Parametric Facade Design of High-rise Tower

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Award

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Description
This parametric high-rise tower façade design stems from the investigation of complex double-curved forms as the base for high-performance façade. The contemporary high-rise towers are mostly restricted by the structural form, which developed by the extrusion of simple geometry. The curtain panel system of the building façade composes of glass panel and mullions, these reflective materials create serious light pollution, which has done considerable harm to the environment. This re-design product addresses environmentally responsive architecture, where the building envelope adapts to the sunlight effect. The panel compositions divide into several layers, including the inner layer - typical glass wall for vision transmission, middle layer – air buffet zone to reduce heat gain from direct sunlight and minimize the energy consumption of the tower, and outer layer – adjustable shading panels in response to the sunlight and curvature of the building form. The parametric tower twists as it rises vertically and tapers in the middle level. Under the parametric definition, panel subdivision is performed across the varied surface and aligns with floor to floor height, resulting in a mesh like grid. The cutting edge technology can easily resolve the fabrication of panel grid system. Within each grid pattern, there are horizontal shading fins and cross-shaped shading net. The extension size of the fins and the open up width of the shading net are defined by the solar radiation. The parametric design to integrate solar analysis into the iterative study of building form shows the power to foresee unexpected design potential within the environment.

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1. Low-e Glass
2. Air Buffet Zone
3. Horizontal Shading Fins
4. Responsive Shading Net