

Ceramic & Glass

DECEMBER 2019 • VOLUME 1 • ISSUE 1

MANUFACTURING

www.ceramics.org/ceramicandglassmanufacturing



GLOBALIZATION: DOING BUSINESS IN CHINA, VIETNAM, AND INDIA

HOW TO DO BUSINESS IN THE
CHANGING ECONOMY OF CHINA

WHY INDIA?
WHY NOW?

WELCOME TO VOLUME 1, ISSUE 1

In an August blog post, Statista (statista.com), the online aggregator of statistics on just about anything, reported that 7,218 magazines were published in the United States—42 more than were published in 2017.

Does the world need a new magazine?

Yes, if the content is relevant, timely, and trusted!

Manufacturers certainly care about near-term and long-term horizons, but they worry about today, tomorrow, next week, and next month. Their concerns are urgent.

Ceramic & Glass Manufacturing—ACerS' NEW B2B magazine—delivers news and information for ceramic and glass manufacturers and businesses. Published quarterly starting December 2019, *C&GM* provides useful, relevant, and timely articles from experts in the industry.

If you are a manufacturer, plant engineer, plant manager, production leader, operator, supply chain vendor, purchasing manager, sales team member, product developer, or otherwise connected with making and selling ceramic or glass components—this magazine is for you.

In every issue, you will find information you can use to build your business:

- Feature articles focused on practical solutions
- People news
- Business news
- Trade show news and reports

Working with advisors who are themselves ceramic industry manufacturers, we developed themes on topics that relate to your business's bottom line, your business relationships, and your business efficiency. We look forward to bringing you great content on themes that impact manufacturers.

Issue	Theme
December 2019	Globalization and the ceramic industry
April 2020	Breaking in: A small company guide to working with big companies
June/July 2020	Smart manufacturing: Good business practices for manufacturers
September 2020	Workforce development
December 2020	Standards: Guideposts to quality

ACerS has more than a century of history as the most trusted source of information for the ceramic and glass industry. The Society publishes four peer-review journals and the *ACerS Bulletin*. Late-breaking news and information is published three times weekly in *Ceramic Tech Today*. Discover these resources at www.ceramics.org/publications-resources.

I'd also like to introduce you to David Holthaus, content editor, for *C&GM*. Holthaus, an experienced business journalist, brings many years of insight that will benefit readers.

This is our industry. Ceramics and glass are our business, too. Ensure you get every issue! Sign up today for your free copy at www.ceramics.org/ceramicandglassmanufacturing.

We welcome your feedback and suggestions!

Happy reading,

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Ceramic & Glass Manufacturing is published four times per year by The American Ceramic Society. The American Ceramic society is not responsible for the accuracy of information in the editorial, articles, and advertising sections of this publication. Publication of articles does not comprise endorsement, acceptance, or approval of the data, opinions, or conclusions of the authors on the part of the Society or its editors. Readers should independently evaluate the accuracy of any statement in the editorial, articles, and advertising sections of this publications. Vol. 1, No. 1, pp 1-16.

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INDUSTRY NEWS

APPLE INVESTS IN GLASS RESEARCH AT CORNING

Tech giant Apple awarded Corning, a supplier of its precision glass, \$250 million from its Advanced Manufacturing Fund.

The award builds on the \$200 million the company received from Apple's Advanced Manufacturing Fund in May 2017. The investments support Corning's research and development into state-of-the-art glass processes, equipment, and materials for next-generation



Corning's Harrodsburg, Ky. facility is the home of its glass technology center.

consumer devices, Apple said.

Glass for every generation of Apple's iPhone, the Apple Watch, and many generations of iPad, have all been made in Corning Inc.'s Harrodsburg, Ky. facility.

JOINT VENTURE ANTICIPATES DEMAND FOR 5G NETWORK TECHNOLOGY

Rising demand for ceramic filters used in 5G communications networks is behind a joint venture between Kyocera Corp. and Ube Industries, Ltd. The two companies signed an agreement to manufacture filters for 5G base stations.

Kyocera will acquire 51 percent of the shares of Ube Electronics, Ltd., a wholly-owned subsidiary of Ube Industries. Kyocera and Ube Industries will then establish a joint venture named Kyocera-Ube RF TEC Corporation.

5G mobile network technology enables high-capacity, low-latency communications for more connected devices in smart homes, driverless cars, health care, and other applications.



Kyocera's global headquarters in Kyoto, Japan.

STRATEGIC PORTFOLIO REVIEW UNDERWAY AT O-I

As part of its goal of reducing debt, Owens-Illinois is conducting a strategic review of its business portfolio.

The company is considering a sale of its Asia-Pacific glass container manufacturing business, which consist of four glass manufacturing plants in Australia, two in China, and one each in Indonesia and New Zealand. The company hired investment banking firm Goldman Sachs to negotiate the potential sale.



Glass packaging for food and beverages is O-I's leading product.

The company has also announced that it's planning to install a new furnace at its plant in Holzminden, Germany.

SAINT-GOBAIN TRIMS ITS GLOBAL BUSINESS PORTFOLIO

Saint-Gobain completed several transactions in its ongoing plan to streamline its global portfolio.

The company, based outside of Paris, completed the sale of its Optimera construction materials distribution business in Denmark to Davidsens Tommerhandel. The business posted annual sales of 120 million euros in 2018.

The company completed the sale of its K par K business to two of its managers. The business specializes in the door-to-door sale of customized woodwork and windows in the French market.

K par K generated sales of around 130 million euros in 2018 and employs nearly 1,000 people.

Saint-Gobain also reached an agreement to sell its construction glass unit in South Korea, called Hankuk Glass Industries, to Glenwood Private Equity.



Saint-Gobain glass wool provides sound insulation at the Mogador Theatre in Paris.

AGROMAT PLANS GLASS FACTORY IN UKRAINE

The first float glass factory in Ukraine will be built in that country's Kiev region by Agromat. Currently, the country's economy is dependent on products that are imported from Europe and Russia.

The plant's capacity is expected to be 300 tons a day. The main products will be glass for architectural applications, solar panels, and for household appliances, electronics, and automotive uses.

The facility is expected to employ about 300 and represent a total investment of 300 million euros.



Agromat headquarters.

RESEARCH PARTNERSHIP FOCUSES ON LIGHTWEIGHT MATERIALS FOR AUTO SECTOR

Oak Ridge National Laboratory and the University of Toledo reached an agreement to collaborate on research into the advanced design and manufacturing of high-strength, intelligent, lightweight materials for the automotive sector.

The partnership brings together the National Laboratory's expertise in manufacturing, carbon fiber and composites, machining, energy storage, and metrology with the university's capabilities in manufacturing system modeling, metals engineering, and assembly systems. The institutions also expect to work with the automotive industry in Ohio and Michigan.



Aerial view of the Oak Ridge National Laboratory

\$5 MILLION GRANT EXPANDS RARE EARTH PROJECT AT WEST VIRGINIA UNIVERSITY

West Virginia University was awarded \$5 million by the U.S. Department of Energy to scale up its Rare Earth Recovery Project, which will include building a facility at a new acid mine drainage treatment plant.

The university will partner with the West Virginia Department of Environmental Protection to design and build the plant. Rockwell Automation will

provide sensor and control technology, and TenCate Corp. will engineer materials for rare earth element extraction from acid mine drainage sludge.



WVU's Rare Earth Extraction Facility produces highly concentrated rare earth products from coal mine drainage. This sample is 87 percent rare earth oxide. Credit: WVU Photo/Chris Vass

GLOBAL RESEARCH NETWORK LAUNCHED FOR CEMENT AND CONCRETE

The Global Cement and Concrete Association (GCCA) formed a new network to bring together the cement and concrete industry with scientific institutions to expand global research. It's called Innovandi – the Global Cement and Concrete Research Network.

Network partners plan to research process technology, carbon dioxide reduction, sustainability, and the use of alternative fuels, among other areas.

Twenty-four companies, including cement and concrete manufacturers, admixture specialists, and equipment suppliers, have committed to the initiative.



TRADE SHOWS

FIRST CERAMITEC CONFERENCE FEATURED SPEAKERS FROM ACADEMIA AND INDUSTRY

A new ceramitec conference event premiered in September in Munich with more than 200 in attendance from 21 countries.

Speakers from academia and industry focused on new industrial opportunities for ceramics and additive manufacturing processes in the automotive, aerospace, electronics, manufacturing, and health sectors. They included representatives from NASA, Germany's aerospace research center DLR, the Fraunhofer Institutes and universities, as well as experts from companies including Eirich, Netzsch, and Xjet.

"We wanted to give ceramic an additional forum alongside our trade fairs," said Gerhard Gerritzen, board member of Messe München, organizer of the conference and the ceramitec trade fair.



The panels focused on new industrial opportunities for ceramics and additive manufacturing processes in the automotive, aerospace, electronics, and other sectors.

The agenda was divided into two tracks. "Shape the Future" looked at the use of additive manufacturing processes in high-performance ceramics. The second track, "Industrial Applications," examined new uses for high-performance ceramics in industry.

The conference was accompanied by an exhibition that included 3DCERAM, Bayern Innovativ, Ceramic Applications, CFI, Linseis, Lithoz, Nanoe, Netzsch, PresTEC, Schenck Process, Springer Nature, and Steinbach AG.

The next ceramitec trade fair is scheduled for May 17–20, 2021, in Munich.

<https://www.ceramitec.com/conference/information/index.html>



CERAMICS EXPO 2020 WILL FEATURE A NEW THEME—CLEAN, ELECTRIFIED, AND EFFICIENT MOBILITY

Ceramics Expo returns to Cleveland, Ohio on May 5–6, 2020. This free-to-attend conference is North America's leading industry event, bringing the latest news on the application and manufacturing processes of technical ceramic and glass materials. The conference is specially designed for engineers and decision makers from OEMs and tier suppliers in the aerospace, automotive, electronics, energy, medical, and industrial applications.

Brand new for 2020: The conference will adopt the innovative theme of clean, electrified, and efficient mobility. Speakers will share the latest news and information on technologies such as CMCs, catalysts and filtration, technical and industrial coatings, metallization of ceramics, and ceramic coatings on metal alloys, among many other key topics.

www.ceramicexpousa.com.



MORE THAN 60,000 EXPECTED AT 2020 WORLD OF CONCRETE

Registration opened for World of Concrete, to be held at the Las Vegas Convention Center Feb. 4–7, 2020. More than 60,000 industry professionals are expected at the commercial construction industry's largest international event for concrete and masonry professionals.

The program features more than 170 seminars covering new technology, technical applications, and strategies for more efficient operations and increased profitability.

Attendees can also visit 1,500 exhibiting companies at the 700,000 square feet of indoor and outdoor exhibit space at the Las Vegas Convention Center.

<https://www.worldofconcrete.com/en/register.html>



REGISTRATION OPEN FOR MINERALS RECYCLING FORUM 2020

Mineral Recycling Forum 2020 will be held March 10–11, 2020, in Aachen, Germany, at the Pullman Hotel Aachen Quellenhof. The forum will bring together panelists to discuss trends and developments in secondary raw materials sourcing, supply, processing, quality control, logistics, and their market applications. It will interest those active in the sourcing, processing, distribution, and use of secondary raw materials, especially established industrial mineral suppliers and buyers. Register at imformed.com, and early bird rates are available until Jan. 27, 2020.

www.imformed.com



INDUSTRIAL MINERALS SUPPLY CHAIN FOCUS OF RENDEZVOUS 2020

Imformed Rendezvous 2020 will be held April 6–8, 2020, at the Grand Hotel Huis ter Duin (Noordwijk) in Amsterdam. The forum launched in April 2019 as a conference for a high-caliber overview and outlook across the industrial minerals business. The industrial minerals supply chain from mine to market will be examined. Registration is available at imformed.com.

www.imformed.com

HOW TO DO BUSINESS IN THE CHANGING ECONOMY OF CHINA

By David Holthaus

With the world's second-largest economy, and one that is still growing, China is an attractive market for any manufacturer looking to expand and do business in one of the most populous countries in the world.

And while the country holds great promise for a business seeking to grow internationally, it should be approached with eyes wide open and an awareness of the potential obstacles. That's the advice of Michael Silver, who shared his thoughts on doing business in China in an interview with *Ceramics & Glass Manufacturing*.

Silver knows of what he speaks. He and his company, American Elements, have been operating in China since the early '90s.

American Elements is one of the world's largest manufacturers and distributors of advanced materials for industry and research, and its products include rare earths, alloys, and nanoparticles.

Silver is the company's founder and CEO and an international expert in the field of rare earths, particularly in the political and economic issues surrounding the global supply chain for these elements, which are found in the Earth's crust and are critical for the production of things we use every day, including computers, cell phones, and fluorescent lighting.

American Elements operates plants, a warehouse, and a sales office in China.





Michael Silver speaking at Ceramics Expo 2019 in Cleveland, Ohio.

"You can do business in China," Silver says. "The Chinese are extremely honest people to do business with and the government can be trusted in most respects," he says.

But changing economic conditions there could present issues. "It's now a very difficult place to do business for a host of reasons," he says.

Silver says China is already experiencing a recession that the government has not officially acknowledged. The ongoing trade war, as well as vestiges of China's planned economy, have contributed to the slowdown, he says.

"There's a lot bad debt on the banks' books that they're not willing to admit to," he says.

Although China started implementing market reforms in the late '70s, its conversion from a centrally planned economy is still not complete and that is apparent in a real estate market that has expanded too quickly, he says.

China's import and exports have been slowing for months amid the protracted trade dispute with the United States that has resulted in the overall China economy growing at a slower pace. For years, the country's economy grew at an accelerated rate, with its gross domestic product growth averaging nearly 10 percent a year—the fastest sustained expansion by a major economy in history, according to the World Bank.

But in the third quarter of this year, the country's gross domestic product grew by only 6 percent. That's strong growth by the stan-

Vietnam—Shift to market economy creates opportunity for businesses and citizens

Michael Silver suggests Vietnam as a good country in which to enter the Southeast Asian market, partly due to its low labor costs, its good ports, and the trustworthiness of its government.

There are other reasons, too. The Vietnam economy is growing at a quick pace. Vietnam's shift from a centrally planned to a market economy has transformed the country from one of the poorest in the world to a lower-middle income country, according to the World Bank.

The international organization calls Vietnam "one of the most dynamic emerging countries in the East Asia region."

In the medium-term, Vietnam's economic outlook is positive, the World Bank says. Real gross domestic product growth peaked at 7.1 percent in 2018. The government forecasts that its gross domestic product will grow by 6.8 percent in 2020, due to weaker external demand and continued tightening of credit and fiscal policies. Inflation will be kept to 4 percent, it forecasts.

The country is in the process of privatizing state-owned enterprises and is investing in its infrastructure.

Through the first three quarters of 2019, the country recorded a trade surplus of \$6.8 billion, with three main categories of export goods recording a turnover of more than \$1 billion, including telephones and components, computers, and electronics and components.

Between 2002 and 2018, more than 45 million Vietnamese people were lifted out of poverty, as poverty rates declined sharply from more than 70 percent to below 6 percent, the World Bank says.

dards of the developed world, but for China, it was the weakest economic growth in 27 years.

Over the past eight years, China has contributed nearly a third of the world's economic growth, the World Bank says. Its current five-year economic plan, from 2016 to 2020, set an annual growth target of 6.5 percent, still fast, but reflecting the rebalancing of its economy, says the global financial institution.

At the start of 2019, the Chinese government announced a stimulus package equivalent to more than \$200 billion in U.S. dollars to shore up its economy.

Along with a trade war and a slowing economy, rising labor costs can present another obstacle to growth in China, Silver says.

China's workforce has been shrinking for nearly 10 years, according to government statistics. That has heated up competition for available

labor and driven up wages for manufacturers. The cost of labor has more than doubled since American Elements began doing business there in 1993, Silver says.

Manufacturers interested in exploring business opportunities in Southeast Asia could look to two other options—Vietnam and Indonesia—over China, Silver says. Both have business ties to the U.S., low production and labor costs, and good logistics.

Vietnam, in particular, is attractive, he says.

“For those who are labor or cost sensitive, I’d choose Vietnam. They have great ports. The government is honest. The labor pool is interested in working, and the costs are much lower than in China.”

Despite a slowing of its economic momentum, China is critical to the future of refractories and ceramic manufacturers.

Ceramic and glass makers are among the world’s top users of rare earths, and China produced 70 percent of those essential minerals in 2018, the U.S. Geological Survey reports. From 2014 to 2017, China was the source of 80 percent of the imports of rare-earth elements into the U.S., the agency says.

The country possesses more than a third of the world’s rare-earth reserves, with Brazil and Vietnam being distant second and third.

“The most valuable, the rarest, the most expensive rare earths are 100 percent in China,” Silver says.

Other critical elements, while not technically rare earths, are also controlled by China. Hafnium, for example, which is used in filaments and electrodes, as well as semiconductors.

China created what Silver called a “sovereign monopoly” with its rare-earth riches. The government employed export duties and a quota system to drive up prices of the materials outside of China. That



American Elements’ facility in Baotou, China.

put pressure on downstream producers to move their operations, jobs, and technologies to China.

In 2010, the country reduced its exports by 40 percent, sending rare earths prices in the U.S. and other markets outside China soaring. That led to the U.S., Japan, and the European Union bringing a case before the World Trade Organization, which they won. After an appeal, China dropped its export restrictions in 2015.

More recently, with trade tensions between China and the U.S. heating up, China has suggested that it might restrict exports of rare earths to the U.S.

Silver says it would be in the economic interests of China, the U.S., and the rest of the global manufacturing industry if rare earths are included as part of any trade deal between the two countries.

Despite these potential hurdles, China can be a promising place to set up shop, especially if manufacturers already have established supply chain relationships in the country, Silver says.

And, speaking from more than two decades of experience there, the people are good to work with.

“You can make a deal in China and people will honor it,” he says. ▀

Every year, the American Ceramic Society profiles the ceramic and glass industry in a particular country in the October/November issue of the *ACerS Bulletin*.

A profile of China, “China—Tradition and transformation,” was just published this year, and Southeast Asia—Singapore, Malaysia, Thailand, and Indonesia—was profiled in 2017 in an article titled “Markets of magnitude.”

Learn about economic drivers and how those play out in the ceramic and glass industry. Each profile includes a directory to the country’s national labs, universities, and other institutions.

Country	Year	Title
China	2019	China—Tradition and transformation
Israel	2018	Israel—Middle East Mavericks
Southeast Asia: Singapore, Malaysia, Thailand, and Indonesia	2017	Markets of magnitude
France	2016	Global groundbreaker: France innovates and collaborates to serve society
Korea	2015	Korea’s core competencies
Australia	2014	Ceramics in Australia: Raw and advanced materials drive Land Down Under’s global reach
Canada and Mexico	2013	Ceramics and glass: Canada and Mexico
India	2012	Ceramics and glass in India
Japan	2011	Ceramic advances in Japan: Achieving new breakthroughs, meeting new challenges
South America	September 2009	Ceramics in South America
China	2008	China: Ceramics world continues eastward shift

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Session 2. Raw Materials

Session 3. Ceramic Processing

WHY INDIA? WHY NOW?

By Mike O'Driscoll

This article was written by Mike O'Driscoll, founder of IMFORMED Industrial Mineral Forums & Research Ltd. It was adapted with permission from his blog at Imformed.com.

India has always been one of the world's great sources and markets for industrial minerals, but now looks set to significantly raise its profile.

Already the world's fifth largest manufacturer, India remains on track to be the world's fastest growing economy with the International Monetary Fund estimating gross domestic product growth of 7.3 percent for fiscal 2019 and 7.4 percent for fiscal 2020.

Meanwhile, the fiscal average in GDP growth in the last five years has topped 7.5 percent, defining a new normal for the Indian economy.

This economic boom has naturally driven strong growth in primary mineral consuming market sectors such as construction, steel, foundry, cement, glass, ceramics, paper, paint, and plastics. This growth has been reflected in recent activity by overseas manufacturers keen to establish subsidiaries and participate in joint ventures in India, for example, RHI Magnesita, Imerys, Vesuvius, Omya, and Almatris.

At the start of 2019, India overtook Japan as the world's second largest steel producer, and by the end of the year is expected to become the world's second largest steel consumer.

However, despite having an abundance of mineral resources, some of which still enjoy strong export markets, there are certain domestic

markets which have been caught out by their over-reliance on Chinese mineral imports—now interrupted, and in some cases declining in availability, while fluctuating in price—which has forced an urgent reassessment of domestic and import options.

This has given rise to a new wave of mineral resource and product development in India (and other Asian countries) as the challenge grows for consumers keen to secure new and alternative sources of industrial mineral supply as their markets expand.

The mining and minerals sector in India is expected to witness a major upward transition in the next few years, boosted by a new National Mining Policy unveiled in February 2019 (to mixed reviews), and driven by nationwide reforms such as "Make in India" initiative (making India a global manufacturing hub), "Smart Cities Mission" (urban renewal and retrofitting), "Saubhagya scheme" (rural electrification), and a focus on building renewable energy projects under the National Electricity Policy.

Rising demand from infrastructure and transportation sector schemes such as housing for all by 2022, "Bharatmala Pariyojana scheme" (84,000 kilometers of new highways by 2022), expansion of the railway network, and development of "Industrial Corridors" (e.g., Amritsar-Delhi-Kolkata, Bengaluru-Mumbai, Visakhapatnam-Chennai) will also help boost and facilitate mineral demand.

INDIA'S MINERALS: DOMINATED BY NONMETALLICS

During 2017–18, India's mining and quarrying industry accounted for about 2.3 percent of the gross value added (GVA) at current prices, and, according to the latest data from the Indian Bureau of Mines (IBM), mineral production in India increased by 2.3 percent (as per index of mineral production base year 2011–12) compared to the previous year.

This increase was mainly owed to a rise in production of raw coal, lignite, and natural gas among fuel minerals; copper concentrates, gold, iron ore, lead concentrates, zinc concentrates, manganese ore, and tin concentrates, among metallic minerals; and phosphate, diamond, fluorspar, garnet, kyanite, sillimanite, and limestone among nonmetallic minerals.



Minerals industry in India. Credit: Imformed

The value of metallic minerals produced in 2017–18 was INR500 billion (US \$7 billion), an increase of about 27 percent over the previous year. Nonmetallic minerals' value was INR82 billion (US \$1 billion), representing a decrease of 2 percent.

However, it should be noted that these figures do not account for "atomic minerals" (uranium, thorium, niobium, tantalum, beryllium, lithium, zirconium, titanium, rare earths), and, crucially, "minor minerals" (all other industrial minerals) as classified by the IBM.

INVESTMENT: CLIMATE RIPE ALTHOUGH NEW MINING POLICY QUESTIONED

With barely 20 percent of reserves mined, India presents a major opportunity for investors. The Geological Survey of India has earmarked 100 blocks for auctioning regional exploration.

One hundred percent FDI is allowed in the steel and mining sectors under the automatic route, and some US \$13.83 billion of FDI has been channeled into the metallurgical and mining sectors since 2000.

On 28 February 2019, the Union Government approved the National Mineral Policy 2019, the key focus of which is on transparency, better regulations and enforcement, balanced growth, and sustainability. The National Mineral Policy 2019 replaces the National Mineral Policy 2008.

Key features include:

- Encouraging the private sector to take up exploration
- Encouragement of merger and acquisition of mining entities
- Creation of dedicated "mineral corridors" to boost private sector mining areas
- Proposals to grant status of industry to mining activity to boost financing of mining for private sector and for acquisitions of mineral assets in other countries by private sector
- Long term import-export policy for minerals will help private sector in better planning and stability

Of high concern is a perceived lack of focus on the future of India's minerals security. Owing to little or no major exploration and discoveries of certain domestic minerals, there has not been any significant change to their inventory base for decades. Moreover, there has been little development in required mineral processing technology. Opportunity knocks for new mineral investors and developers?

REFRACTORIES: DRIVEN BY STEEL GROWTH

India is now the second largest crude steel producer in the world, generating an output of 106.5 million tonnes in 2018, a growth of 3.7 percent year-on-year. Indian steel demand is set to grow by 7.1 percent in 2019 while globally, steel demand has been projected to grow by 1.3 percent. India is certainly one of the few bright spots for world steel growth.

As well as expanding, the Indian steel industry is producing higher grade steels which is demanding higher quality refractories and con-

sequently higher quality refractory minerals. A major challenge is that much of India's refractory raw material requirements are imported.

Refractories production in India for fiscal 2018–19 was 1.2 million tonnes, representing a significant recovery and growth of 9 percent over the previous year, driven mostly by steel, but also by the country's growing cement and glass sectors.

Leading international refractory groups are present in India, for example Krosaki Harima, RHI Magnesita, and Vesuvius, and activity is increasing.

May 2019 saw Dalmia Seven, the Katni, Madhya Pradesh-based monolithics joint venture between Dalmia-OCL, India's fastest growing refractory company, and Seven Refractories of Slovenia come on stream.

CERAMICS & FILLERS: CONSTRUCTION BOOM LOOMS

Driven by the growing construction sector and a rise in exports, the Indian ceramic industry, which has the potential to be the largest producer in the world, is looking to double its turnover by 2021.

The industry produces around 2.5 percent of the total global output, in which Gujarat accounts for 70 percent of the total output.

With many new infrastructure projects in the pipeline, the construction sector is growing at an approximate rate of 7–8 percent per annum. The demand for industrial ceramic products such as ceramic tiles, sanitaryware, and pipes required in construction applications are therefore expected to follow suit.

PROCESSING: ESSENTIAL SUPPORT TO MINERAL DEVELOPMENT

Core to the successful development and expansion of India's mineral sector is the investment in and utilization of modern processing technology.

Without the appropriate crushing and grinding equipment, calcination technologies, and beneficiation methods, India's minerals will be unable to meet the growing and increasingly sophisticated requirements of the expanding minerals consuming markets.

FUTURE DEVELOPMENTS: ELECTRIFICATION & BATTERY MARKETS

As well as meeting the demand of India's growing existing markets, mineral developers are also looking to the future mineral consuming markets in the region, in particular, the new generation energy markets using lithium-ion batteries and solar power.

The lithium-ion battery market is expected to grow exponentially in the next five years in India, driven by initiatives such as the National Electric Mobility Mission Plan 2020, with a projection of having 6–7 million electric vehicles on Indian roads by 2020, and installation of 175 GW of renewable energy by 2022. ▀

ABOUT THE AUTHOR

Mike O'Driscoll is founder and director of Imformed Industrial Mineral Forums & Research. Contact O'Driscoll at mike@imformed.com

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June/July 2020	Smart manufacturing: Good business practices for manufacturers
September 2020	Workforce development
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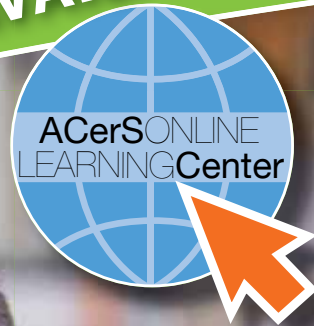
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