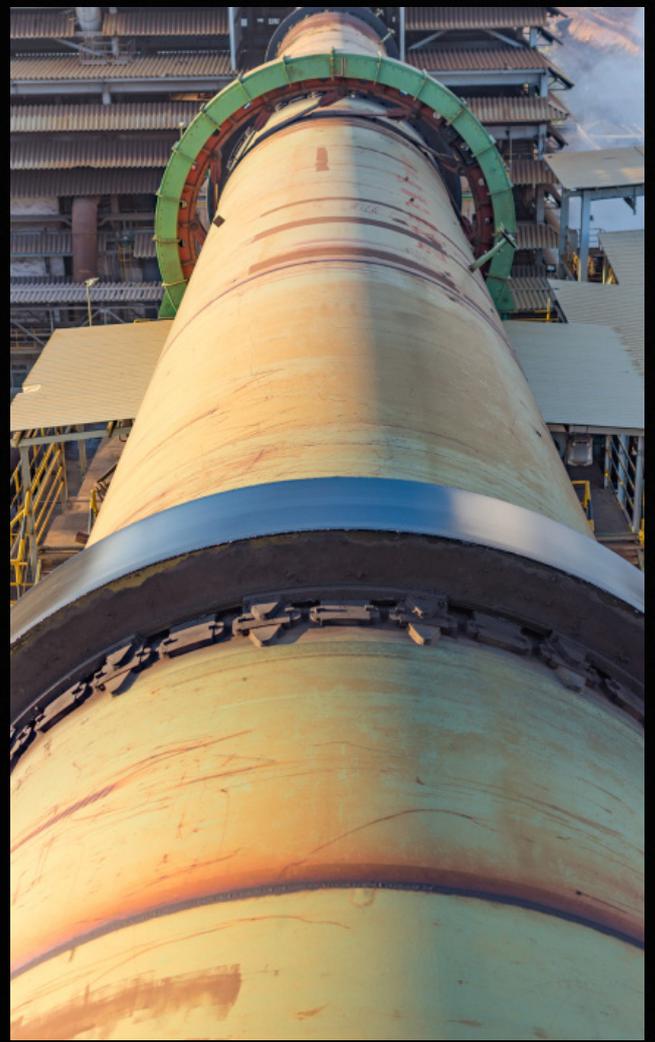




FCT Calcined Clay Technologies

FLASHCALX & ROTACALX



Fuel-flexible and quality tested for sustainable cement production and significant emissions reductions

Increase sustainability and reduce costs with Green Cement

Cement is one of the world's most vital industries. However, as with every energy intensive industry, cement production is also responsible for significant environmental impact, with approximately 8% of the world's man-made CO₂ emissions attributable to the process. One of the ways to reduce this impact while maintaining product quality is to replace clinker with Supplementary Cementitious Materials (SCM) such as calcined clay, also known as pozzolan.

Using FCT technologies, calcined clay can be produced via two different methods. FCT FlashCalx™ is a suspension calciner, while FCT RotaCalx™ is based on a rotary kiln and can be supplied new or modified from existing equipment the customer may already have. As a supplier of both flash calcining and rotary calcining options, FCT is an unbiased partner to carefully assess each client's unique case and select the most appropriate solution for their needs and environment.

One of the challenges to the commercialisation of calcined clays in cement is the ability to maintain the traditional grey colouring, as the iron (Fe) content often found in the material can result in a reddish hue in the final product. There are methods to overcome this, including quenching, maintaining a reducing zone during cooling using injection close to the kiln discharge, and/or injecting fuel mixed with the raw clay, but these options can have significant issues such as increased plant-specific consumption and the creation of other hazardous emissions.

Fortunately, FCT has a proprietary solution (patent pending) to control the colour of calcined clay cement using the addition of inorganic modifiers. This solution ensures clients can achieve the traditional grey cement colouring that end-users are used to - without the disadvantages of the traditional methods.

At FCT, we have an experienced, specialist team who have successfully commissioned tens of plants around the world for calcined clay cement, including both brownfield and greenfield projects. With a network of international offices dedicated to serving clients in North America, South America, Europe, Africa and the Asia Pacific region, FCT Combustion has the team, experience and local presence to assist clients easily adopt clay calcining technology.

The use of FCT calcined clay technologies can

- **INCREASE PRODUCTIVITY**
- **REDUCE ENVIRONMENTAL FOOTPRINT**
- **DECREASE FUEL CONSUMPTION**
- **REDUCE ELECTRIC POWER CONSUMPTION**
- **MODEST CAPITAL COSTS WITH FAST PAYBACK**
- **REDUCE MAINTENANCE COSTS**
- **PRE-TESTING OF MATERIAL FOR QUALITY ASSURANCE**



FCT has a proprietary solution to control the colour of calcined clay cement, to ensure a traditional grey hue regardless of Fe content

TECHNOLOGY

Two solutions for clay calcining: FlashCalx and RotaCalx

EXPERIENCE

Specialist clay calcining team have commissioned tens of clay cement plants globally

GLOBAL PRESENCE

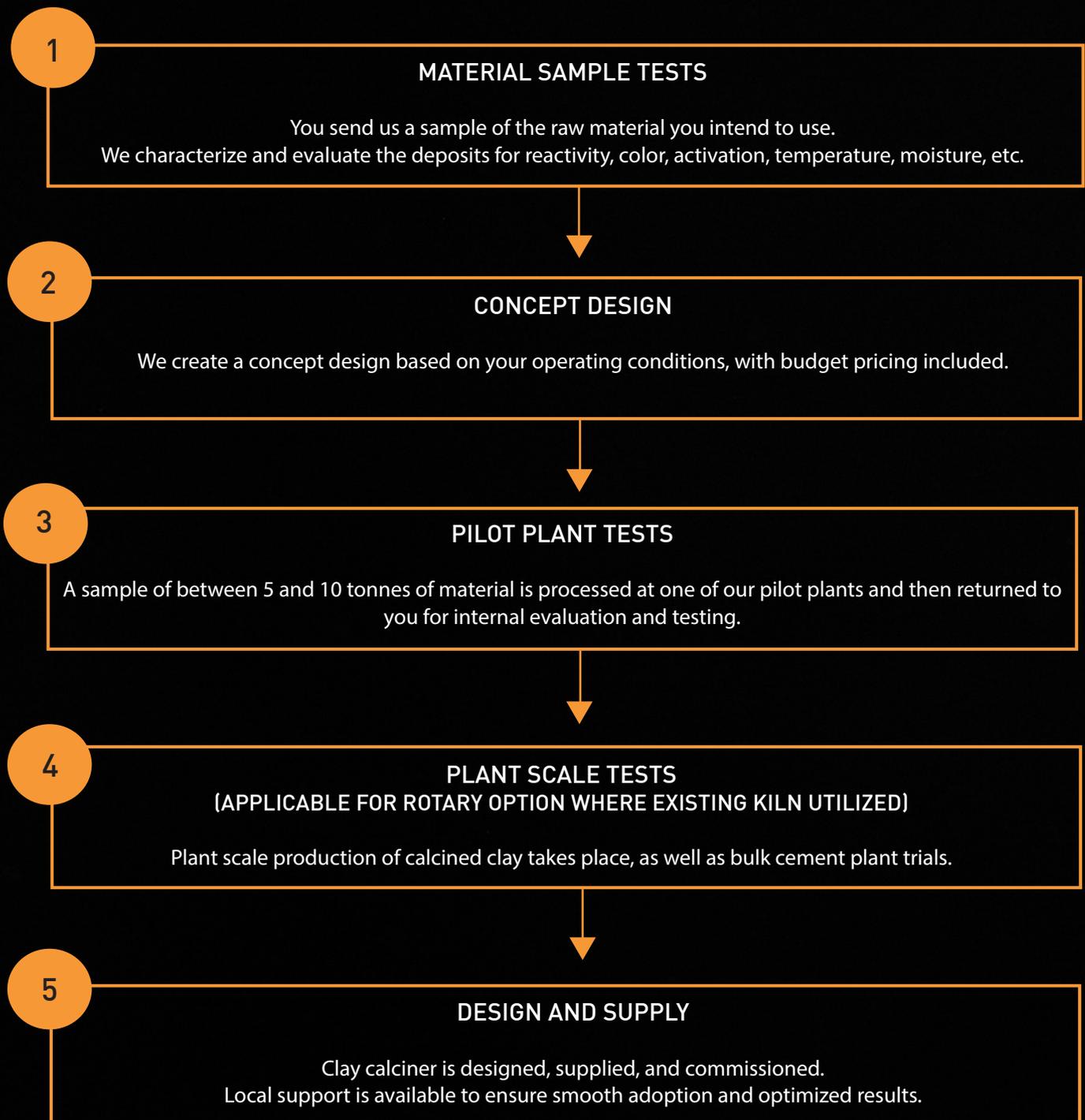
Network of international offices to provide local support for clients



A rigorous process to ensure quality, prior to installation

FCT collaborates with associated laboratories to perform a complete set of tests including XRD, Pozzolan Activity Index, Thermogravimetric/ Differential Scanning Calorimeter and Le Chappelle/ Reactivity Tests and colour tests by different methods. FCT also has access to pilot plants in Europe and South America for testing. The synthetic pozzolan produced is shipped back to the client to allow the preparation of different cement blends with the produced pozzolan for laboratory assessment of its strength.

It is also possible to do industrial scale tests in plants that work in partnership with FCT to provide significant and consistent tests. The calcined clay can be shipped back to the plant to allow plant scale tests in the cement blending circuit for final proof of quality before building a complete plant.



Fuel-flexible with economic and environmental benefits

FlashCalx™ combines the flexibility to use the least expensive and most readily available fuels, with the environmental and economic benefits of using flash calcining technology for sustainable cement production.

Available in standard sizes to optimize engineering and shipping costs, FlashCalx™ has a minimum footprint and can easily fit in new or existing plants with customization available to suit different moisture contents, fineness and fuel types.

- Lower overall energy consumption
- Quick set-up with a calcination time of just seconds
- Low thermal inertia with limited amount of refractory lining
- Precise temperature control for highly reactive pozzolan
- Only one grinding system is required
- Static system results in less maintenance
- Lower rate of under- or over- calcination
- Quick return of investment

FUEL USAGE 450-600 kcal/kg
(depending on raw material mineralogy)

- FUELS**
- Oil
 - Gas
 - Petroleum coke (0 to 10mm)
 - Mineral coal (0 to 10mm)
 - Wood chips (10 to 30mm)
 - Biomass (including wood pellets, wooden briquettes, sugarcane bagasse, other)
 - Refuse derived fuels (RDF)



FCT's FlashCalx™ suspension calciner



Better temperature control and improved reaction times

How does it work?

Prior to the flash calcination, raw material must be dried down to 1% moisture. This is accomplished either by a flash dryer, a rotary dryer, or their equivalent depending on the moisture. In some cases, a dryer-grinder might be required.

The selection of the dryer-grinder should be done case by case, very carefully considering the moisture and composition of the material. The flash calciner exhaust gases are used to dry the raw material so that the operation does not require external heat source to dry the material.

Clay is co-currently fed to the flash calciner and preheated in a traditional set of two preheating cyclones, where hot gases coming from the calciner cyclone transfer heat to the feedstock. This provides significant heat savings for the system. An induced draft process fan controls the transport in the preheat/calcination sections, while a baghouse filter is applied for dedusting.

The installation comprises a state-of-the-art hot gas generator that gives huge flexibility on the type of fuel to be used. The hot gas generator, also proprietary to FCT might fire traditional fuels as natural gas, fuel oil and pulverized fuel or a fluid bed hot gas generator that can burn lumpy coal and alternative solid fuels.

In-between the calciner riser and calciner cyclone, the dihydroxylation of the clay is achieved. Reaction temperature is easily controlled by a temperature-fuel PID loop, normally ranging from 700 to 900°C. The control of temperature in a narrow range is key to avoid the crystallization of the calcine.

Refractory is only applied in the combustion chamber, riser and calciner cyclone, which allows for faster and cheaper heat up. This makes it possible to re-start the system from cold condition within 1-2 hours. All material transport through the system is either pneumatic conveying or gravity, which is translated into a low maintenance, low weight and high reliability installation.

After the completion of the reaction, the product arrives at a set of cooling cyclones, responsible for decreasing the calcine temperature while recovering heat both to the hot gas generator and raw clay drying. Another process fan controls the gas flow in the cooling section.

The final product can be pneumatically or mechanically conveyed to the product silos or straight to finish mill separator to be blended with cement.

As FCT's flash calcination easily controls and prevents the melting and agglomeration of the clay, the calcine has high specific surface, leading to a highly reactive pozzolan.



FlashCalx™ installation can include a state-of-the-art hot gas generator, which provides extreme fuel flexibility



RotaCalx™ technology for greenfield or brownfield projects

RotaCalx™ is based on a rotary kiln and is applicable for either greenfield or brownfield projects.

FCT offers supply of new kilns and equipment, or alternatively, we can match existing parts of old kilns or dryers with new equipment to complete the design and supply of a clay calcining plant with reduced capital costs.

FCT has extensive knowledge and experience in the conversion of clinker rotary kilns to clay calciners, and longer kilns can be very effectively repurposed for this application.

Although homogenous granulometry is required to achieve homogenous calcination, rotary calcining allows for a coarser feed material to be utilized due to longer residence time in the kiln.

For clays with higher moisture content, RotaCalx™ may also be an attractive option since there is potential to directly feed the material to the back of the kiln. This can result in reduced costs associated with pre-processing, since there is no need for grinding and drying the material prior to calcination.

RotaCalx™ allows for the use of a wide range of fuels and the ability to fire multiple fuels at once, so that the cheapest and most convenient fuel can always be utilized. Suitable fuel sources include solid, liquid, gaseous and alternative fuels.

Rotary calcining can also be a good option for operators wanting to utilize fuels that are lighter in weight, such as fluff or sawdust, that may not be as suited to use in the hot gas generator installed as part of a flash calcining plant.

- New or existing equipment
- Drying and calcination in a single unit
- Burner or combustion chamber
- Utilization of de-commissioned machinery
- Fast track
- Broad range of fuels, and multi-fuel firing
- Allows for coarser feed granulometry
- Easy operation



FCT's RotaCalx™ calciner



Flash or rotary calcining? Selecting the best method

Calcined clay has proven to be a sustainable alternative, offering both environmental and economic benefits to cement producers, as well as contributing to enhanced durability and plasticity within the concrete.

FCT offers state-of-the-art technologies, delivered by a specialist team with proven experience in the successful commissioning of calcined clay cement plants across the globe.

In general, the key benefits of flash calcining include better temperature control, faster reaction time, reduced fuel and operating costs, and increased alternative fuel firing capabilities. Alternatively, the use of a rotary kiln can be an attractive option when working with clays of high moisture content, or using a coarser feed granulometry.

Whether flash calcining or rotary calcining, choosing the best solution for a specific site depends on the types of fuel, available CAPEX, existing equipment, raw material characteristics, and more.

To get the best results, it is important to know the clay activation mechanisms and particularities in detail. Having an experienced partner can reduce risks and shorten the learning curve of plant personnel.

FCT is ready to support the customer to select the most appropriate method and deliver the best solution to produce high quality activated clay. We provide clients with assistance from conceptual engineering to EP(C) to production.

Contact us for unbiased and comprehensive evaluation of the best calcining solution for your needs.

VISIT [FCTCOMBUSTION.COM](https://www.fctcombustion.com)





Setting global performance benchmarks in pyro-processing.

FCT Combustion is the world leader in optimizing high-temperature processing plants to realize new levels of performance for productivity, emission control, fuel efficiency and flexibility to meet ever-changing requirements.

Our pyro-processing products and expertise are all based on proven and industry validated techniques, helping our global customers be competitive as their needs and industry conditions change. Our designs, engineering and product range are used in the world's most competitive mineral processing plants.

FlashCalx™ & RotaCalx™

FCT CLAY CALCINING TECHNOLOGY

Unlock the performance of your process plant.

Reduce both costs and emissions through sustainable cement production, with extreme fuel flexibility

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