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IAF MATERIALS AND STRUCTURES SYMPOSIUM (C2)
Advancements in Materials Applications and Rapid Prototyping (5)

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ADVANCEMENTS IN MATERIALS APPLICATIONS AND RAPID PROTOTYPING: LIVING UNITS ONSITE IN GLASS AND DIRTY CERAMICS, 3D MICROWAVINGVDIRT

Abstract

1 This surface living structural concept for low catastrophic failure risk, and of course the view. 1.1 The ISRU taking dirt to process architectural anhydrous pseudo-glass and dirty ceramics into tapered, deeply arched wall units 4m/13.1ft tall, running widths about that on a 10m/33ft central space giving thin arms that join panels at the tension points. 1.1a Microwave frequency controlled structuring with laser assist to handle the diversity of heating to form structures, unlike casting this creates spatial variety between fastening points at 'sticky' temps well below melting, surfaces sealed to meltpoint. 1.1b Viewable sections feed a different setup for melting, diffused laser and induction produces the quality and quantity needed, 65kw spec machine for speed. Having this opens new vistas, and, with the goal came ease of onsite, ISRU supplies for the making of them with mostly OTS gantry actuator parts software. 1.1c Sorting for structuring panels is minimal with such large dimensions, being dielectric microwaving in-situ offers less time-work per finished unit than by-the-piece assembly methods. 1.2 These panels take one midspan tensional line, then roof and floor tensional rings of 'paint can' bottoms concave externally and bound by tensional rings with tensional "columns" holding pressure midspans to complete the structure. 1.3 The floor set, panels 3D printed in-place as double-panes, the gap filled to 1/2-atm with insulation, roof columns set, dirt roof layer. 1.4 With such strong glass sortable to clear as spheroids for "windows", panels are custom to the site and nice as living quarters with more aesthetic value than most space building designs from being a pressure vessel. 1.5 Micrometeorites have little real chance of causing more than a leakage. Having natural views as part of structure removes the need for sealing thru-the-wall viewing ports, air locks a panel module assumed standard all units. Radiant and radiation amendments or coatings assumed to be added to panels. 1.6 Square and rectangular buildings can be made using the same pieces applying tension with trusses vs single pieces when curved. This gives larger volume shapes freedom from preforms, the building can follow function more easily. 1.7 For lunar days or nights, flat radiant-insulation panels were considered as wise to have, adds to large event protection, also another chance at reducing cumulative exposure for longer stays.