

chapter sixteen

Projects

16-1 Introduction

This chapter presents two large projects: the Milling Vise and the 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.

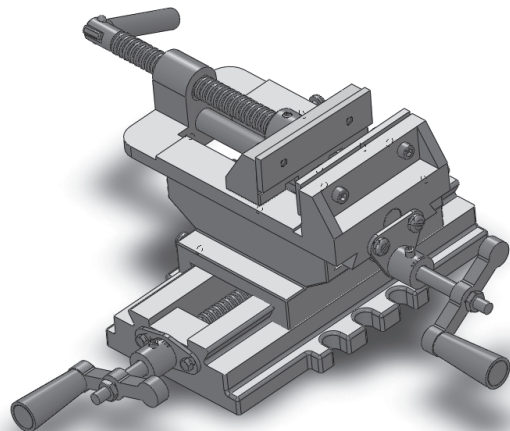
Complete the following or as it is assigned by your instructor.

1 The Milling Vise

See Figure 16-1.

- A. An assembly drawing.
- B. A BOM; include Item Numbers, Part Numbers, Descriptions, and Quantities

Figure 16-1
Milling Vise



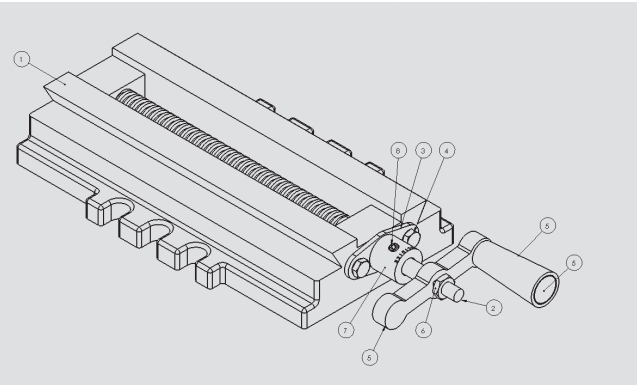
2 Base Subassembly

See Figure 16-2.

- A. An assembly drawing
- B. A BOM
- C. Dimensioned drawings of each part that is used in the subassembly.

Figure 16-2

Base Subassembly



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 tolerance drawings of the parts that make up the base subassembly are as follows.

Base

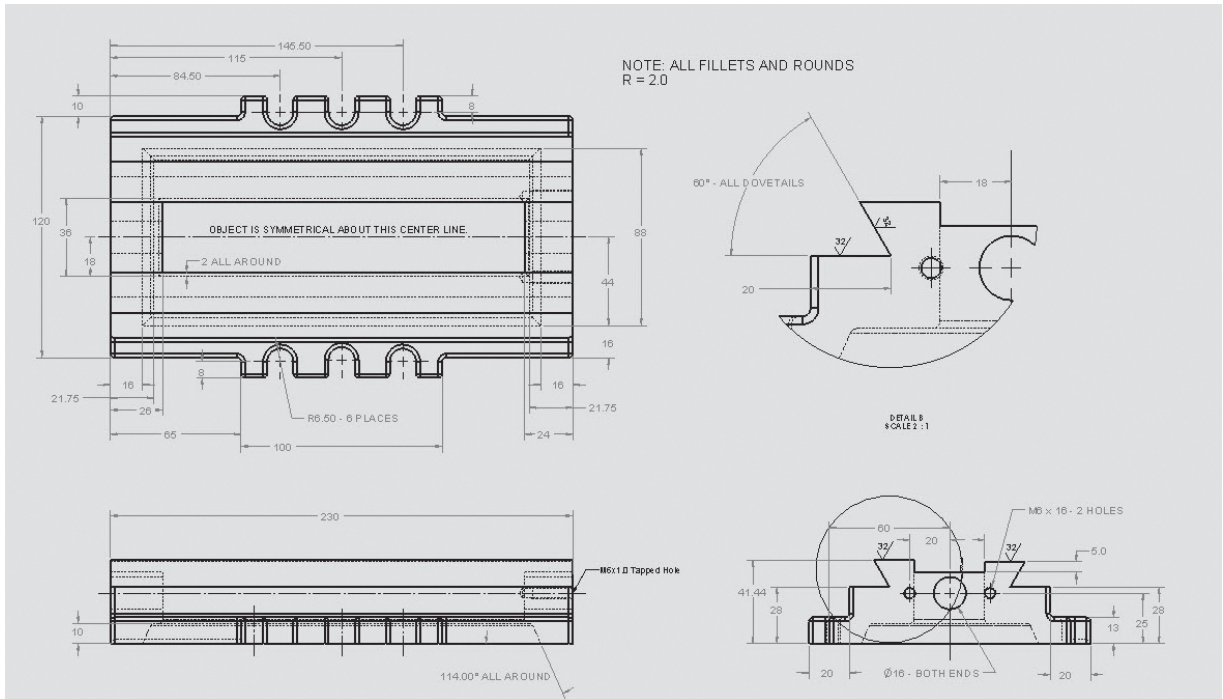


Figure 16-3

Figure 16-4

ACME, Base

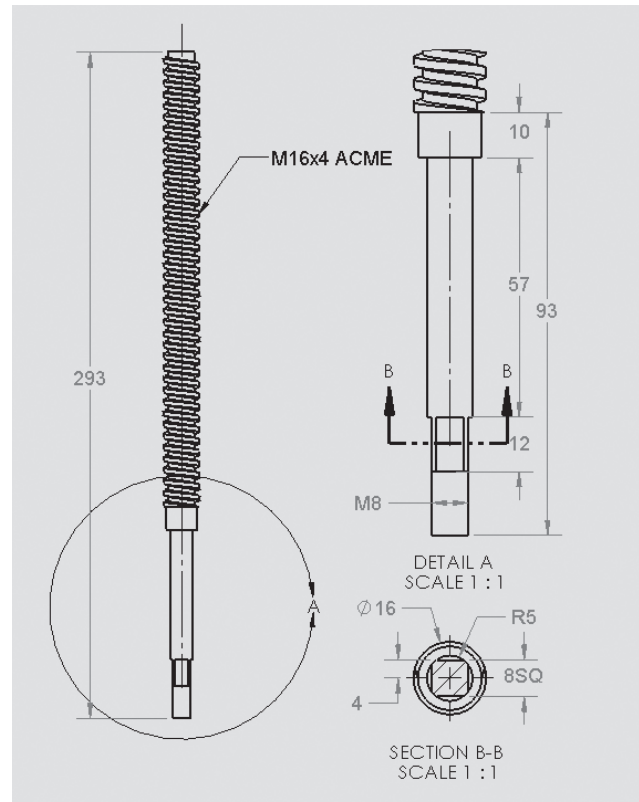


Figure 16-5

Collar

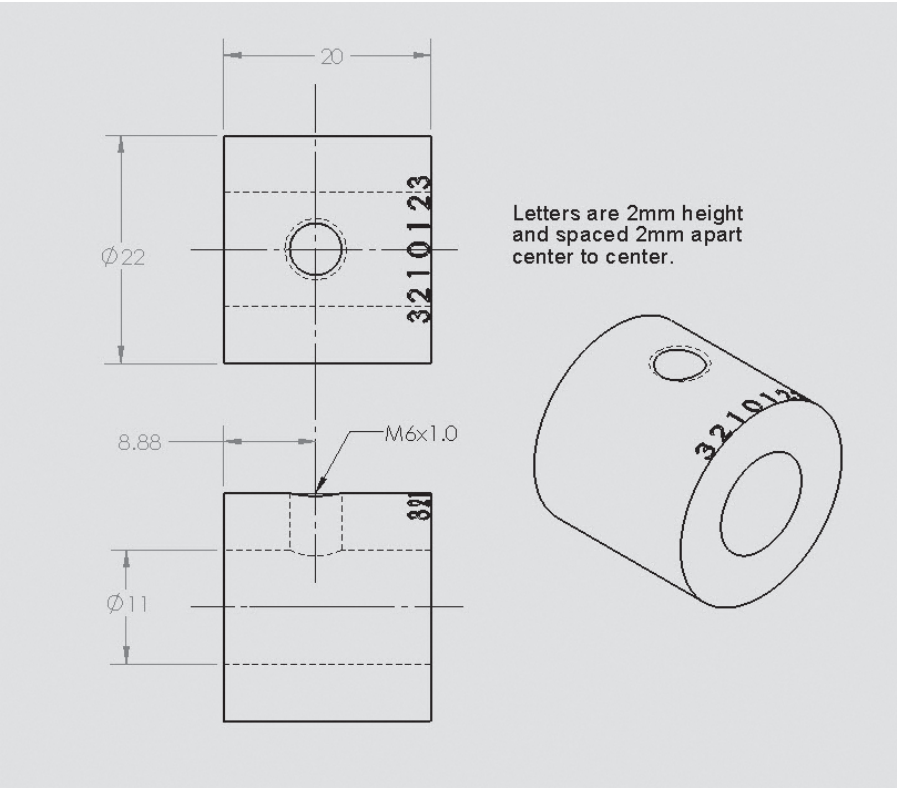


Figure 16-6

Plate, Cover, Base

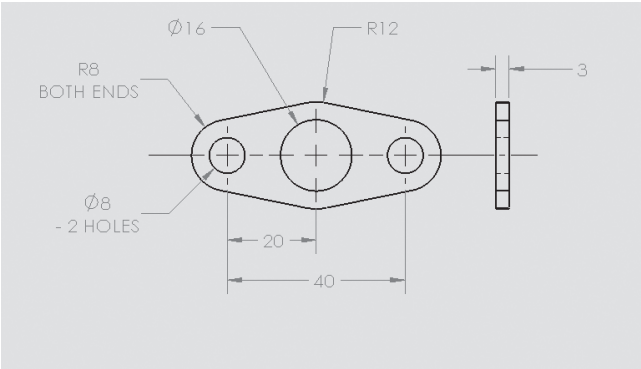
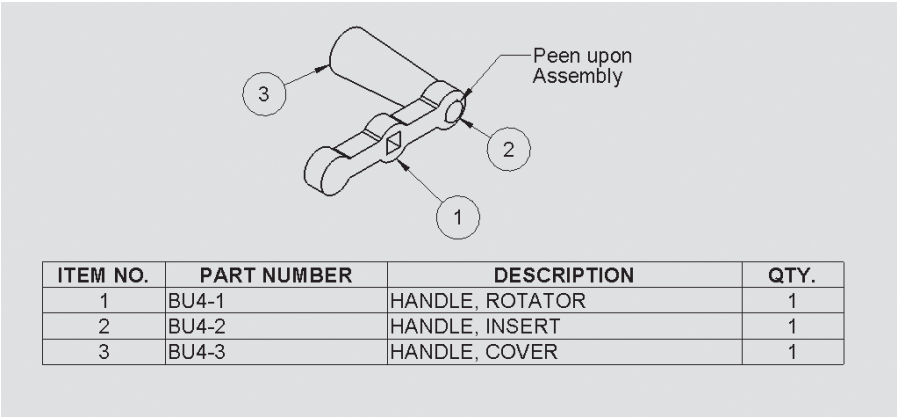


Figure 16-7

Handle Subassembly



Handle, Rotater

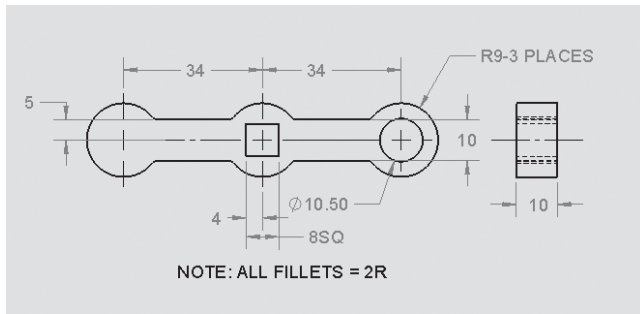


Figure 16-8

Handle, Insert

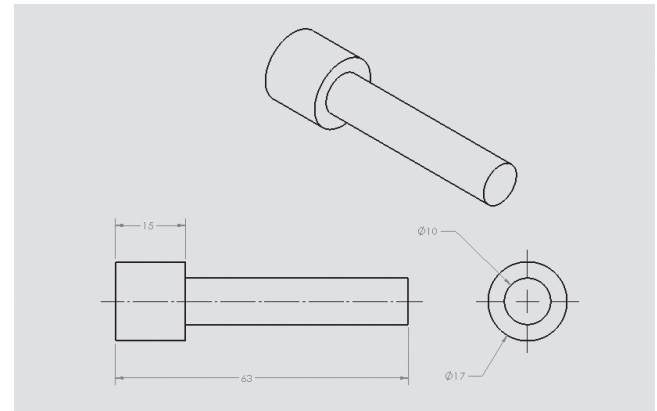
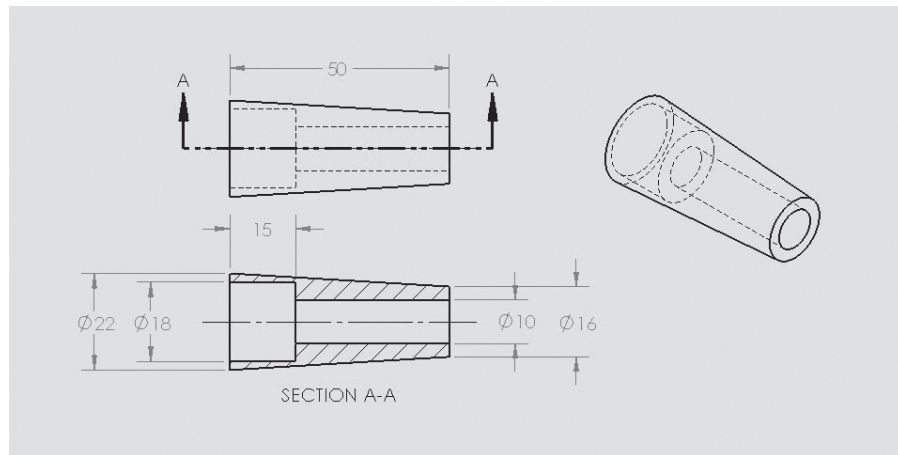


Figure 16-9

Figure 16-10

Handle, Cover

**NOTE**

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

3 Middle Subassembly

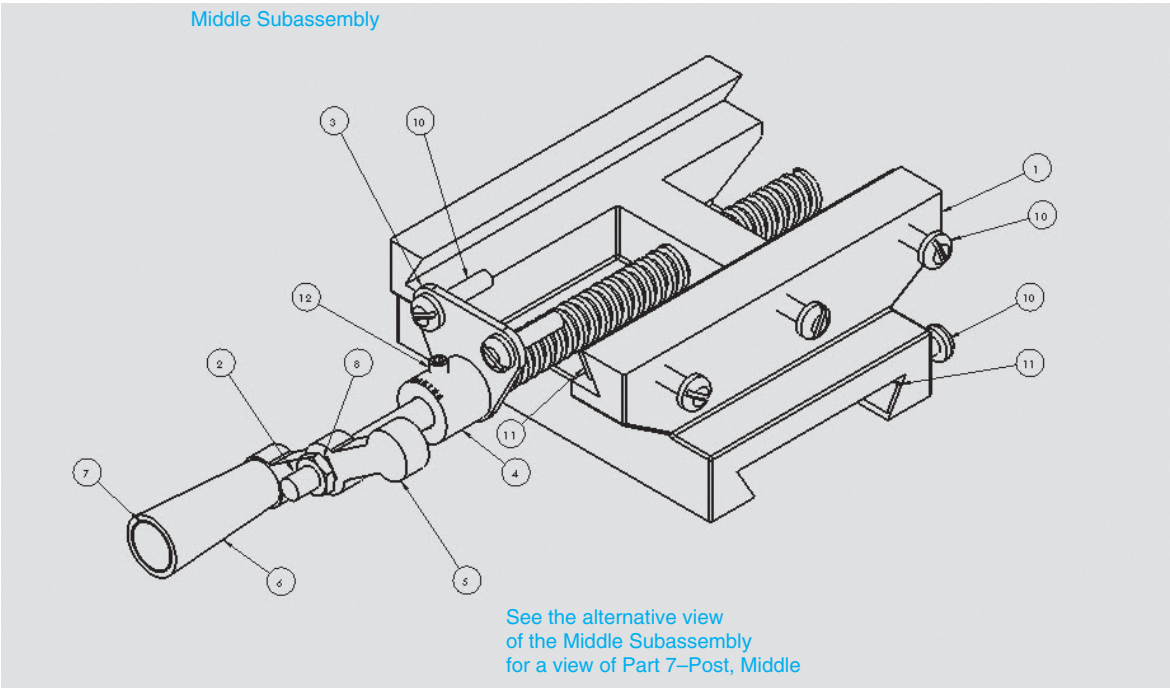
See Figure 16-11.

- A. An assembly drawing
- B. A BOM
- C. Dimensioned drawings of each part that is used in the Subassembly

NOTE

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

Middle Subassembly



Middle BOM

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

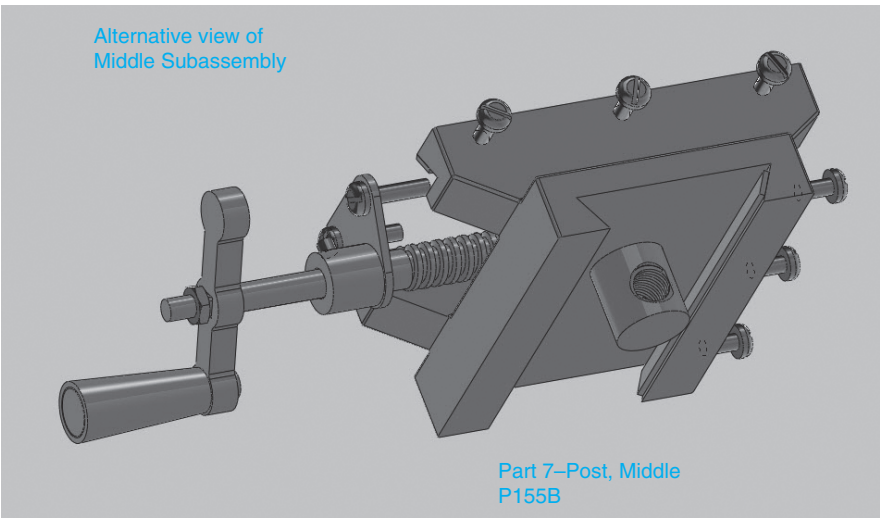


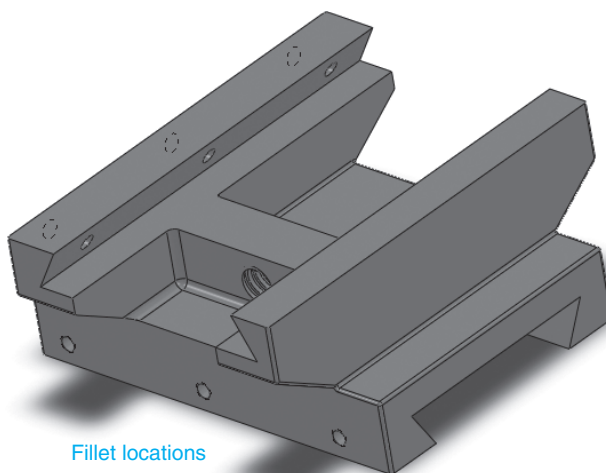
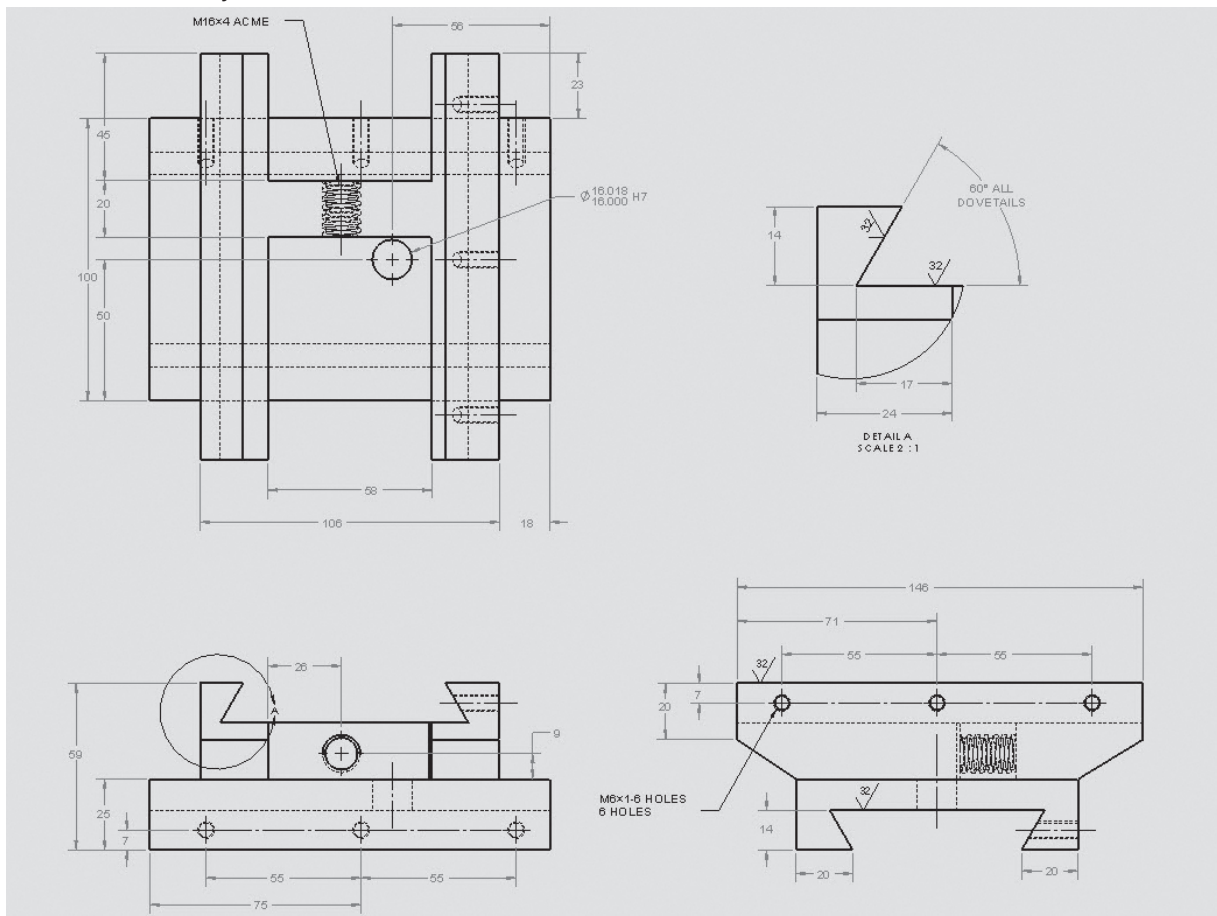
Figure 16-11

Dimensioned and tolerance drawings of the parts that make up the Base Subassembly are as follows:

Figure 16-12a and 16-12b Middle Subassembly

Note that Figure 16-12a shows a dimensioned drawing of the Support, Middle, but does not include any fillets. Fillets were omitted for clarity. Figure 16-12b is a 3D of the Support, Middle, that shows the fillets. Use the fillets shown in Figure 16-12b as a guide to applying fillets.

Middle Subassembly



Fillet locations

Figure 16-12

[illegible]

Technical drawing of a mechanical part showing a top view and a side view.

Top View Dimensions:

- Overall width: 32
- Distance from center to side holes: 16
- Height: 12
- Central hole diameter: $\varnothing 12$
- Side holes diameter: $\varnothing 8$ BOTH SIDES
- Corner radius: R12
- Side holes: R8 BOTH SIDES

Side View Dimensions:

- Thickness: 4

Technical drawing of a mechanical part showing a top view and a side view.

Top View:

- Outer diameter: $\varnothing 27$
- Inner diameter: $\varnothing 16.012$ (tolerance $k6$)

Side View:

- Total height: 28
- Top flange height: 12
- Central hole diameter: 12.0
- Thread specification: M1 6x4 ACME
- Chamfer: 2 x 45°

Note: Aligns with the acme, Base on the Base Subassembly

4 Top Subassembly

- A. An assembly drawing
- B. A BOM
- C. Dimensioned drawings of each part that is used in the Subassembly

NOTE

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

Bar, Spacer

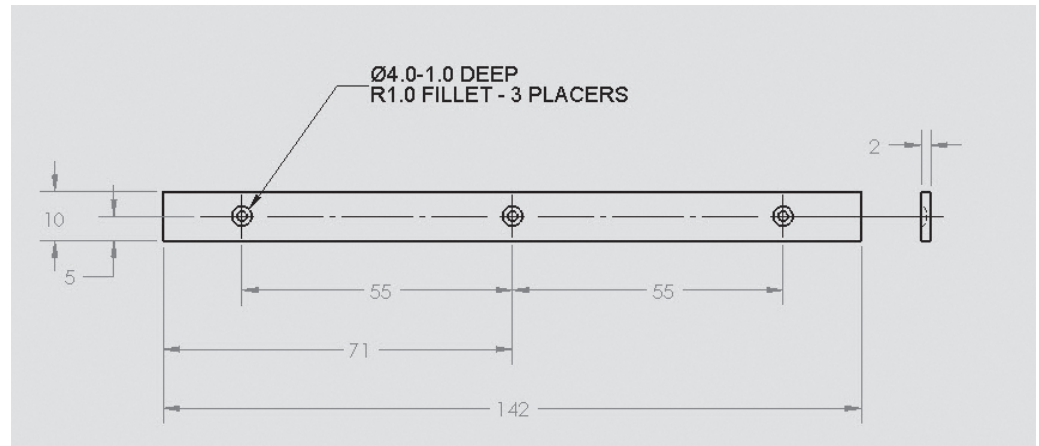


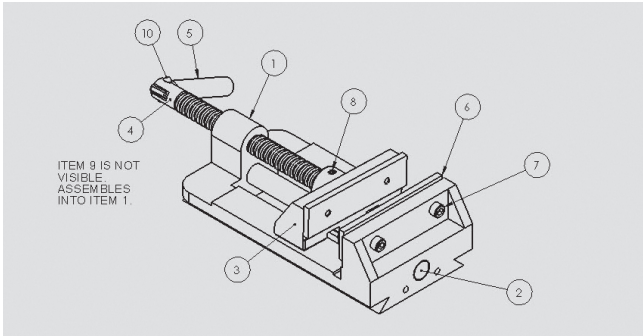
Figure 16-16

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

Figure 16-17a and Figure 16-17b Top Subassembly

Figure 16-17

Top Subassembly



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	FILLESTER HEAD SCREW	4
9	M6 × 1.0 × 8	SET SCREW - DOG	1
10	M6 × 1.0 × 6	SET SCREW - CUP	1

Support, Top

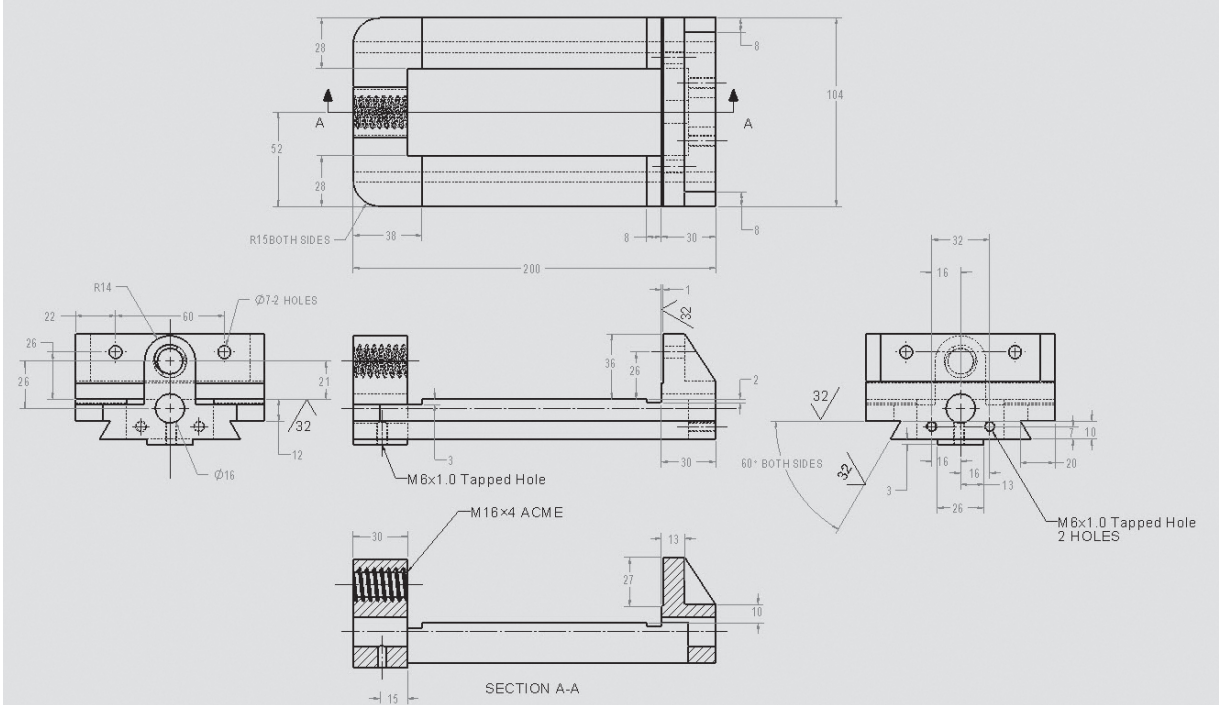


Figure 16-18

Figure 16-19

Post, Acme, Top
Post, Acme, Top

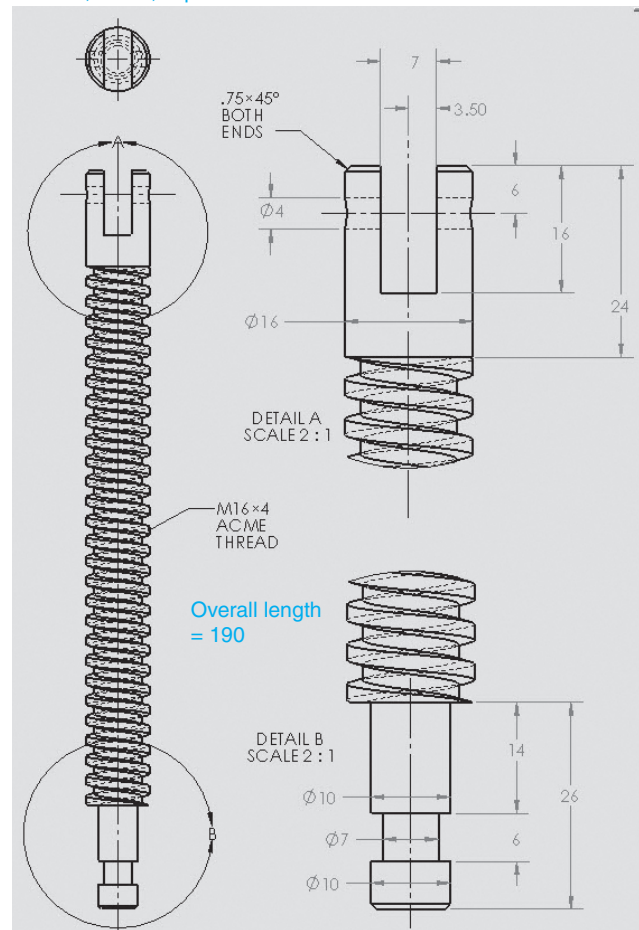


Figure 16-20

Post, Guide

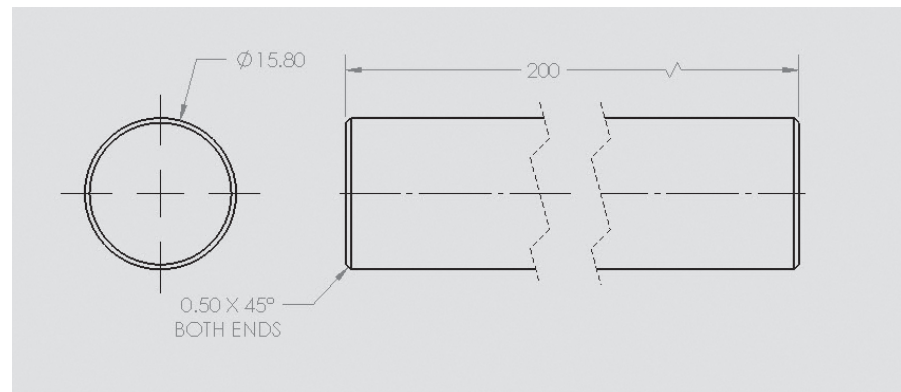


Figure 16-21a and 16-21b Jaw, Movable

Note that Figure 16-21a shows a dimensioned drawing of the Jaw, Movable, but does not include any fillets. Fillets were omitted for clarity. Figure 16-21b is a 3D of the Jaw, Movable, that shows the fillets. Use the fillets shown in Figure 16-21b as a guide to applying fillets.

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NOTE: ALL
FILLETS HAVE
BEEN REMOVED
FOR CLARITY

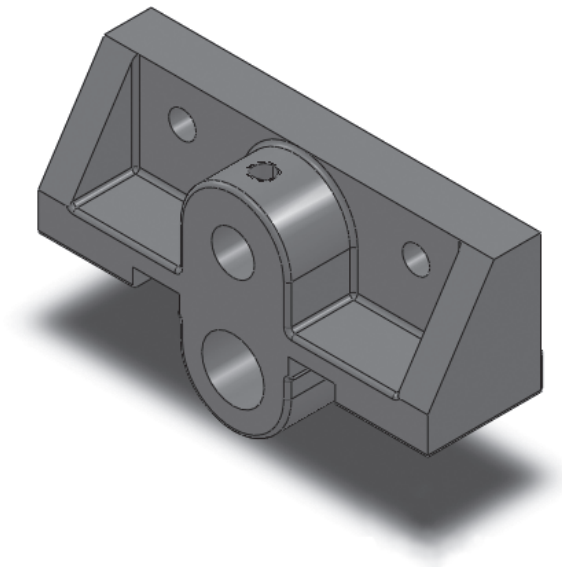


Figure 16-22

Handle

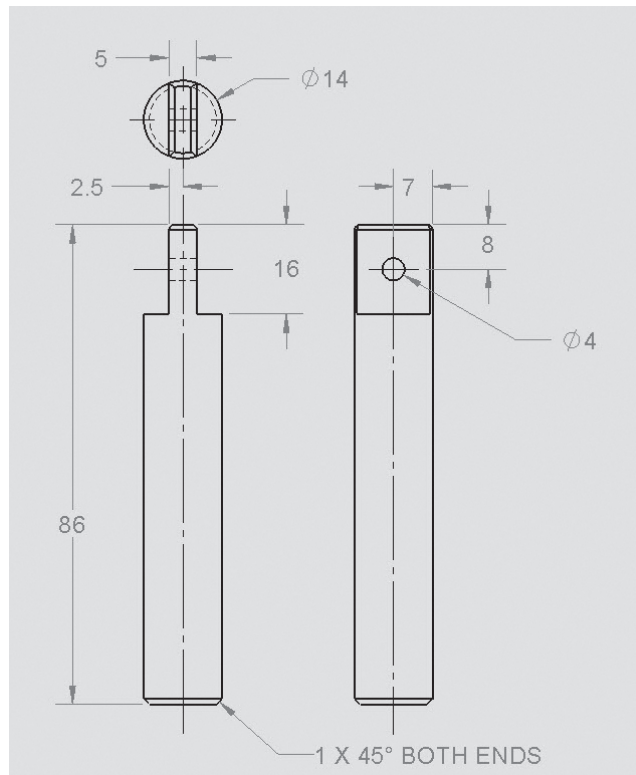
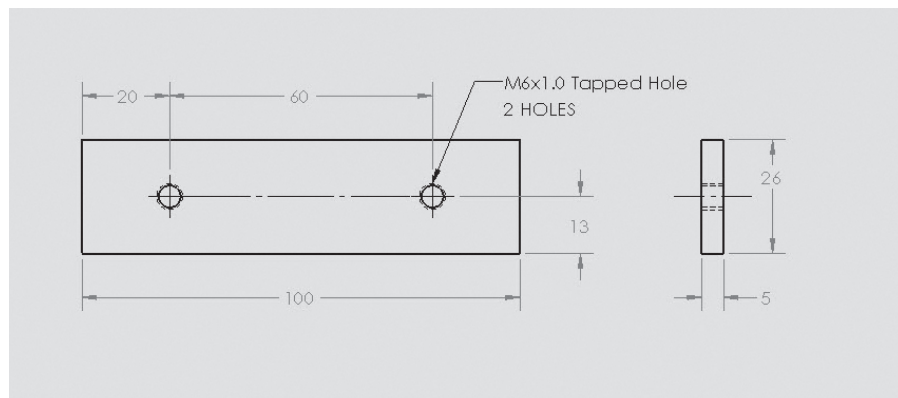


Figure 16-23

Plate, Jaw



16-3 Project 2: Tenon Jig

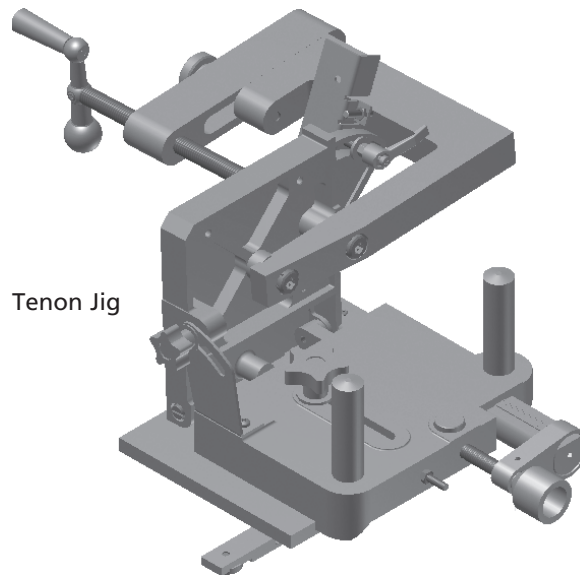
The Tenon Jig has four main subassemblies: Clamping, Vertical, Base Plate, and Guide Plate. There are other parts that are used in the final assembly. This is intended to be a group project, but could be done by one person. Complete the following assignments:

A. Draw 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.

- B. Draw 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.
- C. Draw 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.
- D. Draw 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.
- E. Create an Assembly drawing of the Tenon Jig.
 - 1 Create a BOM for the Tenon Jig.

Figure 16-24a



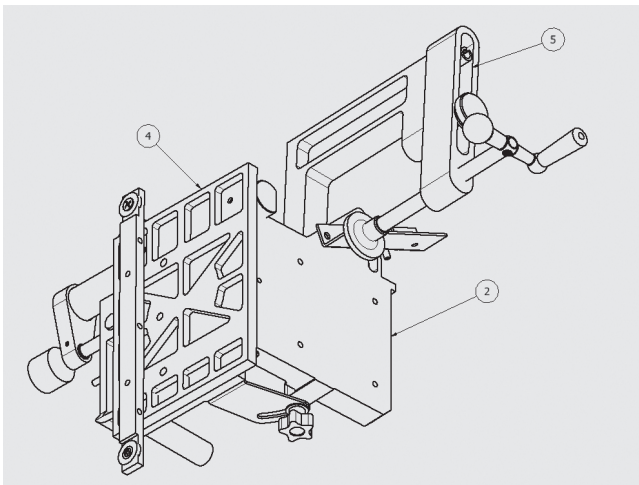


Figure 16-24b

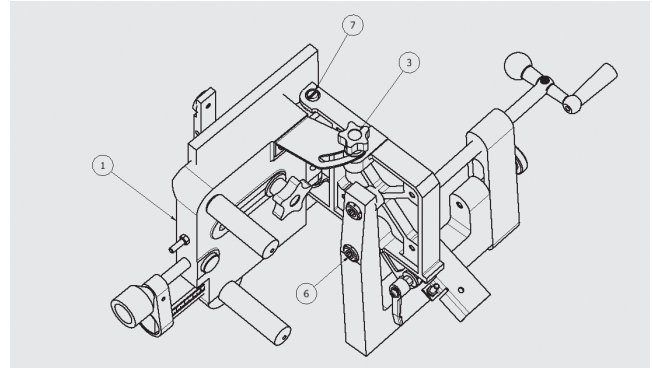


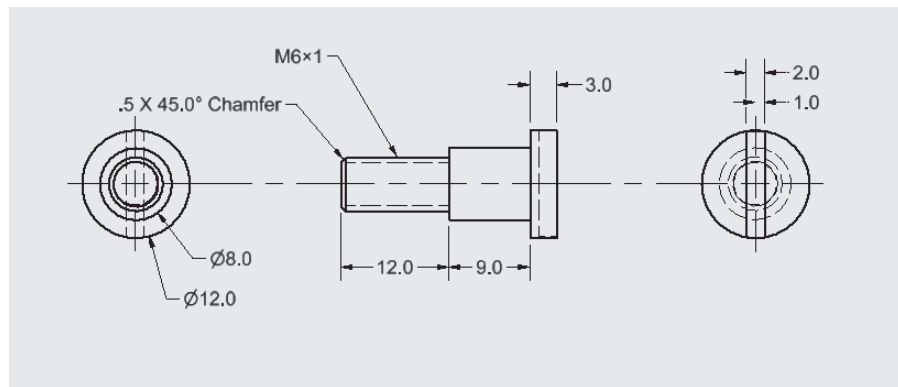
Figure 16-24c

Figure 16-24d

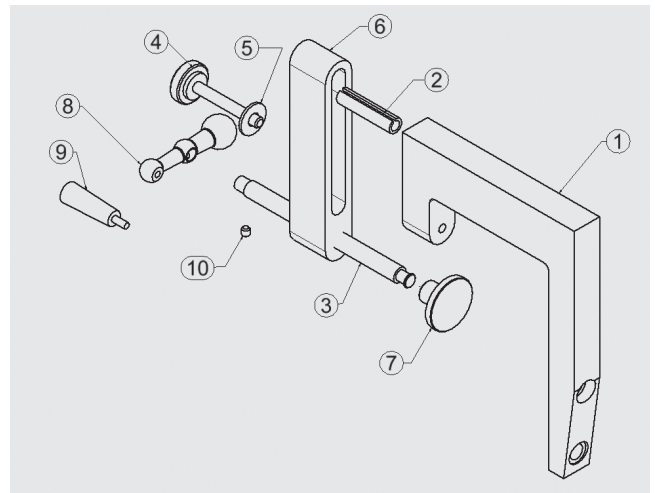
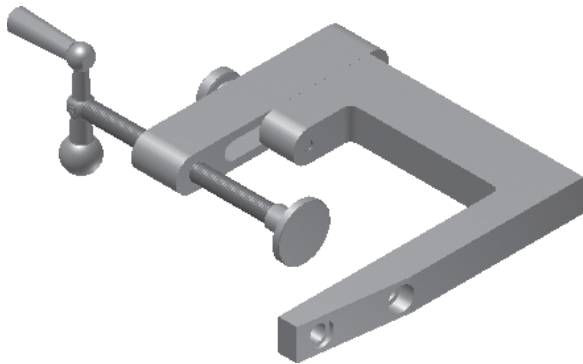
PARTS LIST				
ITEM	PART NUMBER	DESCRIPTION	MATERIAL	QTY
1	SA-1	BASE SUB-ASSEMBLY		1
2	SA-2	VERTICAL SUB-ASSEMBLY		1
3	SA-3	ADJUSTER SUB-ASSEMBLY		1
4	SA-4	GUIDE SUB-ASSEMBLY		1
5	SA-5	CLAMP SUB-ASSEMBLY		1
6	M10x1.5 x 25	DRILLED FORGED HEXAGON SOCKET HEAD CAP SCREW	MILD STEEL	2
7	SA-6B	SLOTTED HEAD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

Figure 16-24e

Slotted Head Machine Screw
PN: SA-6B



Clamp Subassembly
PN: SAS



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 16-25

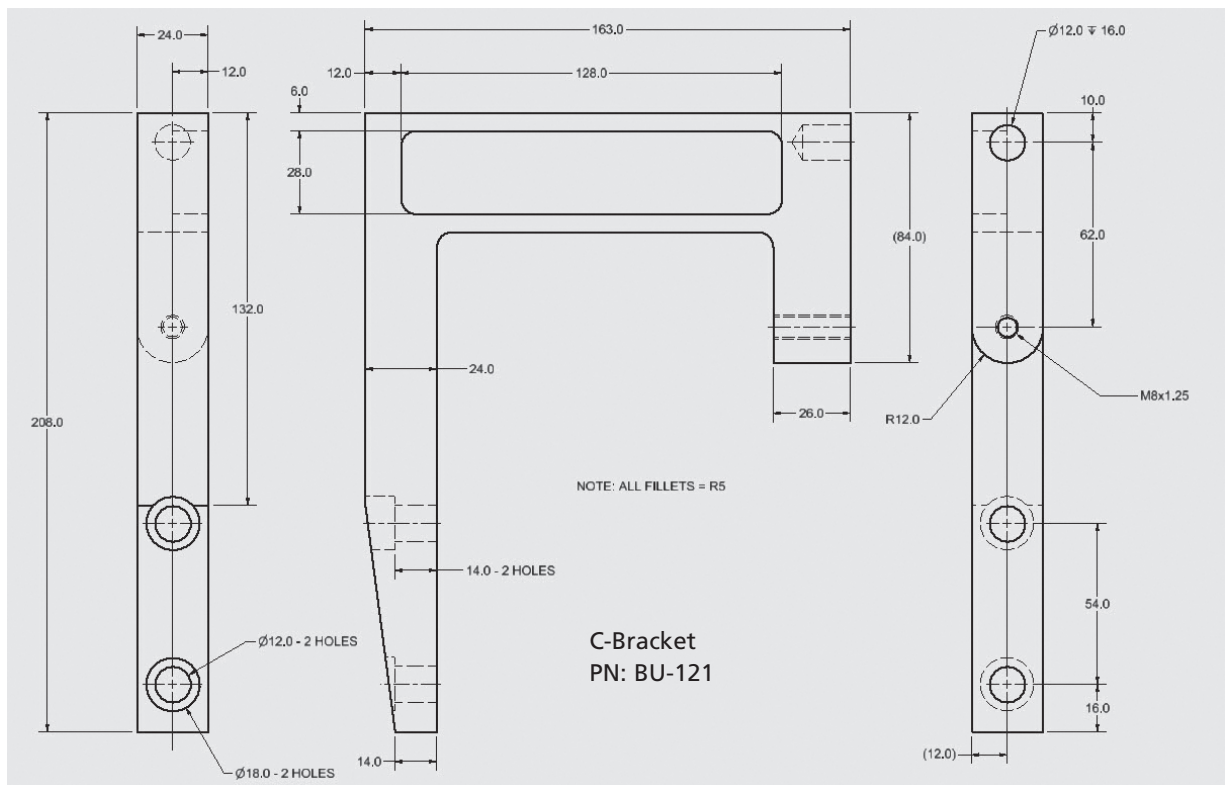


Figure 16-26

Pin
PN: BU-122

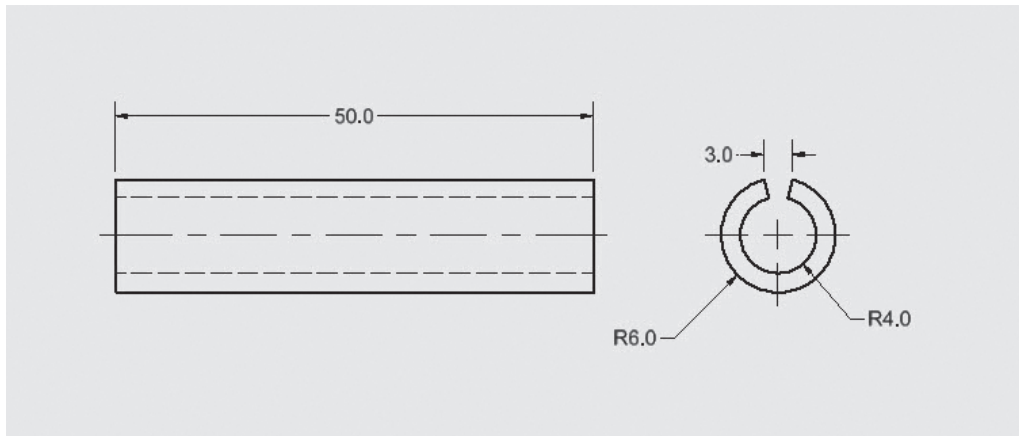


Figure 16-27

Post Threaded
PN: BU-123

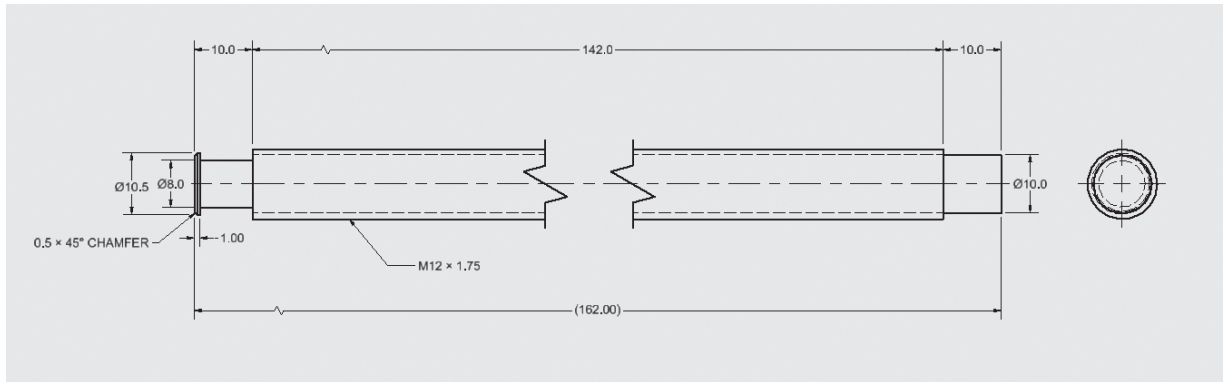


Figure 16-28

Screw, Thumb
PN: BU-124

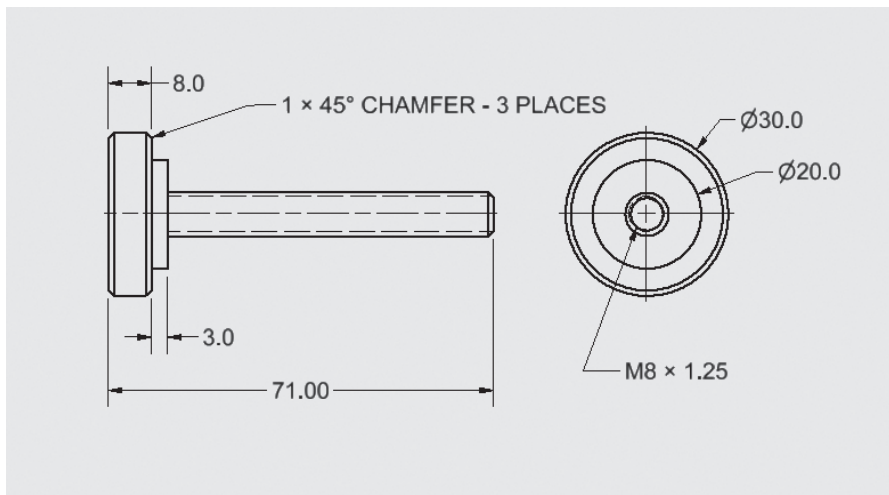


Figure 16-29

Slider
PN: BU-125

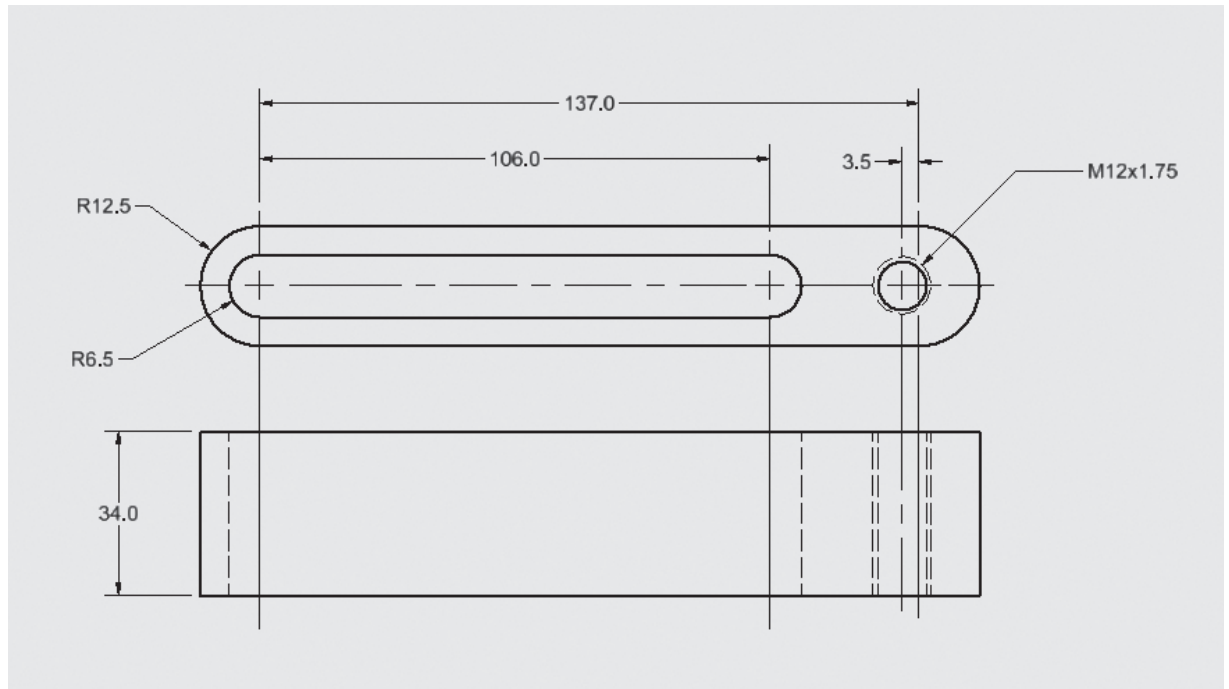


Figure 16-30

Holder
PN: BU-126

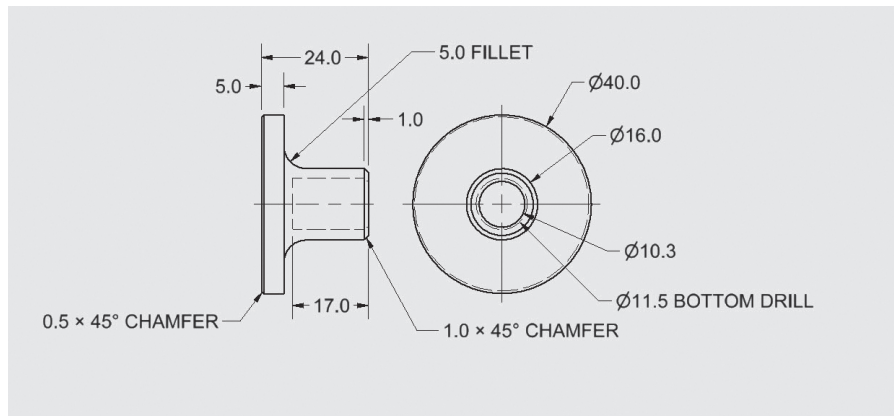
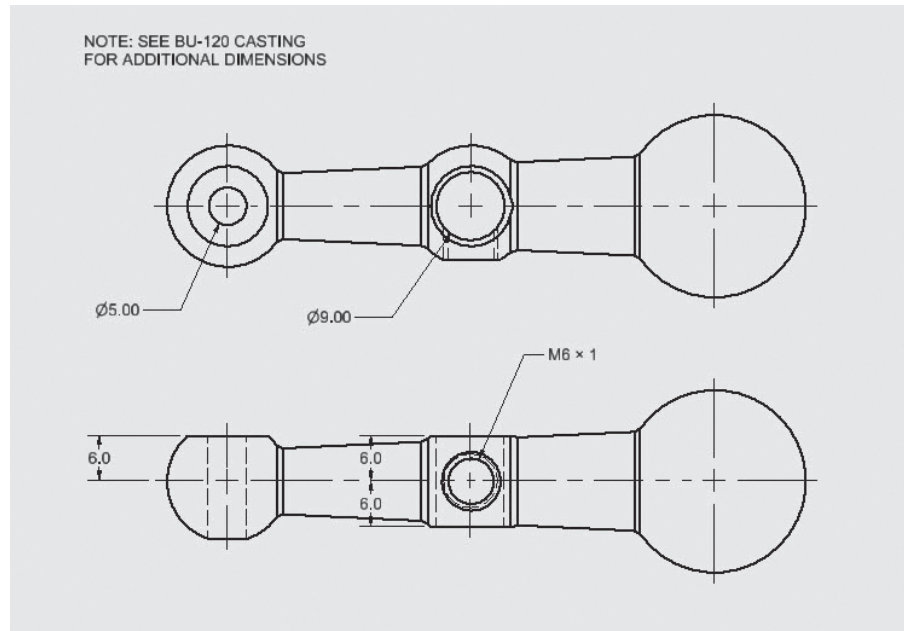


Figure 16-31

Figure 16-32

Pivot, Handle
PN: BU-127



Casting for Pivot, Handle

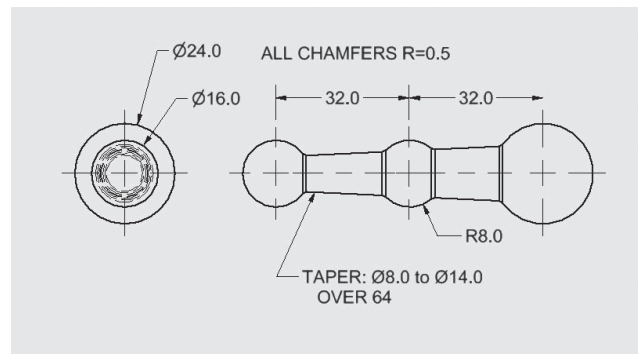


Figure 16-33

Post, Handle
PN: BU-128

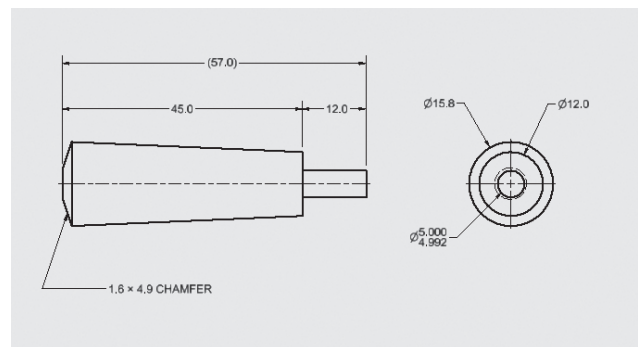
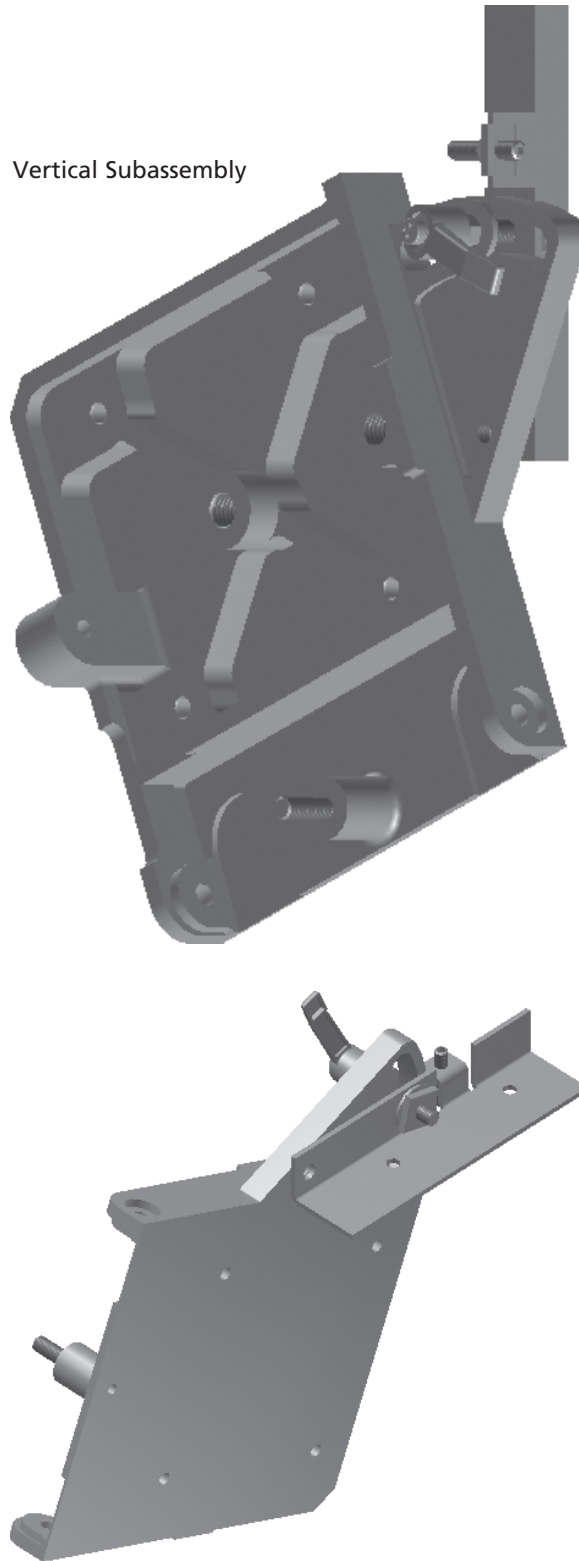


Figure 16-34

Vertical Subassembly



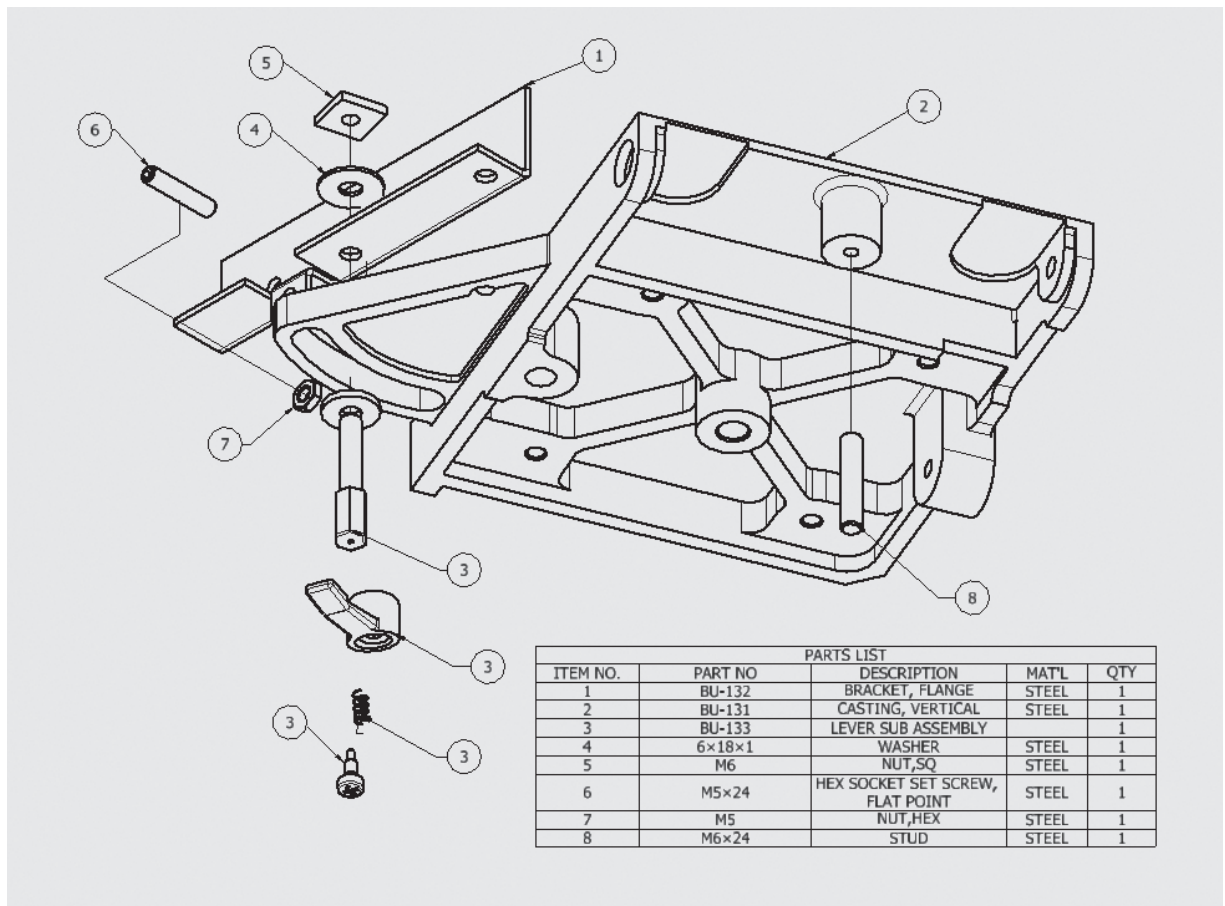


Figure 16-35

Bracket, Flange
PN: BU-132

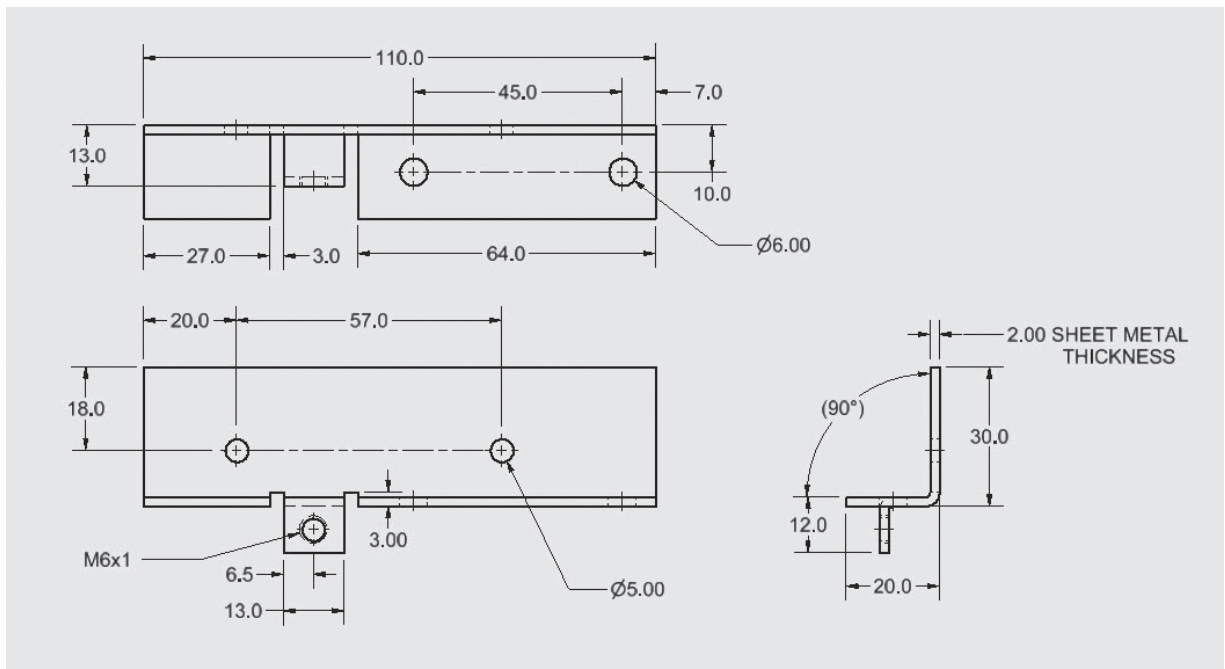


Figure 16-36

Figure 16-37a

Casting, Vertical
PN: BU-131

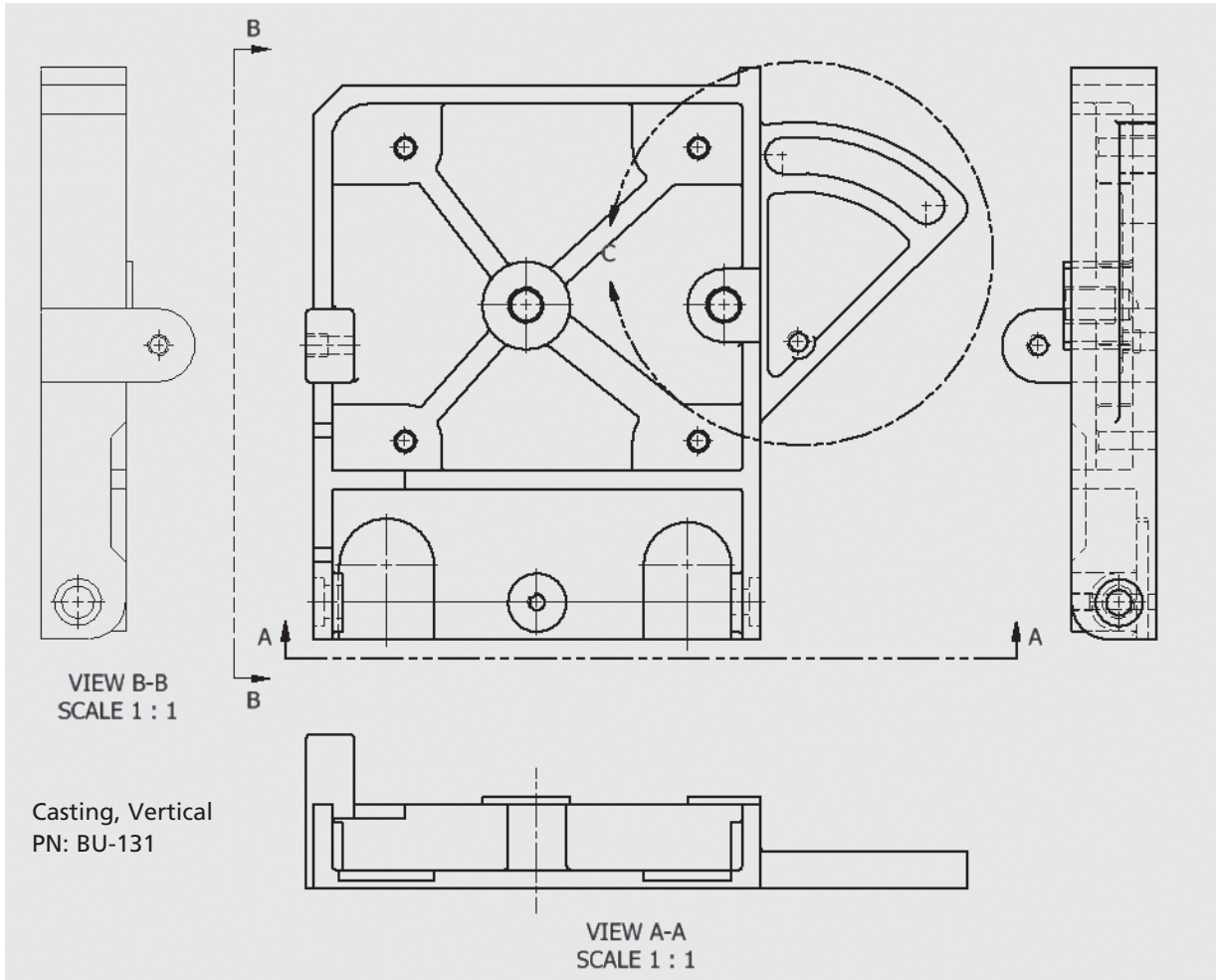
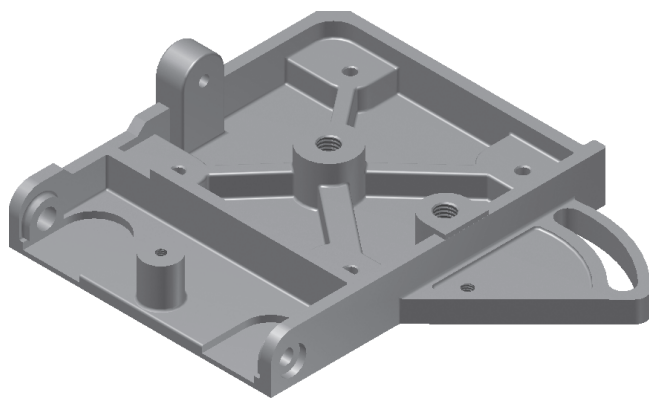


Figure 16-37b

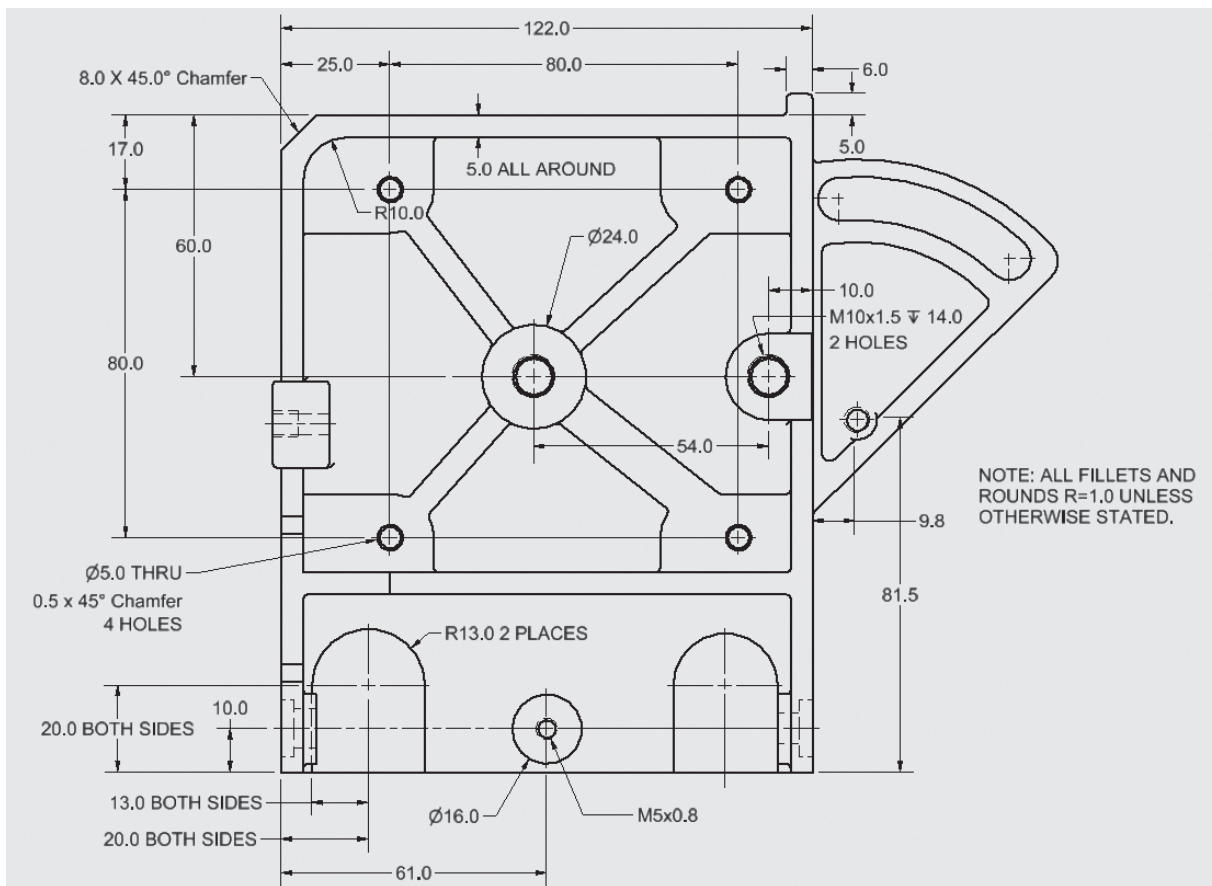


Figure 16-37c

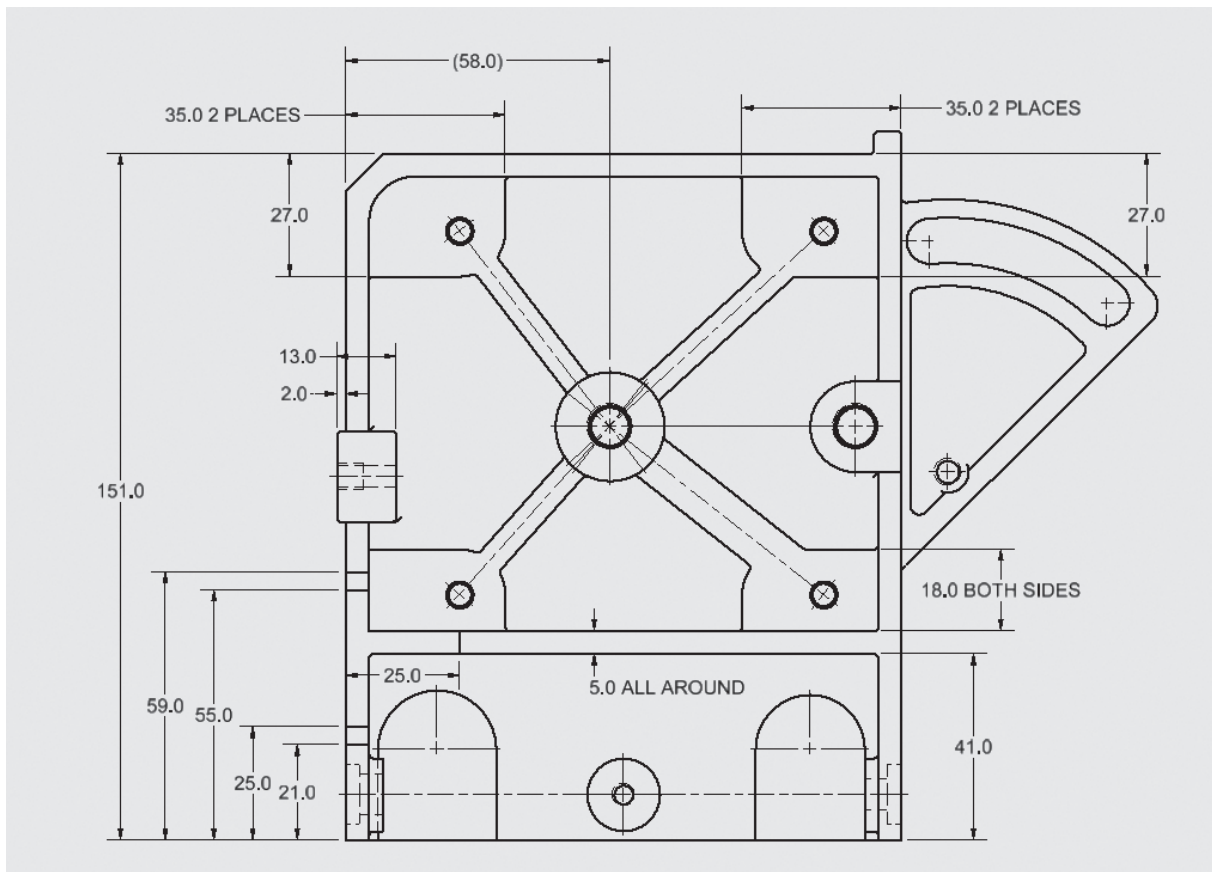


Figure 16-37d

Figure 16-37e

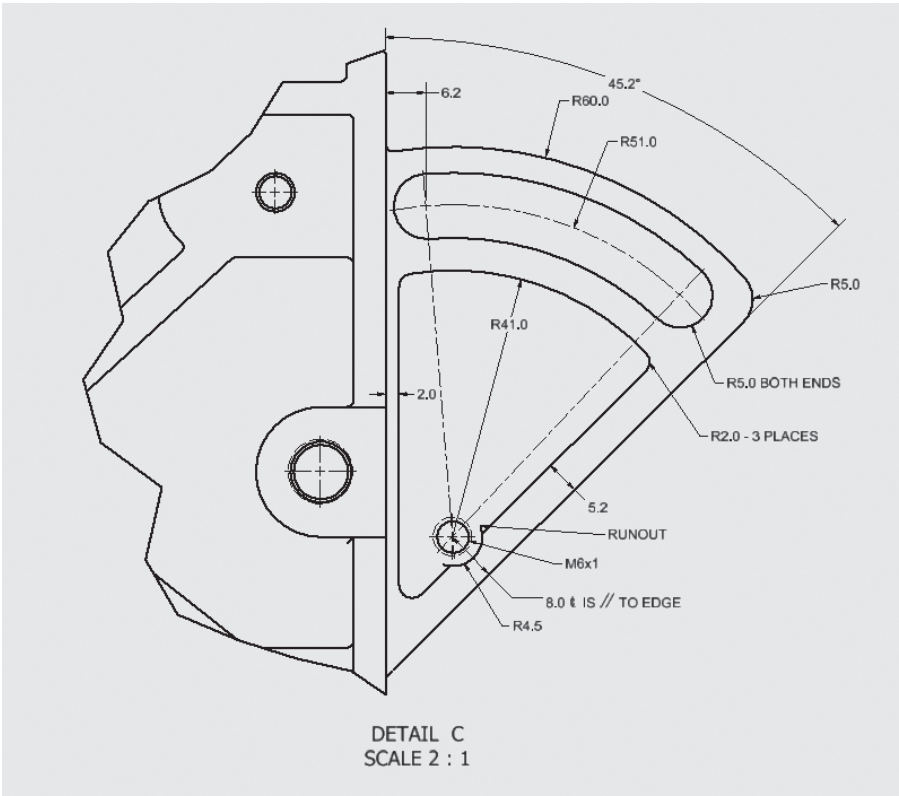
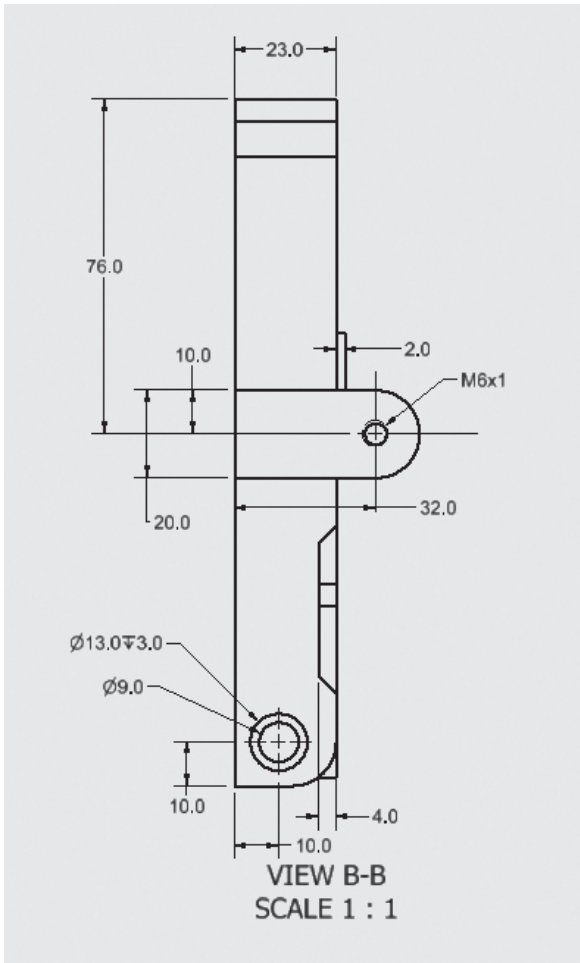


Figure 16-37f



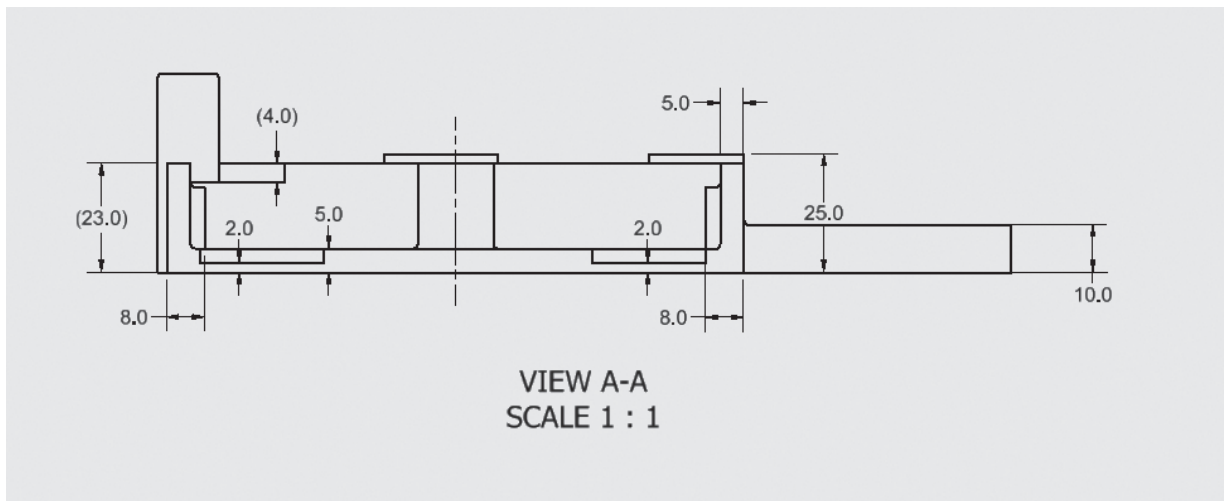
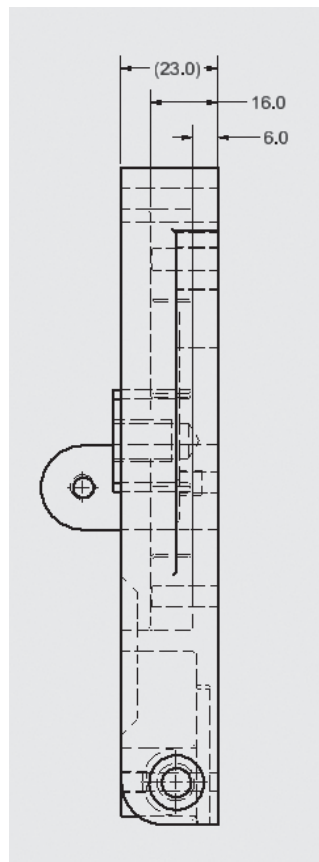


Figure 16-37g

Figure 16-37h

Right Side View



Lever Subassembly
PN: BU-133

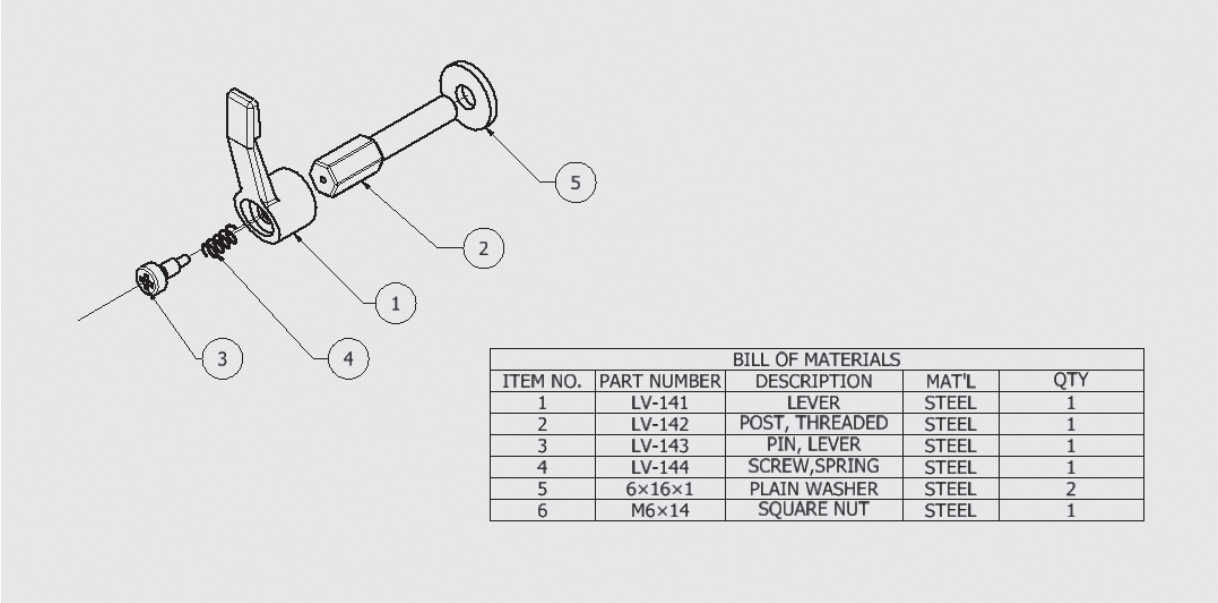


Figure 16-38a

Lever
PN: LV-141

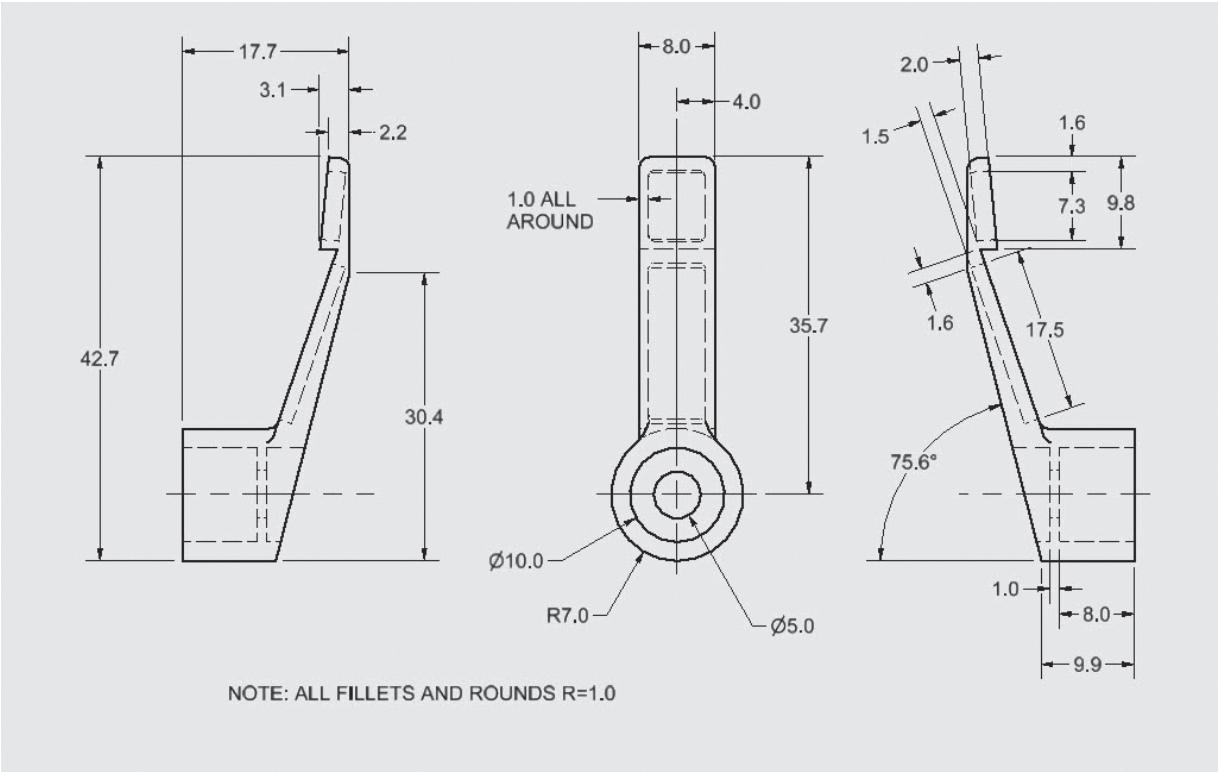


Figure 16-38b

Figure 16-38c

Post, Threaded
PN: LV-142

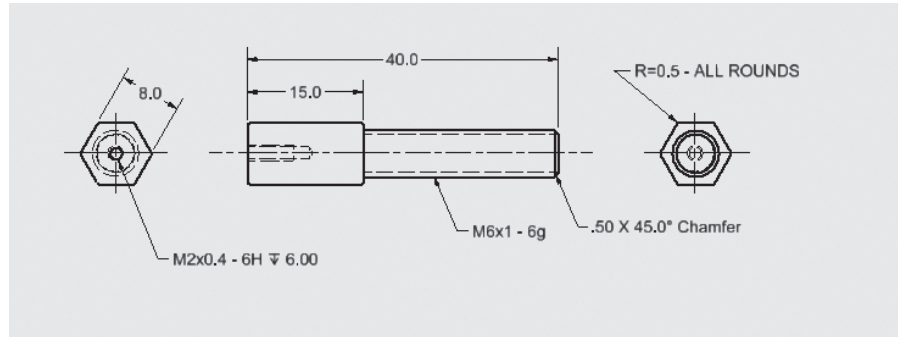


Figure 16-38d

Pin, Lever
PN: LV-143

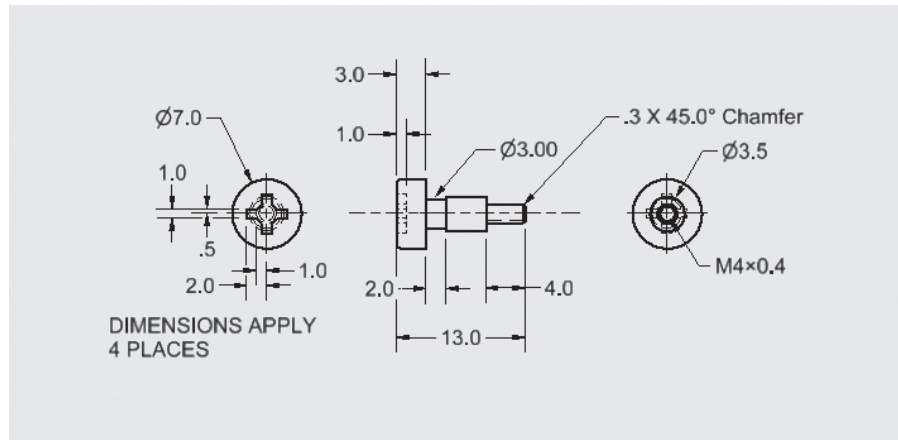


Figure 16-38e

Screw, Spring
PN: LV-144

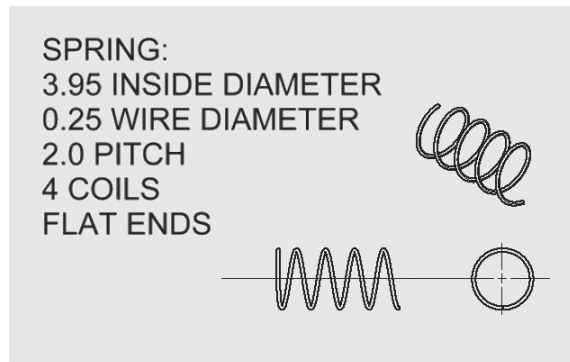


Figure 16-39a

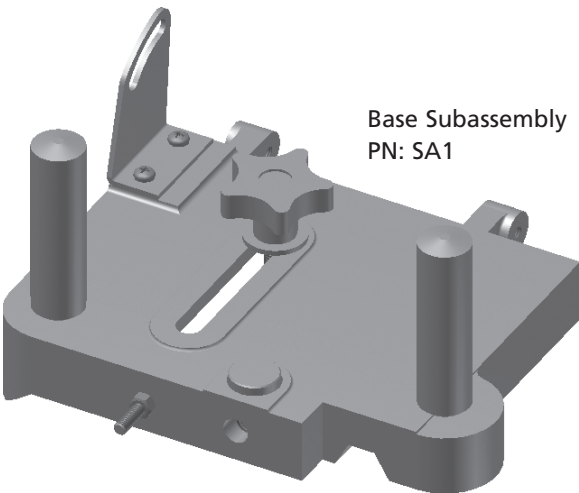


Figure 16-39b

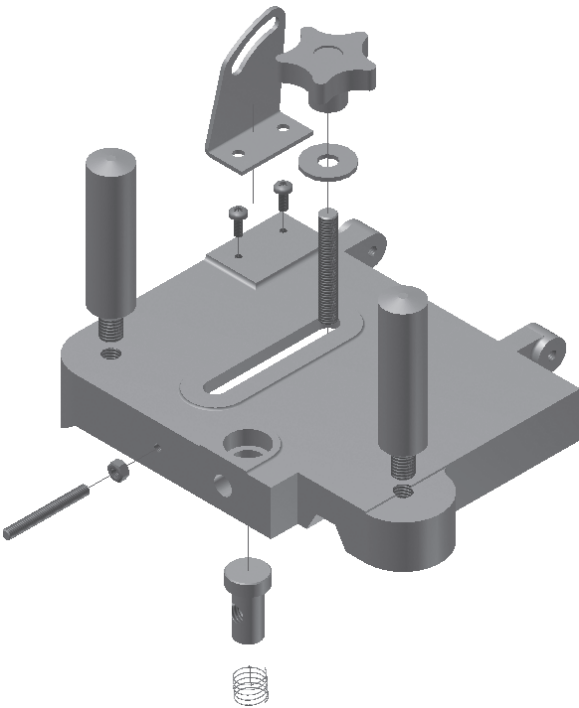


Figure 16-39c

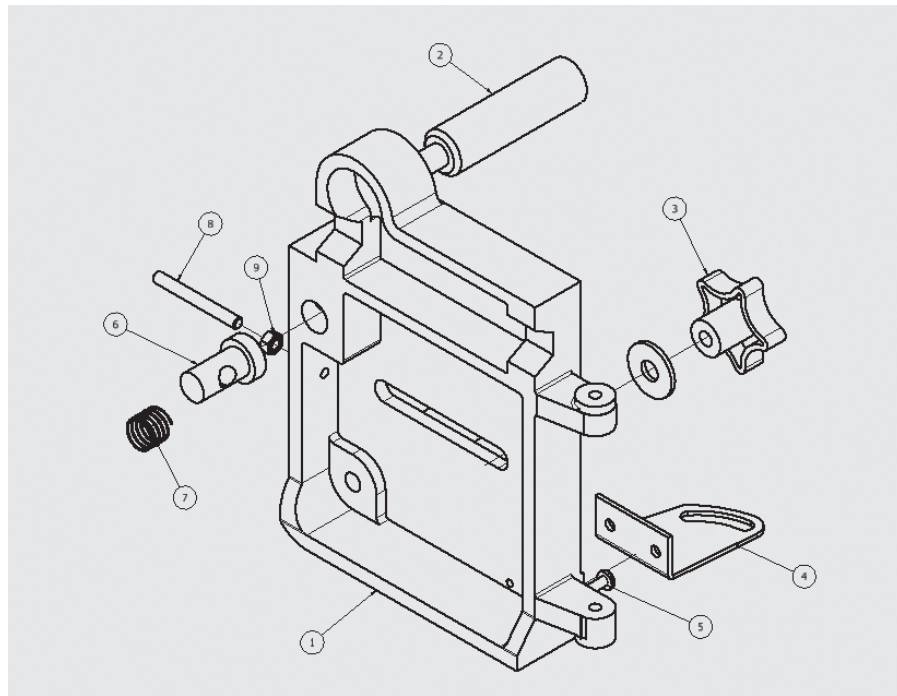


Figure 16-39d

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 SUB-ASSEMBLY		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

Plate, Base
BU-306-A

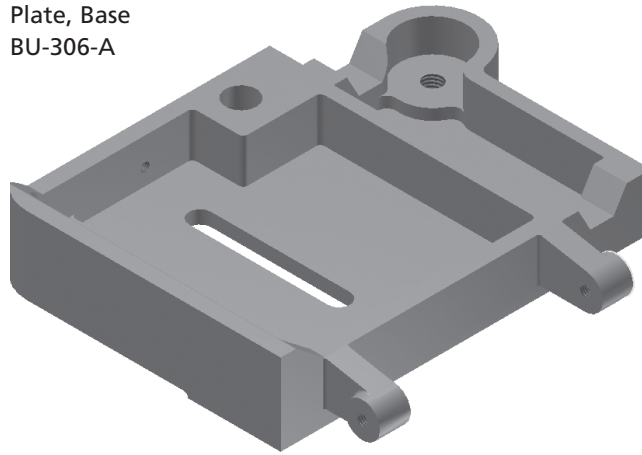


Figure 16-40b

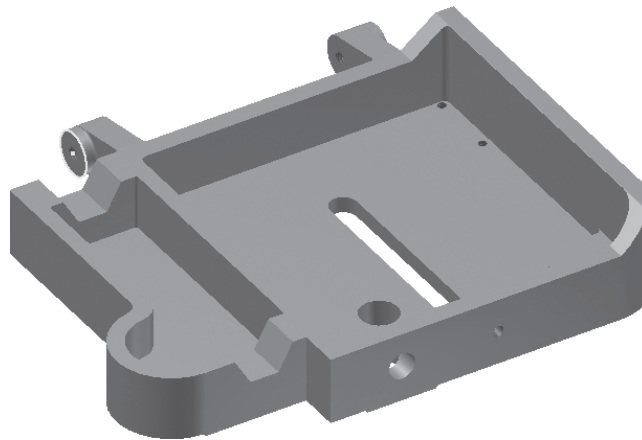


Figure 16-40c

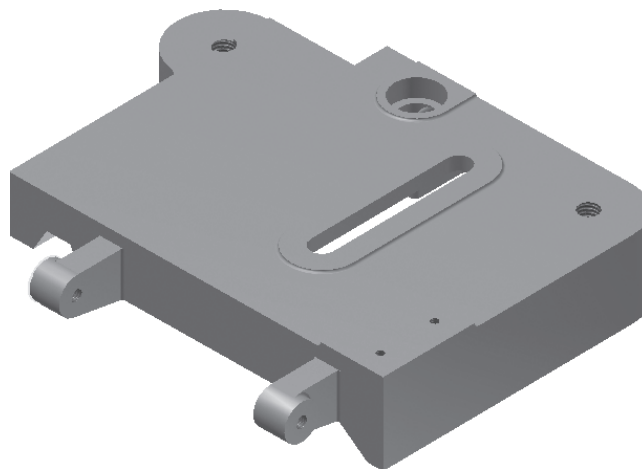






Figure 16-40g

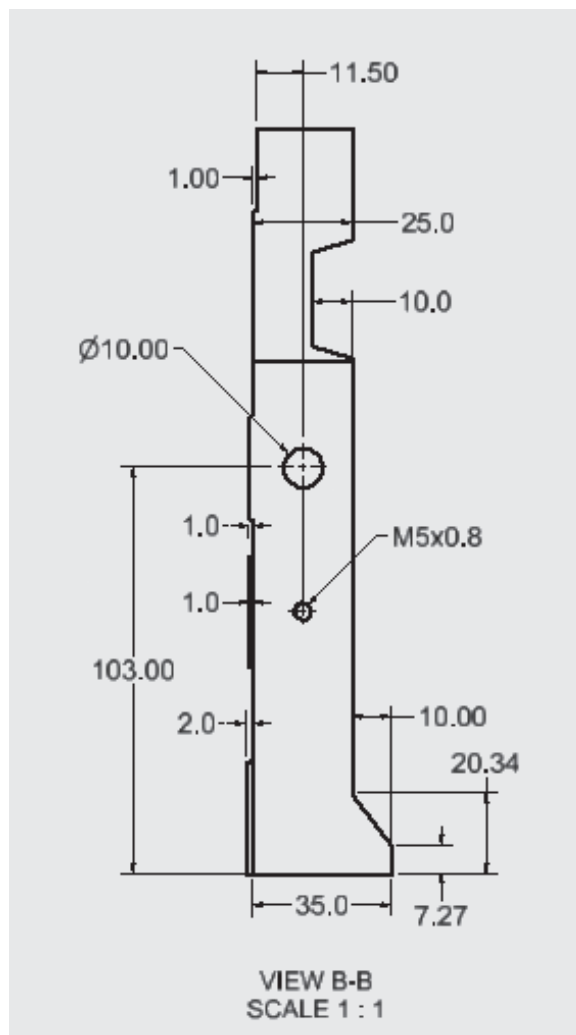


Figure 16-40h

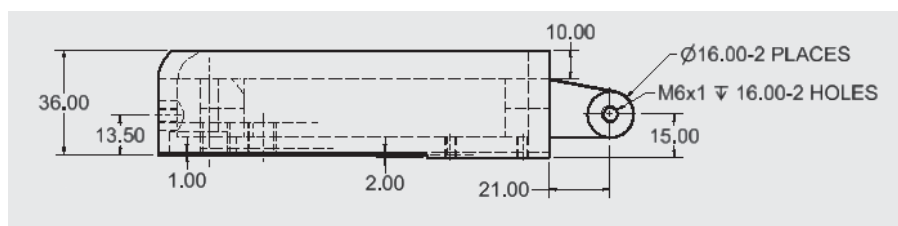
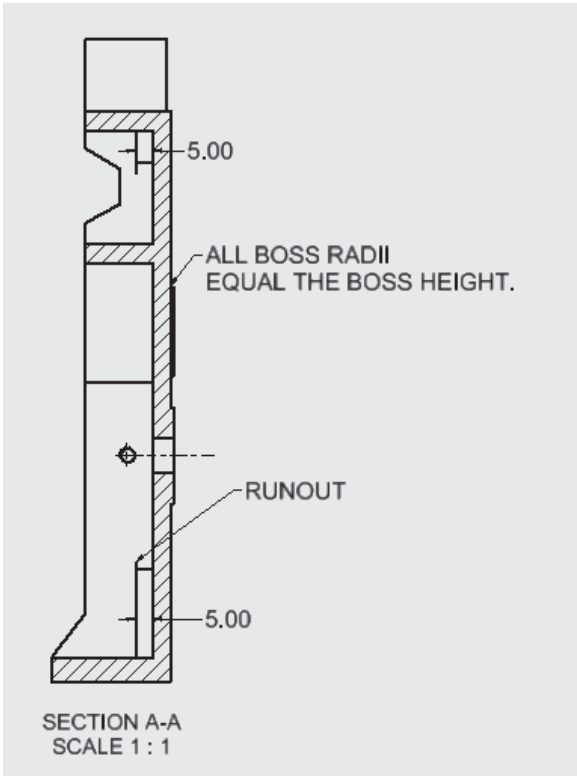


Figure 16-40i



Post Handle, Large
PS3-A2

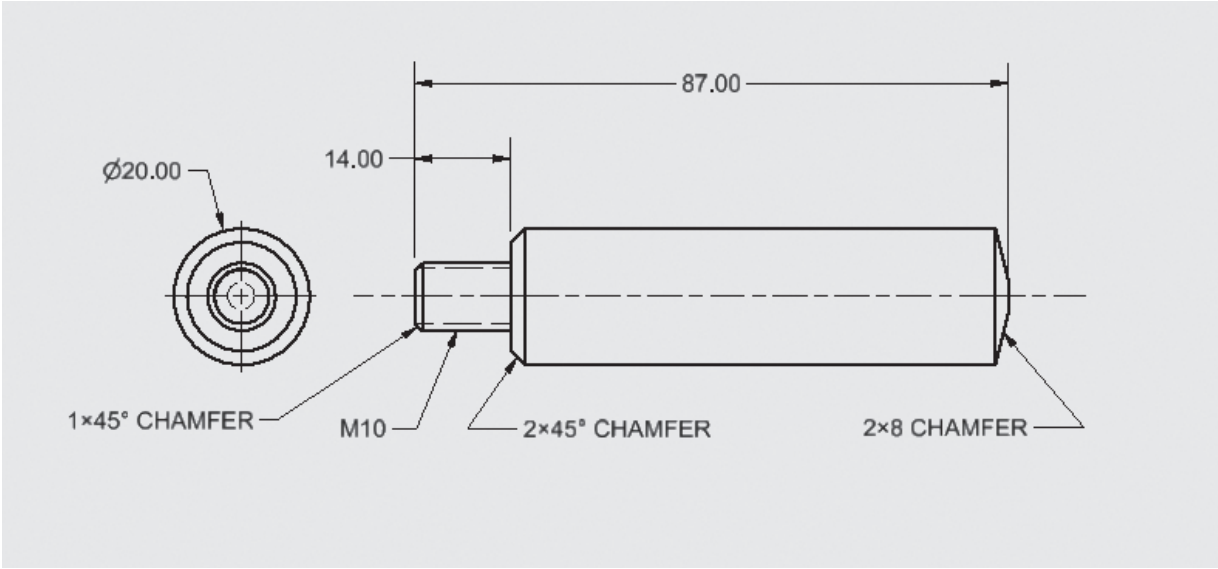


Figure 16-41

Large Knob Subassembly
PN: HS-21

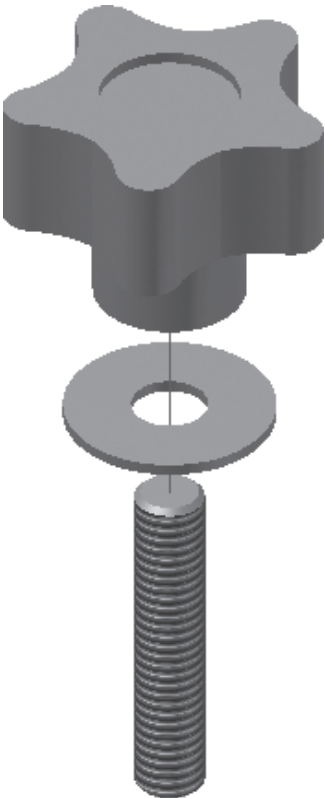


Figure 16-42a

Large Knob Subassembly
PN: HS-21

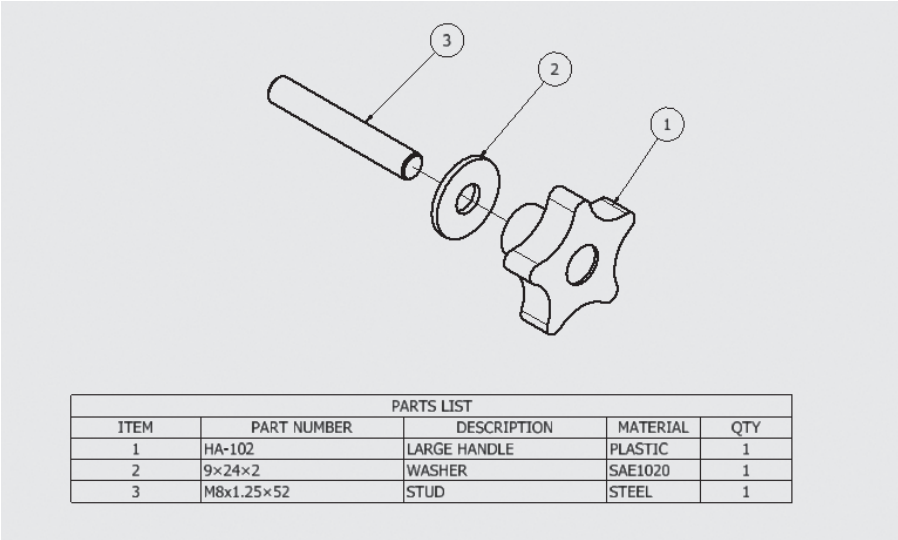
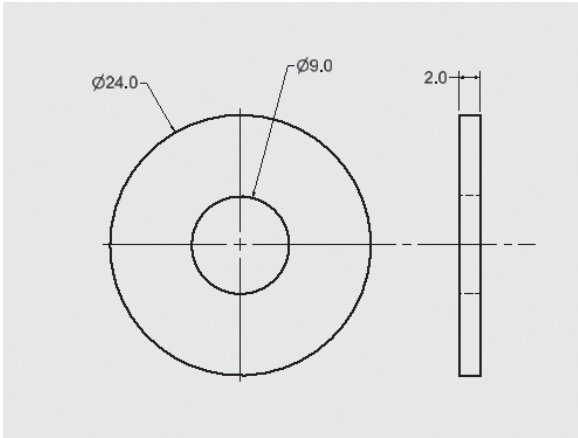


Figure 16-42b

Figure 16-42c

Washer
9 × 24 × 2



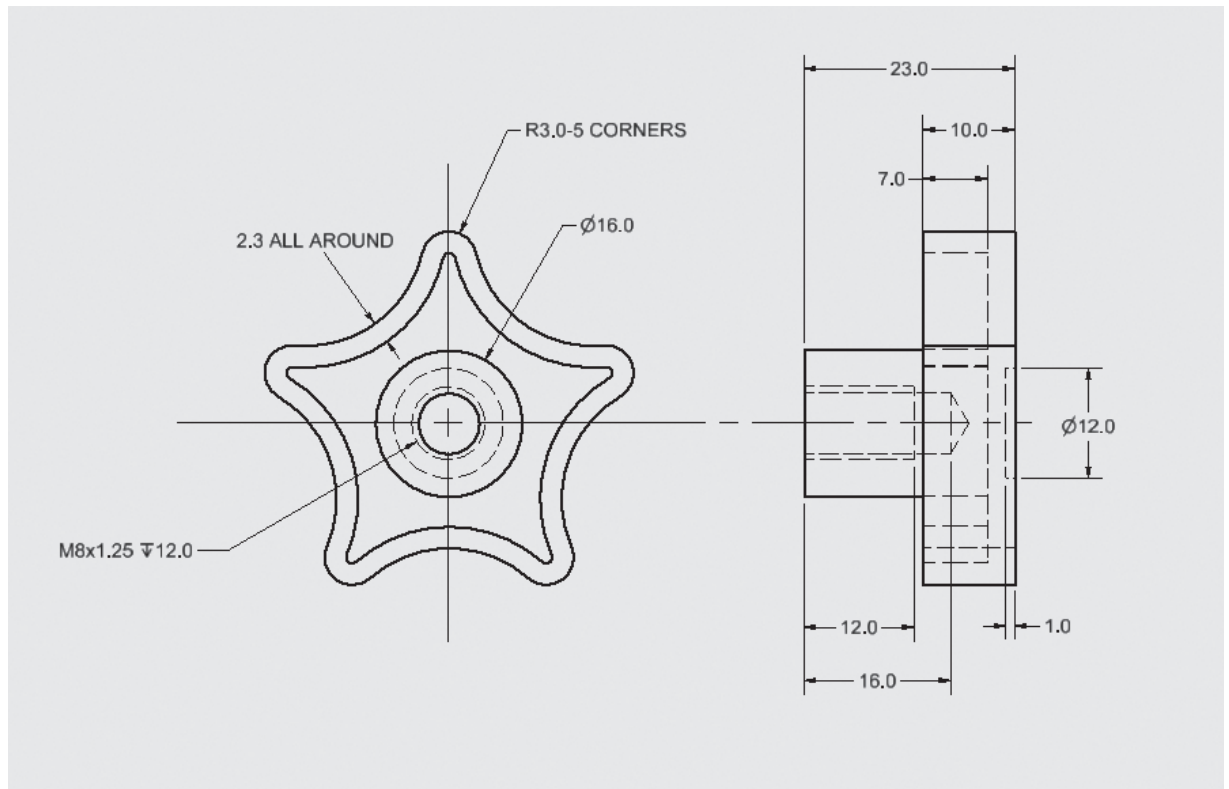
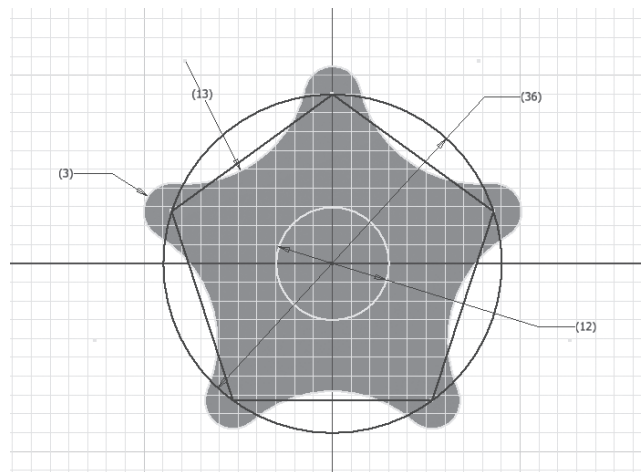


Figure 16-42d

Figure 16-42e

Layout for Large Handle



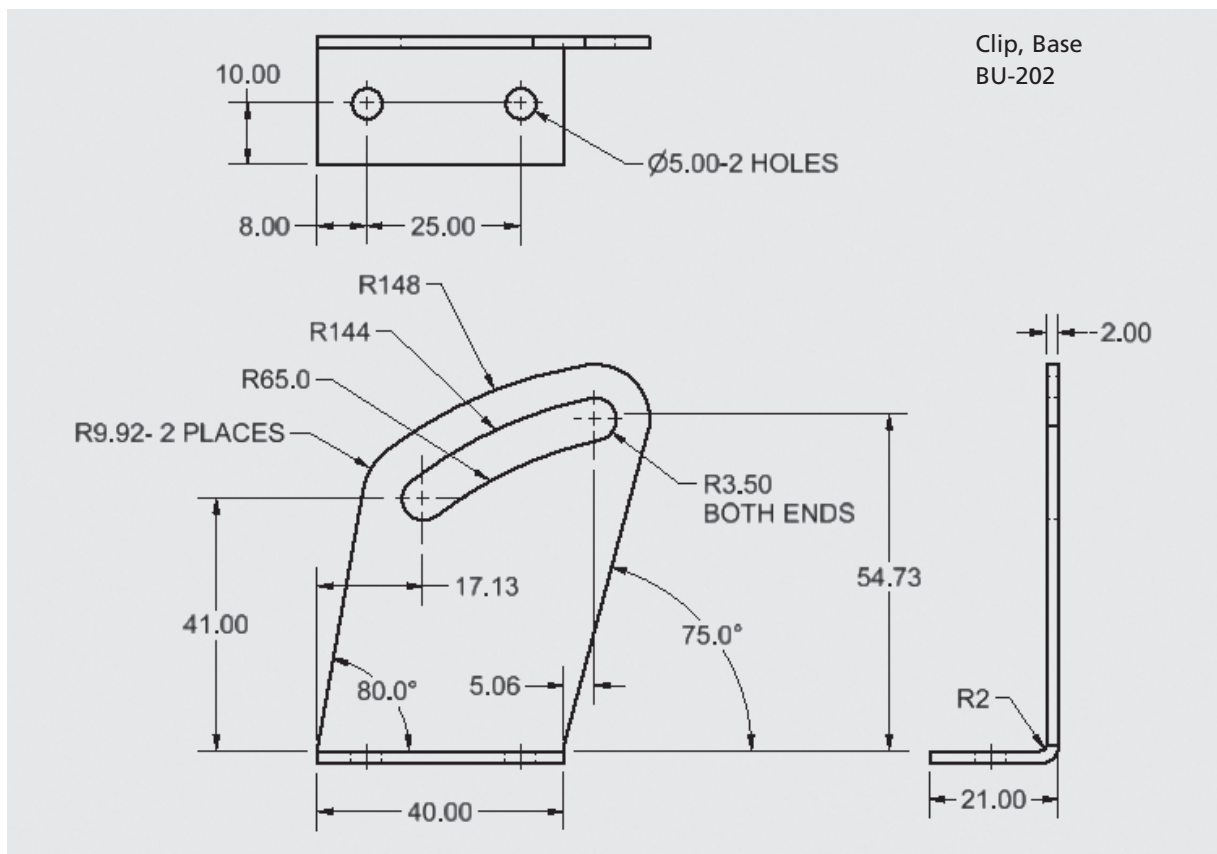
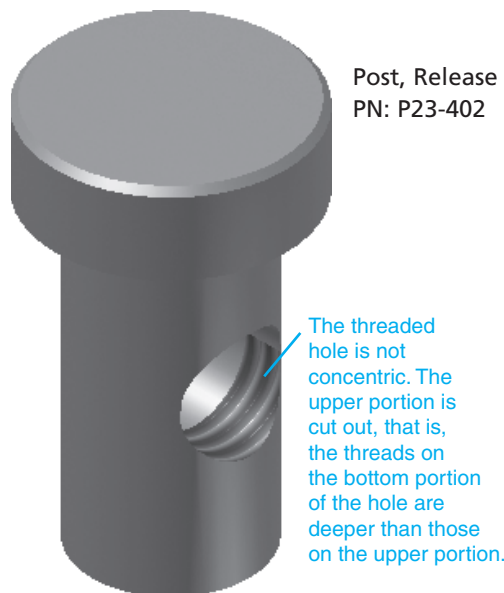


Figure 16-43

Figure 16-44a



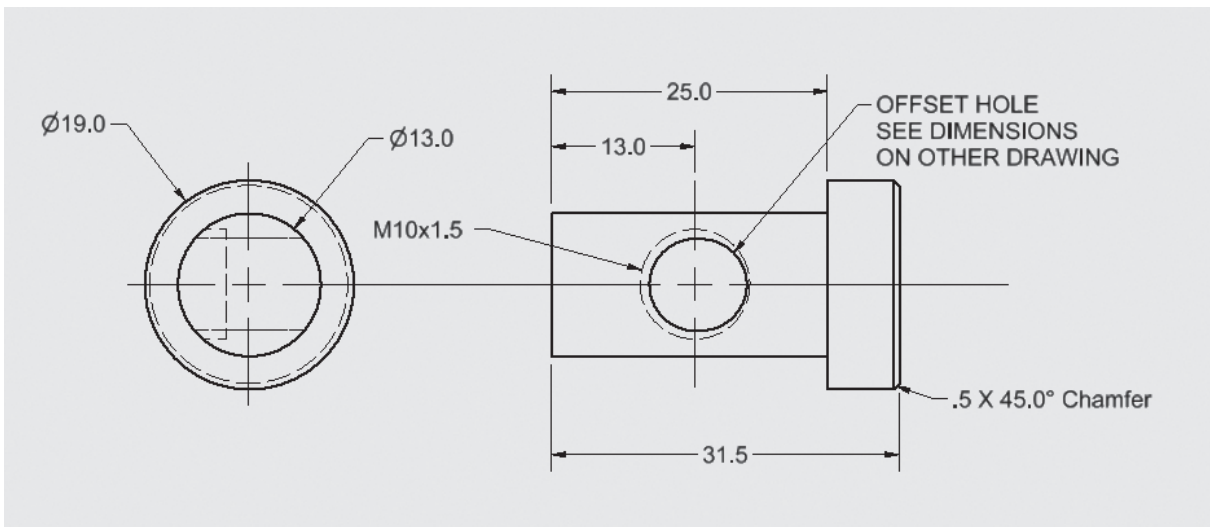


Figure 16-44b

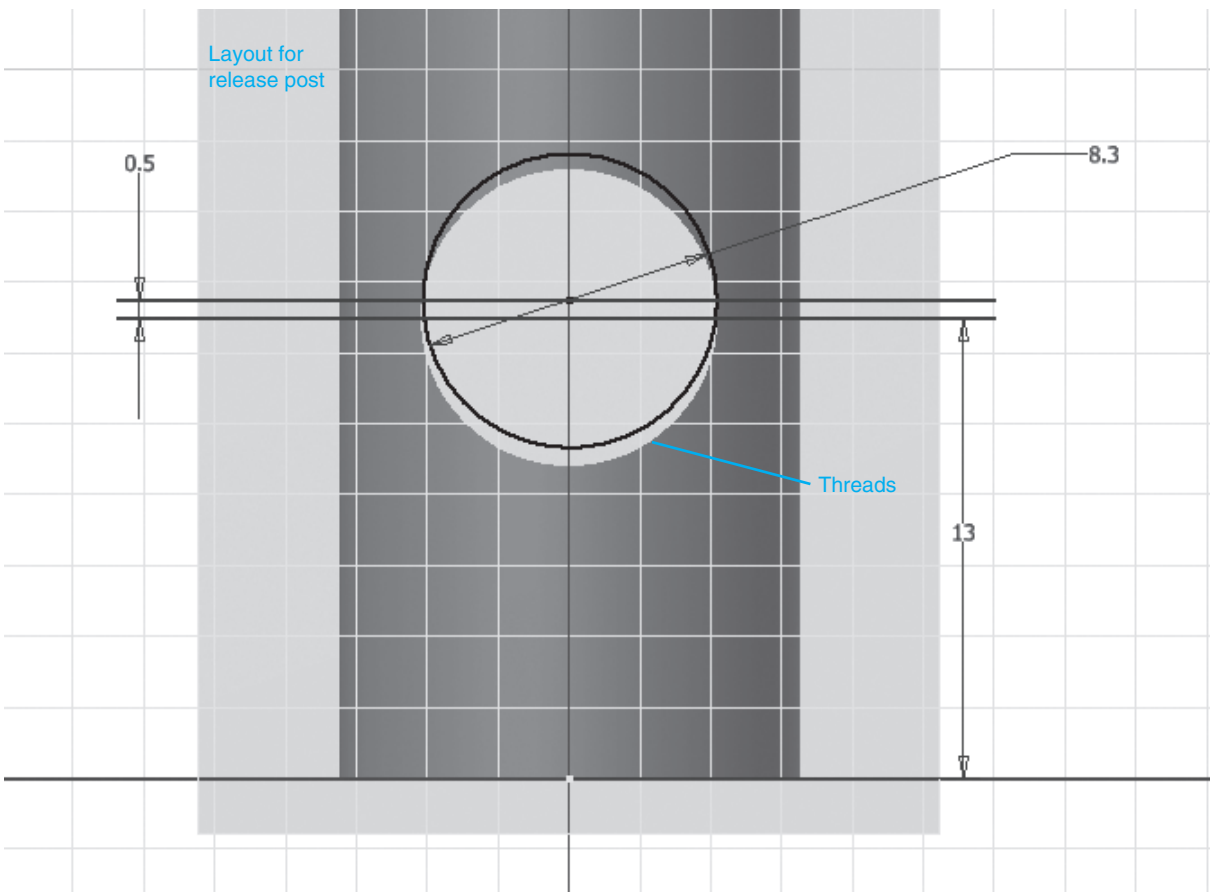


Figure 16-44c

Figure 16-45

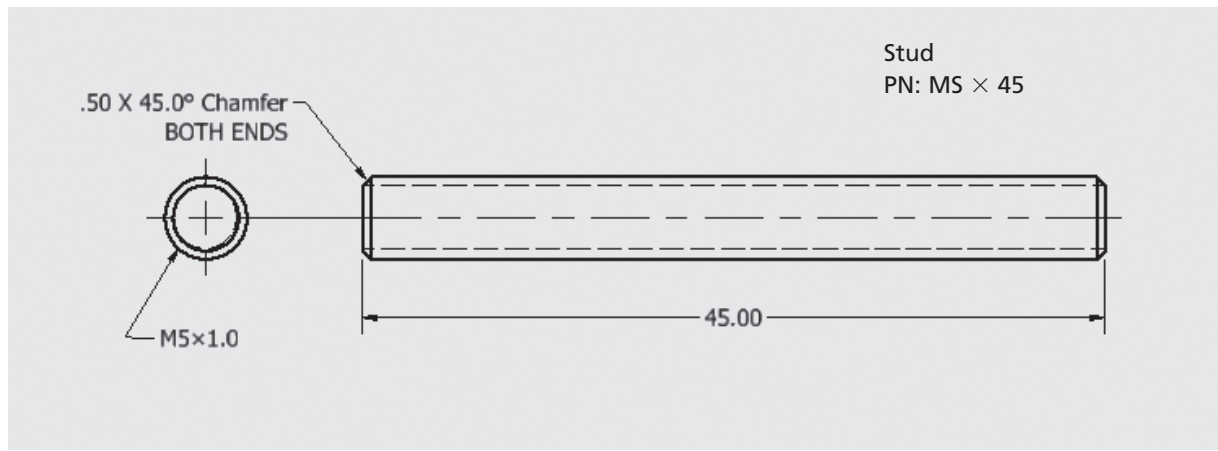
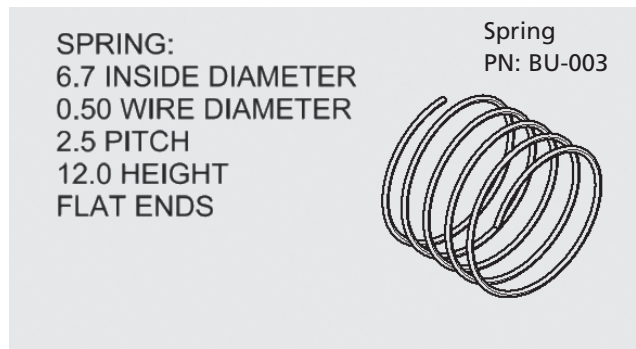


Figure 16-46

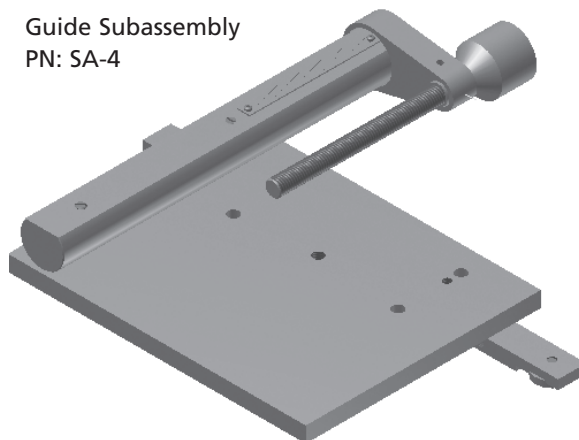


Figure 16-47a

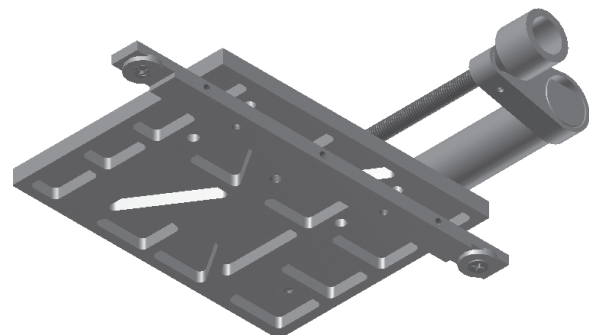


Figure 16-47b

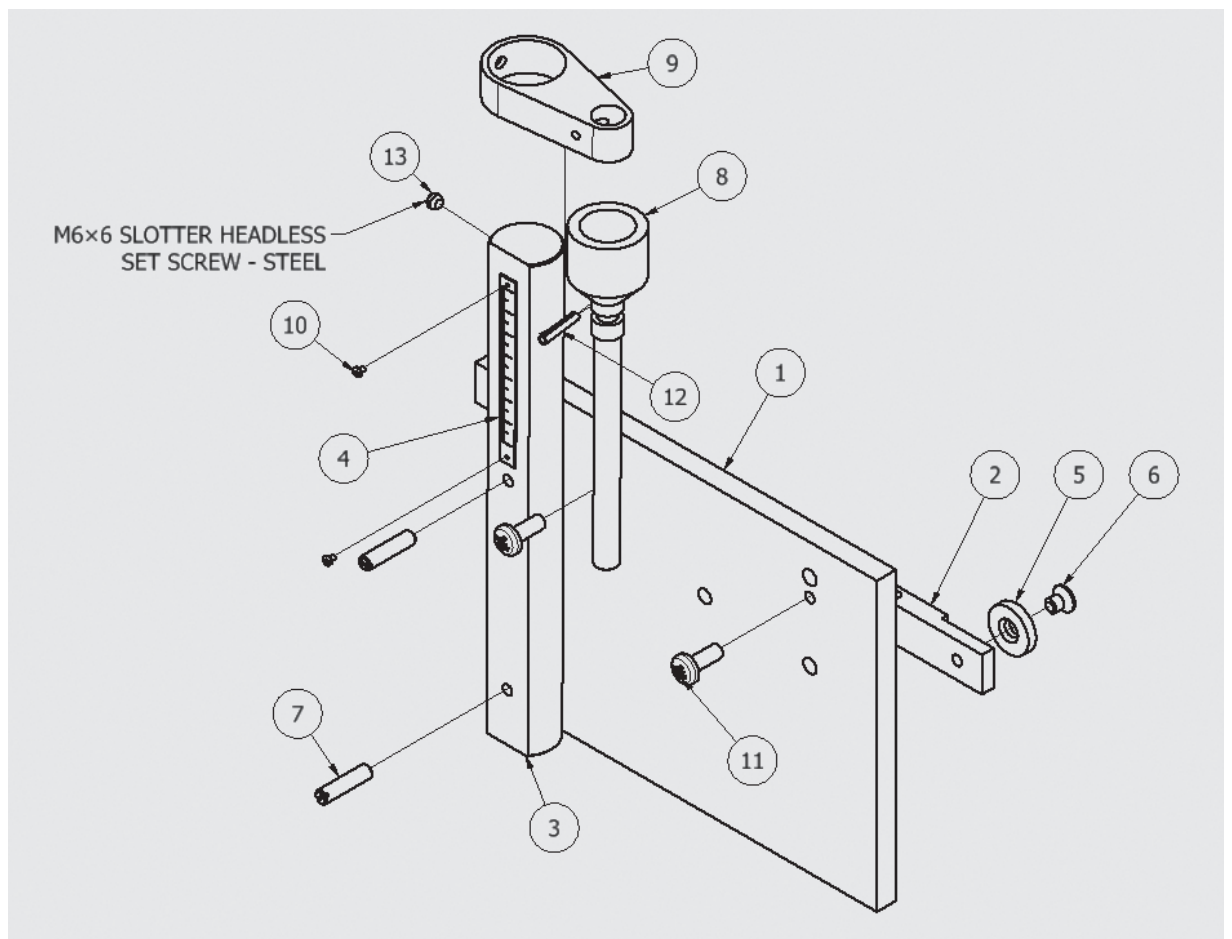


Figure 16-47c

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

Plate, Guide
PN: G101-A1

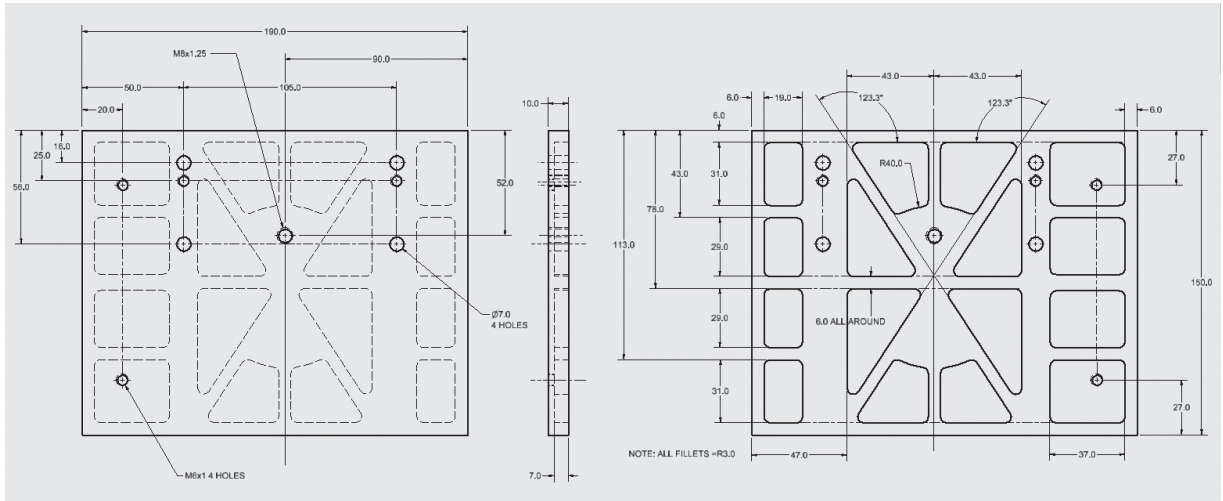


Figure 16-48

Bar, Guide
PN: G101-A2

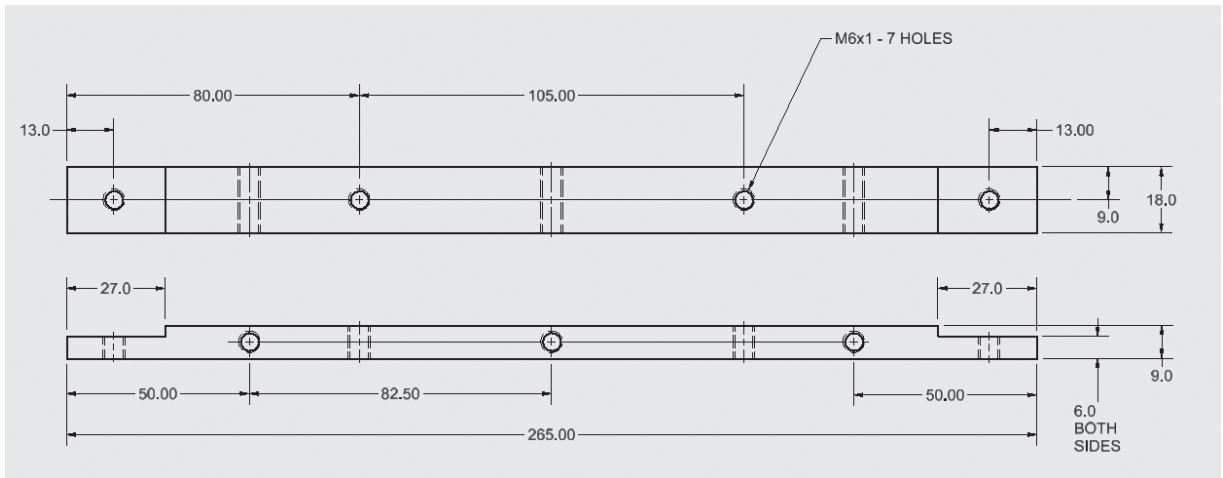


Figure 16-49

Post Guide
PN: G101-A3

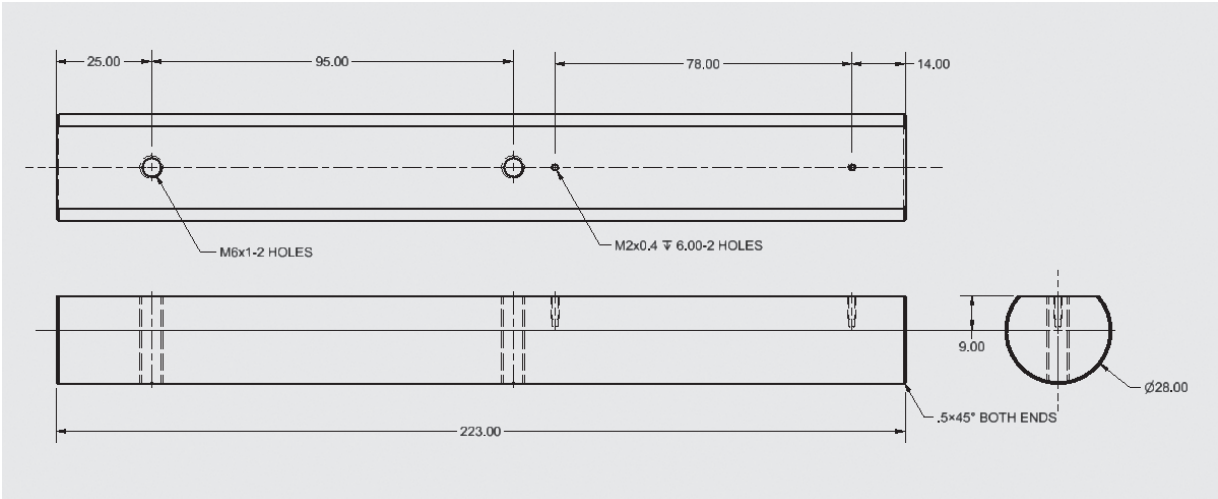


Figure 16-50

Figure 16-51

Ruler
PN: RR-6-40

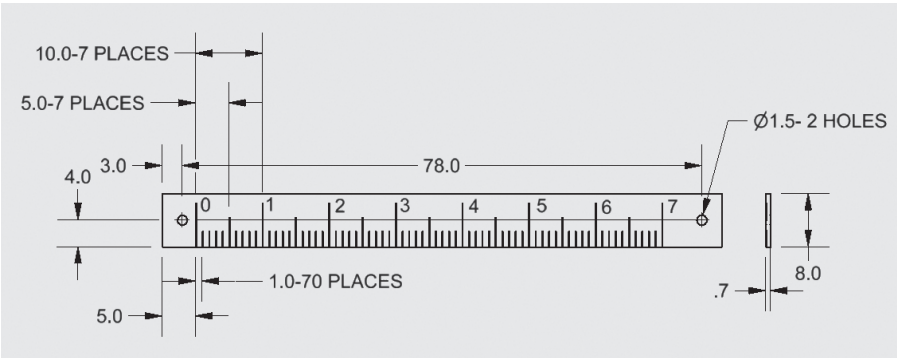
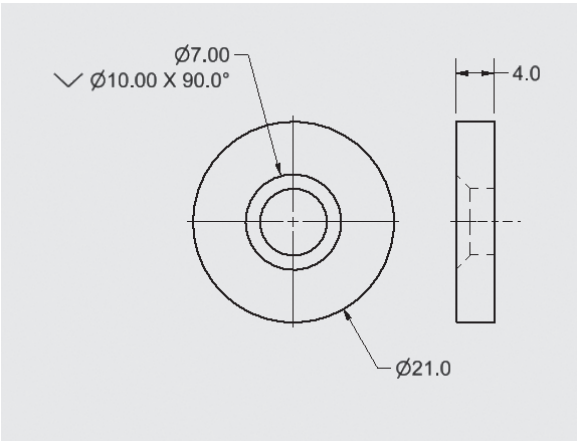


Figure 16-52

Ruler, Guide
PN: RG-1005



Screw, Guide
PN: G103-2

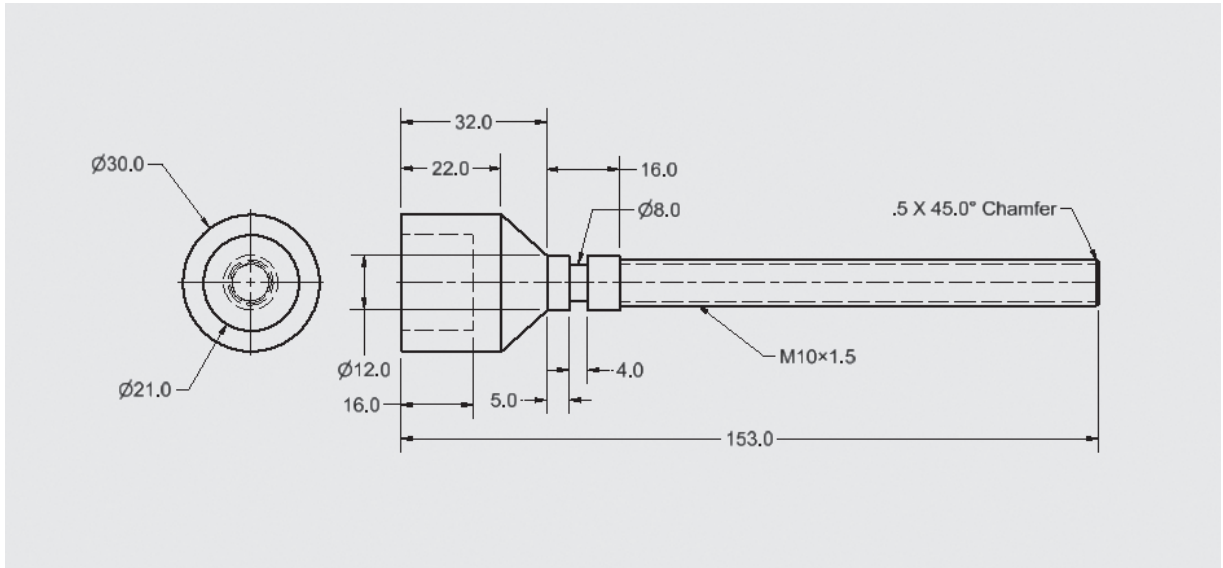


Figure 16-53

Plate, Guide
PN: G101-4A

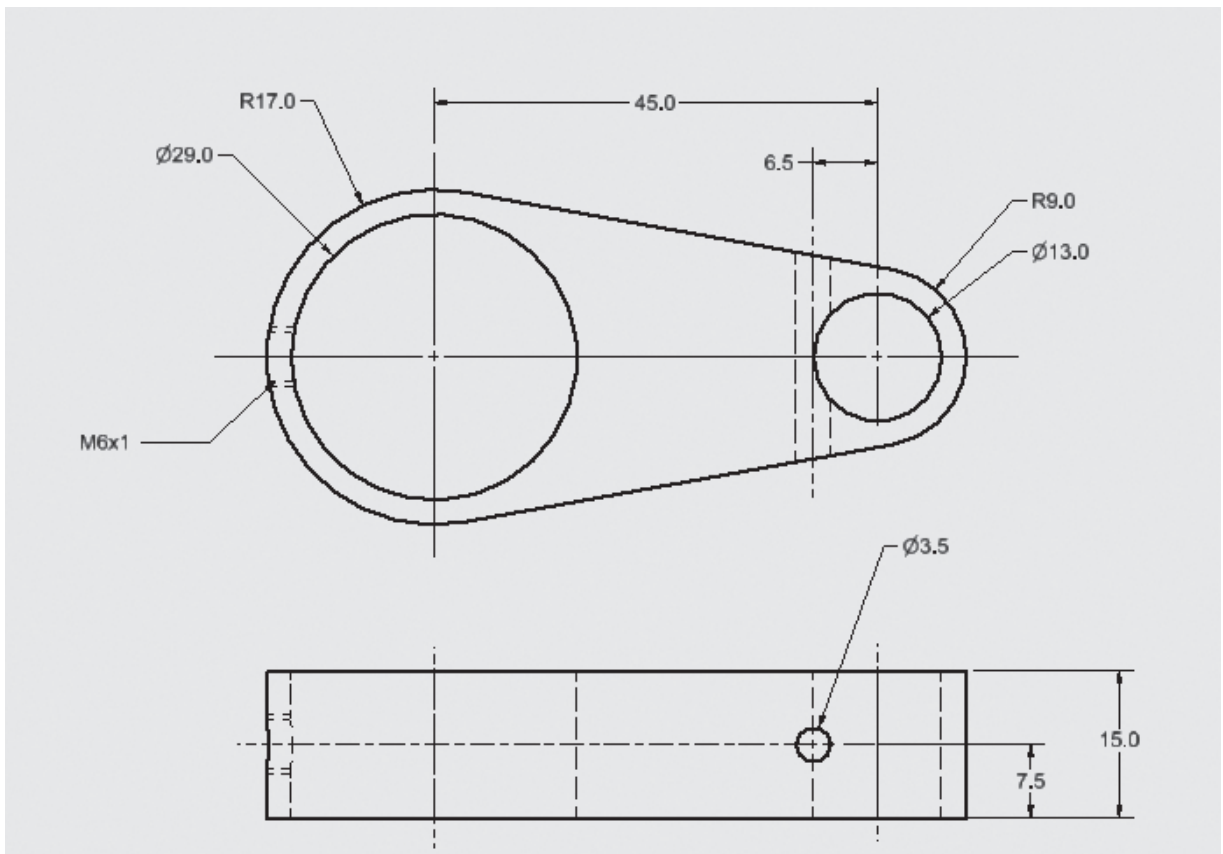


Figure 16-54

Figure 16-55

Pin, Holder
PN: G101-63

