

# BUILDING IMPLEMENTING HOLISTIC ARCHITECTURAL DESIGN, MASDAR CITY, UAE



Desert



Abu Dhabi City



Masdar - Arcades



Masdar - Green Courtyards



67°C



71°C



50°C

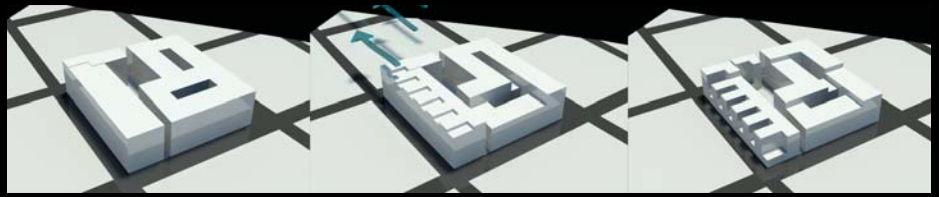


48°C

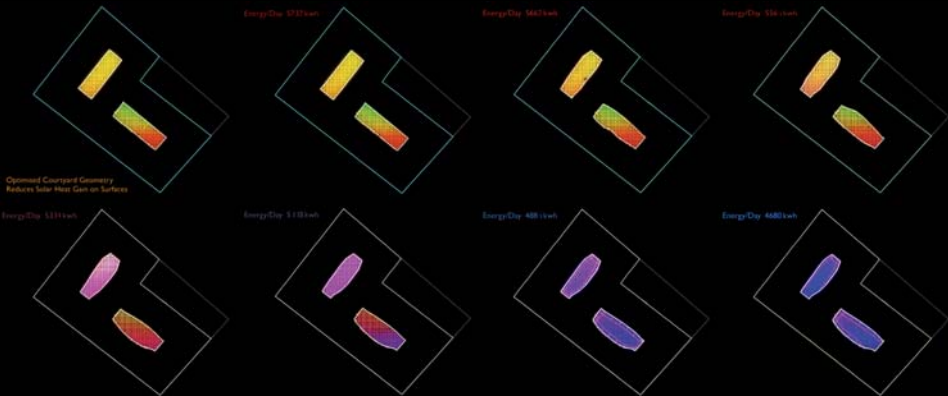
CLIMATE DESIGN

## OBJECTIVES OF THE BUILDING DESIGN

- # Find an innovative solution for the specific context by using transferable methods and strategies
- # Reduce the very high solar impact on the building envelope, prevent direct solar radiation into the building and ameliorate the outside climate in the courtyards and arcades
- # Increase natural ventilation in the public areas using cross winds as well as temperature and pressure differences between the different spaces
- # Reduce the temperatures and the humidity in the morning by using 100% shaded rammed earth walls in the additional common spaces of the building who are supported by solar chimneys to suck out hot air
- # Join Swiss know-how for sustainable construction technologies with vernacular construction methods and materials



BUILDING DESIGN



COURTYARD DESIGN BY CFD MODELLING

## LEARNING FROM ARABIA

A few thousand years ago, between Tigris and Euphrates the first urbanized settlements in history of humankind were built. Already they accomplished the three objectives of sustainability or sustainable building methods: Ecology, economy and society. There lie the basic approaches which still today have validity. To connect these with today's technological advancements addressing the human needs of personal, private, professional, social and societal development is the foundation and creative ground of architectural design and construction.

The study and analysis how urban planning was conducted in the Middle East in primeval times raised our awareness for the potential to further develop such structures and mindsets to become local approaches for many places throughout the world. Not regress, but progress with contemporary methods and possibilities regarding societal, social and technical aspects is the aspiration.

## BUILDING DESIGN

The system of streets, alleys and squares facilitate natural cross ventilation of public spaces and private courtyards.

Reacting towards the natural gradient on the site and the main wind direction from north-west, the building volume is stepped down to increase natural ventilation in the internal Courtyards and Arcades.

## COURTYARD DESIGN

Together with Kaisersrot, a Spin-Off from the Swiss Federal Institute of Technology (ETH) Zurich who are able to create parametric and customized software to design the building form, we optimized the shape of the courtyard to minimize solar impacts on the building envelope.

The courtyards have been sculpted as a result of CFD modelling to provide the optimum shape for the reduction of solar gain across the year. Through this design approach, we could reduce the solar impact on the courtyard surface by up to 20%.

## FAÇADE DESIGN

The façade design was also developed in cooperation with Kaisersrot to enable the fulfilment of the technical requirements such as different opening ratios and structural characteristics of the used material (terracotta tiles) as well as to prevent direct solar impact.

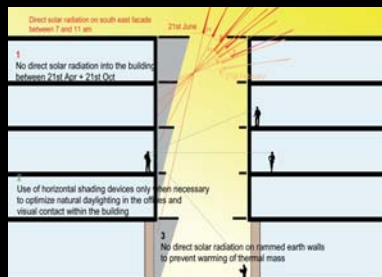
## OBJECTIVES OF THE FAÇADE DESIGN

- # Raise the level of privacy inside and provide direct views to the outside and to other parts of the building
- # Reduce the number of moveable parts due to sand impact/erosion and adjust the appearance of façade to perform visually and functionally when dirty
- # Unique and significant expression of the building without dominating the context
- # Reinterpretate local design traditions of the ornamental façade

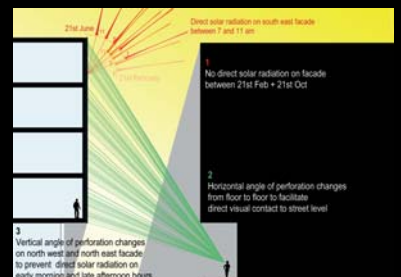
## STREET FAÇADE

The street façade is a combination of local ornamental elements and a "brise soleil":

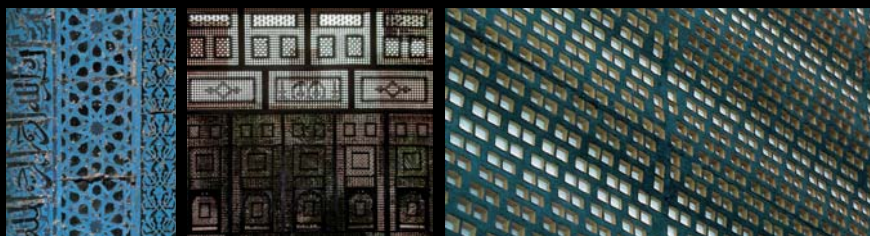
- # Size and configuration of the openings protect the building of direct sunlight impact between 21st of April and 21st of October while allowing direct sunlight to enter the building in the mornings and evenings during the colder season
- # The sloping shape of the openings facilitates direct visibility and contact to the street from every workspace and prevents direct views into the building
- # The horizontal and vertical slope changes between floors and orientations as a reaction of the specific spatial position
- # Bigger openings (20x20cm) permit direct views and a better contact to the street level



COURTYARD FAÇADE



STREET FAÇADE



ANALOGIES

## COURTYARD FAÇADE

The courtyard façade is a transformational application of the street façade. To optimize the visual contact within the building and towards the courtyard, the same shading elements are used as horizontal shading devices, which raise the level of natural daylight while preventing direct solar impacts.

## TRADITION MEETS TECHNOLOGY

The Sprinter building will be the first building of the Swiss Village in Masdar City, a Business Hub for Swiss Cleantech Companies that will work together closely with the Masdar Institute of Technology (MIST). Therefore the appearance of the building has to be recognisable and unique. It should bring together Swiss design principles and vernacular architectural traditions and expressions.