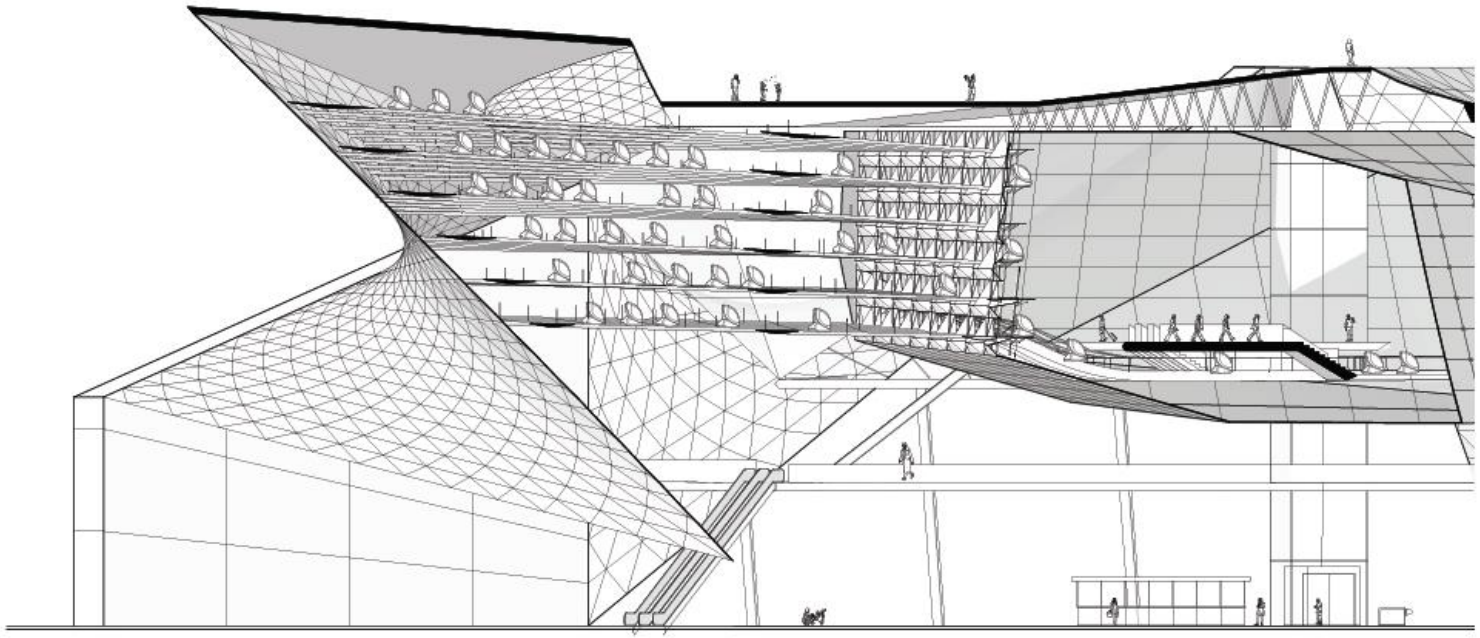
Parking Optimization

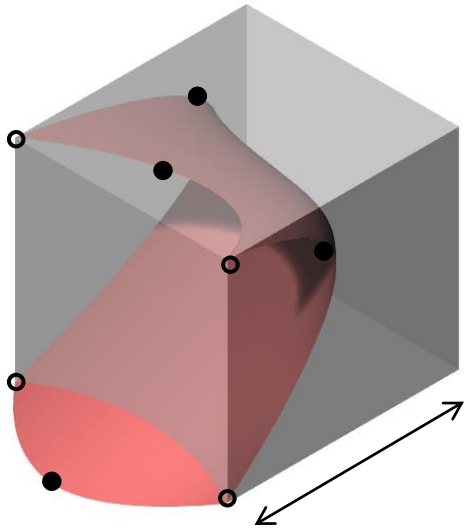
Ouyang Tian + Yiqun Chen



Design Problem

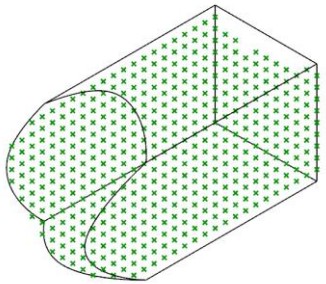
The design problem stems from one of our studio projects. A major transportation hub for future automated car system is to be built at Red Hook, New York. One key feature of the parking strategy of the hub is to store the cars in vertical manner, connecting from one given face to another twisted face with rails to put cars in.

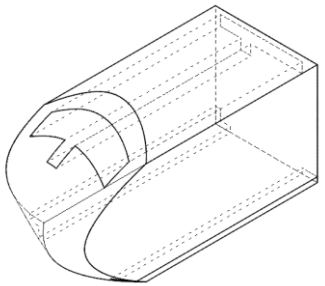
The problem is to figure out what is the best way to generate the twisted facade with smallest surface area when given a certain amount of cars to be store. Another challenge is that there will also be programs between storage “threads” as recreational space for the drivers.

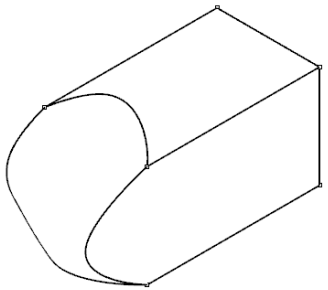


We extract a cube from the whole volume and optimize the facade of this cube.

- ○ 4 anchor points
- ● 4 control points
- ⟷ Cube Depth







Parking Capacity:

Every car occupy a 10x10x10 cube.

Over and close to 2000

Program Space:

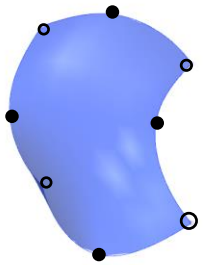
We sort out the 12% area on the grid of vertical wall which are the closest to its opposite facade.

2000*0.2*3=1200 sqft

We assume only 20% of the 2000 people will use the program we insert into the parking tower and each of them get 3sqft area.

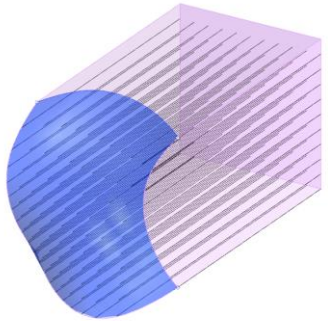
Budget:

Minimize the total 6 surface area

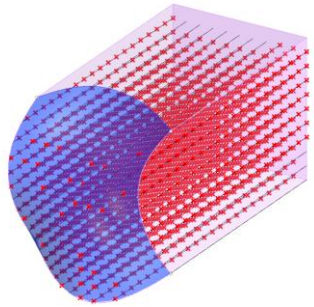


Interpolate four curves through four anchor points and four control points.

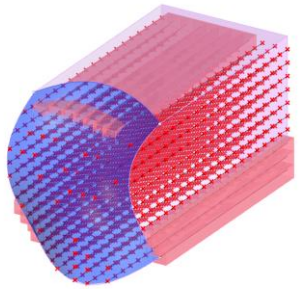
Generate the twisted surface from the four control curves.



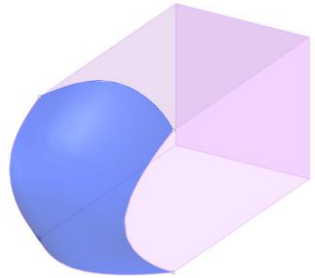
Generate 10*10 grid on the purple surface.



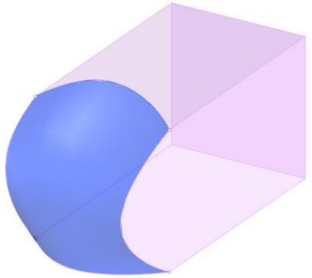
Divide the “storage” thread by 10 to calculate parking capacity.

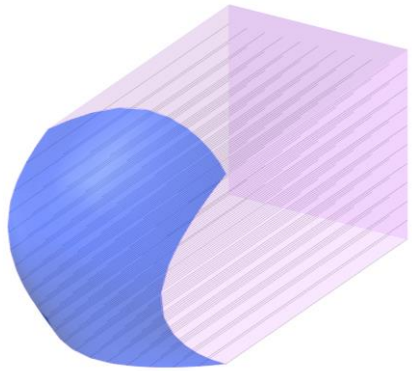


We sort the 12% “storage” thread with least parking capacity then turn them into recreational space.

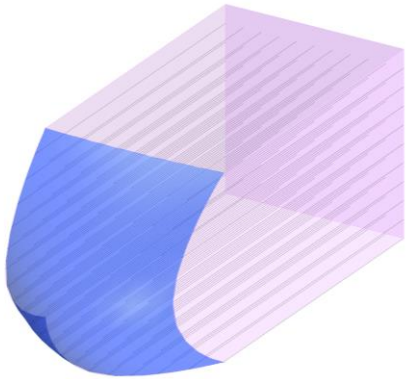


Calculate the total six surface area

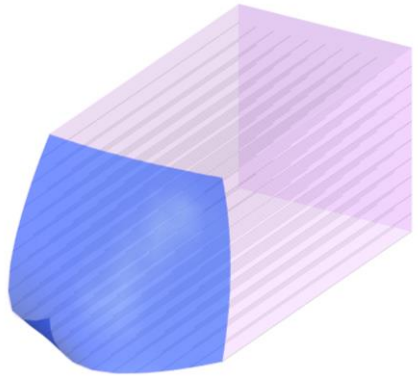




option1



option2



option3