Project: Zollverein School of Management and Design

Location: Essen, Germany
Architect: SANAA

Climate Conditions: Essen is mild, both in summer and winter, leaning toward the colder side. Its average temperature is around 10 degrees C. Cold is the main climatic condition that has to be mediated, as the average temperature during the summer is around 18 degrees C.

Design Strategies:

1: Windows on the building are located such that they indicate the interior organization of programs, but also respond somewhat to environmental factors. They are large square openings that allow low light into the building during the colder months. They add to the solar efficiency of the building while slightly increasing conduction and infiltration because of their size. The windows cannot be opened, so ventillation is still an issue, but since the main issue is cold, this is less significant.

2: The floor plates in Zollverein are low density and weight, and effect that is achieved through the casting of displacement air bladders into the slabs. This increases thermal transfer between floors (due to solar gain or internal gain) but also potentially increases infiltration.

3: The roof is open on the top floor, allowing high sunlight to penetrate into the lower floors. This helps with solar gain, but is also a source of infiltration.

4: Zollverein features a thermally active outer wall that uses warm water pumped from a nearby decommissioned mine to compensate for its thin profile and lack of other insulation. This move helps to decrease heat loss from conduction and regulates the temperature of the wall, mediating between internal and external temperatures.

Changes:

The main changes I would make to the design would be:
1: To increase the thickness of the exterior wall so a more conventional and passive insulation method could be used.

2: To more carefully orient the windows such that they are responsive to environmental conditions rather than their primary purpose being to call out programmatic moments from the exterior of the building.