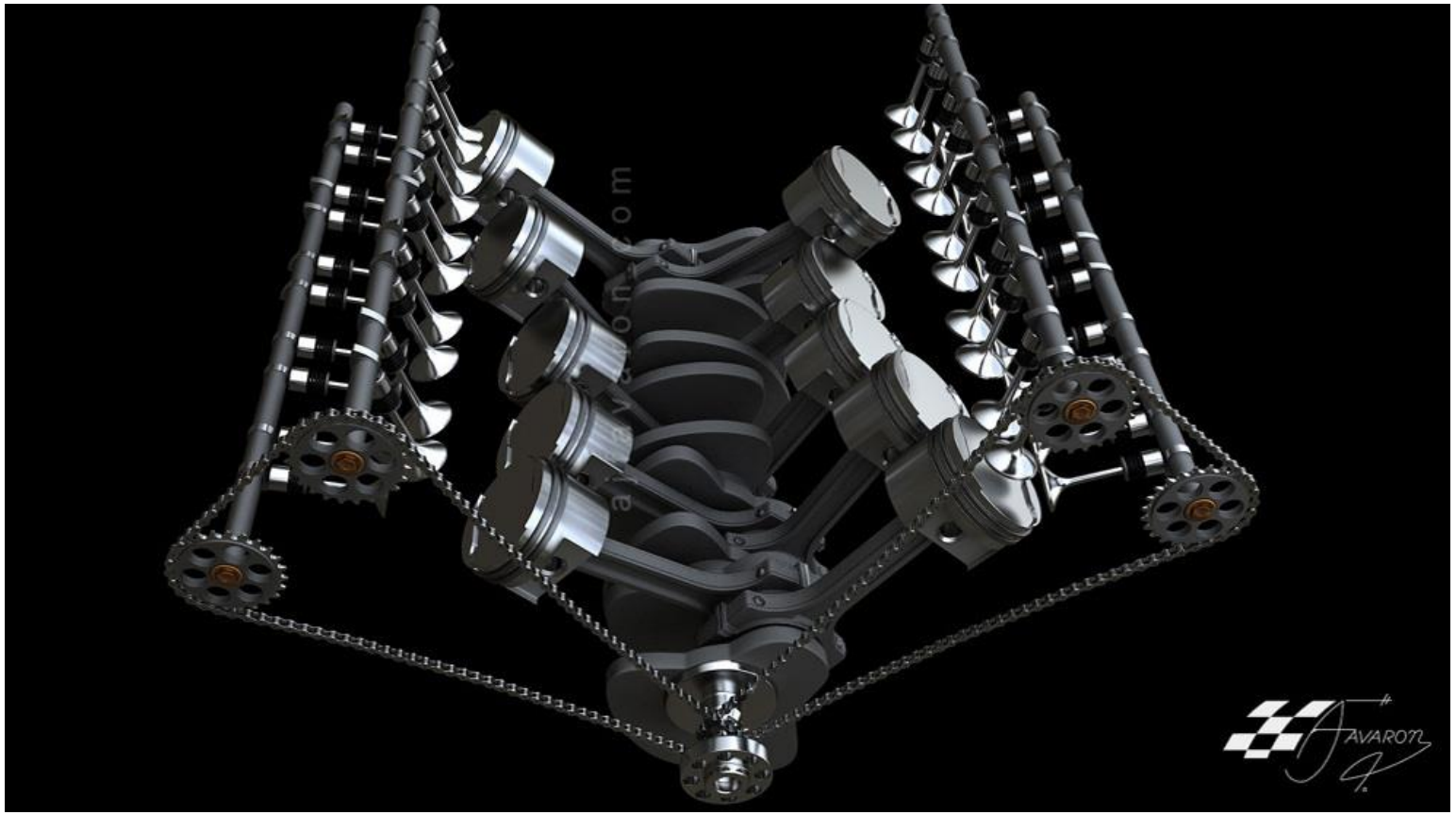
TEyang

The Engine of Hanyang

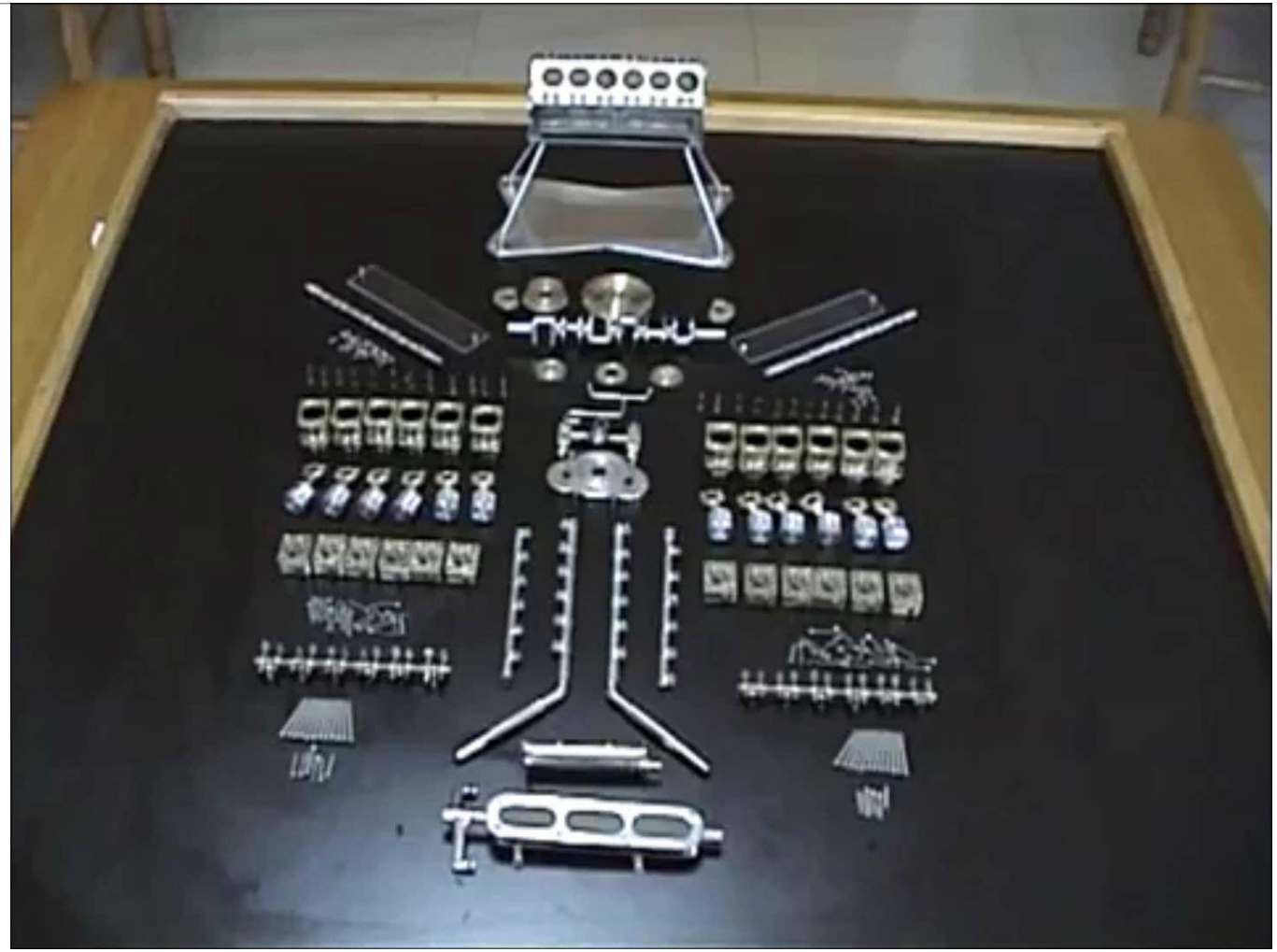
2013020552 이상규
2013020477 손해강
2013020325 권나현

1 모델 선정 이유



1 모델 선정 이유

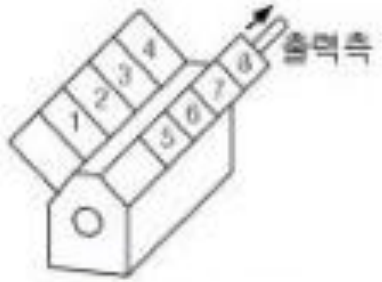
V12만들기.wmv



2 설계과정

1	2	3	4	5	6
치수 분석	파트 제작	파트 수정	파트 조립	DMU 시행	오류 해결

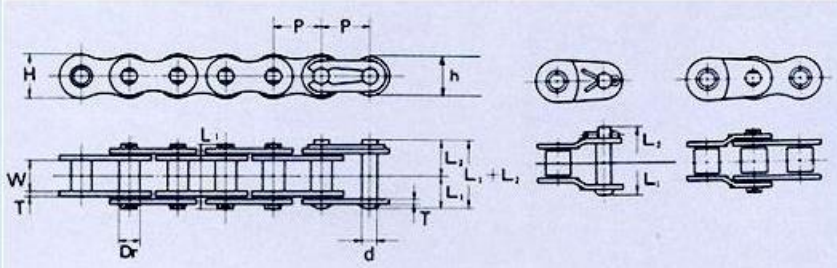
2-1 치수분석



4	1 3 2 4
6	1 2 5 6 4 3 또는 1 4 5 6 2 3
8	1 6 3 5 4 7 2 8 또는 1 5 4 8 6 3 7 2 또는 1 8 3 6 4 5 2 7
10	1 6 2 8 4 9 5 10 3 8 또는 1 6 5 10 2 7 3 8 4 9
12	1 7 5 11 3 9 6 12 2 8 4 10 또는 1 12 5 8 3 10 6 7 2 11 4 9
16	1 14 9 4 7 12 15 6 13 8 3 16 11

□ 표준형 로울러체인(단열)

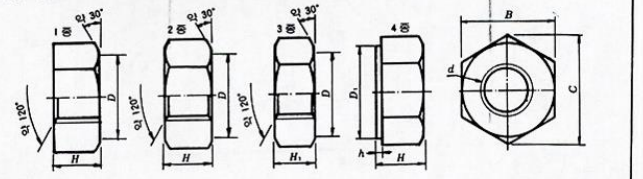
체인 번호	피치 P	로울러 내폭 W	로울러 외경 Dr	핀 경d	핀 길이 L1+L2	핀 치수 L1	핀 치수 L2	링크플레이트 두께 T	링크플레이트 폭H	링크플레이트 폭h	KS 파단 강도 (kg.f)	평균 파단 강도 (kg.f)	최대 허용 하중 (kg.f)	계략 중량 (kg/m)
25	6.35	3.18	3.3	2.31	8.45	3.82	4.63	0.75	6	5.2	360	400	65	0.14
35	9.53	4.78	5.09	3.59	13.1	5.9	7.2	1.25	9	7.8	800	950	220	0.33
40	12.7	7.95	7.94	3.97	17.45	8.2	9.25	1.5	12	10.4	1,420	1,720	370	0.64
50	15.9	9.53	10.16	5.09	22.15	10.3	11.9	2	15	13	2,210	2,550	650	1.04
60	19.1	12.7	11.91	5.96	27.3	12.8	14.6	2.4	18.1	15.6	3,200	3,830	900	1.53
80	25.4	15.88	15.88	7.94	36.05	16.2	19.8	3.2	24.1	20.8	5,650	6,500	1,500	2.66
100	31.8	19.05	19.05	9.54	43.4	19.8	23.6	4	30.1	26	8,850	10,500	2,300	3.99
120	38.1	25.4	22.23	11.1	54.25	25.2	29.1	4.8	36.2	31.2	12,800	14,000	3,100	5.93
140	44.5	25.4	25.4	12.7	58.75	27.1	31.7	5.6	42.2	36.4	17,400	18,500	4,100	7.46
160	50.8	31.75	28.58	14.3	69.35	32.1	37.3	6.4	48.2	41.6	22,700	22,700	5,400	10.1
180	57.2	35.72	35.71	17.5	79.5	36.2	43.3	7.2	54.2	46.7	28,700	29,400	6,200	13.45
200	63.5	38.1	39.69	19.9	86.55	39.4	47.2	8	60.3	52	35,400	42,000	7,300	16.49
240	76.2	47.63	47.63	23.8	103.9	48.2	55.7	9.5	72.4	62.4	51,100	51,100	10,100	24.5



2-1 치수분석

육각 너트

육각 너트

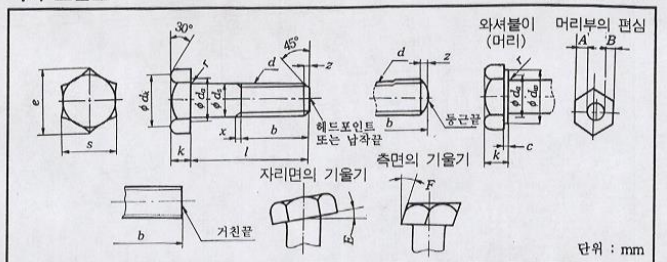


KS B 1012

	나사의 호칭 (d) 보통나사	나사의 호칭 (d) 가는나사	H	H_1	B	C (약)	D (약)	h (약)	D_1 (최소)
육각너트 (미터나사) 상	M 2	–	1.6	1.2	4	4.6	3.8	–	–
	(M 2.2)	–	1.8	1.4	4.5	5.2	4.3	–	–
	M 2.3	–	1.8	1.4	4.5	5.2	4.3	–	–
	M 2.5	–	2	1.6	5	5.8	4.7	–	–
	M 2.6	–	2	1.6	5	5.8	4.7	–	–
	M 3×0.5	–	2.4	1.8	5.5	6.4	5.3	–	–
	M 3.5	–	2.8	2	6	6.9	5.8	–	–
	M 4×0.7	–	3.2	2.4	7	8.1	6.8	–	–
	M 4.5	–	3.6	2.8	8	9.2	7.8	–	–
	M 5×0.8	–	4	3.2	8	9.2	7.8	0.4	7.2
	M 6	–	5	3.6	10	11.5	9.8	0.4	9.0
	(M 7)	–	5.5	4.2	11	12.7	10.8	0.4	10
	M 8	M 8×1	6.5	5	13	15.0	12.5	0.4	11.7
	M 10	M 10×1.25	8	6	17	19.6	16.5	0.4	15.8
	M 12	M 12×1.25	10	7	19	21.9	18	0.6	17.6
	(M 14)	(M 14×1.5)	11	8	22	25.4	21	0.6	20.4
	M 16	M 16×1.5	13	10	24	27.7	23	0.6	22.3
	(M 18)	(M 18×1.5)	15	11	27	31.2	26	0.6	25.6
	M 20	M 20×1.5	16	12	30	34.6	29	0.6	28.5
	(M 22)	(M 22×1.5)	18	13	32	37.0	31	0.6	30.4
	M 24	(M 24×2	19	14	36	41.6	34	0.6	34.2
	(M 27)	(M 27×2)	22	16	41	47.3	39		
	M 30	(M 30×2	24	18	46	53.1	44		
육각너트 (미터나사) 상·중·보통	(M 33)	(M 33×2)	26	20	50	57.7	48		
	M 36	M 36×3	29	21	55	63.5	53		
	(M 39)	(M 39×3)	31	23	60	69.3	57		
	M 42	–	32	25	65	75	62		
	(M 45)	–	36	27	70	80.8	67		
	M 48	–	38	29	75	86.5	72		
	(M 52)	–	42	31	80	92.4	77		
	M 56	–	45	34	85	98.1	82		
	(M 60)	–	48	36	90	104	87		
	M 64	–	51	38	95	110	92		
	(M 68)	–	54	40	100	115	97		
	–	M 72×6	58	42	105	121	102		
	–	(M 76×6)	61	46	110	127	107		
	–	M 80×6	64	48	115	133	112		
	–	(M 85×6)	68	50	120	139	116		
	–	M 90×6	72	54	130	150	126		
	–	M 95×6	76	57	135	156	131		
	–	M 100×6	80	60	145	167	141		
	–	(M 105×6)	84	63	150	173	146		
	–	M 110×6	88	65	155	179	151		
	–	(M 115×6)	92	69	165	191	161		
주 : 보통너트에는 4종은 없다.	–	(M 120×6)	96	72	170	196	166		
	–	M 125×6	100	76	180	208	176		
	–	(130×6)	104	78	185	214	181		

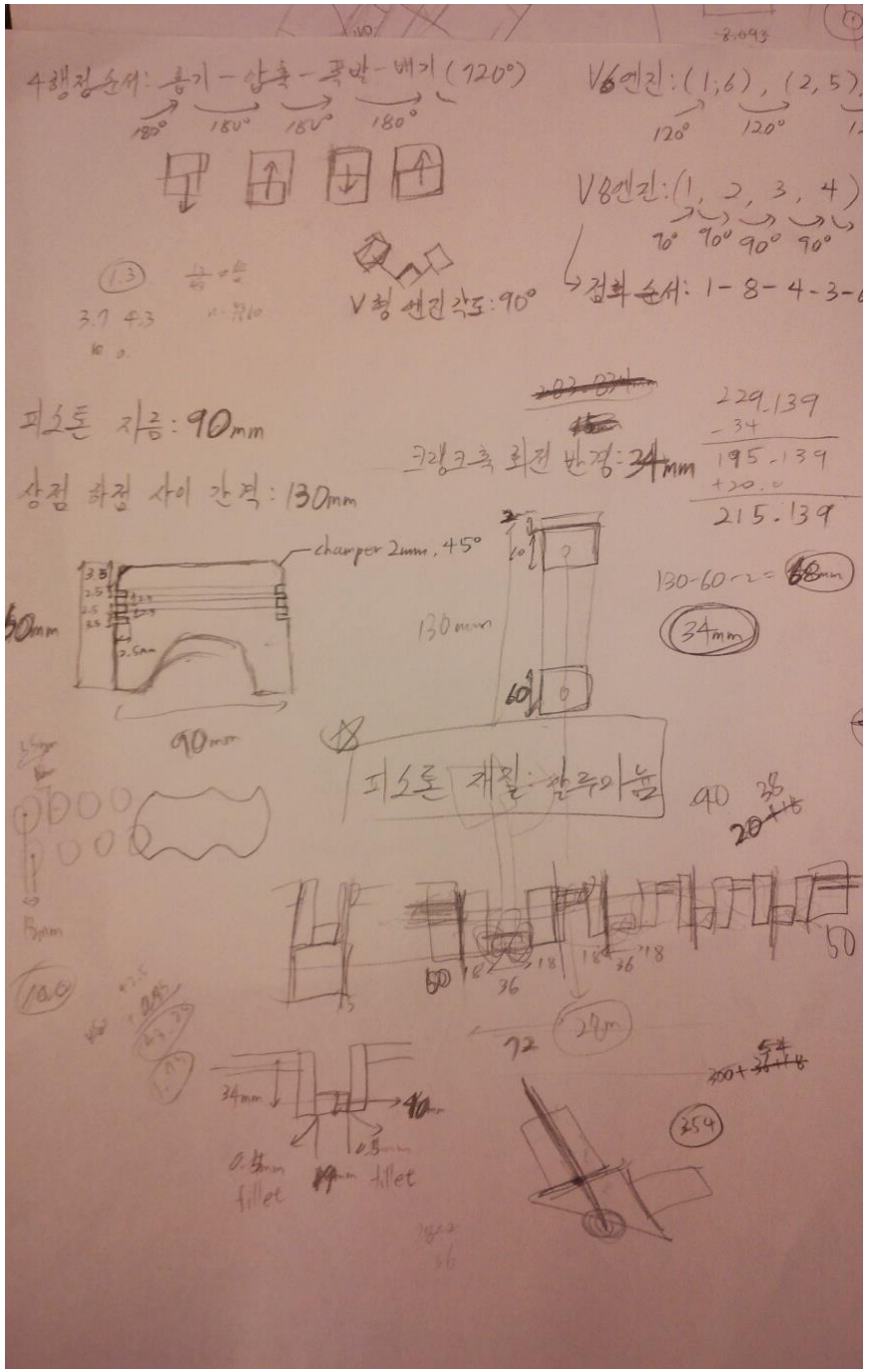
육각 보울트

KS B 1002–1986

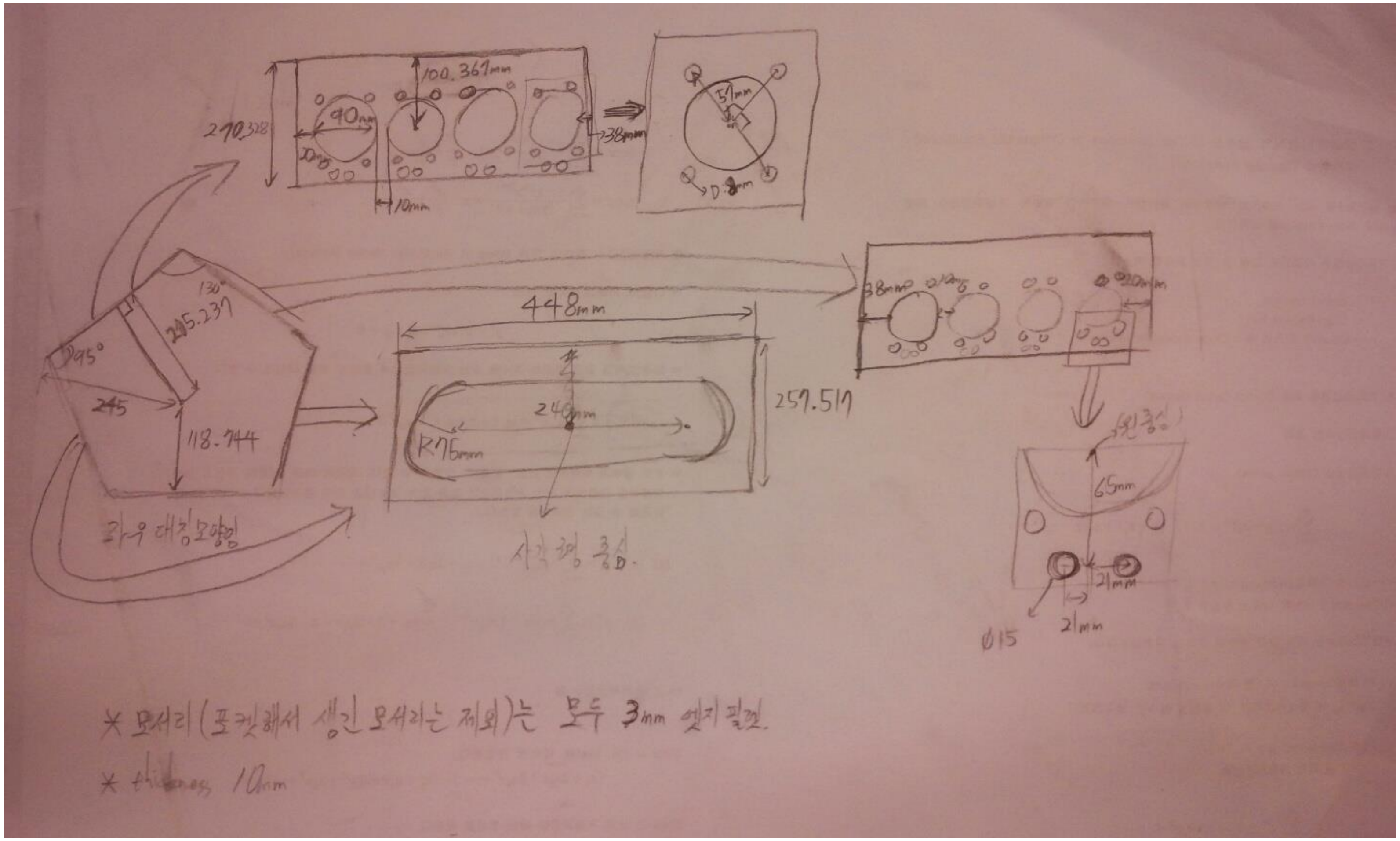


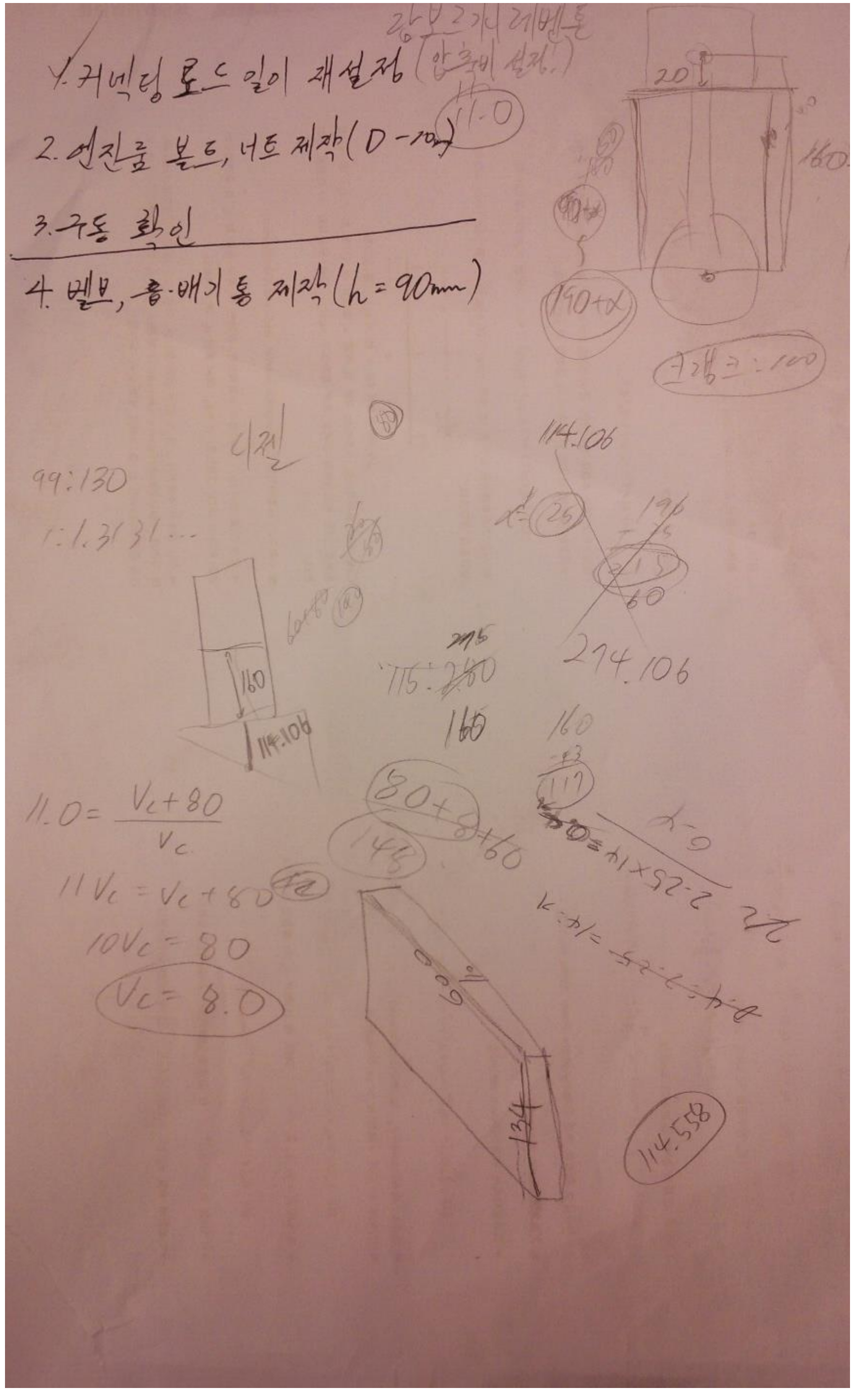
나사의 호칭(d)	d_s 보통나사	d_s 가는나사	d_s 기준치수	d_s 허용차	k 기준치수	k 허용차	s 기준치수	s 허용차	e 약	d_s' 약	r 최소	d_a 최대	z 약	A–B 최대	E 및 F 최대
	M 3	–	3		2		5.5		6.4	5.3	0.1	3.6	0.6	0.2	
	(M 3.5)	–	3.5		2.4	±0.1	6		6.9	5.8	0.1	4.1	0.6	0.2	
	M 4	–	4	0 −0.1	2.8		7	0 −0.2	8.1	6.8	0.2	4.7	0.8	0.2	
	(M 4.5)	–	4.5		3.2	±0.15	8		9.2	7.8	0.2	5.2	0.8	0.3	
	M 5	–	5		3.5		8		9.2	7.8	0.2	5.7	0.9	0.3	
	M 6	–	6		4		10		11.5	9.8	0.25	6.8	1	0.3	
	(M 7)	–	7		5		11		12.7	10.7	0.25	7.8	1	0.3	
	M 8	M 8×1	8	0 −0.15	5.5		13	0 −0.25	15	12.6	0.4	9.2	1.2	0.4	
	M 10	M 10×1.25	10		7		17		19.6	16.5	0.4	11.2	1.5	0.5	
	M 12	M 12×1.25	12		8		19		21.9	18	0.6	13.7	2	0.7	
	(M 14)	(M 14×1.5)	14		9		22		25.4	21	0.6	15.7	2	0.7	
	M 16	M 16×1.5	16	0 −0.2	10	±0.2	24	0 −0.35	27.7	23	0.6	17.7	2	0.8	
	(M 18)	(M 18×1.5)	18		12		27		31.2	26	0.6	20.2	2.5	0.9	
	M 20	M 20×1.5	20		13		30		34.6	29	0.8	22.4	2.5	0.9	1
	(M 22)	(M 22×1.5)	22		14		32		37	31	0.8	24.4	2.5	1.1	
	M 24	M 24×2	24		15		36		41.6	34	0.8	26.4	3	1.2	
	(M 27)	(M 27×2)	27		17		41	0 −0.4	47.3	39	1	30.4	3	1.3	
	M 30	M 30×2	30		19		46		53.1	44	1	33.4	3.5	1.5	
	(M 33)	(M 33×2)	33		21		50		57.7	48	1	36.4	3.5	1.6	
	M 36	M 36×3	36	0 −0.25	23	±0.25	55		63.5	53	1	39.4	4	1.8	
	(M 39)	(M 39×3)	39		25		60		69.3	57	1	42.4	4	2	
	M 42	–	42		26		65	0 −0.45	75	62	1.2	45.6	4.5	2.1	
	(M 45)	–	45		28		70		80.8	67	1.2	48.6	4.5	2.3	
	M 48	–	48		30		75		86.5	72	1.6	52.6	5	2.4	
	(M 52)	–	52		33		80		92.4	77	1.6	56.6	5	2.6	
	M 56	–	56		35		85		98.1	82	2	63	5.5	2.8	
	(M 60)	–	60		38		90		104	87	2	67	5.5	3	
	M 64	–	64	0 −0.3	40	±0.3	95		110	92	2	71	6	3	
	(M 68)	–	68		43		100	0 −0.55	115	97	2	75	6	3.3	
	–	M 72×6	72		45		105		121	102	2	79	6	3.3	
	–	(M 76×6)	76		48		110		127	107	2	83	6	3.5	
	–	M 80×6	80		50		115		133	112	2	87	6	3.5	

비고 : 1. 나사의 호칭에 ( )를 붙인 것은 될 수 있는 한 사용하지 않는다.
2. 나사끝은 특히 지정이 없는 한, 나사의 호칭 M6 이하는 거친끝, 그것을 초과한 것은 헤드포인트, 납작끝 또는 둥근끝으로 하고 그 어느 것이든, 필요로 하는 경우에는 주문자가 지정한다.
3. 전조나사의 경우에는 M6 이하인 것은, 특히 지정이 없는 한 d_s를 대략 나사의 유효지름으로 한다. 또한, M6을 초과하는 것은, 지정에 따라 d_s를 대략 나사의 유효지름으로 할 수 있다.
4. 특히 큰 자리면을 필요로 하는 경우에는 한계단 큰 s 및 e 치수를 사용하여도 좋다.
5. 보울트 머리에 자리붙이를 필요로 하는 경우에는 주문자가 지정한다.

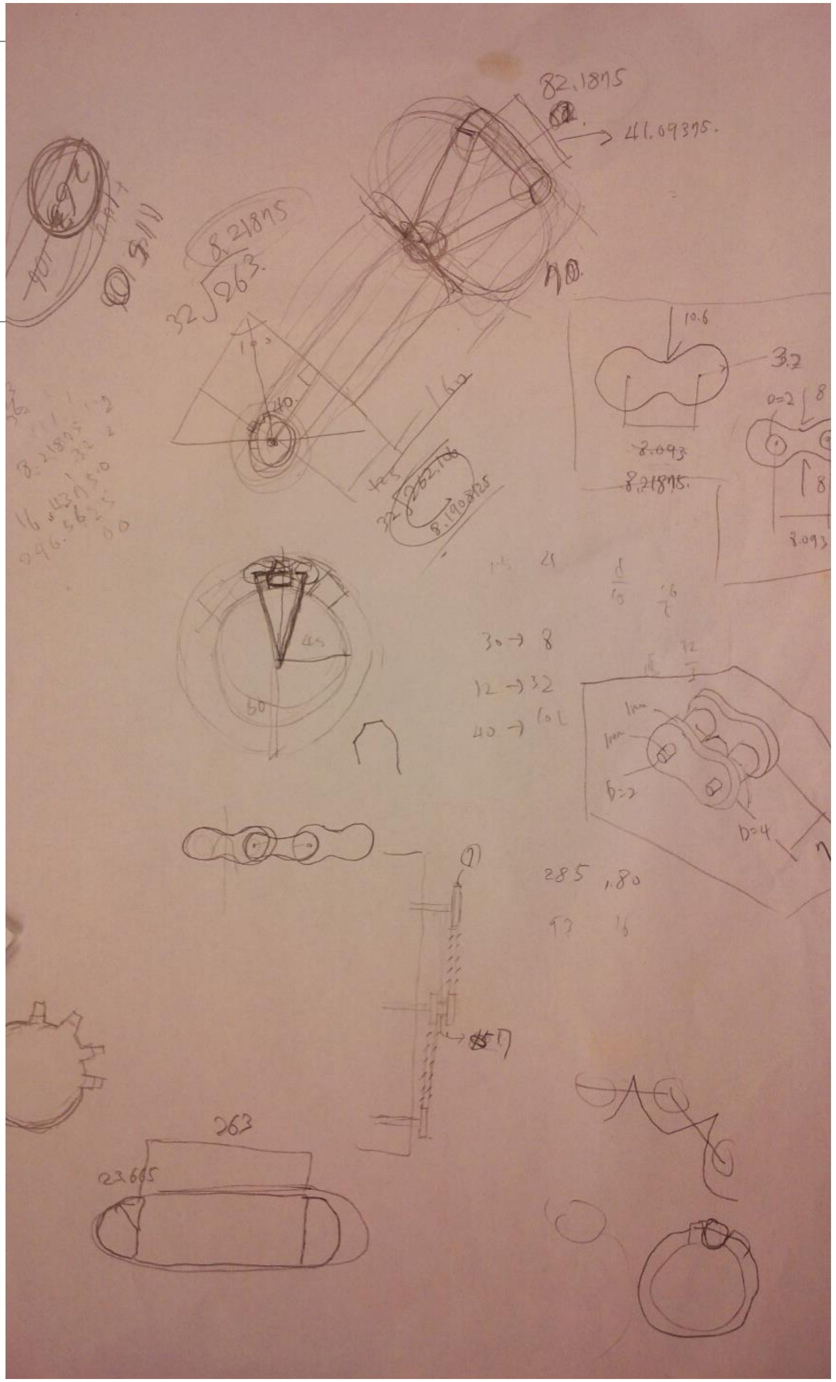


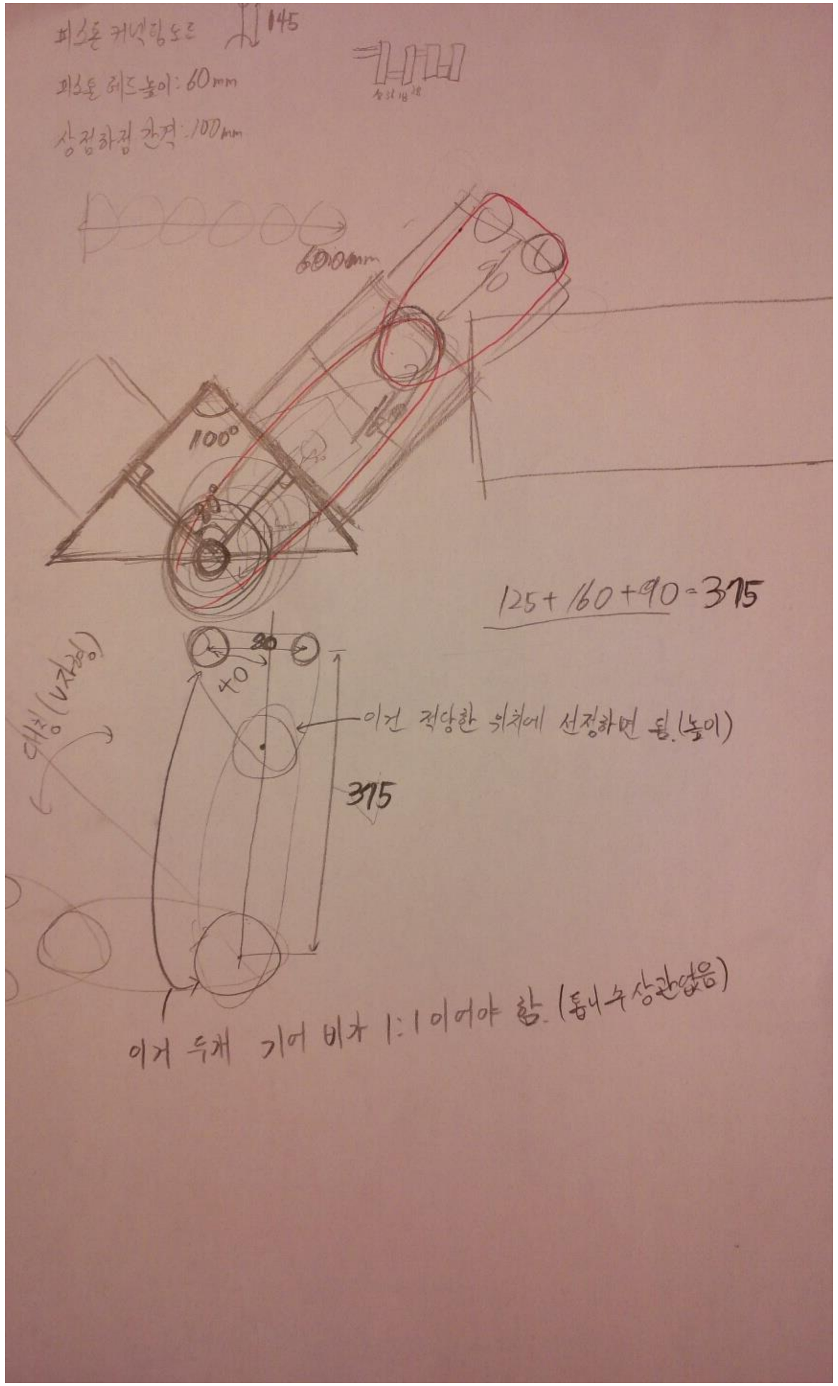
2-1 치수분석


448mm
257.517
240mm
R75mm
245.237
118.744
65mm
21mm
ø15
* 모서리(포켓해서 생긴 모서리는 제외)는 모두 3mm 엣지 필렛.
* thickness 10mm


1. 커넥팅 로드 길이 재설정
2. 엔진룸 볼트, 너트 제작
3. 구동 확인
4. 벨브, 흡·배기 통 제작 (h=90mm)
114.106
274.106
99:130
160
114:106
134
114.558

2-1 치수분석




피스톤 헤드높이: 60mm
상점하점 간격: 100mm
125+160+90=375
375
이건 적당한 위치에 선정하면 됨.(높이)
이거 두개 기어 비가 1:1이어야 함.

2-2 파트제작

Piston head
Connecting rods
Bearing
Piston pin
Piston pin bolt
Bolts
Nuts
Compression rings
Oil control ring

Piston

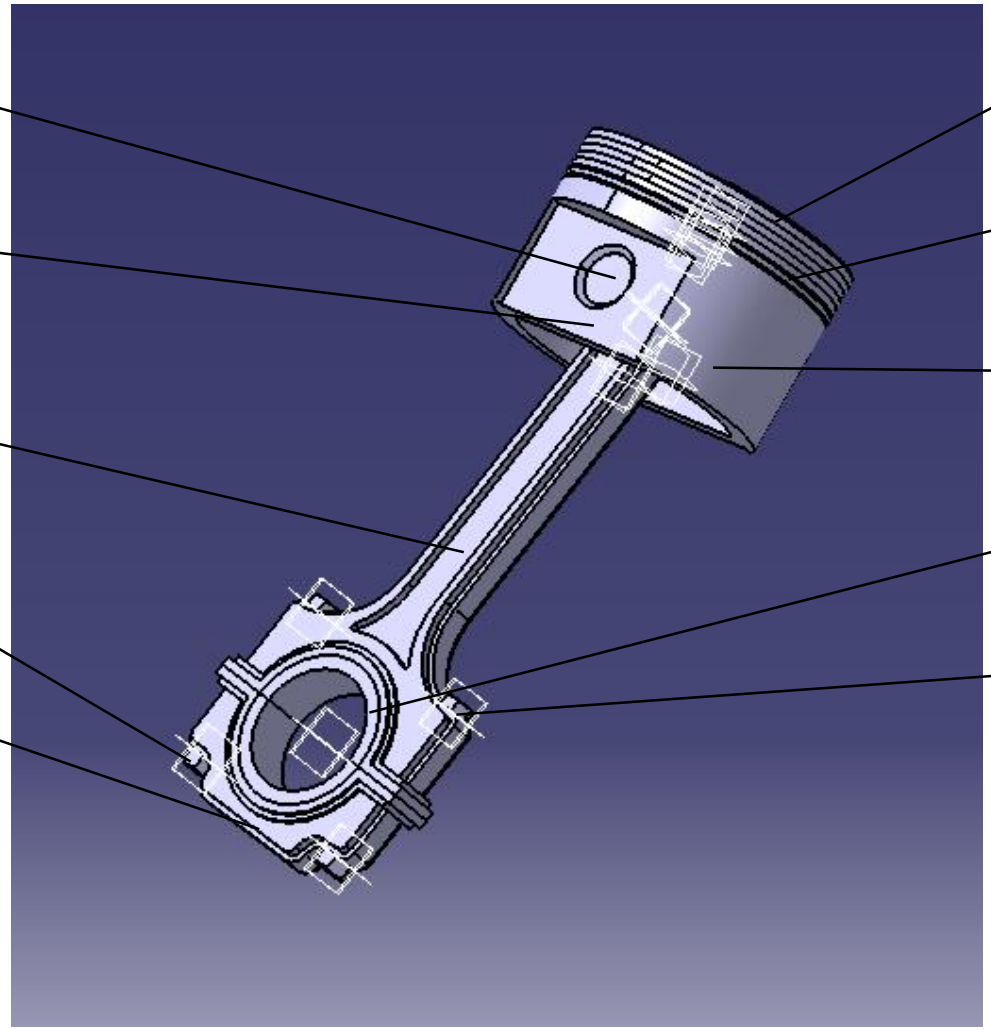
Crank bolts
Engine bolts
Engine nuts
Crank shaft
Crank endpoints connecting parts
Crank connecting parts
Piston blocks
Carter
Piston room

Engine

Gear
Chain
Cam bolt
Cam connecting part
Cam shaft
Cylinder head
Exhaust valve
Intake valve

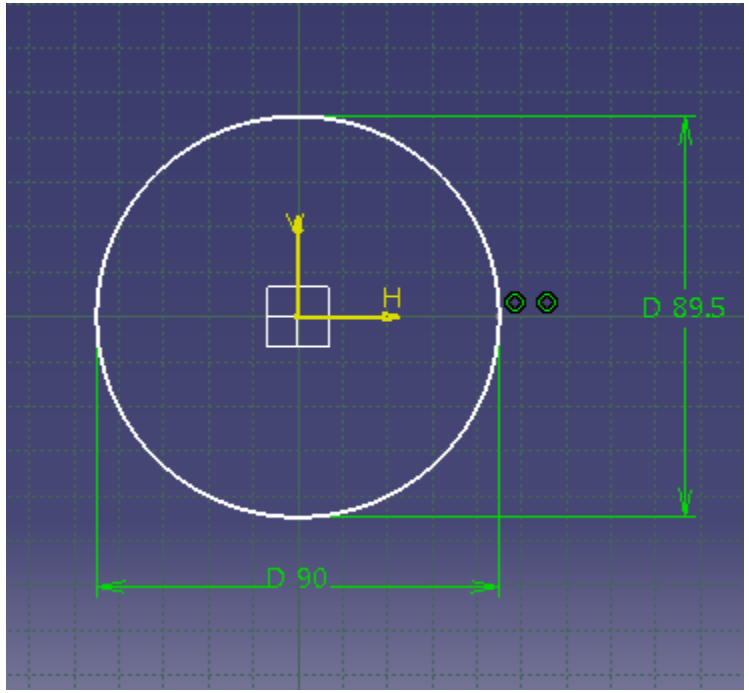
Cylinder head & Chain

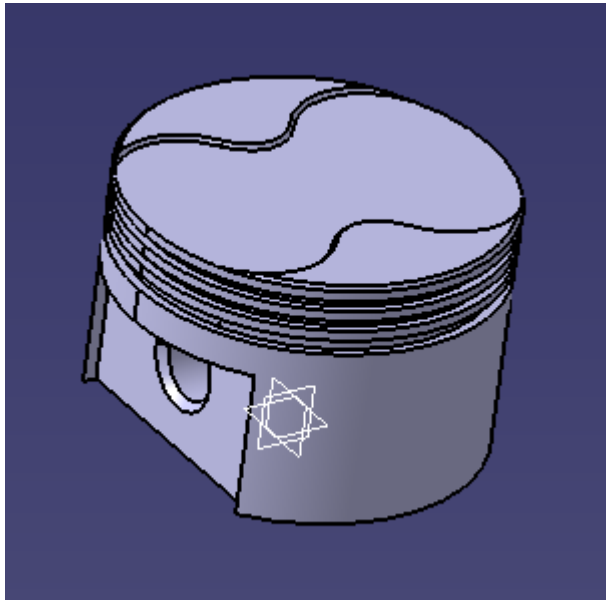
2-2 파트제작 - Piston



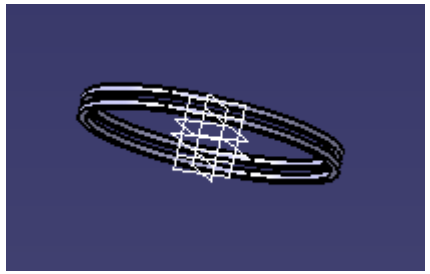
2-2 파트제작 - Piston

- Piston head 타원형 기둥과 윗면의 홈이 특징

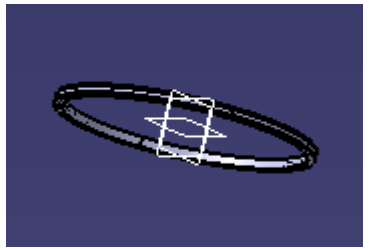




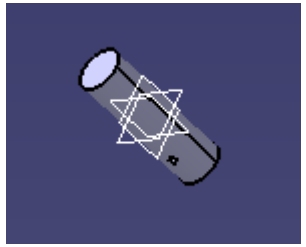
2-2 파트제작 - Piston



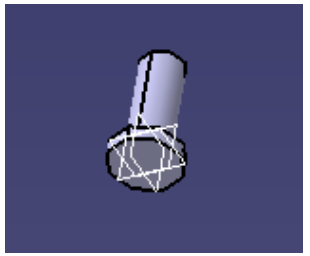
Compression ring



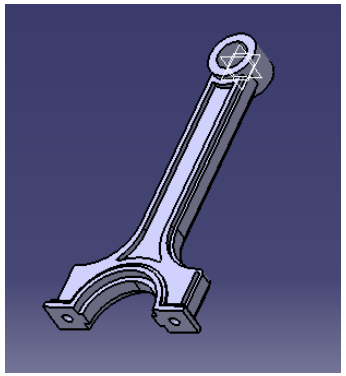
Oil control ring



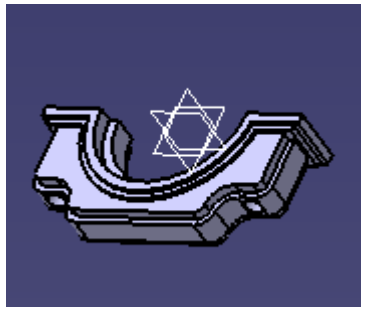
Piston pin



Piston pin bolt

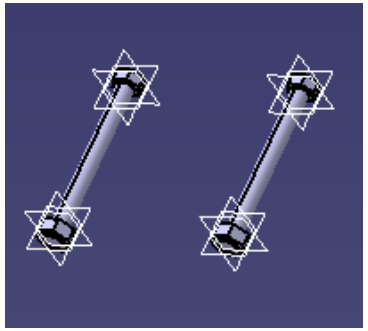


Connecting rod 1



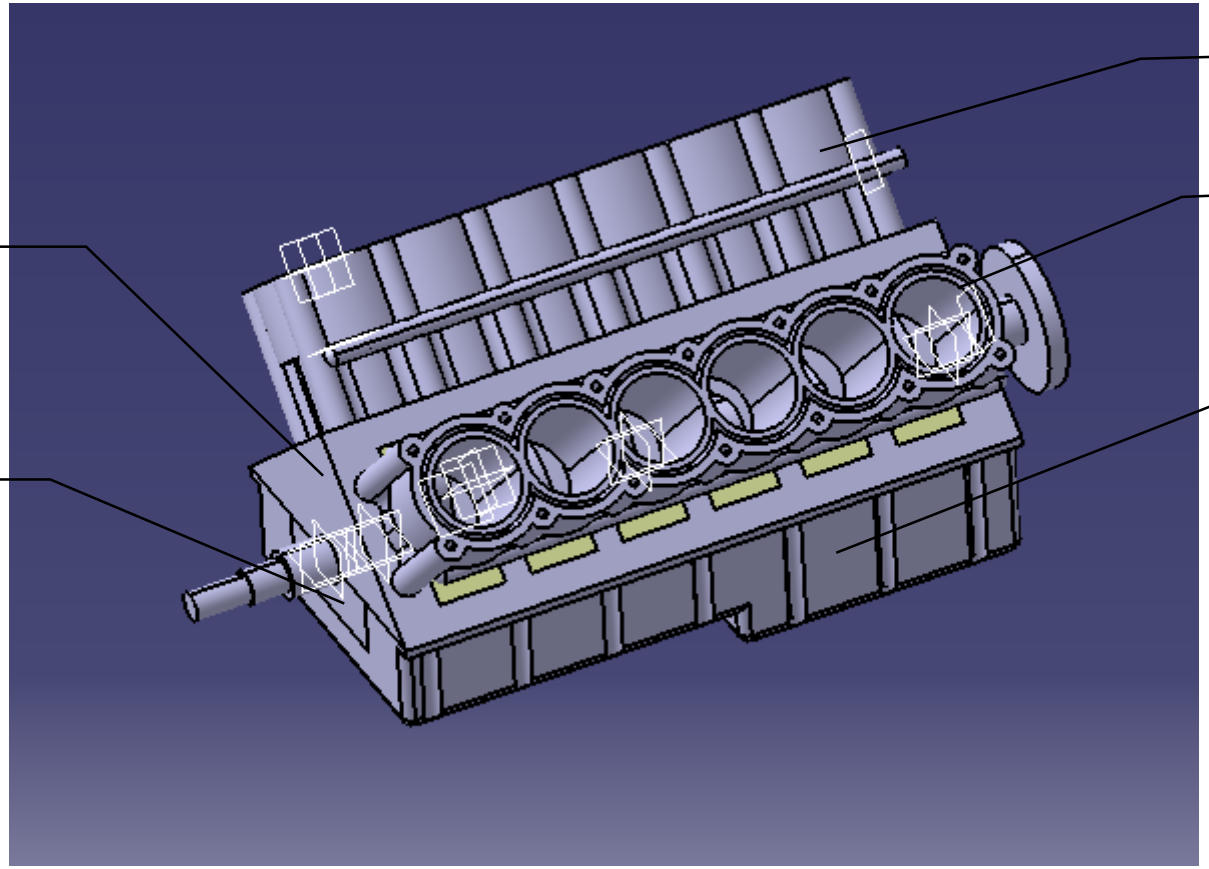
Connecting rod 2

Bearing



Bolts & Nuts

2-2 파트제작 - Engine



Piston block 1

Piston block 2

Piston room

Carter

Crank endpoints
connection parts

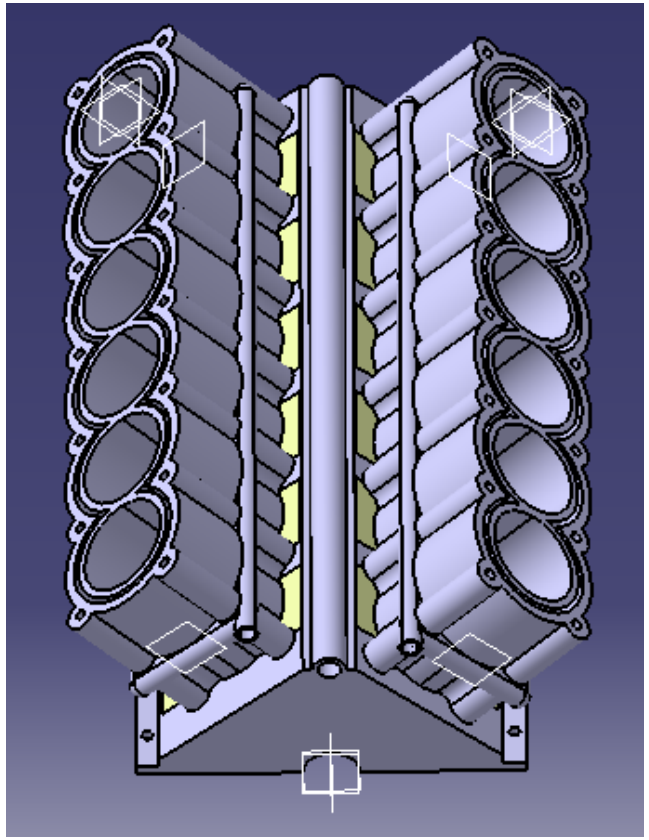
Crank bolts
Engine bolts
Engine nuts

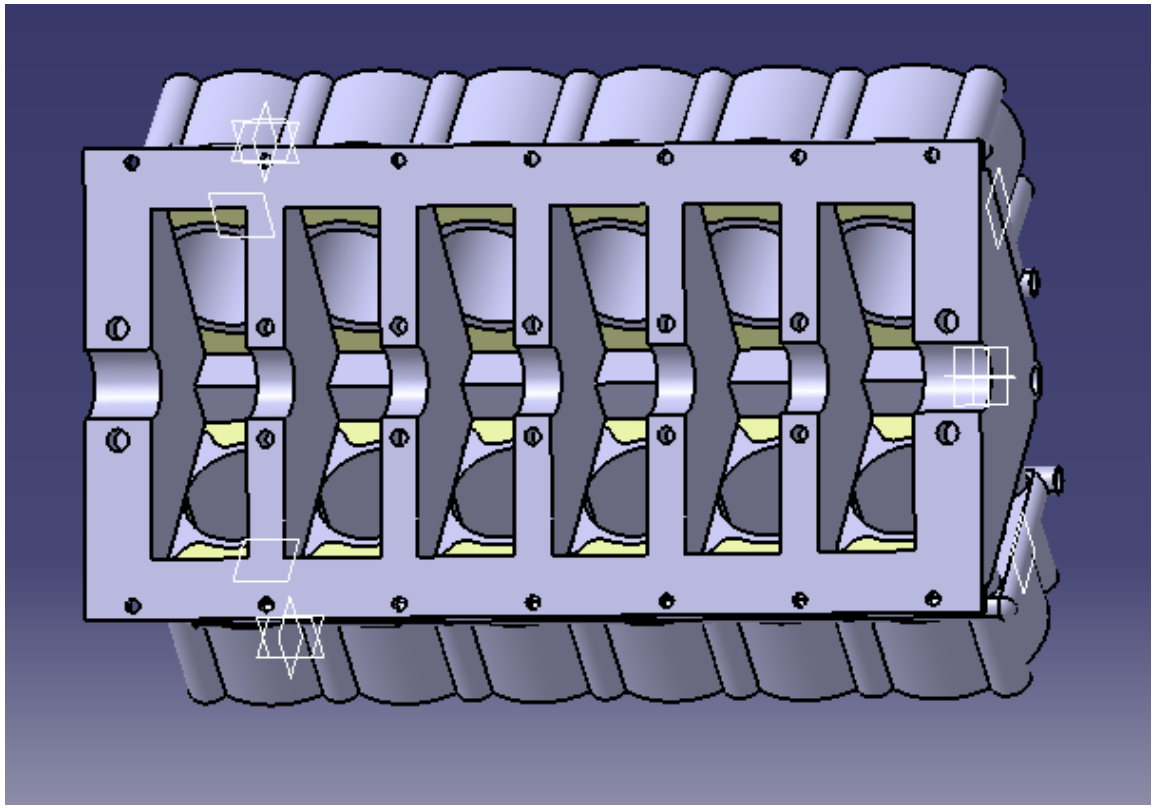
Crank connection parts

2-2 파트제작 - Engine

- Piston block & Piston room

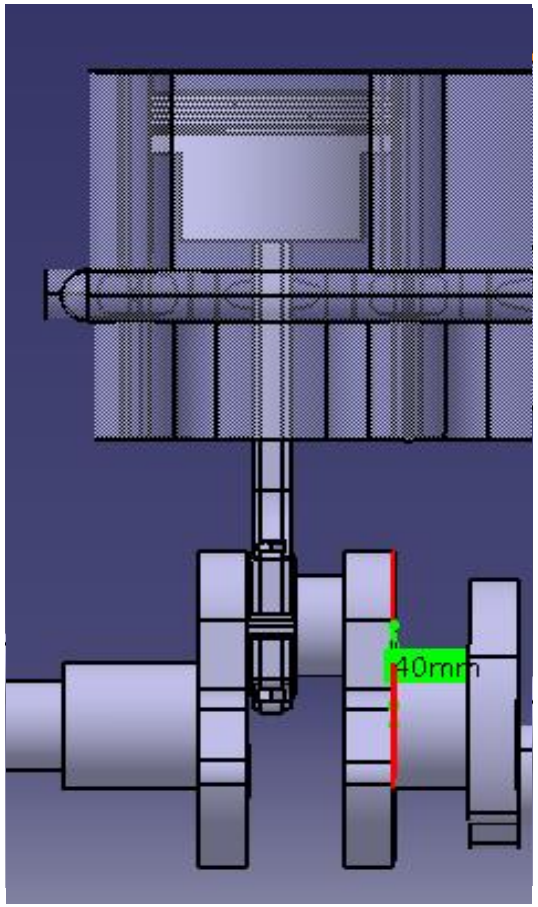
V자로 12개의 Piston hole





2-2 파트제작 - Engine

- Piston block 압축비를 11.0으로 맞춤



- Piston block의 높이 h = 148mm

- 상사점일때 Piston과 block 사이 거리 α = 8mm

- 하사점일때 Piston과 block 사이 거리 b = 88mm

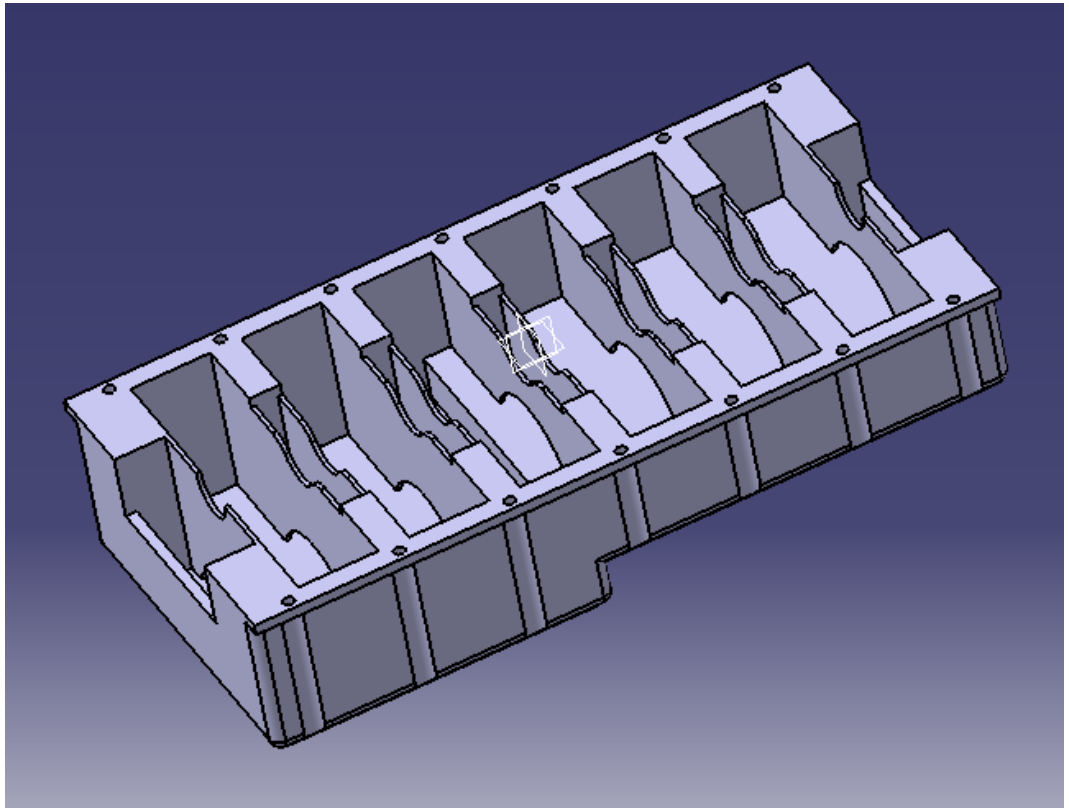
- 압축비 : b / α = 11.0

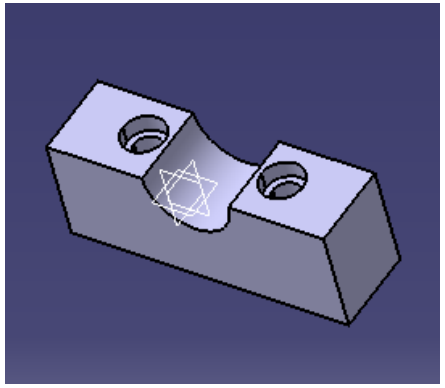
- 크랭크 축의 반경 r = (b − α)/2 = 40mm

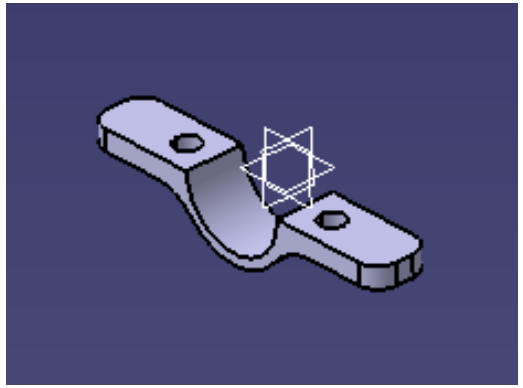
2-2 파트제작 - Engine

- Carter & Crank connecting parts

Piston block이 회전 할 수 있는 6개의 공간

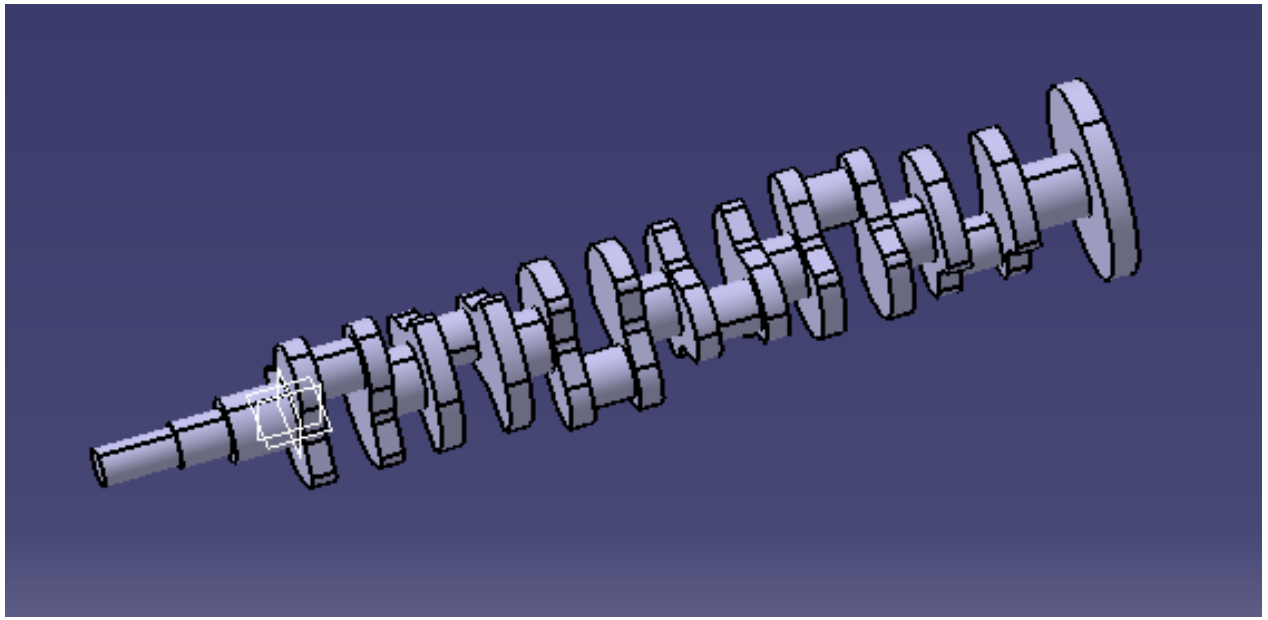


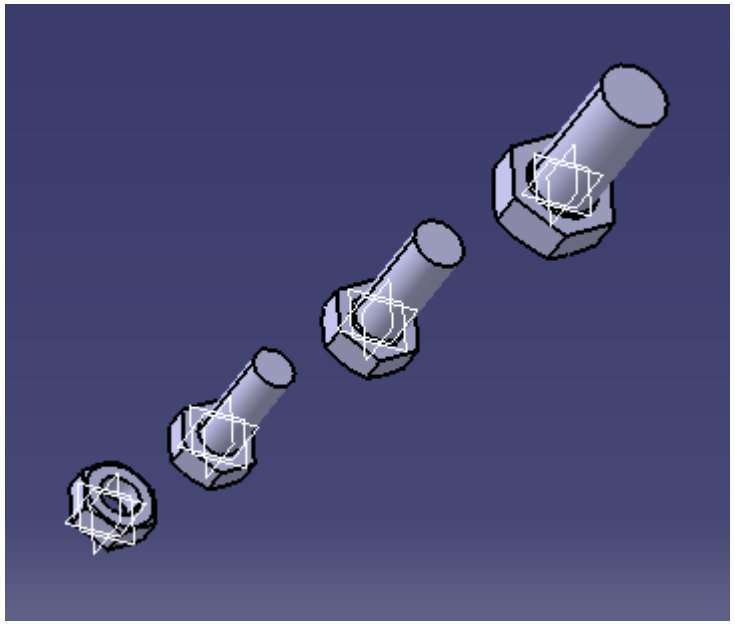




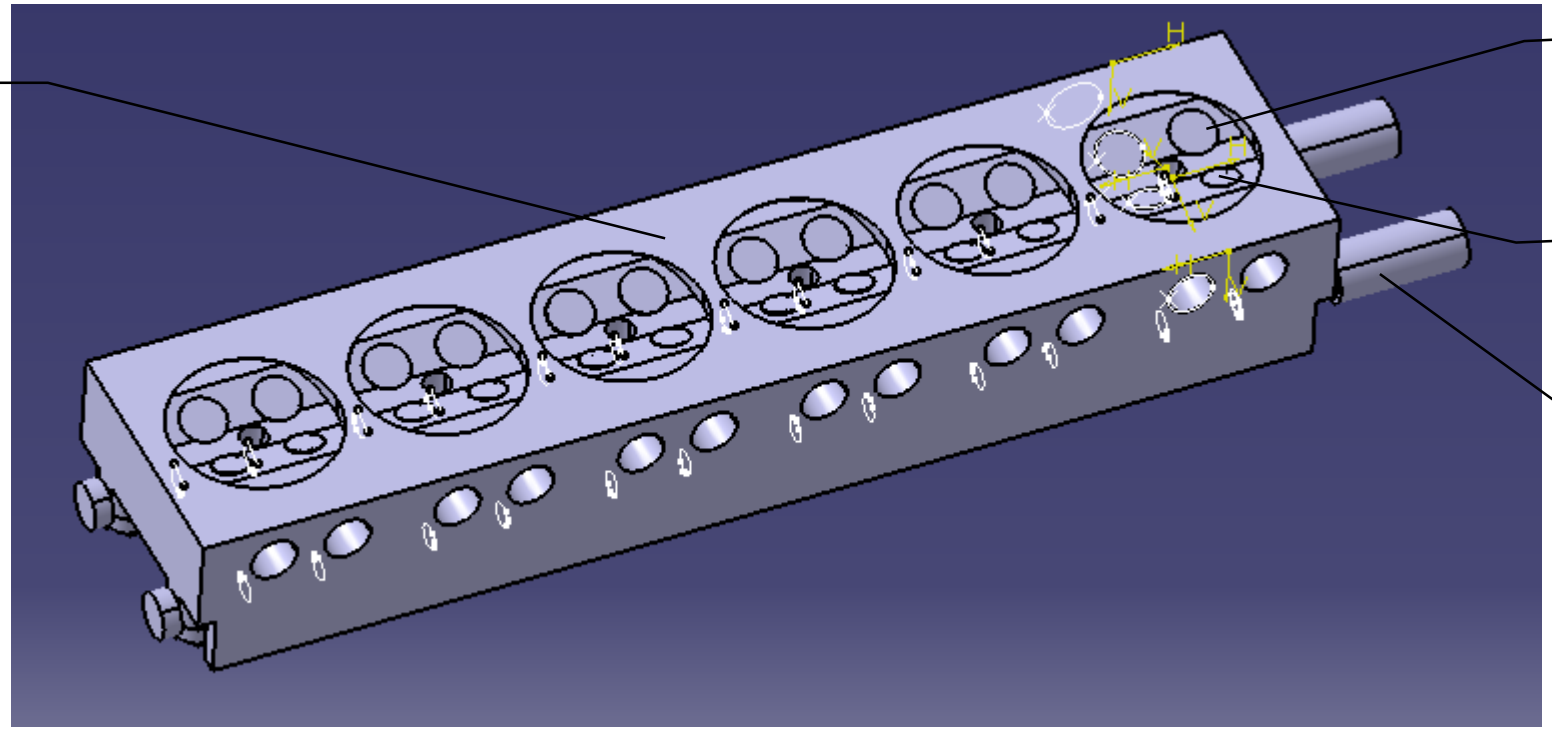
2-2 파트제작 - Engine

- Crank shaft & 3 kinds of Bolts, Nuts



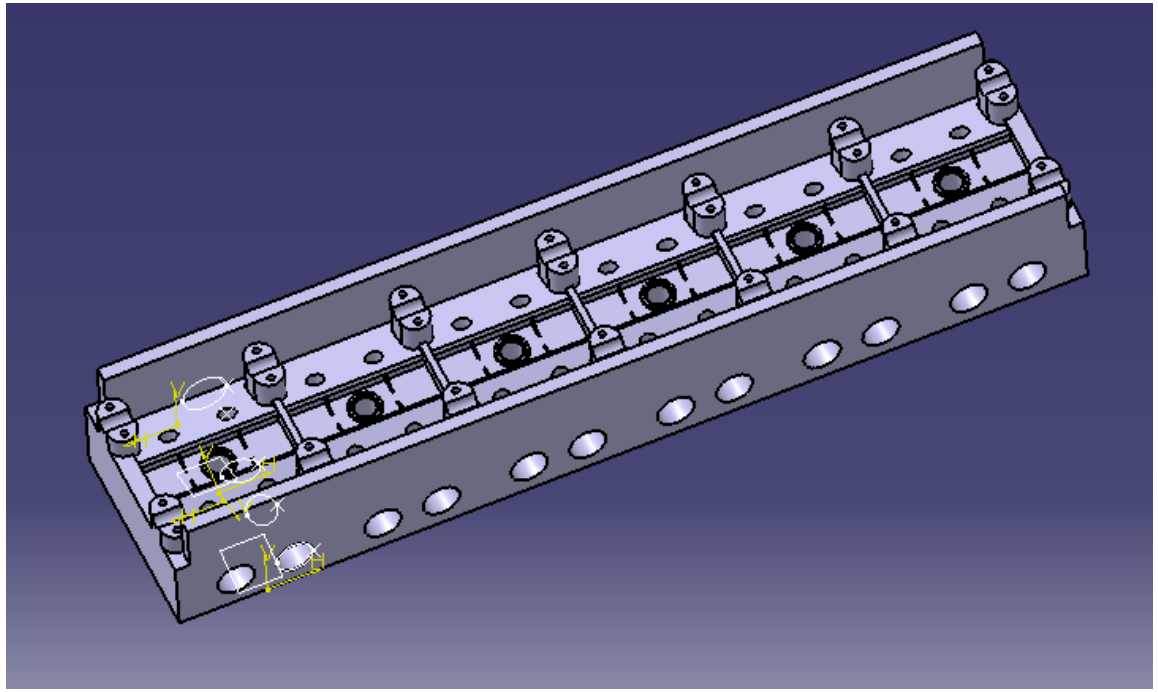


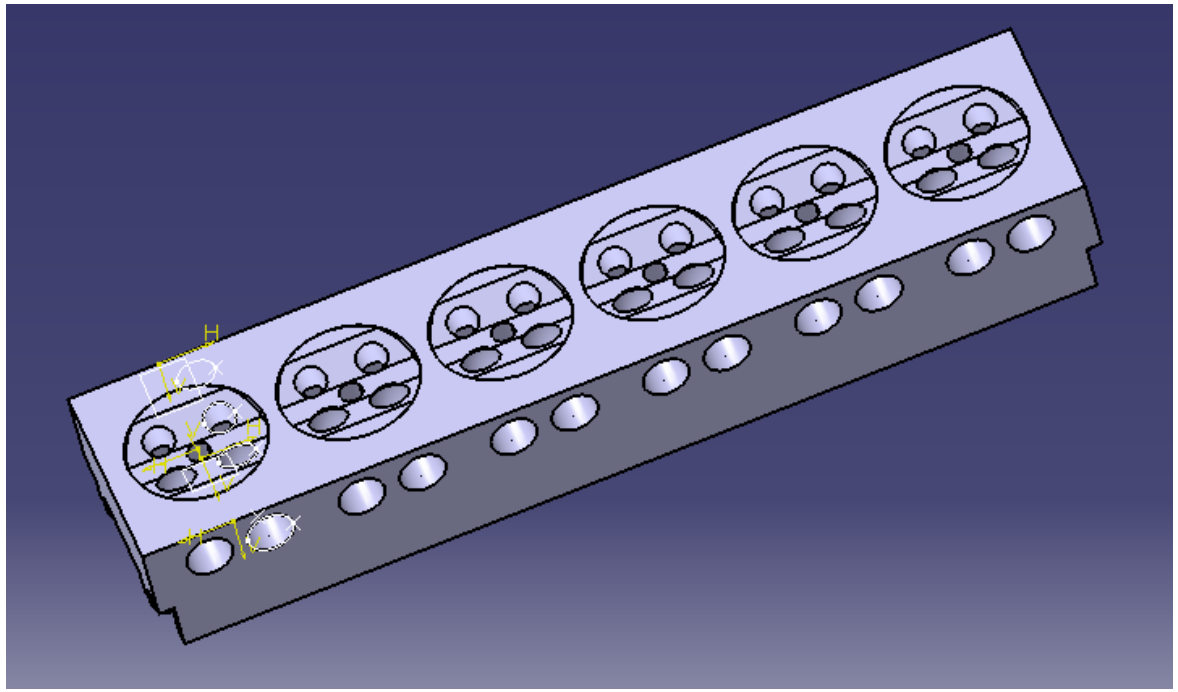
2-2 파트제작 – Cylinder head



2-2 파트제작 – Cylinder head

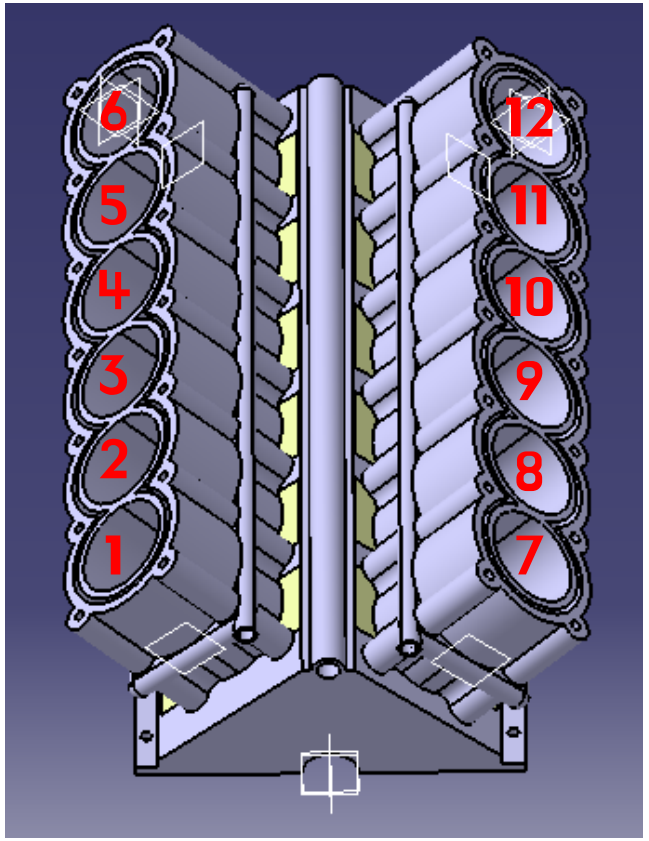
- Cylinder head Valve 구멍이 있고 2개의 Cam shaft 장착



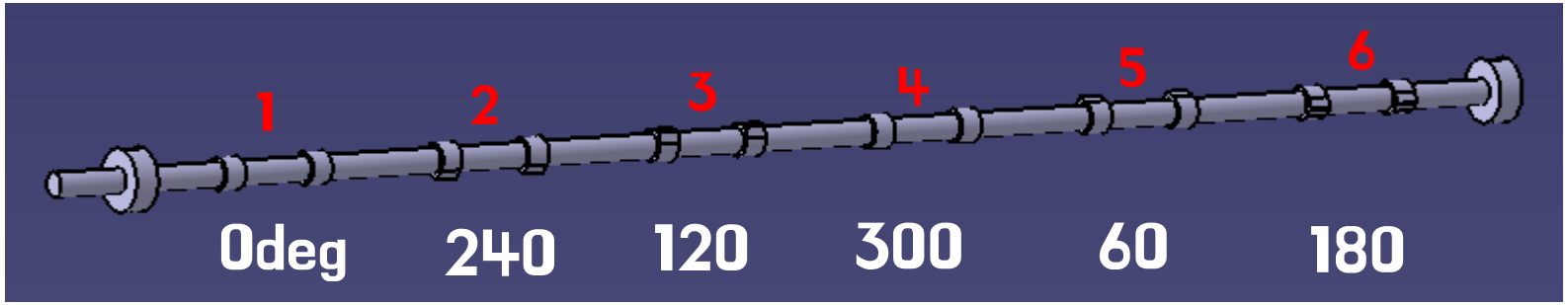


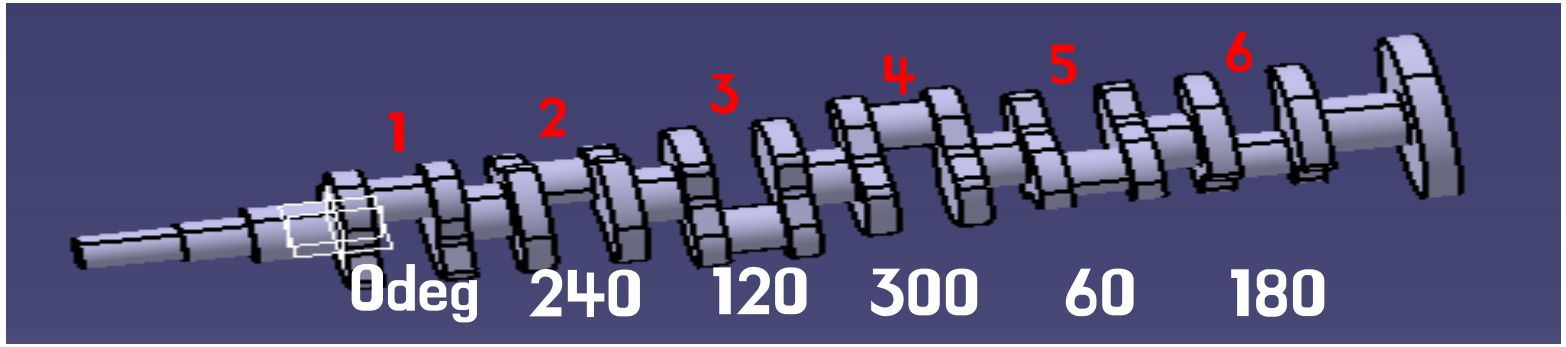
2-2 파트제작 – Cylinder head

- Cam shaft (& Crank shaft)



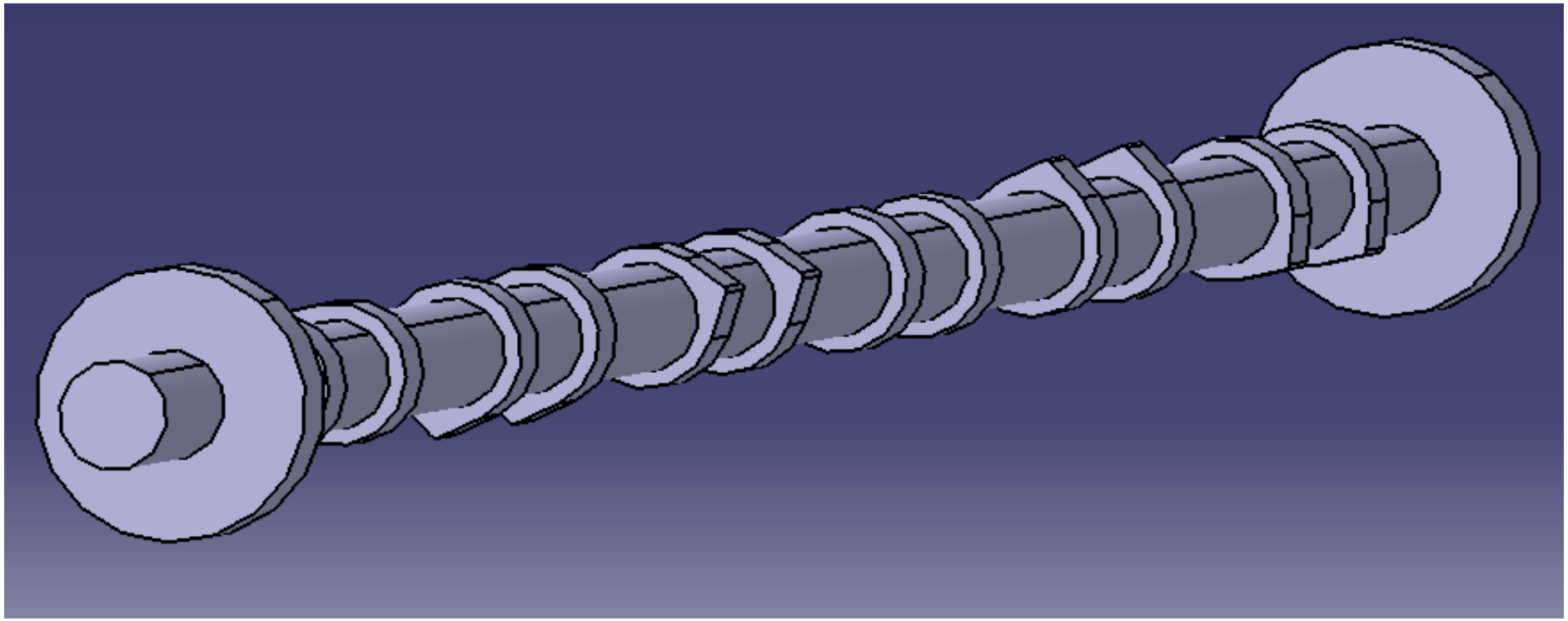
폭발순서 : 1 – 12 – 5 – 8 – 3 – 10 – 6 – 7 – 2 – 11 – 4 – 9





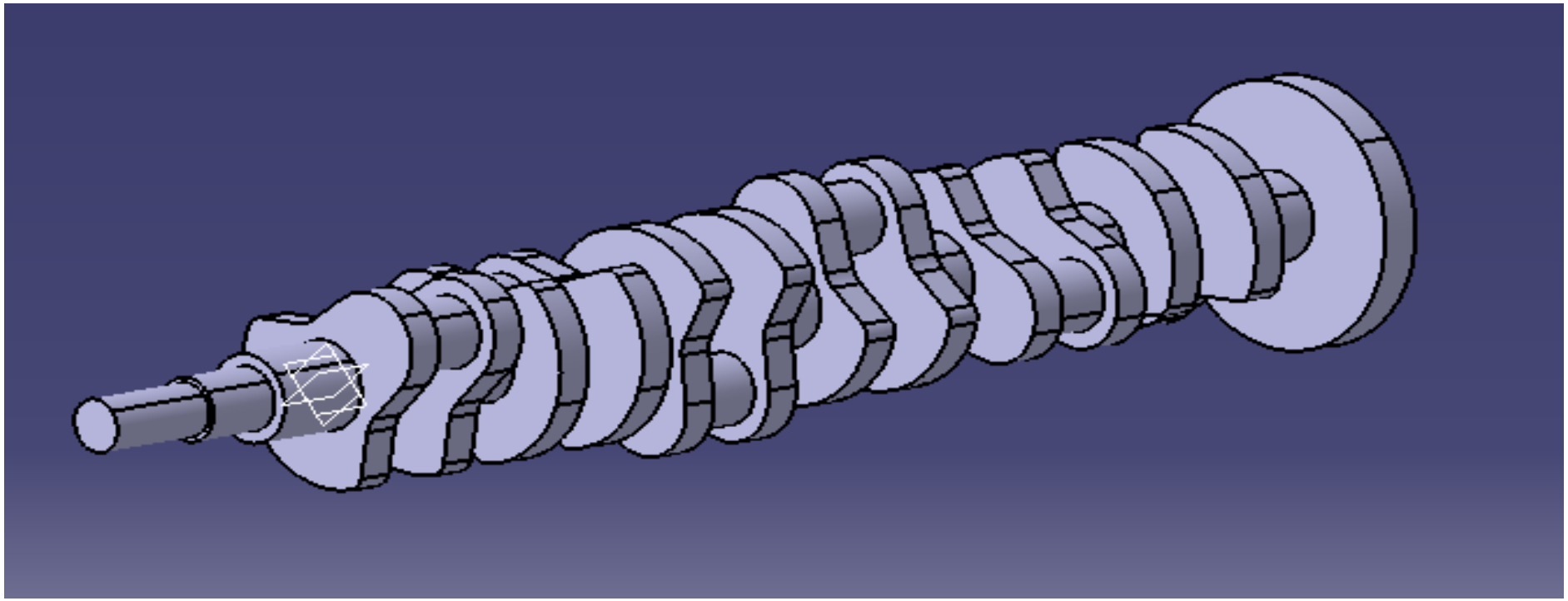
2-2 파트제작 – Cylinder head

- Cam shaft (& Crank shaft)

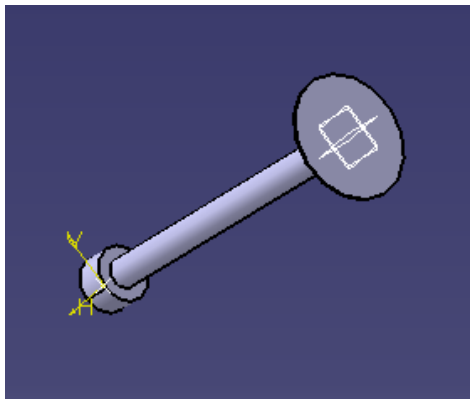


2-2 파트제작 – Cylinder head

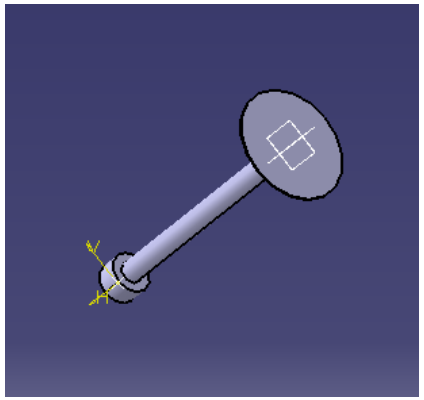
- Cam shaft (& Crank shaft)



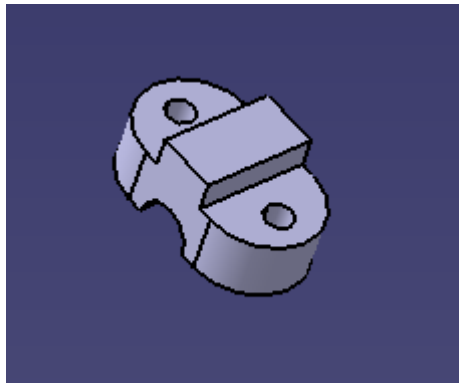
2-2 파트제작 – Cylinder head



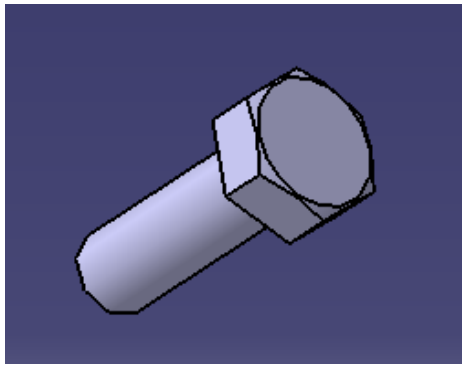
Intake valve



Exhaust valve

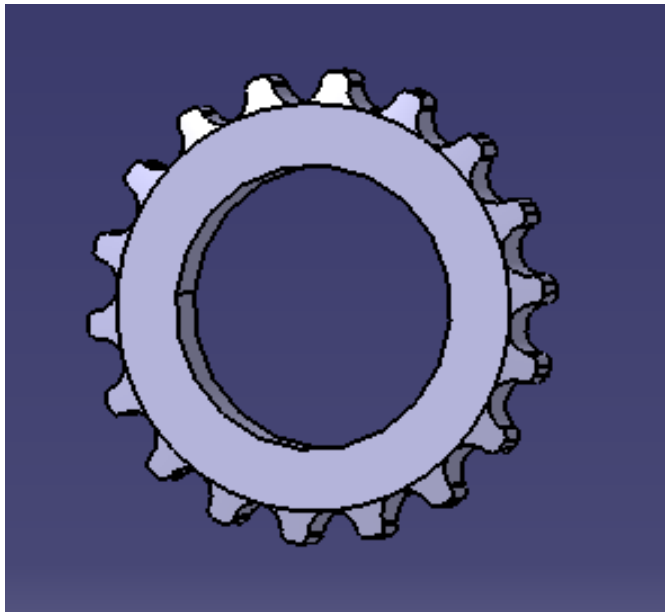


Cam connecting part

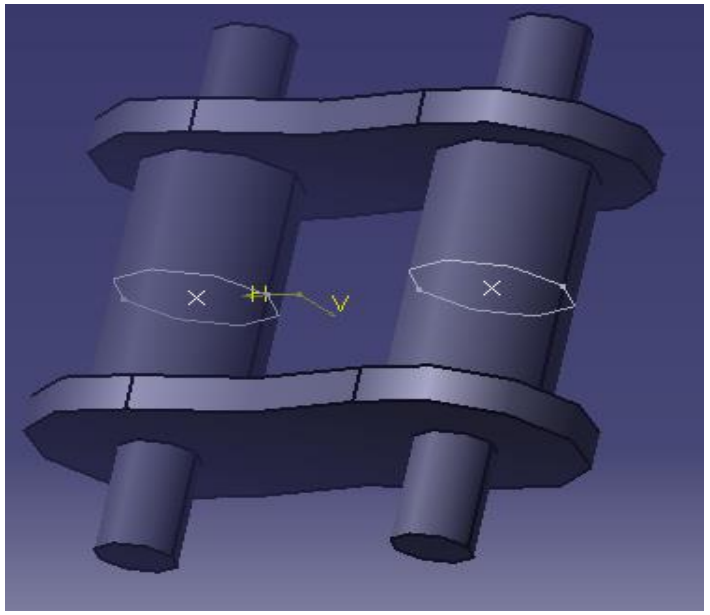


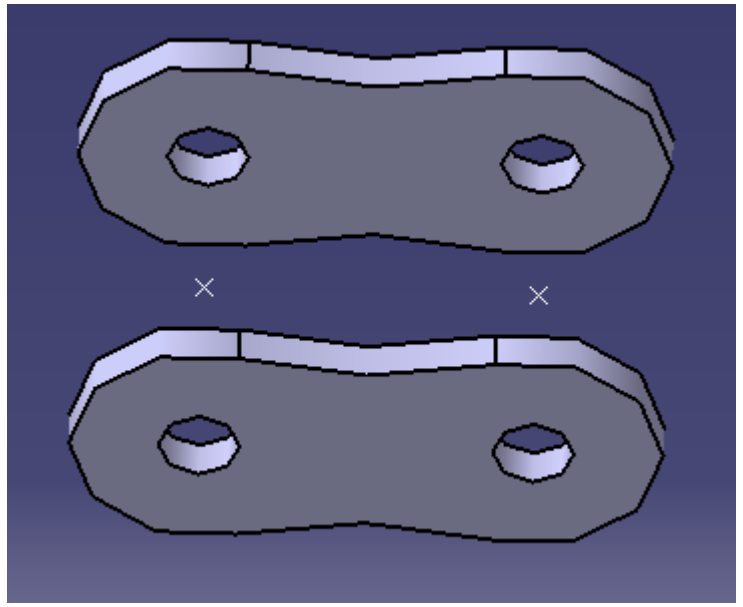
Cam bolt

2-2 파트제작 – Chain



Gear

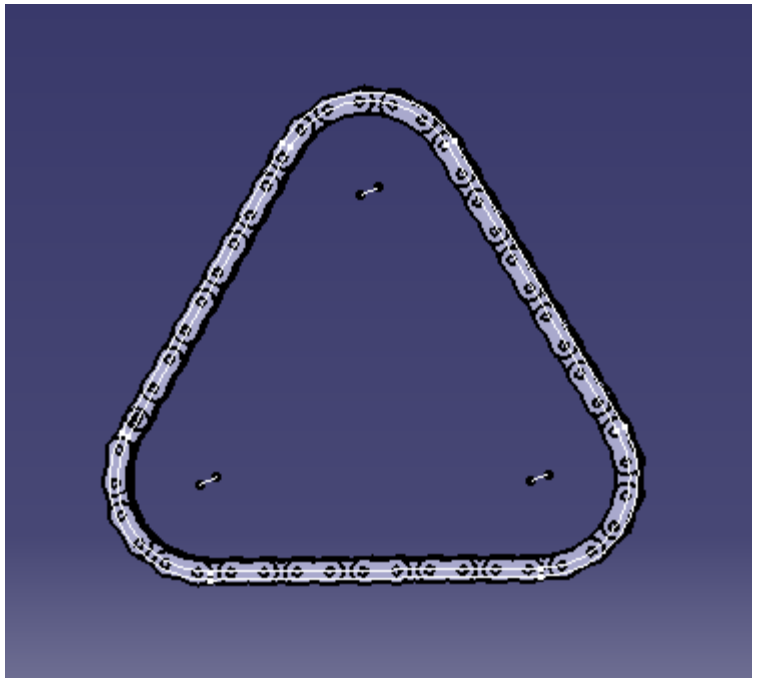




Chain

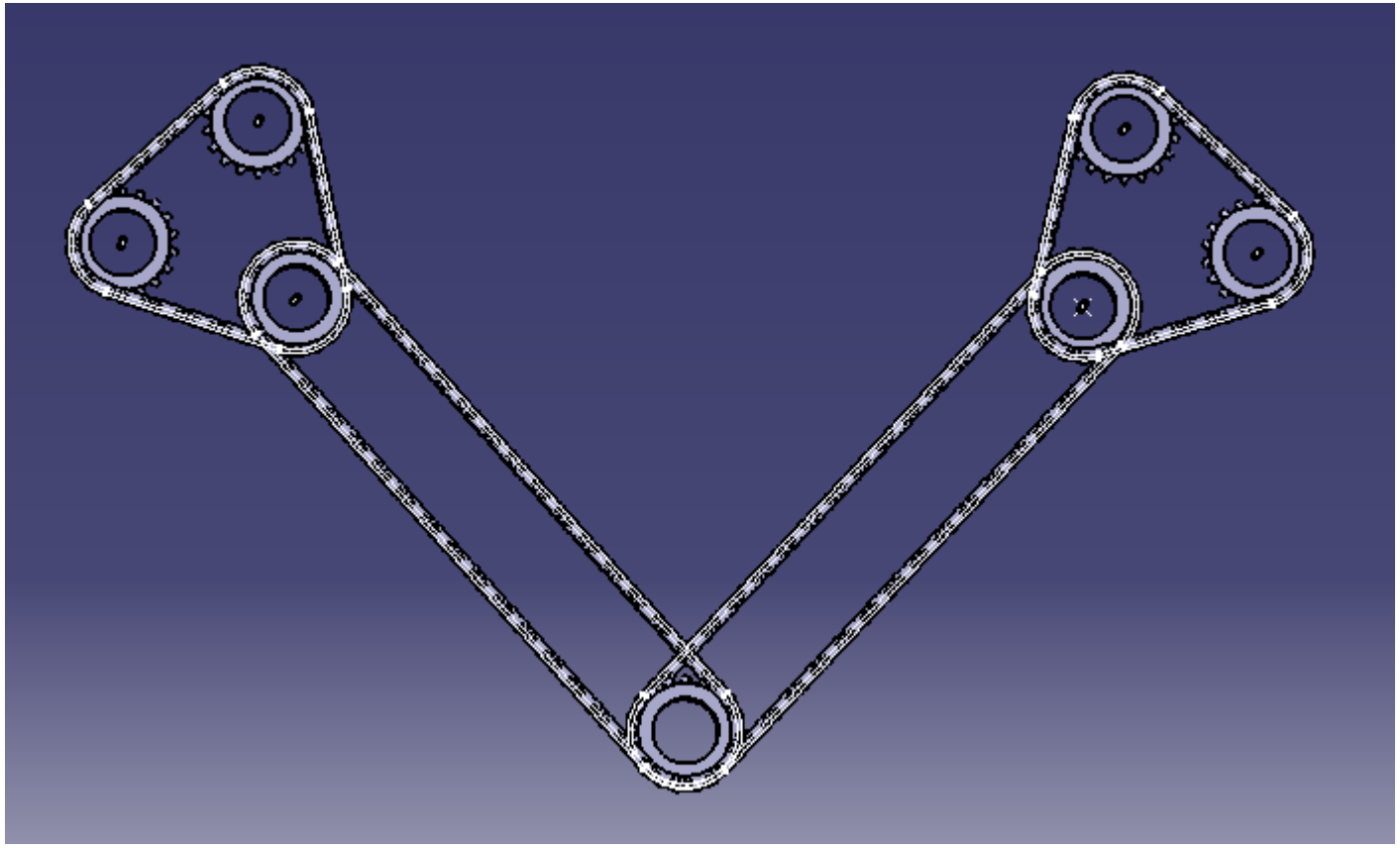
2-2 파트제작 – Chain

- Main chain, Transmission chain

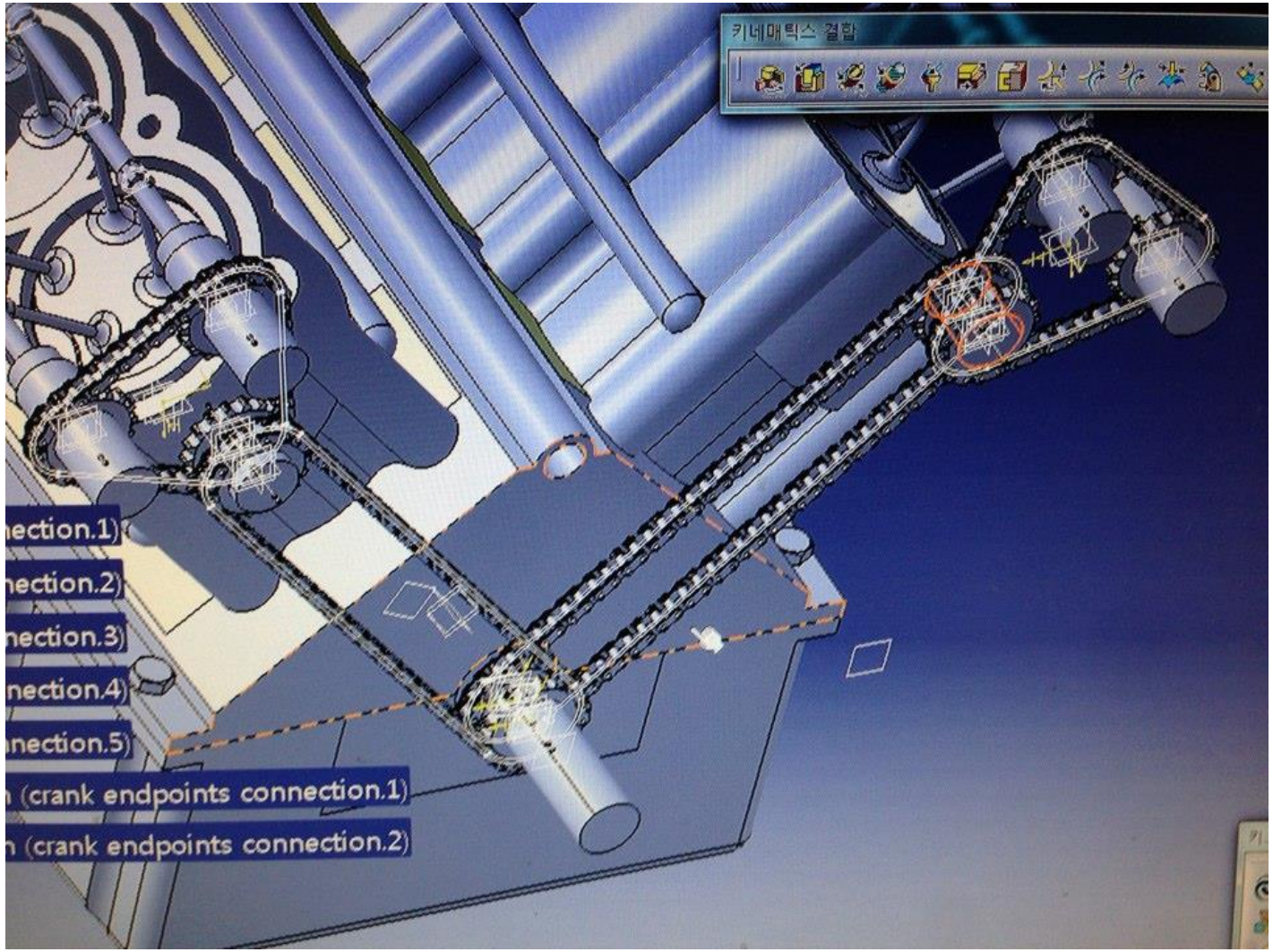


2-2 파트제작 – Chain

- Main chain, Transmission chain

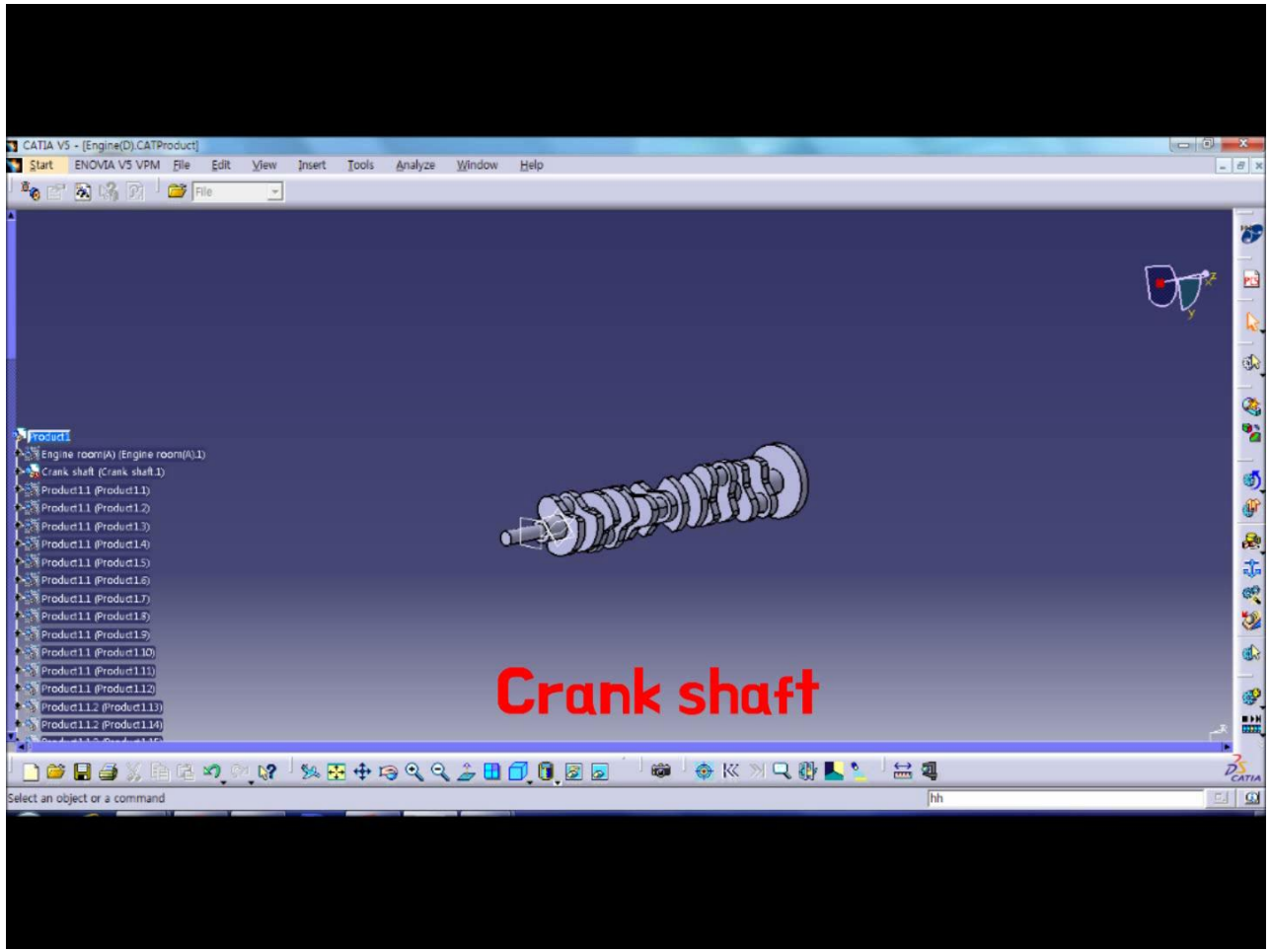


2-2 파트제작 – Chain



2-3 파트조립

조립(with 자막).wmv



2-4 DMU 시행

DMU.avi

감사합니다.