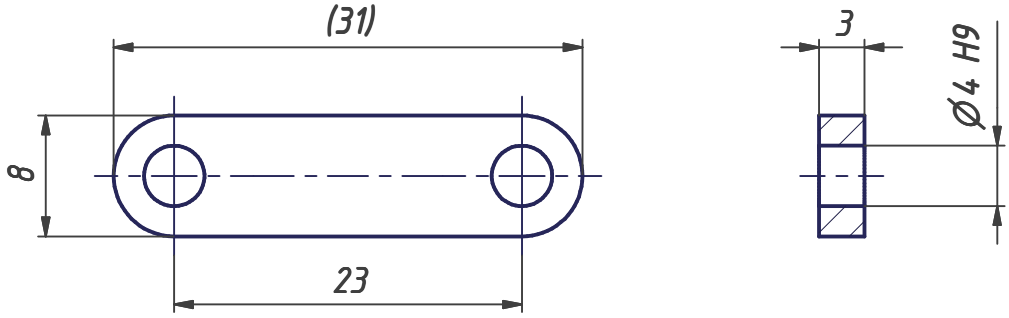
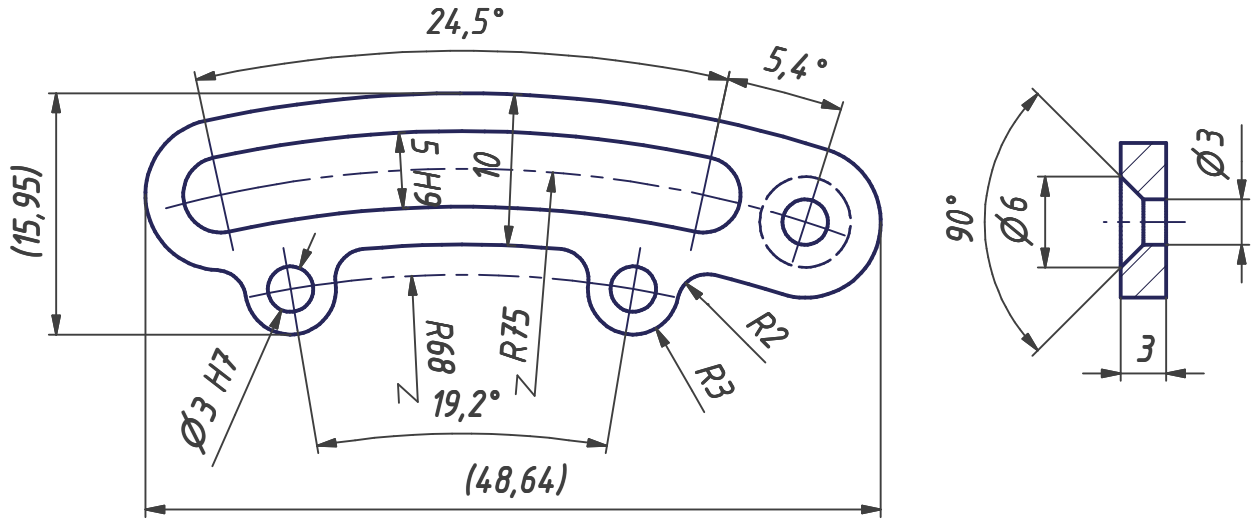
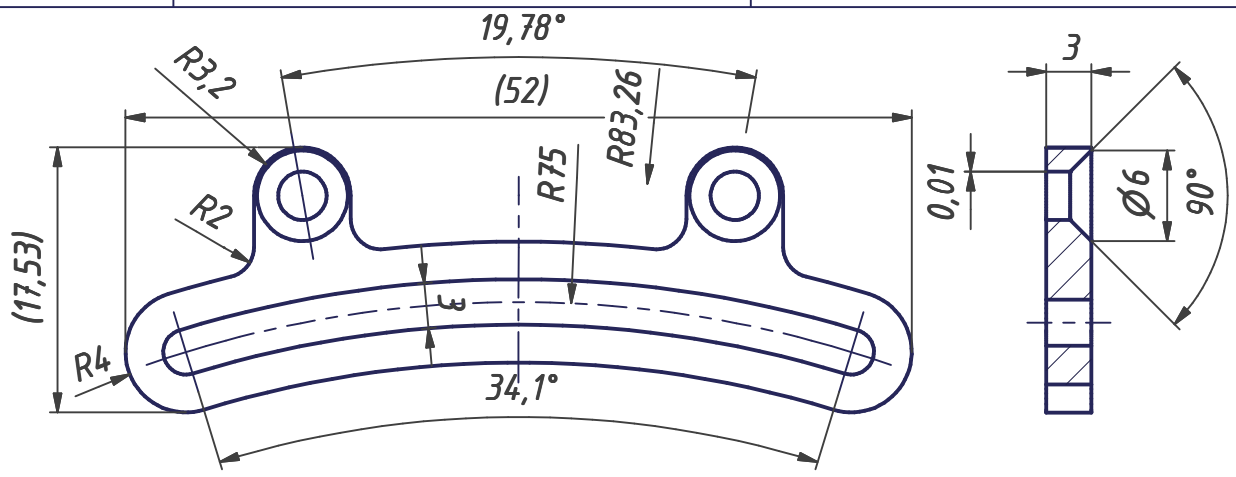
NUMERO PARTE	DESCRIZIONE	MATERIALE
VST033-1	Biscotto	DC01



NUMERO PARTE	DESCRIZIONE	MATERIALE
VST031-1	Binario	DC01



NUMERO PARTE	DESCRIZIONE	MATERIALE
VST022-1	Binario	DC01



Tolleranze generali SN EN 22768-1

-0,2
-0,4

2:1

Revisione: 1

	Data	Nome
Creato	13.04.2010	Cisco
Verificato		
Standard		

Vertical Steam Engine

Biscotto

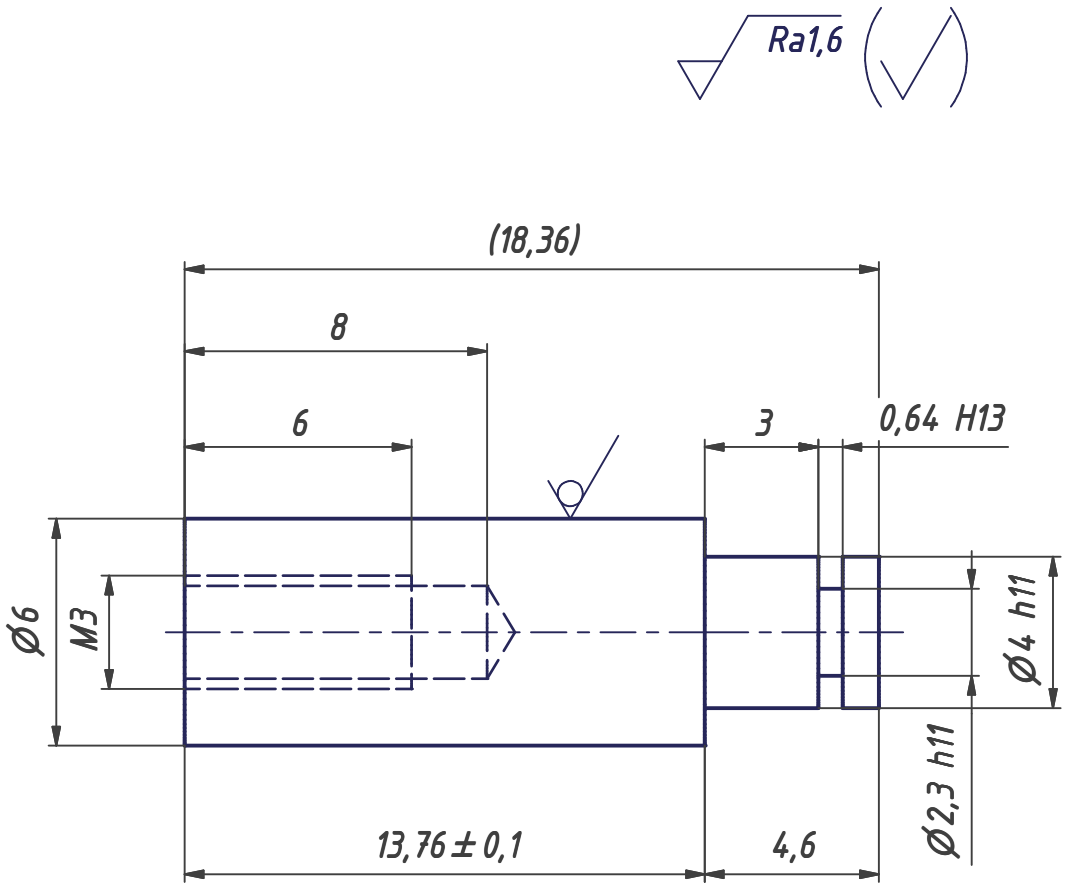
CAM Bellinzona

VST033-1

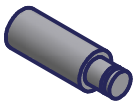
1

A4

Stato	Modifiche	Data	Nome



(1 : 1)



Elenco parti

ELEM	QTÀ	DESCRIZIONE	MATERIALE	MASSA
1	1	Perno	11SMnPb30+C	0.003 kg

Tolleranze generali SN EN 22768-1

-0,2
-0,4

5:1

Revisione: 1

	Data	Nome
Creato	16.04.2010	Cisco
Verificato		
Standard		

Vertical Steam Engine

Perno

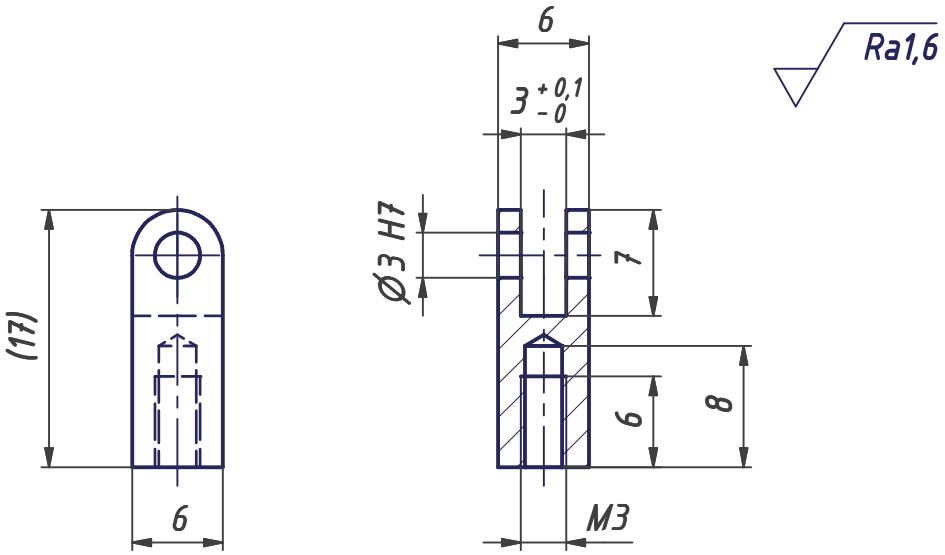
CAM Bellinzona

VST034-1

1

A4

Stato	Modifiche	Data	Nome



(1 : 1)

Elenco parti

ELEM	QTÀ	DESCRIZIONE	MATERIALE	MASSA
1	1	Forcella	G-CuZn33Pb2	0.004 kg

Tolleranze generali SN EN 22768-1

-0,2
-0,4

2:1

Revisione: 1

	Data	Nome
Creato	16.04.2010	Cisco
Verificato		
Standard		

Vertical Steam Engine

Forcella

CAM Bellinzona

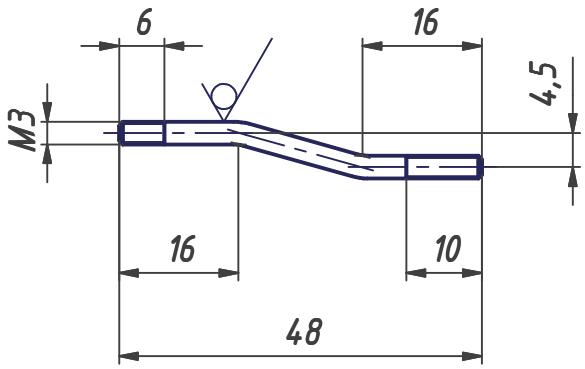
VST035-1

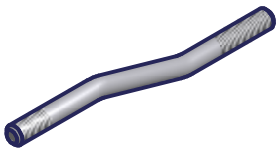
1

A4

Stato	Modifiche	Data	Nome

Ra3,2





Elenco parti

ELEM	QTÀ	DESCRIZIONE	MATERIALE	MASSA
1	1	Braccio DX	11SMnPb30+C	0.003 kg

Tolleranze generali SN EN 22768-1

-0,2
-0,4

1:1

Revisione: 1

	Data	Nome
Creato	16.04.2010	Cisco
Verificato		
Standard		

Vertical Steam Engine

Braccio DX

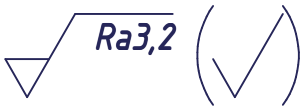
CAM Bellinzona

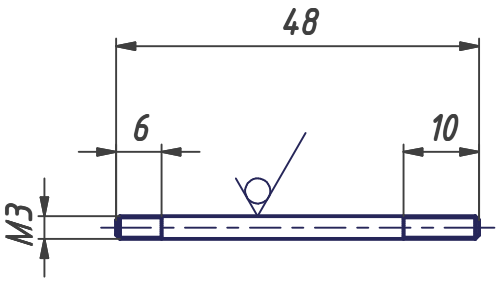
VST037-1

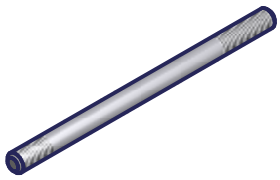
1

A4

Stato	Modifiche	Data	Nome







Elenco parti

ELEM	QTÀ	DESCRIZIONE	MATERIALE	MASSA
1	1	Asta SX	11SMnPb30+C	0.003 kg

Tolleranze generali SN EN 22768-1

-0,2
-0,4

1:1

Revisione: 1

	Data	Nome
Creato	16.04.2010	Cisco
Verificato		
Standard		

Vertical Steam Engine

Asta SX

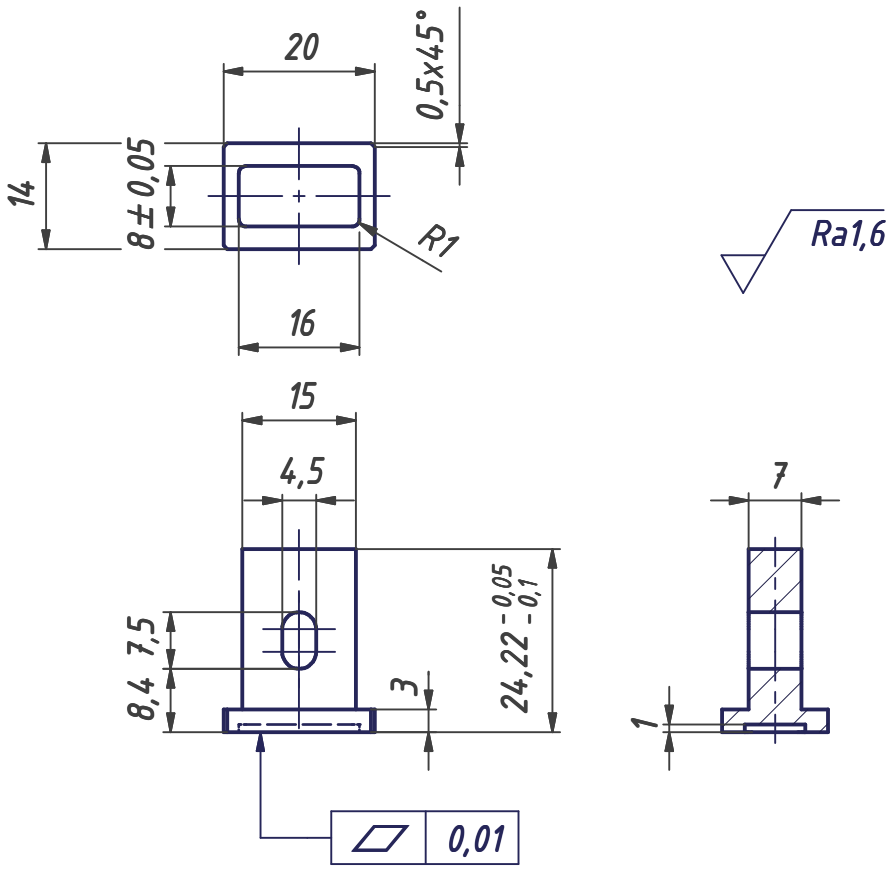
CAM Bellinzona

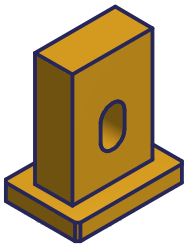
VST038-1

1

A4

Stato	Modifiche	Data	Nome





Elenco parti

ELEM	QTÀ	DESCRIZIONE	MATERIALE	MASSA
1	1	Cassetto	G-CuZn33Pb2	0.023 kg

Tolleranze generali SN EN 22768-1

-0,2
-0,4

1:1

Revisione: 1

	Data	Nome
Creato	16.04.2010	Cisco
Verificato		
Standard		

Vertical Steam Engine

Cassetto

CAM Bellinzona

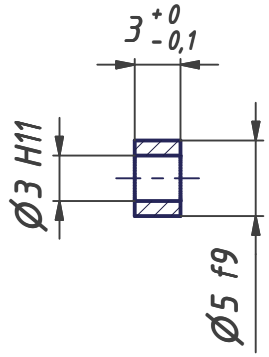
VST039-1

1

A4

Stato	Modifiche	Data	Nome

Ra1,6



(1 : 1)

Elenco parti

ELEM	QTÀ	DESCRIZIONE	MATERIALE	MASSA
1	1	Cuscinetto	G-CuZn33Pb2	0.000 kg

Tolleranze generali SN EN 22768-1

-0,2
-0,4

2:1

Revisione: 1

	Data	Nome
Creato	16.04.2010	Cisco
Verificato		
Standard		

Vertical Steam Engine

Cuscinetto

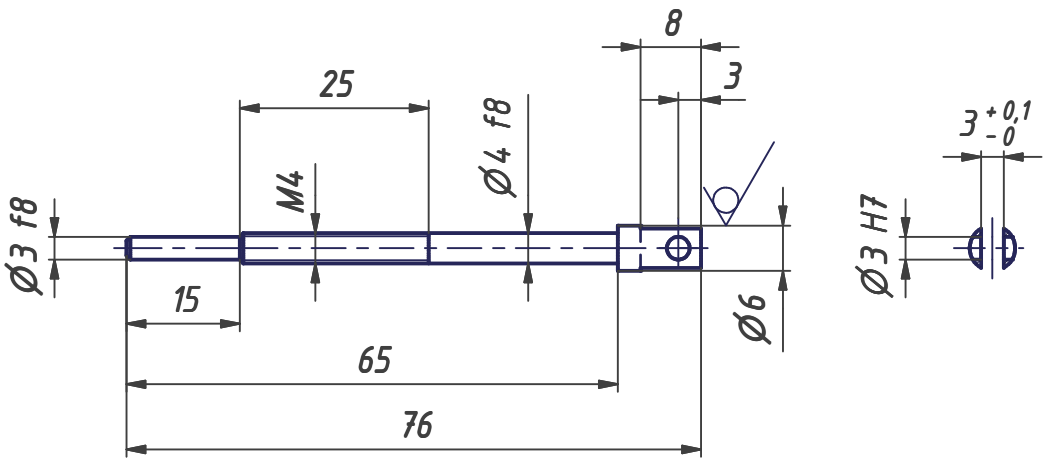
CAM Bellinzona

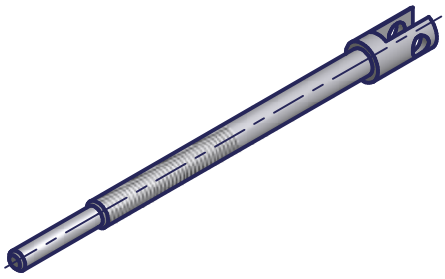
VST040-1

1

A4

Stato	Modifiche	Data	Nome





Elenco parti

ELEM	QTÀ	DESCRIZIONE	MATERIALE	MASSA
1	1	Asta	11SMnPb30+C	0.007 kg

Tolleranze generali SN EN 22768-1

-0,2
-0,4

1:1

Revisione: 1

	Data	Nome
Creato	16.04.2010	Cisco
Verificato		
Standard		

Vertical Steam Engine

Asta

CAM Bellinzona

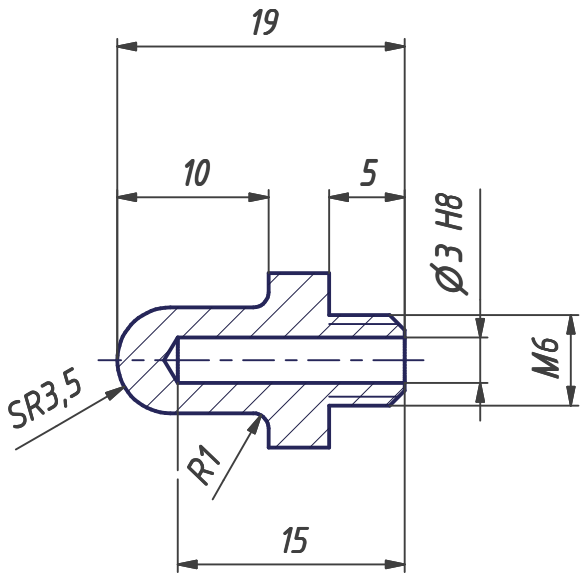
VST041-1

1

A4

Stato	Modifiche	Data	Nome

Ra1,6



(1 : 1)

Elenco parti

ELEM	QTÀ	DESCRIZIONE	MATERIALE	MASSA
1	1	Bussola	G-CuZn33Pb2	0.006 kg

Tolleranze generali SN EN 22768-1

-0,2
-0,4

2:1

Revisione: 1

	Data	Nome
Creato	16.04.2010	Cisco
Verificato		
Standard		

Vertical Steam Engine

Bussola

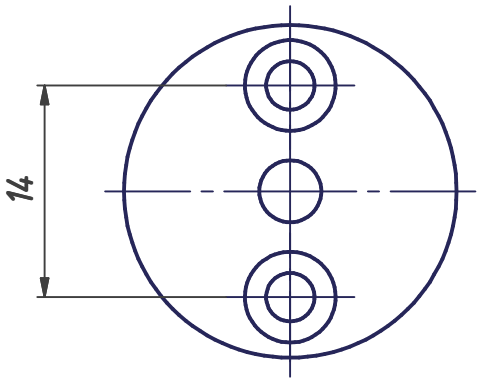
CAM Bellinzona

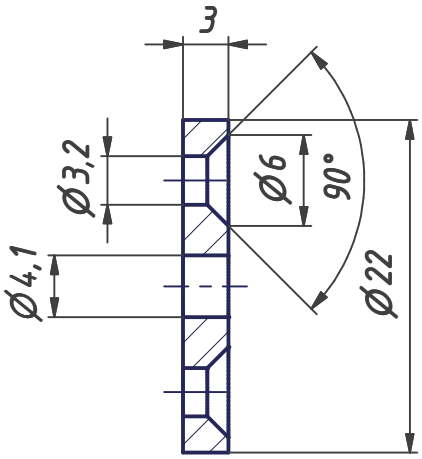
VST042-1

1

A4

Stato	Modifiche	Data	Nome





(1 : 1)

Elenco parti

ELEM	QTÀ	DESCRIZIONE	MATERIALE	MASSA
1	1	Flangia	DC01	0.008 kg

Tolleranze generali SN EN 22768-1

-0,2
-0,4

2:1

Revisione: 1

	Data	Nome
Creato	16.04.2010	Cisco
Verificato		
Standard		

Vertical Steam Engine

Flangia

CAM Bellinzona

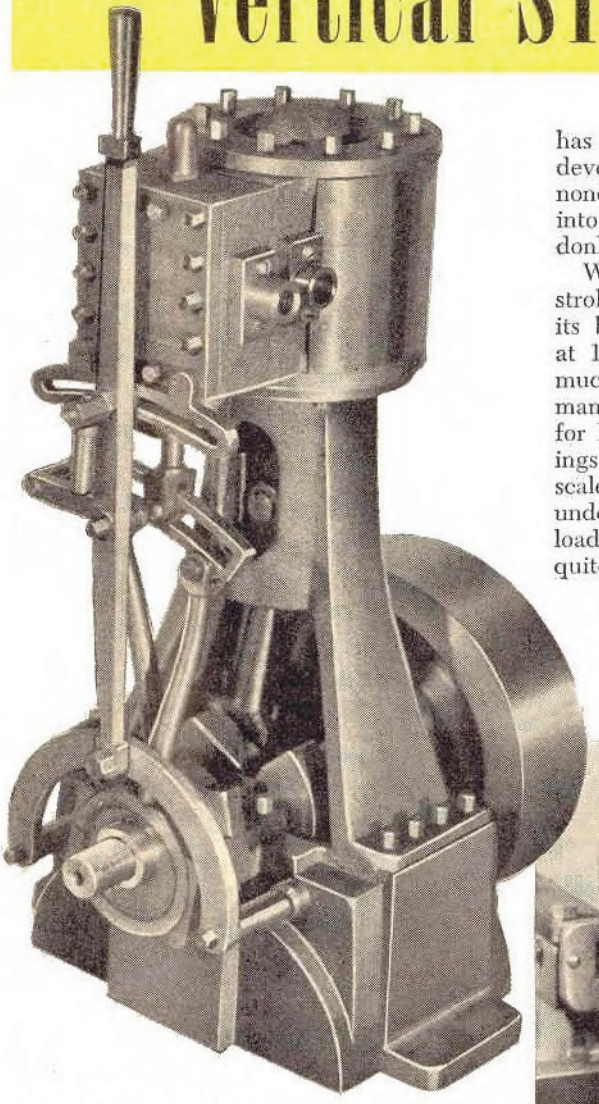
VST043-1

1

A4

Stato	Modifiche	Data	Nome

Vertical STEAM ENGINE

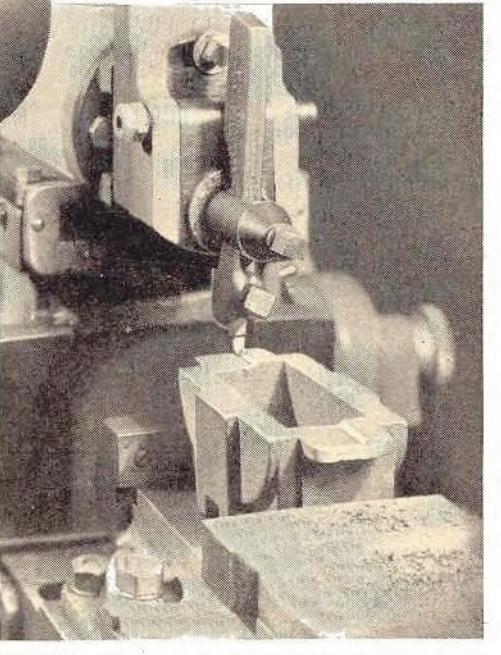


AMATEUR machinists who run the models they build will get double pleasure from this miniature vertical steam engine. Although it is not a scale reproduction of any particular engine, it has the same general appearance and eye-taking appeal of the picturesque old-timers so hard at work about the turn of the century.

The model is equipped with the link-motion reverse gear perfected by George Stephenson for his famous locomotive, *The Rocket*, in the 1830s. This valve action, which also provides a variable steam cutoff, has played a historic role in steam-power development. The engine is a double-acting noncondensing one that exhausts directly into the air with the familiar *puff-puff* of a donkey engine or steam shovel.

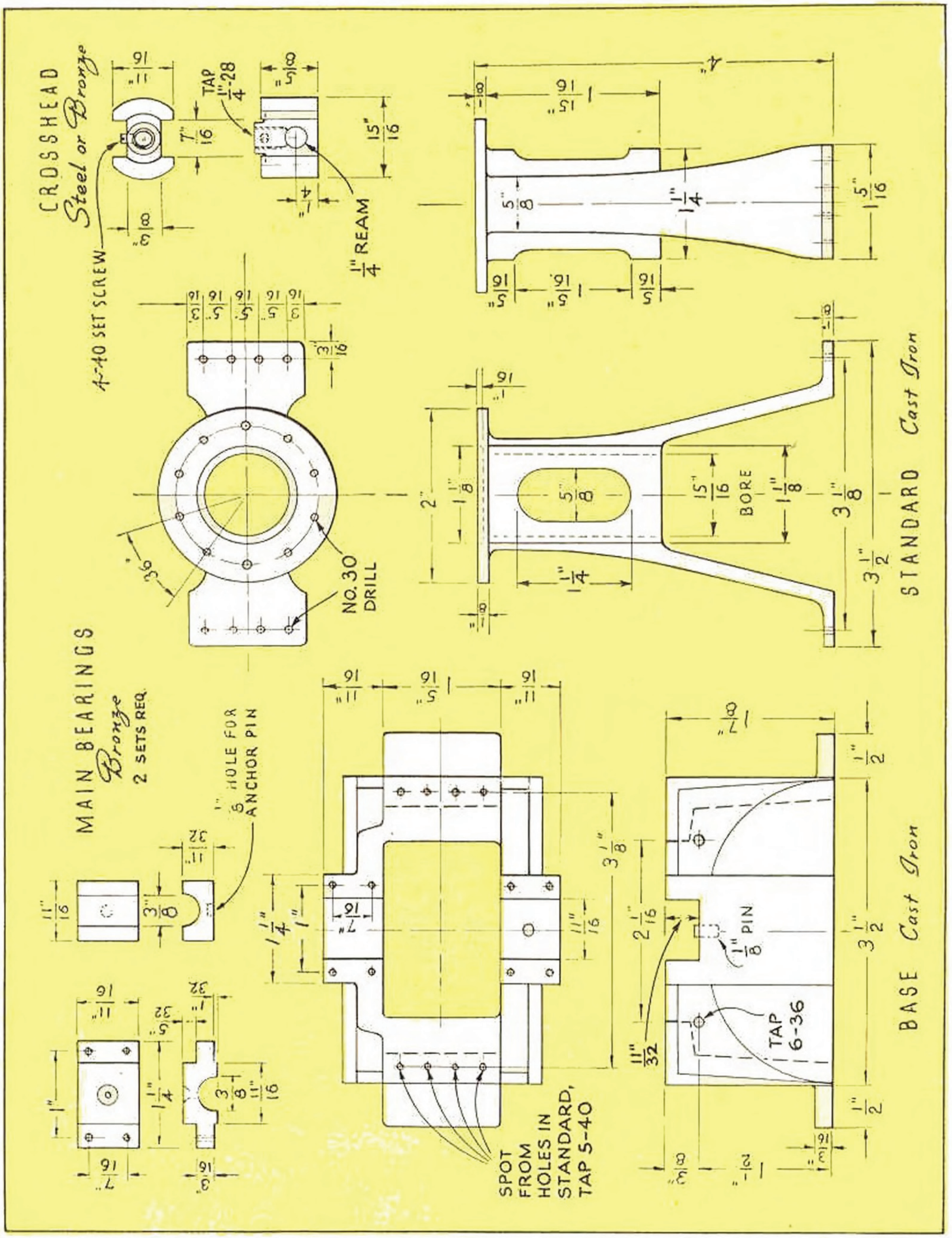
With its 1¼″ cylinder bore and 1″ piston stroke, and with 75 or 80 lb. of steam in its boiler, the little engine will turn over at 1,500 r.p.m. Actual power will depend much on the boiler used and on the workmanship in the engine itself. The design is for heavy duty, however, with main bearings and other working parts larger than scale, and the engine will stand up well under hard, continuous runs at full working load, developing enough power to drive a quite large model boat, a small dynamo, an air fan, or other light equipment of fractional-horsepower rating.

Much exacting work is required in building an engine of this type, espe-



Machining the bottom of the casting for the base. The operation can be done in a lathe as well as a shaper, with the work clamped to the faceplate.

with Reverse Gear



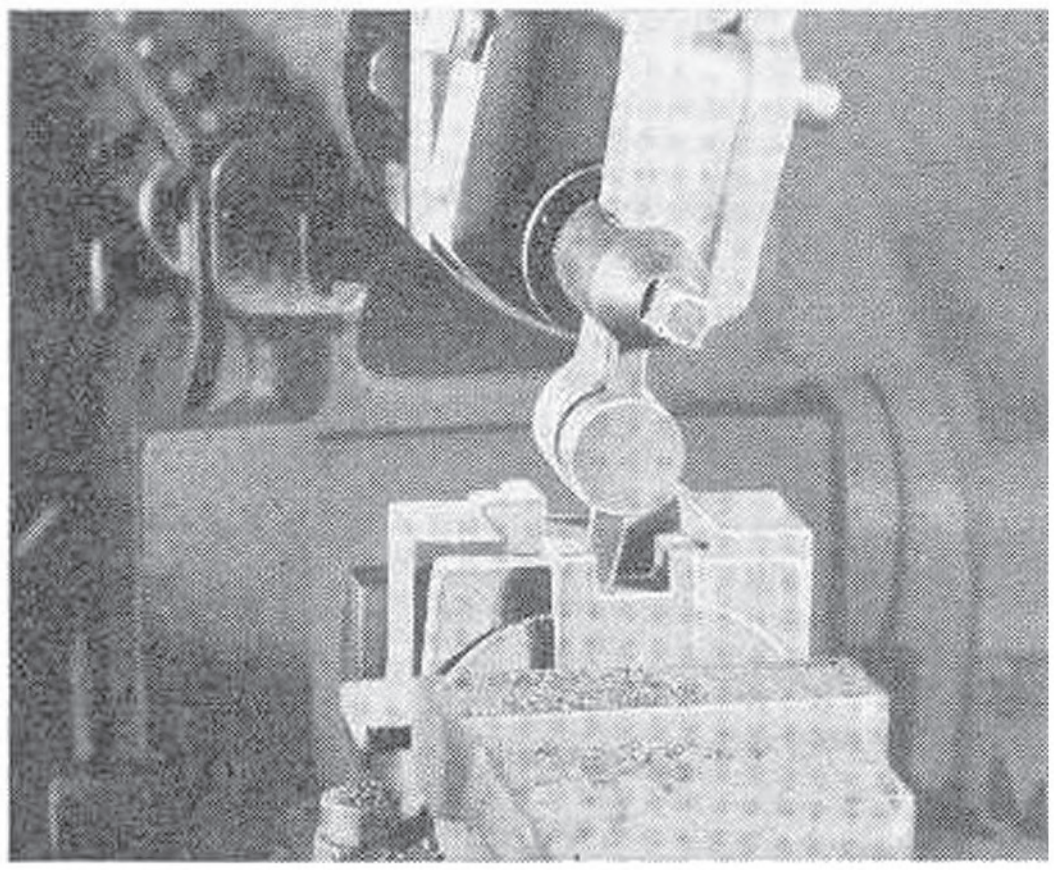
cially since the reverse gear and crankshaft, to be described in a later installment, and other small parts must be machined from steel. However, it is enjoyable work for the modelmaker, and it is of a kind well within the scope of anyone who has become proficient in the use of a screw-cutting lathe.

If you are experienced in woodworking, you can build the necessary patterns and have iron or bronze castings made at your local foundry for the base, standard, cylinder, cylinder head, steam chest, and flywheel. Or you can even make up the sand molds and pour bronze castings yourself. The pattern work, however, is by no means a one-evening project, and castings can be supplied for those who want to get right at the machining. Dimensions shown in the drawings are for the finished parts. If patterns are made, an allowance of 3/32" must be added to surfaces to be machined. Shrinkage allowance need not be considered.

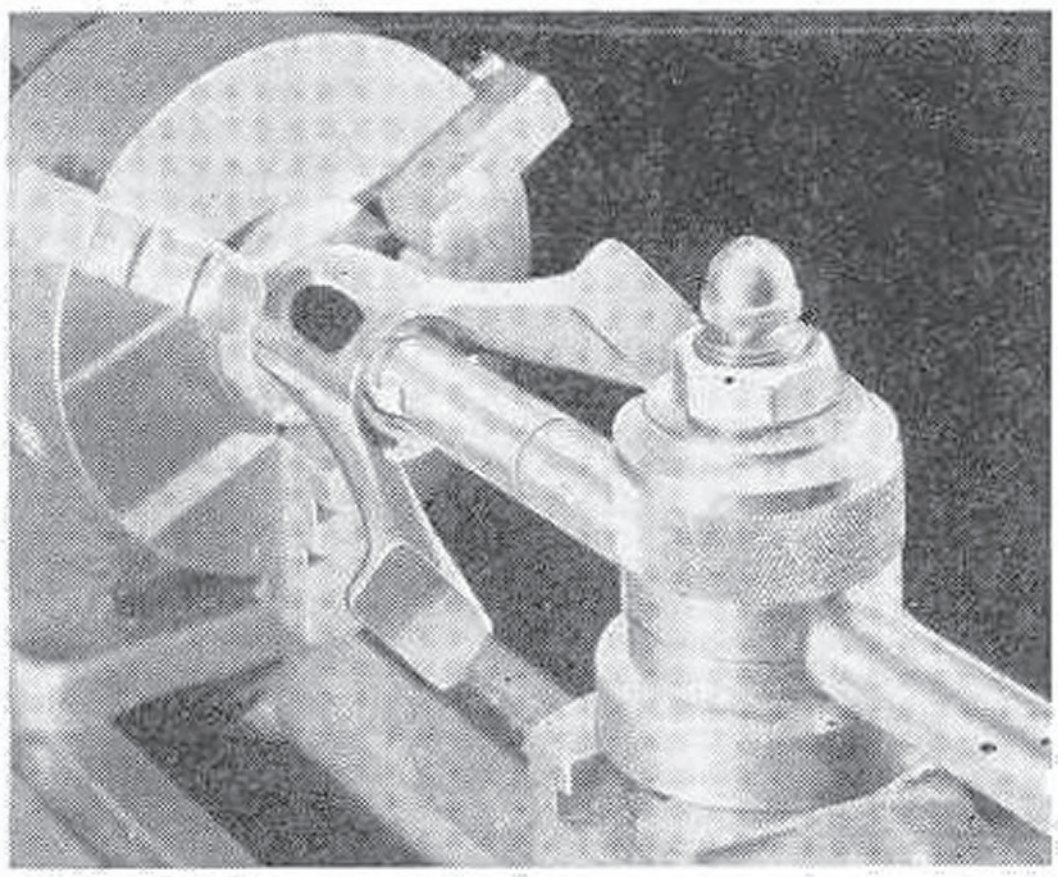
Machining operations are possibly best begun on the base since many of the parts can be fitted on it and temporarily assembled as the work proceeds. The casting is easily handled in a shaper, but if your shop boasts only a lathe, the facing can be done with the work clamped to the faceplate and the milling can be done with the lathe milling attachment. Since the casting is open at the center, only the bottom and top need be faced and slots milled for the bearings, after which the pin holes are drilled and the piece cleaned up with a file. Drilling and tapping the screw holes should wait until the mating parts are fitted, when both can be drilled at the same time.

Two identical main bearings are made up from ⅝" by ¾" brass bar stock cut to length and soldered together in pairs. Mounted in the four-jaw chuck, each bearing is drilled and reamed to size for the crankshaft and the ends faced smooth. The halves are then melted apart and the parts filed to shape and to a good snug fit in the base. Save drilling them and the base for screws until the crankshaft can be set in place.

The standard or main column is held in the three-jaw chuck, and the solid body is bored smoothly and accurately to take the crosshead. With the piece on a mandrel, the head is faced square with the bore and turned to diameter; then the work is reversed on the mandrel and the feet are trued. Screw holes are next drilled in the head to hold the cylinder in place and in the feet for mounting on the base. The tapped holes in the base are spotted from those drilled in the feet.



Slots are machined across the top of the base to take the main bearings, which will be made a snug fit. If a shaper is not available, the work can be done on a lathe with a milling attachment.



Since the top part of the standard or main column is cast solid, it must be drilled and bored out to take the crosshead. The operation is performed in the lathe with the work in the three-jaw chuck.

In making the crosshead, a short piece of cold-rolled steel or bronze is held in the three-jaw chuck and turned to a nice sliding fit in the main-column bore. Next, the upper end is recessed and turned to shape, and it is also drilled and tapped for the piston rod while still chucked so the outer diameter and the piston-rod hole will be concentric. The part is then cut off and the opposite end faced smooth.

Grooves are cut on both sides in the shaper or with the milling attachment, leaving a ⅜" thick web to take the forked end of the connecting rod. The hole for the connecting-rod pin is then cross-drilled in the lower end.

TO BE CONTINUED.