“Intelligent / Sustainable Buildings”
utilizing Under-Floor HVAC Systems
Advantages over the Life Cycle of a Commercial Building

“We shape our buildings and then our buildings shape us”
Winston Churchill, 1943

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Why Under Floor HVAC
Our World is Changing!
Our Business Environment is Developing!
The way we do business is different!
Our buildings need to change in order to be ready for ... what is coming next.
Insanity:
Doing the same thing over and over again and expecting different results.

Albert Einstein
Requirements in modern commercial buildings:

- **Short Construction Time**
- **ADAPTABILITY**
- **Improved Ventilation**
- **Flexibility**
- **Thermal Comfort**
- **Technology Implementations**
- **Friendly Working Environment**
- **Fast & Economic Space Renovation**
Basic Characteristics for a modern commercial building:

<table>
<thead>
<tr>
<th>Modularity</th>
<th>Standardised elements / parts.</th>
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<tbody>
<tr>
<td>Accessibility</td>
<td>Ease of reaching the building services and systems for maintenance and/or replacement</td>
</tr>
<tr>
<td>Flexibility</td>
<td>The ability to permit growth, moves and changes</td>
</tr>
<tr>
<td>Adaptability</td>
<td>The ease of implementing these growth, moves and changes</td>
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</tbody>
</table>
Life* Cycle Cost of a Building

- Operational: 50%
- Construction: 11%
- Financing: 14%
- Modifications: 25%

Source: AT&T Global Private Systems
SYSTIMAX Structure Cabling Systems

“The way in which you construct your building today will determine in the end how much it will cost to live in it.”

* 40 years
Total* Investment in Office Building

* Over a period of 40 years

Source: Davis Langdon & Everest Consultants
What is... Modular, Accessible, Flexible, Adaptable?

Raised Access Floor
Don’t Just use the Raised Floor … but Utilize it!
Don’t Just use the Raised Floor …  
Utilize it!
This is NOT proper Utilization of the raised access floor!

MEP Services are Accessible, but ... are they Flexible and Adaptable?
Energizing the Office
Raised Floor can look Fabulous!
Raised Floor can look Fabulous!
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Raised Floor can look Fabulous!
What HVAC system should be used to retain:

• Modularity
• Accessibility
• Adaptability
• Flexibility
Overhead HVAC Systems

Video
Ceiling based facilities can not respond to modern and future building (unknown) requirements

Current construction methods are under scrutiny by leading developers and companies because the costs are too high, programme time is too long and methods are wasteful.
Modern Workplaces based on Open Plan Arrangements
Under floor HVAC systems provide improved flexibility for building services, allowing for fast and inexpensive reconfigurations and accommodate the high churn rates of the modern workplace.
Floor Supply – Ceiling Return

Air Circulation Diagram
Floor Supply – Floor Return

Scheduled supply air temperature 14 - 27 Deg C

Room Temp 23 Set Pt 22

Room temp 25 Set Pt 25

Room Temp 22 Set Pt 21

Master

Slave

Fresh Air at 18-24 deg C
Underfloor HVAC System

A design concept which needs:

- No horizontal piping
- No ducting
- No false ceiling (Conditional)
- No pressure balancing
- No wall thermostat

...and offers

- Shorter installation time
- More flexibility
- Better comfort
- Much cheaper reconfiguration time
- User friendly operation
- Easier maintenance and cleaning
Central plant
Shell & Core

Flexible Space System
HIROSS
Advanced Cooling Technologies
Underfloor HVAC with Passive Diffusers

- Limited or No Local Control
- Highly Pressurized Plenums / Possible Noise Problems
- Possible Air Leakages
- Cold Feet Syndrome
- Hot Spots inside the Plenum of the Raised Floor
- Limitations in Air Throw and Diffusers Air Flow
Underfloor HVAC with Passive Diffusers
Underfloor HVAC with Passive VAV Boxes

- Highly Pressurized Plenums / Possible Noise Problems
- Possible Air Leakages
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- Hot Spots inside the Plenum of the Raised Floor
- Limitations in Air Throw and Diffusers’ Air Flow
- Very High Raised Access Floor Plenums
CFD Model for underfloor plenum air path
CFD Model for Temperature Simulation
Underfloor HVAC with Active (Fan Assisted) VAV Boxes

- Very Low Raised Floor (30cm)
- Throw of Air at High Level (1.7m – 2m)
- Low Pressure Plenum
- Good Control over Pressure
- Good Control over Air Speed and Air Volume
- Possibilities in BMS Interfacing
- Communication between Floor and AHU
Floor Terminal Unit – Active VAV Box

Supply Air Temp Sensor
Under floor
Supply Grille
Floor Terminal Unit – Active VAV Box

260mm
Floor Terminal Unit – Active VAV Box

Electronic controller with LCD Screen
Floor Terminal Unit – CFD Model

FTU450 Terminal Unit
Floor Terminal Unit – CFD Model
Temperature Slide
CFD Model Carbon Dioxide Slide
Modeling of Costs and Net Present Values:

Data courtesy of The British Council for Offices, Arup Associates & BAA
Eurobank Cards HQ Building
Athens (Greece)

10,000m² of High Tech Offices completed in just 8 months
Conclusions:

Long and Short Term Benefits

- Height Savings (Up to 30cm per Floor)
- Shorter Building Program (Up to 30%)
- Initial Building Cost Savings (between 5% - 7%)
- Reduced Life Cycle Running & Maintenance Costs (up to 20% Energy Savings)
- Improved Thermal Comfort
- Lower Reconfiguration Costs
- Shorter Reconfiguration Time Needed
- Improved Ventilation Efficiency & IAQ
- Points towards LEED accreditation
Thank you

70 years
EKA GROUP
EST. 1946

time for questions