Silicon Carbide & More

What's going on in silicon carbide, fused alumina & other minerals #25 September 2008

Kollo to launch crystalline products in 2009

By Paul Harris in Delfzil, The Netherlands

Dutch SiC producer Kollo intends to produce crystalline SiC products for refractory, abrasives and other markets once its strategic alliance with German processor ESK-SIC ends in September 2009, owner Frans Schmolzer told ***SiC & More***.

Kollo intends to diversify its customer base and leverage its environmentally advanced furnace capability to penetrate new markets: SiC products, environmental technology, and energy.

Schmolzer declined to detail the investment the company will make to be able to process crystalline material and it will not aim to produce micro grits in the short term. "After September 2009, we will sell Fepa products. It will take about five years to develop a micro grit plant so that is not realistic at the moment," he said.

The company has begun talks with ESK-SIC about the strategic agreement they entered into in 2004 when Schmolzer bought the furnacing plant from the German firm. Kollo currently supplies all its crystalline material to ESK-SIC, which processes it into micro and macro grits.

> "We are looking to get our SiC out into the world, we are looking for strategic partners to produce SiC with and we are looking at entering the micro and macro business"

"Both Kollo and ESK had five years to look at their futures. We are looking to get our SiC out into the world, we are looking for strategic partners to produce SiC with and we are looking at entering the micro and macro business," said Frans Schmolzer.

Kollo wants to broaden its market reach to not be dependent on one customer, a strategy that makes sense, according to global SiC producer Saint Gobian, adding that this would change the market dynamic in Europe. "The question is what are they going to do? To survive in the EU they have to go towards higher value products. It is logical for them to move into refractory, abrasive and specialty products. They have good quality material, a lot of experience, so why not?" said Guido Muller head of SiC at Saint Gobain.

In addition to selling crystalline ☞

SUPPLY NEWS

Europe

Kollo builds new factory

Kollo Holding will build a €9 million facility at Delfzijl, The Netherlands in 2009 to produce premium quality silicon carbide grains. The new facility, that will be built on the Oosterhorn industrial site near Kollo's existing Delfzijl crude furnacing facilities, will be operated by a new subsidiary called Kollo Special Grains.

Trials of the new facility are scheduled to be held from September 2009 and the new division will create five jobs rising to 20 in 2015. Kollo Special Grains will focus on SiC grains and powders that are used in diesel particulate filters, for cutting silicon slices for solar cells and computer chips, and for the manufacture of top quality ceramic components.

The plant will have a modular design to facilitate future production capacity increases. A four-fold increase of the initial production capacity is planned during the 2010-2015 period.

No details of initial production capacity have been released.

China

Chinese SiC export licenses

Through mid-year 2008, China represented 93% of SiC crude imported into the US and 54% of refined SiC imports, due to supply displacement and a weak US dollar, but that could change

material to ESK-SIC, Kollo, which aims to produce up to 55,000 tonnes of SiC in 2008, sells lower grade products to the metallurgical and refractory sectors. Its Refsic 90/94 is used in crucibles and linings, while Refsic 95/97 is used for crucibles, bricks, and ramming mix. Its Topsic is sold into metallurgical markets in two qualities: a 0-1mm product that is 88% SiC and a 1-10mm product that is 92% SiC. It also sells Asic, a 37-85% SiC product, to briquette producers.

While a new deal has yet to be agreed, it is likely that Kollo will continue to sell part of its crystalline material to ESK-SIC, and at a higher price, and place material in the spot market, in addition to producing its own products.

ESK-SIC

Without SiC furnacing capacity of its own, ESK-SIC is keen to maintain supply of crystalline material to meet demand from expanding high-end applications such as diesel particulate filters and wiresaw cutting. Kollo currently supplies about 95% of the raw material for ESK-SIC's Frechen plant, but to diversify its supply base, ESK-SIC recently increased its stake in South African producer Sublime from 25% to 43.8% to increase the amount of material it receives. Sublime will produce about 25,000 tonnes of SiC in 2008.

"We increased our stake in Sublime to get more crude material and have an alternative source to Kollo. I think we can grow in volume and we are thinking of expanding again. We need 98% SiC crude and we are interested in having as much of possible of this. Our traditional supply of this is Kollo," said Dr Petersen.

ESK-SIC could see Kollo become a direct competitor in traditional markets. Both companies see new opportunities in refractory markets for cement, waste incineration and power plants, where demand is in excess of supply, as SiC experiences a Renaissance as consumers "rediscover that some SiC are helpful for high-performance refractories," said Petersen.

Environment

Kollo is confident it can benefit from having what it claims is the most environmentally benign SiC furnacing operation in the world. "There is no factory better than ours by far. We have the best-developed technology, we made it and have proven it," said Ricahard Schmolzer.

The company expects to become more competitive with Eastern Europe producers such as Elsid in Romania, that from 1 January 2008 had to start implementing the EU Integrated Pollution Prevention and Control Guideline, which will increase their costs.

"Water contaminants include highly carcinogenic products such as polycyclic aromatic hydrocarbons from petcoke. Other producers must have this problem as well, therefore they have an environmental and health and safety problem for their workers"

The Kollo plant captures 95% of H2S emissions, which it uses to produce elemental sulphur, while CO2 gas is recovered and piped into a power plant that converts it into steam power to generate 14-16% of the plants' energy usage. A flue gas scrubbing unit means Kollo does not have to buy low-sulphur petcoke to prevent SO2 emissions, a material whose price has increased substantially.

Kollo says it is the only SiC furnace plant in the world that collects and treats water runoff from its furnaces to remove petcoke contaminatants. "Water contaminants include highly carcinogenic products such as polycyclic aromatic hydrocarbons from petcoke. Other producers must have this problem as well, therefore they have an environmental and health and safety problem for their workers but they do not realize this," said Dr Joost Demmink, managing director of Kollo Technology.

Kollo sees an opportunity in selling its environmental technology and know-how as a closed water circuits become necessary. "We are convinced that air, soil and water are polluted if you do not have water and gas capture installations. These are not harmless pollutants," says Richard Schmolzer. **SiC**

due to ongoing developments within China's industry.

If the Chinese steel, foundry, refractory, abrasives, DPF, and P-V markets remain strong, the export license tonnage for SiC could be reduced to 195,000 tons in 2009 and 175,000 in 2010, which would hit North American SiC consumers hard.

Such levels would mean considerably less material than seen in recent years. In 1999, China's government authorized the sale of 270,000 tons of export licenses, which reduced to 200,000 tons in 2002 as a result of growing domestic demand. It increased to 230,000 in 2003 and remained at this level throughout 2005.

While the western hemisphere closed a handful of SiC plants during this period, China reduced the tonnage available for export from 230,000 mt in 2005 to 216,000 tons in 2008.

China's export license policy affects SiC pricing more than any other factor, particularly when they are obtained in the resale market. Export licenses sold by the government for $35-50/ton have subsequently been resold for up to $300/ton.

Americas

US SiC imports

Through June 2008, China represented 92.6% and Venezuela 5.8% of all US crude SiC imports. Material from South Africa has fallen off the US radar screen along with that from Russia and Romania, both of whom were significant suppliers during 2004-2006.

While The Netherlands averaged 9,192 tpy for the last five years it has not exported any material to the US during the first six months of 2008.

There was a five-year window

As clear as mud: SiC supply and pricing

By Kormac Kennedy

Just about the time you believe you have a handle on what is happening with global SiC supply and pricing, China throws a massive curve ball, and this curve appears to have fallen right off the table.

Just before the Beijing Olympics, prices for all SiC grades spiked to unprecedented levels. Some material sold at extraordinary asking prices while some did not. Most of the SiC that was bought at the ridiculously high prices was purchased by those hedging in case shipping did not return to normal until late 2008 due to logistics issues following the Olympics. However, top importers of Chinese SiC such as the US, Japan and Korea, and to a lesser extent Taiwan and Mexico, had stockpiled SiC throughout 2008 to prepare for a Chinese shipping squeeze.

Immediately after the Olympics most traders and processors asked how empty the Chinese SiC supply pipeline was, was there SiC at port or in transit, and was there SiC at furnace plants?

SiC & More talked to traders in North America and China and the situation is still unclear. For example, in mid September one trader said there were 40,000 tons of export licenses still available for the remainder of 2008, which means that about 20% of 2008 licenses are still available, and so exports can proceed as normal.

However, another trader commented that licenses are very limited. "There are not enough licenses for large quantities for export," he said, adding that, "most of the remaining licenses will be used for high value products such as refractory and abrasive grades".

Despite slowing economies in North America, the EU and even China, it appears as if the SiC stockpiles in China are limited. Yes, there has been some stockpiling due to the closure of many SiC consumers in preparation for and during the Olympics, but many SiC furnace plants closed as well. Which means, according to another trader, "there are some stockpiles at SiC smelters in the western and northwestern provinces but that's about the extent of it". China's *Asian Metals* newsletter reported, "in view of the small quantity of export quota, some foreign consumers are worrying about the sharp price increases in the following months," which brings us to the pricing issue.

> **"SiC usage is now increasing and it is a more interesting market. Before it was not a good business model to produce and that has completely changed"**

Although prices are not nearly as high as they were during the fortnight before the Olympics, they remain higher than they were in June. Quotes issued in mid September on 90% SiC metallurgical grain, 97-98.5% SiC refractory grain, and #1 grade abrasive grain were all higher than in late June and early July.

The question is, if global economies are soft and other mineral commodities have dropped in price, why is SiC still seeing price increases?

The export license arrangement encourages excess profits by those holding licenses. A license could be purchased by an authorized entity for as little as $50 / ton but they can resell it for $300 (or more) as demand stays firm and licenses are scarce. The price difference is not enjoyed by the smelter but by the entity holding the paper.

Chinese furnace plants have also seen another round of energy price increases and electricity remains the number one expense for SiC furnace plants. ☞

(2003-2007) when other SiC suppliers became entrenched in the US crude SiC market. However, thriving domestic markets and a weak dollar have discouraged those players from shipping material to the US.

Import percentages are more diverse for SiC grain due to its added value, which overshadow the exchange rate issue. For example, China 54%, Brazil 16.3%, Vietnam 9.7%, Norway 5.3%, Venezuela 4.5%, Japan 4.1% and Germany 2.8%.

There have been some interesting developments regarding SiC grain imports into the US. For example, Vietnam never shipped to the US until 2004 and is now the third largest grain supplier. Russia will supply its lowest amount of grain since 1998, and unless there is a large influx of material during the second half of 2008, Brazil will ship its lowest amount since 2002.

Green energy is big business for SiC

Foundries use SiC in casting parts for wind turbines, slicing polysilicon crystals in a wiresaw with SiC slurry remains the most efficient way to make solar cells, and according to the American Solar Energy Society (ASES) these two industries are poised for continued long-term growth.

In a recent issue of *Solar Today*, ASES reported that photovoltaics (PV) and the wind turbine business are each a $6 billion industry; big numbers for producers of SiC, a material used heavily in the production of wind turbine castings and silicon slicing for PV.

Those numbers are set to grow if the green lobby succeeds as it asks to have the Green Jobs Act fully funded.

The Green Jobs Act, if fully funded, will allocate over $2

Recession coming?

By Geroge O'Malley

Intermet Corporation has filed for Chapter 11 bankruptcy protection for the second time while other companies closely associated with the automotive industry are also in financial trouble.

Activity in the foundry industry is slowing with facilities operating reduced work schedules, implying that demand for castings has dropped, which indicates there will be significant slow-down in the US economy by year end.

Regular grade 75% FeSi is quoted at $1.27/lb silicon, FOB warehouse and is falling. The high calcium grade sells for about $0.10/lb silicon higher than this.

Compounding matters is the fact that China has put an additional 5% export tax on FeSi shipments from September, an increase that will be reflected in pricing when new shipments arrive in the US.

The current situation for a basket of other materials is varied: high-carbon FeCr prices have fallen, however, as supplies have increased; ferromanganese prices are steady or falling; DLA manganese prices are lower but new production pricing has held steady.; metallurgical coke is in tight supply and it is estimated that supply could be 4-6 million tons short over the next 3-5 years. In some cases, metallurgical coke is priced higher than foundry coke, which is a very unusual situation.

Foundry coke supply is adequate to meet the reduced current demand and pricing could be as high as $600/net ton or more, delivered, next year.

Producer Erie Coke was hit with a $6.2 million fine for pollution violations recently, and some observers fear that ongoing environmental problems with its ovens could see the plant close.

A Latin American company with coal properties and coke ovens that was ready to import up to 4,000 tpm of foundry coke from the US is now hesitating because of the financial condition of the industry.

Prime steel scrap prices are now more difficult to obtain since automotive producer Chrysler made its monthly auction confidential. Pig iron and scrap prices have come down from their highs but they usually drop during the summer, but Nucor is buying scrap processors and at some point this could impact prices. **SiC**

Due to export quota and license fee distortions, the laws of supply and demand do not necessarily dictate prices. Business has softened and demand for SiC has dropped creating some small overstock in China. However, energy and petcoke pricing have increased dramatically over the past two years setting a new baseline for furnace plant cost structures. No global producer could keep their plant open if the market price returned to 2004 levels, let alone 2001 levels.

The smoke has to clear from the confusion centered around license availability and the amount of material in the supply chain. Since most processors in North America order SiC 120 days in advance, end-use market prices will continue to increase through the first four months of 2009. This is certain.

What happens after April 2009 is less certain, but if we assume that SiC furnace plants across the world will have a new cost structure to face, and that global SiC demand will continue to soften, FOB China prices will stabilize or begin to drop over the winter. The problem for North American consumers is that end-use market prices will not drop until mid 2009. Nevertheless, there is a light at the end of the tunnel for SiC consumers as supply and demand factors will eventually rule the day despite China's SiC license policies and prices will fall. **SiC**

billion for training and block grants to communities to improve energy efficiency, which can include installations of solar arrays and/or wind turbines.

Solar Today quoted Julie Blunden, SunPower Corp's vp public policy and corporate communications: the company, "has driven down the installed cost of its (PV) products to the point where it is a rational choice for California homeowners and small businesses".

Blunded said she expects worldwide installed capacity to increase by about 10 gigawatts annually from 2009, rising to 28 gigawatts annually by 2011.

It appears that the greening of energy production and the reduction of greenhouse gas emissions presents a unique opportunity for companies using SiC in their processes to cooperate and agree with environmentalists. *Solar Today* reported that at SOLAR 2008, an ASES-sponsored energy conference, that the installation of renewable energy sources is on track to create an 80% reduction in greenhouse gas emissions by electric utilities. This data was presented by Jighar Shah, chief strategy officer at SunEdison, who added a goal of 80% reduction by 2018 is possible utilizing a combination of new wind, solar, geothermal, biomass and energy-efficiency improvements.

New wind and solar installations may help reduce greenhouse gas emissions from coal-fired power plants, and they will go a long way toward achieving healthy and sustainable growth in the SiC business. By Daniel Charles.

Global energy rates

There is little doubt that energy pricing continues to haunt virtually everyone producing SiC.

A SiC producer in Europe commented that, "prices went up due to the rapidly increasing cost of petcoke and electricity". This refrain has been repeated across the globe. A producer in Brazil said, "with further exploding prices for petcoke and other cost increases, SiC prices will increase significantly in 2009".

Reports from China confirm what we have read in *Asian Metal* as energy prices recently increased as much as 10% in some provinces and 5% price increases were commonplace.

This type of pricing is going to impact all energy hungry industries such as SiC, aluminum oxide, graphite, ferroalloys, silicon metal and others. Energy supply is a global problem that is not going away and will provoke continuous price increases.

Alox

US alox imports

The import of Chinese aluminum oxide into the US reads very similar to SiC imports: China represents 89.4% of all crude (155,362 tons) brought into the US during the first six months of 2008.

Subtracting white AO imported from Venezuela, China represents 96.6% of all brown AO crude imports.

US importers built inventories earlier this year in fear of rising prices and potential supply shortages due to the Beijing Olympics. Annualizing first half 2008 import figures would make this year the largest year of AO imports into the US by far.

While it is true that the US steel industry had been very strong, AO imports will drop significantly in the second half of 2008 as refractory needs begin to drop off due to a softening North American steel market.

Imports of AO grain paint a completely different picture due to antidumping duties levied against Chinese material.

Only 5,258 tons have been imported during the first six months, with Austria leading the pack at 1,702 tons. Other suppliers include Germany (960 tons), China (646 tons), Brazil (486 tons), France (373 tons) and (Italy 226 tons).

Other

Mag metal opportunity lost

The closure in early 2007, of Hydro Magnesium's Becancour, Quebec, Canada 48,000 tpy magnesium production plant helped cause a worldwide 200% price run-up for pure and alloy magnesium ingot. China sourced magnesium ingot peaked in May 2008 at almost $6,000/t FOB China Port.

Since then, China magnesium prices have dropped like a stone with current FOB China pricing for pure ingot just below $4,000/t, a fall of 33% (90¢/lb) in just four months.

This dramatic decline in magnesium prices, while US gasoline prices at high levels would suggest that the magnesium diecasting industry is ready to capitalize on increased magnesium usage in automotive applications. Although one third the weight of aluminum, this substitution effect is not yet being seen.

The casting industry continues to shrink as major Mg diecasters announce bankruptcy: Intermet Corp and Lunt Manufacturing.

Continued US antidumping duties on Chinese magnesium imports protect the current $8,000/t market prices of the only remaining US primary magnesium producer (US Magnesium in Utah) leading to high profits for US Magnesium but an uncertain supply and cost future for a shrinking US magnesium diecasting industry. By Daniel Charles.

US industrial output falls

During August, US industrial output fell 1.1% due to a big dip in auto production. Automobile output dropped 12%, the largest slide in almost ten years.

US auto sales also fell significantly during August. The 15.5% fall represented the fifth consecutive double-digit monthly decline. US auto sales may barely hit 14 million in 2008, an 18% decline from the high of 17 million in 2000, and a significant drop from the more than 16 million level that the industry has come to expect.

The pain, however, is being felt elsewhere. A report by the *BBC* about a Confederation of British Industry (CBI) survey said, "manufacturers are becoming more downbeat about forthcoming levels of activity but are still having to raise their prices due to the severity of recent cost increases". Regarding the UK,, the CBI survey said, "it expects the economy either to stagnate or contract over the next six to nine months".

Toyota is also feelingthe pinch. It forecasted 10.4 million vehicle sales in 2009 but that figure has been downgraded to 9.7 million. This cut came on the heels of a downward adjustment in 2008 vehicle sales from 9.85 million to 9.5 million.

Chinese coal and coke

The Chinese Customs Tariff Committee announced in August that it would raise the export tariff rate on coke from 25% to 40% and would increase that on coal from 5% to 10% to bring exports into balance. While the world's largest exporter of coke, supply in China is tight.

China also suffers from a coal shortage, although much of the shortfall can be attributed to an inadequate railway system. As coal demand increases and production tries to follow suit, the railway cannot transport the increased volume.

In Shanxi province, railway capacity meets only 50% of demand. This will be an ongoing problem in most provinces and will ultimately increase the coal and coke export prices.

FREIGHT RATES

Origin	Lot size	Rate/metric ton	
Brazil	10,000 mt	$43-50/mt	◀
China (North)	Any bulk cargo	$72-75/mt	▼
China (South)	Any bulk cargo	$75-83/mt	▼
India	5,000–10,000 mt	$70-75/mt	▼
Russia	Small bulk 3,000 ton	$82-86/mt	▲
Russia	Large bulk 20,000 ton	$75-79/mt	▲

Fused mineral pricing

Western Europe SiC - Metric Tons

88-92% Metallurgical (EU Producers)	€1,050-1,300 ▲
88-92% Metallurgical (Russia)	SiC unavailable
90% Refractory; Typical Sizes	€1,400-1,600 ▲
94-97% Refractory; Typical Sizes	€1,700-1,900 ▲
97% Refractory; Typical Sizes	€1,800-1,975 ▲
97.5% Refractory: Typical Sizes	€1,850-2,050 ▲
98% FEPA F8-F220	€1,900-2,100 ▲
98% FEPA Green F8-F220	€2,300-2,600 ▲

Middle Europe Alox - Metric Tons

8-46 Grit Bonded Abrasive (Ukraine)	N/a
54-220 Grit Bonded Abrasive (Ukraine)	N/a
WAO F12-F150 Bonded (Czech)	€800 ▲
WAO F12-F150 Bonded (Hungary)	€900-980 ◀
WAO Refractory, Typical split (Hungary)	€840-880 ◀

USA Other SiC - Net Tons

97% Refractory, Hi Fe (China)	$1,650-2,000 ◀
97% Refractory, Low Fe (China)	$1,800-2,200 ◀
97% ANSI 16-60 Grit (PNAM) (FOB SP)	$1,800-2,200 ◀
97% ANSI 80-220 Grit (PNAM) (FOB SP)	$1,900-2,300 ◀
98% Black F500 & 600	$4,100-4,500 ◀

Brown Al2O3 (PNAM) FOB SP - Net Tons

ANSI 16-70	$920-1,080 ▲
ANSI 80	$960-1,100 ▲
ANSI 90-100	$950-1,100 ▲
ANSI 120, 150, 180	$1,000-1,150 ▲
ANSI 220	$1,040-$1,280 ▲

Middle Europe SiC - Metric Tons

88-92% Metallurgical (Russia)	N/a
88-92% Metallurgical (Romania)	€1,000-1,100 ▲
98% FEPA F12-F90	€1,650-1,900 ▲
98% FEPA F100-F220	€1,700-2,000 ▲
97% Refractory, Typical Splits	€1,500-1,650 ▲
98% Black F320 (Czech)	€1,800-2,050 ▲
98% Black F500 & 600 (Czech)	€3,100-3,500 ▲

USA SiC & Al2O3 FOB New Orleans - Net Tons

90% Metallurgical SiC	$1,040-1,060 ▲
97% Crude SiC (Russia)	SiC unavailable
97% Crude SiC (China - Anthracite)	$1,830-2,000 ▲
Al2O3 crude (China) bulk	$795 ▲

Miscellaneous

Chinese bauxite 3.15 material FOB China	$500
50% contained FeSi Reg grade USA FOB	$1.17-1.26/lb

Notes **Prices ex-works, dry sieve per metric ton, except USA which are net tons.** Chinese SiC 52.6% anti-dumping duty in EU. RoC = Run of Crusher. PNAM = Processed North America, SP = Shipping Point. WAO = White Aluminum Oxide.

Price information has been obtained through contact with sources engaged in the trade of silicon carbide. Actual transaction prices will be determined by a host of factors, including, but not exclusive to, quantity, grades, contract terms and various other factors. Price information sources are deemed to be reliable but due to the possibility of error by ***Silicon Carbide & More***, or others, ***Silicon Carbide & More*** does not guarantee the accuracy, adequacy or results obtained from the use of such information.
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PRICE NEWS

BFA pricing

BFA smelters are being hit hard by energy price increases. A Chinese smelter reported, "I believe energy prices will force up the price of brown fused alumina in the coming months".

Price increases in early September ranged from $17 n/t to $38 n/t most of which was attributed to energy price increases.

Although energy pricing continues to affect the BFA cost, the price of bauxite remains the driving force behind the global pricing run-up.

A bulk load of BFA crude containing 1.3-1.6% SiO2 and 2.0-2.5% TiO2 is nearing $800 n/t delivered to New Orleans. A recent tender had a price of $782 n/t NOLA.

A trader in China reported that, depending on the quality and quantity, the range for BFA crude FOB Tianjin is currently $650-690 n/t.

Consumers should not expect any relief: as long as Chinese BFA furnace plants represent about 70% of the world's production and bauxite availability is tenuous at best, pricing angst will continue well into 2009.

Silicon Carbide & More

Publisher: Kormac Kennedy **Editor: Paul Harris**

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kormackennedy@aol.com