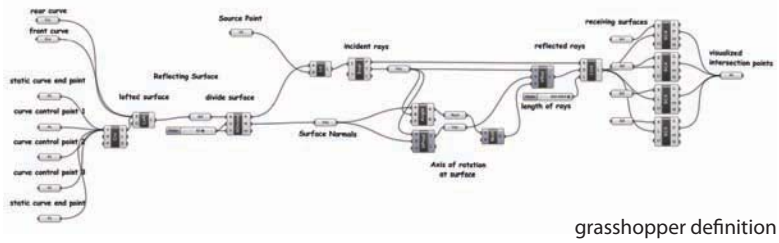
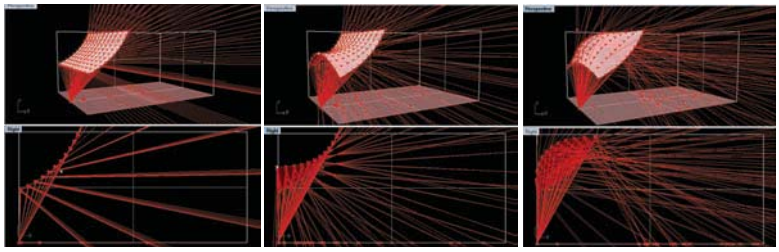
PARAMETRIC APPROACH - MAPPING FIRST-ORDER REFLECTIONS

At its simplest, the prediction model consists of three inputs: one source point, one surface that will be reflecting rays from the source point, and another surface that will be receiving rays from the reflecting surface. These three basic components can be built in Rhinoceros and imported into the Grasshopper definition, where the reflections will be calculated and mapped in the Rhinoceros window. The significance of the parametric nature of the process becomes clear as you begin to manipulate the input parameters in Rhinoceros. Since the surfaces are linked to the script in Grasshopper, when you modify any of the input components in Rhinoceros, the reflections that are mapped change accordingly. For example, rotating of one of the surfaces or moving the position of the source point will correspond to a real-time translation of the reflections.

This is where the true power of the tool lies; in its ability to produce many iterations very quickly. Change the orientation, size, position, or curvature of any of the input variables and the consequences of those design changes are immediately visualized. And the more parameters that are controlled in Grasshopper the greater the possibility to generate unique solutions. By implementing a systematic approach to the manipulation of the variable control points, successful patterns become clear. Knowing which moves have the most significant positive change on the configuration of the hall, those critical surfaces can be identified and used to make design decisions.

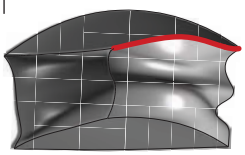


grasshopper definition

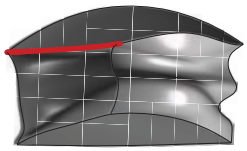


simple surface example

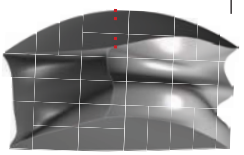
SURFACE FORMATION



FIRST DEFINING EDGE CURVE, EXTRACTED FROM REAR WALL SURFACE

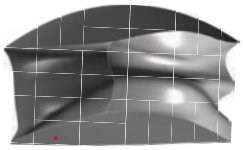


SECOND DEFINING EDGE CURVE, EXTRACTED FROM FRONT WALL SURFACE

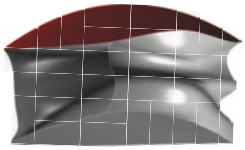


MIDLINE CONTROL POINTS, MANIPULATED INDEPENDENTLY TO SHAPE CEILING SURFACE

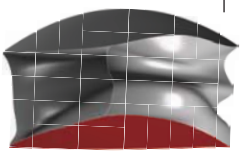
SURFACE REFLECTION MAPPING



SOURCE POINT, POSITION CONTROLLED WITHIN RHINO

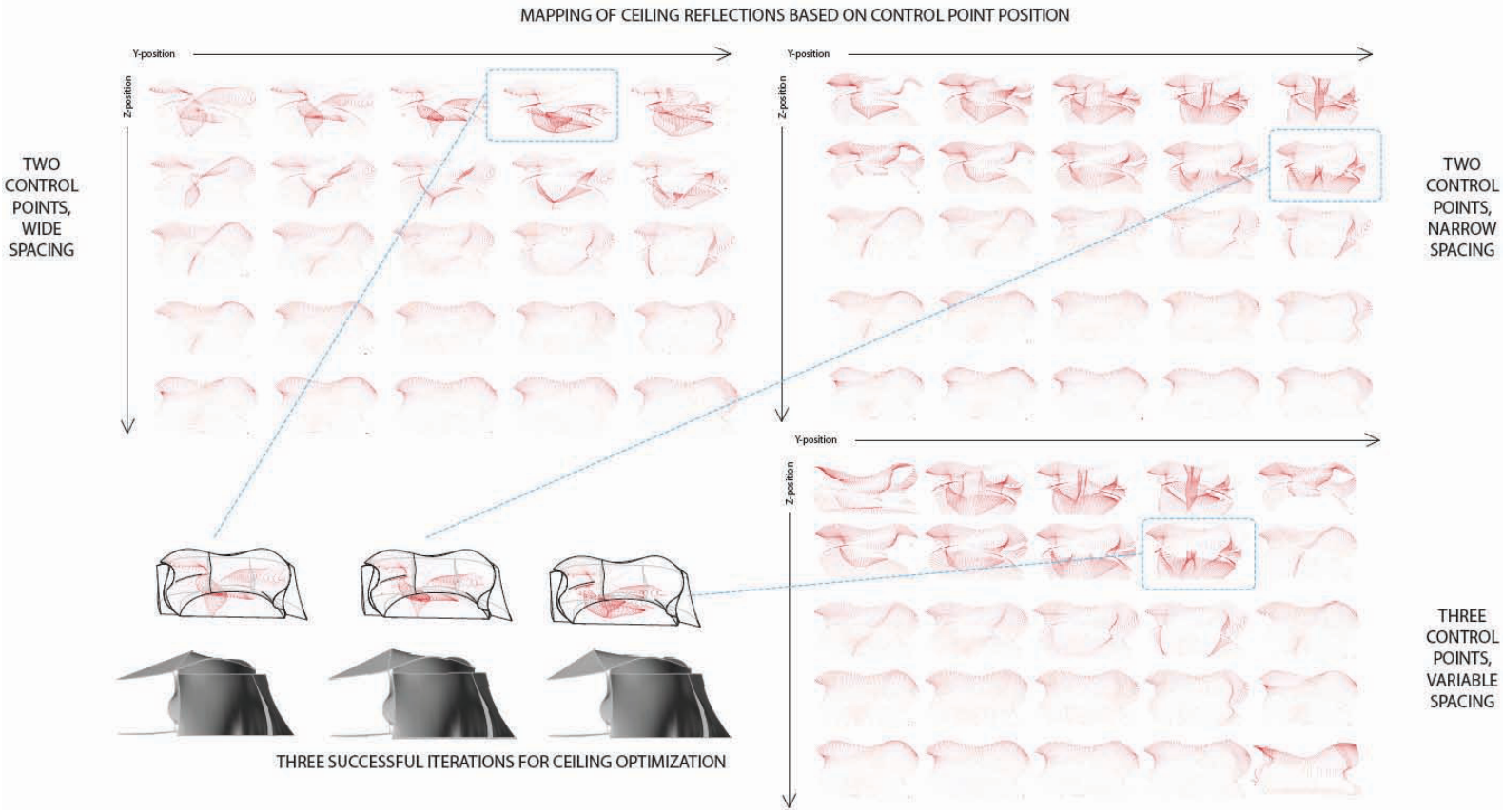


CEILING SURFACE, FORMED BY POINTS AND CURVES, REFLECTING SURFACE



FLOOR SURFACE, EXTRACTED FROM RHINO MODEL, RECEIVING SURFACE

MAPPING OF CEILING REFLECTIONS BASED ON CONTROL POINT POSITION



THREE SUCCESSFUL ITERATIONS FOR CEILING OPTIMIZATION