chapter sixteen

Projects

16-1 Introduction

This chapter presents two large projects: a milling vise and a tenon jig. The projects are intended to serve as group projects or as large individual projects.

16-2 Project 1: Milling Vise

Figure 16-1 shows a milling vise. The subassemblies, detailed drawings, and BOMs are included.

Complete this project or as it is assigned by your instructor.

Creating the Milling Vise

See Figure 16-1.

1. Create an assembly drawing.
2. Create a BOM, including item numbers, part numbers, descriptions, and quantities.

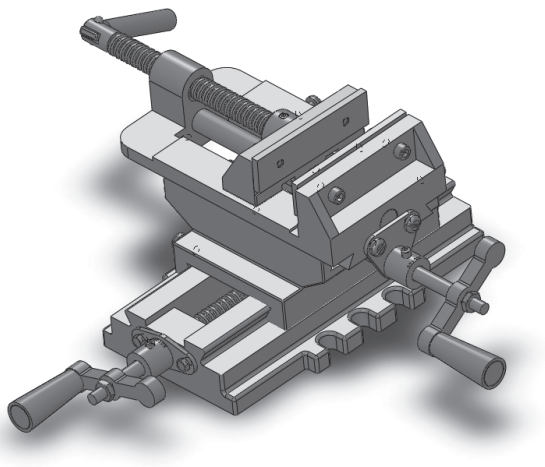


Figure 16-1
Milling Vise

Creating the Base Subassembly

See Figure 16-2.

1. Create an assembly drawing.
2. Create a BOM.
3. Create dimensioned drawings of each part used in the subassembly.

Figure 16-2a

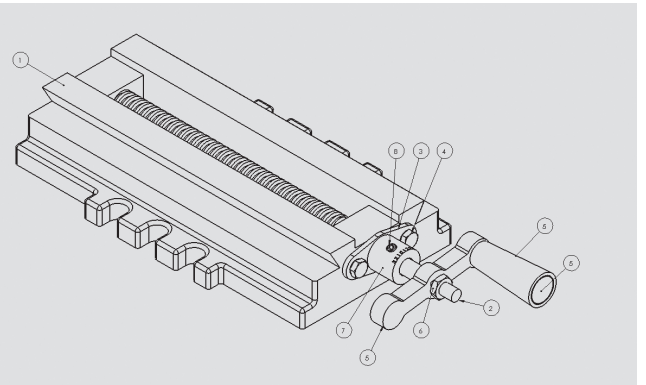


Figure 16-2b

ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	BU2012-B	BASE	1
2	P100-20A	ACME, BASE	1
3	BU-313	PLATE, COVER, BASE	1
4	M6 × 1.0 ×16	SCREW, SLOTTED CAP	2
5	PN311-1A	HANDLE, SUBASSEMBLY	1
6	M8 ×1.25	NUT, HEX	1
7	ENG-2	COLLAR	1
8	M6 × 1.0 ×10	SET SCREW-CONE	1

Dimensioned and toleranced drawings of the parts that make up the base subassembly are as follows.

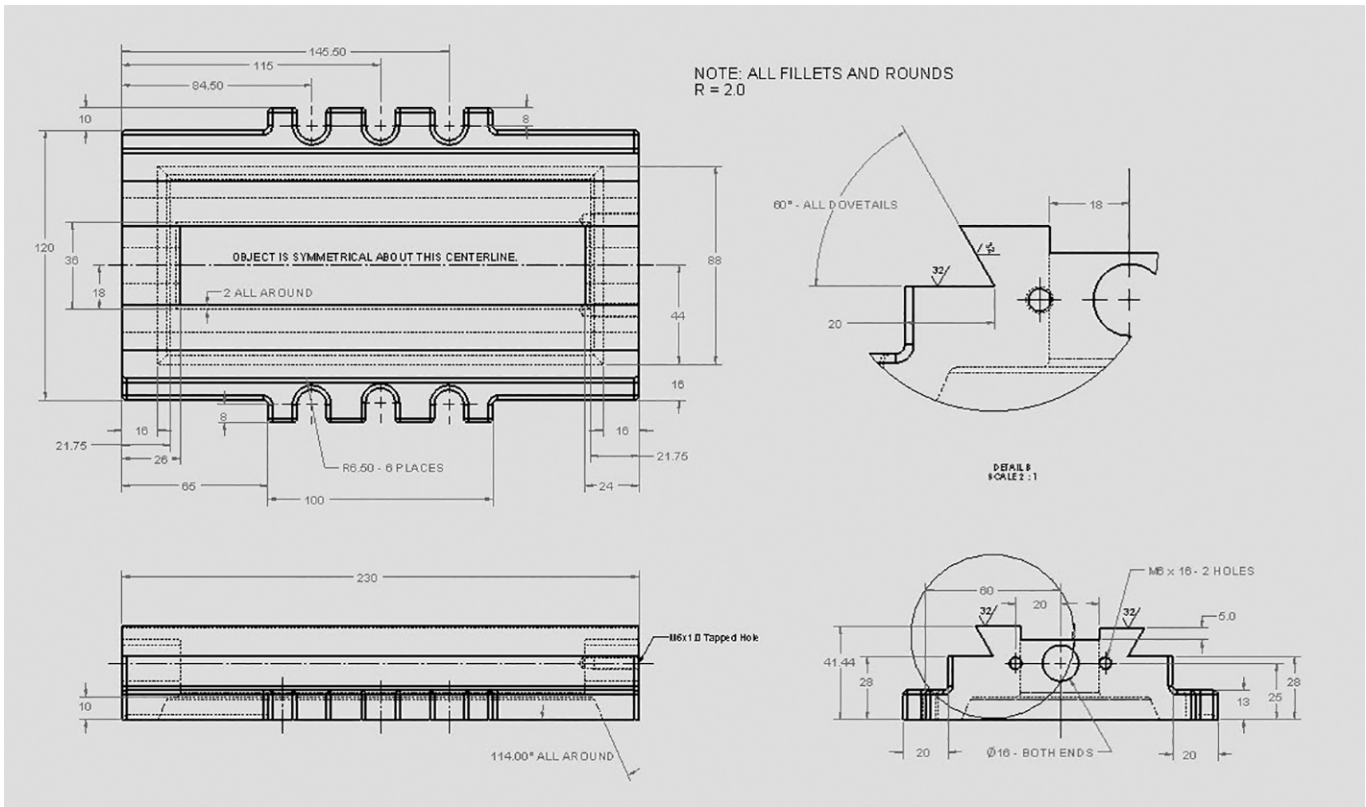


Figure 16-3

Figure 16-4

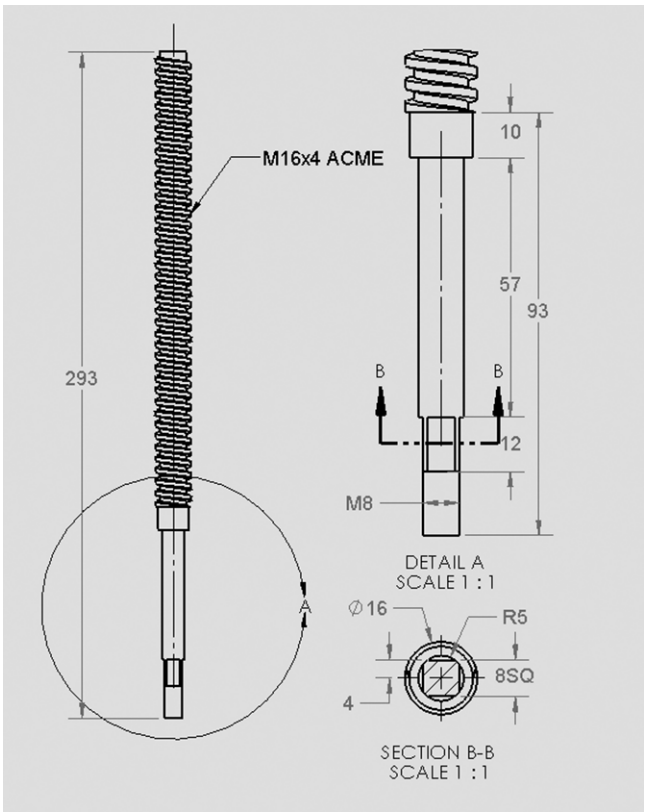


Figure 16-5

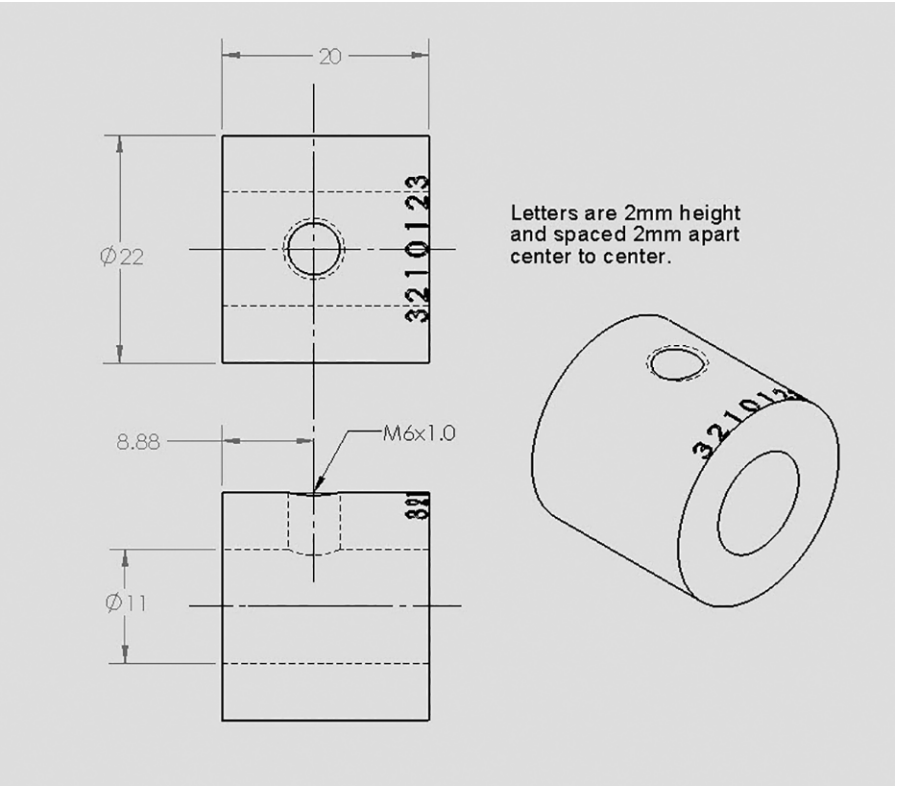


Figure 16-6

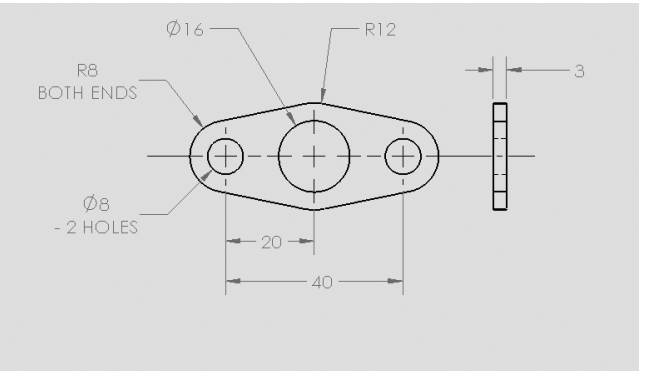
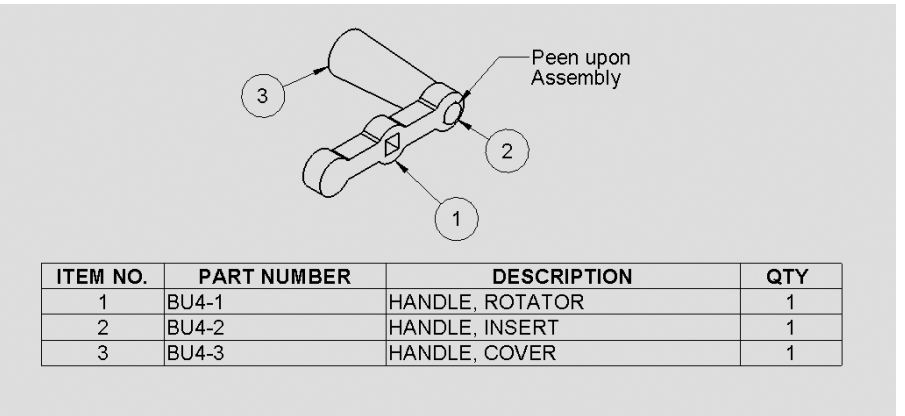


Figure 16-7



ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	BU4-1	HANDLE, ROTATOR	1
2	BU4-2	HANDLE, INSERT	1
3	BU4-3	HANDLE, COVER	1

Figure 16-8

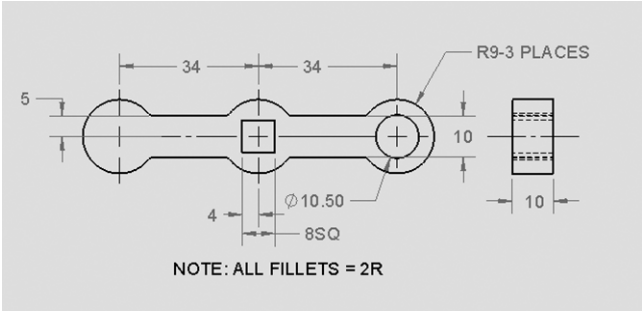


Figure 16-9

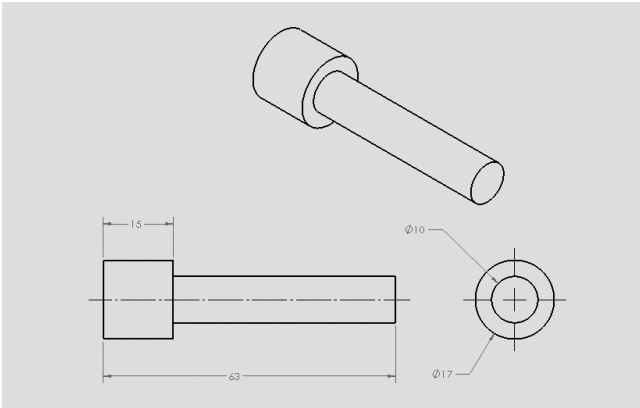
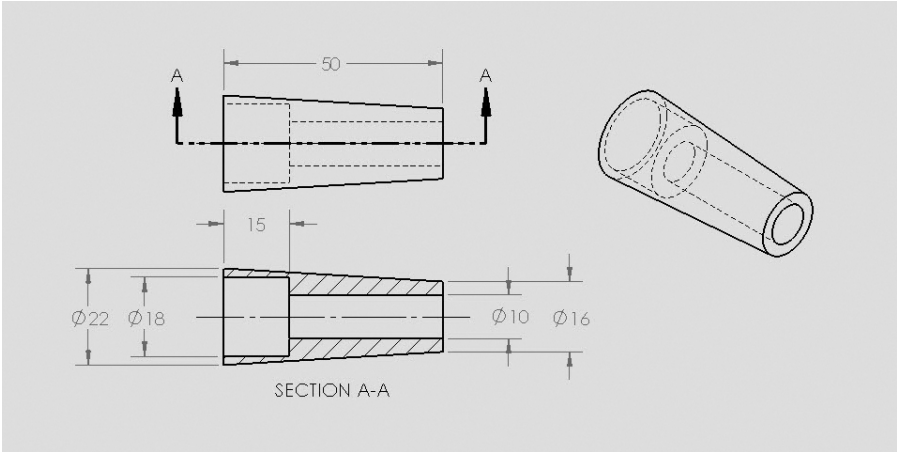


Figure 16-10



NOTE

Standard parts do not need drawings but require manufacturer part numbers listed in the BOM.

Creating the Middle Subassembly

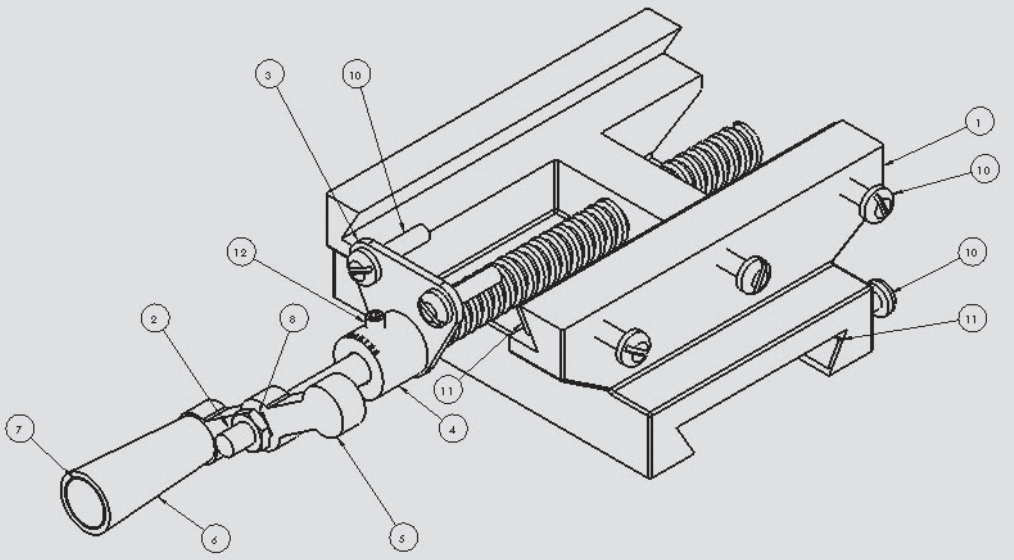
See Figure 6-11.

1. Create an assembly drawing.
2. Create a BOM.
3. Create dimensioned drawings of each part used in the subassembly.

NOTE

Standard parts do not need drawings but require manufacturer part numbers listed in the BOM.

Middle Subassembly



See the alternative view of the Middle Subassembly for a view of Part 7 – Post, Middle

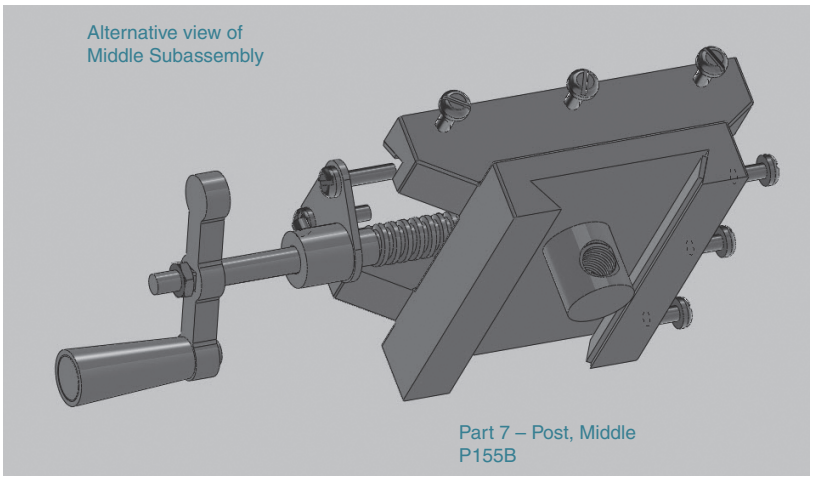
Figure 16-11a

Middle Subassembly BOM

ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	S51-2A	SUPPORT, MIDDLE	1
2	P200-24	POST, ACME, MIDDLE	1
3	WIT-130	PLATE, END	1
4	ENG-2	COLLAR	1
5	PN311-1A	HANDLE, SUBASSEMBLY	1
6	M8 X 1.25	NUT, HEX	1
7	P155B	POST, MIDDLE	1
8	M6 x 1.0 x 25	SCREW, PAN	8
9	SP-33	BAR, SPACER	2
10	M6 x 1.0 x 16	SET SCREW, SOCKET	1

Figure 16-11b

Figure 16-11c



Dimensioned and toleranced drawings of the parts that make up the base subassembly are as follows:

Figure 16-12 shows the middle subassembly.

Note that Figure 16-12 shows a dimensioned drawing of the support, middle but does not include any fillets. Fillets were omitted for clarity. The lower image in Figure 16-12 shows a 3D model of the support, middle that shows the fillets. Use the fillets shown in the 3D model as a guide to applying fillets.

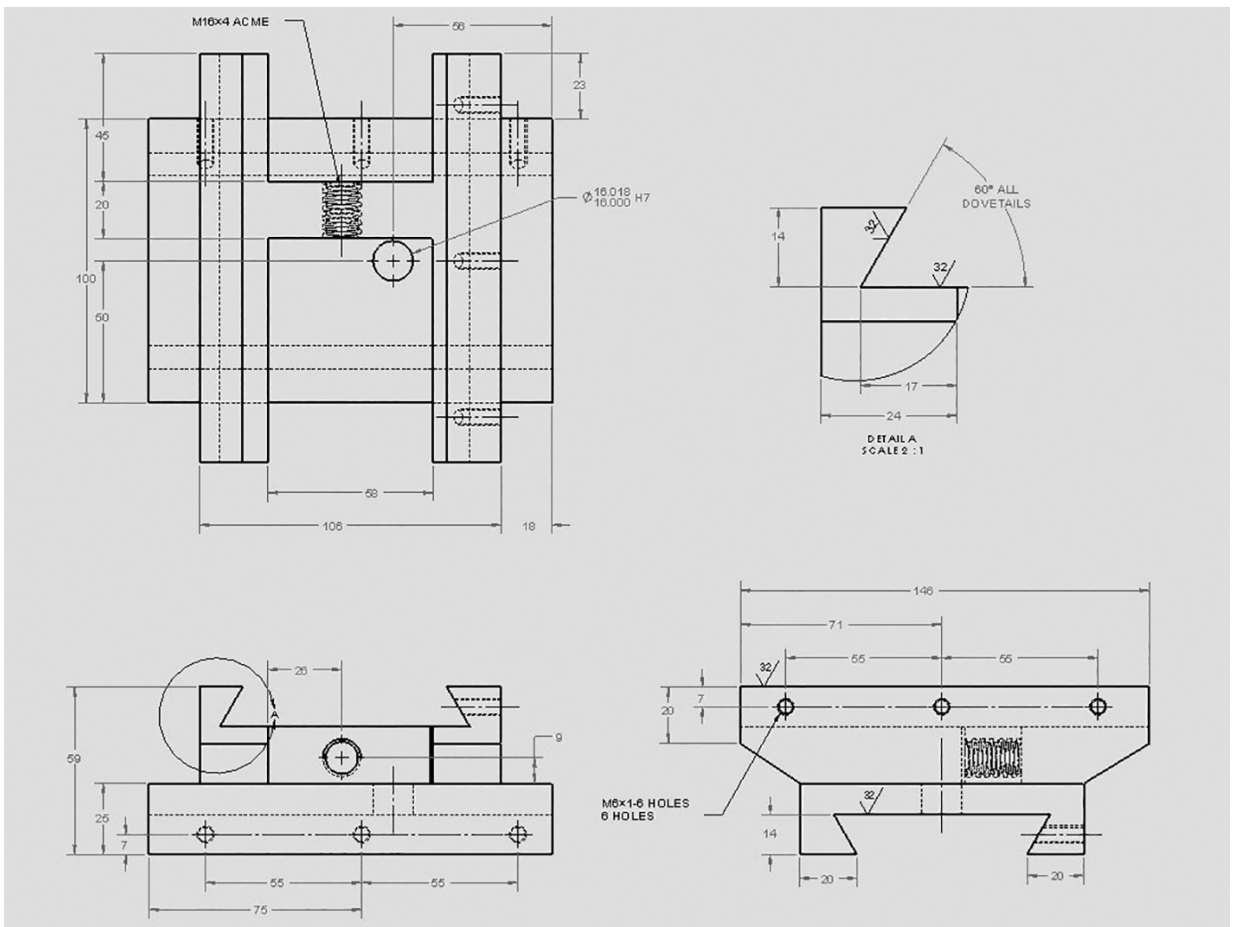


Figure 16-12a

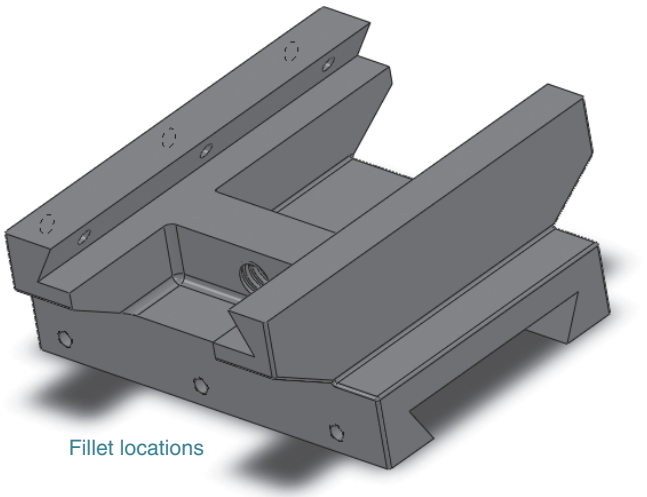


Figure 16-12b

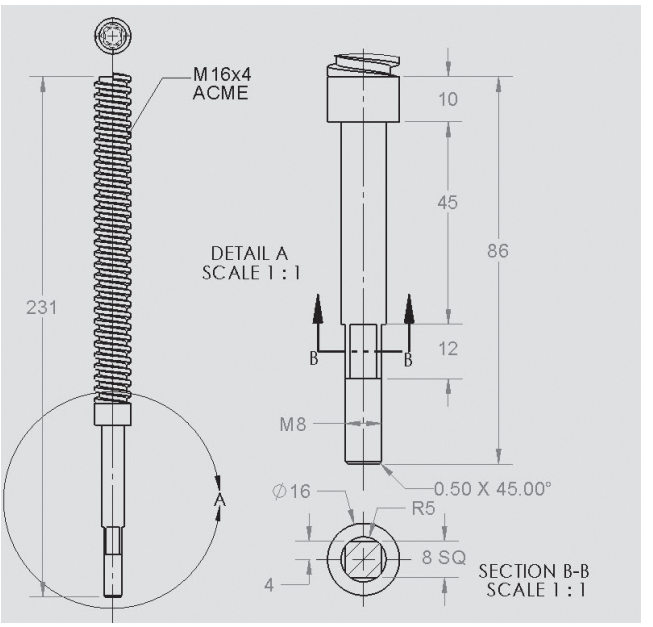


Figure 16-13

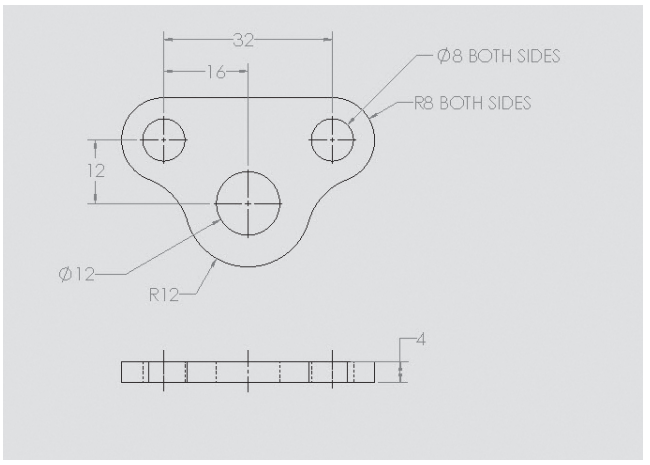


Figure 16-14

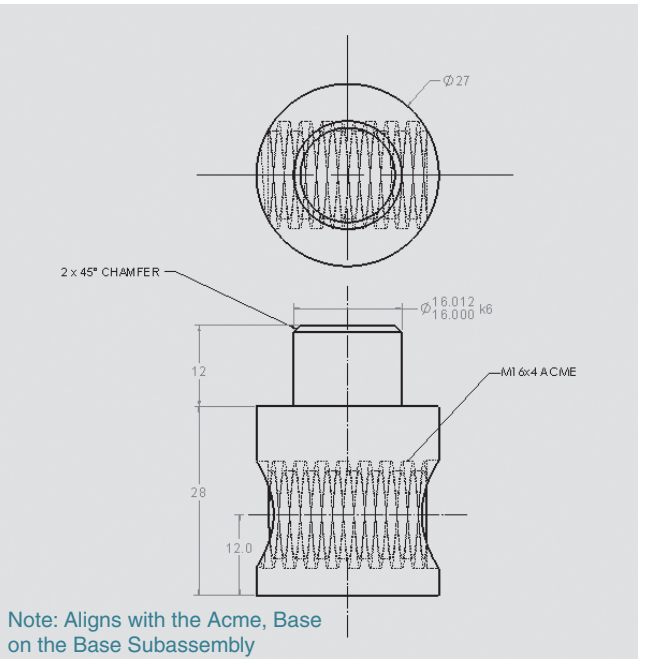


Figure 16-15

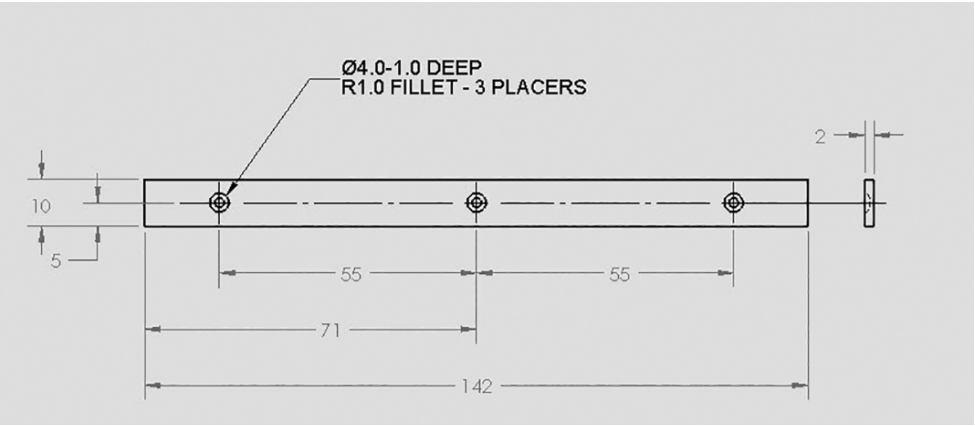
Creating the Top Subassembly

1. Create an assembly drawing.
2. Create a BOM.
3. Create dimensioned drawings of each part that is used in the subassembly.

NOTE

Standard parts do not need drawings but require manufacturer part numbers listed in the BOM.

Figure 16-16



Dimensioned and toleranced drawings of the parts that make up the base subassembly are as follows:

Figure 16-17, top subassembly, shows an isometric view with a table denoting part details.

Figure 16-17a

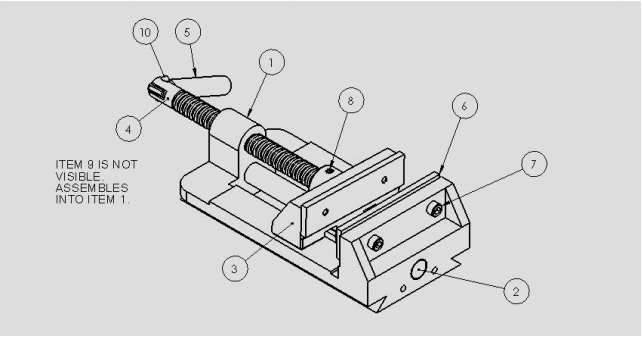


Figure 16-17b

ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	S50-1	SUPPORT, TOP	1
2	P200-16	POST, GUIDE	1
3	MJ100-2A	JAW, MOVABLE	1
4	M16x4	POST, ACME, TOP	1
5	M407-A	HANDLE, TOP	1
6	PT100	PLATE, JAW	2
7	Ø3.5 × 16	3.5 × 16 RIVET	1
8	M6 × 1.0 ×8	FILLISTER HEAD SCREW	4
9	M6 × 1.0 ×8	SET SCREW - DOG	1
10	M6 × 1.0 × 6	SET SCREW - CUP	1

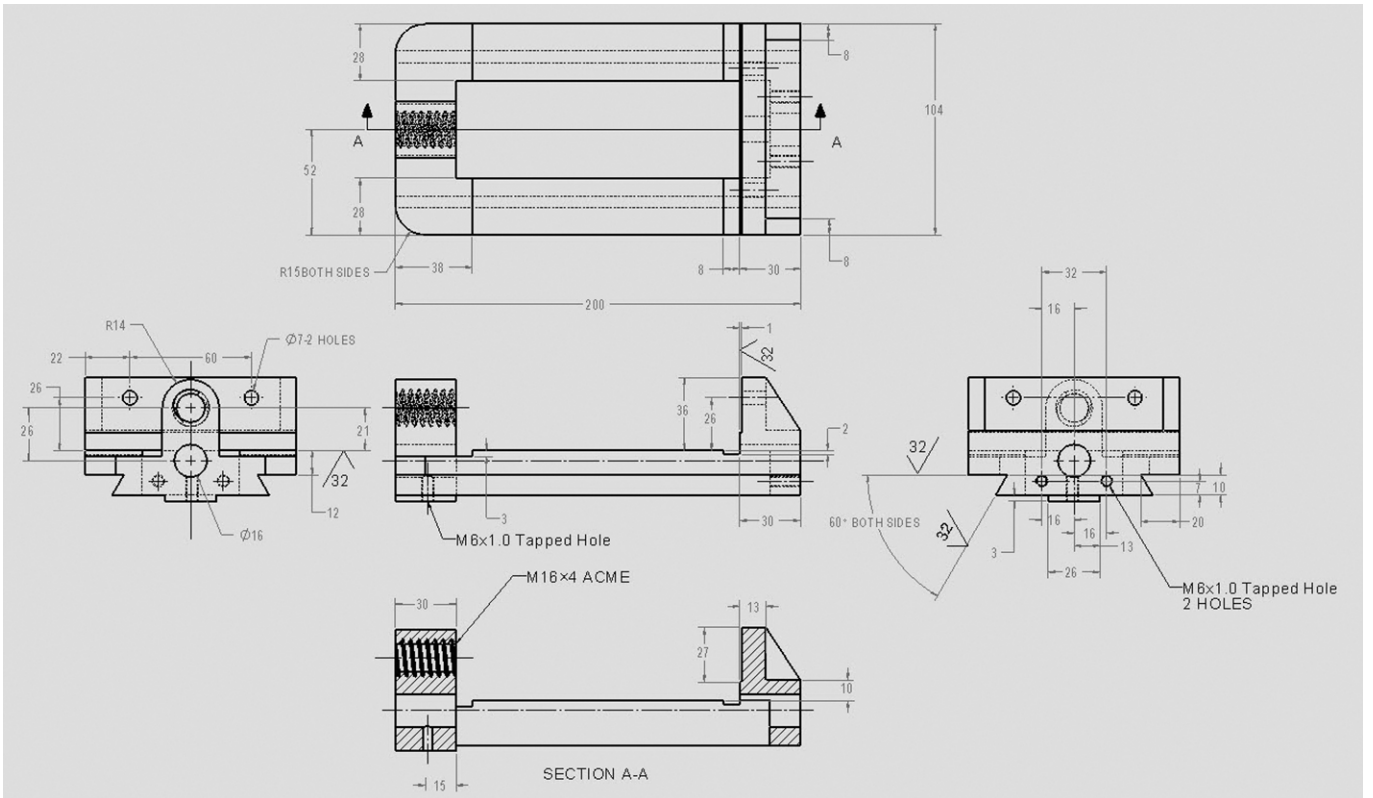


Figure 16-18

Figure 16-19

Post, Acme, Top

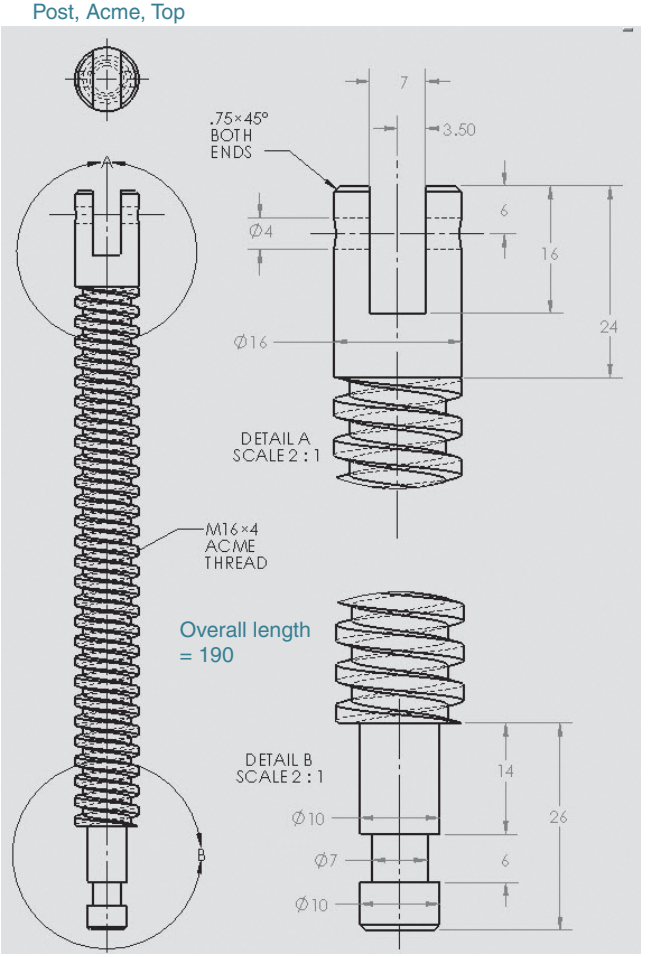


Figure 16-20

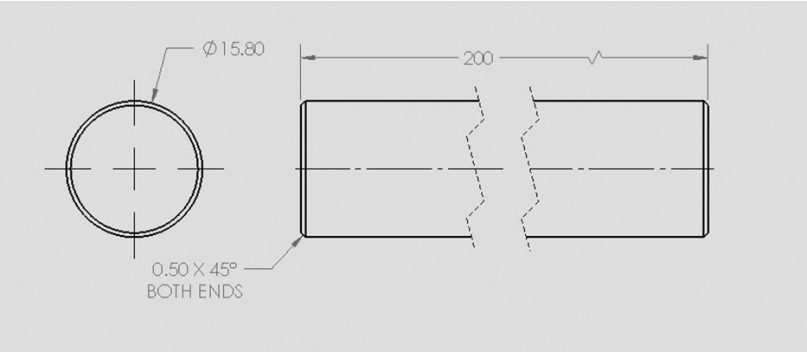


Figure 16-21 shows the part jaw, movable.

Note that Figure 16-21 shows a dimensioned drawing of the jaw, movable but does not include any fillets. Fillets are omitted for clarity. The lower image in Figure 16-21 shows a 3D model of the jaw, movable that shows the fillets. Use the fillets shown in the 3D image as a guide to applying fillets.

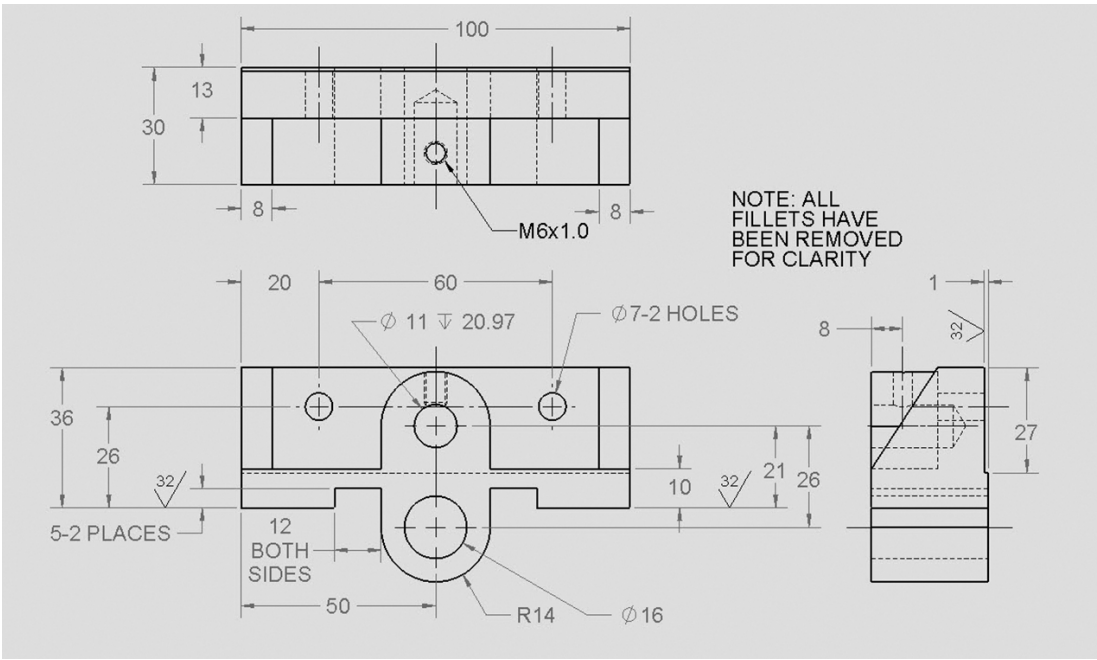


Figure 16-21

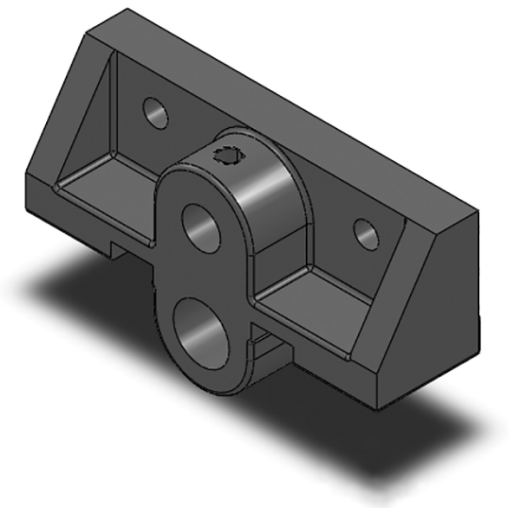


Figure 16-22

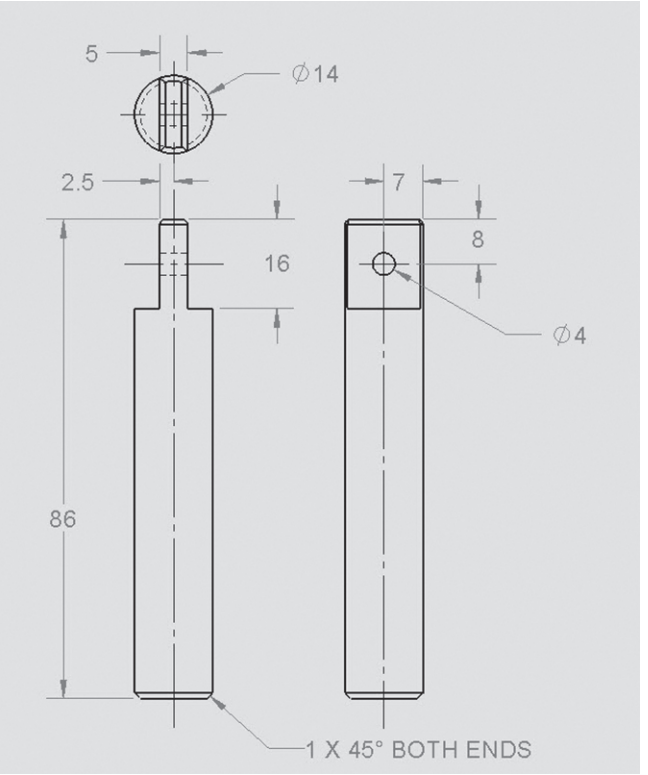
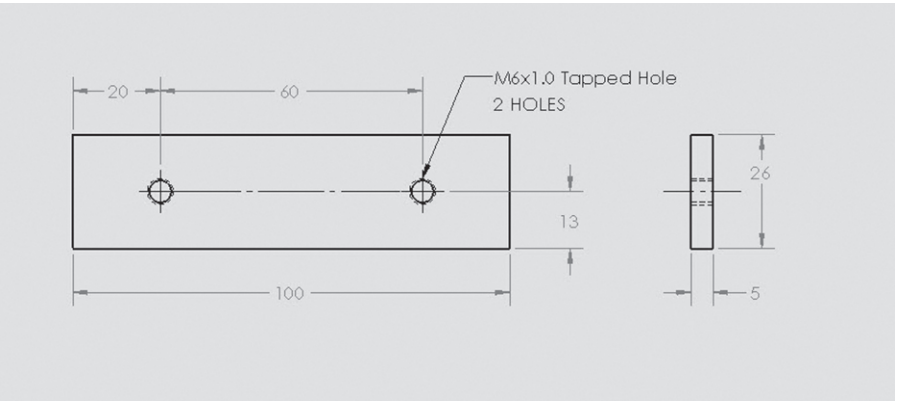


Figure 16-23



16-3 Project 2: Tenon Jig

This tenon jig has four main subassemblies: clamping, vertical, base plate, and guide plate. There are other parts that are used in the final assembly. This project is intended to be a group project but could be done by one person. Complete the following assignments:

Drawing the Clamping Subassembly

1. Create a BOM for the clamping subassembly.
2. Complete drawings for each part.
3. Create dimensioned drawings of each part.

4. Create an exploded assembly drawing with balloons referencing each part to the BOM.

Drawing the Vertical Subassembly

1. Create a BOM for the vertical subassembly.
2. Complete drawings for each part.
3. Create dimensioned drawings of each part.
4. Create an exploded assembly drawing with balloons referencing each part to the BOM.

Drawing the Base Plate Subassembly

1. Create a BOM for the base plate subassembly.
2. Complete drawings for each part.
3. Create dimensioned drawings of each part.
4. Create an exploded assembly drawing with balloons referencing each part to the BOM.

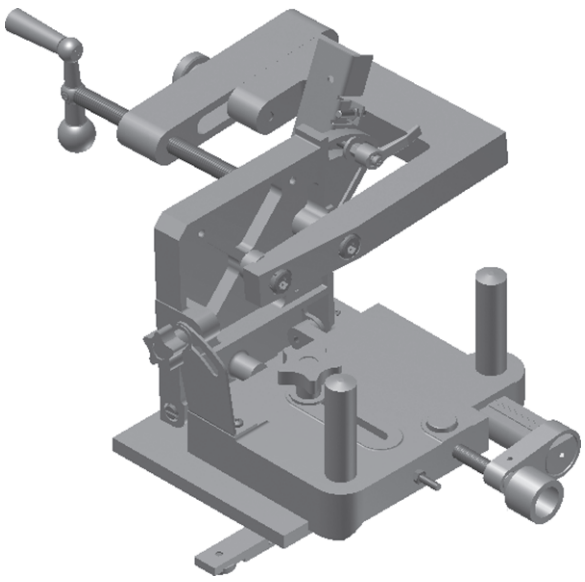
Drawing the Guide Plate Subassembly

1. Create a BOM for the guide plate subassembly.
2. Complete drawings for each part.
3. Create dimensioned drawings of each part.
4. Create an exploded assembly drawing with balloons referencing each part to the BOM.

Creating an Assembly Drawing of the Tenon Jig

1. Create a BOM for the tenon jig.

Figure 16-24a



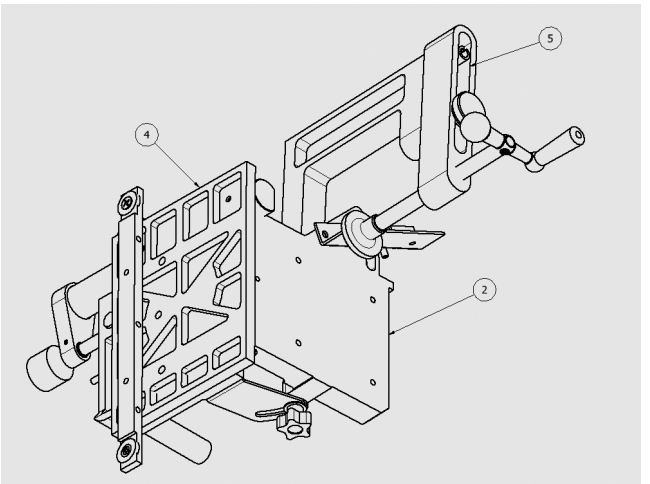


Figure 16-24b

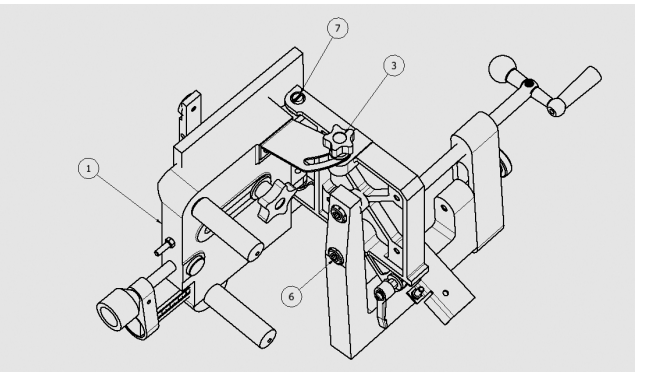


Figure 16-24c

PARTS LIST				
ITEM	PART NUMBER	DESCRIPTION	MATERIAL	QTY
1	SA-1	BASE SUB-ASSEMBLY		1
2	SA-2	VERTICAL SUB-ASSEMBLY		1
3	SA-3	ADJUSTER SUB-ASSEMBLY		1
4	SA-4	GUIDE SUB-ASSEMBLY		1
5	SA-5	CLAMP SUB-ASSEMBLY		1
6	M10x1.5 x 25	DRILLED FORGED HEXAGON SOCKET HEAD CAP SCREW	MILD STEEL	2
7	SA-6B	SLOTTED HEAD MACHINE SCREW	MILD STEEL	2

Figure 16-24d

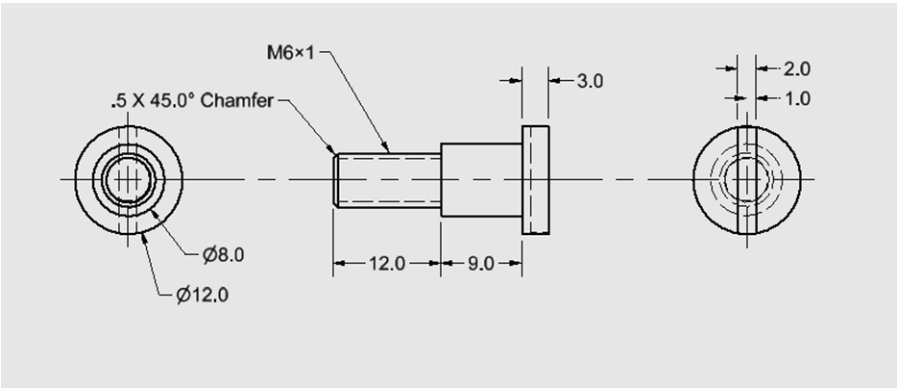


Figure 16-24e

Figure 16-25a

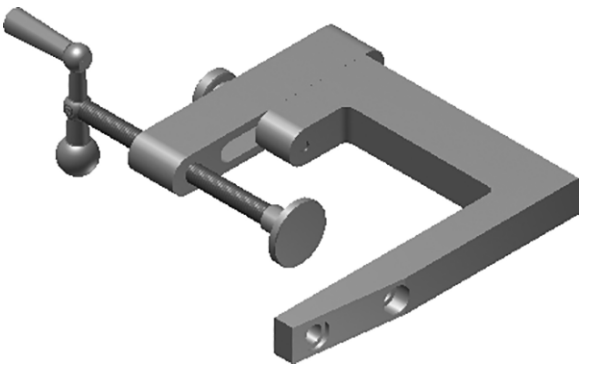


Figure 16-25b

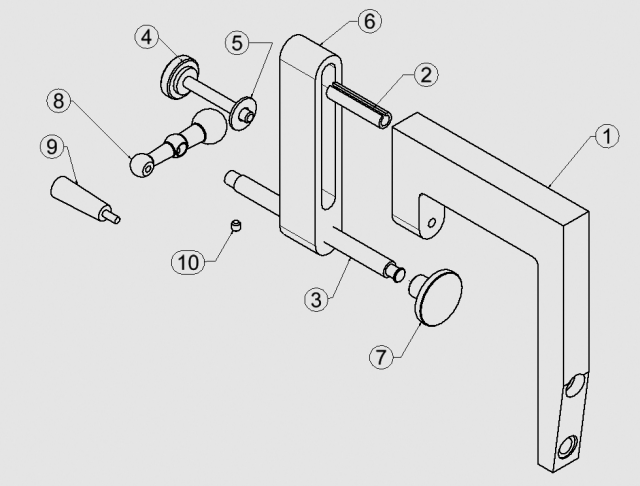


Figure 16-25c

PARTS LIST				
ITEM NO.	PART NUMBER	DESCRIPTION	MAT'L	QTY
1	BU-121	C-BRACKET	CASTING	1
2	BU-122	PIN	STEEL	1
3	BU-123	POST, THREADED	STEEL	1
4	BU-124	SCREW, THUMB	STEEL	1
5	10×24×2	PLAIN WASHER	STEEL	1
6	BU-125	SLIDER	CASTING	1
7	BU-126	HOLDER	STEEL	1
8	BU-127	PIVOT, HANDLE	CASTING	1
9	BU-128	POST, HANDLE	STEEL	1
10	M6×6	SET SCREW, SOCKET HEAD, FLAT POINT	STEEL	1

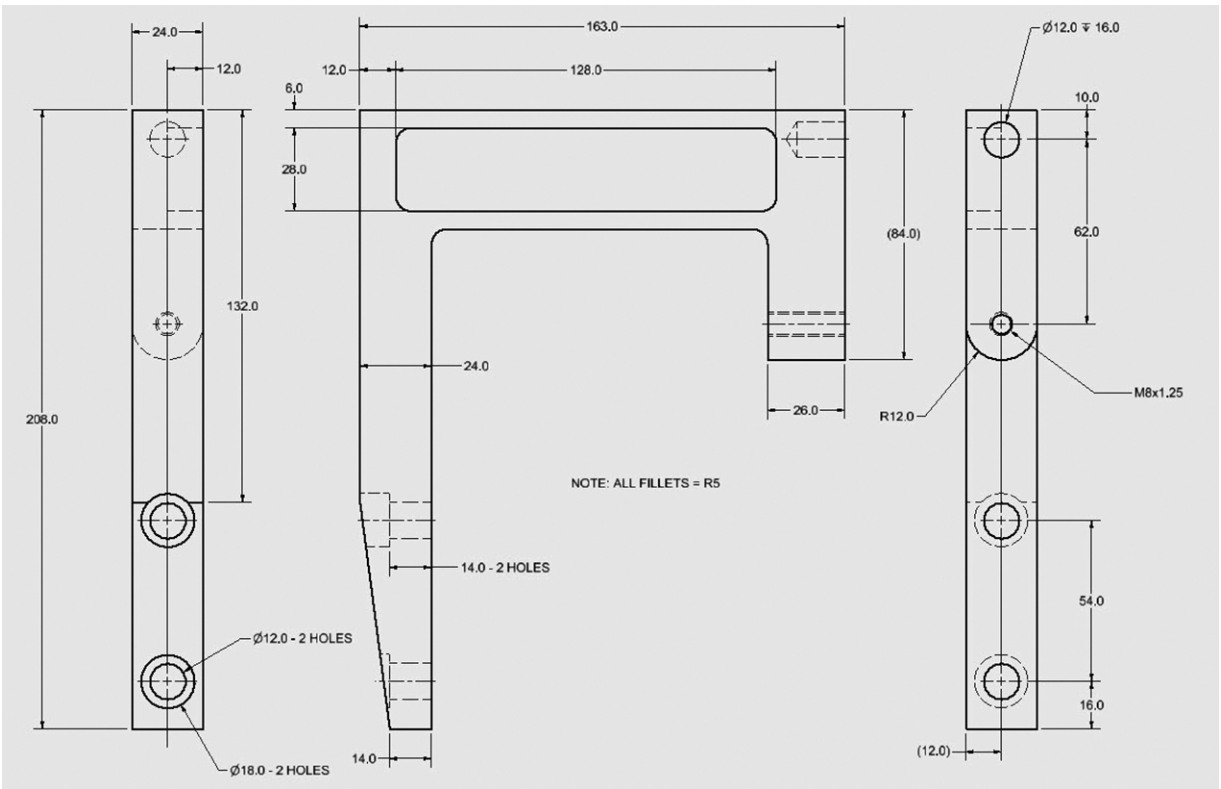
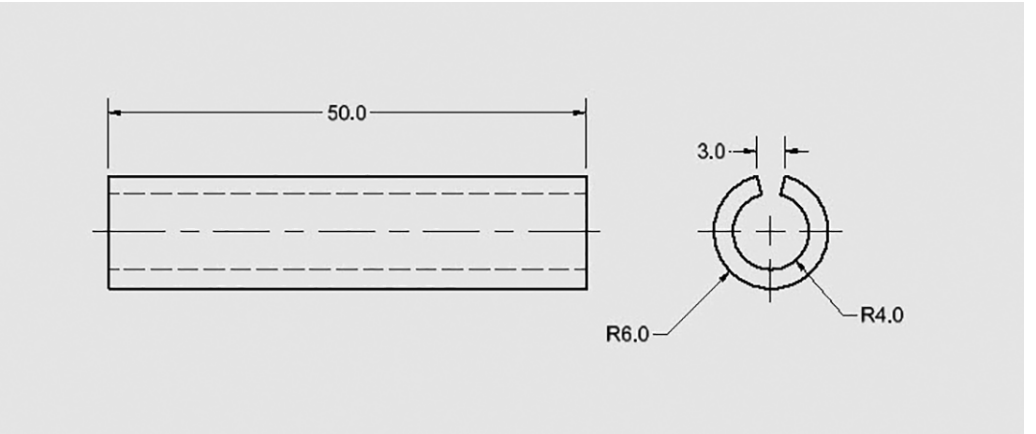


Figure 16-26

Figure 16-27



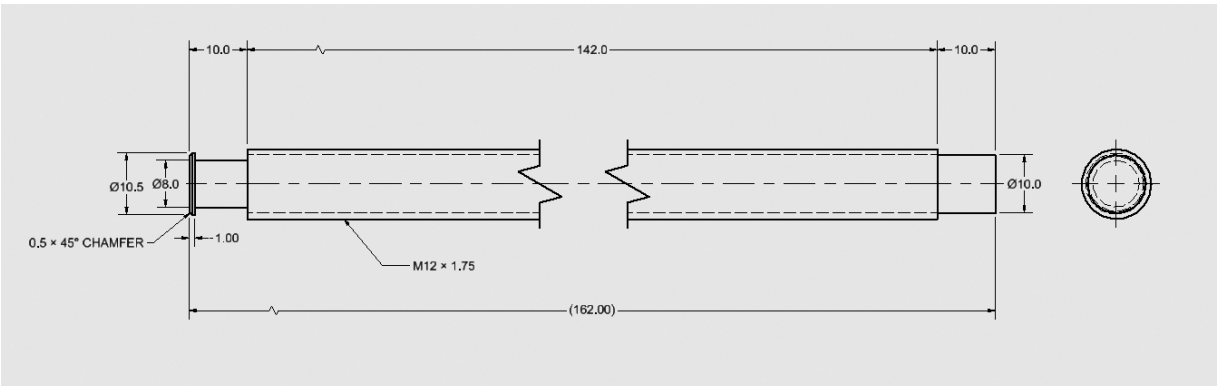
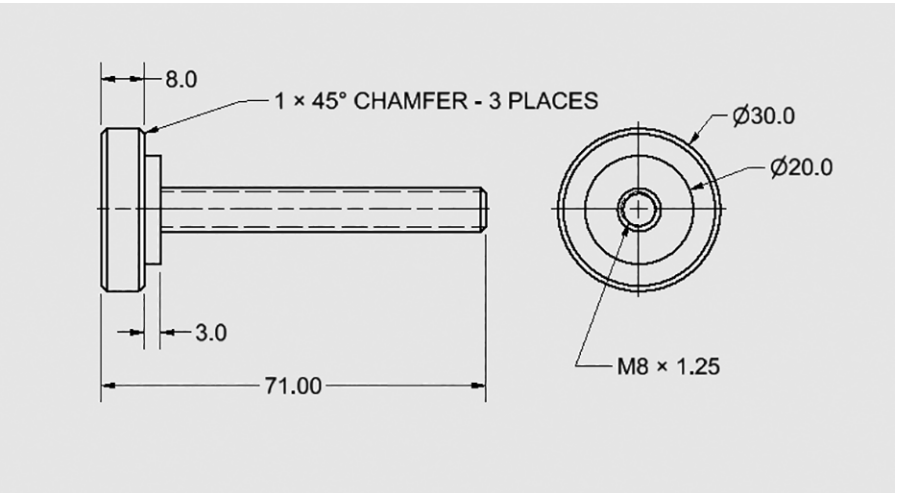


Figure 16-28

Figure 16-29



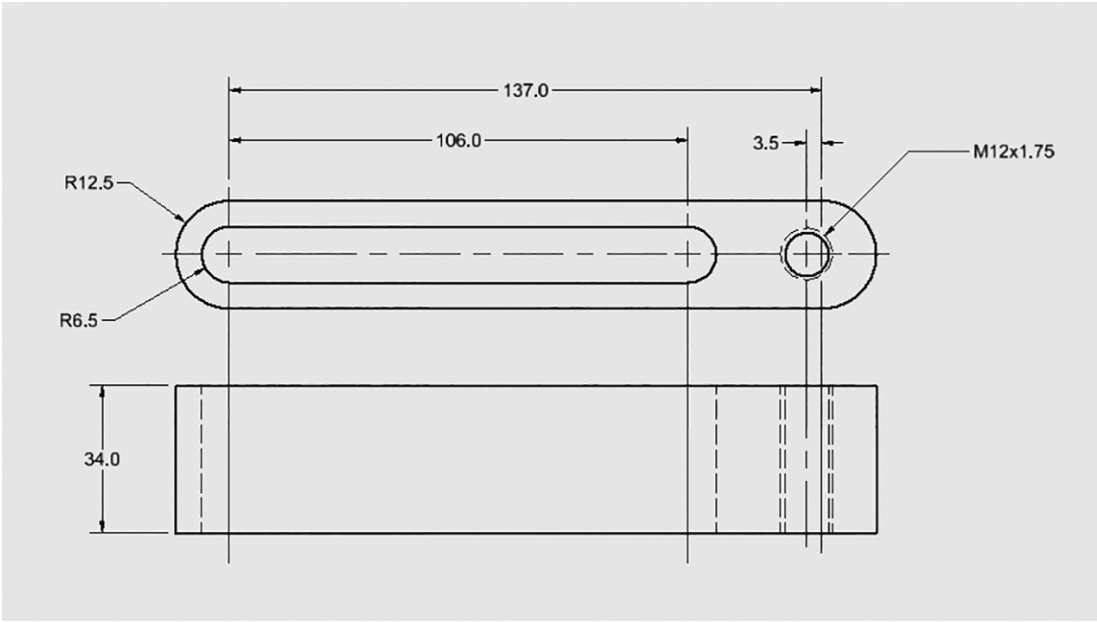


Figure 16-30

Figure 16-31

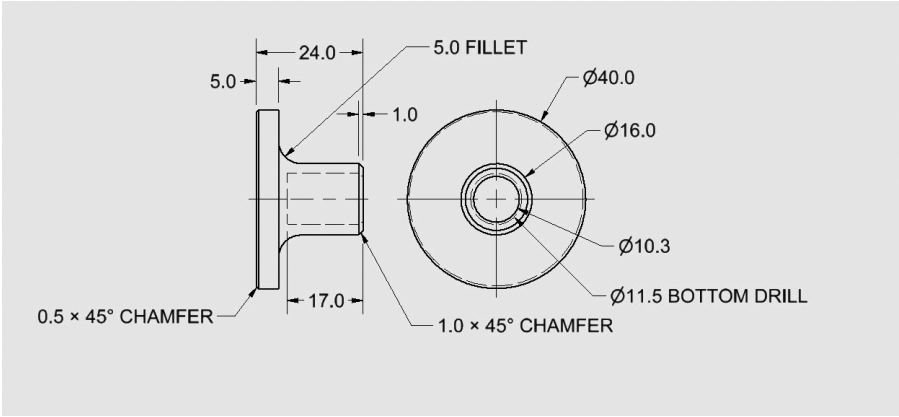
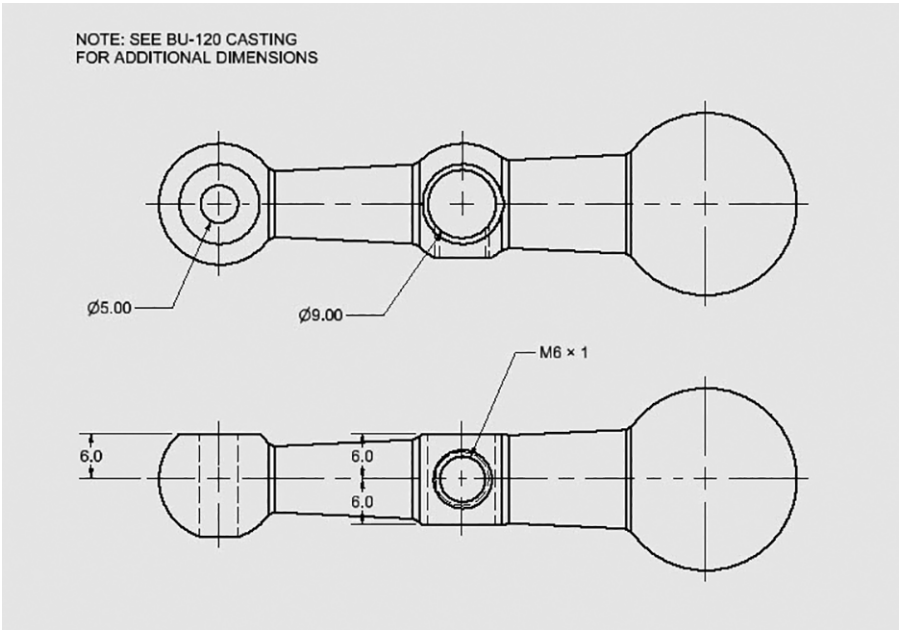


Figure 16-32a



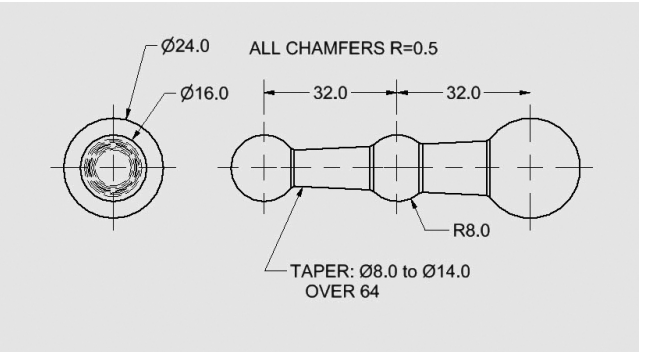


Figure 16-32b

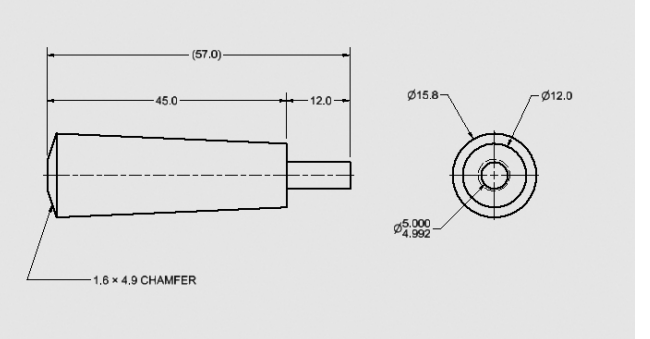


Figure 16-33

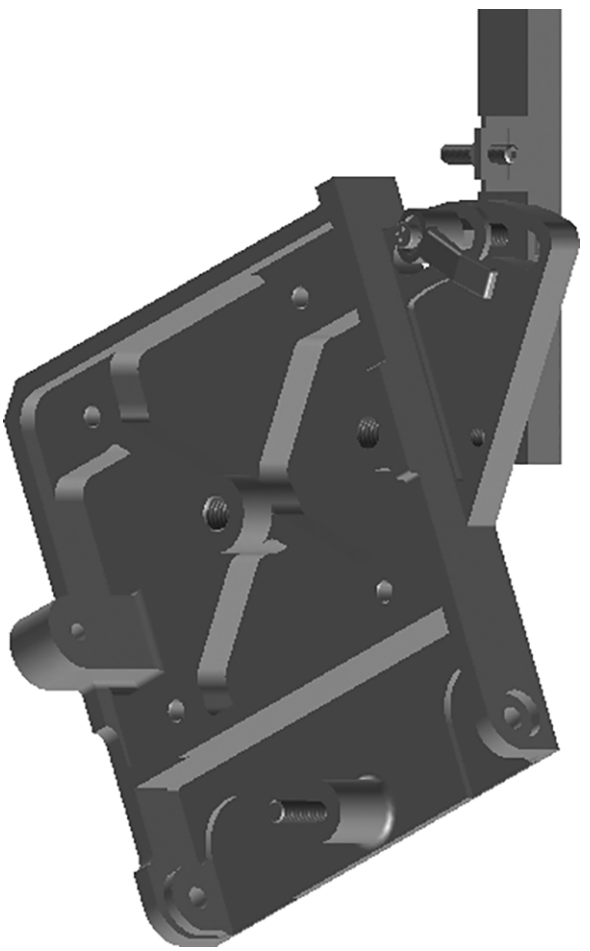


Figure 16-34a

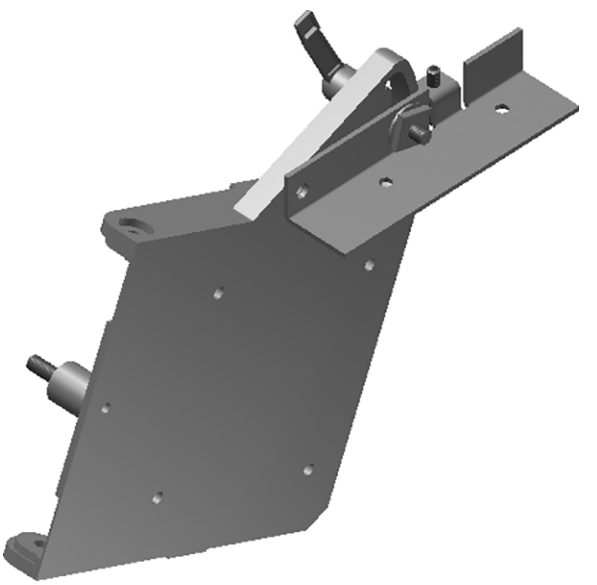
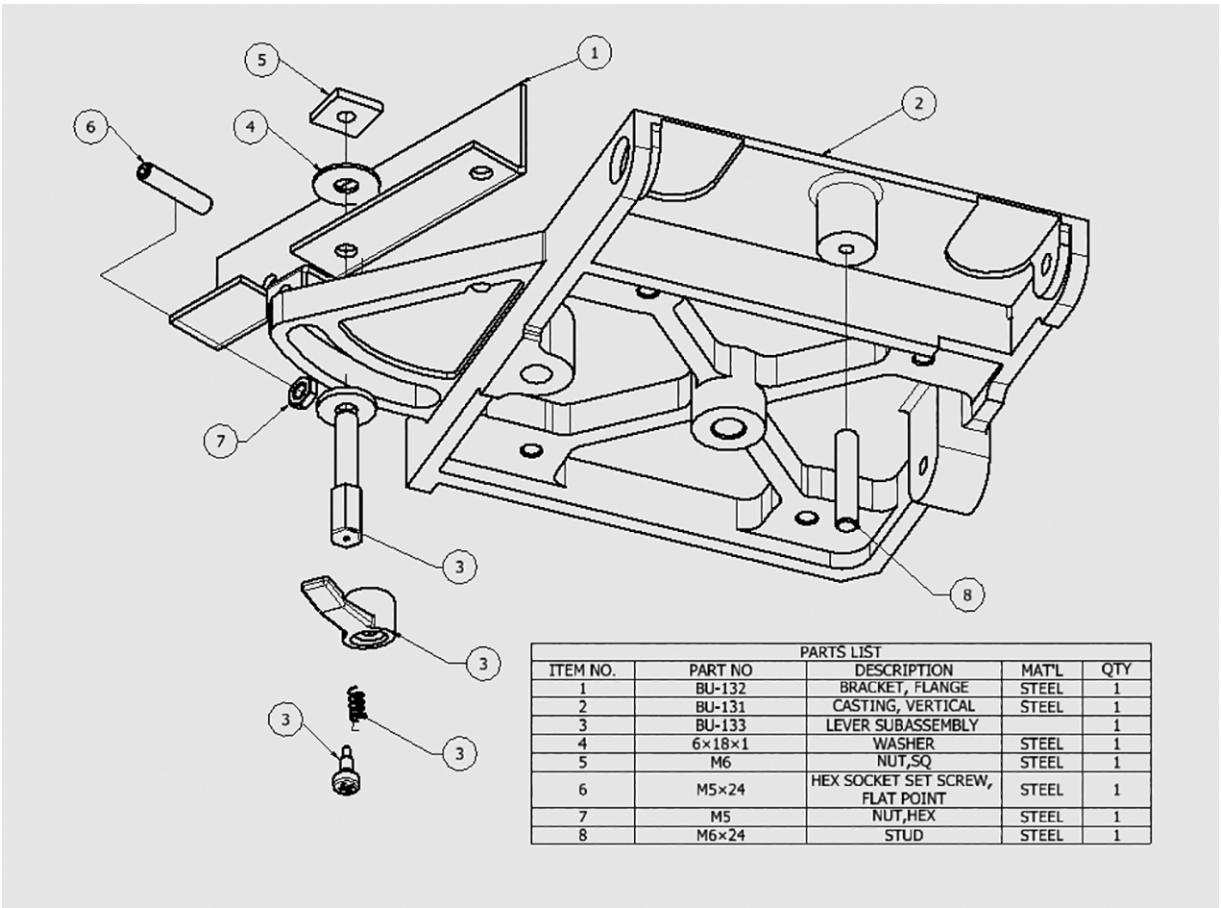


Figure 16-34b



PARTS LIST

ITEM NO.	PART NO	DESCRIPTION	MAT'L	QTY
1	BU-132	BRACKET, FLANGE	STEEL	1
2	BU-131	CASTING, VERTICAL	STEEL	1
3	BU-133	LEVER SUBASSEMBLY		1
4	6×18×1	WASHER	STEEL	1
5	M6	NUT,SQ	STEEL	1
6	M5×24	HEX SOCKET SET SCREW, FLAT POINT	STEEL	1
7	M5	NUT,HEX	STEEL	1
8	M6×24	STUD	STEEL	1

Figure 16-35

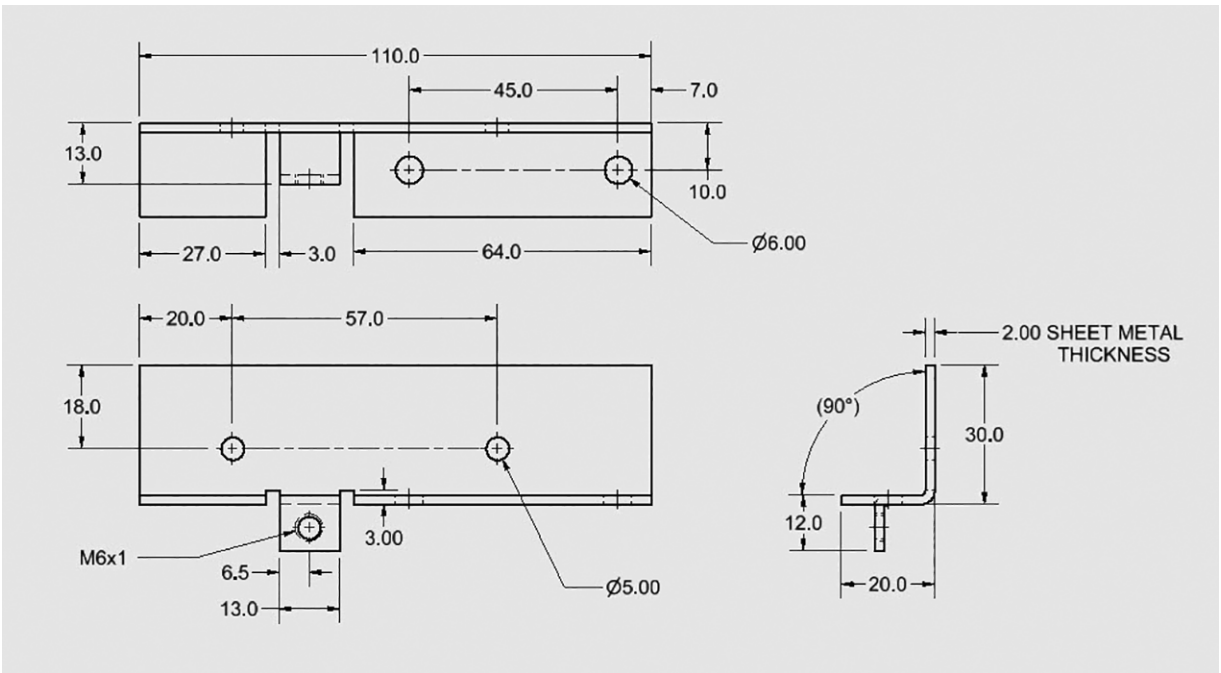
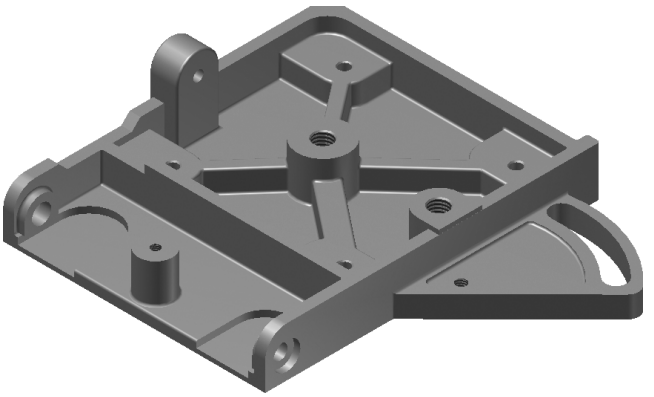


Figure 16-36

Figure 16-37a



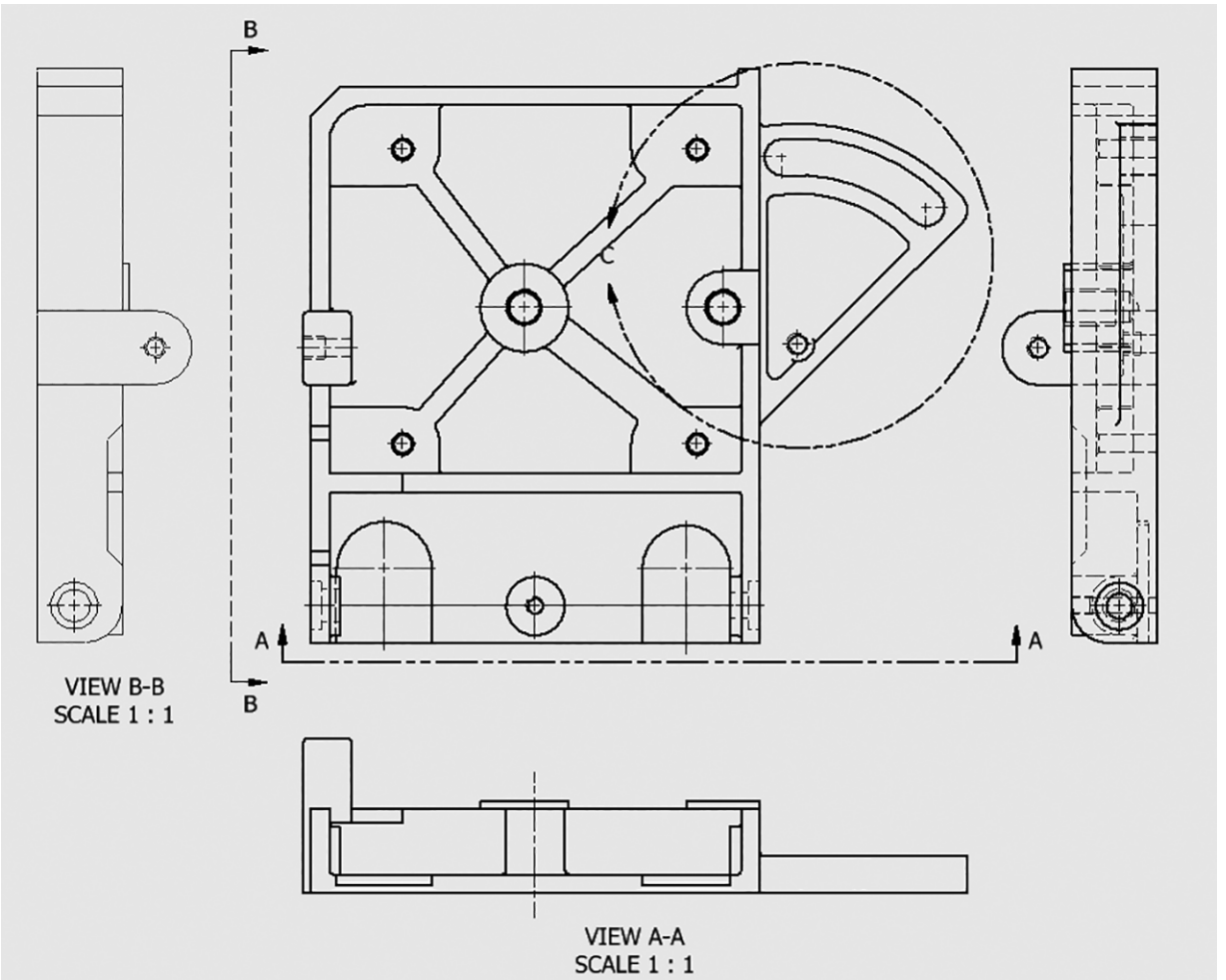


Figure 16-37b

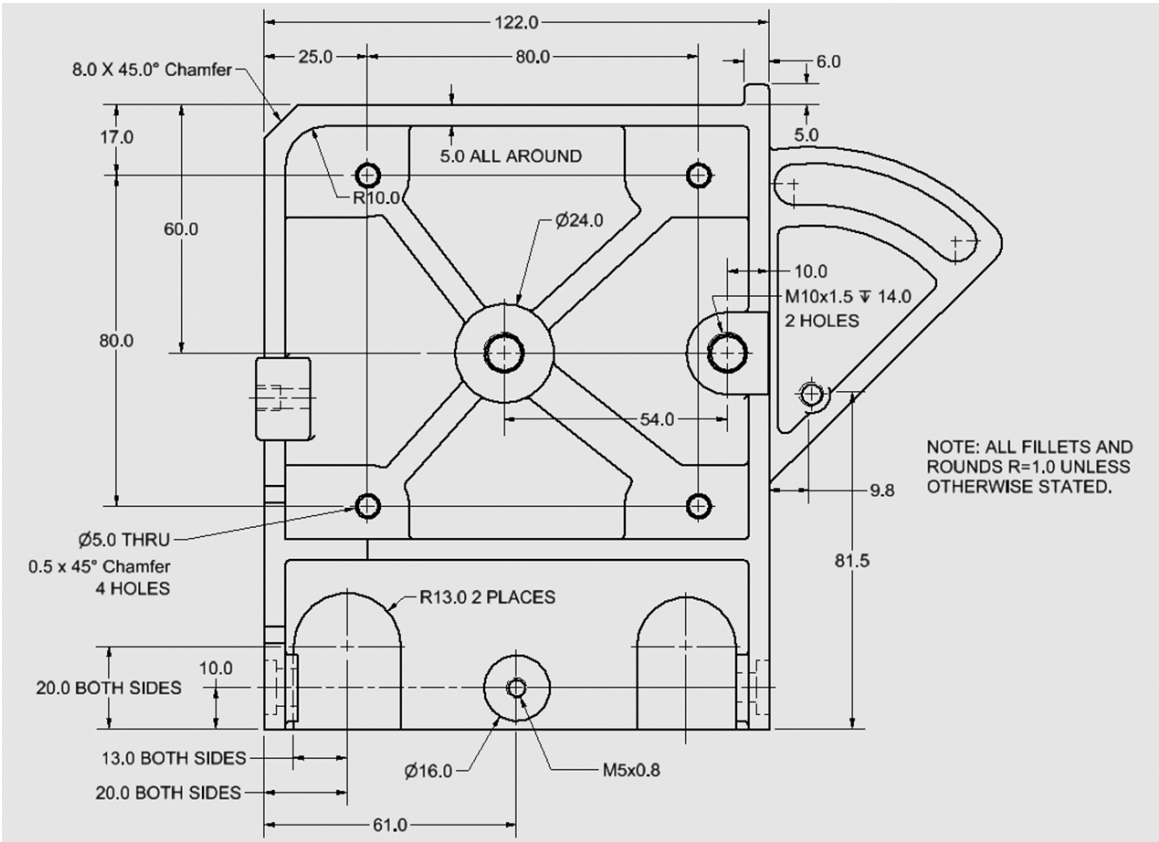


Figure 16-37c

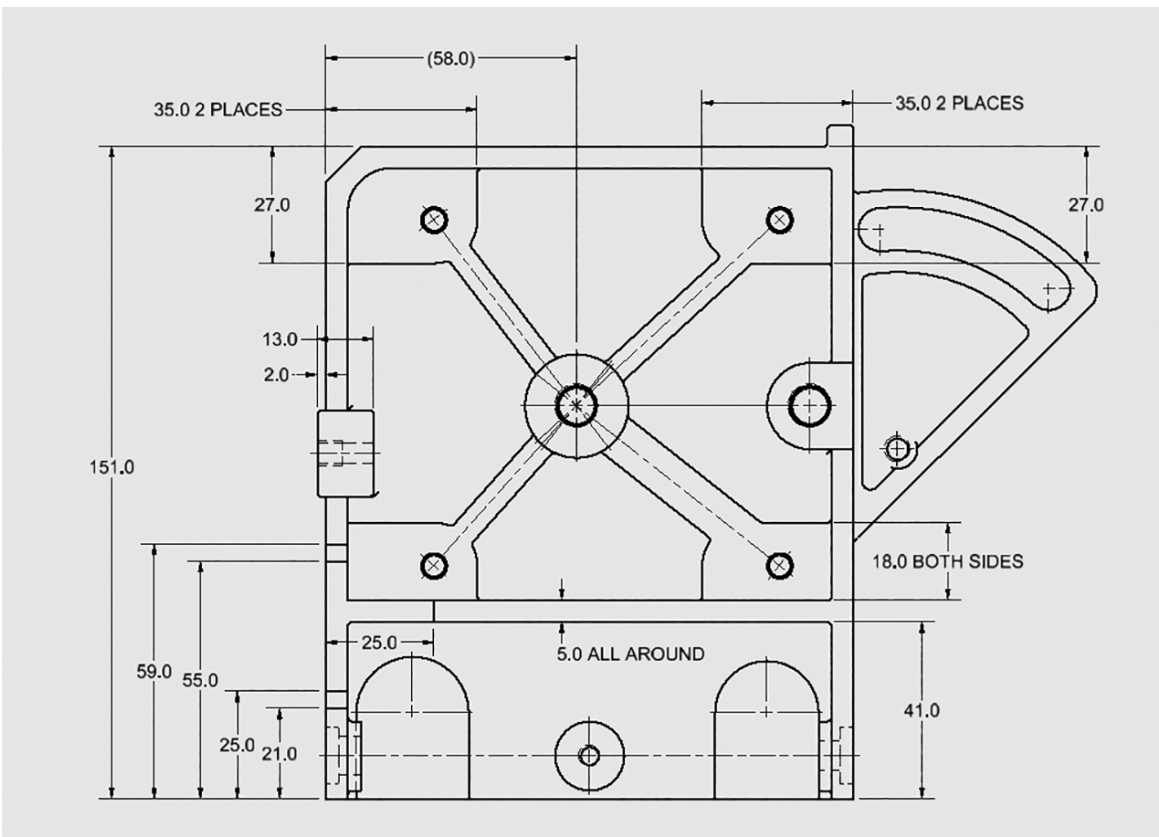


Figure 16-37d

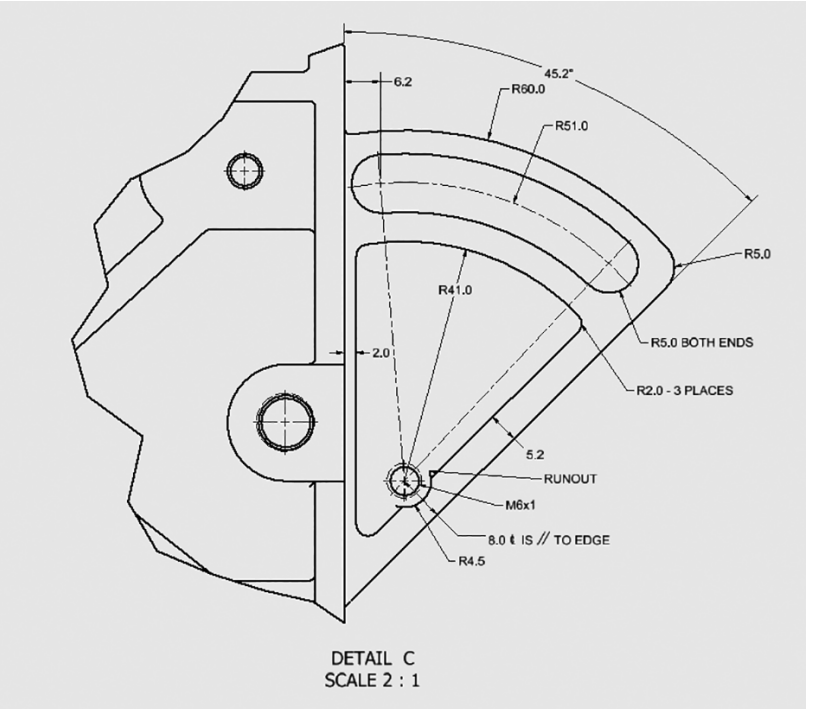


Figure 16-37e

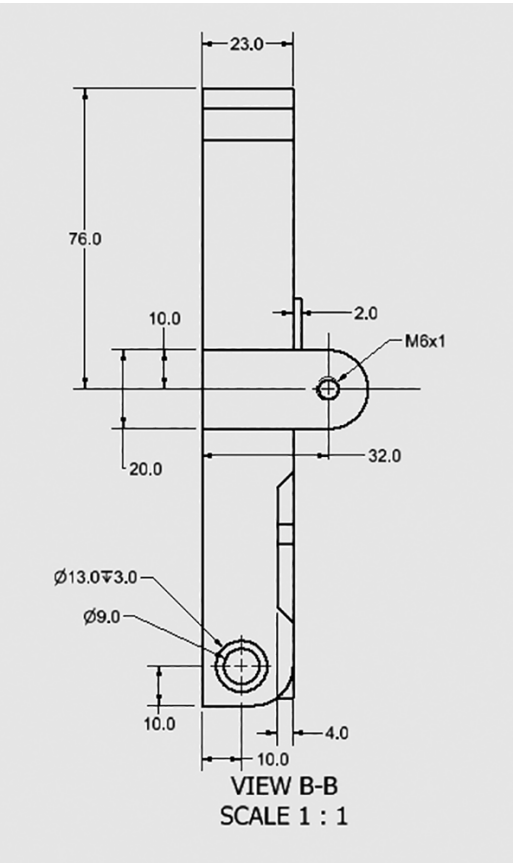


Figure 16-37f

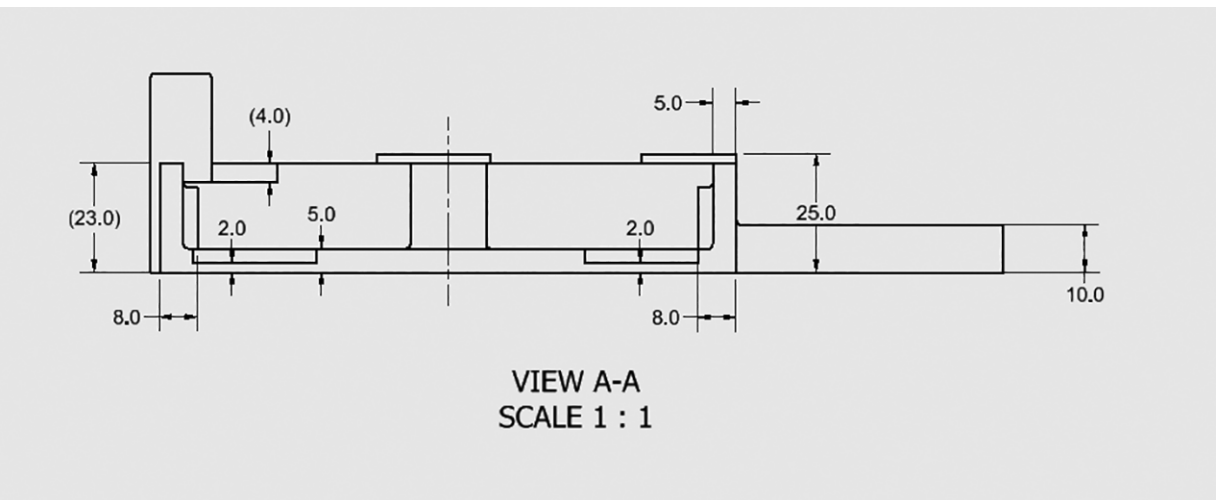
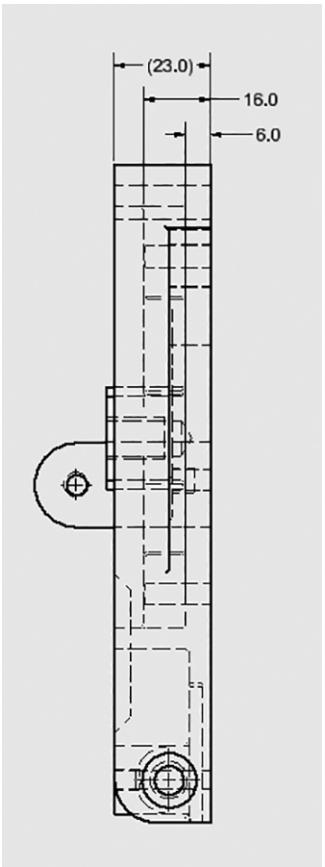
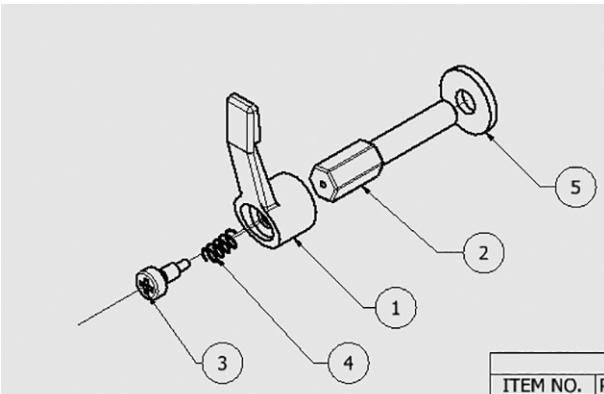


Figure 16-37g

Figure 16-37h





BILL OF MATERIALS				
ITEM NO.	PART NUMBER	DESCRIPTION	MAT'L	QTY
1	LV-141	LEVER	STEEL	1
2	LV-142	POST, THREADED	STEEL	1
3	LV-143	PIN, LEVER	STEEL	1
4	LV-144	SCREW, SPRING	STEEL	1
5	6×16×1	PLAIN WASHER	STEEL	2
6	M6×14	SQUARE NUT	STEEL	1

Figure 16-38a

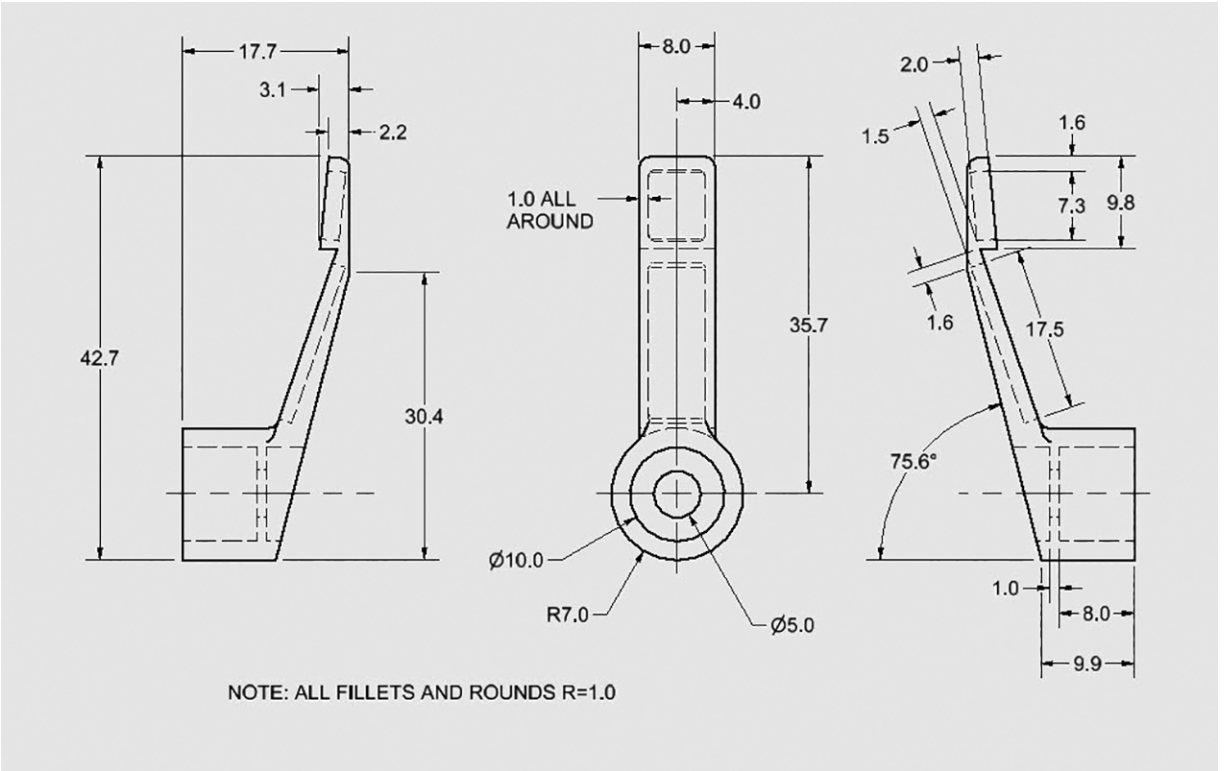


Figure 16-38b

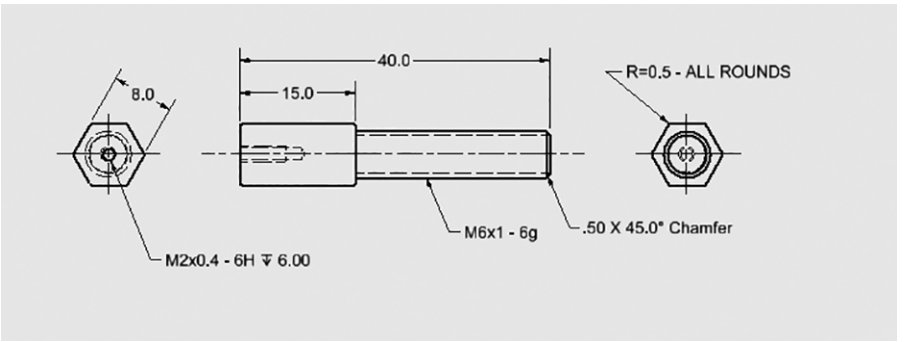


Figure 16-38c

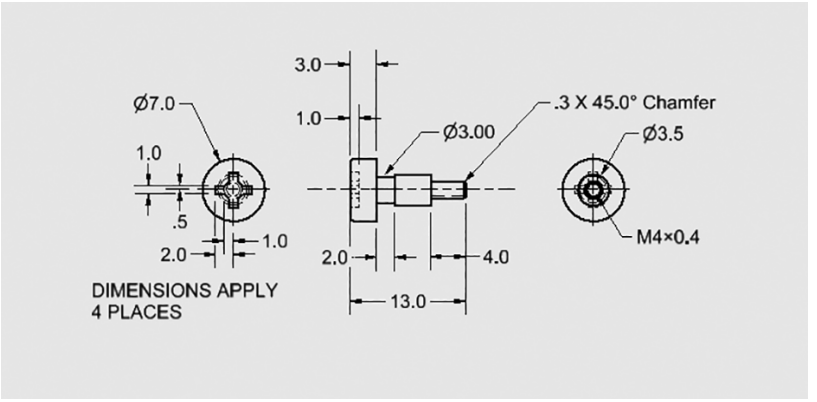


Figure 16-38d

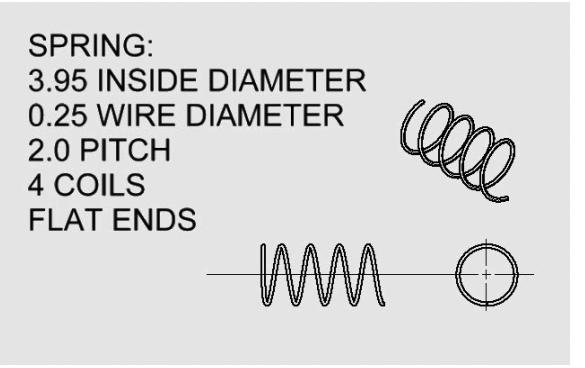


Figure 16-38e

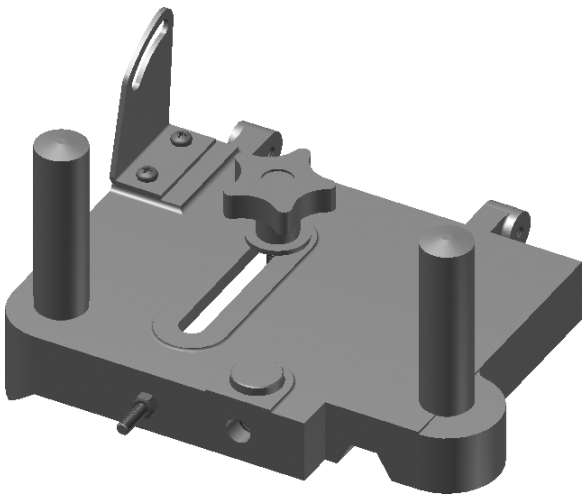


Figure 16-39a

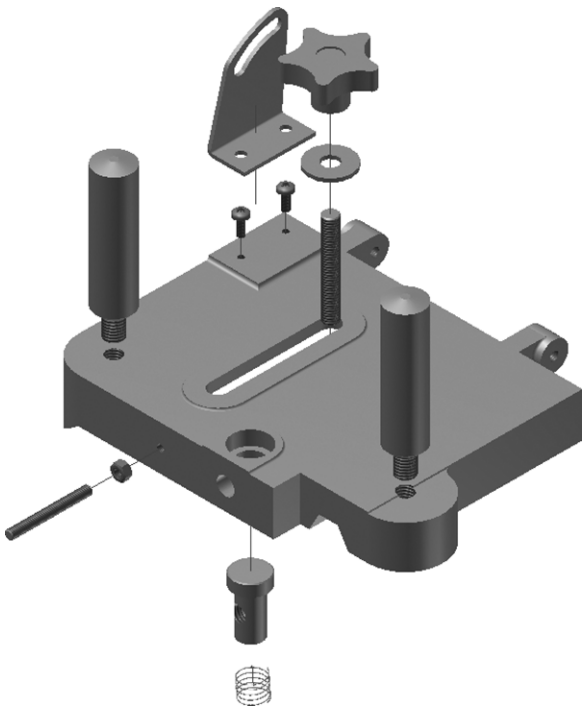


Figure 16-39b

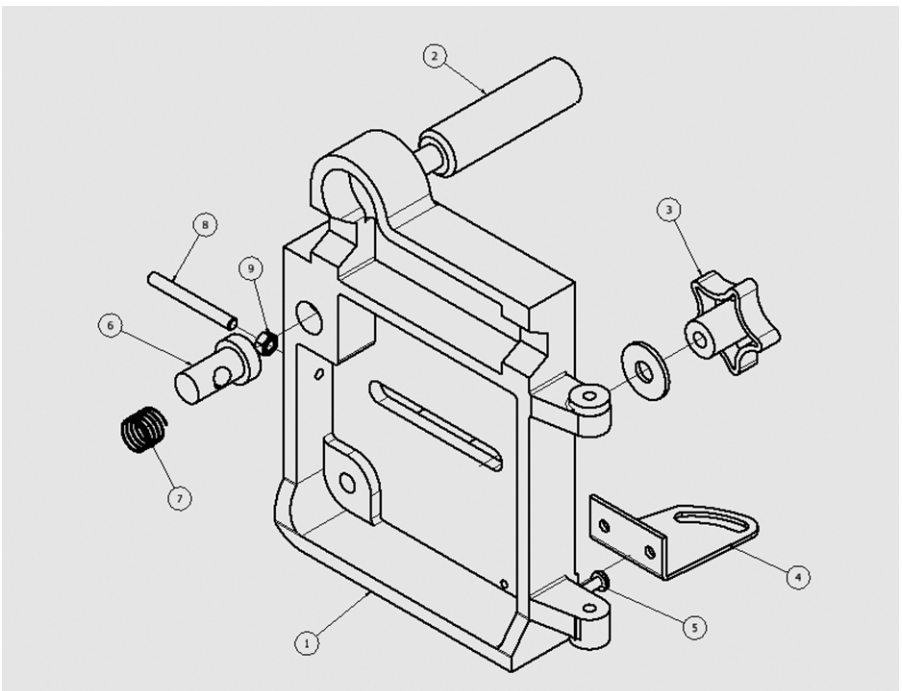


Figure 16-39c

Figure 16-39d

PARTS LIST				
ITEM	PART NUMBER	DESCRIPTION	MATERIAL	QTY
1	BU-306-A	PLATE, BASE	CAST STEEL	1
2	P53-A2	POST, HANDLE, LARGE	STEEL	2
3	H5-21	LARGE KNOB SUBASSEMBLY		1
4	BU202	CLIP, BASE	STEEL	1
5	M4x0.7 x 10	Cross Recessed Pan Head Machine Screw	STEEL, MILD	2
6	P23-402	POST, RELEASE	STEEL	1
7	BU-003	SPRING	PIANO WIRE	1
8	M5x45	STUD	STEEL	1
9	M5	HEX NUT	STEEL	1

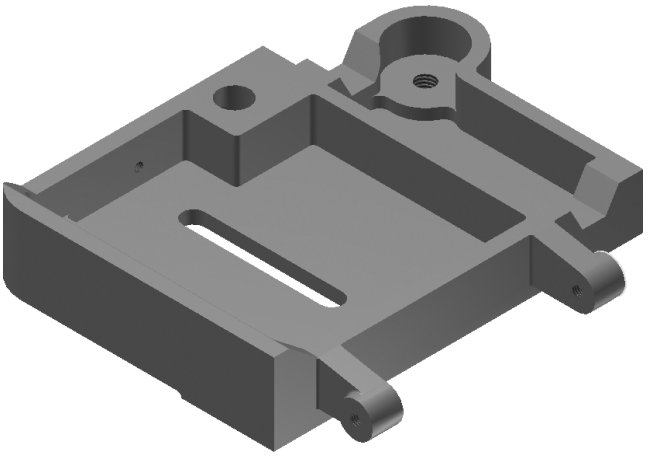


Figure 16-40a

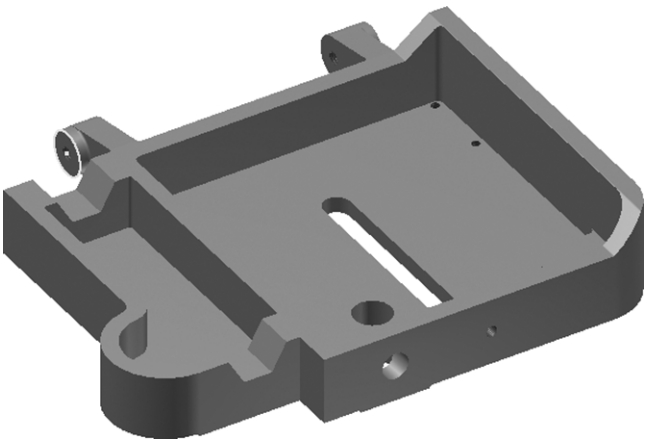
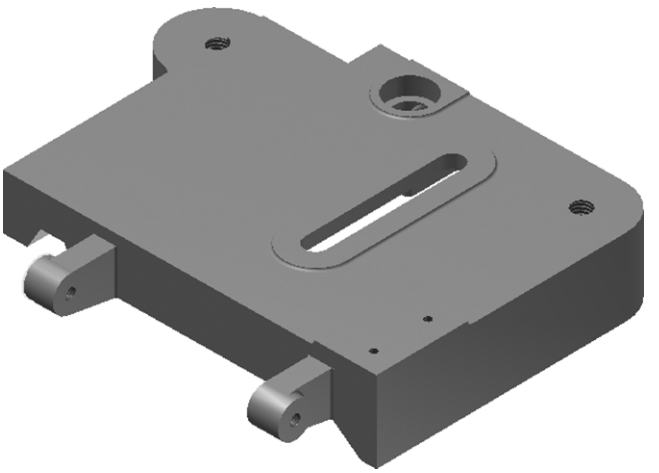


Figure 16-40b

Figure 16-40c



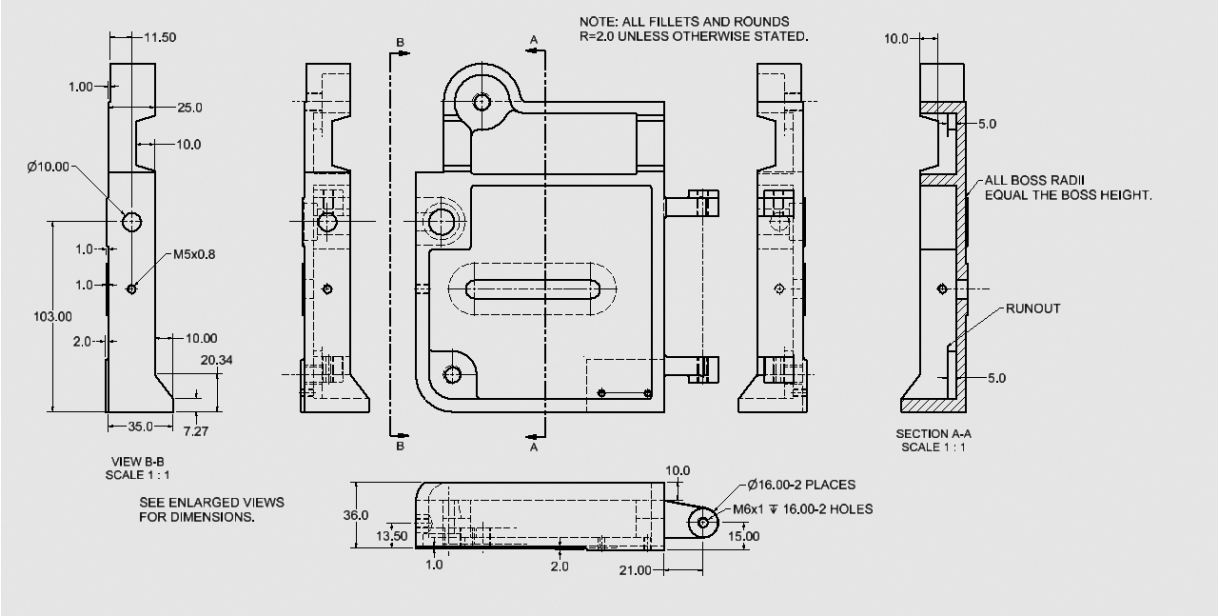


Figure 16-40d

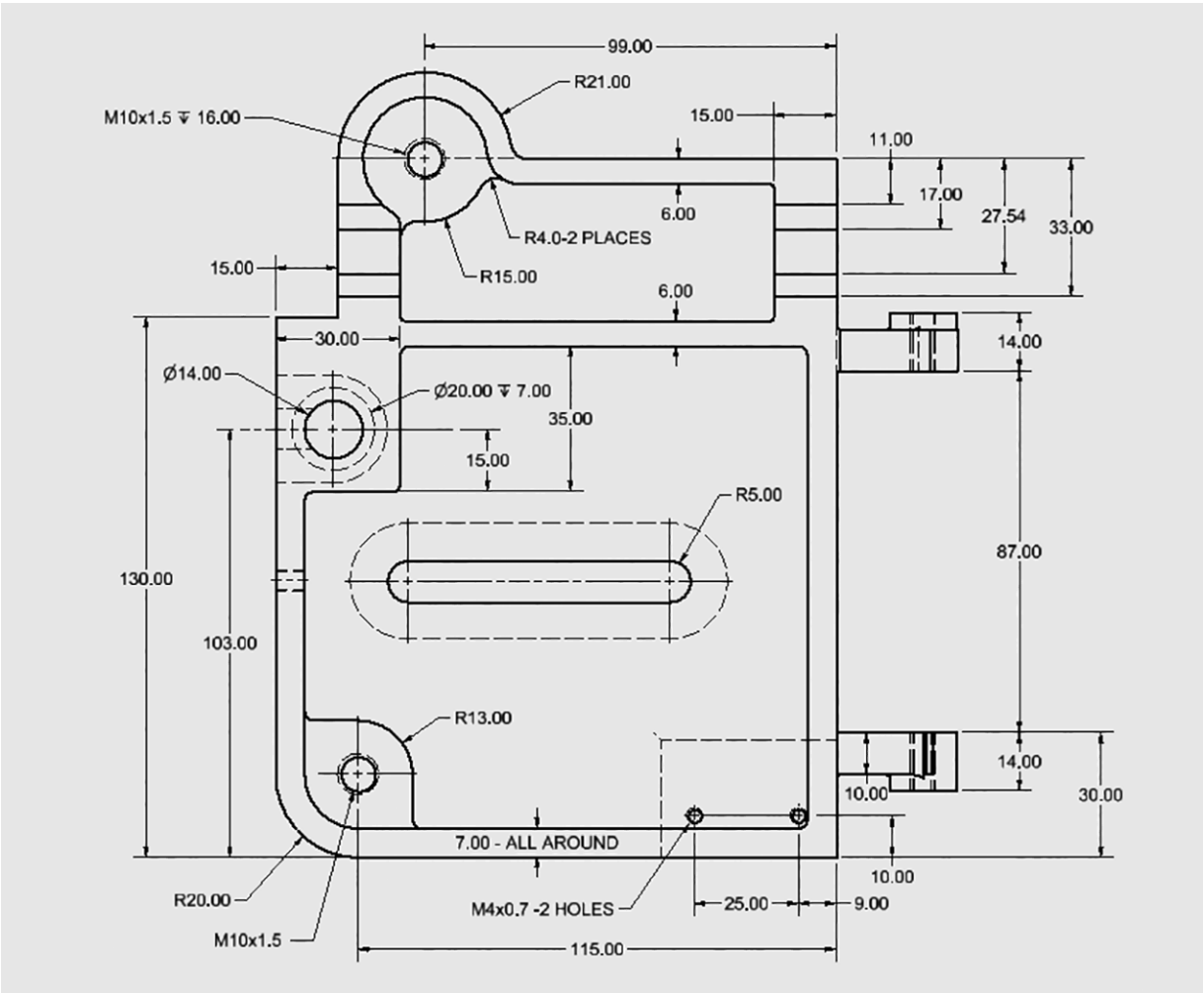


Figure 16-40e

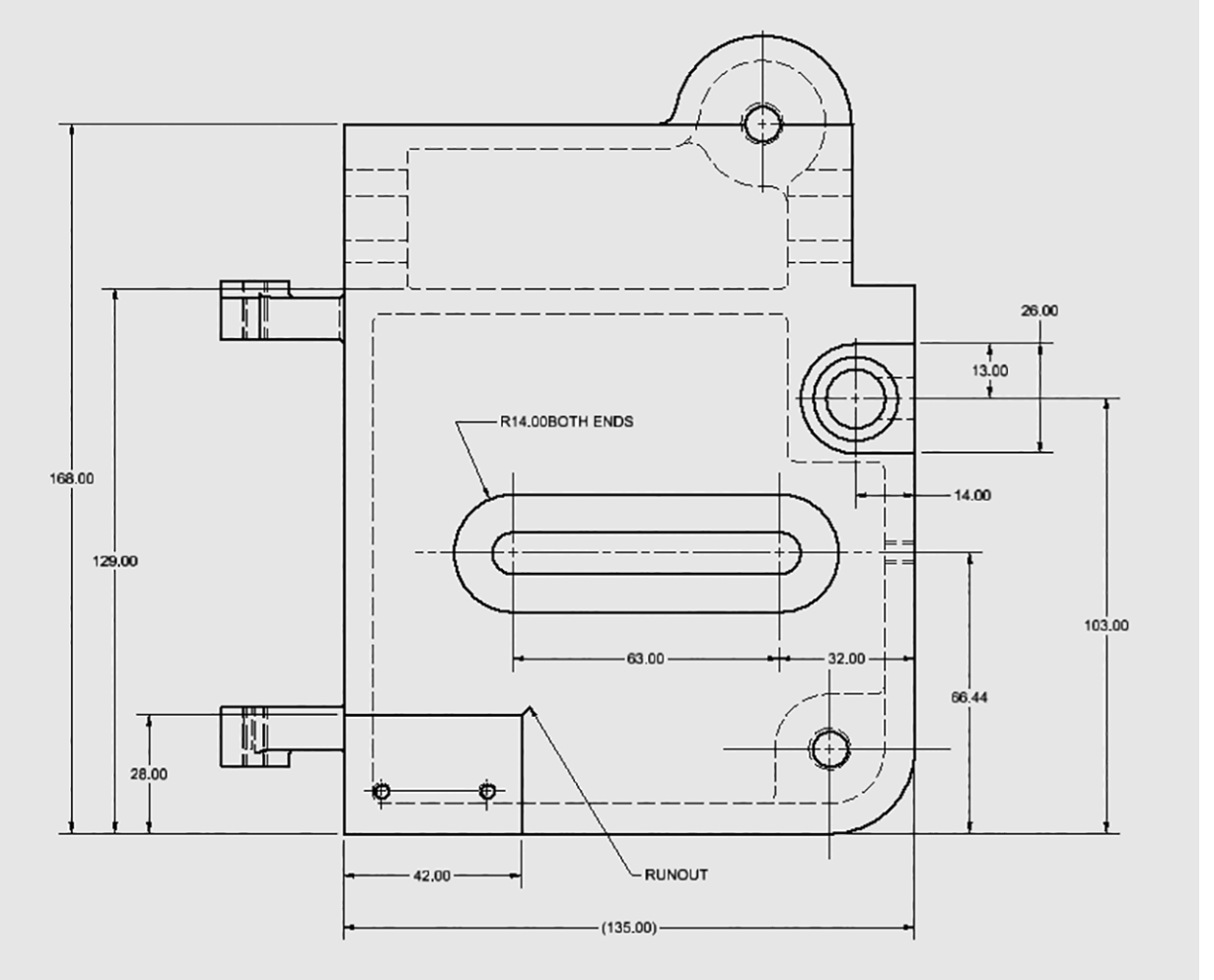


Figure 16-40f

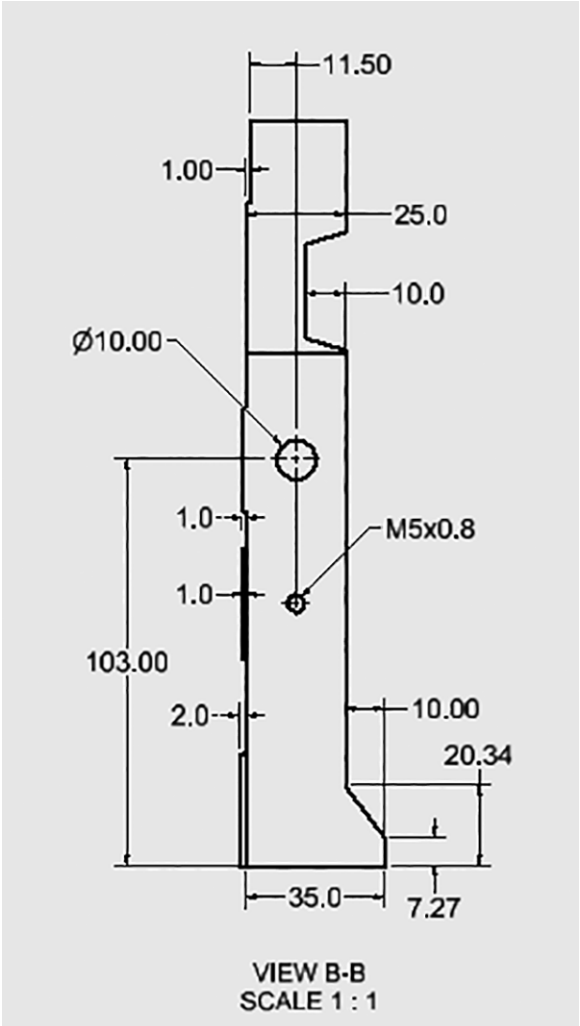


Figure 16-40g

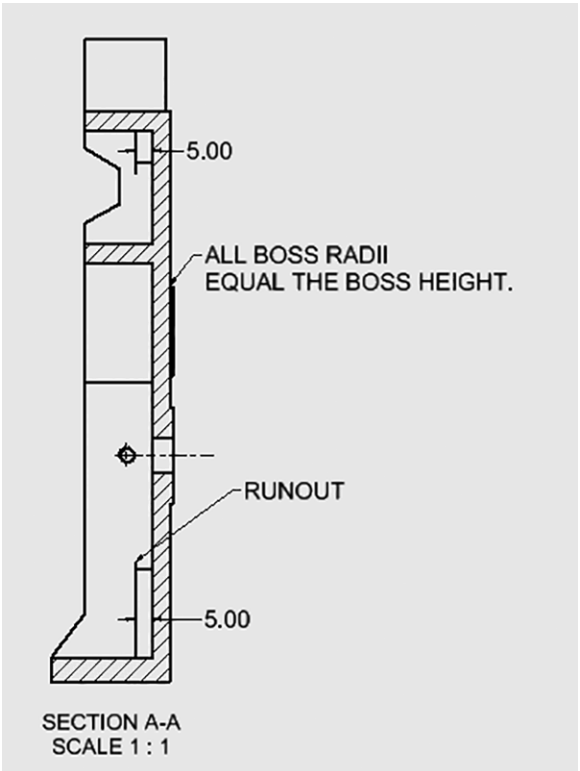


Figure 16-40i

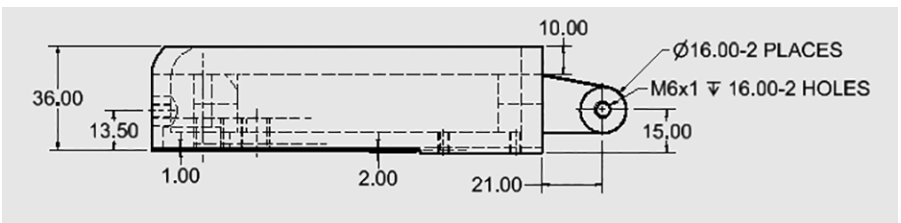


Figure 16-40h

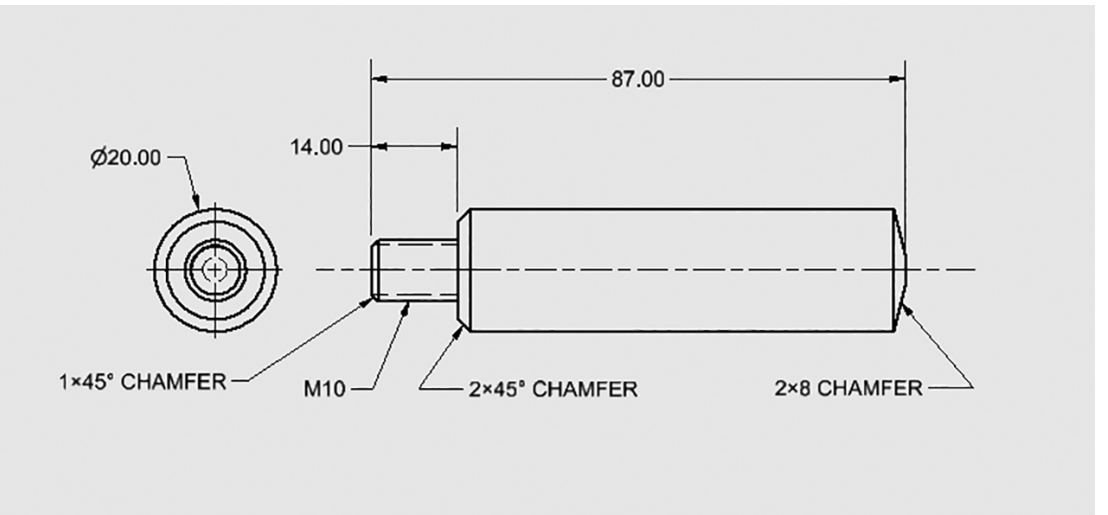


Figure 16-41

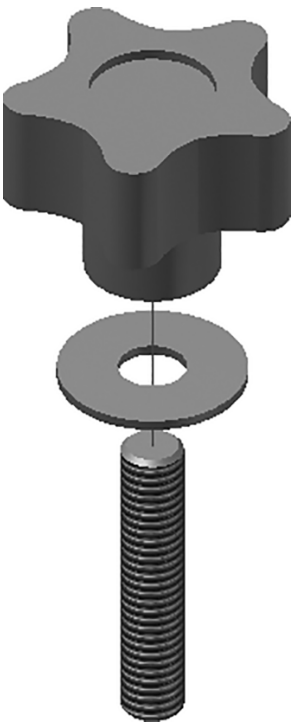
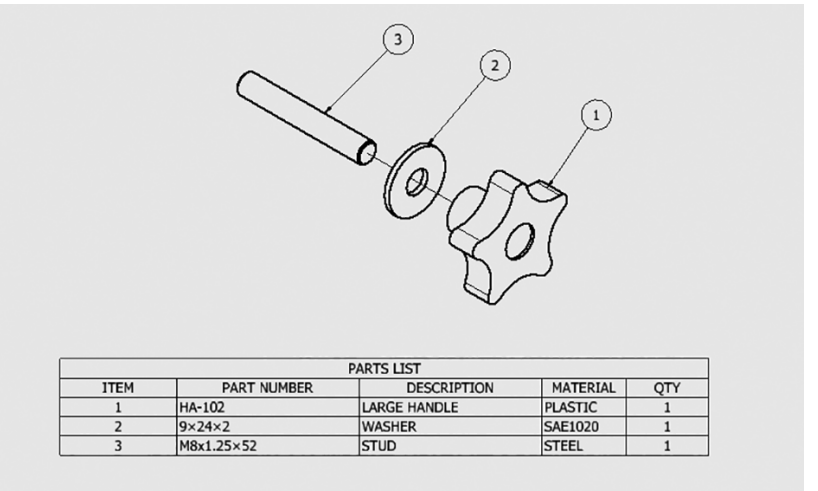


Figure 16-42a



PARTS LIST				
ITEM	PART NUMBER	DESCRIPTION	MATERIAL	QTY
1	HA-102	LARGE HANDLE	PLASTIC	1
2	9×24×2	WASHER	SAE1020	1
3	M8x1.25×52	STUD	STEEL	1

Figure 16-42b

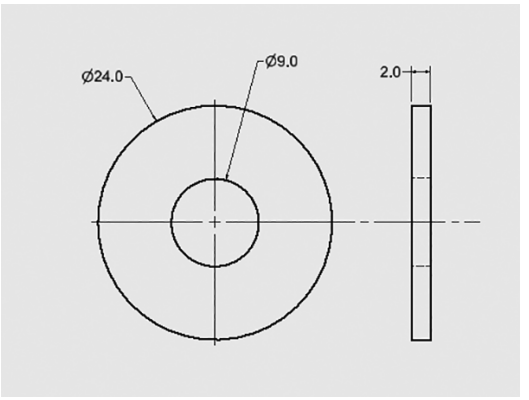


Figure 16-42c

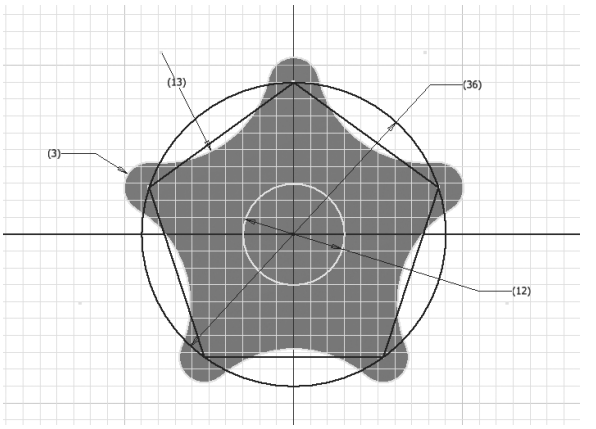


Figure 16-42d

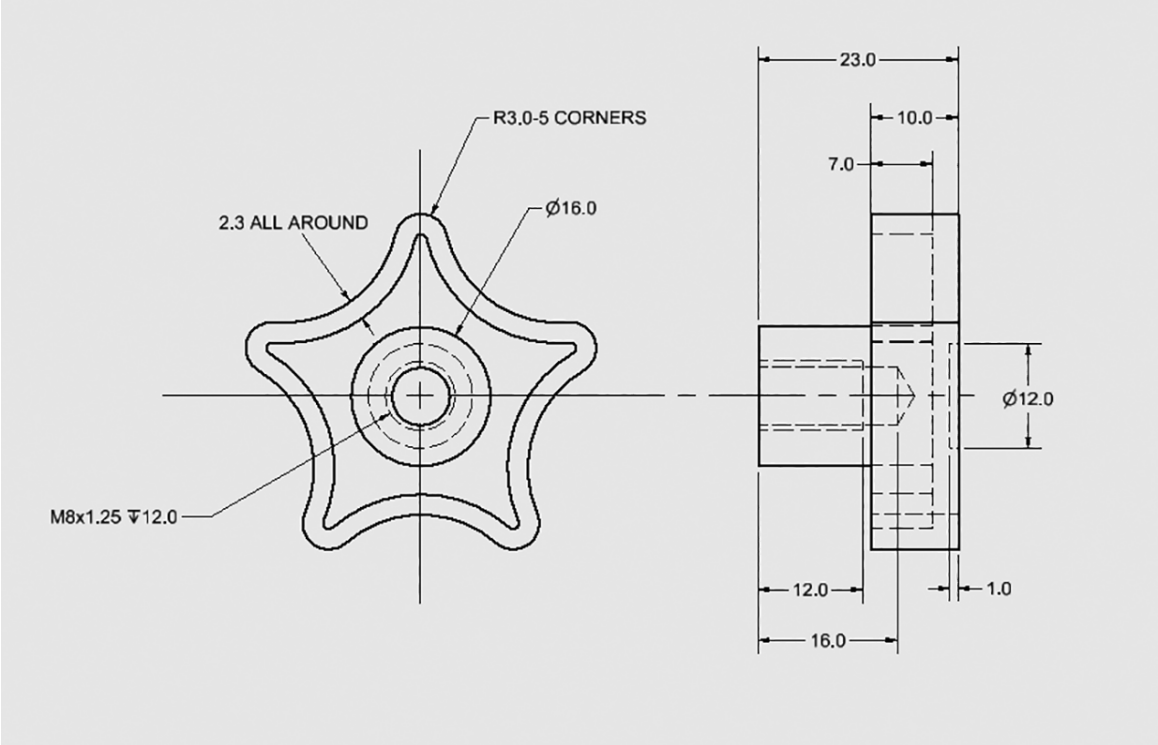


Figure 16-42e

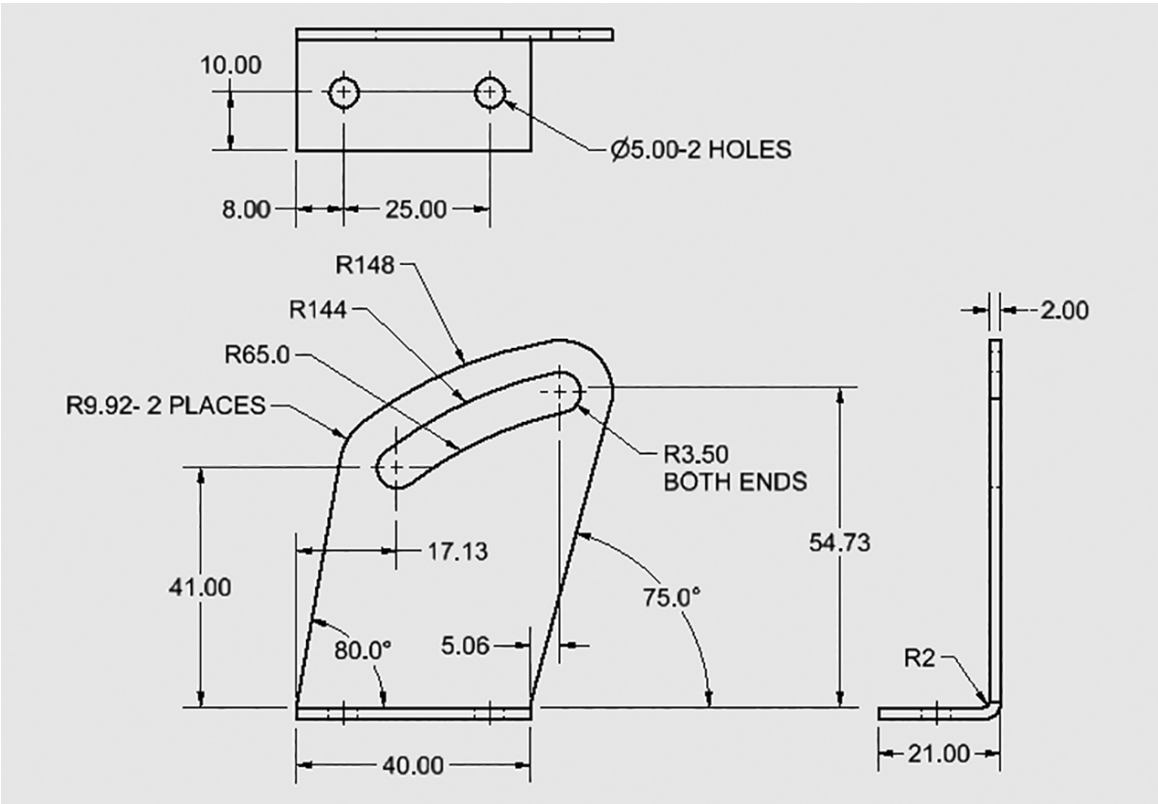
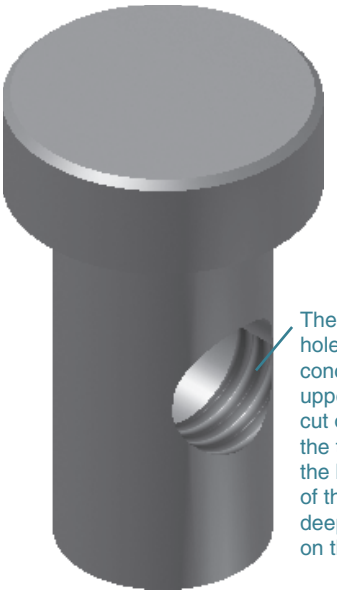


Figure 16-43

Figure 16-44a



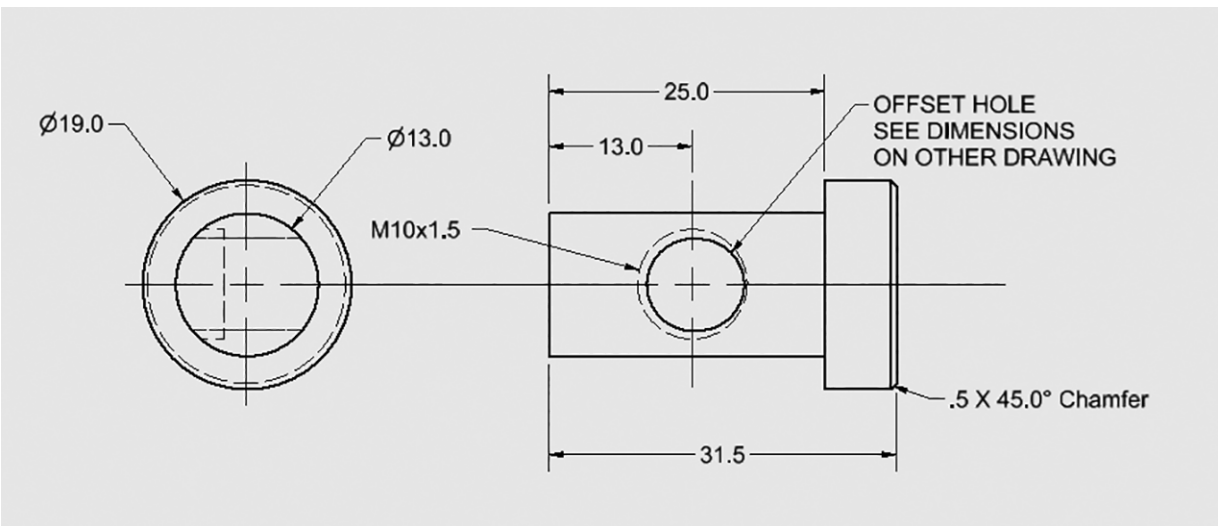


Figure 16-44b

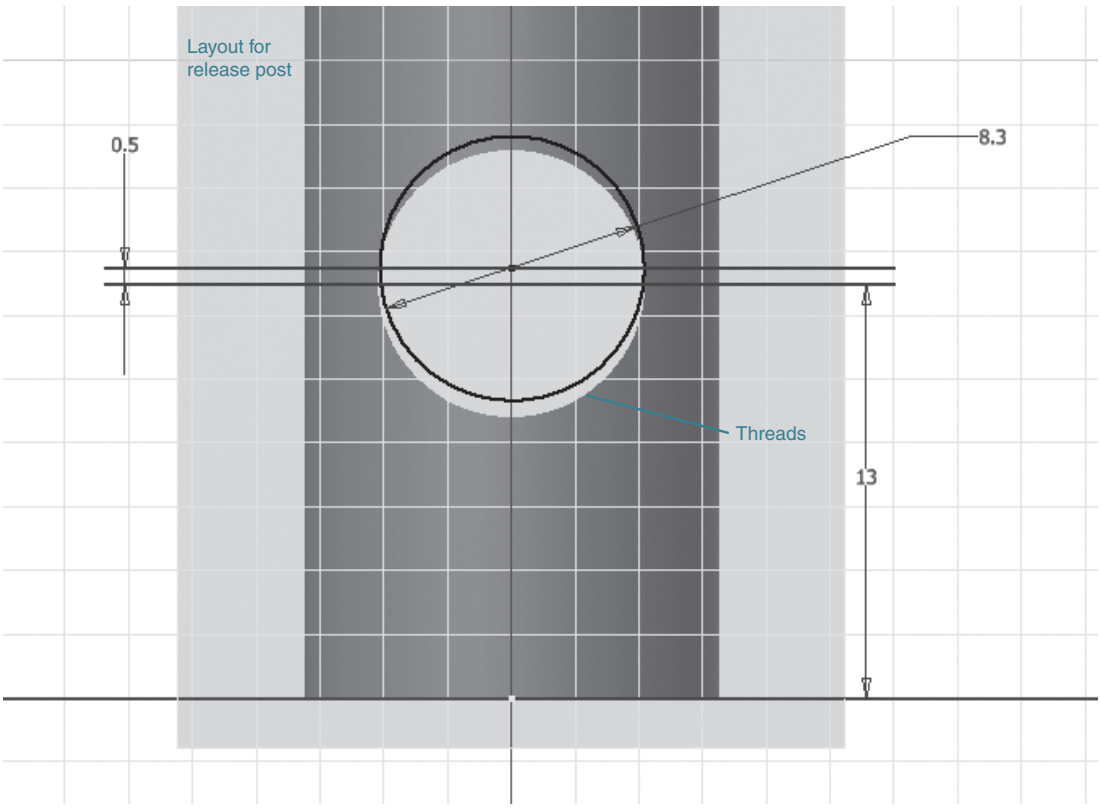
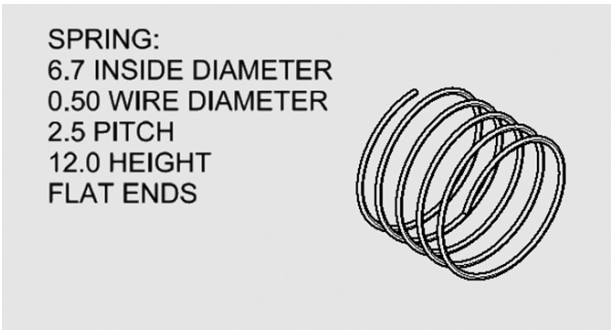


Figure 16-44c

Figure 16-45



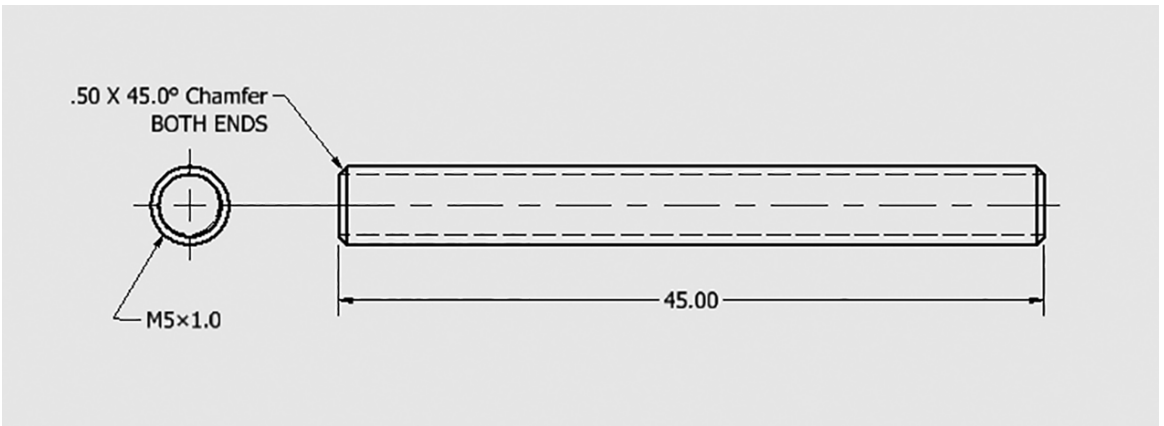


Figure 16-46

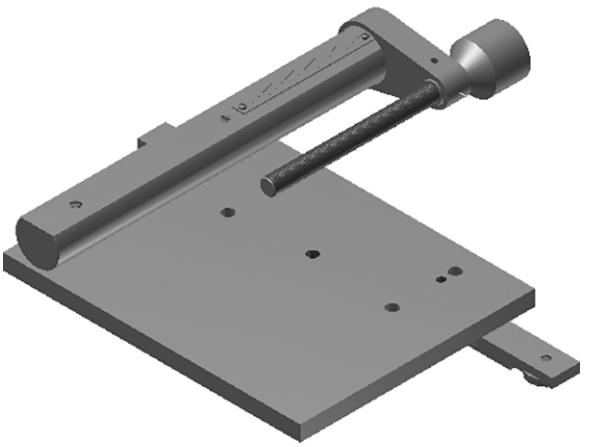


Figure 16-47a

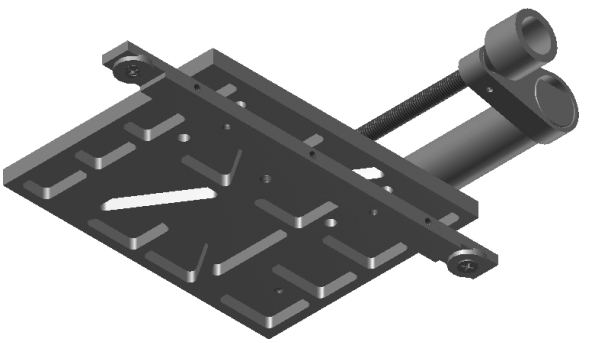


Figure 16-47b

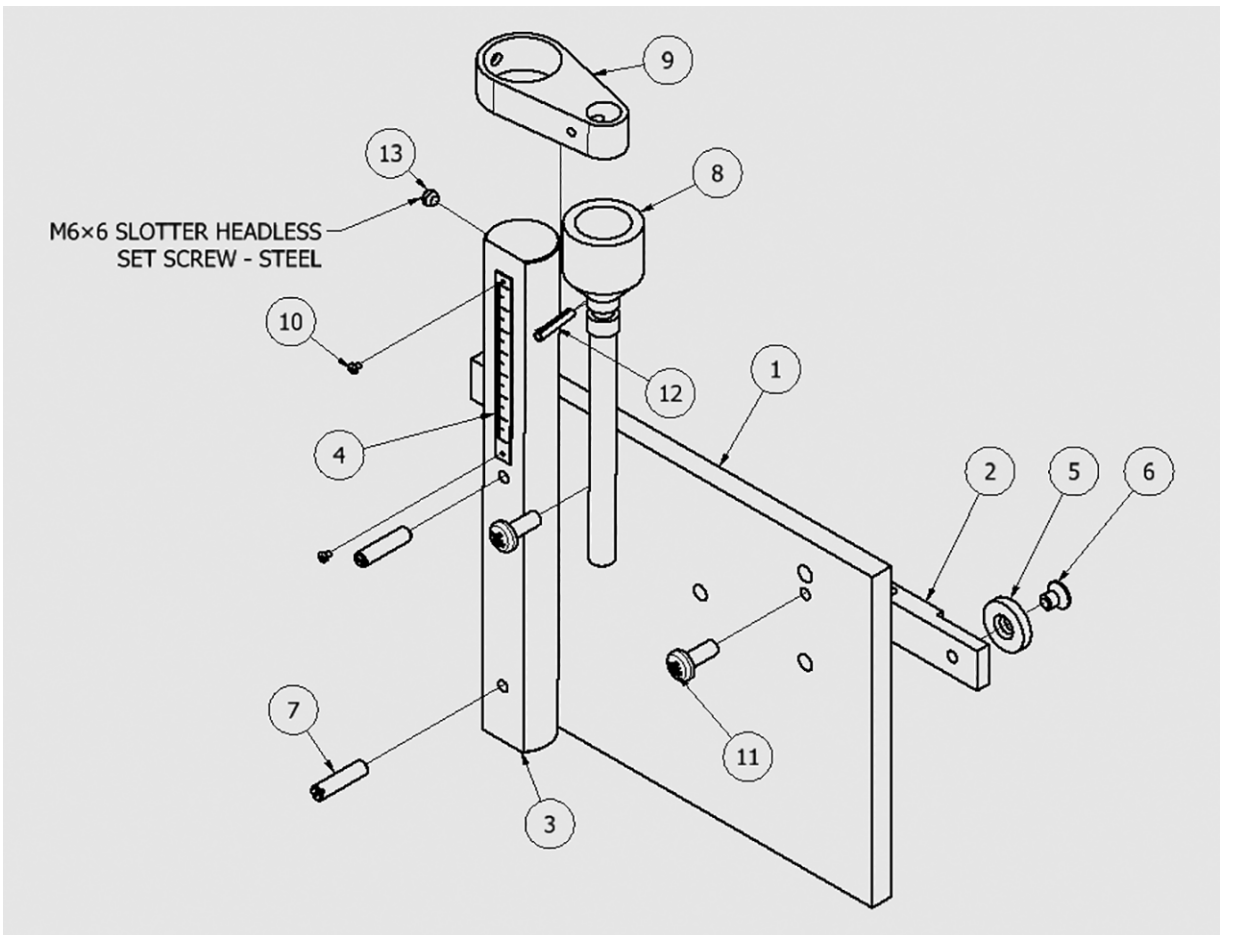


Figure 16-47c

PARTS LIST				
ITEM	PART NUMBER	DESCRIPTION	MATERIAL	QTY
1	G101-A1	PLATE, GUIDE	STEEL	1
2	G101-A2	BAR, GUIDE	STEEL	1
3	G101-A3	POST, GUIDE	STEEL	1
4	RR-6-40	RULER	STEEL	1
5	RG-1005	ROLLER, GUIDE	STEEL	2
6	M6x1 x 8	Cross Recessed Flat Countersunk Head Machine Screw	MILD STEEL	2
7	M6 x 25	Slotted Headless Set Screw - Flat Point	STEEL	2
8	G103-2	SCREW, GUIDE	STEEL	1
9	G101-4A	PLATE, GUIDE	STEEL	1
10	M2x0.4 x 3	Cross Recessed Pan Head Machine Screw	MILD STEEL	2
11	M6x1 x 16	Cross Recessed Pan Head Machine Screw	MILD STEEL	2
12	G101-63	PIN, HOLDER	STEEL	1

Figure 16-47d

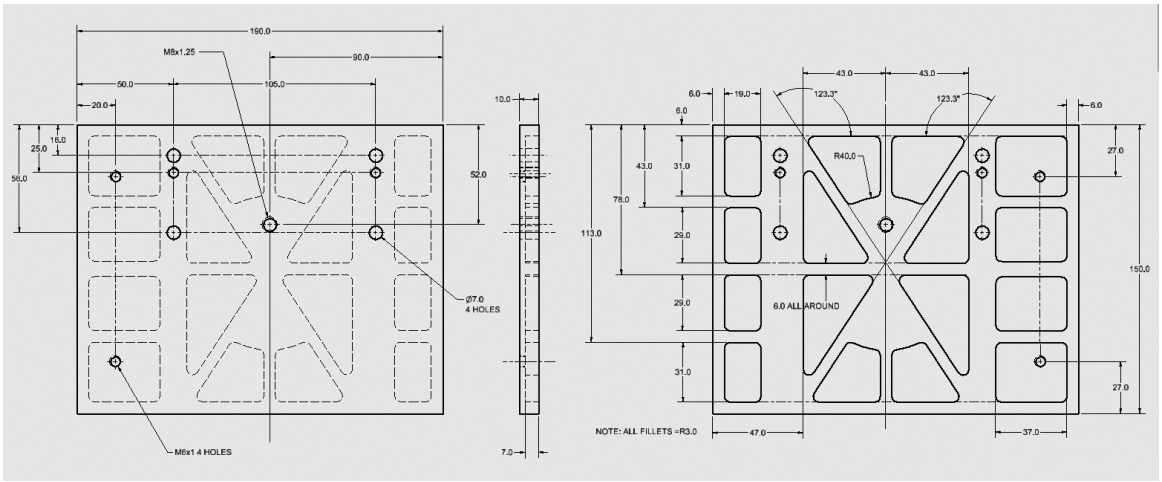


Figure 16-48

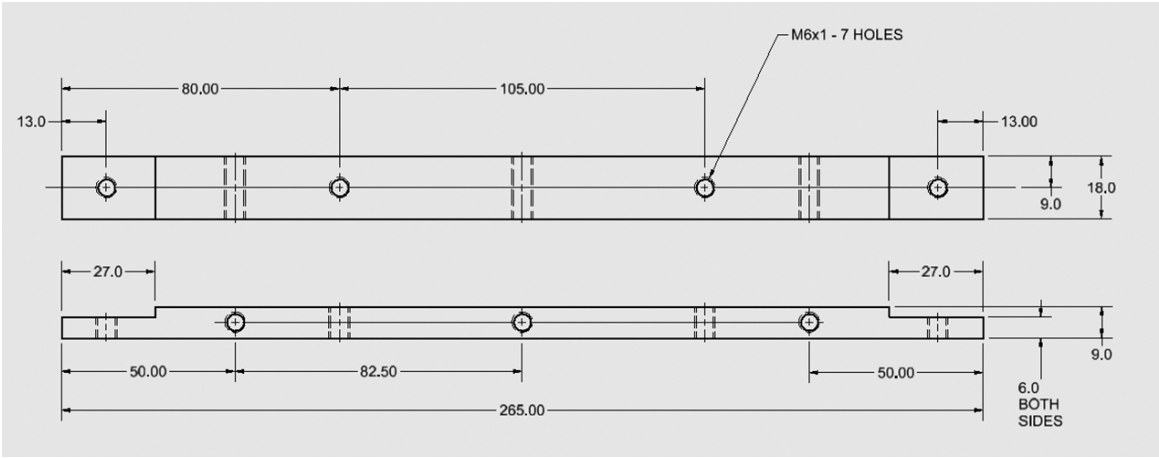


Figure 16-49

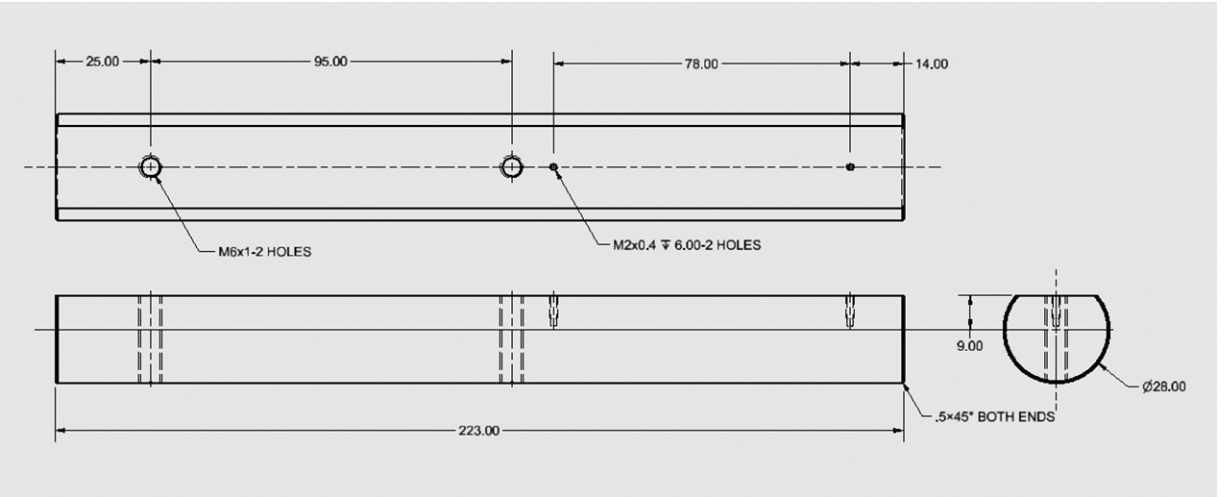


Figure 16-50

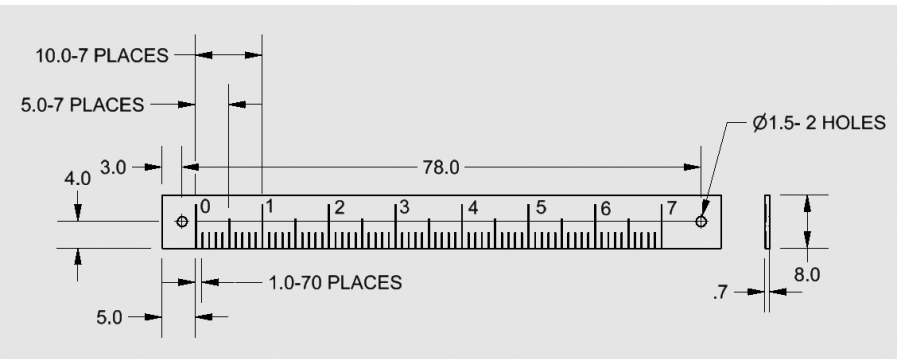


Figure 16-51

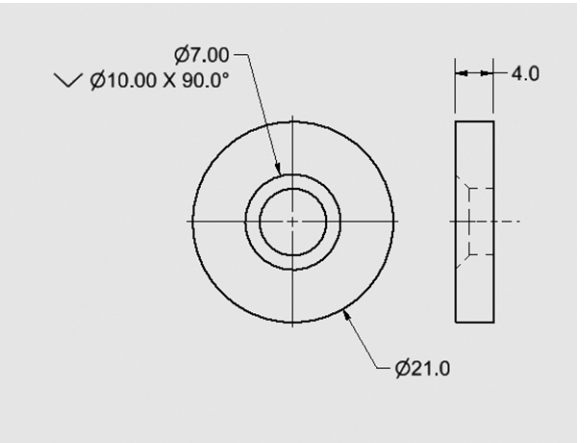


Figure 16-52

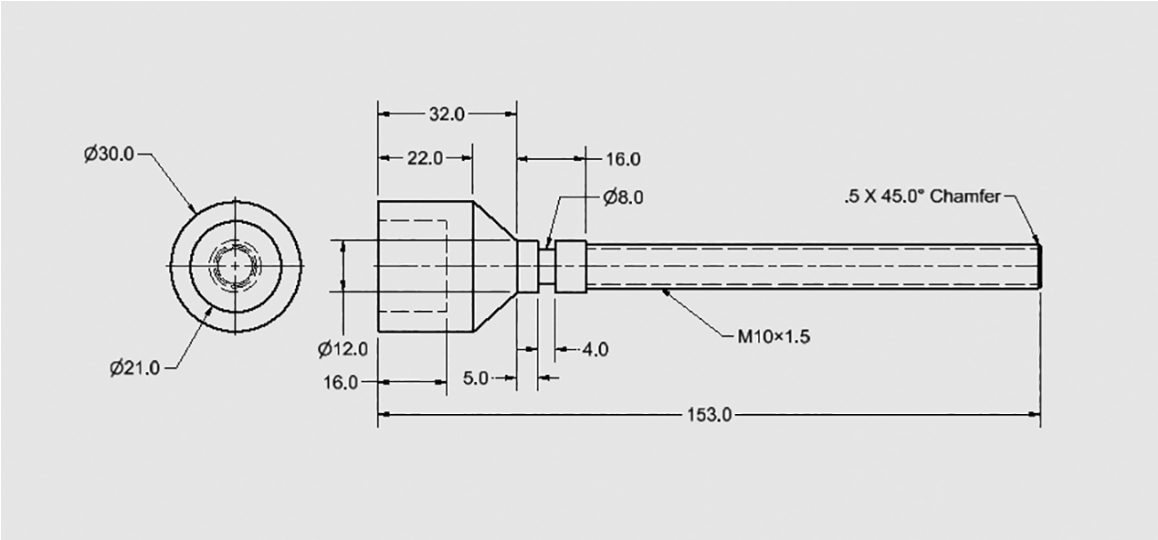


Figure 16-53

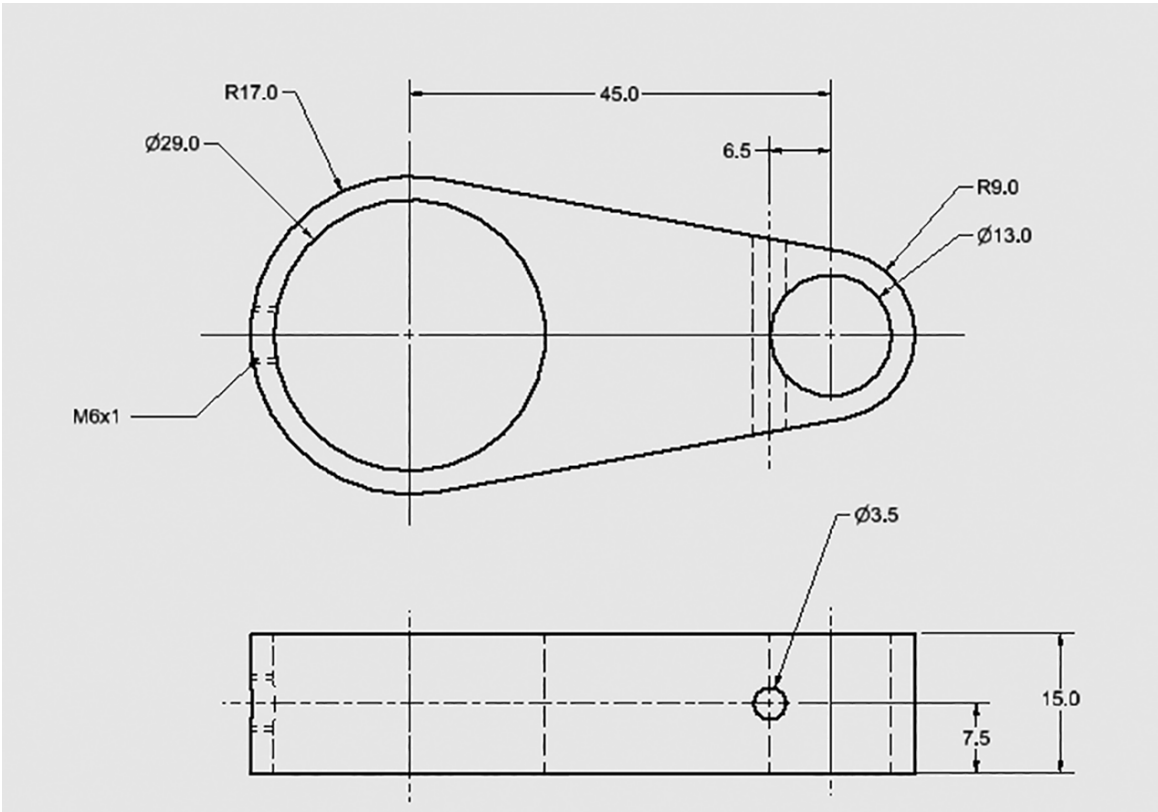


Figure 16-54

Figure 16-55