

STAGON (Stability + Hexagon)

The honeycomb Struction building

Concept

자연계에서 최소부재로 최대의 공간을 활용하면서 외부 충격에 잘 견디내는 벌집구조를 건물에 도입
-> 육각형(공간활용도를 떠나 외부 충격에 효율적으로 대처할수 있는 구조)



Kwang-Woon University
조 현식, 이 형락, 이 병찬

개요

건물명 : STAGON
대지위치 : 인천광역시
용도 : Department,
(1~5F)
Office,
(6~70F)
Apartment
(71~100F)
높이 : 392m
구조 : SRC,
Shear wall,
Outrigger,
Belt truss

건축 배경

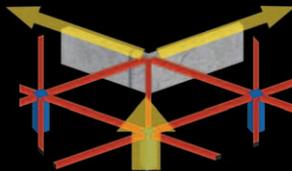
제한된 대지안에 효율적인 공간활용과 그 지역의 Land Mark로써 지역경제 활성화를 촉진시킨다

두뇌적인 건축물, 초고층의 건축물은 두뇌건축물을 만드는 것이다. 통신 및 자동시스템, 냉난방의 절약화 등으로 공동실이 많이 소요되지만, 고급의 서비스를 받을 수 있는 것이 초고층의 장점이다

구조 개념

자연의 벌집

1. 단위면적당 벌집을 만들 때 필요한 재료가 덜 들어간다
2. 똑같은 재료가 있다면 더 넓은 면적의 벌집을 만들수있다
3. 외부 충격에 의해 부서질 확률이 낮아다
(정삼각형, 정사각형의 경우 한 직선을 경계로 밀리게 된다.)

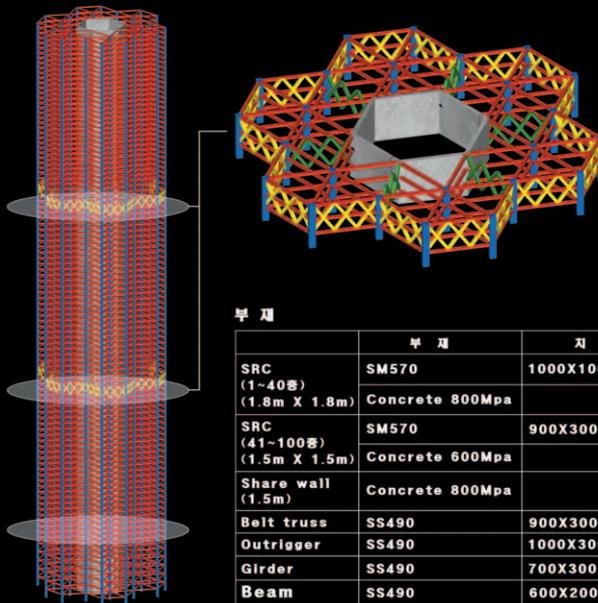


건물의 벌집

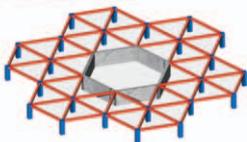
1. 횡하중에 대해 벌집의 육각형 구조로 횡하중을 분산하여 각각의 전단벽이 부담한다
2. 코어가 횡하중을 분산부담하는 내에 서 최대의 공간을 활용한다

Outrigger & BeltTruss

- Core Outrigger, BeltTruss, 외부기둥으로 구성되며, 횡강성이 큰 Outrigger와 BeltTruss에 의해 외부기둥을 코어와 하나로 묶음으로서 횡강성을 증가시킨다



기준층 평면



부재

	부재	지수
SRC (1~40층) (1.8m X 1.8m)	SM570 Concrete 800Mpa	1000X1000X40X40
SRC (41~100층) (1.5m X 1.5m)	SM570 Concrete 600Mpa	900X300X16X28
Share wall (1.5m)	Concrete 800Mpa	
Belt truss	SS490	900X300X16X28
Outrigger	SS490	1000X300X18X30
Glrder	SS490	700X300X13X24
Beam	SS490	600X200X11X17

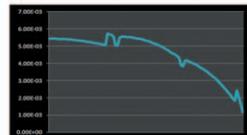


풍하중

지역 : 인천광역시
 기본풍속 : 30m/sec
 노출도 : B
 중요도계수 : 1

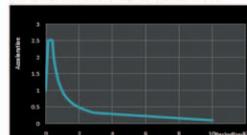


Story Drift



Story Drift Ratio
 : 0.0015m

Response Spectrum



ALT 1.

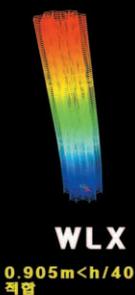


Deformed Shape	
Translation - XYZ	
STATIC LOAD	
W_L_X	
MAXFRAME	-4726 (Y13)
DX	-1.319E+00
DY	8.471E-01
DZ	6.664E-03
DKYZ	1.321E+00
UNIT	m
SCALE	3.089E+01

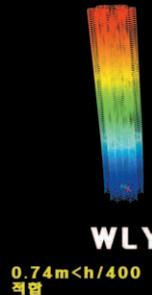


Deformed Shape	
Translation - XYZ	
STATIC LOAD	
W_L_Y	
MAXFRAME	-4717 (Y13)
DX	2.826E-01
DY	1.096E+00
DZ	4.986E-03
DKYZ	1.095E+00
UNIT	m
SCALE	3.712E+01

ALT 2. (Belt Truss + Out Rigger)

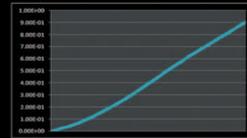


Deformed Shape	
Translation - XYZ	
STATIC LOAD	
W_L_X	
MAXFRAME	-4726 (Y12)
DX	-9.005E-01
DY	3.919E-01
DZ	4.517E-02
DKYZ	9.017E-03
UNIT	m
SCALE	4.910E+01

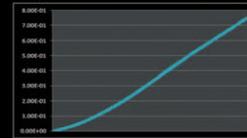


Deformed Shape	
Translation - XYZ	
STATIC LOAD	
W_L_Y	
MAX FRAME	-8972 (Z)
DX	1.326E-01
DY	7.464E-01
DZ	3.505E-02
DKYZ	7.472E-01
UNIT	m
SCALE	5.442E+01

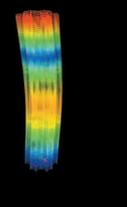
WXL 평면위



WLY 평면위

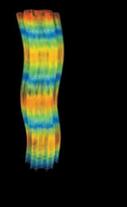


3차 모드



Mode Shape	
VIBRATION Mode - XYZ	
MODE 3	
FREQUENCY (CYCLES/SEC)	
NATURAL PERIOD (SEC)	
8.779E-03	11.505E-02
8.399E-03	11.906E-02
7.959E-03	12.552E-02
7.579E-03	13.194E-02
7.249E-03	13.929E-02
6.969E-03	14.769E-02
6.729E-03	15.719E-02
6.529E-03	16.789E-02
6.369E-03	17.989E-02
6.249E-03	19.329E-02
6.169E-03	20.819E-02
6.129E-03	22.469E-02
6.119E-03	24.299E-02
6.129E-03	26.329E-02
6.159E-03	28.569E-02
6.209E-03	31.029E-02
6.279E-03	33.729E-02
6.379E-03	36.689E-02
6.519E-03	40.029E-02
6.699E-03	43.769E-02
6.929E-03	48.029E-02
7.209E-03	52.829E-02
7.549E-03	58.189E-02
7.959E-03	64.229E-02
8.449E-03	71.029E-02
9.029E-03	78.629E-02
9.709E-03	87.029E-02
1.050E-02	96.229E-02
1.140E-02	1.062E-01
1.240E-02	1.170E-01
1.350E-02	1.286E-01
1.470E-02	1.410E-01
1.600E-02	1.542E-01
1.740E-02	1.682E-01
1.890E-02	1.830E-01
2.050E-02	1.986E-01
2.220E-02	2.150E-01
2.400E-02	2.322E-01
2.590E-02	2.502E-01
2.790E-02	2.690E-01
2.990E-02	2.886E-01
3.200E-02	3.090E-01
3.420E-02	3.302E-01
3.650E-02	3.522E-01
3.890E-02	3.750E-01
4.140E-02	3.986E-01
4.400E-02	4.230E-01
4.670E-02	4.482E-01
4.950E-02	4.742E-01
5.240E-02	5.010E-01
5.540E-02	5.286E-01
5.850E-02	5.570E-01
6.170E-02	5.862E-01
6.500E-02	6.162E-01
6.840E-02	6.470E-01
7.190E-02	6.786E-01
7.550E-02	7.110E-01
7.920E-02	7.442E-01
8.300E-02	7.782E-01
8.690E-02	8.130E-01
9.090E-02	8.486E-01
9.500E-02	8.850E-01
9.920E-02	9.222E-01
1.0350E-01	9.592E-01
1.0800E-01	9.970E-01
1.1260E-01	1.0356E-01
1.1730E-01	1.0770E-01
1.2210E-01	1.1142E-01
1.2700E-01	1.1472E-01
1.3200E-01	1.1766E-01
1.3710E-01	1.2024E-01
1.4230E-01	1.2246E-01
1.4760E-01	1.2432E-01
1.5300E-01	1.2582E-01
1.5850E-01	1.2696E-01
1.6410E-01	1.2774E-01
1.6980E-01	1.2816E-01
1.7560E-01	1.2822E-01
1.8150E-01	1.2794E-01
1.8750E-01	1.2732E-01
1.9360E-01	1.2636E-01
1.9980E-01	1.2506E-01
2.0610E-01	1.2342E-01
2.1250E-01	1.2144E-01
2.1900E-01	1.1912E-01
2.2560E-01	1.1646E-01
2.3230E-01	1.1346E-01
2.3910E-01	1.1012E-01
2.4600E-01	1.0644E-01
2.5300E-01	1.0242E-01
2.6010E-01	9.806E-02
2.6730E-01	9.332E-02
2.7460E-01	8.822E-02
2.8200E-01	8.276E-02
2.8950E-01	7.794E-02
2.9710E-01	7.276E-02
3.0480E-01	6.722E-02
3.1260E-01	6.132E-02
3.2050E-01	5.506E-02
3.2850E-01	4.844E-02
3.3660E-01	4.146E-02
3.4480E-01	3.412E-02
3.5310E-01	2.642E-02
3.6150E-01	1.836E-02
3.7000E-01	1.004E-02
3.7860E-01	2.46E-03
3.8730E-01	-2.16E-03
3.9610E-01	-5.46E-03
4.0500E-01	-9.06E-03
4.1400E-01	-1.296E-02
4.2310E-01	-1.706E-02
4.3230E-01	-2.096E-02
4.4160E-01	-2.466E-02
4.5100E-01	-2.816E-02
4.6050E-01	-3.146E-02
4.7010E-01	-3.456E-02
4.7980E-01	-3.746E-02
4.8960E-01	-4.016E-02
4.9950E-01	-4.266E-02
5.0950E-01	-4.496E-02
5.1960E-01	-4.706E-02
5.2980E-01	-4.896E-02
5.4010E-01	-5.066E-02
5.5050E-01	-5.216E-02
5.6100E-01	-5.346E-02
5.7160E-01	-5.456E-02
5.8230E-01	-5.546E-02
5.9310E-01	-5.616E-02
6.0400E-01	-5.666E-02
6.1500E-01	-5.696E-02
6.2610E-01	-5.706E-02
6.3730E-01	-5.696E-02
6.4860E-01	-5.666E-02
6.6000E-01	-5.616E-02
6.7150E-01	-5.546E-02
6.8310E-01	-5.456E-02
6.9480E-01	-5.346E-02
7.0660E-01	-5.216E-02
7.1850E-01	-5.066E-02
7.3050E-01	-4.896E-02
7.4260E-01	-4.706E-02
7.5480E-01	-4.496E-02
7.6710E-01	-4.266E-02
7.7950E-01	-4.016E-02
7.9200E-01	-3.746E-02
8.0460E-01	-3.456E-02
8.1730E-01	-3.146E-02
8.3010E-01	-2.816E-02
8.4300E-01	-2.466E-02
8.5600E-01	-2.096E-02
8.6910E-01	-1.706E-02
8.8230E-01	-1.296E-02
8.9560E-01	-8.66E-03
9.0900E-01	-4.22E-03
9.2250E-01	2.22E-03
9.3610E-01	6.56E-03
9.4980E-01	1.176E-02
9.6360E-01	1.876E-02
9.7750E-01	2.756E-02
9.9150E-01	3.816E-02
1.0000E+00	5.056E-02

9차 모드



Mode Shape	
VIBRATION Mode - XYZ	
MODE 9	
FREQUENCY (CYCLES/SEC)	
NATURAL PERIOD (SEC)	
8.196E-03	12.326E-02
7.886E-03	12.806E-02
7.606E-03	13.326E-02
7.356E-03	13.886E-02
7.136E-03	14.486E-02
6.946E-03	15.126E-02
6.786E-03	15.806E-02
6.656E-03	16.526E-02
6.556E-03	17.286E-02
6.486E-03	18.086E-02
6.446E-03	18.926E-02
6.426E-03	19.806E-02
6.426E-03	20.726E-02
6.446E-03	21.686E-02
6.486E-03	22.686E-02
6.546E-03	23.726E-02
6.626E-03	24.806E-02
6.726E-03	25.926E-02
6.846E-03	27.086E-02
6.986E-03	28.286E-02
7.146E-03	29.526E-02
7.326E-03	30.806E-02
7.526E-03	32.126E-02
7.746E-03	33.486E-02
7.986E-03	34.886E-02
8.246E-03	36.326E-02
8.526E-03	37.806E-02
8.826E-03	39.326E-02
9.146E-03	40.886E-02
9.486E-03	42.486E-02
9.846E-03	44.126E-02
1.0220E-02	45.806E-02
1.0610E-02	47.526E-02
1.1010E-02	49.286E-02
1.1420E-02	51.086E-02
1.1840E-02	52.926E-02
1.2270E-02	54.806E-02
1.2710E-02	56.726E-02
1.3160E-02	58.686E-02
1.3620E-02	60.686E-02
1.4090E-02	62.726E-02
1.4570E-02	64.806E-02
1.5060E-02	66.926E-02
1.5560E-02	69.086E-02
1.6070E-02	71.286E-02
1.6590E-02	73.526E-02
1.7120E-02	75.806E-02
1.7660E-02	78.126E-02
1.8210E-02	80.486E-02
1.8770E-02	82.886E-02
1.9340E-02	85.326E-02
1.9920E-02	87.806E-02
2.0510E-02	90.326E-02
2.1110E-02	92.886E-02
2.1720E-02	95.486E-02
2.2340E-02	98.126E-02
2.2970E-02	100.806E-02
2.3610E-02	103.526E-02
2.4260E-02	106.286E-02
2.4920E-02	109.086E-02
2.5590E-02	111.926E-02
2.6270E-02	114.806E-02
2.6960E-02	117.726E-02
2.7660E-02	120.686E-02
2.8370E-02	123.686E-02
2.9090E-02	126.726E-02
2.9820E-02	129.806E-02
3.0560E-02	132.926E-02
3.1310E-02	136.086E-02
3.2070E-02	139.286E-02
3.2840E-02	142.526E-02
3.3620E-02	145.806E-02
3.4410E-02	149.126E-02
3.5210E-02	152.486E-02
3.6020E-02	155.886E-02
3.6840E-02	159.326E-02
3.7670E-02	162.806E-02
3.8510E-02	166.326E-02
3.9360E-02	169.886E-02
4.0220E-02	173.486E-02
4.1090E-02	177.126E-02
4.1970E-02	180.806E-02
4.2860E-02	184.526E-02
4.3760E-02	188.286E-02
4.4670E-02	192.086E-02
4.5590E-02	195.926E-02
4.6520E-02	199.806E-02
4.7460E-02	203.726E-02
4.8410	