



# KAPSARC



## The Project

King Abdullah Petroleum Studies and Research Centre (KAPSARC) is a future-oriented research and policy centre committed to energy and environmental exploration and production and analysis. The 887,000 sq feet KAPSARC campus is located in Riyadh, Saudi Arabia's capital and largest city. Headquartered in an iconic complex 8 Kms south of King Khalid International Airport and designed by world-renowned architect Zaha Hadid, the Centre is the first thing visitors see upon arriving in Riyadh and the last they will glimpse before leaving, by airplane.

The Centre's construction employs a variety of sustainable building techniques and advanced technologies. Arranged to temper the light and heat of the desert environment, and utilize wind to cool facades and outdoor spaces, the design bathes interiors in carefully controlled, soft light. Building and landscaping mix with the dry-land ecosystem and take advantage of seasonal breeze to offer temperate zones and improve pedestrian comfort. Energy-efficient light sources such as LEDs, powered outside the grid using photovoltaic

elements, give the landmark a crystal-like identity during the night.

The Entire complex will be LEED Platinum Rated upon completion, which is the highest level achievable under U.S. Green Building Council specifications.

## Architectural highlights of development

The KAPSARC centre resembles a cellular structure of crystalline forms. Composed of a network of three-dimensional, six-sided cells with many junctions and bonds, its design is based on the concept of connections. The modular, adaptive building is made up of a series of shaded outdoor spaces, courtyards, entrances, meeting areas, indoor gardens, corridors, underground tunnels and roof terraces.

The Centre consists of 8 basic areas.

1. Basement
2. Research Center
3. Library



4. Conference Center
5. Musalla
6. IT Center and Backup
7. Ancillary Buildings
8. Canopy

### Basement

The Basement area links the Research Center, Library, and Conference Center. It has a Public Access Tunnel and also contains all major plant rooms area. The basement level is at -6.70 SSL and a total gross area of 16,785 m<sup>2</sup>. As it lies below the flood level, the basement area is waterproofed on all sides.

### Research Center

The Research Center is the hub of KAPSARC. It consists of 3 levels, measuring 23,685 Sq. m. This area combines the three main departments: Administration, Research and Executive. The Research Center accommodates a daily population of around 350. The building is made of a group of similar 3 dimensional cells, organized around a central courtyard with North-South orientation. A multi level public lobby also links all departments from parking to the place of the ICON.

### Library

The public face of KAPSARC, the Library is directly connected to the Place of the Icon. It is made up of 5 interlocking hexagonal cells that vary in height. It consists of 2 levels spread over 14,832 m<sup>2</sup>. The KAPSARC library has been designed to be cutting edge, and houses both a digital library (books obtained from online sources, to save paper) and physical shelves to store books.

### Conference Center

The Conference Center is a premium venue for meeting and large conferences. It consists of 5 cells, built on 2 levels spread over 21,318 m<sup>2</sup>. The Conference Center has been designed to host external events and conferences and seats around 320 people.

### Musalla

Musalla is located in the center of the Master Plan. The Musalla comprises of 4 cells, and combines a lobby, courtyard and a Prayer Room. The Musalla is spread over 1320 m<sup>2</sup>, with Structural Steel, Façade and Finishes.

### IT Center and IT Back-up

The state of the art IT Center is a one storey building for Data Center and Office spaces, housing the computational power of the KAPSARC center. The building has 3 cells, spread over 4504 m<sup>2</sup> on two floors.

### Canopy

The entire site is under the cover of a unique Canopy at the ground level, which covers an area of 11,800 m<sup>2</sup>, made in a hexagonal grid, with Treated Exposed Steel and PTFE (Poly-tetra-Fluoro-Ethylene-Teflon based material) as the shading material.



## Scope of Work

Drake & Scull Construction was awarded the contract to execute the Civil, Architecture, Interior Architecture, Electro-mechanical, External Road & Parking Facilities, Infrastructure Works, Site Works and Landscaping.

Drake & Scull Construction undertook the following project elements:

- Basement – connecting the 3 main buildings with access tunnels
- 5 Core Buildings (Research Center, Conference Center, Library, Musalla & IT Center)
- Structural and Façade works
- Interface with Novated contractors
- PMT Offices

## Challenges

The KAPSARC project is a pioneering concept that calls for very high levels of attention to detail and coordination. The design of the campus is very unique, with complicated structural geometry. The design of external façade and support steel elements also requires extensive coordination between the various teams on ground.

While the building itself is normal sized, the KAPSARC specifications set new benchmarks when it comes to the level of detail involved. For e.g., cladding work specifications in most projects do not exceed parameters for 2 layers, whereas with KAPSARC, Drake & Scull Construction handles cladding works with 6 layers of custom specifications.

The KAPSARC project also requires very high level of technological sophistication, which is why DSC leads the way with state of the art 3D BIM models that maximized efficiency and offered virtual walkthroughs of designs, giving design engineers unparalleled access and flexibility to have a virtual view of the architecture. Interfacing with other packages like the KAPSARC Residences and KAPSARC Utilities also adds another layer of complexity to the project.

KAPSARC is designed to be a LEED Platinum building, which meant that the energy standards and specifications will be 100% compliant with the most rigorous standards of energy efficiency.



## DSC Innovation

Work on this massive, prestigious project has been progressing at a brisk pace, thanks to the constant interaction that DSC has with the client. From a technology perspective, DSC upgraded its technical hardware and know-how, to utilize the latest 3D Building Information Modeling (BIM) software to coordinate the installation of Structural Steel, Supporting secondary steel, MEP and finishes.

The BIM models used in the KAPSARC project are sophisticated tools, capable of storing minute details of each and every inch of the wall, cladding, flooring, and other sub-structures in the virtual world, which can be quickly referenced by the architect/planning engineers before making any design changes. Modern Virtual simulation gives DSC the flexibility to virtually observe the impact of design changes on the structural and energy profile of the building before submitting them for client approval.

The KAPSARC project is a landmark project in terms of being environmentally friendly, with minimal resource consumption and maximum recycling on site. DSC has increased the efficiency of its eco-friendly operations, with increased re-use of excavated materials, recycling of concrete waste and optimum waste separation and management.

The project has an aspiration to achieve LEED Platinum (Leadership in Energy and Environmental Design) certification that has been developed by the US Green Building Council. The LEED ratings system consists of a rating and certification

for green building design, construction, operations and maintenance solutions. Platinum certification is the highest LEED certification level, and it is considered to be a challenging target for any project.

To ensure that Drake & Scull Construction achieve the LEED plan targets to gather all the eligible credits during the construction phase, the following measures have been implemented on-site.

- Construction materials have been selected to have the least impact on the environment and to assets, which achieves 8 LEED points.
- A high percentage of the construction materials are locally harvested & manufactured which reduces the transportation element on site.
- DSC has maintained 33% recycled content on site, which proves beneficial to the environment as it reduces virgin material usage which lowers solid waste volumes.
- All the installed wood works in the building are FSC certified. In addition, the construction waste management methodology diverts more than 75% of the construction waste from the landfill.
- DSC has implemented high standards in the Indoor Air Quality during the construction & before occupancy by using low emitting materials and reducing the pollution during the construction activities to deliver healthy and clean indoor environment.

Upon completion, the iconic KAPSARC project will be the flagship project of DSC, and a global landmark that will act as the benchmark for environmentally friendly mega-projects.