$  over the ECS reactor; operating with 10 rather than 8.5 vol.% methanol results in ~20° higher  $\Delta T$ .

Plants without the bypass over the preheater can be retrofitted. Some plants that already have a bypass and have also have increased production rates, might need to fine-tune the bypass function; contact your Perstorp Formox representative for more information.



## Projects & Start-ups

# 1,200,000 TPA of **NEW** formaldehyde capacity!!

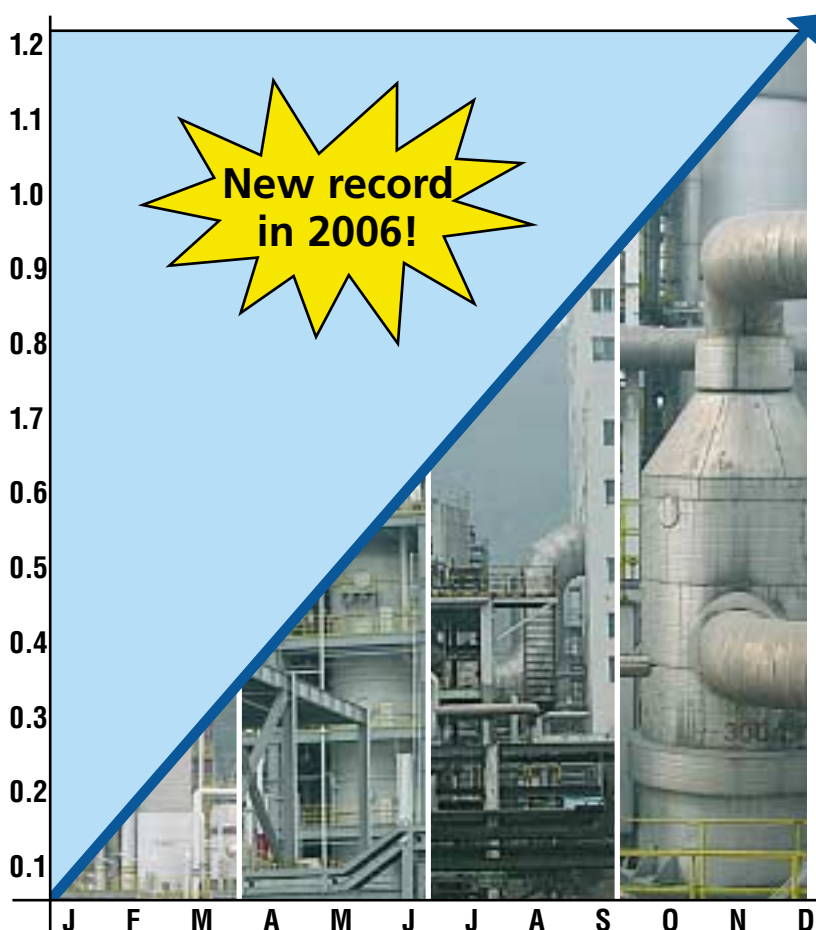
At the Vancouver conference (Formaldehyde Americas 2005), Bob Crichton remarked that "...average capacity utilization is now 70% – at which we would normally expect to see an increase in the number of plant inquiries." We certainly did! During 2006, Perstorp Formox has sold plants whose total capacity is 1.2 million TPA. That amount is about 20% of the total plant capacity we sold over the previous 25 years – combined! Excuse us for finding this quite astounding ourselves!

### New Projects

Apart from the four new projects announced in the last issue of *informally speaking*, Perstorp Formox has been awarded another five that are now in the pipeline:

- **Yunnan Yuntianhua** came in with their third order for a Perstorp Formox plant, an FT3 (720 TPD), to be built at their new site Changshou outside Chongqing, China. The deal was signed in June, and the project is scheduled for completion in early 2008. See the article on Yuntianhua, pages 10-11.

- **Lucite International Singapore** ordered their first formaldehyde plant (and our first in Singapore!), to be erected in Jurong Island, where it will supply the new MMA (methyl methacrylate) plant based on Lucite's proprietary Alpha Technology.
- **Faplac S.A.** has ordered the first plant using Perstorp Formox technology to be erected in Argentina. Based on our FS1 (160 TPD) size, the plant is being designed to produce both UFC and formaldehyde, and will be built in the City of Puerto San Martin. Slated to go onstream Q4 2007.
- **S.K. Petrochemical** has signed for an FS2.5 (300 TPD) size plant for the supply of formaldehyde to their BDO-plant in South Korea, and we are honoured that yet another country joins the ranks of formaldehyde producers utilizing Perstorp Formox technology.
- Last but not least, **Ningbo Wanhua** will expand their existing plant with a new reactor line, bringing their capacity up to 720 TPD (FT3-size). Read more about Ningbo Wanhua on pages 8-9.



### Ongoing Projects

These projects currently include:

- The FT3 UFC plant for **Togliattiazot** in Togliatti Russia is now under construction, as is the other Russian project outside Moscow. In other words, both projects are running as planned, with start-up expected during for the first part of next year.
- Our project for **Kuraray**, Japan, is now underway, as is the FS1 project for **Nafta Petrochem** in Lendava, Slovenia.
- Three (3!) other projects in China – for **Nantong Jiangtian Chemical Co. Ltd** (see pages 4-5), **Shanxi Sanwei Group** (see pages 6-7) and **Xinjiang Markor Chemical Industry** (dual reactor) in Korla – are all making good progress.

### Revamps

We're currently all caught up on our revamp projects. If you haven't yet revamped and are looking for extra capacity out of your existing plant, don't hesitate to contact your Perstorp Formox representative!

# Reppe rides again

by Bob Crichton

In an article called "Reppe's Last Stand" [see the spring/summer 2001 issue of *informally speaking*, page 15, as well as the box below], we learned that formaldehyde and acetylene were no longer the materials of choice for 1,4-butyndiol production. But the article concluded that "supply is projected to outstrip demand for some time to come, and the once-powerful Reppe method is being left behind. Within the next year or two, only half the capacity will use this method.... But who knows, when the oil runs out we may yet have to return to Reppe's methods!"

Though oil has not run out, it certainly is getting more expensive. In June this year, Viktor Khristenko, the Russian energy minister, was quoted in the *Financial Times* as saying: "Forecasting is a thankless task in hydrocarbons, but one can say with certainly that the era of cheap hydrocarbons is over...."

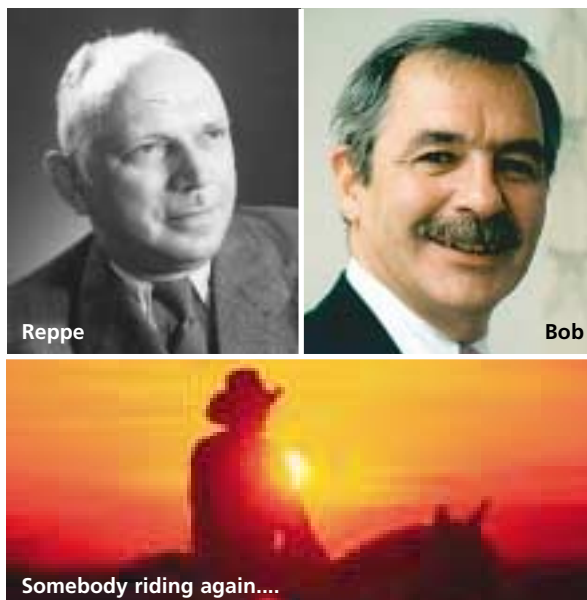
But can we be so certain that this is the case? The same sentiments were expressed in 1973/4 when the price of oil doubled, and once more in 1979/80 when it doubled again. I was a young engineer then, with a broad remit to look at other routes to synthetic fibres and plastics. The project involved not only other fossil fuels – coal, shale and tar sands – but also renewable resources such as wood.

It was an interesting time and, for what it is worth, the conclusion of the study was that oil was too valuable to burn – that it should be conserved for petrochemical use and other means developed for power generation and motive power. The key here was the aromatics in the crude oil. These compounds (benzene, toluene etc.) are crucial for many modern materials. They cannot readily be synthesized and though they can be extracted from coal, the mixtures are complex and difficult to separate.

But, of course, nothing very much happened; we went on burning valuable chemical feedstock in our automobiles and our power stations. Eventually, coal mines closed in Western Europe, so indigenous coal was no longer an option for many of us. We saw power generation switching to gas – gas is greener. And we all know what happened to gas prices as a result.

I suppose we have seen an increase in heavy oil conversion within the oil industry. But this has not gone as far as it might; refinery returns were not high enough to encourage investment. And a lack of refinery capacity has certainly contributed to high gasoline prices.

Indeed, it is the supply side that is the difference between now and the 1970s and 80s. Back then, oil supply was artificially restricted to raise prices; producers could simply increase supply and prices would drop. And this is what happened. In reality, the price of oil today in real terms is no more than it was in 1980/81. But today's supplies are already stretched and are likely to remain so; the consensus is that this time around prices



will continue to rise. [And China – see elsewhere in this issue – has played a part.]

What lessons can we learn? Are we all going to drive cars fuelled with biomass ethanol or diesel? Somehow I doubt it. It would require over 70% of the farmland in the US just to meet that nation's demand for gasoline. There were similar arguments in the 70's – for example, use wool rather than synthetic fibres – but it would have required an area larger than the former Soviet Union to graze enough sheep.

In practice, wool's market share did increase, as did that of other natural materials, leading to the establishment of a new equilibrium. And that is what we can expect to see in the future: a mix of technologies old and new, using a variety of raw materials – evolution rather than revolution – a broad range of solutions to generate power and fuel automobiles.

The re-emergence of natural products in the 70s is often viewed as a reaction against the extremes of the 60s. In the future, new fuels will be portrayed as products of the "green revolution". In truth, economics is the driver and progress is dependent more on energy prices than global warming.

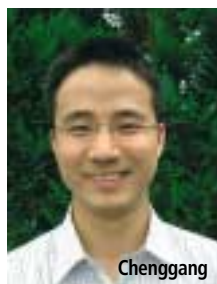
But what about formaldehyde's future role; will Reppe truly ride again? In parts of China, acetylene produced from calcium carbide is the basis of a number of 1,4-butyndiol projects. But this is not a global solution; acetylene production from calcium carbide is not without problems. Having said this, formaldehyde's role as a building block seems assured. After all, formaldehyde is manufactured from methanol and methanol can be produced from almost any carbonaceous material. Methanol will certainly be more expensive – which is likely to place the high yield offered by the Perstorp Formox process in greater demand than ever.

## What/who is "Reppe"?

Walter Reppe (1892-1969) contributed to a branch of chemistry that bears his name: the "Reppe" addition of acetylene to aldehydes. In the case of formaldehyde, the addition of one molecule yielded propargyl alcohol, the addition of two led to butyne-2-diol-1,4. His key discovery was first recognizing that these reactions require high pressure (6 bar), and then developing safe methods of handling the acetylene under the required conditions.

## Faces & Places

We've had these team changes since the last issue of *informally speaking*:



Chenggang



Johan



Anna



Jan-Erik



Mattias

- **Zhang Chenggang** has joined our team in China, replacing Lou Yang. Read more about Chenggang on page 12.
- **Johan Holmberg**, who has just completed his doctorate at Lund University under Prof. Arne Andersson, will be filling the gap in our R&D after **Magnus Hernelind**, who has left us for a position in the petrochemical industry – and a location closer to his girlfriend.... Johan's doctoral focus was on process chemistry and catalysis.
- **Anna Nilsson** is the latest member of our team of process engineers. Anna is truly local talent – in fact a graduate of Perstorp's technical high school – who then went on to take her degree in chemical engineering at Lund University.

- **Jan-Erik Andersen** is new as a Perstorp Formox employee, but not new in working for us as a project engineer. Jan-Erik has already some five years' experience supporting us as a consultant.
- **Mattias Fridolf** has taken over **Henrik Hansson's** role among our process engineers. Henrik has a new position within the Perstorp Group, at the site in Toledo, Ohio. Mattias has a degree in engineering.

We welcome all of our new people on board and extend our very best wishes to those who've left us!

All of us at Perstorp Formox would like to wish all of our customers, suppliers and other readers of *informally speaking* a joyful holiday season and a prosperous and peaceful 2007.

This year, we'll be making a donation to Doctors without Borders (a.k.a. *Médecins Sans Frontières*) in recognition of the outstanding job they do to alleviate human suffering under difficult conditions (see [www.doctorswithoutborders.org](http://www.doctorswithoutborders.org)).



## China address

Is your address book up to date? Please check that you have the correct info, which is:

Perstorp Formox Beijing Office  
1308, TIMESON Tower  
YI 12 Chao Yang Men North St.  
Beijing, China 100020  
Phone +86 10 655 212 02  
Fax +86 10 655 212 06

## Seminar news

After years of struggling with a staggered schedule – some years with two seminars, others with none – we've finally wised up and decided to do something sensible about it. Simply by making it simple for everyone.

So as from 2007, we will hold **one (1) seminar each year**, sometime between February and early May (taking into account local holidays etc), rotating between Asia, the Americas and Europe, as follows:

Asia	Americas	Europe
2007	2008	2009
2010	2011	2012
2013	2014	2015

Etcetera, you get the picture. We would also like to point out that *all* of our customers are welcome

to attend any or all of these seminars, whether the venue is in your region or not.

Looking ahead to the next two seminars:

- **Formaldehyde Asia 2007** – to be held in Bangkok, Thailand on 6-7 February, immediately followed by an operator training course (7-8 February). **Note!** The registration deadline is 5 January.
- **Formaldehyde Americas 2008** – the exact time and venue have yet to be decided, but eastern Canada in early May might be a good bet....

Watch our website ([www.formaldehyde.com](http://www.formaldehyde.com)) for further details!

## informally speaking

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