

Development of a Hollow Concrete Block with Improved Thermal Properties, Having Same Dimensions and Load Bearing Characteristics as the Traditional HCB (THERMHCB)

Galea Curmi Engineering Services Ltd. (Lead Partner)

JCR Ltd. (Industrial Partner)

University of Malta (Academic Partner)

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AIMS

- To develop a hollow concrete block which has a higher resistance to the transfer of heat over traditional building materials.
- To use the same dimension of existing blocks
- To be load bearing
- To require no additional training for builders
- To develop rendering that will add more insulation to the new block

U-Values of Building Materials

Building Element	U Value
Hollow concrete block (230mm thickness, conventional type)	2.75 W/m ² K
Limestone slab (230mm thickness)	2.71 W/m ² K
Double wall made of limestone slabs (410mm total thickness) including bond-stone	1.58 W/m ² K
Solid brick wall (225mm) with 10mm mortar joints	2.0 W/m ² K.
Cavity wall with no insulation	1.6 W/m ² K

Aim is to produce a U-value that is between 10 and 30% lower than HCB

Rendering to improve performance by a further 3-10% per 100 mm

Main Aggregates

- Hard stone
- Cement
- Expanded clay
- Bakelite
- Polystyrene
- Sand
- Special binding additives
- Water

U-Value Measurement

- ISO 9869 Part 1: Thermal insulation — Building elements — In-situ measurement of thermal resistance and thermal transmittance — Part 1 : Heat flowmeter method
- ISO Draft 9869 Part 2: Thermal insulation — Building elements — In-situ measurement of thermal resistance and thermal transmittance — Part 2 : Infra-red method

Structural Tests

- Structural strength tests and other tests on the prototypes shall be carried out to test:
 - the compressive strength of the prototypes;
 - other structural integrity tests

WORK PACKAGES

- WP1 : Materials Science – to lead to a stable product
- WP2 : Product Testing for Structural Strength Properties
- WP3 : Product Testing for Thermal Properties
- WP4 – Product analysis and improvement
- WP5 – Process Development
- WP6 : Externalization
- WP7 : Project Management and Reporting
- WP8 : Coordination

Outputs

- Obtain a U-value for the thermal HCB and rendering material with the lowest value possible while keeping the compressive stress at a minimum of 7.5N/sqmm and keeping dimensions of a traditional HCB. The U-value has to be lower than the maximum allowable value in Guide F of 1.57 W/m²K by at least 10%.
- Develop a thermal rendering base coat which will further improve the U value of the thermal HCB by 3-7% for every 10mm thickness of applied material.
- Publish 2 quality research papers in a refereed journal or international conference of repute in accordance with approved ECU research criteria by the end of September 2014.
- Manufacturing and full production of thermal HCB and rendering of material by end of September 2014.
- Offer two post-graduate degrees

Budget

Galea Curmi Engineering Services Ltd.	Commercial Entity	67,096
JCR Ltd.	Commercial Entity	59,565
University of Malta	Academic Institution	53,243
	Total Grant Requested	€179,904

M.Sc. Student

- Call for Application to be published soon for a 1 year full-time research officer, who will be ready to do a part-time M.Sc. by research (over 2 years)
- <http://www.um.edu.mt/hrmd/vacancies>

Thank you

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