# *HexBrick PLUS* - New designs of ceramic bricks with hexagonal cells

## Only one brick will be multiplied its sound absorption capacity on the equivalent of four bricks and half

*A multidisciplinary team of UPM, of researchers from the School of Engineering and Industrial Design and School of Architecture, has developed new designs of ceramic bricks with horizontal hexagonal holes that improve the sound absorption characteristics of the conventional ceramic bricks with square or rectangular holes. This invention develops "new geometries" of cells of the ceramic bricks and constitutes a new, more efficient and a more competitive building system for wall construction. These new designs have won the award and the honorable mention for the best research paper in 2014 at the "International Conference on research related to Mechanical, Engineering Design & Advanced Manufacturing" held in Toulouse (France) in June 2014.*

**Technology solution supported by the Technical University of Madrid**

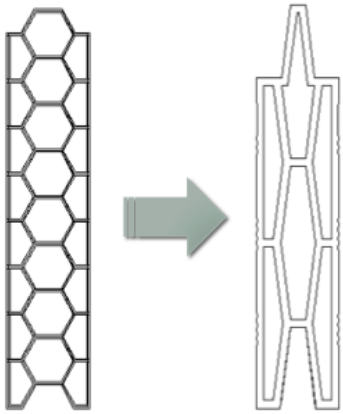
## Technology solution

HexBrick Plus is a new design of the internal geometry of ceramic bricks based on horizontal perforation with a hexagonal geometrical arrangement. It offers an innovative solution that satisfies the requirements of sound insulation of the walls keeping the exterior dimensions of the conventional bricks.

The improvements of the internal geometry of the horizontal hollow ceramic brick with cells hexagonal, under equal exterior dimensions, get multiply the sound absorption capacity of a single brick by the equivalent of four and half conventional bricks.

This new solution satisfies the requirements of sound insulation walls, without increasing the outside dimensions of conventional brick and also without increasing costs.

***"The improvements made on the internal geometry of the horizontal hollow ceramic brick with hexagonal cells, under equal exterior dimensions, get multiply the sound absorption capacity of a single brick by the equivalent of four and half conventional bricks"***



## Areas of application

- Sector construction of buildings

## Market demands

• Building systems that ensure acoustic comfort inside homes, without increasing costs.

• Technological solutions as well as improving the energy performance, comfort and sustainability, that are adaptable to customer needs, and are industrializable and competitive in price with traditional construction systems.

• The need to improve the mechanical resistance and the weight reduction has led bricks with lower acoustic absorption capacity , and therefore a higher transmission of noise.

• The current horizontal hollow ceramic brick has a square or rectangular hollow with a design that allows direct transmission of noise between the walls of said bricks. This arrangement makes the transmission of airborne noise between the outer faces of the wall it is direct and acoustic damping is very low.

***"In the hollow ceramic bricks marketed with square or rectangular, their absorption capacity and noise damping are limited by the width dimension of the piece"***

## Market potential

▪ **Global expectations**

• The worldwide meteoric growth of construction (about 70%) is concentrated mainly in China, USA and India. [Oxford Economics y Global Construction Perspectives]

• Expecting an increase of around 33% in the USA employment for the period 2010-2020, reaching a total of 1.8 million jobs in the sector for 2020. [Statistical department, USA]

▪ **Spain**

• Growth of Spanish sector around 2,5% in 2015-2020 [Oxford Economics y Global Construction Perspectives]

• In Spain, the potential housing demand will be situated above 300,000.00 homes between 2011 and 2016. [BBVA, 2011]

## Competitive advantages

• Under equal exterior dimensions, a single brick multiplies his sound absorption capacity by the equivalent of four and a half of conventional bricks"

• Properties of Large format LGF-LD, uncoated commercial bricks obtain an attenuation of 33 dBA (CTE DB-HR) and the LGF-LD "ladriyesos" ceramic bricks coated with plaster with a thickness between 5 and 10 mm are obtaining an attenuation over 50 dBA, inside Silensis System.

• If the manufacturers decide to use the new designs of ceramic bricks developed by our investigation, it would be necessary to revise upward the acoustic damping values indicated on this last point, No.9, both for uncoated and coated bricks, multiplied by more than FOUR times.

## IPR

▪ Patent granted in Spain [ES2265234 ]

▪ Application for Patent of Addition in Spain [P201430877]

## Development stage

| | |
|---|---|
| ○ Concept | ○ Industrial Prototype |
| ⊕ R & D | ○ Production |
| ○ Lab Prototype | |

## References

▪ These new designs have won the award and the honorable mention for best research paper in 2014 at the "*International Conference on research related to Mechanical, Engineering Design & Advanced Manufacturing*" held in Toulouse (France) in June 2014.

▪ Research Group with extensive research experience and collaboration with industry.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