

# Introduction

## Syllabus, Grouping

4013.315 Architectural Engineering System Design

Mar. 4<sup>th</sup>, 2009

## Moonseo Park

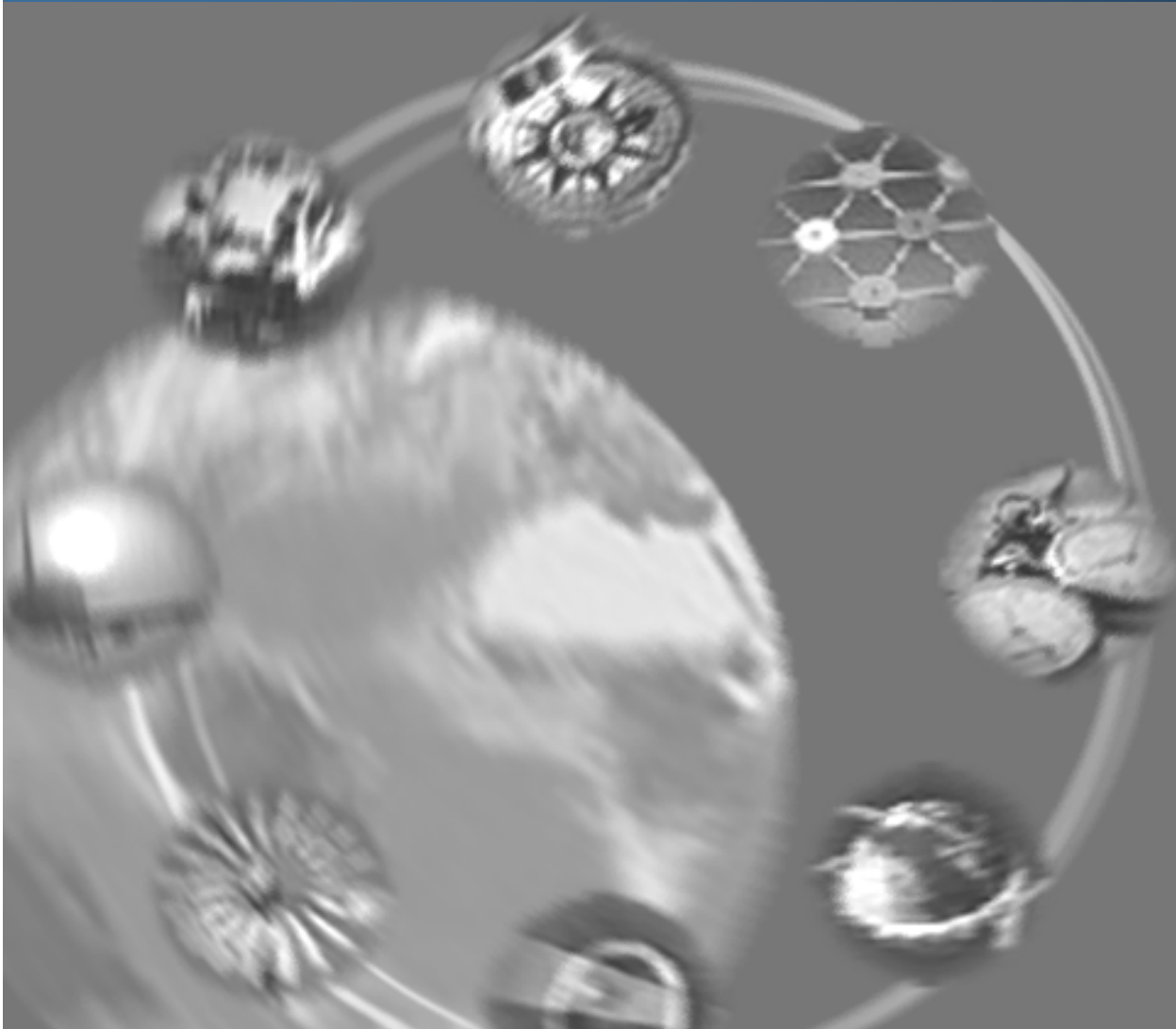
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39동 433

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Seoul National University





# System thinking vs Analytic thinking

## Analytic Thinking

- Break the system down into its components
- Slice and dice approach (divide and conquer)
- To understand basic elements of something  
(예: What comprises water  
How to organize CD collection  
How a clock works  
How much a car weigh)
- Underlying Assumption:
  - The system stands still.
  - Relationships and interactions between the components are not important.
  - Nothing changes in terms of the nature and functions if some of components are taken away from or added to the system

## Systems Thinking

- See the system in terms of the whole rather than parts or individual events
- Holistic approach (Dividing a system is impossible)
- To sense how the parts work together, which in result, influence the patterns of behavior over time  
(예: All-star team not always the best  
Dividing a big elephant in half for the two?  
What about the speed and comfort of a car)
- Underlying Assumption:
  - The system moves and changes.
  - One event influences another, even far away from or long time after the first event.
  - Definite changes in terms of the nature and functions if some of components are taken away from or added to the system.
  - What's happening around us depends on where we stand the the system.



# Course Objectives

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- Appreciating the importance of system approach in engineering design.
- Acquiring the concepts, tools, and techniques of engineering systems design and creative problem-solving ability for architectural engineering projects.



# Lecture Outline

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- Design Process
- Making Information Flow
- Product Planning
- Identifying Customer Needs
- Strategic Planning for Construction Companies
- Structural Engineering Design
- M&E, Environmental Design
- Concept Generation & Selection
- Robust Design



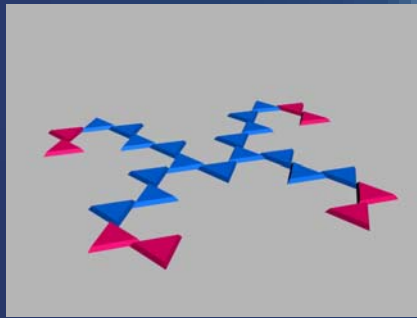
# Hidden Pictures Game



# Rebuilding WTC

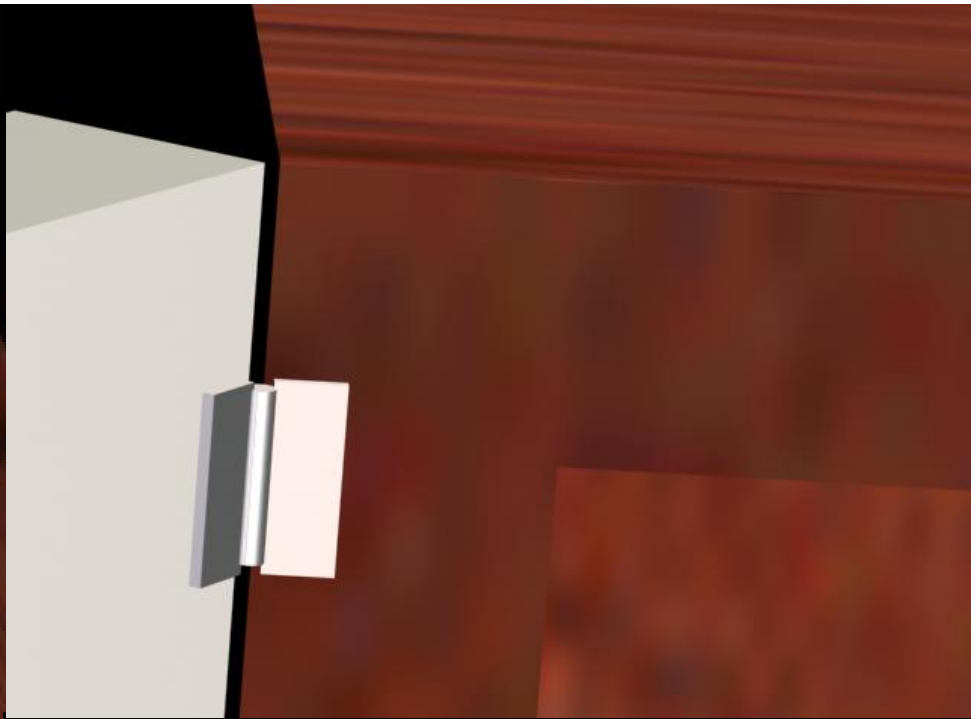


# Delta Game

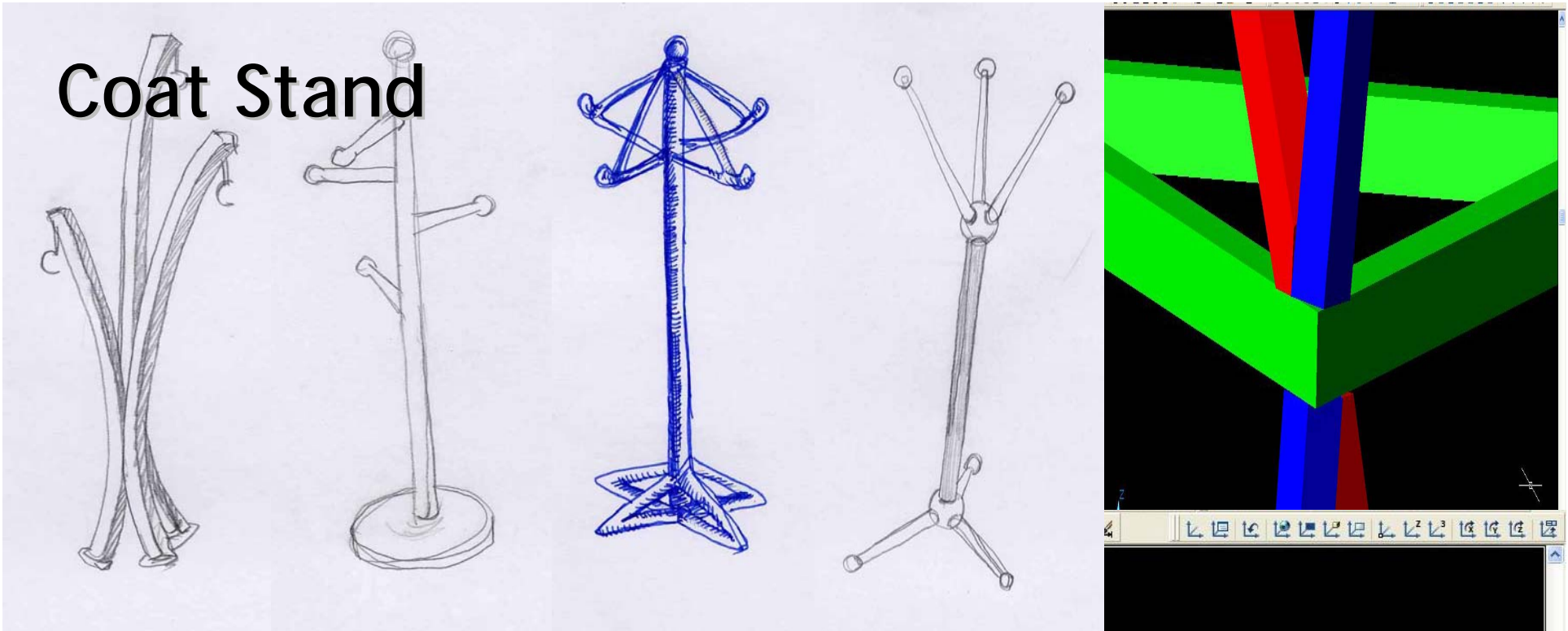




# CD Rack



# Coat Stand

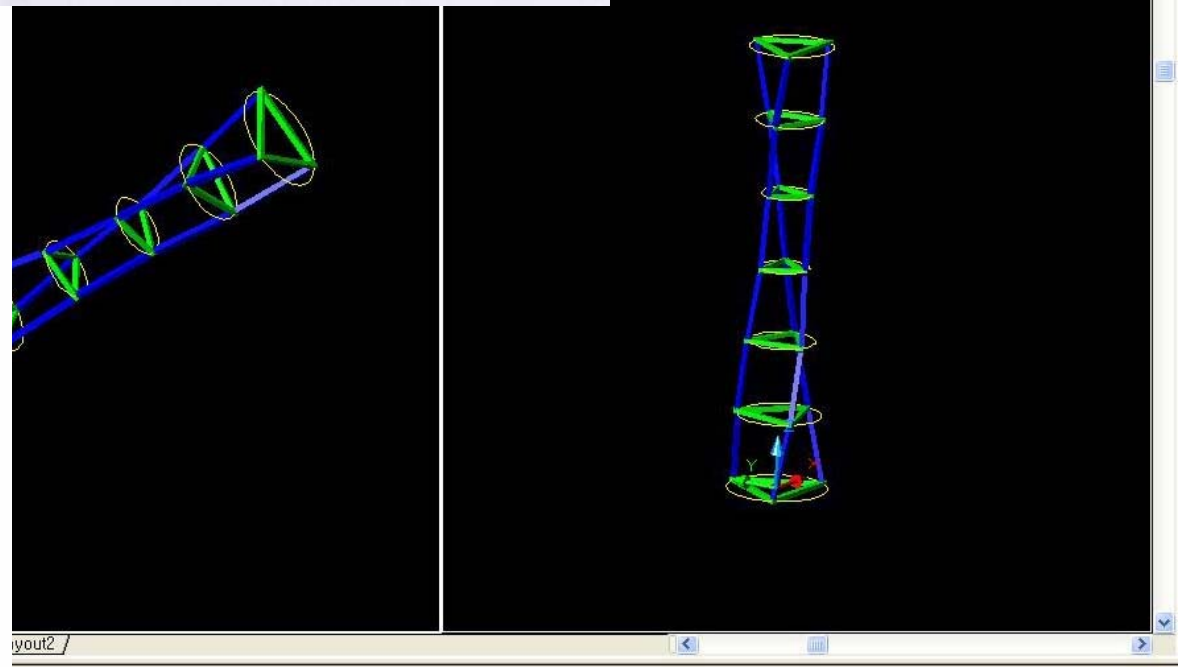


$$\delta = \frac{M_0 * \frac{L}{2}}{2EI} * (2L - \frac{L}{2}) - \frac{gL^4}{8EI}$$

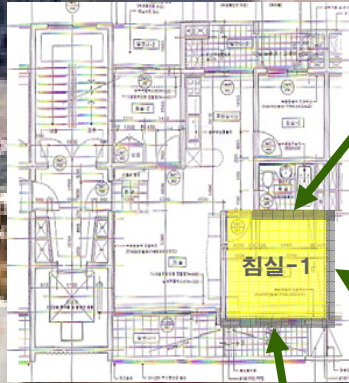
$$\delta = \frac{L^2}{h^2} \left( \frac{9}{20bh} - \frac{1.6 * 10^{-8} L^2}{20000} \right)$$

$$\delta = \frac{300^2}{50^2} \left( \frac{9}{20 * 20 * 50} - \frac{6 * 1.6 * 10^{-8} * 300^2}{20000} \right) < 0.5mm$$

$$\delta = 0.16mm$$



# Thermal Load



부분	재료	열저항	열관류율	열손실
조적벽	벽돌, 단열재 석고보드, 벽지	0.32	3.08	279.76

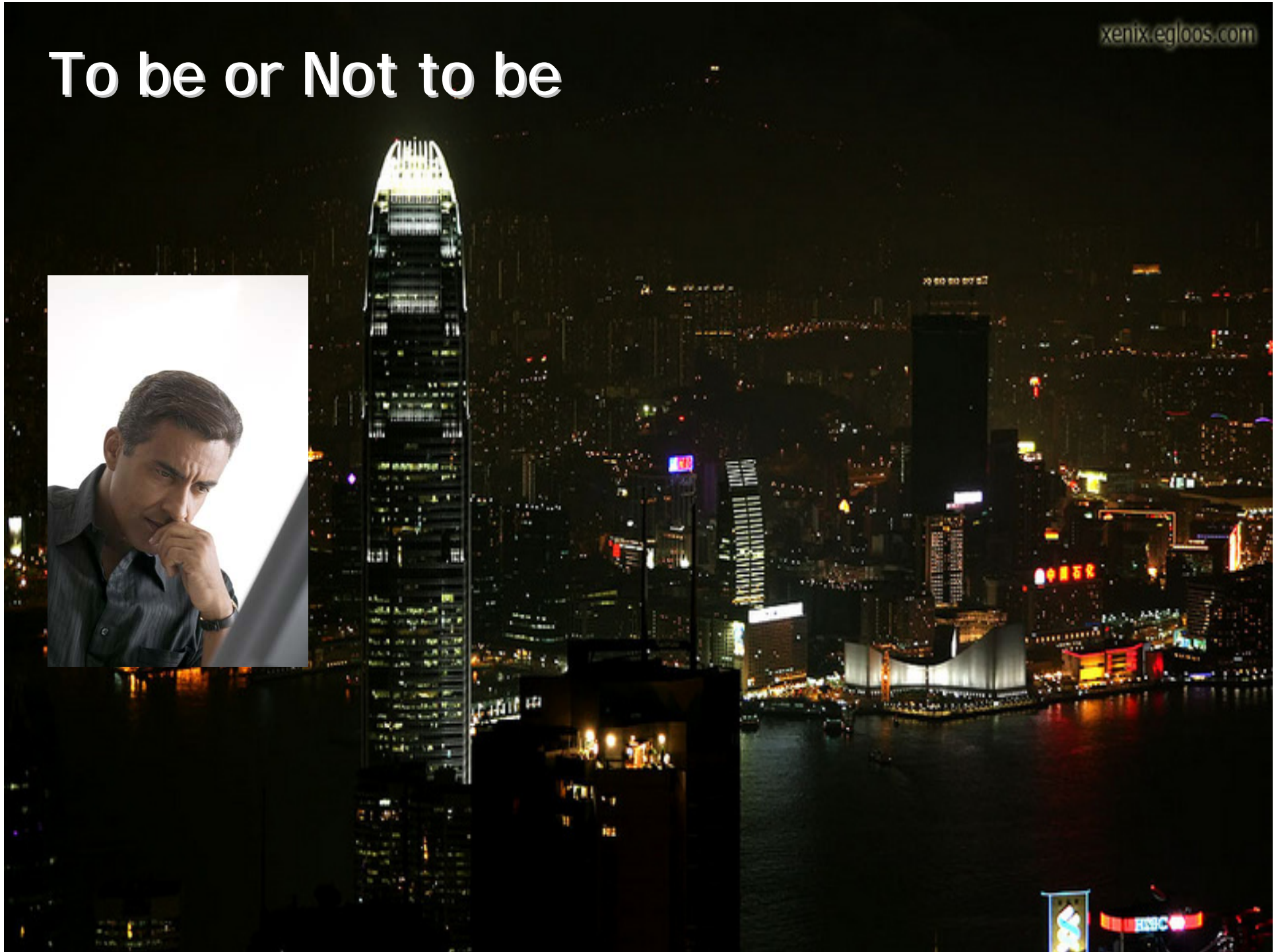
부분	재료	열저항	열관류율	열손실
콘크리트벽	콘크리트, 단열재 석고보드, 벽지	3.45	0.29	73.22

부분	재료	열저항	열관류율	열손실
벽	벽돌, 단열재 석고보드, 벽지	2.80	0.36	49.26
창문	유리, 중공층	0.37	2.71	289.68
창문	알루미늄샷시	0.15	6.62	118.34
창문	알루미늄샷시	0.15	6.61	86.41

총 열손실 : 896.7 watt



# To be or Not to be



Just Got Married

Mid-Term Project





# Term Project



Eng

## Architectural

# Engineering Systems Design



# Grading

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- Design Projects: 56% (7 x 8%)
- Mid-Term Project: 20%
- Term Project: 20%
- Peer Review): 4%



# Others

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- Lecture materials will be posted at <http://etl.snu.ac.kr>.
- 7 Design Projects and 2 Term Projects will be done and assessed in a group of 2-3 students.
- All projects are to be presented using the most effective presentation medium (probably Power Point Slide) in the due week class.
- Term Project would be further developed to 공학전작품 during the summer vacation.
- 공학전작품 will be assessed and credited to the designated course in the 2nd semester, 2008.

# Lecturer

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180 cm, 83kg  
Associate Prof.,  
PhD from MIT  
E-mail: [mspark@snu.ac.kr](mailto:mspark@snu.ac.kr)





# Design Project 0: Hidden Picture Game

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- Finding a set of Korean or English alphabets which are hidden in any objects or buildings within the SNU campus.
- ‘가, 나, 다,...하’, ‘a, b, c,... z’
- group assignment
- to be prepared in a PPT file
- due next week



# Grouping

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