Faster . Lighter . Economical . Flexible . Greener
Cobiax Middle East (CME), is a commercial, investment and business development company specialized in innovative construction structures and solutions. According to its exclusive licenses, Cobiax Middle East DMCC is responsible for Cobiax Slab System manufacturing, marketing, design, product supply and application in Middle Eastern markets. Out of the Dubai based regional office, and through a network of local business partners in various countries, CME serves the construction industry throughout the region with Cobiax engineering solutions and products. Based on project-by-project customized design, we supply proper products to our local partners. With CME full support and continuous coordination, CME local business partners throughout the Middle East, support local Engineering offices and Designers with Cobiax slabs design and provide project contractors with training and on site continuous support.
Cobiax Technology

Concept of Cobiax Slab System

Cobiax is a special biaxial, voided slab system manufactured and developed by Cobiax Middle East. The concept of Cobiax is to replace the non-working concrete in the slab with voids. The immediate result is optimization of concrete and up to 35% reduction in the slab self-weight while still providing a high equivalent stiffness. This will enhance the bearing behavior on the whole structural elements.

Cobiax void formers modules consist of 2 elements:

- The void formers, which have a spherical flattened rotationally symmetrical shape. Void formers are made of recycled plastic material and have different heights according to the structural design.
- The Cobiax positioning steel cage, used to integrate void formers and make spacing between them. Steel cages are positioned between the bottom and top reinforcement layers in the slab’s cross section where they also serve as supporting cages.

Product Range

Multiple void sizes can be provided for a wide range of slab thicknesses depending on span requirements and load applied. These can be used in concrete structures for various types of projects: commercial, residential, parking and institutional buildings as well as other applications.

Depending on the slab thickness the Cobiax cage modules are available in two types.

Eco-Line

- Slab thickness from 40 to 60 cm
Cobiaux Elements Uniqueness

Steel Cage & Void Formers

Spherical flattened rotationally symmetrical VF Shape:
1. Cobiaux Section has no sharp edges due to VF shape.
2. No concentrated stresses.
4. No internal cracks.
5. 100% controlled concrete quantities.
6. Almost 18 Cobiaux sections in one square meter, which means perfect bracing and bearing capacity, enhanced load transfer and reduced local punching.
7. Enhanced wave diffusion of sound impact.
8. Improved vibration resistance.

Steel cage:
1. No need for special steel chairs in Cobiaux areas.
2. Steel cage frequency prevents normal top steel sagging.
3. Fast installation, each steel cage weight 4-6 kgm and covers almost 1 m2.
4. Fixed Symmetry of I-section, thanks to Cobiaux module distribution structure.
5. Minimum 10 mm concrete bonding achieved between plastic and normal steel.
6. Uniform effective depth as design proposed & fixed slab thickness, due to fixed steel cage height.
7. Steel cage works as shear links between concrete layers (Top & Bottom).
8. Increased shear capacity of the slab (Partial Shear Reinforcement).

Slim-Line

- Slab thickness from 20 to 50 cm with one layer
Working Principle

The weight reduction is achieved by displacing concrete that would otherwise be under tension and therefore not contributing to the load bearing mechanism. The system is essentially a kind of permanent formwork, creating voids within the slab. The shape of the voids is dictated by the shape of the shells and is the most important factor in determining the behavior of the voided slab. COBIAX has undergone extensive development to obtain the optimal shape for efficient load-bearing ability and minimize manufacturing costs.

The location of the voids is such that there is no interference with the compression areas of the slab. The stress-strain relationship therefore is not altered, compared to a solid slab. Additionally, reinforcement covers are respected.

Cobiax slabs differ in three ways from traditional solid flat plate slabs:

- Reduced dead load due to the concrete displacement of void formers. The bending moments and column reactions are reduced consequently.
- Reduced stiffness of the slab due to the presence of the void formers. The deflection of the slab is influenced consequently.
- Reduced shear capacity of the slab due to the presence of the void formers. This requires the identification of the slab areas with too high shear in which the void formers mustn’t be placed.

These three elements have to be taken into account in the structural design process.

The Cobiax slab is dimensioned with the methods used for traditional flat slabs and compatible with any concrete design code.
COBIAX Implementation Timetable

**CONCEPT DESIGN**
- Ideally the COBIAX system is adopted at this stage. This enables the optimization of the structure from the beginning.
- We provide detailed information about the system’s capabilities and Cobiax technical proposal for sample slab from the project.

**FINAL DESIGN**
- Design and dimensioning of all structural elements by the consultants. Preparation of general arrangement drawings.
- We provide technical assistance for the design. If required we can undertake the design of the COBIAX slabs and prepare associated shop drawings.

**TENDER STAGE**
- The system is included in the technical specifications of the project, prepared by the consultants.
- We provide quotations for the system based on the technical specifications to all interested parties.

**CONSTRUCTION**
- Installation of the modules on the slabs by the contractor, following the respective shop drawings.
- We deliver the system’s modules assembled at the site. Our technical staff makes training and supervises part of the installation.
The structural analysis of Cobiax Slabs can be executed with conventional Finite Element software tools (SAFE, STAAD, ETABS, SAP...etc).

- The established codes (ACI Code, BS Code...etc.) for the structural dimensioning of traditional concrete flat plate slabs are compatible with the Cobiax Slabs after applying related cobiax factors.
- Cobiax System can be flat or with drop beams, drop panels, semi precast and post tension solutions.

**The following comparison between a solid slab and Cobiax slab:**

<table>
<thead>
<tr>
<th>Traditional Solid slab</th>
<th>Same Slab Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Weight reduction by 20% up to 25%</td>
</tr>
<tr>
<td></td>
<td>Span width increase between 5% and 10%</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Traditional Solid slab</th>
<th>Same Spanning Width</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Weight reduction by 27% and 33%</td>
</tr>
<tr>
<td></td>
<td>Thickness reduction between 5% and 10%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Traditional Solid slab</th>
<th>Same Dead Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Span width increase between 30% and 40%</td>
</tr>
</tbody>
</table>
Cobiax Flexibility Factors

For Designer
1. During design, designer can use Cobiax selectively in applicable areas of the slab, as per design requirements and consultant preferences, end to end is not obligatory.
2. No drop panels or drop beams are needed in 90% of cases, Cobiax slabs can be 35% lighter than solid slabs or 20% lighter than PT slabs.
3. Sub-Structure floors applicability, Cobiax can be used in substructure floors, there is no tensioning, not sensitive to lateral backfill pressure.

For Contractor
1. For quickness, overlapping is possible; different slab construction works (Shuttering, Bottom Steel, Cobiax distribution, MEP & Top Steel) can be done at the same time in different parts of the slab by using: construction joints, split levels, etc. In Cobiax, full-slab same-stage work, end to end is not a must.
2. Easy during-construction changes, some Cobiax elements can be easily removed or canceled, if so required due to MEP or any other last minute changes at site.
3. General contractor installs Cobiax elements, no need to coordinate with and wait for any other subcontractor several times during each slab construction.
4. No Outriggers, Cobiax does not need outriggers for tensioning, which for other systems usually requires between 10% to 20% of extra shuttering.
5. Less props, about 35% less than solid slab and 15% to 25% lighter than PT slabs.
6. No need for special grouting or chairs under Cobiax elements or even under top steel in Cobiax areas.

For Owner
1. After construction flexibility, cut-outs or coring is possible exactly as in solid slabs.
2. No problem with possible future change of use, such as smaller imposed loads or different loads distribution.
Why Cobiax

Cobiax Benefits

The numerous advantages of the Cobiax technology lead to an increased added value for all parties involved in the project, including owner, designer, engineer and contractor.

Resource efficiency leads to increased static performance, economic costing and sustainable climate-friendly building structures. Major benefits would include:

**Engineering Benefits**

By merging the Cobiax system, the slab dead load will be reduced with approximately 35% and its stiffness would almost be the same as solid slab, this allows:

- Architectural free layout planning.
- Spans reaching up to 20m.
- Flat Slab soffit.
- Reduction up to 40% in columns.
- Up to 20% less earthquake design load.
- Easy and fast electromechanical implementation.
- No future maintenance needed.
- Improved fire resistance and acoustic insulation.

**Earthquake Resistance**

Lightweight construction with less mass is typically an advantage in seismic design.

- Up to 20% less earthquake design load.
- Less internal inertial forces generated.
- Reduction of the accelerated mass.
- Reduced damage risks.

**Savings:**

In most cases, a structure built with Cobiax is cheaper than with conventional systems, savings can be achieved by:

- Optimized Concrete and Steel Reinforcement quantities in slabs, columns and footings.
- Savings in implementation costs, including labor, formworks, scaffolding, and time.
- Savings on facade elements materials as well as basement and shear walls heights. As total building height becomes less, since the thickness of Cobiax slabs is less than solid and ribbed slabs.
- Earthquake handling requirements.
- Alternative materials costs, ribs, PT
- Earthquake handling requirements.
- Alternative materials costs, ribs, PT
Speed:

In addition to the very easy and fast Cobiax elements distribution and sitting on the bottom steel reinforcement, the construction implementation becomes much faster than any other slab system, this is due to the following facts:

- Steel reinforcement quantities are optimized.
- With Cobiax flat plate slabs, steel reinforcement comes as bottom and top steel mesh. Top steel mesh sits on top of Cobiax modules. No need for special steel chairs in Cobiax areas.
- Concrete quantities are 35% less. time needed for concrete pouring is optimized.
- Time needed for Cobiax slab forming and pouring preparations is 40% less.
- Cobiax elements don’t require skilled workers to assemble them. The system could be done by ordinary labors of the general contractor, no need for special trained staff or waiting specialized sub-contractors.

Conventional Construction Method

Optimized Construction Method Using Cobiax

More Latitude in Spacial Planning
Cobix on-site

- The contractor installs Cobix void formers modules in designated areas according to the Cobix layout drawing.
- They are placed between the top and bottom reinforcement layers using a fixed distance device (to ensure required minimum spacing).
- The formwork and bottom reinforcement is installed.
- Installing Cobix cage modules; fixing with tying wire on the bottom reinforcement on both sides.
- Placing of the top reinforcement directly on the cage modules, which take over the function of wire chairs.
- Further slab inserts such as ventilation ducts, plumbing pipes, electrical installations as well concrete core thermal activation tubes can be combined with the Cobix cage modules between the reinforcement layers.
- Concrete pouring.

Simple and efficient
Lay one of the individual void former module by hand as outlined in the Cobix installation instructions.

Secure
Cobix void former modules delivered to the construction site in batches.
Precise and flexible
Assemble the void former model on the lower reinforcement layer using an installation aid.

Certified quality
The lightweight and material-efficient concrete slab and the void former modules are cemented together.
Cobiax void formers are manufactured out of 100% recycled plastics which gives them excellent life cycle credentials. Void former modules also help to reduce harmful environmental emissions in concrete slabs such as CO2 by saving concrete and steel – both energy-intensive building materials. This can even reduce primary energy demands by up to 22%. Additional material savings can be achieved in the building structure. This has been confirmed by a life cycle analysis of the product from manufacture to sustainable demolition. In this way Cobiax is fulfilling an essential precondition of sustainable construction. To take account of Cobiax’s continuing positive impact on building certification schemes like DGNB, BREEAM and LEED, the results are summarised in an environmental product declaration (EPD).
Some Cobiax green arguments are:

- Construction Cost Saving.
- Usage of recycled materials.
- Cobiax products are also recyclable.
- Saving 22% of Primary Energy requirement.
- Preventing 20% of Toxic Emissions.
- Reduction of CO2 emissions, through concrete volume optimization. (Producing 1 m³ of concrete causes 210 Kg of CO2 emissions into the air).
- Saving of natural resources (Concrete, steel reinforcement, water...).
- Reduction of transportation to the jobsite and related pollution (Each 40 ft. HC container of Cobiax delivered to site, replaces delivery of 15 concrete mixers).
- Clean product and clean jobsite.
- Time saving, 40% less time needed for slab forming and pouring preparations.
Reference Projects Middle East

**Vida Residence, UAE**
Building Owner: EMAAR Properties P.J.S.C.
Principal Consultant: NORR Architects & Engineers
Contractor: AL-Basti & Muktha LLC
Cobiax Area: 30,608.0 m²
Slab Depth: 25, 27, 33 & 35 cm
Dead-Load Reduction: 51,770.0 KN
Reduction of CO2: 435.0 Ton

**GCT Warehouse, Bahrain**
Owner: Gulf Corporation for Technology
Consultant: MSCEB
Contractor: Dar Al- Khaleej WLL.
Cobiax Area: 1,404 m²
Span: 21.20 m
Year: 2015

**Al-Thumama Palace, Qatar**
Building Owner: Mr.Badr Mahmoud J.A.Heidos Engineering Office: Eng. Adnan Saffarini Cobiax
Area: 2,386.0 m²
Slab Depth: 22, 29, 35, 40 & 60 cm
Dead-Load Reduction: 6,102.0 KN
Reduction of CO2: 51.0 Ton

**Assima Tower, Kuwait**
Owner: SALHIA Real Estate Company K.S.C
Main Consultant: PACE – architecture and engineer planning
Main Contractor: Ahmadiah Contracting & Trading Co.
3rd Party consultant: ARCADIS Design and Consultancy
Project Floors: 54 stories
Areas: 32,976.0 m²
Mall of Palestine, Palestine
Architecture: LACASA Architect & Engineering Consultant
Structural Engineer: LACASA Architect & Engineering Consultant
Total Area: 34,700 m²
Max. Span: 20 m

Sustainability Pavilion Expo2020, UAE
Client: Dubai World Trade Center Authority (DWTC) Authority
Project Management: EMAAR Properties
Project Management: CH2M Hills & Mace
Architect: Grimshaw Architects
Consultant: Buro Happold
Contractor: ASGC
Cobiax area: 6,284.0 m²

The VUE Project - KSA
Owner: Lifestyle Developers
Cobiax area: 11,289.0 m²
Slab Thickness: 27cm
Number Of floors: 17

Mr. Amer Qaqesh Villa, Jordan
Owner: Mr. Amer Qaqesh
Engineering Office: Wael Hamarneh Architects and Consultant Engineers
Cobiax area: 240 m²
Slab depth: 26 & 35 cm
Dead-Load Reduction: 100.13 Ton
Reduction of CO2: 8.40 Ton
Cantilever Length: 5.50 m
Ciftci Tower, Turkey
Building Owner: Çiftçiler Gayrimenkul
Architect: John McAslan & Partners
Structural Engineer: Arup
Project Area: 290,000 m2
Year: 2012 – 2016

Microsoft Deutschlandzentrale, Germany
Certificate: LEED Gold
Client: Argenta Parkstadt Schwabing MK 8 GmbH & CO.KG
Architect: GSP Architekten
Structural Engineer: Berk + Partner
Contractor: W.Markgraf
Year: 2015

Biblioteca Campus WU, Austria
Architect: Zaha Hadid Architects
Engineer: Vasko and partners
Surface Area: 24,550 sqm
Year: 2011
**Great Ormond Street Hospital – Phase 2B, UK**
Client: Great Ormond Street Hospital  
Designer: Llewellyn Davies Yeang, WSP  
Contractors: Skanska UK  
Surface: 12,500m²  
Slab thickness: 27 mm  

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**Colombia University Medical Center, USA**
Architect: Gensler Piller Scafidio+Renfro  
Structural Engineer: LERA  
Contractor: SCIAMI CM, Difama concrete  
Number Of Stories: 14  
Year of Completion: 2014

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**Academic Business Center and Shopping Mall, Russia**
Architect: UNK Project  
Cobiax Area: 12,000 m²  
Slab Depth: 35 cm  
Concrete Eeduction: 1,163 m³  
Dead Load Reduction: 2,907 tons  
Year: 2015