

บรรณานุกรม

ผศ.ชาลี ตระการกุล. การออกแบบแม่พิมพ์ฉีด 1 และการออกแบบแม่พิมพ์ 2.

พิมพ์ครั้งที่4,สมาคมส่งเสริมเทคโนโลยี (ไทย-ญี่ปุ่น),2536.

ผศ.ชาลี ตระการกุล. เอกสารประกอบการเรียนวิชา ออกแบบแม่พิมพ์ฉีดพลาสติก2.

ประจำ ภาคเรียนที่2,ปีการศึกษา 2544.

รศ.บรรเลง ศรีนิล. เทคโนโลยีพลาสติก. พิมพ์ครั้งที่9,สมาคมส่งเสริมเทคโนโลยี (ไทย-ญี่ปุ่น),9 สิงหาคม 2537.

รศ.บรรเลง ศรีนิล,รศ.สมนึก วัฒนศรีกุล ตารางโลหะ. สำหรับ นักพิมพ์สถาบัน เทคโนโลยีพระจอมเกล้าพระนครเหนือ,2549.

วิโรจน์ เตชะวิญญธรรม. งานฉีดพลาสติก. กรุงเทพมหานคร , ซีเอ็ดดูเคชั่น , 2540

เอกสารคู่มือการใช้โปรแกรม.CAD MOLD

มาตรฐานขั้นตอนทดสอบของสหรัฐอเมริกา ตามมาตรฐาน ASTM : D 3123-94

นสพ.โพสต์ทูเดย์ประจำวันที่ 25 มกราคม 2551

สมาคมอุตสาหกรรมแม่พิมพ์ไทย

สถาบันไทย-เยอรมัน(TGI)

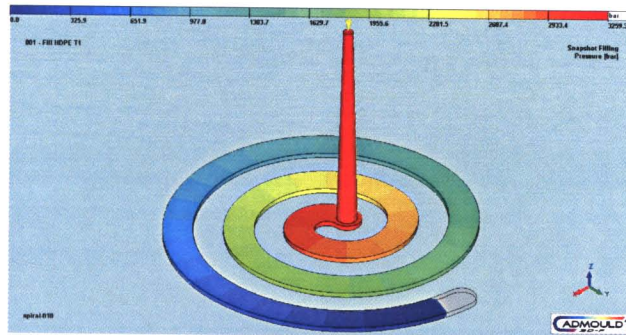
ดร.พีระวัฒน์ สมนึก เอกสารประกอบการบรรยาย เรื่องการออกแบบแม่พิมพ์ฉีดพลาสติก คณะ วิศวกรรมศาสตร์ มทร.พระนคร 2553

ล้วน สายยศ.และ อังคณา สายยศ. 2538 เทคนิคการวิจัยทางการศึกษา. พิมพ์ครั้งที่ 4.

กรุงเทพ ฯ : สุวีริยาสาส์น.

ภาคผนวก ก

ข้อมูลในการทดลอง



การวิเคราะห์ชิ้นงานก่อนสร้างแม่พิมพ์ฉีด

Description

Cadmould 3D-F Version 5.0f

Mold:

Name: "spiral-010"

Surface = 4559.99 mm²

Volume = 2304.02 mm³

Centroid = 5.697 , 0.471 , 2.248 mm

Mass = 2.19 g

Part 1:

Surface = 4559.99 mm²

Volume = 1950.12 mm³

Centroid = 6.731 , 0.557 , -0.500 mm

Mass = 1.86 g

Cold Runner:

Volume = 353.9 mm³

Centroid = 0.000 , 0.000 , 17.392 mm

Mass = 0.337 g

Finite-Element Mesh:

Total volume of all rod elements = 354 mm³

Total volume of all triangular elements = 2041 mm³

Element-based volume = 2396 mm³

Total volume of all parts = 1950 mm³

Total volume of the cold runner = 354 mm³

Real volume = 2304 mm³

Element-based volume / real volume = 1.0397210508

Gate Locations:

1 at 0.000 , 0.000 , 45.000 mm , Surface normal is -0.000 , -0.000 , 1.000

Material:

Name: "EXXON MOBIL HD 6706"

Type: "PE-HD"

Manufacturer: "EXXON MOBIL CHEMICAL"

Carreau Parameters:

P1 = 499.98 Pa·s

P2 = 0.0075 s

P3 = 0.584

T0 = 216.33 °C

Ts = -100.19 °C

Fp = 0 K/bar

Ei = 0 Pa·s

Fa = 8.86

Thermal Data:

Thermal Conductivity = 0.211 W/(mK)

Thermal Diffusivity = 0.0859 mm²/s

No-Flow Temperature = 135 °C

Recommended Process Parameters:

Melt Temperature = 220 °C

Wall Temperature = 40 °C

Ejection Temperature = 97.8 °C

Process Parameters:

Filling Time = 0.285 s

Pressure-Controlled Filling: 99 %%

Melt Temperature = 220 °C

Wall Temperature = 40 °C

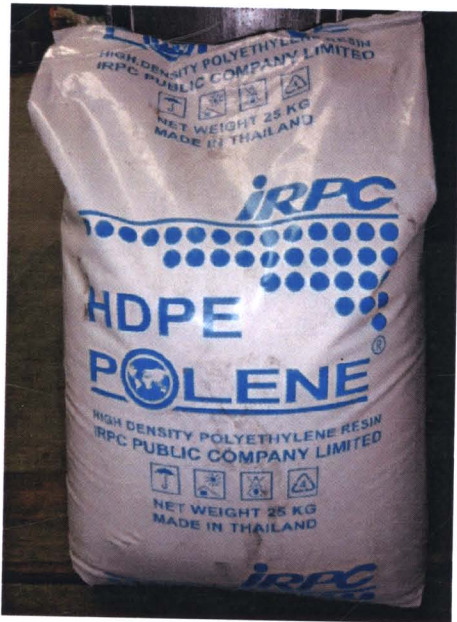
Ejection Temperature = 97.8 °C

Flow-Rate/Pressure Input:

Switch dep. on Level [%%]

Filling

1. Level []: 100.0 Flow Rate [cm³/s]: 8.084



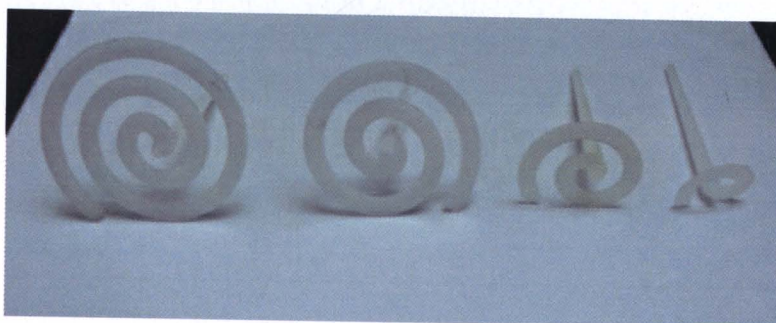
HDPEใช้สำหรับทดลอง



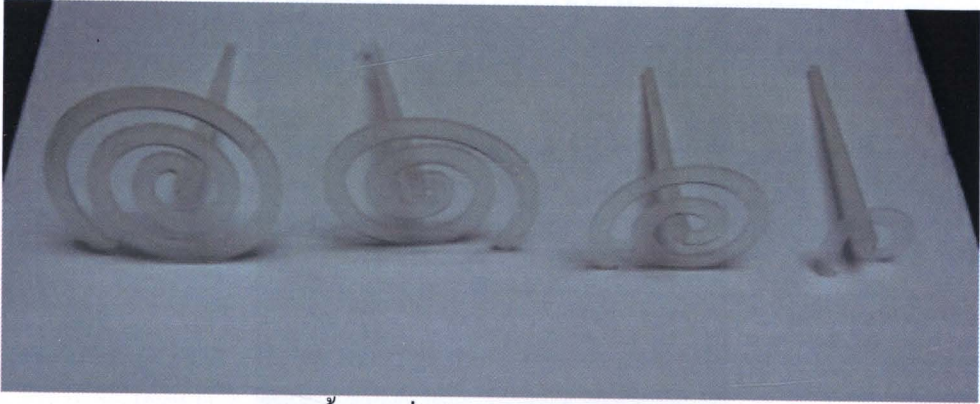
PPใช้สำหรับทดลอง



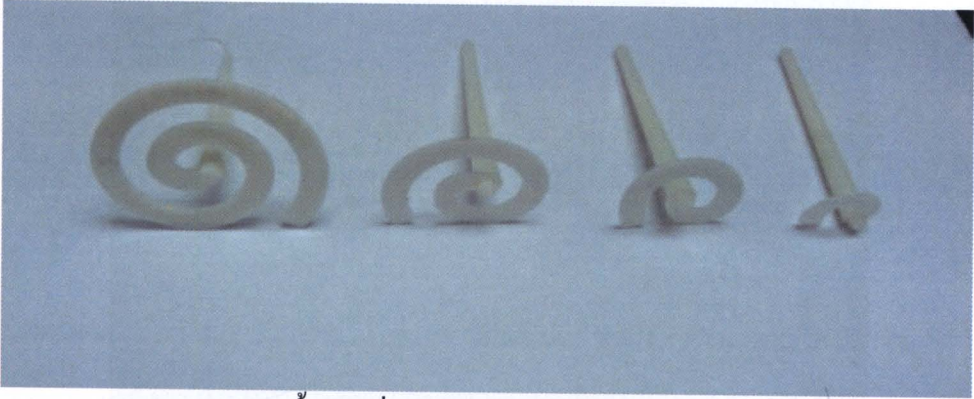
ABSใช้สำหรับทดลอง



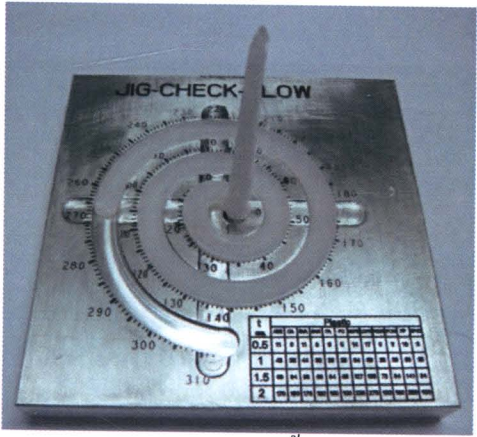
ชิ้นงานที่ได้จากการทดลองฉีดHDPE



ชิ้นงานที่ได้จากการทดลองฉีดPP



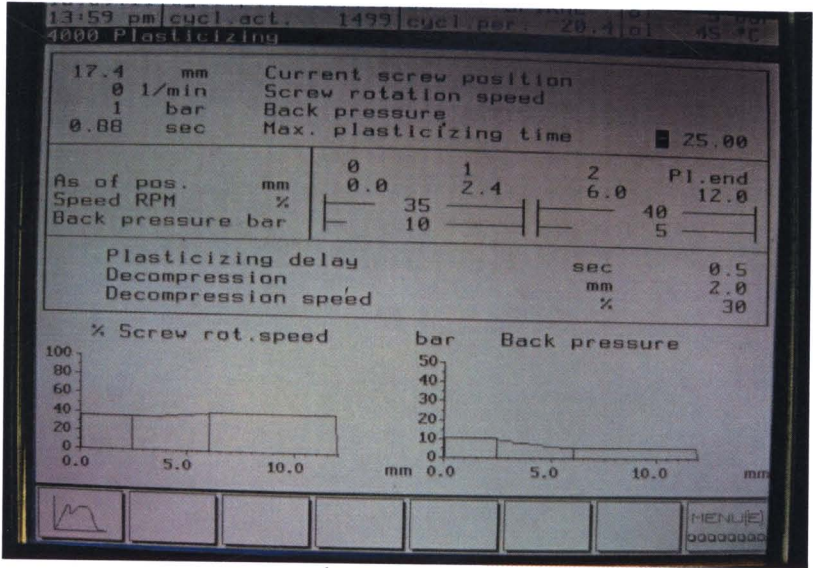
ชิ้นงานที่ได้จากการทดลองฉีดABS



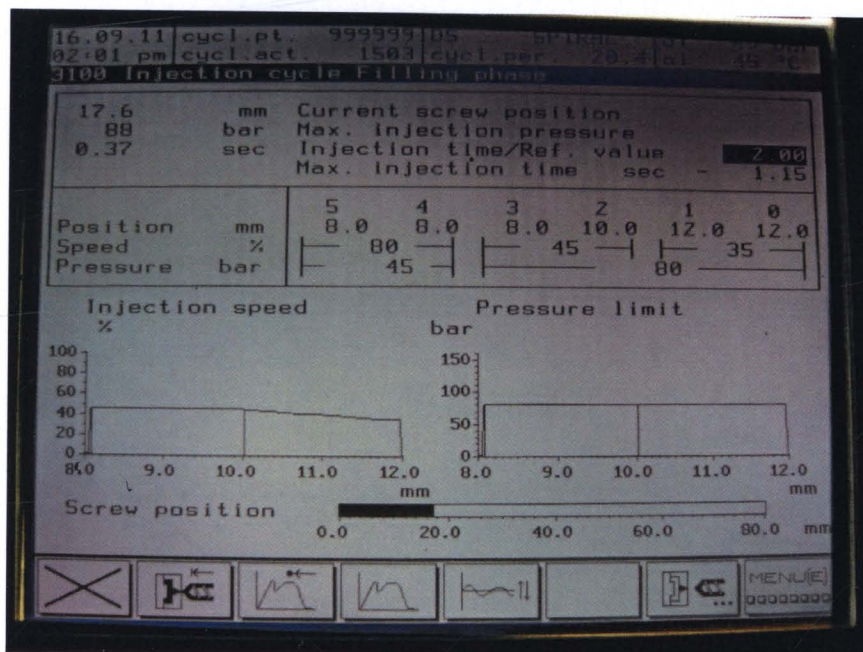
การวัดความยาวชิ้นทดลอง



เครื่องที่ใช้ในการทดลองฉีด



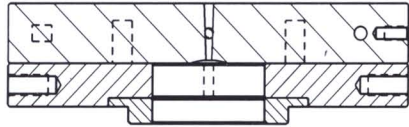
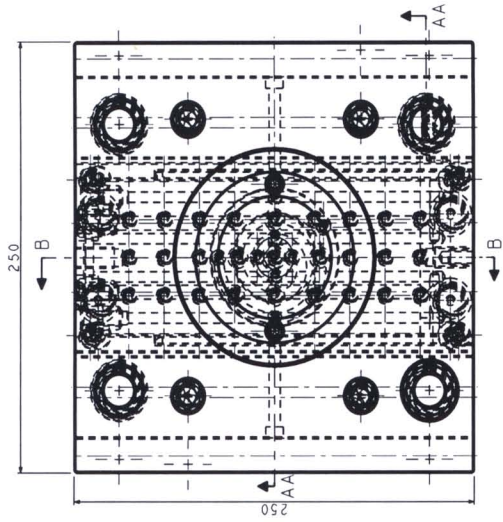
ค่าต่างๆที่ใช้ในการฉีดHDPE,PP



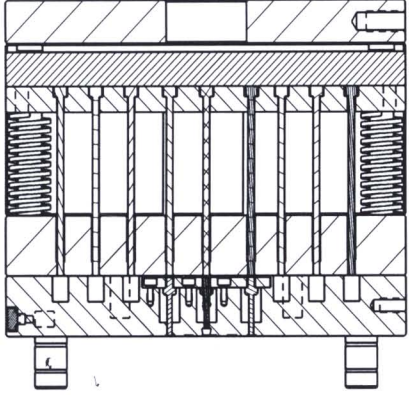
ค่าต่างๆที่ใช้ในการฉีดABS

ภาคผนวก ข

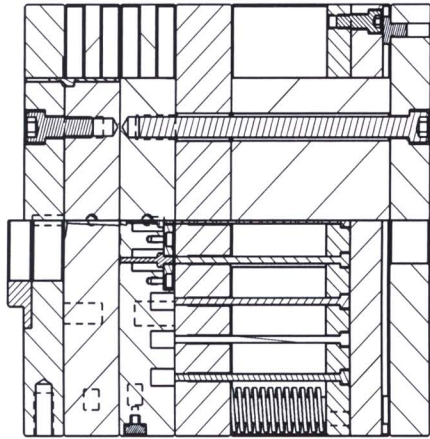
แบบแม่พิมพ์



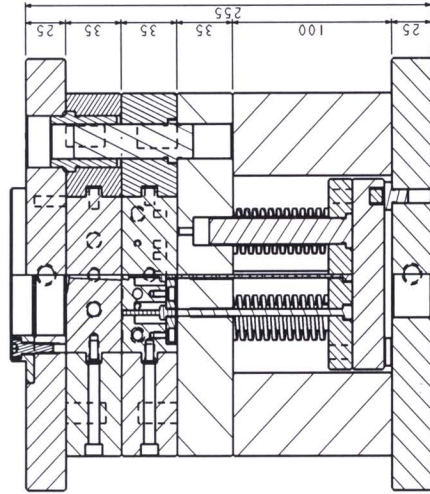
SECTION B-B
SCALE 0.500



SECTION B-B
SCALE 0.500



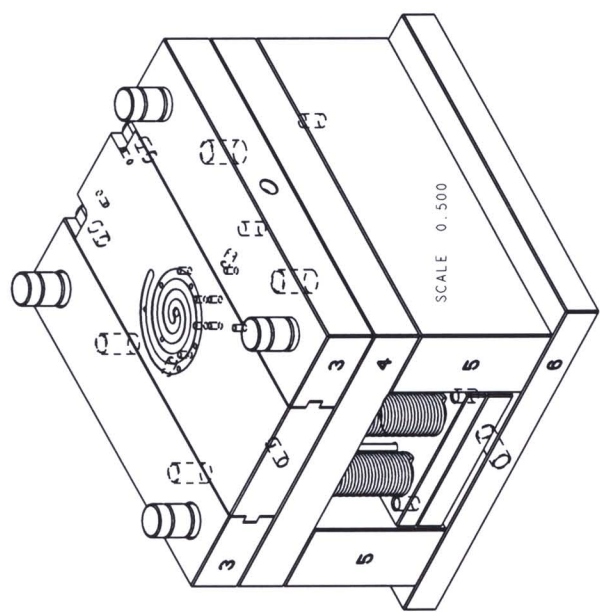
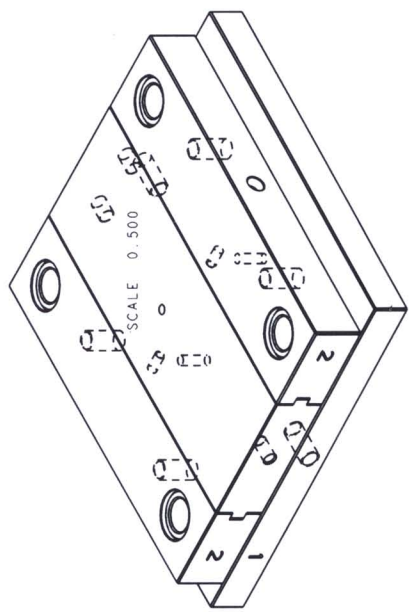
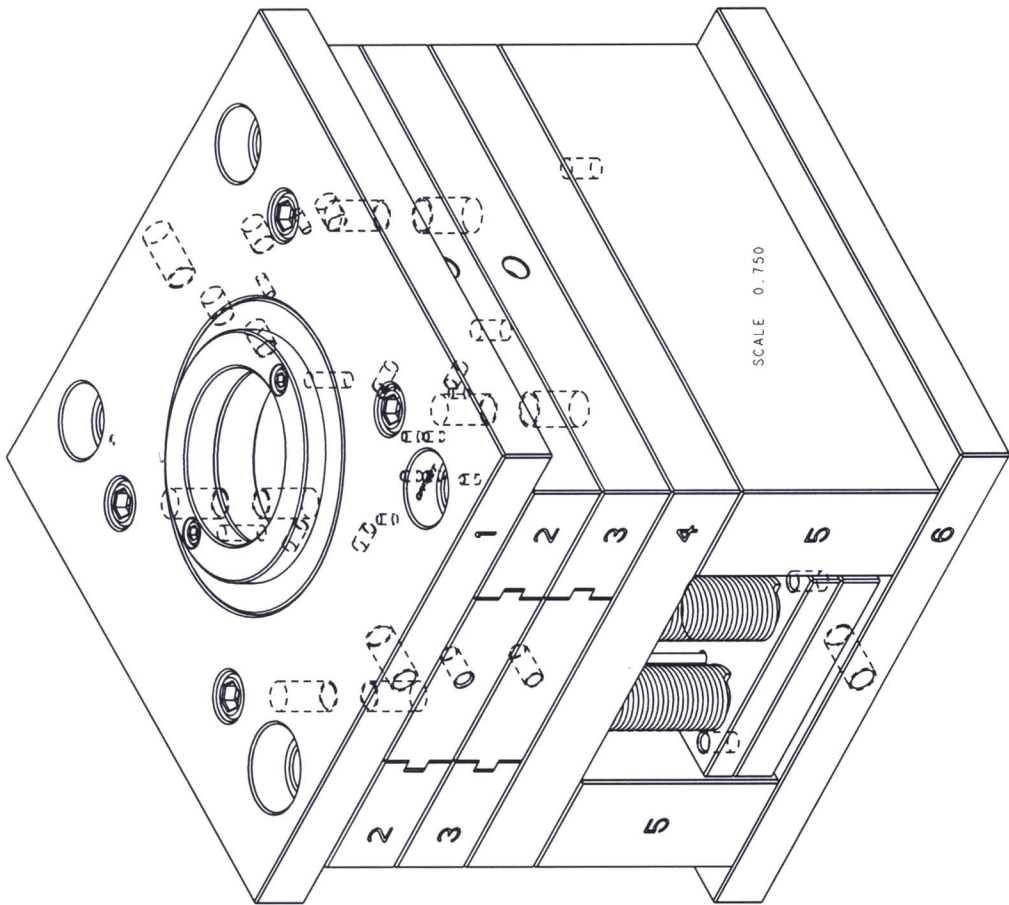
SECTION BB-BB



SECTION AA-AA
SCALE 0.500

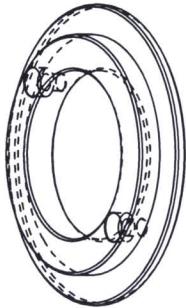
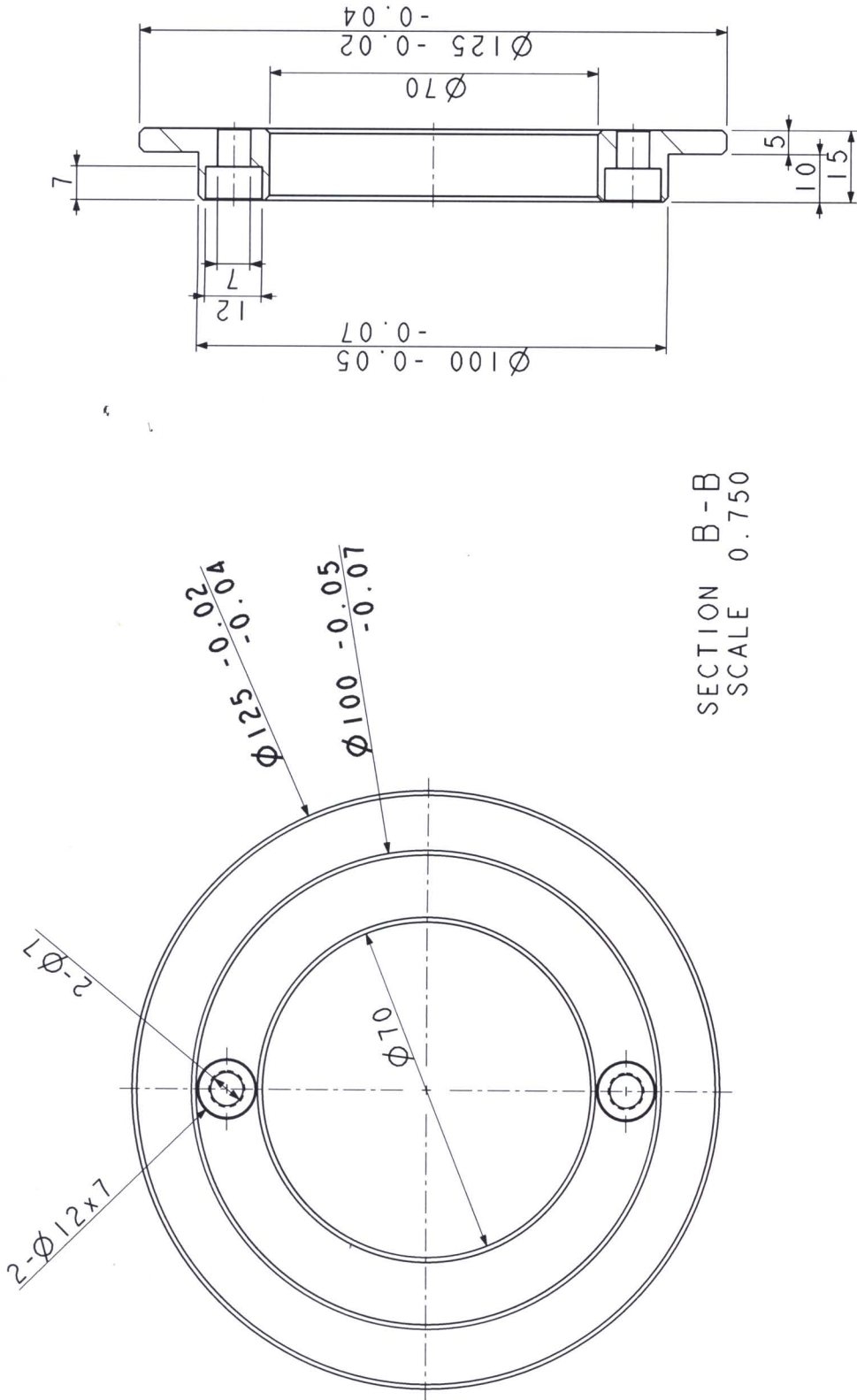
SPRINT TEST				
ITEM	COMPONENT NAME	TYPE	MATERIAL	SIZE
1	BACK-UP-CORE-PL	PART	SS304	250x250x35
2	BACK-UP-EJECTOR-8046	PART	SS304	Ø80x16
3	BOTTOM-PL	PART	SS304	250x250x25
4	BACK-UP-EJECTOR-8046	PART	SS304	250x250x25
5	CAVITY-INSERT	PART	SS304	250x100x35
6	CAVITY-PL-L	PART	SS304	250x100x35
7	CAVITY-PL-R	PART	SS304	250x100x35
8	CONNECT-PLATE	PART	SS304	250x100x35
9	CAVITY-PL-L	PART	SS304	250x100x35
10	CORE-PL-L	PART	SS304	250x100x35
11	CORE-PL-R	PART	SS304	250x100x35
12	EJECTOR-PIN-3130	PART	SS304	16x4x30
13	EJECTOR-PIN-3130	PART	SS304	16x4x30
14	EJECTOR-PIN-4410	PART	SS304	16x4x10
15	EJECTOR-PIN-4410	PART	SS304	250x150x20
16	FITTING-L-4-H8	PART	SS304	250x150x20
17	GUIDE-PIN-2065-15	PART	SS304	Ø16x20x65x15
18	OSCILLATING-RING	PART	SS304	Ø16x20x65x15
19	WELDED	PART	SS304	Ø16x20x65x15
20	WELDED	PART	SS304	Ø16x20x65x15
21	WELDED	PART	SS304	Ø16x20x65x15
22	WELDED	PART	SS304	Ø16x20x65x15
23	WELDED	PART	SS304	Ø16x20x65x15
24	WELDED	PART	SS304	Ø16x20x65x15
25	RETAINER-EJECT-PL	PART	SS304	250x100x15
26	RETAINER-PIN-15X80	PART	SS304	Ø16x15x80
27	SPACER-BLOCK	PART	SS304	250x100x15
28	SPACER-BLOCK	PART	SS304	250x100x15
29	STOP-PIN-B	PART	SS304	Ø16x20x65x15
30	STOP-PIN-B	PART	SS304	250x250x25

PROJECT	SPRINT-MOLD-TEST	DRAW NO.	GM-003-05
TYPE	ENGINEERING DEPT	DRAWN	CSUMONG
CLIENT	ENGINEERING DEPT	CHECKED	CSUMONG
SUPPLIER	GM ENGINEERING Co., Ltd.	APPROVED	KRASSONG
DATE	01-JAN-11		



PROJECT	SPIRAL-MOLD-TEST	DRAW NO	GMD-033-05
PART NAME	SPIRAL-TEST	TYPE	ASSEM
CUSTOMER	ENGINEERING DEPT	SHEET	2
SUPPLIER	GMD MANUFACTURING CO., LTD	CHECKED	16
		APPROVED	
		DATE	01-JAN-11

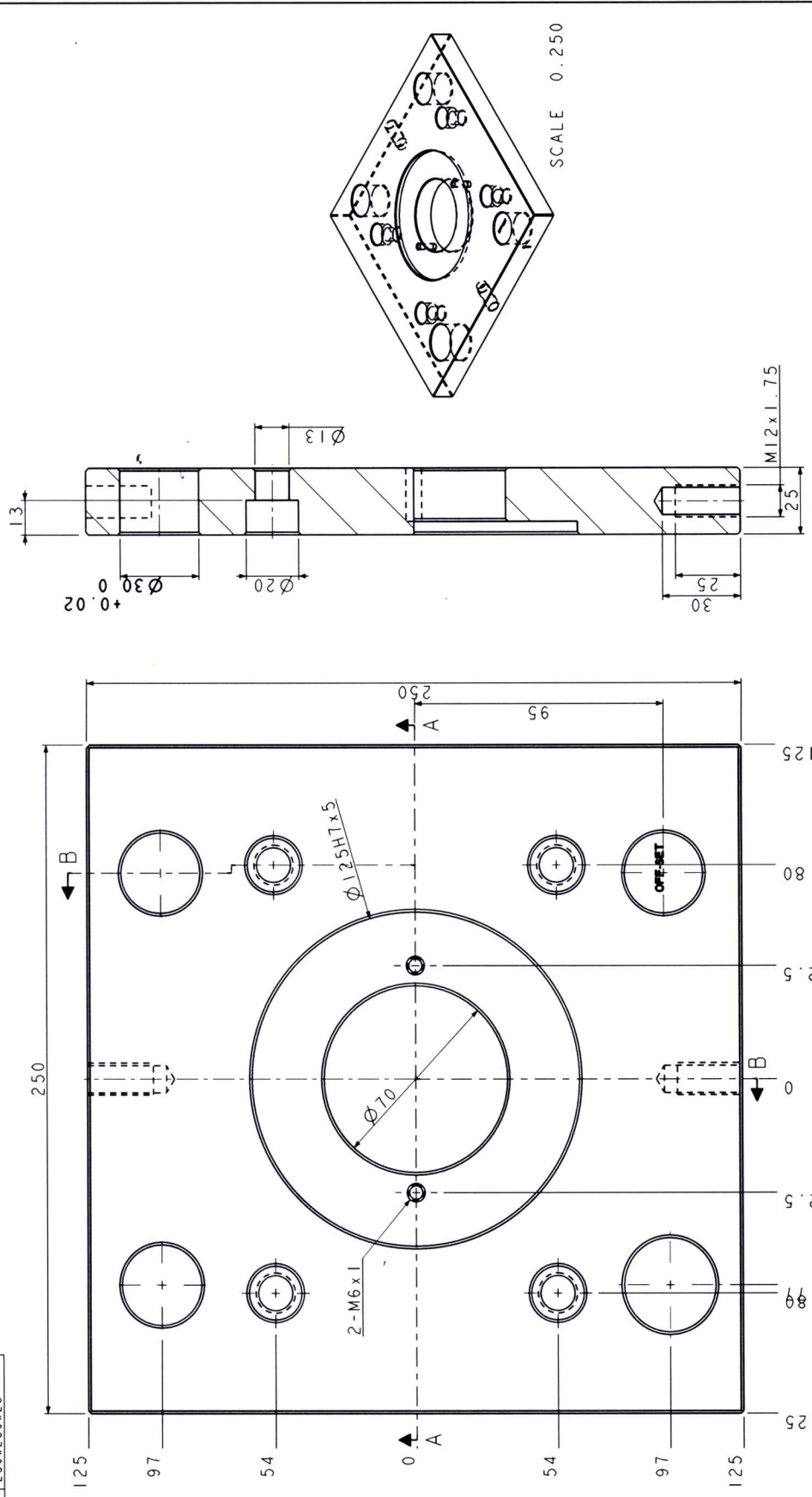
MATERIAL	S50C	REVISION	
SIZE	Ø 125x15	REV-0	01-Jul-11
			ORIGINAL



PROJECT	SPIRAL-MOLD-TEST	DRAW NO.	GMD-003-05
PART NAME	LOCATING-RING	DRAWN	C.SURAPONG
CLIENT	ENGINEERING DEPT.	CHECKED	K.PRASONG
SUPPLIER	GMD Manufacturing Co., Ltd.	APPROVED	K.PRASONG
		DATE	01-Jul-11

REVISION	Q1-JUL-11	ORIGINAL
REV-0		

MATERIAL	S50C
SIZE	250x250x25



SECTION A - A
SCALE 0.650

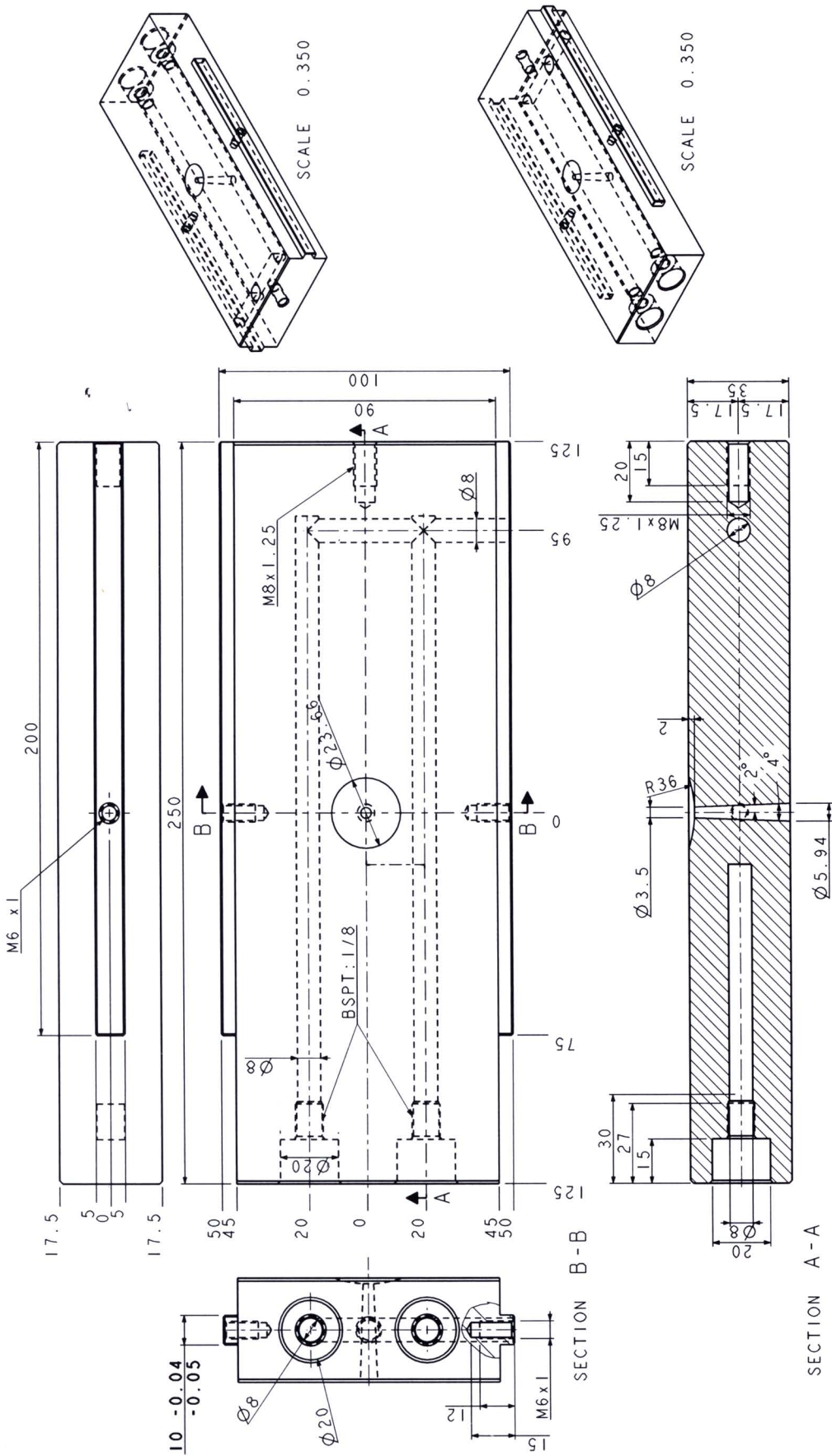
SECTION B - B

PROJECT	SPIRAL - MOLD - TEST	DRAW NO.	GMD-003-05
PART NAME	TOP-PL	TYPE	CSURAPONG
CLIENT	ENGINEERING DEPT.	SHEET	4
SUPPLIER	GMD Manufacturing Co., Ltd.	UNIT	MM.
		CHECKED	K. PRASONG
		APPROVED	K. PRASONG
		DATE	01-Jul-11

Ragamagala University of Technology Pranakhon

MATERIAL	SS0C
SIZE	250x100x35

REVISION	Q2-JUL-11	ORIGINAL
REV-0		

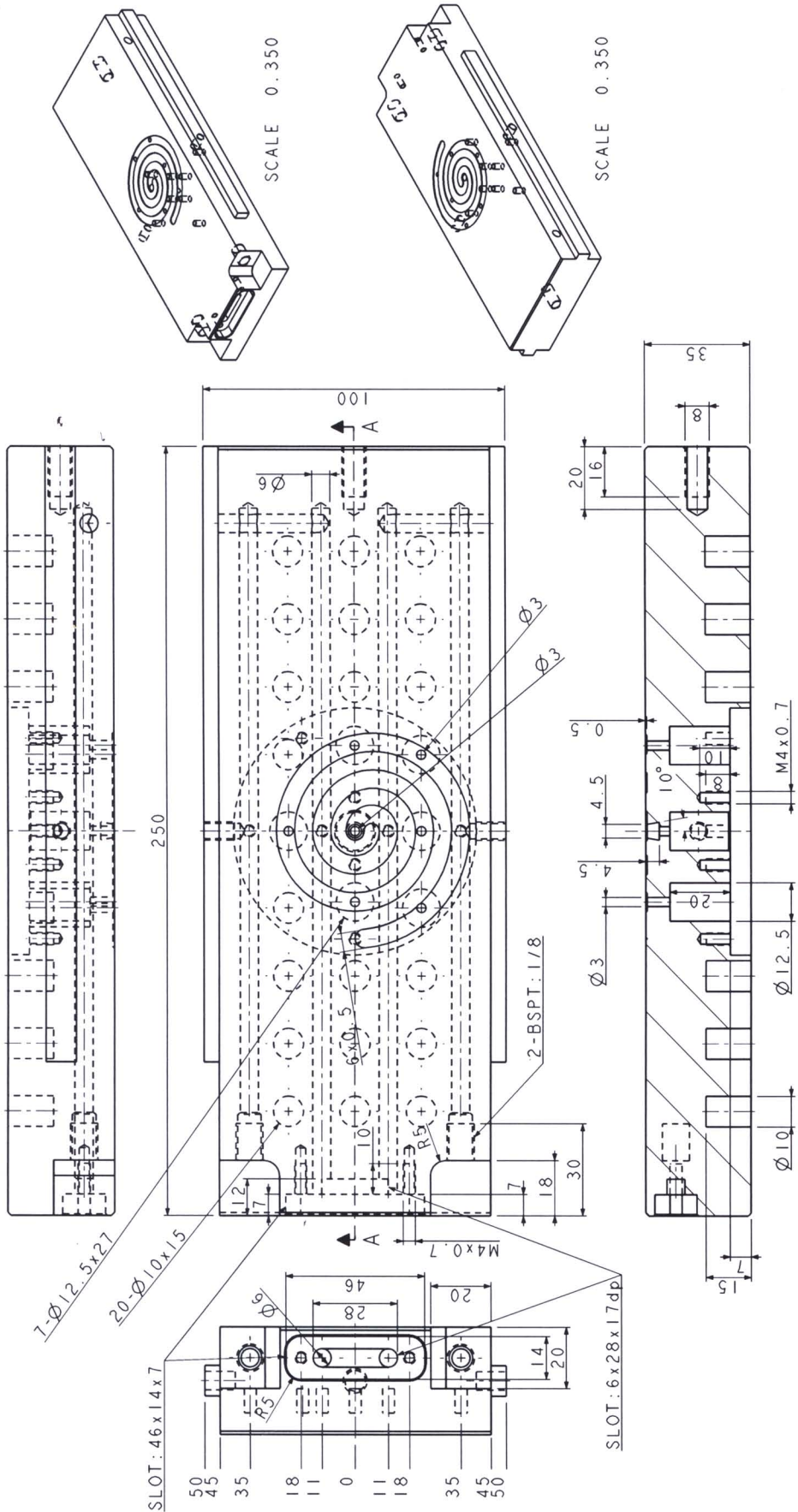


PROJECT	SPIRAL MOLD-TEST	DRAW NO.	GMD-003-05
PART NAME	CAVITY-INSERT	DRAWN	CSURAPONG
CLIENT	ENGINEERING DEPT.	SHEET	6
SUPPLIER	GMD Manufacturing Co., Ltd.	CHECKED	K.PRASONG
		UNIT	MM
		APPROVED	K.PRASONG
		DATE	02-Jul-11

Ragamagala University of Technology Pranakhon

REVISION	01-Jul-11	ORIGINAL
REV-0		

MATERIAL	S50C
SIZE	250x100x35



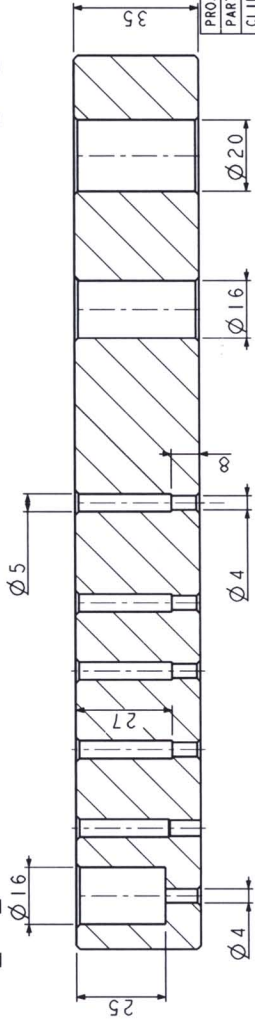
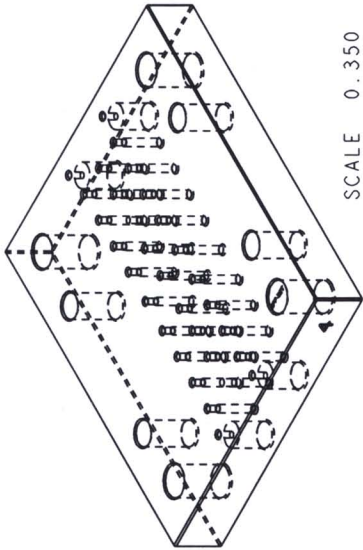
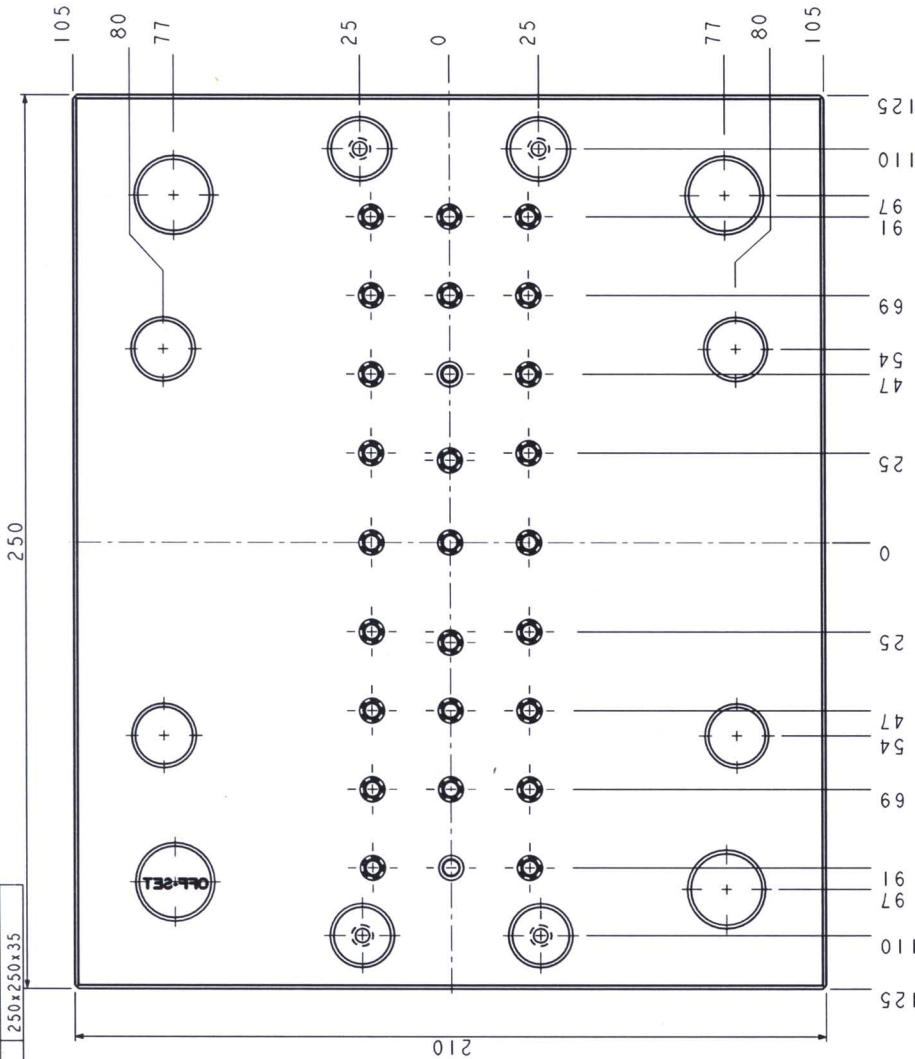
PROJECT	SPIRAL-MOLD-TEST	DRAW NO.	GMD-003-05
PART NAME	CORE-INSERT	TYPE	CSURAPONG
CLIENT	ENGINEERING DEPT.	SHEET	7
SUPPLIER	GMD Manufacturing Co., Ltd.	CHECKED	K.PRASONG
		APPROVED	K.PRASONG
		DATE	01-Jul-11

SECTION A-A
SCALE 0.750

Ragamagala University of Technology Pranakhon

REVISION	01-Jul-11	ORIGINAL
REV-0		

MATERIAL	S50C
SIZE	250x250x35

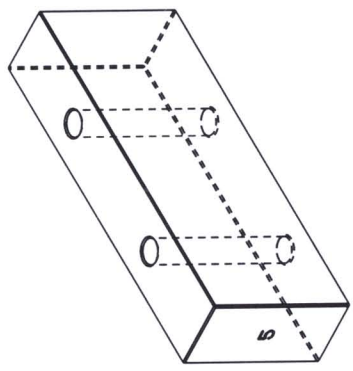
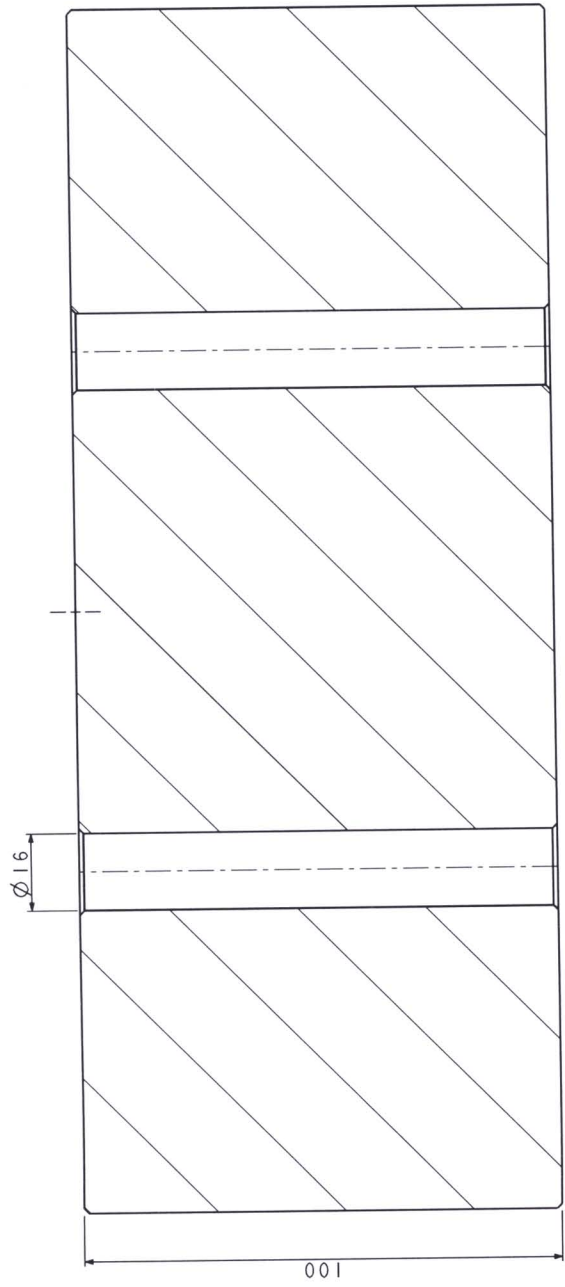
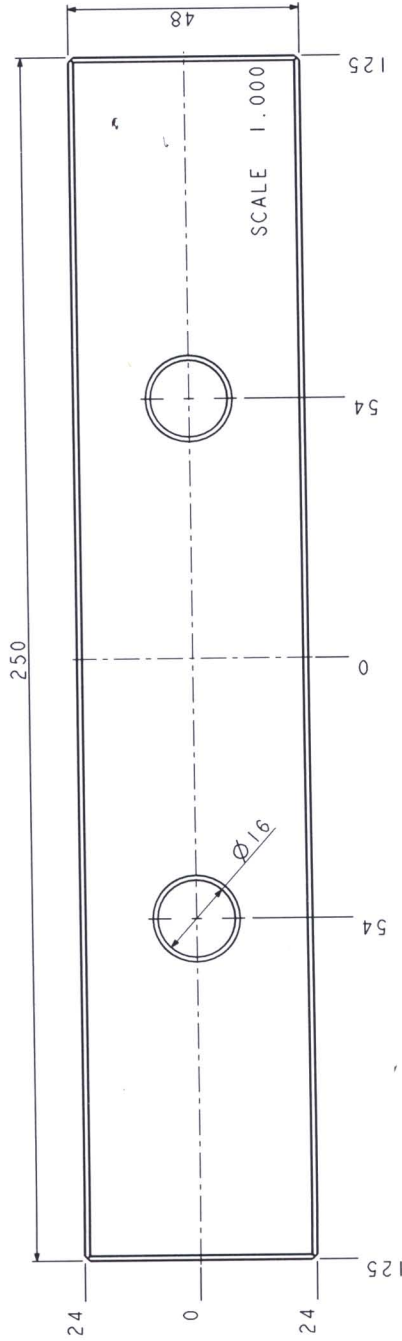


PROJECT	SPIRAL-MOLD-TEST	DRAW NO.	GMD-003-05
PART NAME	BACK-UP-CORE-PL	DRAWN	C.SURAPONG
CLIENT	ENGINEERING DEPT.	CHECKED	K.PRASONG
SUPPLIER	GMD Manufacturing Co.,Ltd.	UNIT	MM.
Ragamagala University of Technology Prnakhon		DATE	01-Jul-11

SECTION B-B
SCALE 0.750

MATERIAL	SS0C
SIZE	250x100x48
QTY	2 pcs.

REVISION	01-Jul-11	ORIGINAL
REV-0		



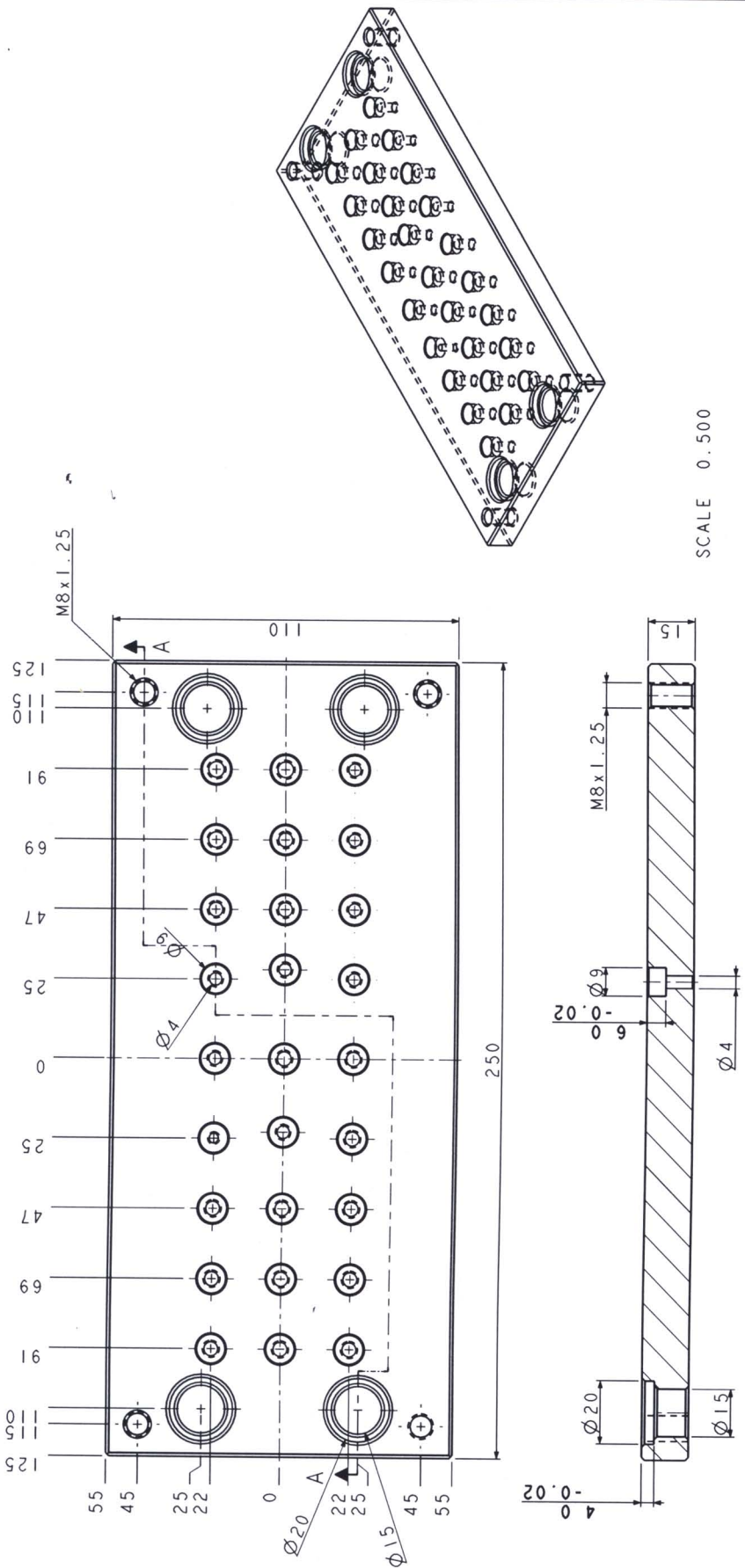
SECTION A-A
SCALE 0.350

PROJECT	SPIRAL-MOLD-TEST	DRAW NO.	GMD-003-05
PART NAME	SPACER-BLOCK	DRAWN	C.SURAPONG
CLIENT	ENGINEERING DEPT.	CHECKED	K.PRASONG
SUPPLIER	GMD Manufacturing Co., Ltd.	APPROVED	K.PRASONG
		DATE	01-Jul-11



Ragamagala University of Technology Pranakhon

MATERIAL	SS50C	REVISION	
SIZE	250x110x15	REV-0	02-Jul-11
			ORIGINAL



SECTION A - A
SCALE 0.750

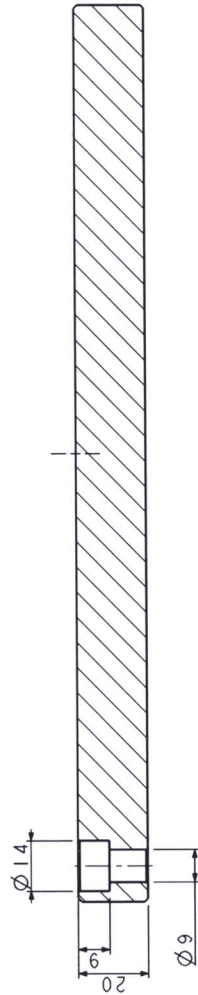
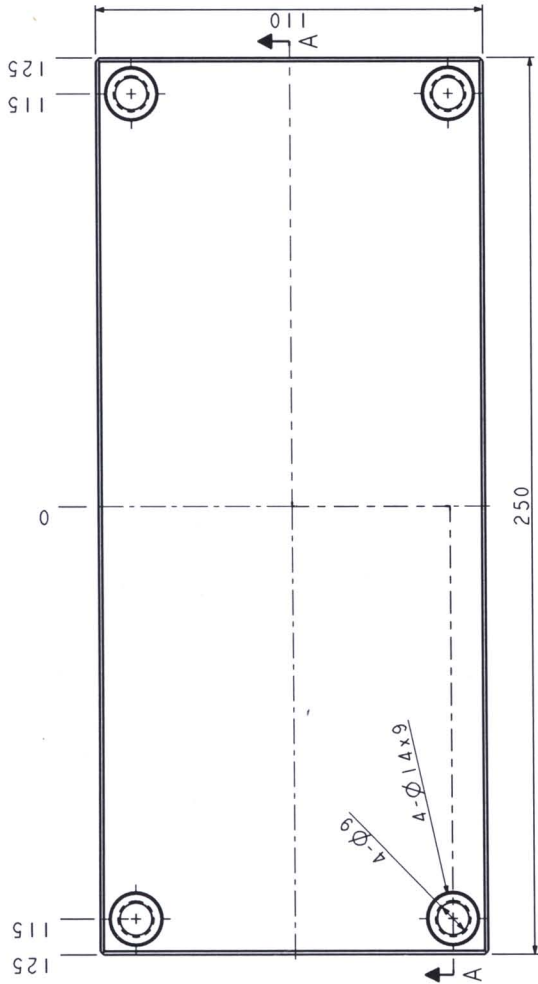
PROJECT	SPIRAL-MOLD-TEST	DRAW NO.	GMD-003-05
PART NAME	RETAINER-EJECT-PL	TYPE	CSURAPONG
CLIENT	ENGINEERING DEPT.	SHEET	11
SUPPLIER	GMD Manufacturing Co., Ltd.	CHECKED	K.PRASONG
		UNIT	MM
		APPROVED	K.PRASONG
		DATE	02-Jul-11



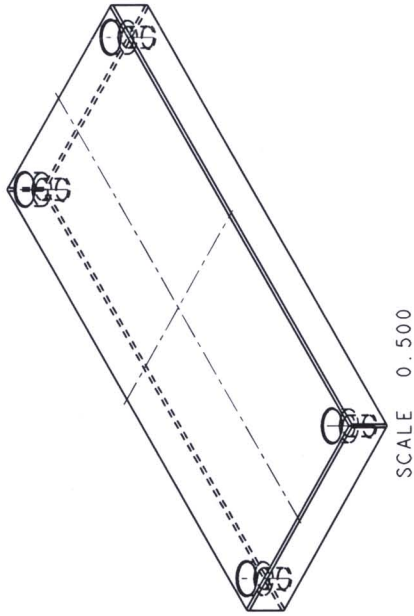
Ragamagala University of Technology Pranakhon

REVISION	02-Jul-11	ORIGINAL
REV-0		

MATERIAL	S50C
SIZE	250x150x20



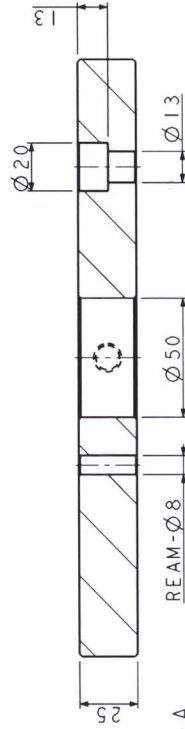
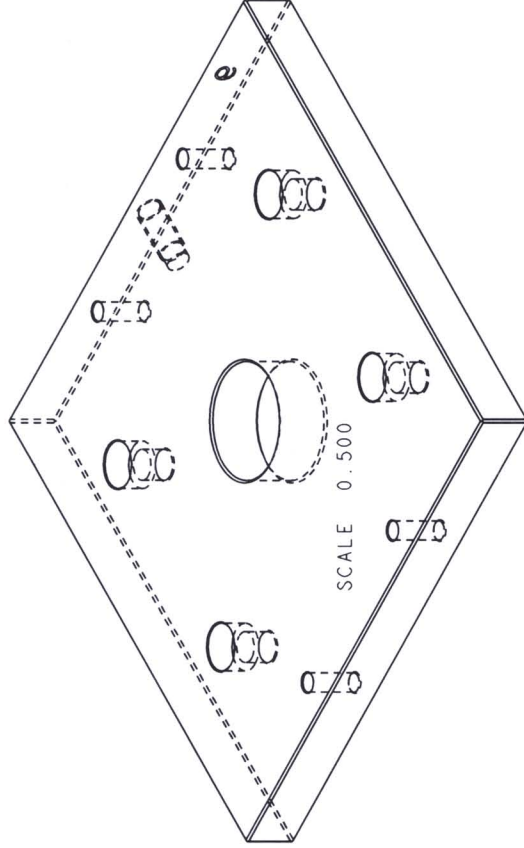
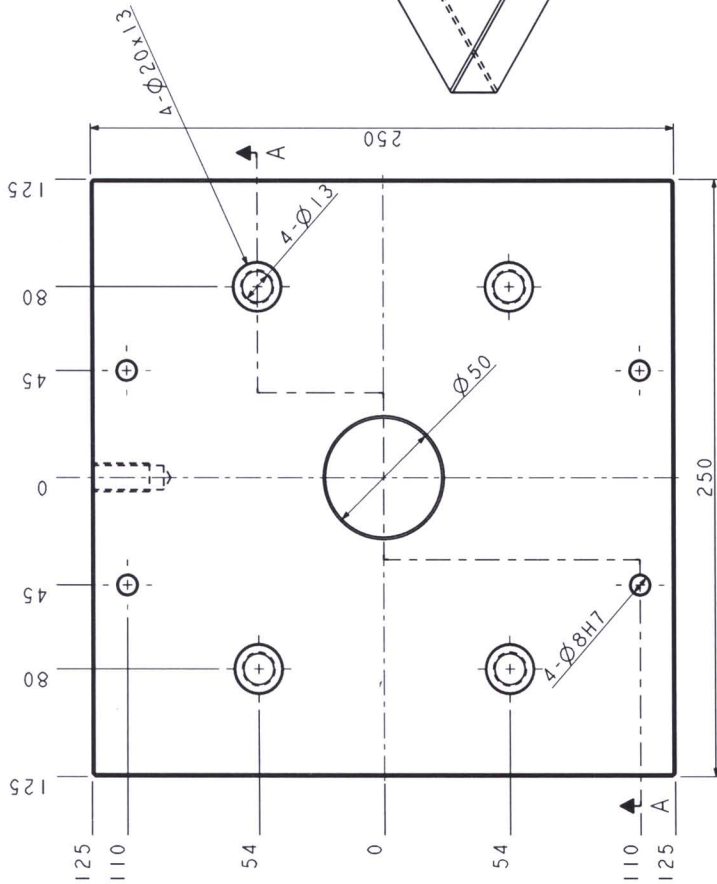
SECTION A - A
SCALE 0.750



PROJECT	SPIRAL-MOLD-TEST	DRAW NO.	GMD-003-05
PART NAME	EJECTOR-PL	DRAWN	C.SURAPONG
CLIENT	ENGINEERING DEPT.	SHEET	12 16
SUPPLIER	GMD Manufacturing Co., Ltd.	CHECKED	K.PRASONG
		UNIT	MM
		APPROVED	K.PRASONG
		DATE	02-Jul-11
Ragamagala University of Technology Pranakhon			

REVISION	02-Jul-11	ORIGINAL
REV-0		

MATERIAL	S50C
SIZE	250x250x25



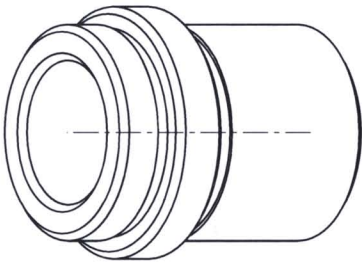
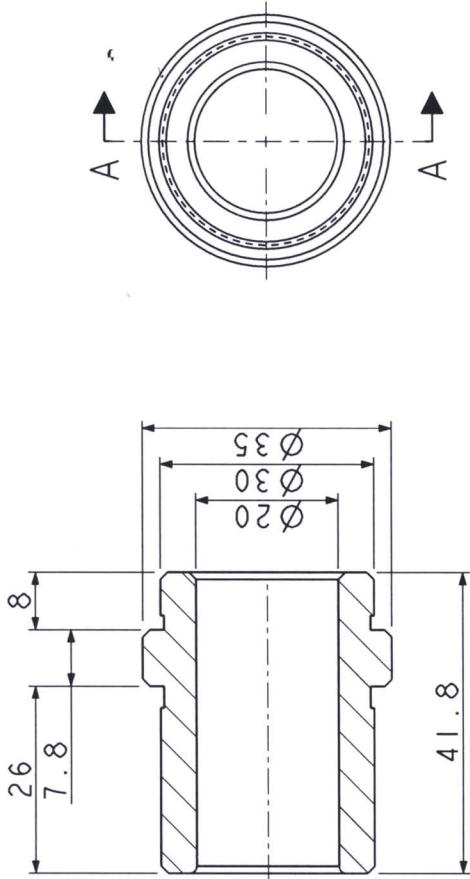
SECTION A-A
SCALE 0.500

PROJECT	SPRINT-MOLD-TEST	DRAW NO.	GMD-003-05
PART NAME	BOTTOM-PL	DRAWN	C.SURAPONG
CLIENT	ENGINEERING DEPT.	CHECKED	K.PRASONG
SUPPLIER	GMD Manufacturing Co., Ltd.	APPROVED	K.PRASONG
		DATE	02-Jul-11

Ragamagala University of Technology Pranakhon

MATERIAL	SUJ2
SIZE	BA-25x35/42
QTY	4 pcs.
HARDNESS	60 HRC

REVISION	02-Jul-11	ORIGINAL
REV-0		

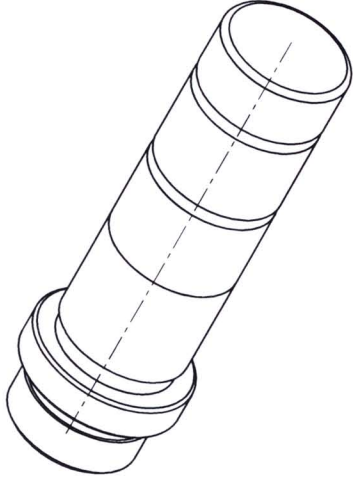
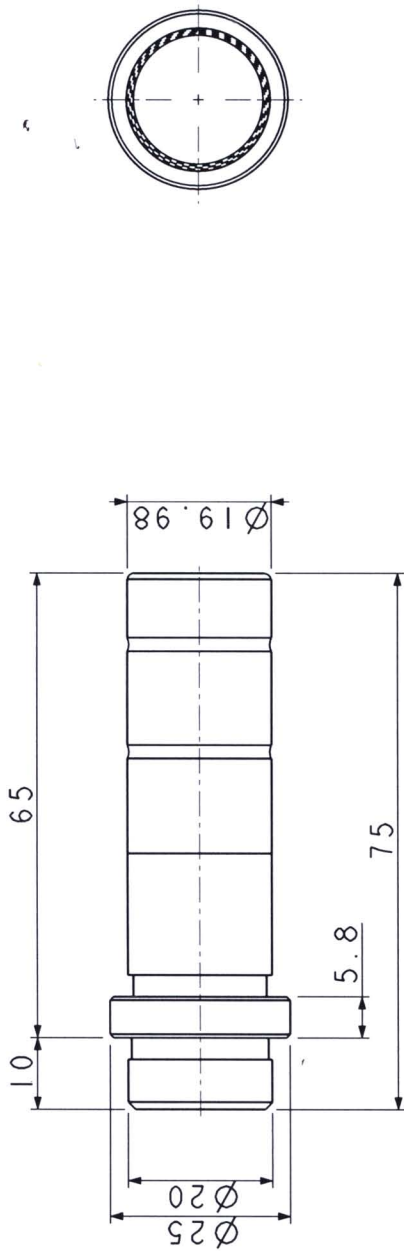


SECTION A - A
SCALE 1 : 000

PROJECT		SPIRAL-MOLD-TEST			DRAW NO.		GMD-003-05	
PART NAME		BUSH-A_20x35-42			DRAWN		C.SURAPONG	
CLIENT		ENGINEERING DEPT.			CHECKED		K.PRASONG	
SUPPLIER		GMD Manufacturing Co.,Ltd.			APPROVED		K.PRASONG	
 Ragamagala Univesity of Technology Pranakhon					DATE			02-Jul-11

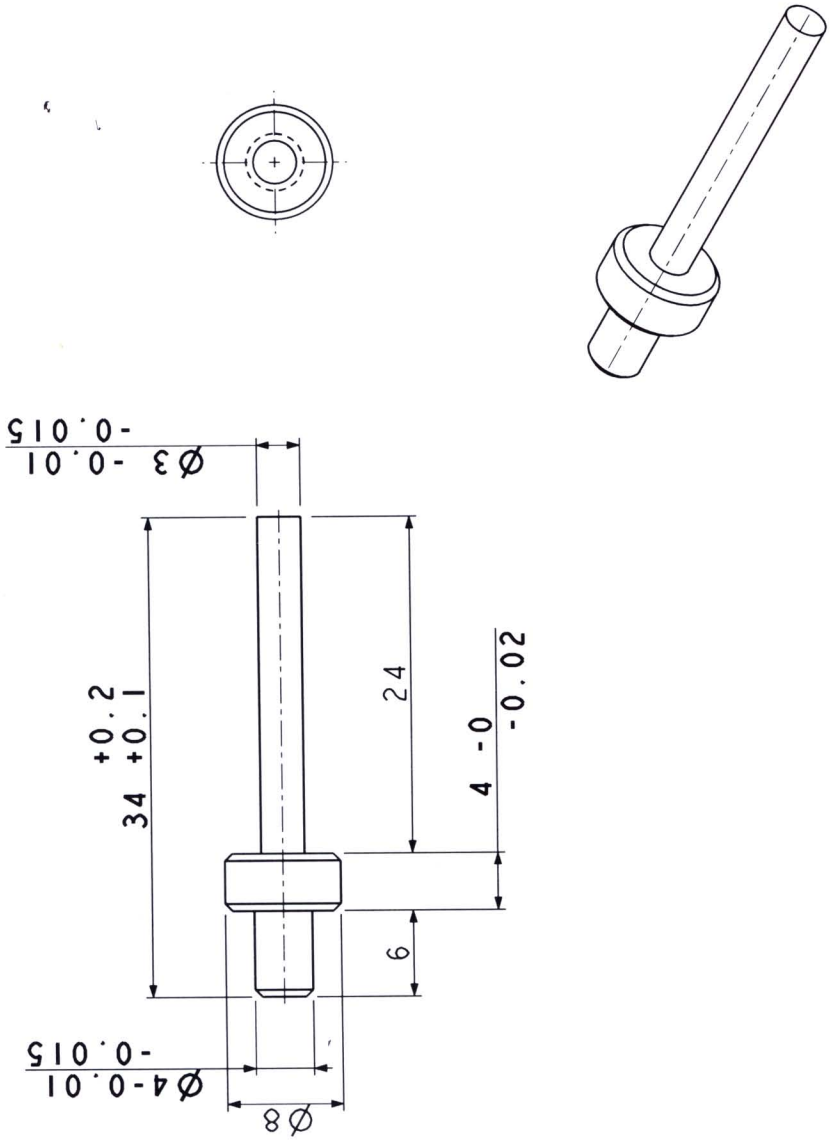
MATERIAL	SUJ2
SIZE	GPA-20x65/75
QTY	4 pcs.
HARDNESS	60 HRC

REVISION		
REV-0	02-Jul-11	ORIGINAL

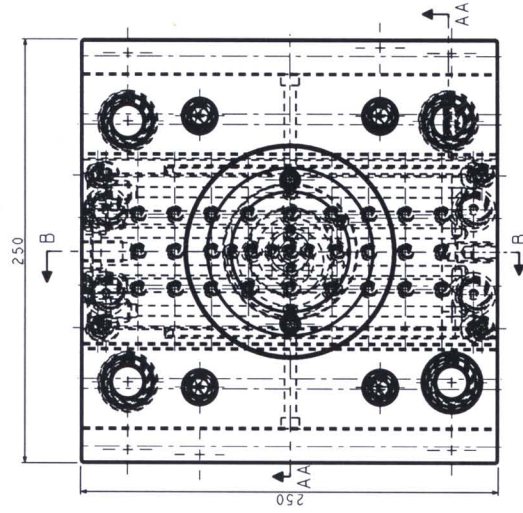


PROJECT	SPIRAL-MOLD-TEST			DRAW NO.	GMD-003-05
PART NAME	GUIDE-PIN-20X65-75	TYPE	PART	DRAWN	C.SURAPONG
CLIENT	ENGINEERING DEPT.	SHEET	15	CHECKED	K.PRASONG
SUPPLIER	GMD Manufacturing Co.,Ltd.	UNIT	MM.	APPROVED	K.PRASONG
 Ragamagala University of Technology Pranakhon			DATE		
			02-Jul-11		

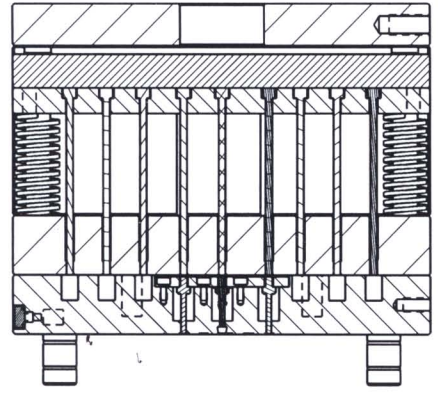
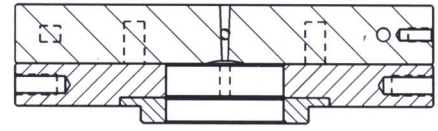
MATERIAL	SKD61	REVISION	
SIZE	FX-4x34	REV-0	02-Jul-11
QTY	25 pcs.		ORIGINAL
HARDNESS	40 HRC		



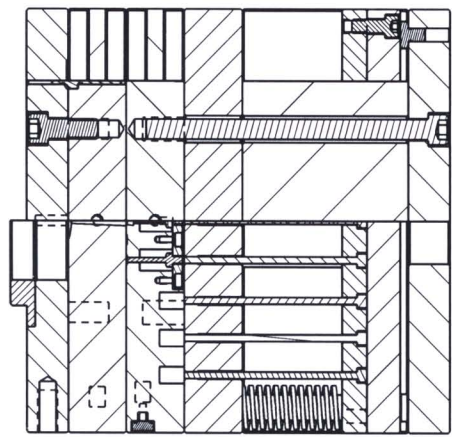
PROJECT	SPIRAL - MOLD - TEST			DRAW NO.	GMD-003-05
PART NAME	EJECTOR-PIN-3X34	TYPE	PART	DRAWN	C.SURAPONG
CLIENT	ENGINEERING DEPT.	SHEET	16	CHECKED	K.PRASONG
SUPPLIER	GMD Manufacturing Co., Ltd.	UNIT	MM.	APPROVED	K.PRASONG
Ragamagala University of Technology Pranakhon				DATE	02-Jul-11



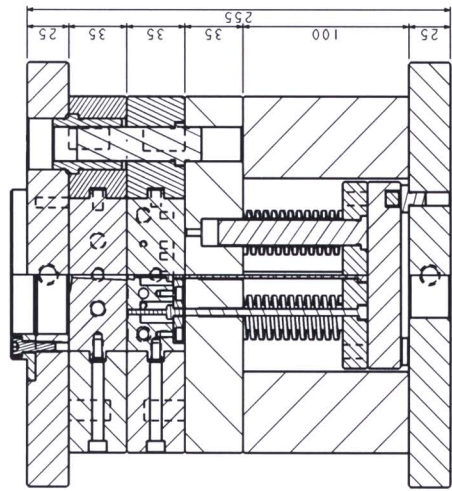
SECTION B-B
SCALE 0.500



SECTION B-B
SCALE 0.500



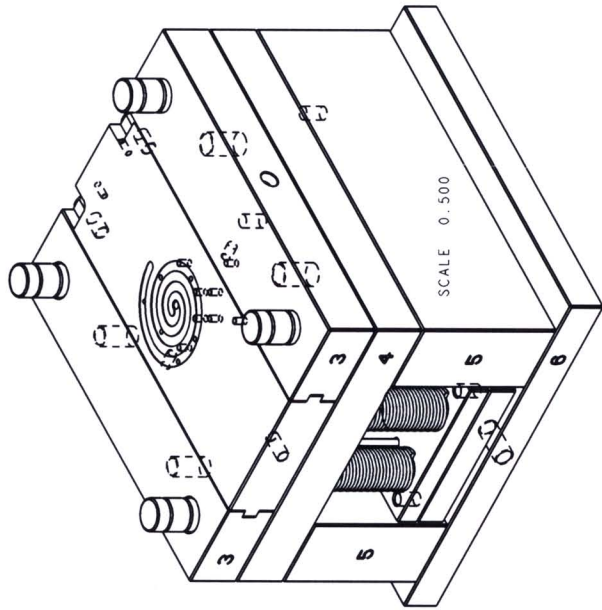
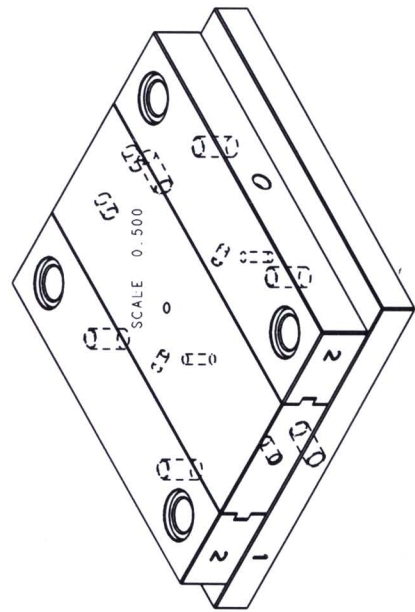
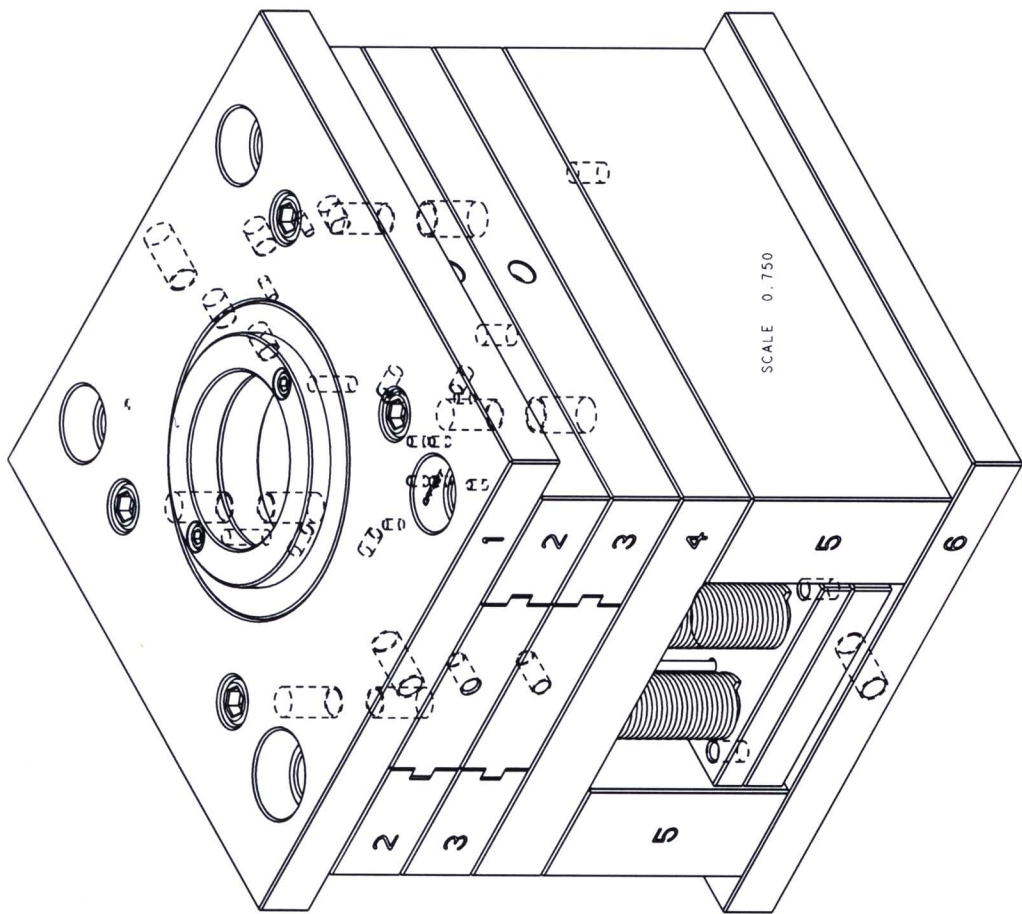
SECTION BB-BB



SECTION AA-AA
SCALE 0.500

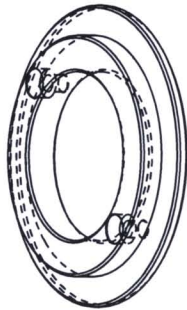
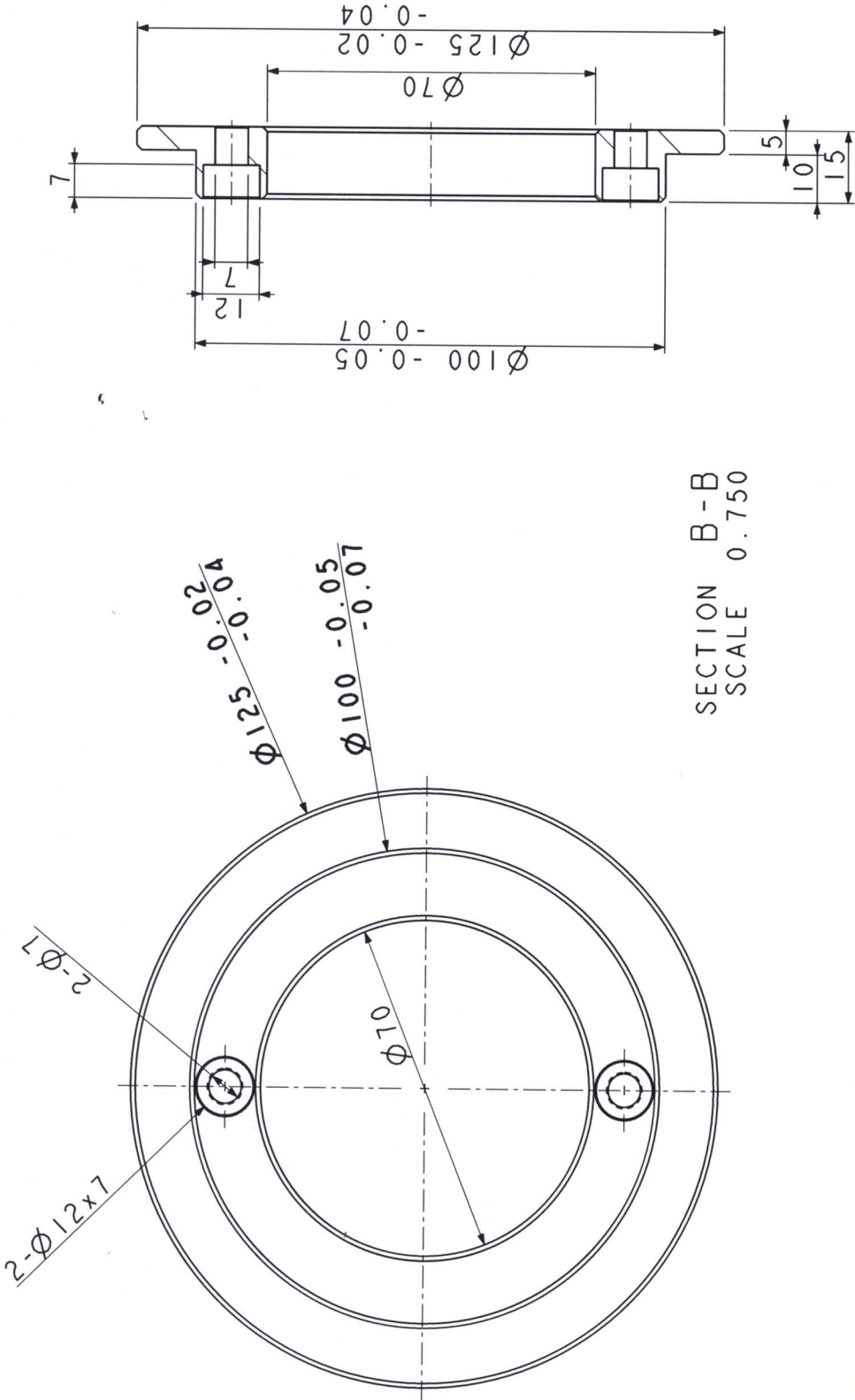
SERIAL TEST	TEST NAME	TYPE	MATERIAL	SIZE
1	BACK-UP-ELECT-PLATE	PART	SS304	250x250x35
2	BACK-UP-ELECT-ROD	PART	SS304	Ø30x16
3	BOTTOM-PL	PART	SS304	250x250x25
4	BUSH-A, 20x35x42	PART	SS312	BA-25x35x42
5	CAPIT-INSERT	PART	SS304	250x100x35
6	CAVITY-INSERT	PART	SS304	250x100x35
7	CAVITY-PL	PART	SS304	250x100x35
8	CONNECT-PLATE	PART	SS304	250x100x35
9	CORE-INSERT	PART	SS304	250x100x35
10	CORE-PL-L	PART	SS304	250x60x35
11	CORE-PL-R	PART	SS304	250x60x35
12	CORE-PL-2	PART	SS304	250x60x35
13	ELECTOR-FIN-4110	PART	STAINLESS	FIN-4110
14	ELECTOR-FIN-41110	PART	SS304	FIN-41110
15	ELECTOR-PL	PART	SS304	250x150x20
16	FITTING-L-R	PART	SS312	ØP2-20x16x75
17	GUIDE-PL-20X35x75	PART	SS304	ØP2-20x16x75
18	LOCATING-RING	PART	SS304	ØP2-20x16x75
19	M2X120	PART	SS304	SS304 M12X120
20	M2X130	PART	SS304	SS304 M12X130
21	M4X110	PART	SS312	SS304 M4X110
22	M6X20	PART	SS304	SS304 M6X20
23	M6X20	PART	SS304	SS304 M6X20
24	M6X20	PART	SS304	SS304 M6X20
25	RECEIVER-ELECT-PL	PART	SS304	250x100x15
26	RETURN-PL-150R0	PART	SS312	RPI-150R0
27	SAPRING-D10x5-002X160	PART	SS304	250x100x40
28	SPACER-D10x5-002X160	PART	SS312	10-116x5/78x40
29	STOP-FIN-R	PART	SS304	SS304 STOP
30	TOP-PL	PART	SS304	250x250x25

PROJECT	SPIRAL-MOLD-TEST		DRAW NO		GMD-033-05
PART NAME	SPIRAL-TEST	TYPE	ASSEM	DRAWN	C.SUMPOONG
CLIENT	ENGINEERING DEPT.	SHEET	1	CHECKED	K.PRASONG
SUPPLIER	GMD MACHINERIES CO.,LTD	UNIT	MM	APPROVED	K.PRASONG
					DATE
					01-Jul-11



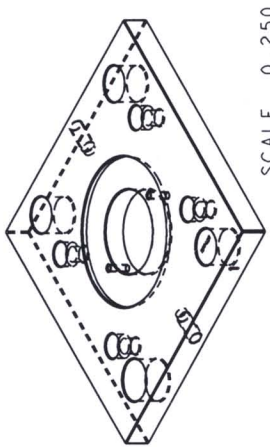
PROJECT	SPIRAL-WIND-TEST	DRAW NO.	010-011-01
PART NAME	SPIRAL-TEST	TYPE	ASSEM
CUSTOMER	ENGINEERING DEPT	SHEET	2
SUPPLIER	QMS Manufacturing Co., Ltd.	UNIT	MM
APPROVED	K. PRASONG	DATE	01-JAN-11

MATERIAL	S50C	REVISION	01-Jul-11	ORIGINAL
SIZE	Ø125x15	REV-0		



PROJECT	SPIRAL-MOLD-TEST	DRAW NO.	GMD-003-05
PART NAME	LOCATING-RING	DRAWN	C.SURAPONG
CLIENT	ENGINEERING DEPT.	CHECKED	K.PRASONG
SUPPLIER	GMD Manufacturing Co.,Ltd.	APPROVED	K.PRASONG
Ragamagala Univesity of Technology Pranakhon		DATE	01-Jul-11

REVISION	
REV-0	01-JUL-11 ORIGINAL

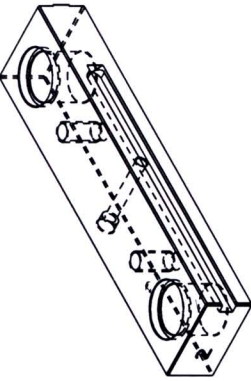


SECTION A - A
SCALE 0.650

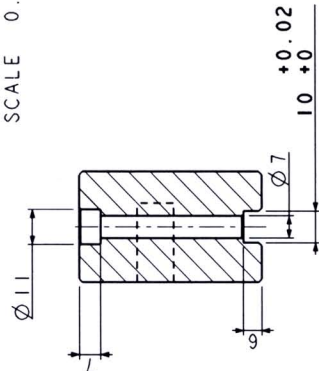
PROJECT	SPIRAL - MOLD-TEST			DRAW NO.	GMD-003-05
PROJECT NAME	TOP-PL	TYPE	PART	DRAWN	CSURAPONG
CLIENT	ENGINEERING DEPT.	SHEET	4	CHECKED	K.PRASONG
SUPPLIER	GMD Manufacturing Co.,Ltd.	UNIT	MM	APPROVED	K.PRASONG
 Ragnasagala University of Technology Pranakhon				DATE	01-Jul-11
					

MATERIAL	S50C
SIZE	250x60x35
QTY	2 pcs.

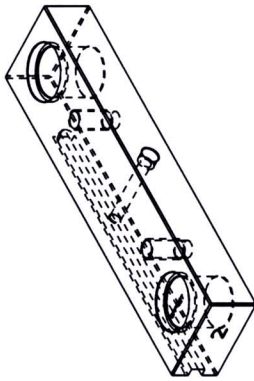
REVISION	01-JUL-11	ORIGINAL
REV-0		



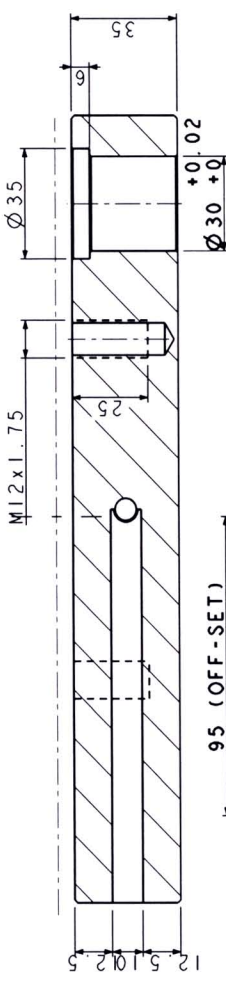
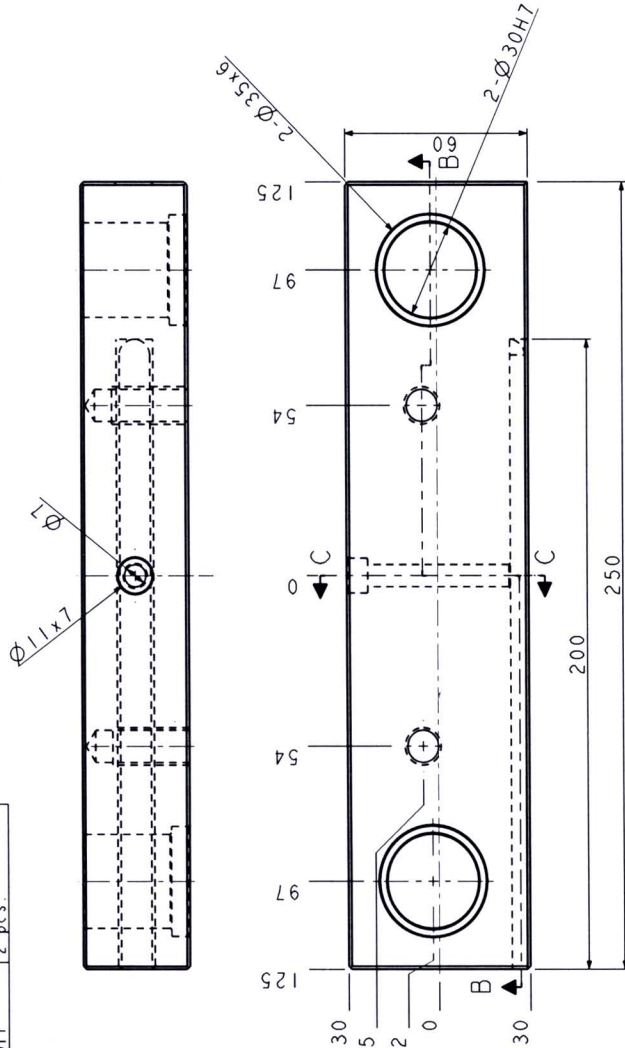
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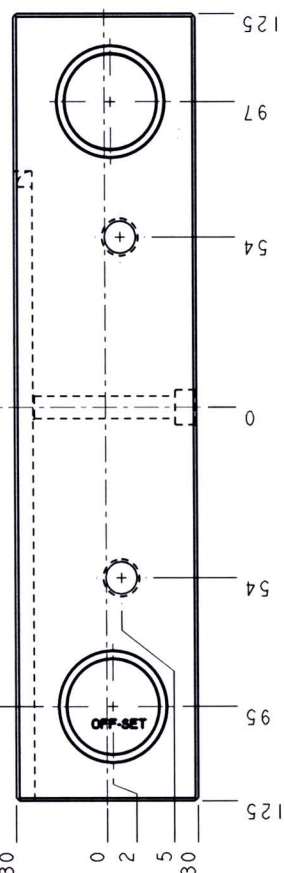
SECTION C-C
SCALE 0.650



SCALE 0.350



SECTION B-B
SCALE 0.650

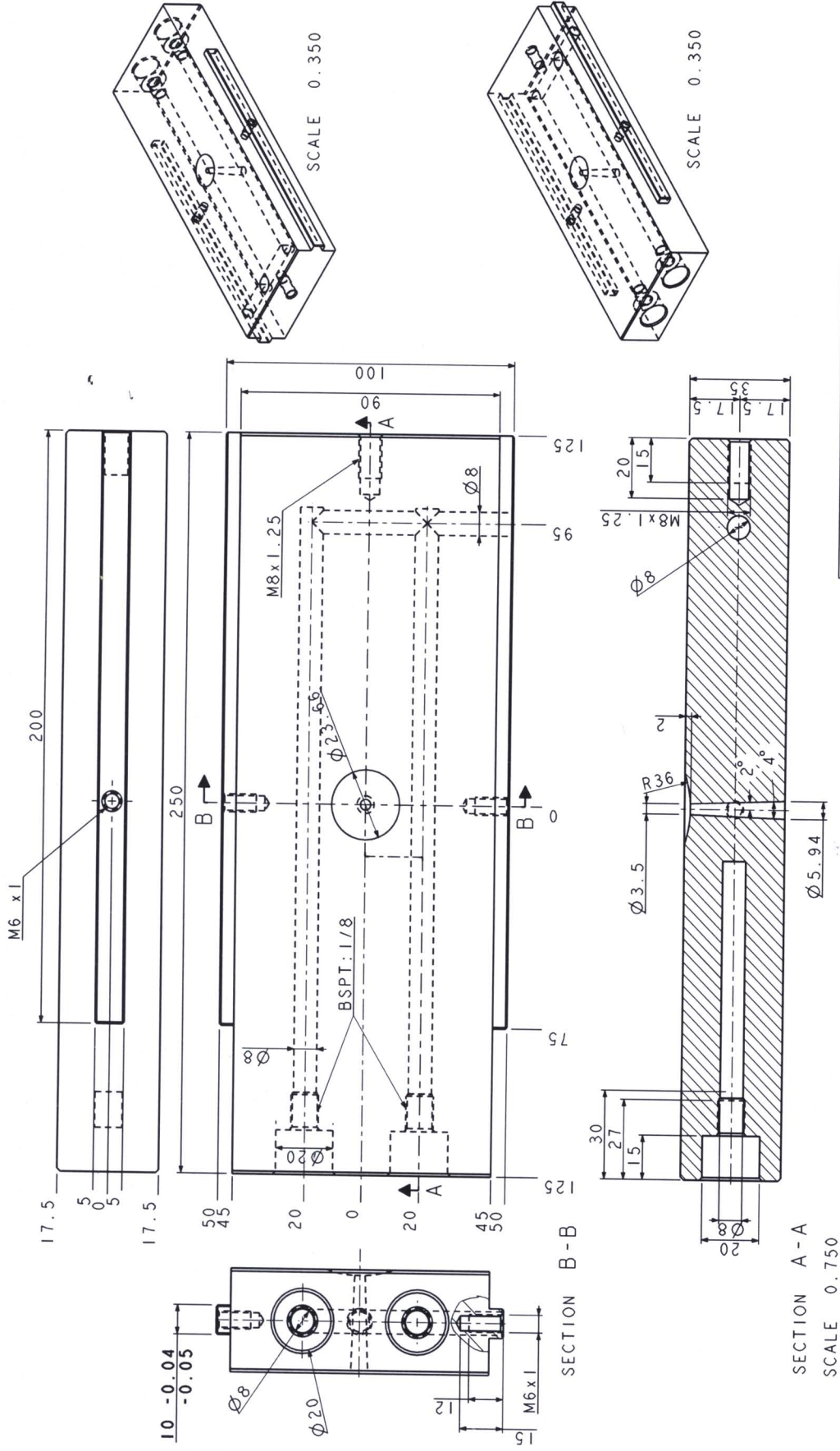


PROJECT	SPIRAL-MOLD-TEST	DRAW NO.	GMD-003-05
PART NAME	CAVITY-PL-L	DRAWN	CSURAPONG
CLIENT	ENGINEERING DEPT.	CHECKED	K.PRASONG
SUPPLIER	GMD Manufacturing Co., Ltd.	APPROVED	K.PRASONG
		DATE	01-Jul-11

Ragamagala University of Technology Pranakhon

MATERIAL	S50C
SIZE	250x100x35

REVISION	02-Jul-11	ORIGINAL
REV-0		

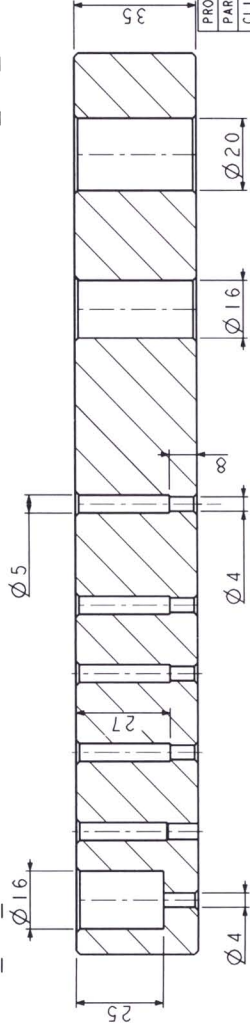
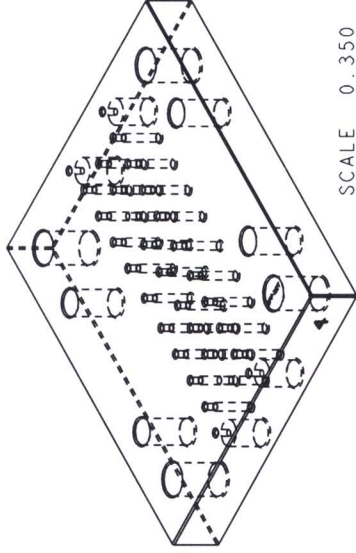
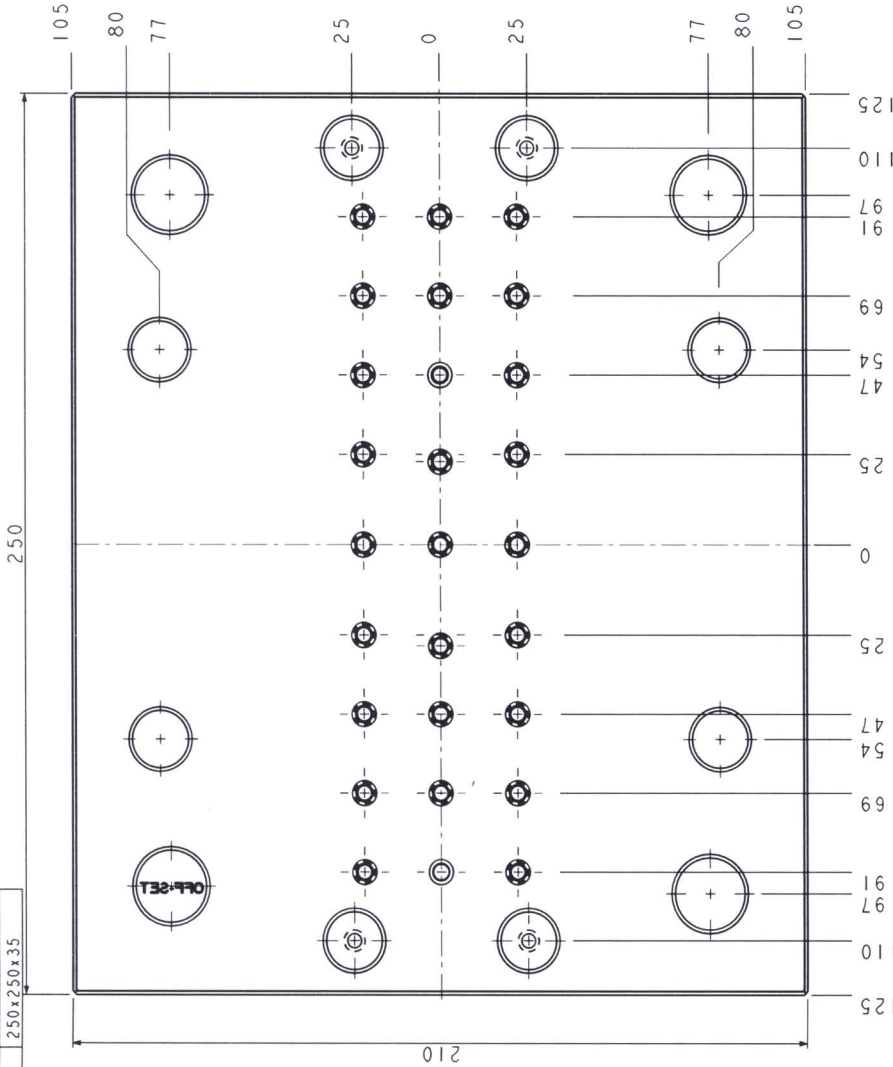


PROJECT	SPRAL-MOLD-TEST	DRAW NO.	GMD-003-05
PART NAME	CAVITY-INSERT	DRAWN	CSURAPONG
CLIENT	ENGINEERING DEPT.	SHEET	6
SUPPLIER	GMD Manufacturing Co., Ltd.	CHECKED	K.PRASONG
		UNIT	MM.
		APPROVED	K.PRASONG
		DATE	02-Jul-11

Ragamagala University of Technology Pranakhon

MATERIAL	S50C
SIZE	250x250x35

REVISION	01-Jul-11	ORIGINAL
REV-0		



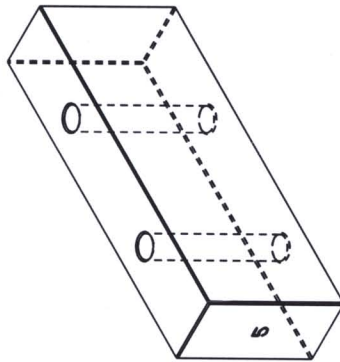
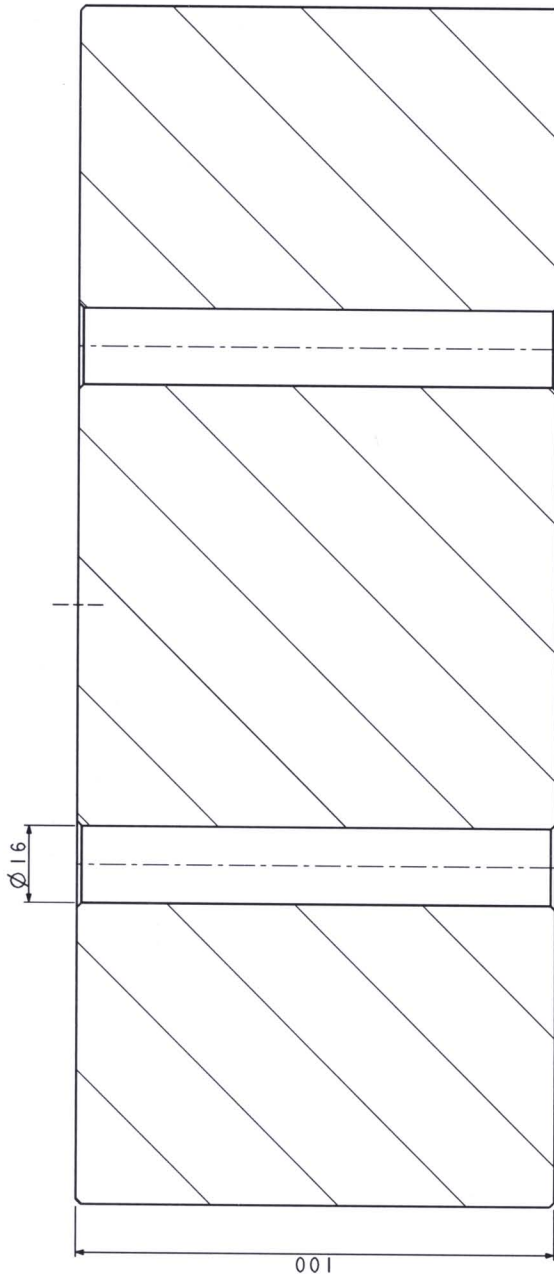
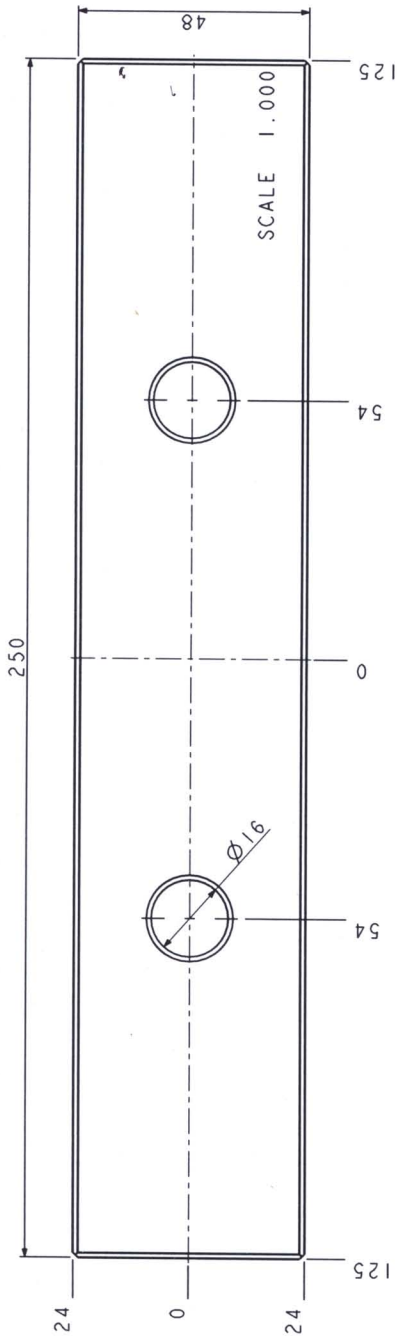
SECTION B-B
SCALE 0.750

PROJECT	SPIRAL-MOLD-TEST	DRAW NO.	GMD-003-05
PART NAME	BACK-UP-CORE-PL	DRAWN	C.SURAPONG
CLIENT	ENGINEERING DEPT.	CHECKED	K.PRASONG
SUPPLIER	GMD Manufacturing Co., Ltd.	APPROVED	K.PRASONG
		DATE	01-Jul-11

Ragamagala University of Technology Pranakhon

MATERIAL	S50C
SIZE	250x100x48
QTY	2 pcs.

REVISION	01-Jul-11	ORIGINAL
REV-0		



SECTION A-A
SCALE 0.350

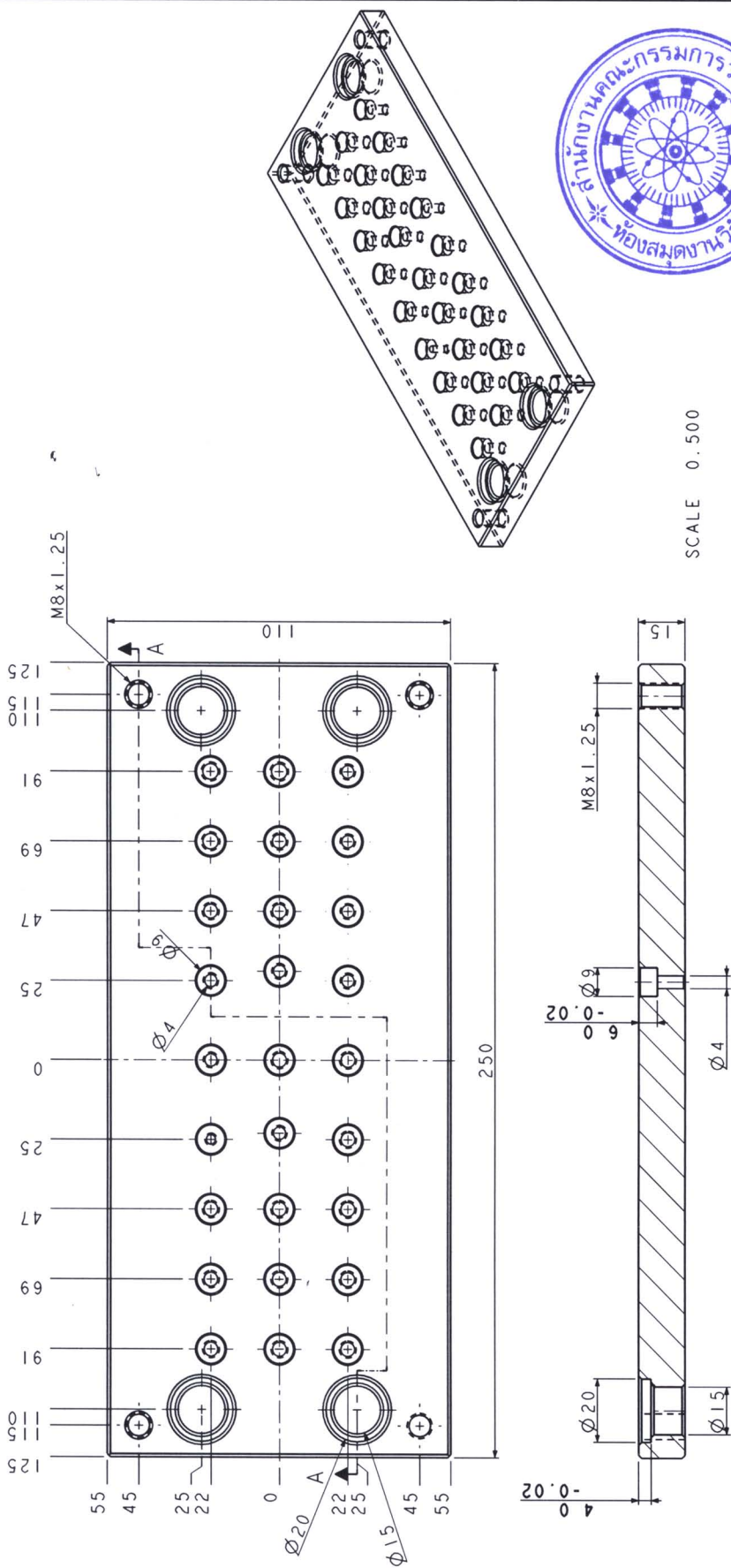
PROJECT	SPIRAL-MOLD-TEST	DRAW NO.	GMD-003-05
PART NAME	SPACER-BLOCK	DRAWN	CSURAPONG
CLIENT	ENGINEERING DEPT.	CHECKED	KPRASONG
SUPPLIER	GMD Manufacturing Co., Ltd.	UNIT	MM.
		APPROVED	KPRASONG
		DATE	01-Jul-11



Ragamagala University of Technology Pranakhon

REVISION	02-Jul-11	ORIGINAL
REV-0		

MATERIAL	SS50C
SIZE	250x110x15

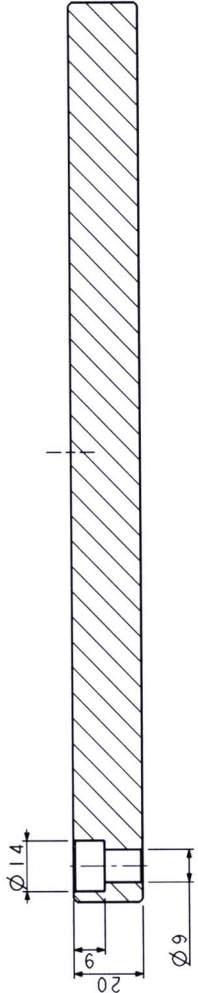
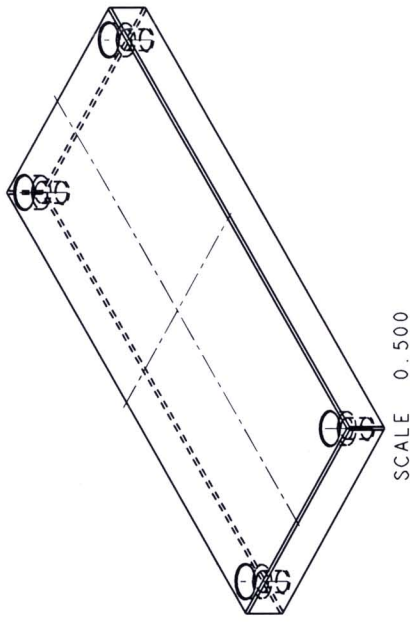
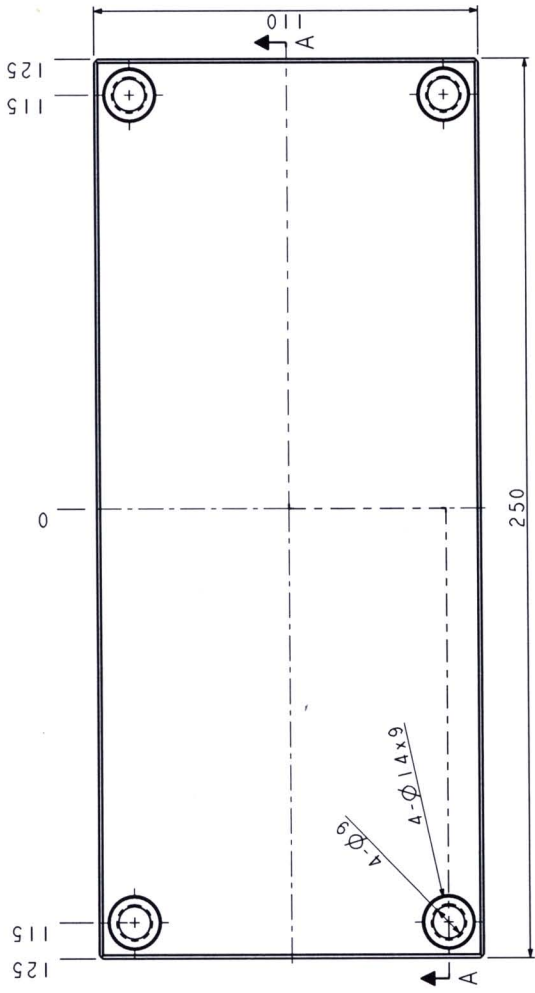


PROJECT	SPIRAL-MOLD-TEST	DRAW NO.	GMD-003-05
PART NAME	RETAINER-EJECT-PL	DRAWN	C.SURAPONG
CLIENT	ENGINEERING DEPT.	CHECKED	K.PRASONG
SUPPLIER	GMD Manufacturing Co.,Ltd.	APPROVED	K.PRASONG
		DATE	02-Jul-11

SECTION A - A
SCALE 0.750

MATERIAL	S50C
SIZE	250x150x20

REVISION		02-Jul-11	ORIGINAL
REV-0			



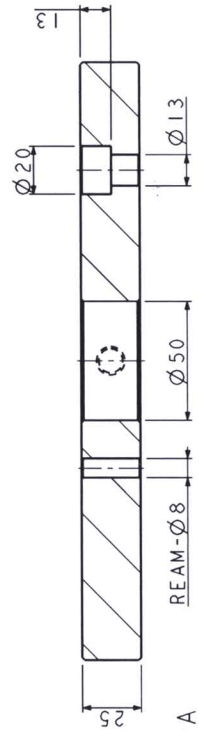
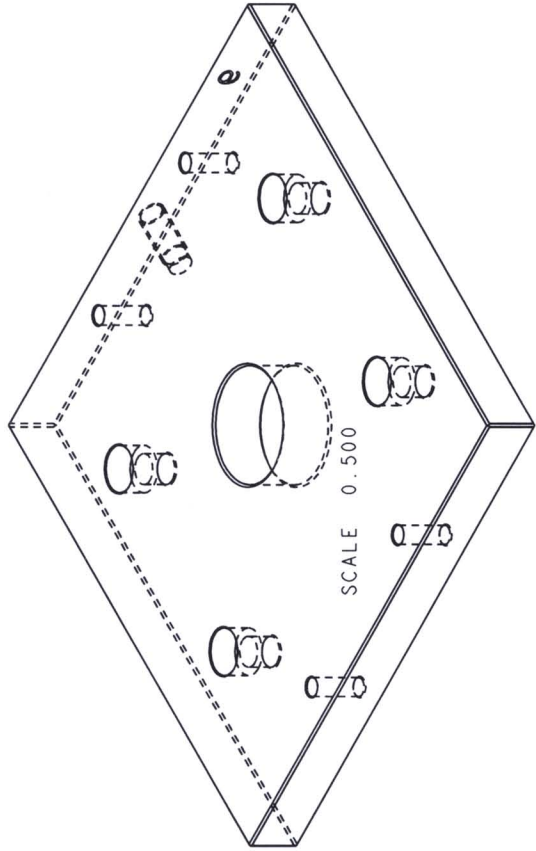
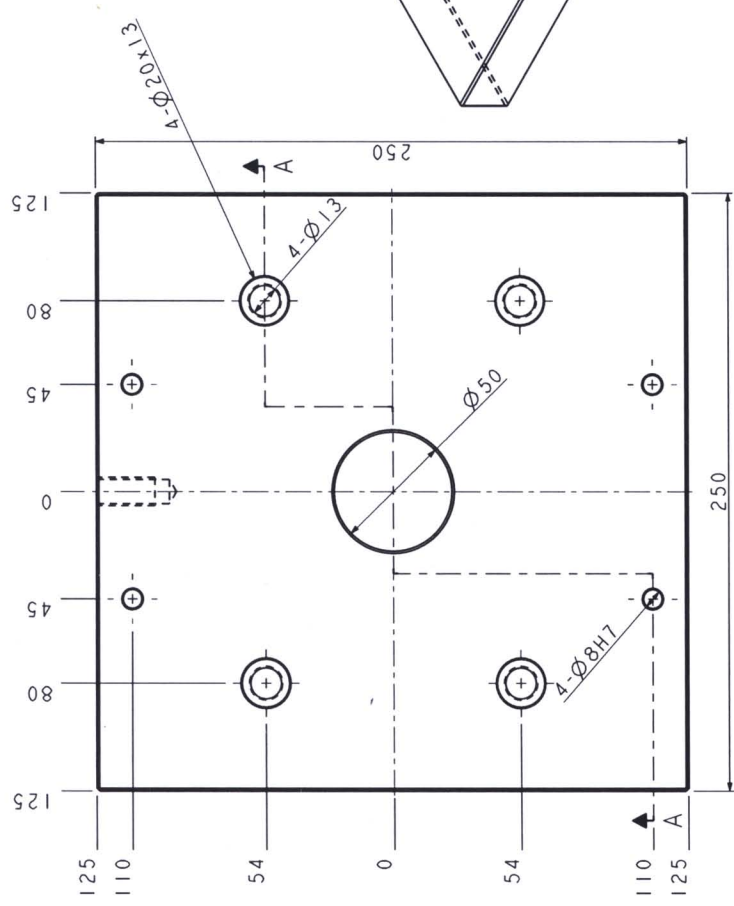
SECTION A - A
SCALE 0.750

PROJECT	SPIRAL-MOLD-TEST	DRAW NO.	GMD-003-05
PART NAME	EJECTOR-PL	DRAWN	C.SURAPONG
CLIENT	ENGINEERING DEPT.	CHECKED	K.PRASONG
SUPPLIER	GMD Manufacturing Co., Ltd	UNIT	MM
		APPROVED	K.PRASONG
		DATE	02-Jul-11

Ragamagala University of Technology Pranakhon

REVISION	REV-0	02-Jul-11	ORIGINAL
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MATERIAL	S50C
SIZE	250x250x25



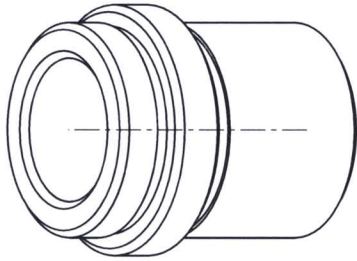
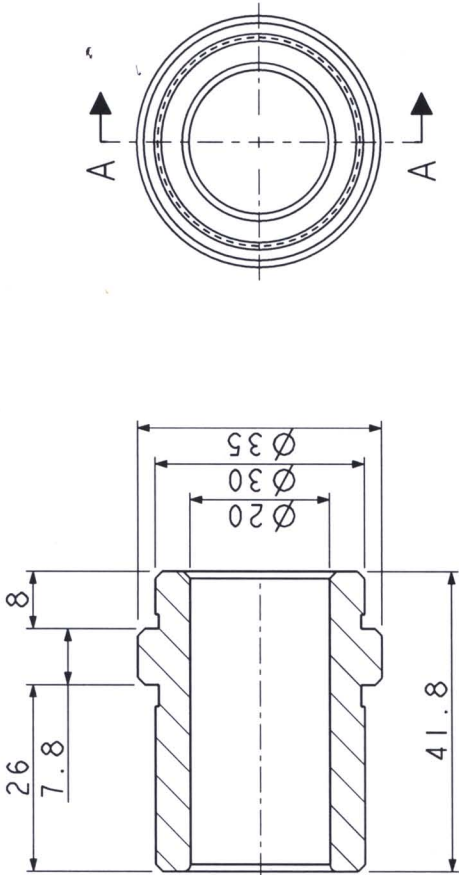
SECTION A - A
SCALE 0.500

PROJECT	SPIRAL-MOLD-TEST	DRAW NO.	GMD-003-05
PART NAME	BOTTOM-PL	DRAWN	CSURAPONG
CLIENT	ENGINEERING DEPT.	CHECKED	K.PRASONG
SUPPLIER	GMD Manufacturing Co., Ltd.	APPROVED	K.PRASONG
		DATE	02-Jul-11

Ragamagala University of Technology Pranakhon

MATERIAL	SUJ2
SIZE	BA-25x35/42
QTY	4 pcs.
HARDNESS	60 HRC

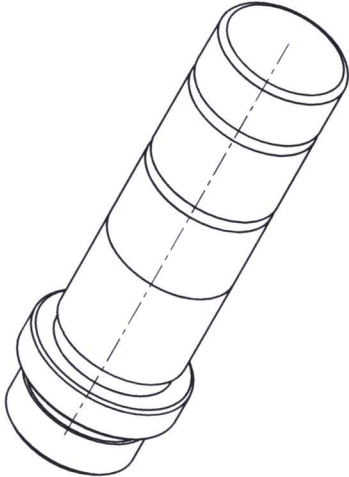
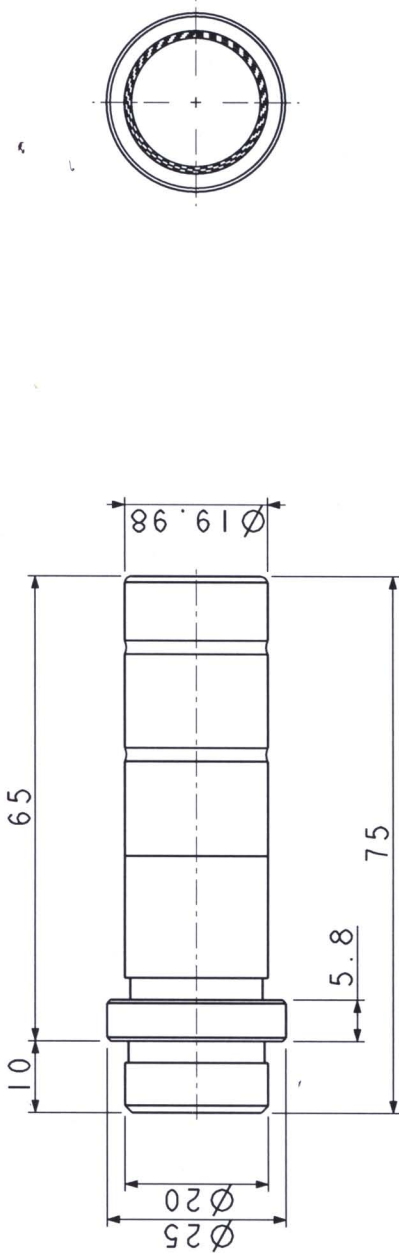
REVISION	02-Jul-11	ORIGINAL
REV-0		



SECTION A - A
SCALE 1.000

PROJECT	SPIRAL-MOLD-TEST			DRAW NO.	GMD-003-05
PART NAME	BUSH-A_20X35-42	TYPE	PART	DRAWN	C.SURAPONG
CLIENT	ENGINEERING DEPT.	SHEET	I 4 I 6	CHECKED	K.PRASONG
SUPPLIER	GMD Manufacturing Co., Ltd.	UNIT	MM.	APPROVED	K.PRASONG
 Ragamagala University of Technology Pranakhon				DATE	02-Jul-11

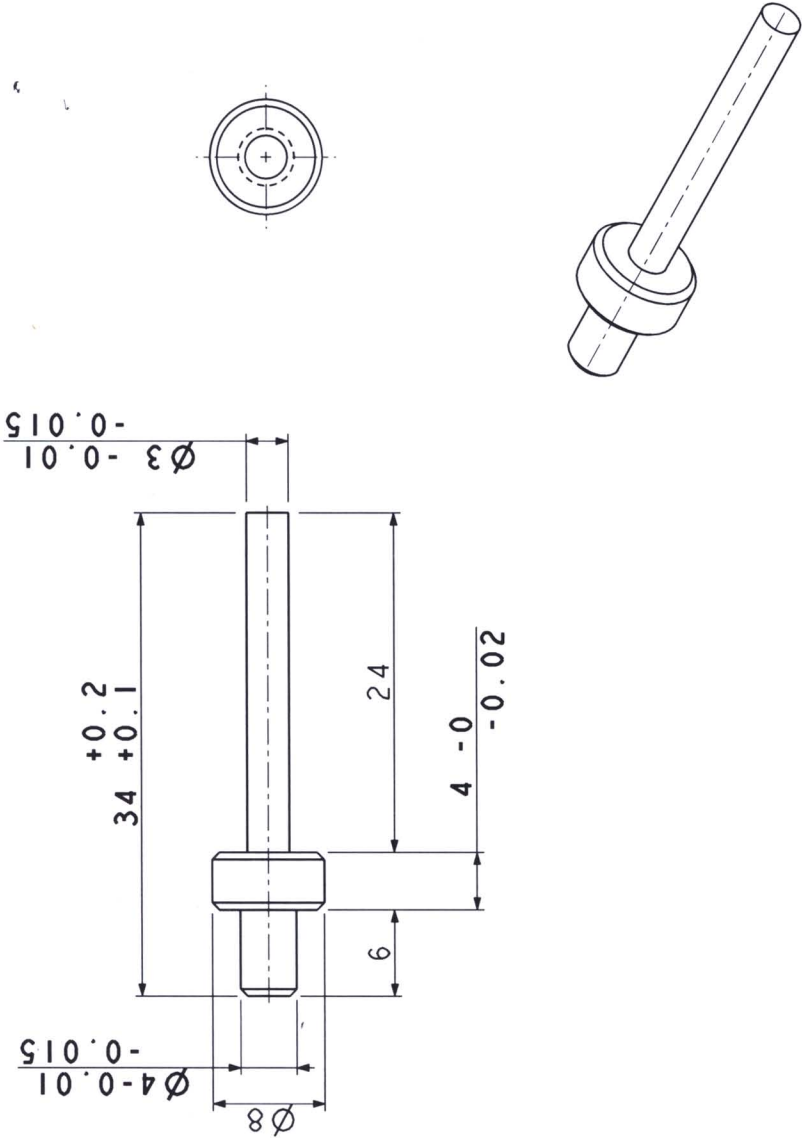
MATERIAL	SUJ2	REVISION	
SIZE	GPA-20x65/75	REV-0	02-Jul-11
QTY	4 pcs.		ORIGINAL
HARDNESS	60 HRC		



PROJECT	SPIRAL-MOLD-TEST	DRAW NO.	GMD-003-05
PART NAME	GUIDE-PIN-20X65-75	DRAWN	C.SURAPONG
CLIENT	ENGINEERING DEPT.	CHECKED	K.PRASONG
SUPPLIER	GMD Manufacturing Co.,Ltd.	APPROVED	K.PRASONG
		DATE	02-Jul-11
 Ragamagala Univesity of Technology Pranakhon			

MATERIAL	SKD61
SIZE	FX-4x34
QTY	25 pcs.
HARDNESS	40 HRC

REVISION		02-Jul-11	ORIGINAL
REV-0			



PROJECT	SPIRAL-MOLD-TEST			DRAW NO.	GMD-003-05
PART NAME	EJECTOR-PIN-3X34	TYPE	PART	DRAWN	C.SURAPONG
CLIENT	ENGINEERING DEPT.	SHEET	I6	CHECKED	K.PRASONG
SUPPLIER	GMD Manufacturing Co., Ltd.	UNIT	MM.	APPROVED	K.PRASONG
Ragamagala University of Technology Pranakhon				DATE	02-Jul-11

ภาคผนวก ค

ผลการทดลอง

HDPE Mat/t	0.5	1	1.5	2
1	52	117	243	303
2	50	118	247	303
3	51	118	244	303
4	53	118	243	302
5	54	118	250	301
6	53	117	248	300
7	53	116	245	300
8	53	117	237	300
9	53	119	243	299
10	53	118	240	303
11	53	117	241	301
12	53	117	247	299
13	53	117	246	298
14	50	114	240	303
15	53	115	241	300
16	50	115	238	302
17	54	118	241	300
18	51	118	238	301
19	50	117	239	300
20	54	117	239	302
21	52	117	239	301
22	53	115	237	298
23	53	118	240	303
24	54	117	241	300
25	54	116	238	303
26	50	117	239	302
27	50	116	237	298
28	53	117	241	298
29	52	115	243	300
30	53	115	238	299
31	52	116	246	301
32	51	117	239	298
33	54	115	238	299
34	52	116	236	301
35	50	118	239	300
36	52	117	243	298
37	52	117	236	300
38	52	118	237	301
39	52	117	236	302
40	53	118	237	298
41	50	117	237	301
42	52	117	237	298
43	52	115	240	297
44	53	116	240	298
45	51	115	236	298
46	53	115	236	303
47	53	116	237	301
48	54	116	232	298
49	54	116	234	297

HDPE Mat/t	0.5	1	1.5	2
50	54	117	235	302
51	53	119	236	303
52	53	117	239	297
53	53	116	233	298
54	51	118	235	298
55	53	117	240	297
56	53	118	235	302
57	52	117	235	297
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94	53	116	235	297
95	54	119	236	301
96	52	118	237	297
97	50	116	238	297
98	52	117	237	298

HDPE Mat/t	0.5	1	1.5	2
99	51	116	238	299
100	52	117	237	298

PP Mat/t	0.5	1	1.5	2
1	63	186	244	310
2	63	185	249	310
3	65	186	249	310
4	63	187	248	310
5	62	187	246	310
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31	65	187	247	310
32	67	185	250	310
33	66	187	250	310
34	64	184	250	310
35	63	183	257	310
36	62	183	257	310
37	61	186	245	310
38	63	186	245	310
39	63	187	246	310
40	62	184	241	310
41	63	185	243	310
42	65	187	244	310
43	62	185	243	310
44	62	183	246	310
45	65	183	245	310
46	65	187	248	310
47	65	186	247	310
48	67	186	243	310
49	62	187	248	310

PP Mat/t	0.5	1	1.5	2
50	62	185	242	310
51	63	185	244	310
52	64	186	248	310
53	64	185	242	310
54	63	182	248	310
55	66	182	245	310
56	66	187	248	310
57	64	183	246	310
58	66	187	248	310
59	67	185	242	310
60	63	183	245	310
61	63	184	248	310
62	64	187	247	310
63	62	184	242	310
64	62	187	247	310
65	67	187	243	310
66	65	185	243	310
67	62	185	248	310
68	62	187	242	310
69	67	187	243	310
70	62	185	244	310
71	68	184	242	310
72	63	182	246	310
73	63	184	243	310
74	63	186	243	310
75	62	185	244	310
76	63	183	243	310
77	62	186	246	310
78	64	186	242	310
79	63	187	249	310
80	64	184	244	310
81	67	182	244	310
82	64	187	246	310
83	62	185	244	310
84	63	184	243	310
85	62	182	243	310
86	64	184	242	310
87	64	187	242	310
88	65	187	242	310
89	65	185	246	310
90	64	187	243	310
91	63	182	243	310
92	63	184	245	310
93	66	183	246	310
94	64	184	243	310
95	65	183	247	310
96	68	183	244	310
97	64	183	246	310
98	67	184	243	310

PP Mat/t	0.5	1	1.5	2
99	63	185	245	310
100	65	186	243	310

ABS Mat/t	0.5	1	1.5	2
1	24	100	190	210
2	26	101	192	210
3	28	101	191	211
4	26	100	194	215
5	28	103	194	212
6	26	104	192	215
7	26	104	190	215
8	27	105	190	215
9	26	105	190	210
10	27	101	195	215
11	26	102	193	216
12	27	100	190	212
13	27	102	192	213
14	27	104	190	214
15	27	103	191	216
16	28	103	190	215
17	27	102	192	215
18	25	104	194	214
19	27	106	190	216
20	27	102	193	213
21	25	103	190	214
22	25	102	190	212
23	25	102	195	210
24	26	102	192	211
25	26	103	194	210
26	26	105	194	213
27	26	105	194	215
28	26	105	190	214
29	28	102	195	216
30	27	104	193	215
31	28	102	192	213
32	18	103	190	210
33	28	104	191	211
34	27	102	190	212
35	28	100	190	214
36	28	104	195	216
37	28	100	194	215
38	28	103	191	214
39	28	100	198	212
40	28	100	190	210
41	28	102	191	212
42	26	104	198	210
43	26	101	191	212
44	27	102	195	211
45	28	104	190	213
46	27	104	191	214
47	26	100	190	215
48	28	100	192	212

ABS Mat/t	0.5	1	1.5	2
49	27	102	193	213
50	28	102	194	214
51	26	104	196	215
52	26	102	192	216
53	28	100	192	214
54	26	103	195	215
55	27	102	191	213
56	28	104	194	215
57	26	104	195	216
58	25	104	196	218
59	26	102	190	213
60	26	105	193	210
61	26	100	195	212
62	26	101	195	214
63	25	100	195	211
64	25	102	190	213
65	26	100	196	216
66	26	101	197	214
67	28	101	198	213
68	27	102	190	215
69	27	102	192	210
70	25	103	198	211
71	25	104	197	213
72	26	102	190	214
73	27	104	190	216
74	27	102	195	210
75	26	102	190	212
76	25	101	193	212
77	28	101	197	211
78	27	102	198	213
79	26	101	198	210
80	26	104	194	210
81	25	102	190	212
82	28	100	192	213
83	27	104	198	214
84	25	100	197	215
85	26	104	190	210
86	25	103	190	213
87	25	105	196	214
88	26	104	195	215
89	27	102	198	216
90	26	102	197	214
91	25	101	196	213
92	26	104	198	212
93	26	102	197	210
94	25	104	196	212
95	26	102	198	210
96	28	101	195	211
97	25	102	196	215

ABS Mat/t	0.5	1	1.5	2
98	26	102	197	214
99	26	102	198	210
100	27	101	198	212



