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SAFE PRACTICES: CORONAVIRUS AFFECTS CERAMIC MANUFACTURING BUSINESSES—AND PRESENTS NEW OPPORTUNITIES

SHARING KNOWLEDGE ACROSS THE CERAMICS SECTORS—REDUCING BATCH-TO-BATCH VARIATION IN ADVANCED CERAMICS USING PROCESS CONTROL

CASE STUDY: DIGITALIZATION OF AN ITALIAN CERAMIC TILE FACTORY

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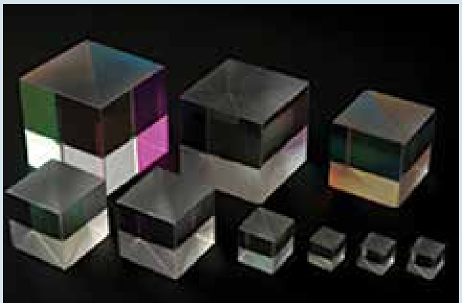
INDUSTRY NEWS



Among Showa Optronics' products are optically-contacted polarizing beam splitters.

KYOCERA ACQUIRES OPTICAL COMPONENTS MAKER

Kyocera Corp. entered into a share transfer agreement with NEC Corp. to acquire all of NEC's shares in Showa Optronics Co., Ltd., an optical components manufacturer. Showa will operate as a subsidiary of Kyocera under the name Kyocera Showa Optronics Co., Ltd. Kyocera's optical components business produces lenses used in fields including automotive, office and factory automation equipment, and medical equipment, since Kyocera entered this business in 1983. Showa, established in 1954, has targeted high-value-added markets, including space-related products, semiconductor manufacturing equipment, and medical equipment.

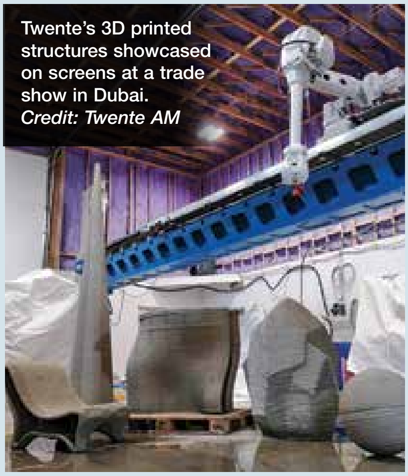
BATTERY CONSORTIUM SEEKS RESEARCH BIDS

The Consortium for Battery Innovation (CBI), which promotes research in advanced lead batteries, seeks research bids focused on energy storage applications, such as microgrids for renewable energy, load following for electrical grids, and demand response for commercial and industrial applications. CBI's technical innovation roadmap, issued last year, set the research goal of increasing the cycle life of lead batteries for energy storage applications by five times to 5,000 by 2022, a key technical parameter for renewable and utility energy applications.

CBI's request for proposals seeks research bids focused on innovation in advanced lead batteries for energy storage applications.

DUTCH STARTUP UNVEILS LARGE-SCALE CONCRETE 3D PRINTER

Twente AM, a Dutch startup focused on architectural 3D printing, unveiled its latest large-scale concrete 3D printer. It was developed and assembled at the company's research and development center in Nelson, Canada. Twente's goal was to develop a concrete 3D printer placed on a gantry-like structure capable of traveling 10 meters wide and five meters high. Parametric CAD/CAM software links directly to the machine to create shapes guided by algorithms. The reach of the printer coupled with its advanced articulation enables shapes that would otherwise be difficult with conventional formwork.



Twente's 3D printed structures showcased on screens at a trade show in Dubai. *Credit: Twente AM*

TOTAL S.A. LAUNCHES ITS LARGEST ENERGY STORAGE SYSTEM

A Total solar power plant in El Salvador. *Credit: Zylberman Laurent – Graphix Images – Total*

France-based energy company Total S.A. will launch a battery-based energy storage project in Mardyck, France. With a storage capacity of 25 MWh and output of 25 MW of power, the new lithium-ion energy storage system will be the company's largest in France. Scheduled for commissioning in late 2020, the storage system represents an investment of around $16.8 million. The project will provide reserve services to support the stability of the French power grid.

POWER METAL RESOURCES TARGETS RARE EARTHS DEPOSITS

The Ditau project may contain commercial deposits of rare earth elements.

Power Metal Resources said it planned to acquire a 51% interest in the Ditau project in Botswana from Kavango Resources. The company said it will fund the acquisition by issuing 35.7 million new shares. Power Metal said the "highly prospective" Ditau project targets commercial deposits of rare earth elements. It said due diligence for the acquisition will begin after the removal of coronavirus-related international travel and work restrictions, or Sept. 1. Power Metals would become the operator of the project following the purchase. Power Metal Resources is a London- based, African-focused metal exploration and development company.

EUROPEAN MANUFACTURERS COLLABORATE ON GREEN FURNACE PROJECT

Twenty European container glass manufacturers have agreed to build the first large-scale hybrid electric furnace to run on 80% green electricity. Called the "Furnace of the Future," it will be a hybrid oxy-fuel furnace running on 80% renewable electricity. It will cut CO_2 emissions by 50%. Ardagh Group, one of the largest glass packaging manufacturers, has volunteered to build the furnace in Germany. It will be built in 2022, with an assessment of results planned for 2023. The next steps will be to select a supplier, apply for a grant to the EC Innovation Fund, and set up a legal entity to manage the project.

The green furnace will cut CO_2 emissions by half.

GCL officials sign an agreement for the plant with the government of Feidong County in Hefei, capital of China's Anhui Province.

GCL TO RAMP UP SOLAR PANEL PRODUCTION

China-based solar manufacturer GCL System Integration Technology is planning to build a solar panel manufacturing plant with an investment of 18 billion Chinese yuan, approximately $2.5 billion. The facility will be built in eastern Hefei province and will have the capacity to make 60GW of solar panels annually. The plant will produce wafers, cells, modules, and other components such as junction boxes, back sheets, glass, EVA and aluminum frames. The plant is expected to increase GCL's panels production capacity by more than nine times.

CORNING PLANTS MEET EPA ENERGY CHALLENGE

Nine more of Corning Inc.'s global manufacturing facilities exceeded energy efficiency goals set by the U.S. Environmental Protection Agency's Energy Star Challenge for Industry program. Corning now has 27 facilities that have achieved the designation. To meet the challenge, industrial sites must increase energy efficiency by at least 10% in five years or less. The sites are: Corning Environmental Technologies plants in Port Elizabeth, South Africa, and Kaiserslautern, Germany; Corning Life Sciences facilities in Bedford, Mass., Salt Lake City, and Warsaw, Poland; Corning Specialty Materials sites in Fairport, N.Y., and Keene, N.H.; and Corning Optical Communications facilities in Gebze, Turkey, and Haikou, China.

Corning's Erwin, N.Y. plant. *Credit: Corning Inc.*

CORONAVIRUS **AFFECTS CERAMIC** MANUFACTURING **BUSINESSES—AND** PRESENTS NEW **OPPORTUNITIES**

By David Holthaus

Faced with a rising number of COVID-19 coronavirus infections, Pennsylvania governor Tom Wolf, like so many other government leaders, issued a stay-at-home order for his state in mid-March. Not long after the governor's order, phone calls and emails started coming in at Du-Co Ceramics' headquarters in Saxonburg, Pa.

Dozens of the family-owned firm's customers called wanting to know if the company would be able to continue supplying the components that are critical to making their products.

"The first call we got was from a company that makes ventilators," says Lora Cooper Rothen, Du-Co's CEO.

Ventilators, of course, have been in high demand as the respiratory illness spread and crippled the ability to breathe unaided for tens of thousands of people. The ventilators were needed to keep them alive, and Du-Co's ceramic components were essential to make the ventilators.

The ventilator maker wanted to double its usual order and wanted it expedited. "We were able to do that," Rothen said.

Rothen's company was able to pivot and meet the demands of its critical customer because of smart practices it had adopted long ago, practices that kept its operations running and its customers happy as the coronavirus pandemic affected the local, national, and global economies.

Manufacturers across the world were forced to respond quickly to business disruptions caused by a crisis unlike any other. Business worldwide essentially came to a halt as companies were ordered to keep their workers at home, if possible, to avoid spreading the highly contagious coronavirus.

Company leaders scrambled to protect their workforces, sanitize their workplaces, put into practice new guidelines on physical distancing, and plan for an uncertain future.

Du-Co has made it its practice to stock up on raw materials, such as alumina and magnesium oxide, which meant it could continue supplying the ventilator manufacturer and its other customers.

"We decided a long time ago that we needed to have the material in-house to prevent any shortages," Rothen says. "We probably have a year's supply of most of our materials in-house."

Many ceramic and glass manufacturers were declared essential businesses during the shutdown, which was a first step in managing through the pandemic.

Columbus, Ohio-based Harrop Industries, for example, makes industrial kilns and other products that are key links in the supply chains that ultimately serve the aerospace, defense, and transportation industries.

When Ohio governor Mike DeWine closed businesses in Ohio in mid-March, Harrop's offices and plant closed for two weeks, and everyone who could work from home did so.

At Du-Co Ceramics, managers served a pizza lunch to employees to boost morale. From left, Mike Crytzer, VP operations; Brel Saiber, general manager; and Tom Arbanas, president. *Credit: Du-Co Ceramics*

When the workplace reopened, physical distancing guidelines were in place to keep employees at least six feet from each other. In the plant, however, following those guidelines has been challenging and has slowed production, says Steve Houseman, Harrop president.

Steve Houseman
Harrop president

"When we're working on a kiln, building a kiln, there are times when people need to be close to each other," he says. "We've tried to adapt to that and keep people six feet from each other. That has slowed us down quite a bit."

To keep its employees safe, the company has reengineered some manufacturing tasks using only one worker where two were used before, or alternating workers, he says.

That's been difficult in the manufacturing areas at Reno Refractories, too, says James Hemrick, senior research engineer at the Morris, Ala.-based company.

The company produces refractories as well as finished shapes, mainly for the cement and steel industries. In the shape shop, it's been difficult to keep workers six feet from each other and still do their jobs, so the company adopted other safe workplace practices, including having the shop's employees wear full respirators and disposable clothing, Hemrick says.

Employee safety, always paramount in a manufacturing environment, became even more critical in light of the contagion's ability to spread easily. Employees tasked with looking after worker safety took on far-reaching new responsibilities.

"We've had to comply with other companies' safety requirements—our customers'," Hemrick says. "Our safety people have been tasked with that. That's been a whole other layer of added responsibility for those guys."

At Harrop Industries, some manufacturing tasks have been reengineered. *Credit: Harrop*

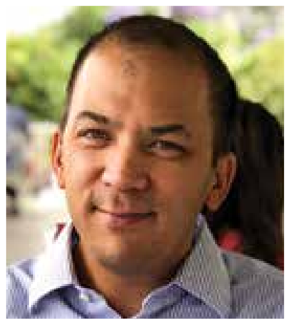
Reno is considering implementing a companywide COVID-19 testing program offered by Alabama's industrial health council. "Being a small business, it's feasible for us to get everyone tested and follow

Reno Refractories is considering a companywide COVID-19 testing program.
Credit: Reno Refractories

Reno Refractories has shelved a couple of capital projects it had planned for this year, Hemrick says. "We're definitely watching our capital and our funds," he says.

The company is focusing on existing business and meeting its current customers' needs, he says.

The same is true at Blasch Precision Ceramics, where the team keeps in touch with customers at least weekly to understand their needs and estimate future orders.



James Hemrick
Reno Refractories

up in a few weeks," Hemrick says. "That will give our employees a little bit of peace of mind."

In fact, compassion and promoting employee peace of mind has become a smart business practice that took on extra importance as employees navigate their workplaces and their daily lives with an invisible germ lurking.

"We're trying to be compassionate to everybody," Houseman says. "People that don't want to be here, we're not going to force them to be during this time."

Some chose to take unused vacation time all at once and stay home, he says.

Like other employers, Blasch Precision Ceramics is checking in more frequently with workers to make sure they feel healthy; has staggered breaks and lunch hours for all three shifts to keep workers at a distance from each other; has asked office staff, engineers and others who can to work from home; and has placed hand sanitizer stations around the office and plant.

"We want to make sure they're not overly stressed," says Keith DeCarlo, vice president of technology at the Menands, N.Y.-based company.

His company, like others, increased the frequency and intensity of plant and office cleaning done by a vendor and has accelerated the plant workers' use of N95 masks and P100 respirators that were already in stock.

The economic disruption caused by the pandemic and the uncertainty over how long it will last made business planning for the long-term difficult. Unnecessary travel was put on hold. Sales calls are being done remotely.

Long-term planning has become nearly impossible. "An annual forecast of markets is a very difficult thing right now," DeCarlo says. "That's a dynamic piece of paper as opposed to something we work to."

At Du-Co Ceramics, the company expanded the number of directors on its board and authorized considerable decision-making to a five-member executive team that is reaching out to insurance brokers, consulting with safety experts, and consulting with attorneys on potential personnel issues, Rothen says.

Because of the upstream position of ceramics manufacturers in the supply chain, many are still working off backlogs of orders. That may change as they look ahead to the second half of the year and the business slowdowns being experienced in the automotive, aerospace, steel, and other industries is felt.

"We've seen this before with a downturn in the economy where we're insulated for a couple of months, but eventually it does catch up with us," Hemrick says.

"Looking down the road, we're certainly going to plan to have less business than we have," says Harrop Industries' Houseman.

Some positive business developments have emerged from the crisis, although, as De Carlo says, "You definitely have to look for them."

Staff at his company became more efficient at administrative tasks, handling paperwork electronically and offsite.

In the production arena, they saw an opportunity to move into the medical equipment market with new high-purity materials its researchers have developed in the last year, he says.

With daily operations slowing, there's more time to focus on innovation.

Researchers at Reno Refractories have been working on a new product line for a couple years and that's taken on a new importance, Hemrick says.

"It's given us a little time to focus on some of that activity on the R&D side, where we don't have to support the day-to-day operations so much," he says.

Keith DeCarlo
Blasch Precision Ceramics

Du-Co Ceramics prioritized a goal of becoming more self-sufficient, Rothen says. Its executives decided to manufacture more of the firing fixtures it uses and purchased equipment to do that.

That focus on finding new products, processes, and practices is one positive impact that may come about from the COVID-19 crisis.

"It's finding that opportunity," Hemrick says. "There is opportunity here even in the midst of all this."

At Blasch Precision Ceramics, employees practice safe physical distancing. *Credit: Blasch Precision Ceramics*

A CHECKLIST FOR REOPENING SAFELY

By J. Douglas Jeter, PE, CSP

Here are some suggestions to help with initial reopening and longer-term preparedness planning in the wake of the COVID-19 pandemic. Best practices are ever-evolving, so be sure to follow current guidelines as set by your local, state, and national health departments.

UPON REOPENING:

1. Post signs at the entrances to your facility to remind people that social distancing protocols are in effect.
2. Make hand sanitizer available around building entry points, shop floors, lunchrooms, office areas, and other gathering spots. Be sure sinks are well supplied with soap.
3. Doors that can stay open without violating local fire codes should remain open, eliminating the need for touching them.
4. Sanitize frequently touched surfaces (light switches, copier, and microwave touch pads, remaining doorknobs and handles, etc.) at least daily.
5. Let employees who can continue to work from home do so, especially those with COVID-19 comorbidities such stroke, lung, heart, or kidney conditions, or those in an age demographic representing increased risk.
6. Stagger shifts to limit exposure of overlapping crews at shift change.
7. To the extent possible, reduce nonemployee access to your facility. Move locations for inbound receiving (including mail) to the periphery of your building.
8. Provide masks, gloves, and hand sanitizer for employees whose role requires public contact, such as field service and delivery personnel.
9. Anyone who travels by air should wear a mask for the duration of their time onboard the aircraft.

LONGER TERM: Since the 2003 SARS epidemic and 1918 Spanish Flu came in multiple waves, it is not unrealistic to expect that there will be some uptick in cases as restrictions are eased and the virus mutates over time. The following steps will help prepare your company should stay-at-home orders be reimposed:

10. Restock the supply of N95 masks, hand sanitizer, disinfectant, gloves, etc., and increase the minimum quantity of these items kept on hand.
11. Address any deficiencies in your remote IT infrastructure that surfaced during the March-April 2020 timeframe, such as issues with remote access to email or servers.
12. Provide training for those not yet comfortable with video conferencing.
13. Along with making your IT infrastructure more robust, make sure your IT security is up to the task. Computer viruses, hacking, and industrial espionage are all too prevalent.
14. Update disaster recovery and business continuity plans to include pandemics.
15. Beyond normal succession planning, consider how the role of key contributors and those fulfilling key positions would be covered in the event of their temporary or long-term absence. This takes on heightened importance for "essential" businesses.
16. Document processes and procedures for any critical functions.
17. Review your Employee Assistance Program. Does it adequately serve the mental health needs of employees in the current environment?
18. Put agreements in place now to secure supply chains in the event of future pandemics.
19. California has an occupational standard (the Aerosol Transmissible Diseases (ATD) standard, Title 8 CCR; Section 5199) for the prevention of worker illness from infectious diseases that can be transmitted by inhaling air containing viruses, bacteria, or other disease organisms. Depending on the work environment, it might be helpful to implement the measures called out in this standard. **https://www.dir.ca.gov/title8/5199.html**

ABOUT THE AUTHOR

J. Douglas Jeter is director of sales and marketing for Harrop Industries.

J. Douglas Jeter at work. *Credit: Harrop*

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SHARING KNOWLEDGE **ACROSS THE CERAMICS** SECTORS—REDUCING **BATCH-TO-BATCH** VARIATION IN ADVANCED **CERAMICS USING** PROCESS CONTROL

By Andrew Perry

As ceramic processes leader at Lucideon, I'm in the privileged position of working with a wide range of clients who manufacture and process many different types of ceramics, covering all of the different ceramic sectors from technical ceramics through to building products and whitewares. Although the sectors are very different in terms of the products they produce, the issues they face are often similar with variation in product performance, processing, and yield issues being the key areas of concern.

While many of these sectors have little communication with each other, the Lucideon team, specialists in specific areas who come together to work as one to tackle a client's problems, has in-depth knowledge of challenges across all sectors. What is apparent to us is the very different approaches to processing in the different sectors and how cross-fertilization of knowledge across sectors could help to solve challenges. Simply put, what can they learn from each to improve their processing?

In this article, I'll look at where problems can occur with processing and how the technical ceramics industry might take up lessons learned in the more traditional, clay-based sectors to reduce those problems.

Andrew Perry
Lucideon

PRINCIPAL SOURCES OF VARIATION

For all production processes, the classic areas where problems can be introduced are man, material, machine, and process. Slight variations in each of these areas, and in the combination of these areas, can have a profound effect.

Man

People influence many areas in the process, including the design of the process itself, and the many process controls that are implemented. Starting at the beginning of the process, the operator needs to select the correct raw material and weigh the required quantity of each material to produce a batch, an area where we often see potential for error. Many advanced ceramic manufacturers produce items of relatively small dimension, therefore a "batch of material" may be a couple hundred kilos at the most. Compare this to other areas of ceramics manufacture where batch sizes of several tons are more typical, which

in turn have prompted greater use of automation. The direct effect of an operator weighing out the material, has a number of aspects:

- Correct material,
- Correct material quantity,
- Housekeeping/contamination between materials,
- Following the correct use of instrumentation,
- Testing regime and procedure.

Each one of these areas has the potential to introduce variation irrespective of the final product type.

Process

Process variation covers a huge potential area, for any part of the process that can be adjusted, intentionally or unintentionally, has the potential to cause variation. For example, a spray dryer can be adjusted by various parameters, or the speed at which the product moves through the process can be adjusted—both these would have a dramatic effect on final product performance.

These variables are often used by the many process improvement tools such as Six Sigma, lean manufacturing, and demand flow technology, all of which are excellent tools to benchmark and map the key process variables and the associated throughput by area. In the clay-based ceramic sectors, process design will often require quality control checking at various stages, something that is usually not seen as required when designing a process to produce a technical ceramic.

Material

Raw material type is normally what differs in processing routes and methodology across the ceramics manufacturers, and hence is normally the driver for the different approaches to material control. The term 'raw material' is also used in different ways, depending on how much material processing is performed by each client. For example, one site may purchase a blended suspension or even a dust/granulate, which is called the raw material by that site, whereas another may take individual materials that require further processing and storage, blending them into a slurry or paste with a range of additives and organics. Each component here may be termed the raw material. It is therefore important to understand what is defined by the term raw material.

Batch to batch variation of a single material or blend gives rise to investigations in the following areas:

- Particle size,
- Chemistry,
- Rheological properties,
- Firing characteristics,
- Forming variables.

At this stage, the material specification, and the associated tolerance during further processing, becomes the focal point. It is very common for both nonclay and clay-based manufacturers to find that the mate-

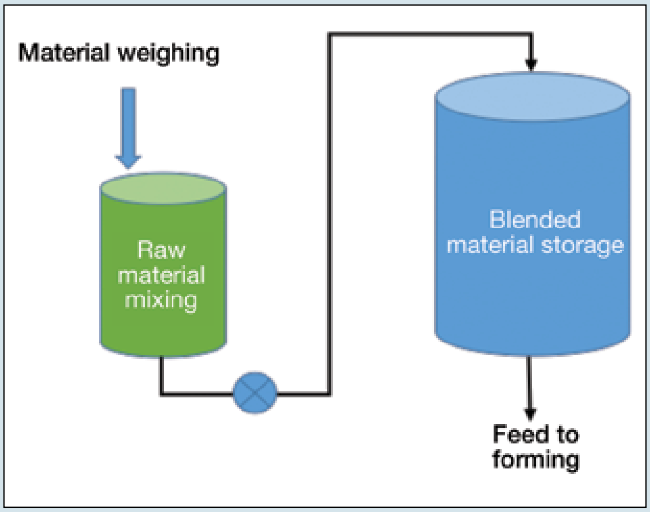

Figure 1. Schematic of typical material preparation for an advanced ceramic suspension.

rial is "within specification" and yet different enough from the last batch to cause problems in a process. This issue is normally because one particular aspect of the raw material is key to a given process and has less tolerance in a specific area than the raw material manufacturer provides. This point may lead to the raw material supplier being able to adjust or blend products for the manufacturer, provided the

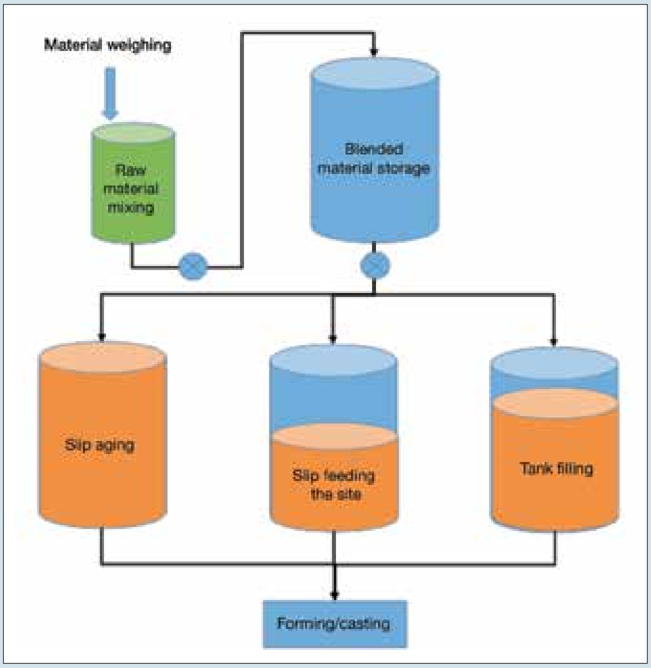

Figure 2. Schematic of typical three-tank slip storage system often utilized within clay-based production systems.

economies of scale make sense, a distinct disadvantage when very low volumes are being consumed, as in the case of the production of technical ceramics.

Raw material specification is normally a function of the level of processing a material undergoes. Materials for technical ceramics may have tighter specifications and higher purity requirements than the clay-based side of the industry. The added complication of particle shape and organics within the clay side of the industry then leads to different approaches to the processing of the required raw materials in the production of a blend.

THE PRODUCTION OF A CERAMIC SLURRY, COMPARISON BETWEEN TECHNICAL AND CLAY-BASED CERAMICS

Figure 1 shows a typical processing route for an advanced ceramic suspension or slip. In this technical ceramics example, the recipe of the blend will include any surfactants and required binders as functions of the dry weight of the primary materials. Here, the purity of all the materials is critical. The materials are blended in the mixer for a given time before being fed to the associated storage tank, often held overnight under constant agitation before being formed.

A similar system is used within the clay-based side of the industry, with additional storage facilities. Larger batch sizes also dominate, which correlates to the daily usage of each material type.

Figure 2 shows an example of the classic way in which clay-based ceramic systems ensure that the rheology of the final slurry is under tight control. The blend is produced in the same manner as with technical ceramics; however, the deflocculants/surfactants are treated as super-additions, such that the addition level can vary. The three-tank rotating system utilizes a feed tank that supplies the site, an aging tank, and a tank that is being filled. The rheology of the slip feeding the "filling" tank has been adjusted to the required target values, the rheology of the slip in the aging tank is monitored and adjusted if required, and the rheology of the feed tank to the process is recorded.

The key reason for the difference between the systems is the state of deflocculation of each ceramic system. Technical ceramics tend to operate with the maximum surfactant level controlling the final viscosity as a function of the solids loading.

Figure 3 shows the deflocculation curve for both clay-based and technical ceramics, plus the typical operating region used to produce the best results during forming.

The graph (Figure 3) shows that the clay-based systems do not typically operate at full deflocculation, and therefore require both measurement and control systems to ensure they are in the correct region of the curve. These differences have also led to a range of different rheology control systems, with technical ceramics being far closer to Newtonian than clay-based. Often, a single viscosity point will be measured at a relatively high shear rate, for example, using a Brookfield viscometer with spindle number 2 or 3, at 70 rpm to record a single viscosity. Clay-based measurement systems will consider the change in viscosity with time, and a range of different measurement systems are utilized, often performed at lower shear rates to allow the material to gel without the measurement device destroying the gel during testing.

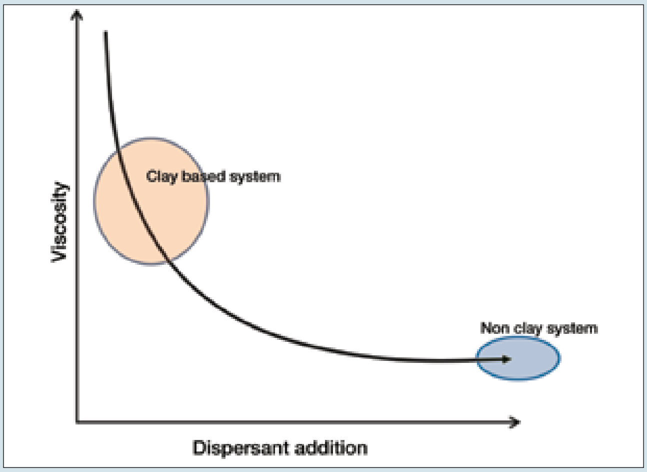

Figure 3. Deflocculation curve representation, showing the deflocculation level utilized for clay and non-clay slip in relation to the viscosity of the associated suspension.

WHERE DOES THIS COMPARISON TAKE US—KEY LESSONS

As with any other industry, process steps and controls are only in place because they have to be. Variation within an individual process is also built into the tolerance of the whole process. For example, a firing curve is normally longer than it needs to be, as is drying, which increases cost and timescales. It is often the interaction between process variations that ultimately leads to production issues. For example, an individual process may be within the agreed tolerance of the measurement system employed, however, that measurement system might not be delivering all the required information to ensure the material is suitable for the whole process. If it isn't, what correction steps are in place?

Six Sigma teaches the importance of measuring the measurement system, via Gauge R&R (reliability and repeatability) and the importance of data itself, especially within the analysis of multivariable systems. The effect of variation from the three key sources—man, process, and material, needs to be quantified with regard to the effect on a given process and its output. To understand this variation, it must be measured, and measured in a repeatable fashion.

In the example of suspension preparation discussed here, the clay side of the industry performs a large amount of rheology testing, and often adjustments associated with each measurement could be argued are a result of variation within the incoming materials, and the fact that the point of deflocculation is critical. On the technical ceramics side of the industry, though, the nature of the materials used and the deflocculation state mean that less variation will occur. While the effects of material variation are therefore rare, there are still man and process variations with which to contend. The lack of relevant testing after each process is often the primary cause of faulty parts. If tests were carried out, information could be used as part of a multi-vary analysis to better understand the most important variables in the system.

The effect of variation on the final product from each source must be evaluated to drive the required process controls, and to determine the key process requirements and capability of each process step. The best-performing sites within the clay side of the industry perform a series of tests after each process step—because they have to. While traditional ceramics manufacturers still have a lot to learn with regard to the correct testing regimes and interpretation of the associated data, in order to optimize processing times and yield, the technical side of the industry could learn a lot from them. Rather than relying on material purity and consistency, more selective and relevant testing could help them to understand the interaction of variation from each stage through the process, and each input variable.

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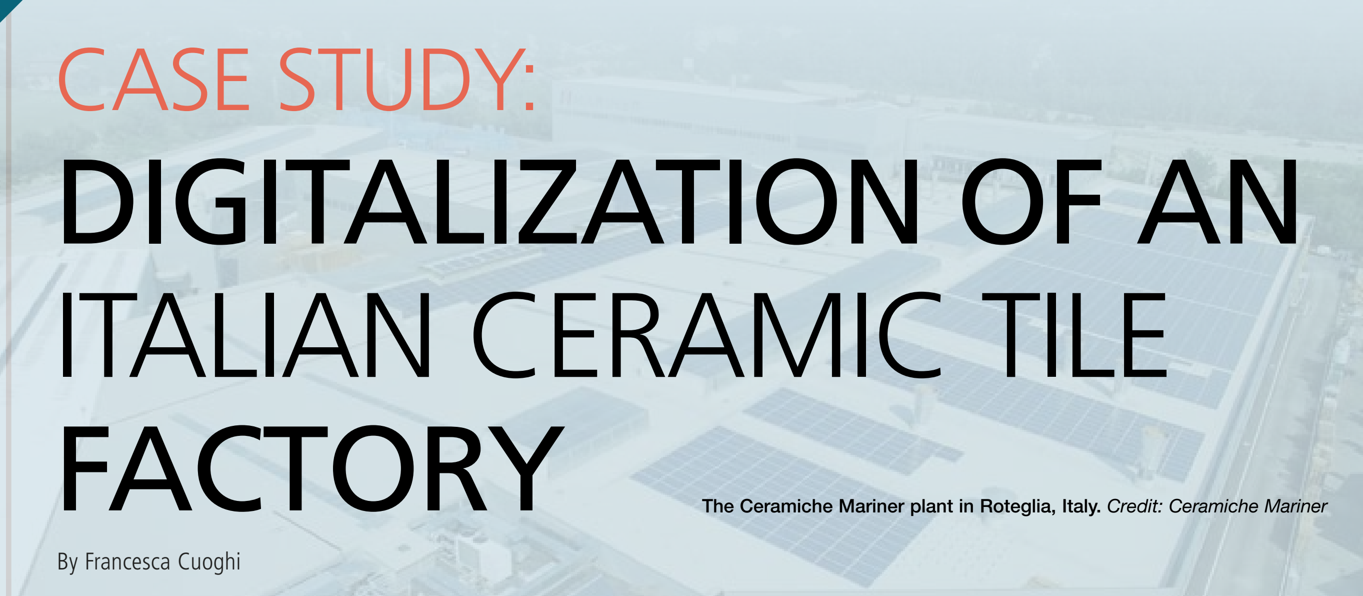
CASE STUDY: DIGITALIZATION OF AN ITALIAN CERAMIC TILE FACTORY



The Ceramiche Mariner plant in Roteglia, Italy. *Credit: Ceramiche Mariner*

By Francesca Cuoghi

The need for production customization, the reduction of lot sizes, and the possibility of producing a unique product are the new challenges facing the manufacturing industry.

The complete digitalization of processes, the use of shared resources, and the efficient management of data are fundamental elements for the development of a new industrial model designed for flexibility and sustainability.

The first completely digitalized factory for the production of ceramic tiles can be found in Roteglia, in the province of Reggio Emilia, in the heart of the Italian ceramics district.

Ceramiche Mariner SpA took on the role of promoter of this new industrial approach, and Prime is the software platform developed by System Ceramics that made it possible to implement this concept of digital manufacturing.

From the processing of raw materials to the finished product, Prime manages the entire production flow through IT systems that monitor the entire process, making use of a latest-generation graphic interface and 3D technologies.

System Ceramics adopted "edge computing" to implement this project. With edge computing, the information technology resources are positioned near the sources of data in a collaborative ecosystem where machines learn from people how to interpret and anticipate relationships between processes, giving rise to possible solutions.

Ceramiche Mariner is an example of horizontal integration and collaborative industry: the new factory represents the evolution toward an open architecture and an example of communication and collaboration that goes beyond the confines of the factory.

The choice to use Prime reflects a new, human-centered manufacturing concept, where the information generated inside the factory, managed and transformed through human intervention from a simple datum to useful knowledge for improving the process and value chain, is at the heart of the industry of the future.

This innovative approach represents a real evolution and transformation of System Ceramics' role. The company, a constructor of systems and machines for the ceramic sector, has become a supplier of cutting-edge services, where the organizational structure and business model are redesigned in keeping with the fundamentals of mechatronics, finding its winning ally in digital transformation.

With regard to hardware, System Ceramics focuses on robotized automation, through which its technologies can change settings via software, without the intervention of an operator.

The company has committed to a process of digitalization for some time to offer customers smart manufacturing solutions that were very complex until recently.

The computerization of production systems, the automatic reconfiguration of machines, and total traceability, besides being a reality today for System Ceramics, achieved success and recognition at an international level among various operators in the sector.

These developments represent a turning point for the ceramics industry. The company, based in Fiorano Modenese, has been a leader in its sector for 50 years, opening up application solutions in the manufacturing world and creating new standards.

"We are proud of what's been done so far and, most of all, of having developed real 4.0 manufacturing in our own territory, with our own workers and with a first-class technological partner such as System Ceramics. We have a 100% digitalized factory, demonstrating a farsighted entrepreneurial vision, envisioning a new way to do business," says Giulia Catti, CEO of Ceramiche Mariner SpA.

ABOUT THE AUTHOR

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