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THE INFINITY TOWER

Dubai, United Arab Emirates/SOM

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THE INFINITY TOWER TERMINATES IN A DRAMATIC CROWN.

ALL IMAGES COURTESY SOM

As the award-winning design and structural teams at SOM Chicago will tell you, dreaming the future is easy; building it is quite another thing altogether.

Set to dominate the Dubai Marina development at a height of 1,083 feet by the time of its completion in 2011, the 73-story goliath Infinity Tower is making history with its 90-degree helical twist that grants the tower's 350 luxury residential apartments expansive views.

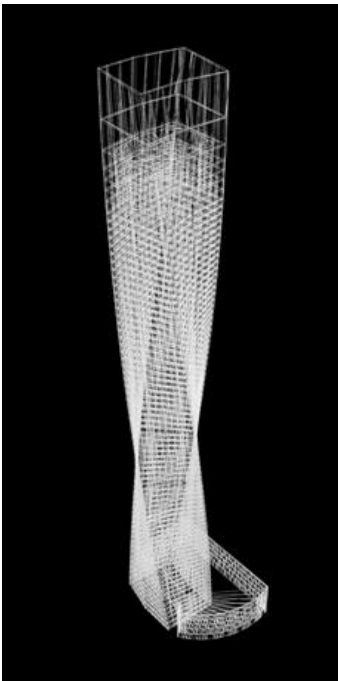
To achieve the innovative 90-degree spiral, Ross Wimer, SOM design partner, and William Baker, structural engineer, devised a cylindrical reinforced concrete core structure around which the individual floors of the luxury condominium rotate like wheels about an axle, resulting in an open-space design that ensures a minimum of interior pillars.

As speed is crucial to the budgets of the supertall, the SOM team employed an ingeniously sequential formwork process to hurry the building's ascent while simultaneously insuring spatial uniformity throughout the condominium's units. After one floor is poured, the aluminum formwork is lifted to the next level and





THE 1,083 FOOT TOWER WILL DOMINATE THE DUBAI WATERFRONT.



A COMPUTER MODEL SHOWS THE IMPRESSIVELY SIMPLE STRUCTURE OF THE TOWER, WHICH IS MOSTLY MADE UP OF VERTICAL COLUMNS AS EACH FLOOR ROTATES 1.2 DEGREES.

rotated 1.2 degrees in relation to the floor below, essentially repeating the floor beneath, thus maintaining a consistent architectural floor plate throughout the structure's height.

The interior columns throughout the floorplan all share the same rotation along the form, resulting in a gradual step or fan of the structural elements, all of which radiate outward from the cylindrical core. "It's as if you were building a layer cake," said Wimer. "Once one layer of the cake is finished, you elevate and rotate the tin, then set the next layer of the cake. As the layers begin to stack, the twist begins to emerge in the form."

But the accumulation of those slight 1.2-degree rotations made it difficult for the contractors to erect an external scaffolding system—with each floor rotating relative to one below, the vertical tracking of conventional scaffolding could find no purchase. Instead, the exterior walls were devised to be installed from the inside out by a series of hoists that extend off the building itself, allowing the workers to follow closely behind the concrete work, adding the exterior cladding as the aluminum forms are dismantled and reconfigured for the next level.

Unlike the more common recti-linear core structure, which would require each rotating floor plate to be unique, pivoting the floor plans along the cylindrical core allowed the designers to standardize the luxury residential units. "Virtually every floor is identical," said Baker. "We try to take something that's complex and make it simple. Simple for the exterior guys, simple for the concrete guys, simple for the sales agent. It's the same floor plate because every floor rotates around the central column."

Initial designs suggested a barber pole spiraling off the exterior columns, though these were abandoned as the resulting gravity loads placed an additional twist on the structure's exterior. SOM solved this creeping load problem with an artful step/twist combination that maintains the Infinity Tower's spiral appearance without compromising its structural integrity.



THE BUILDING, WHICH COULD NOT HAVE A STANDARD SCAFFOLDING SYSTEM, IS ALREADY RISING IN DUBAI.

With the exception of the angled corner columns, the exterior columns and cladding of the structure's broad face are patterned vertically, incrementally stepping to the side as the floors climb, while transferring the twisting gravitational load to an inconspicuous series of spanning beams along the building's width.

"We pride ourselves on designing buildings that actually get built," said Baker. "There are hundreds of designs out there that are very daring, especially for Dubai, but you get the feeling that those are more about the drawing than the actual building. We worked very hard to make this design buildable."

Derrick Ableman



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