

The logo for eoMITS features a cluster of blue and white dots of varying sizes on the left, connected by thin lines. To the right of this cluster, the text "eoMITS" is written in a clean, white, sans-serif font. The background is a dark blue gradient with a network of glowing purple and white nodes and lines.

eoMITS

The logo for apITALY consists of the letters "ap" in a large, bold, grey, stylized font. Below this, the word "ITALY" is written in a smaller, grey, sans-serif font. The entire logo is set against a white background.

apITALY



AGGLONORD advanced quality stone



MIRAMARMI
ESTRAZIONE E LAVORAZIONE DEI MARMI



ENGINEERED STONES – SUSTAINABLE AND INDUSTRIAL CASE
OF USING GEOPOLYMER TECHNOLOGY TO COMPLETELY
REPLACE POLYESTER RESIN AND PORTLAND CEMENT TO
OBTAIN NEW MARBLE COMPOSITES, TOTALT MINERAL, VOC
AND POLLUTION FREE

Dr. Alex Reggiani, **GeoMITS**, Italy



MIRAMARMI, Italy
MARMI OROSEI, Italy
AGGLONORD, Italy



OUTLINE

GeoMITS - AP ITALY – MIRAMARMI – AGGLONORD
introduction

ENGINEED MARBLE STONE Patentend eco-friendly
Geopolymer mineral engineered stone history – R&D –
Industrial testing of blocks

Final Enhanced Properties after cutting in slabs of
different thickness and Applications



GeoMITS

MATERIAL
INNOVATION
TECHNOLOGY
SERVICE

GeoMITS is focalized on :

- Consulting, R&D and supplying about Geopolymer binders (reactive powders and liquid hardeners, thanks the supporting partner INGESSIL) for several applications
- Customizing of automatic mixing plants (mobile and fixed central beton) for production from laboratory to industrial scale
- 360° Service about designing of final geopolymer recipes included choice of best partially reactive aggregate curve and intermediation between clients and aggregates supplier

MIRAMARMI

MIRAMARMI is a stone company founded in 1961 by Danilo Bocchese, now managed by Giancarlo Bocchese, in Chiampo Valley (Vicenza) and it is specialized on:

Extraction of marble and natural stones (MIRAMARMI owns various quarry in Italy and Croatia)

Processing and commercialization about marble and natural stones as entire blocks, slabs, flooring and walling tiles (different thickness and size are available)

Looking for new mineral materials to assure the best quality to their clients for both commercial and luxury



AP ITALY

AP ITALY is a productive company in the stone quarrying sector, the brainchild of 2 entrepreneurs, Stefano Piras and Massimo Gallus, it is specialized on:

30 years of experience in quarrying techniques (AP ITALY owns various quarry of marble starting from Sardegna region)

Business philosophy inspired by an ancient Navajo's proverb «We do not inherit the earth from our ancestors, we borrow it from our children» this is why AP ITALY is committed to reuse the processing cutting rock waste to minimize the environment impact on the land

Looking for new mineral materials to assure the best quality and the best sustainability in line with the needs of modern market



AGGLONORD

AGGLONORD , founded in 1996 by Pietro Quarella , pioneer of the industrial manufacturing of marble agglomerates, is a productive company in the field of engineered stones (vibro-compacted composites under vacuum that harden at ambient temperature) normally using polyester resin or Portland cement as binders:

Pietro Quarella has personally constructed a special manufacturing plant with an innovative technology to optimize the quality and the homogeneity of the marble composites stone to enhance the aesthetics and performances

AGGLONORD system allows to reuse till 90% of marble from waste in the conglomerates and to increase the sustainability the company is everyday committed to find new solutions to reduce its carbon footprint



Block production plant
Caprino Veronese / Italy



Slabs production plant
Rivoli Veronese / Italy



AGGLONORD advanced quality stone

ENGINEERED MARBLE STONE PROJECT

MIRAMARMI, AP ITALY, AGGLONORD and GeoMITS started to collaborate on 2022 about the R&D of new and innovative type of composite material, without polyester resin and also without Portland cement and latex: **ENGINEERED MARBLE STONE**

1. **EMS** has the lowest CO2 emission (>80% less than OPC; >70% less than polyester) considering dosages and yield. The performances are very high about twice the OPC and comparable with resin
2. **EMS** is for both outdoor and indoor use (polyester only for indoor; OPC only for outdoor)
3. **EMS** has prolonged durability (improved acid resistance), sunlight resistance (no variation of color), no hydrolisys , no mould and grass formation, fireproof (no spalling) and it's stable under water
4. **EMS** has competitive costs and has been tailored by GeoMITS to be manufactured using the existing mixing equipment

 **GeoMITS**


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ESTRAZIONE E LAVORAZIONE DEL MARM


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ENGINEERED MARBLE STONE PROJECT



The flow ability of the GP binder (Na/Al=1) designed by GeoMITS, allows:

- **LOW GP BINDER AMOUNT**
- **SAVING ON PIGMENTS AMOUNT**
- **SAVING ON EXTRA WATER ADDITION**
- **SAVING ON TOTAL COSTS**
- **HIGH MARBLE CONTENT FROM RECYCLING**

ENGINEERED MARBLE STONE PROJECT



INDUSTRIAL PRODUCTION: MIXING

- 18 to 22% GP BINDER (Na/Al=1) WITH FLUID CONSISTENCY (HIGH YIELD) USING GeoFAST N01 (SODIUM REAGENT)
- RECYCLED MARBLE UP TO 90% OF THE CURVE
- 0% ADMIXTURES , NO POLLUTIONS
- RESPECTING OF THE INDUSTRIAL MIXING TIMES FOR THE BLOCK REALIZATION (20 MINUTE EACH = STD)
- MIXER EASY TO CLEAN AFTER THE WORK
- FINAL HUMID-EARTH CONSISTENCY ACHIEVED
- HARDENING TIME FROM 2 TO 5 h AMBIENT TEMPERATURE

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ENGINEERED MARBLE STONE PROJECT



**INDUSTRIAL PRODUCTION: VIBRO
COMPACTING AND CASTING : 3 mc /
Block standard size 305 x 125 x 90
cm (> 8500 .kg)**

- No dangerous emissions (no smell)
- Low extra water amount between 0 to 0,5%
- Formwork with plastic or teflon coating

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ENGINEERED MARBLE STONE PROJECT



INDUSTRIAL PRODUCTION: CURING

- AMBIENT TEMPERATURE (5 – 35°C)
- SEALED TO AVOID THE WATER EVAPORATION



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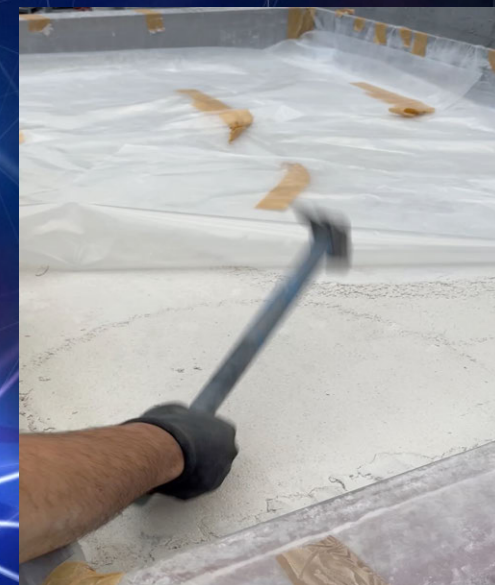

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ENGINEERED MARBLE STONE PROJECT

INDUSTRIAL PRODUCTION: CURING – HARDENING

- AMBIENT TEMPERATURE (5 – 35°C)
- FINAL APPEARANCE (JUST CAST)



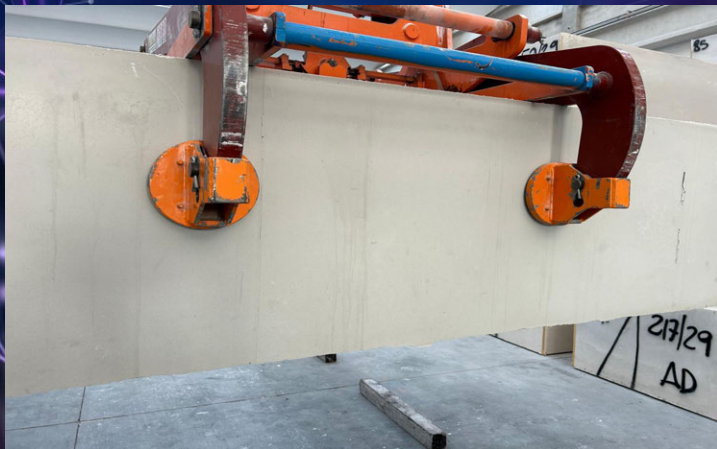
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INDUSTRIAL PRODUCTION: DEMOULDING

- AFTER 2-3 DAYS DEPENDING ON SEASON
- BATCH N° and WRAPPING TO END CURING



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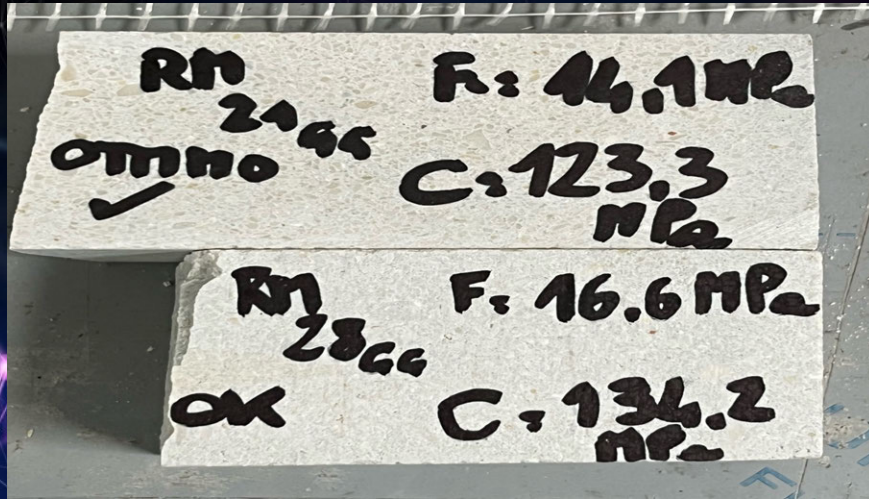


INDUSTRIAL PRODUCTION: CUTTING IN SLABS

- 2-3 cm thick (till 33 slabs per block)
- WATER CUT – DRYING – STORING
- READY TO BE DELIVERED OR POLISHED

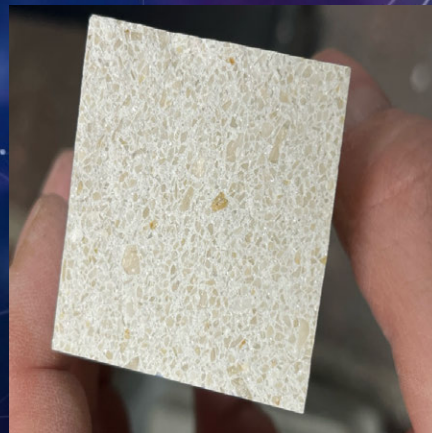


ENGINEERED MARBLE STONE PROJECT

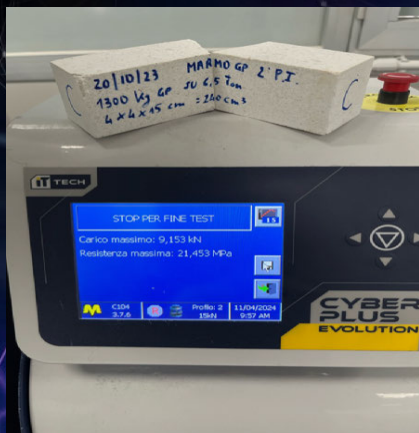


INDUSTRIAL PRODUCTION: MECHANICAL STRENGTH

- 28d FLEXURAL ST. = > 16 MPa (twice OPC and marble)
- 28d COMPRESSIVE ST. = > 130 MPa (twice OPC and marble)
- ACCEPTABLE COMPARED TO POLYESTER (- 30% FLEX ; - 15% COMP) but UVA and HYDROLISIS RESISTANT
- STABLE UNDER WATER FOR 28 DAYS (SAME STRENGHT) SUITABLE FOR OUTDOOR
- FIREPROOF (tested at 1000°C)
- IMPROVED ACID RESISTANCE (CHLORINE ACID 37%)
- LOW WATER ABSORPTION 0,3% (Ceramic method 2h at 60°C in water)



ENGINEERED MARBLE STONE PROJECT



INDUSTRIAL PRODUCTION: LONG TERM MECHANICAL STRENGTH C.Q. CHECK

- 6 month FLEX. ST. = >21 MPa (+23% from 28d)
- 6 month COMP. ST. = > 154 MPa (+13% from 28d)
- ENHANCED LOW WATER ABSORPTION 0,22% (Ceramic method 2h at 60°C in water)



ENGINEERED MARBLE STONE PROJECT



PATENT PROCESS & CERTIFICATIONS PROTOCOL

- SAMPLES PREPARATION FOR OFFICIAL TESTING (ACCREDIA) FOLLOWING THE NORMATIVE OF THE ENGINEERED STONES
- PATENTED GP MATERIAL (REGISTERED)
- CUSTOMIZED GP SYSTEM
- INNOVATIVE MACHINERY FOR VIBRO COMPACTING UNDER VACUUM



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THANKS FOR THE KIND ATTENTION



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