

CODE:

### Pyrogranite ceramic panels

are a unique and tough/resilient external surface for the building, which is also self-cleaning, the long-term benefits from low maintenance/high life-time outweigh the need to transport these panels. However it is envisaged that a kiln and production facility could be constructed within Dubai, and that this could then develop as a separate industry for Dubai. Production of pyrogranite does not consume renewable resources, the kilns can be heated from residual energy.

The tall structure is made of repetitive components, which allow both for pre-fabrication of components and/or for minimisation of in-situ construction aids: the entire box structure can be made using the same formwork in 3 m high stages. The internal formwork for each 3m high level is lightweight and can be reused on each level. The special pyrogranite\* ceramic panels form the external skin of the building and act also as formwork. The panels are made to fit together to form a continuous skin, but also form the outer layer of formwork, eliminating the need for extra structures to make the walls. The panels are lifted into place with the steel reinforcing already attached, thus quickening construction time and reducing site impact. Each horizontal row of cladding (in-situ formwork) is identical to that below, which also minimises the need for on-site construction and use of energy and resource consuming secondary structures for construction.

The central core is assembled first using sliding formwork and the empty shaft also can be used for the vertical transport of construction materials, minimising and hopefully eliminating the need for separate cranes.

### L i f e t i m e :

The structure and the majority of the external surfaces are of high strength and with a high span. This means the building is low maintenance and has a long life-cycle, reducing the need for expensive and energy consuming refits and maintenance - e.g. the external surfaces do not need to be painted, cleaned or specially treated. The inherent nature of the cladding allows it to resist and accommodate the abrasive action of the wind or wind-borne particles.

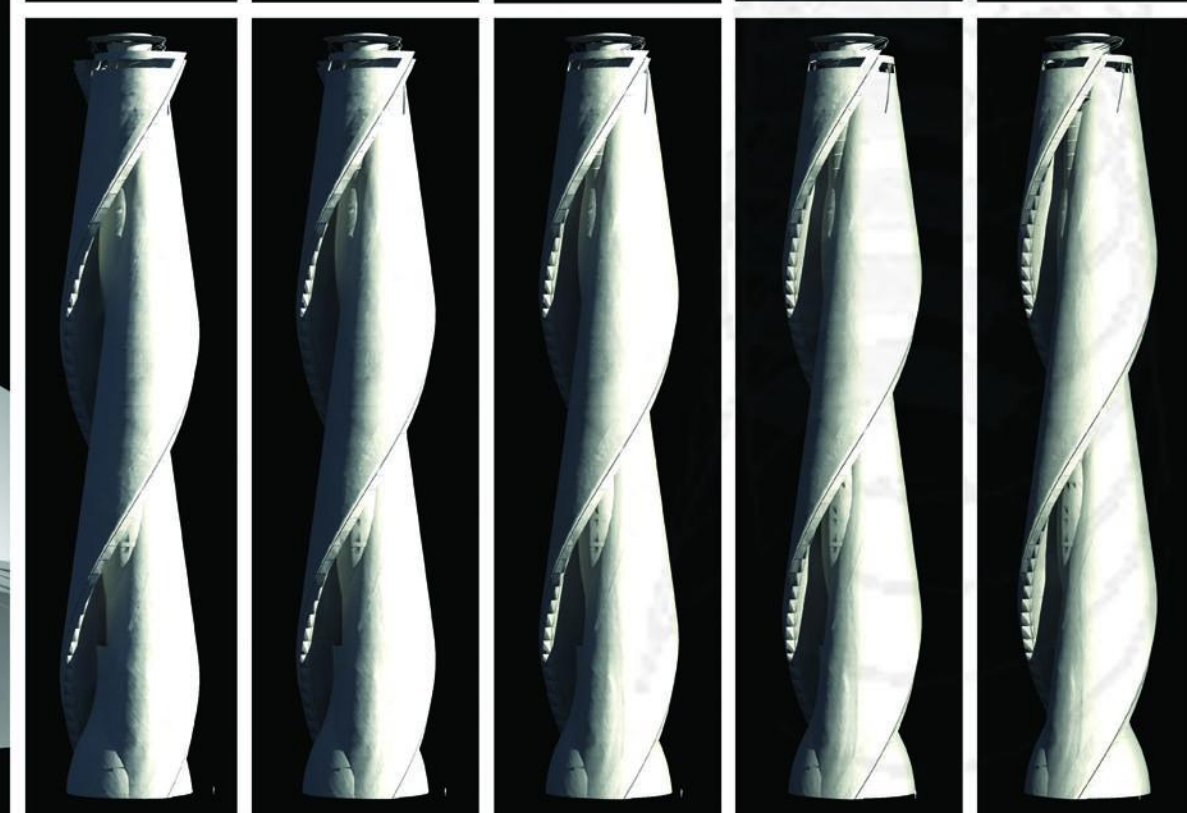
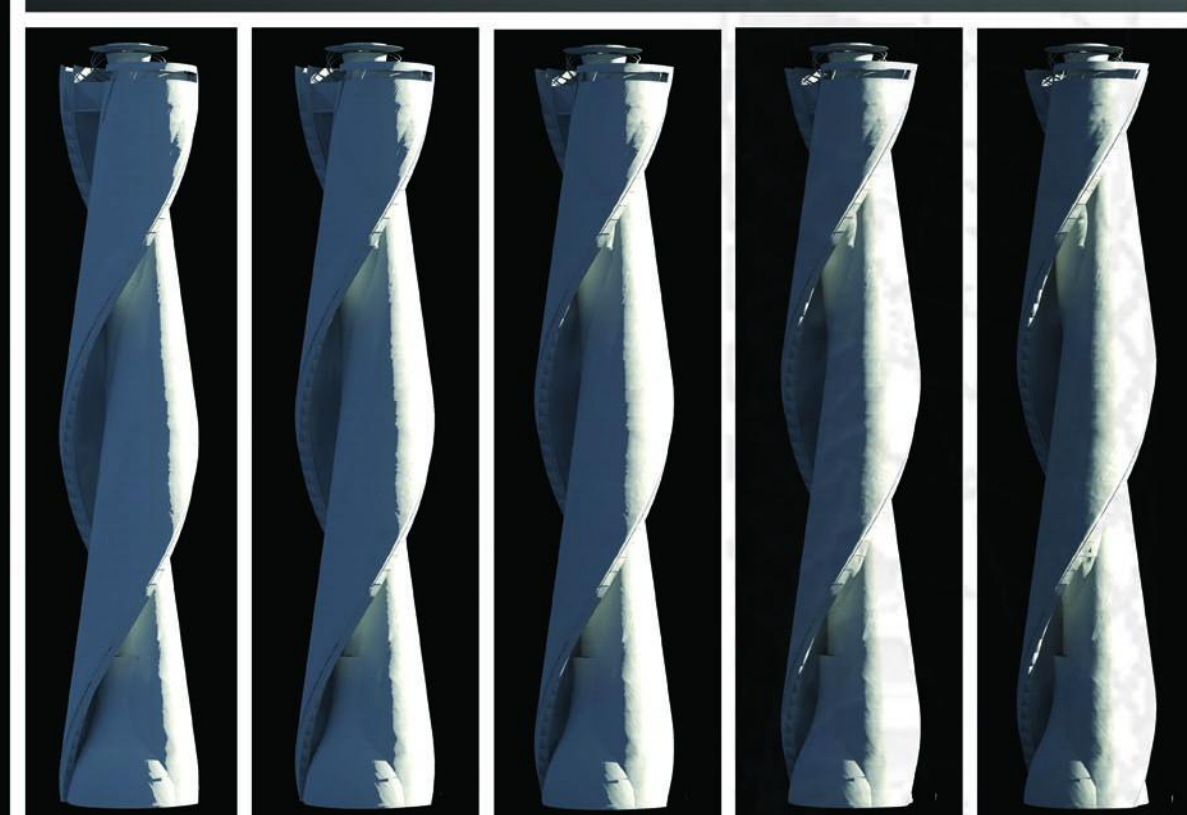
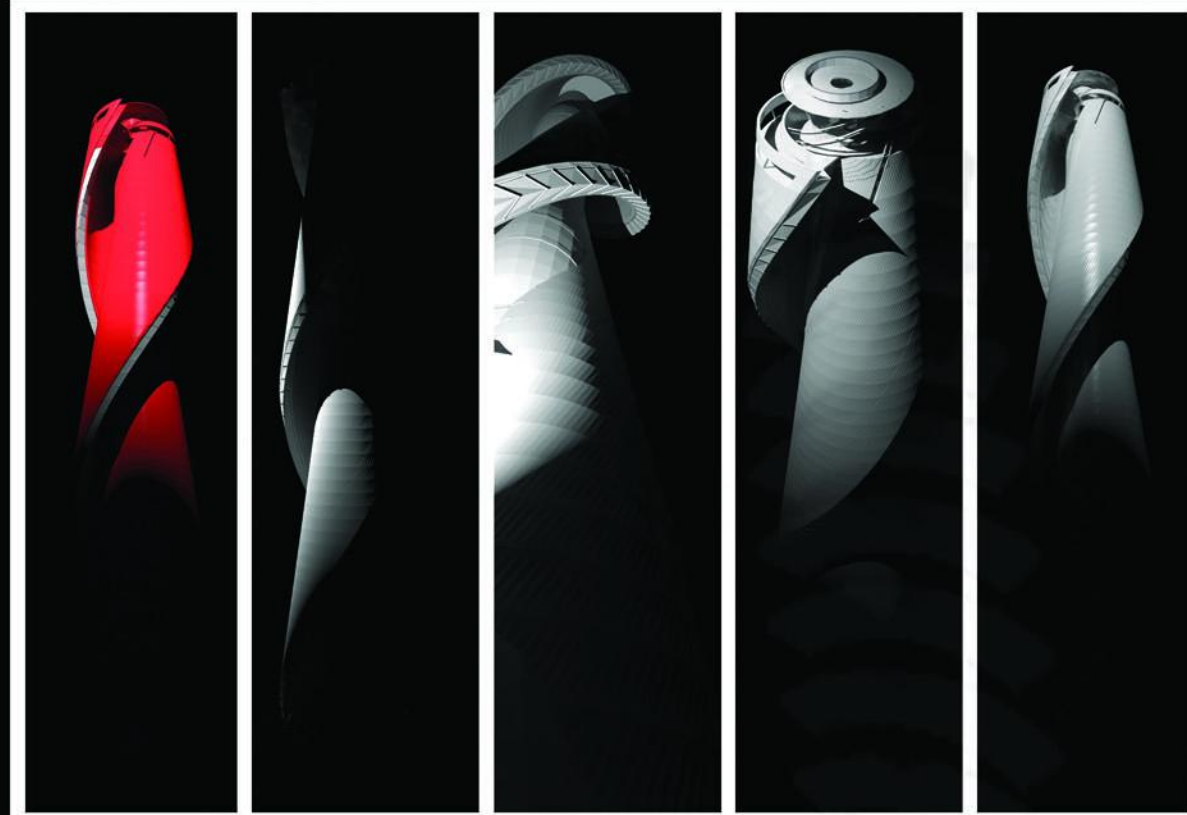
### H e a t i n g / C o o l i n g :

The structure has high thermal mass, which means there are large areas of uninhabited mass structure which absorb and release heat depending on ambient temperatures. The unique curved form of the building also means that the building always has some areas which receive sun and others which are shaded. Each 3metre box section (2700mm internal height and 2400mm internal width) can act as a duct through which air can be sucked or expelled. The central vertical core and ramped circulation also acts as a vertical ventilation-shaft. Structures on the roof can be used to direct air into or from this vertical shaft. Using a highly intelligent system equipped with temperature sensors in all parts of the structure, movement of air in/out of the horizontal ducts and into/out of the central vertical shaft is managed in such a way that heat gain is redistributed throughout the building via ventilation when heating is necessary. Cooling works on similar principle, in that cool air is allowed into the central core via the ducts (from cool high breezes and air cooled by passing through cooler thermal mass) and this expels and displaces warmer air from the building, which can escape through the duct levels. In addition, it is envisaged that evaporative panels can also be placed in some of the levels to allow a type of "passive air-conditioning" to function.

The internal horizontal surfaces of the structure contain a network of thermal pipes in which water is circulated to provide extra cooling or heating to complement the heat/loss gain from the external environment. The water in these small pipes harnesses the heat differential between different parts of the building. Additional energy sources are provided by using heat pumps in the ground and use of the nearby lake as a "heat sink" and source of cooling energy.

All lifts in the building operate on the principle that the energy gained during the downward journey is partially converted into electrical energy to reduce the energy requirements for the upward

j o u r n e y .



# TALL EMBLEM STRUCTURE IN ZA'ABEEL PARK DUBAI

2009 XI THYSSENKRUPP ELEVATOR ARCHITECTURAL AWARD