

# LOCK FORMING MACHINE

MODEL:PF16G



Operation manual

## Safety Warnings

Thank you for choosing TTMC machines. With regular maintenance and proper use of the machine, you will receive many years of accurate and economical production.

PLEASE MAKE SURE ALL PERSONS INSTALLING AND / OR OPERATING THIS MACHINE READ AND UNDERSTANDS THE INFORMATION IN THIS BOOKLET

This operation manual contains information that will guide you through the installation, operation and maintenance of your TTMC Lock forming machine. We recommend that anyone involved with the use of this machine be fully aware of the following operational safety requirements.

1. Read and understand entire owner's manual before attempting assembly or operation.
2. Read and understand the warnings posted on the machine and in this manual. Failure to comply with all of these warnings may cause serious injury.
3. Replace warning labels if they become obscured or removed.

Do not use this machine for other than its intended use, Do not exceed the rated capacity

4. Before operating, remove tie, rings, watches and other jewelry, and roll sleeves up past the elbows. Do not wear loose clothing, and confine long hair. Non-slip footwear or anti-skid floor strips are recommended.
5. Do not operate this machine while tired or under the influence of drugs, alcohol or any medication.
6. Remove adjusting keys and wrenches. Form a habit of checking to see that keys and adjusting wrenches are removed from the machine before using.
7. Sheet metal stock has sharp edges. Use leather gloves when handling.
8. Keep hands and fingers clear of area in front and rear of brake.
9. Keep safety guards in place at all times when the machine is in use. If removed for maintenance purposes, use extreme caution and replace the guards immediately after maintenance is complete.
10. Provide for adequate space surrounding work area and non-glare, overhead lighting.
11. Keep the floor around the machine clean and free of scrap material, oil and grease.

12. Keep visitors a safe distance from the work area. Keep children away.
13. Give your work undivided attention. Looking around, carrying on a conversation and “horse-play” are careless acts that can result in serious injury.
14. Maintain a balanced stance at all times so that you do not fall or lean against moving parts. Do not overreach or use excessive force to perform any machine operation.
15. Use the right tool at the correct speed and feed rate. Do not force a tool or attachment to do a job for which it was not designed. The right tool will do the job better and more safely.
16. Do not stand on machine. Serious injury could occur if machine tips over.

ALWAYS USE A QUALIFIED ELECTRICIAN WHEN OPENING  
ELECTRICAL PANEL

ALWAYS ENSURE THAT ALL ELECTRICAL WIRING IS  
PROPERLY CONNECTED TO AVOID DAMAGE TO  
THE ELECTRONICS

ALWAYS COMPLETELY UNDERSTAND THE FUNCTIONS OF  
THE MACHINE BEFORE INSTALLATION OR  
OPERATION

ALWAYS ISOLATE THE MACHINE FROM ITS ELECTRICAL  
SUPPLY BEFORE PERFORMING AND  
MAINTENANCE WORK

ALWAYS KEEP BODY PARTS AWAY FROM ANY MOVING  
PARTS

ALWAYS OPERATE THE MACHINE WITH A QUALIFIED  
TRADESPERSON WHO IS FULLY AWARE OF ITS  
DANGERS

NEVER PUT HANDS BETWEEN THE ROLLS WHEN MACHINE  
IS IN OPERATION

NEVER OPERATE THE MACHINE WITH ITS COVER AND/OR  
PANELS MISSING

NEVER OPERAE THE MACHINE WHEN IN DOUBT ABOUT ITS  
SAFETY OR YOUR SAFETY

# WARNING

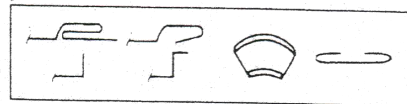
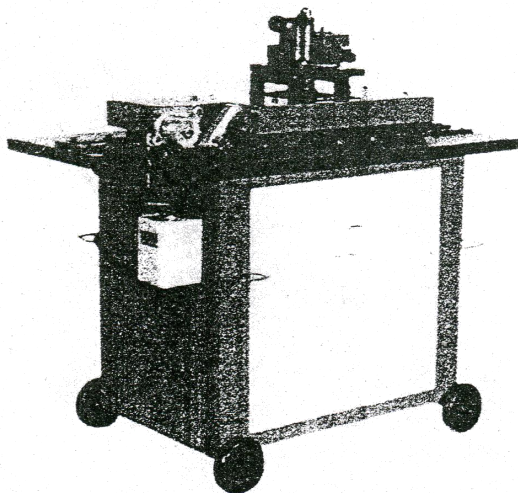
1. This machine can be dangerous if used improperly. Always keep hands, clothing, and hair away from the machine to avoid injury.
2. Disconnect each power source before servicing.
3. The machine should never be left unattended when powered on.
4. Never operate the machine without proper eyes and body protection.
5. Don't operate or work on machine without reading and understanding the operation manual. If manual is lost, contact dealer.
6. Do not operate without doors and covers and guards in place.
7. WATCH THIS MOVING PART!

**NEVER STAY UNDER THIS MOVING PART!**

## PF16G Specification

Capacity(mild steel)	16 Ga(1.5mm)max - 20 Ga(0.9mm)min
Speed(rpm)	24 FPM
Motor(kW)	2.2
Packing size(cm)	120X66X103
N.W./G.W.(kg)	300/320

### 1. Machine Diagram



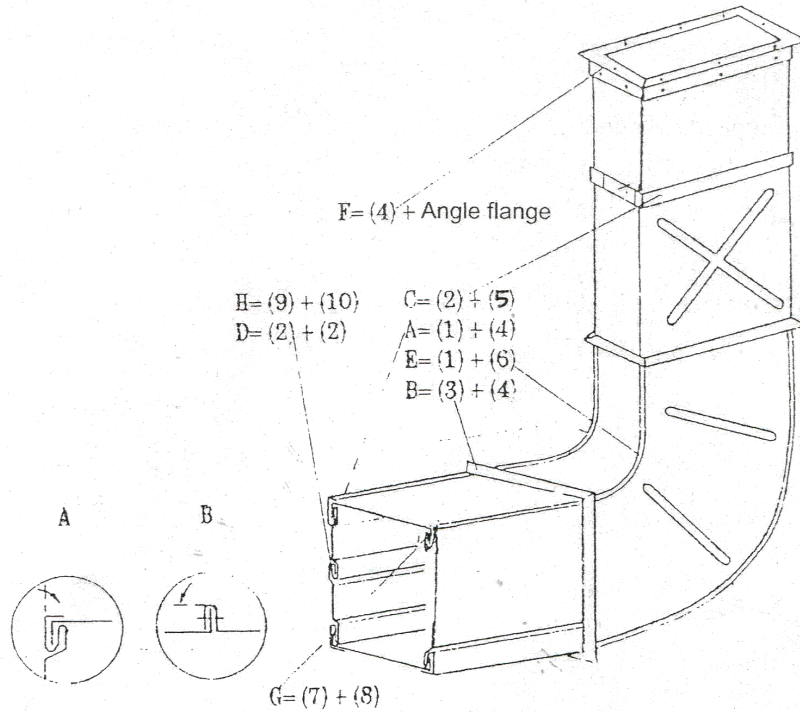
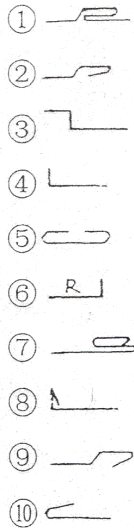
### 2. Design and functions

2.1 The PF16G Pittsburgh Lock forming machine is specially designed for the manufacturing of quadrant ducts.

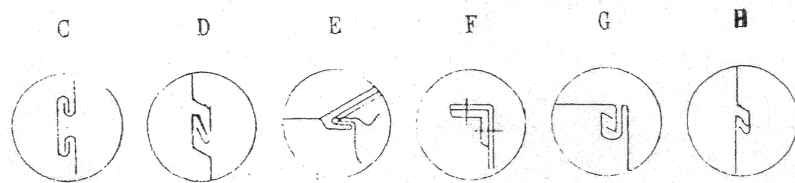
2.2 Depending on the material being used, this machine is capable of forming material thickness from 0.45mm-1.5mm

## 2.3 Sample profiles and Examples

### Sample profiles

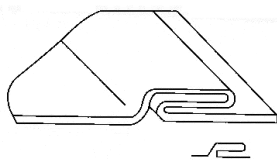


### Examples

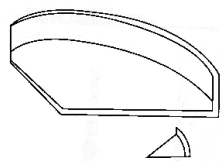


## 3. Standard Seams

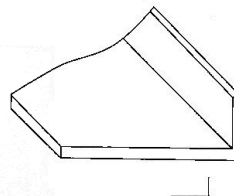
### STANDARD ROLL FORMS



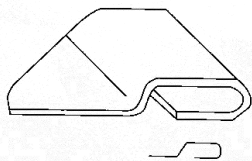
pittsburgh



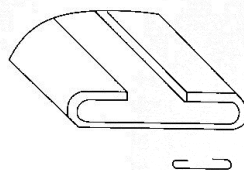
flange attachment



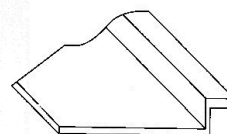
right angle



double seam



drive cleat



Z shape



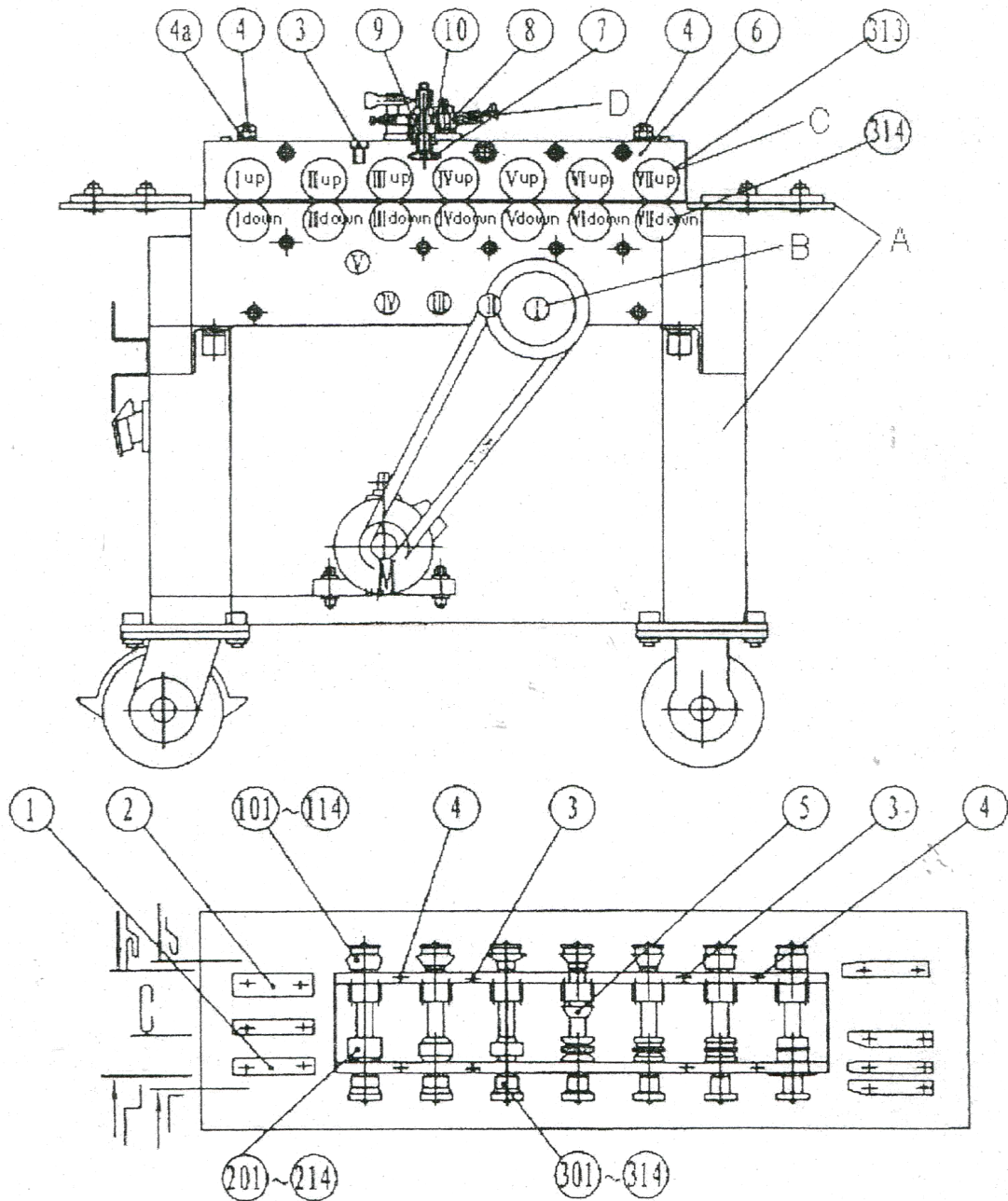
## 4. Construction and layout

A: Chassis and worktable

B: Main drive system

C: forming rolls

D: Bending unit (Power flange attachment)



Attention:

A: Chassis and worktable

The machine's chassis is a welded construction using angle steel and thin steel plates. The worktable fits on top of the chassis and depending on the model, the worktable will have 2-3 inlet guiding plate and 2-3 outlet-guiding plates.(1 and 2 in diagram)

B: Main drive system

The Pittsburgh lock machine's main driving parts are very similar in all models. The only difference between them is in size. The drive system consists of an open gearbox, which is driven by the motor via a belt.

C: Forming rolls

The drive to the forming rolls is by the main drive gear followed by an auxiliary gear and a passing gear to the drive system.

According to the complexity of shape being formed, the Pittsburgh lock machine usually contains 6-7 forming stations.(Each forming stations contains a upper and lower shaft). The machines are built with a configuration of left/right, left/center/right and center right. Forming rollers 101/102-113/114 on the left, 201/202-212/214 centered and 31/302-313/314 on the right. As the material travels though each forming station, the forming rollers gradually form it to shape desired.

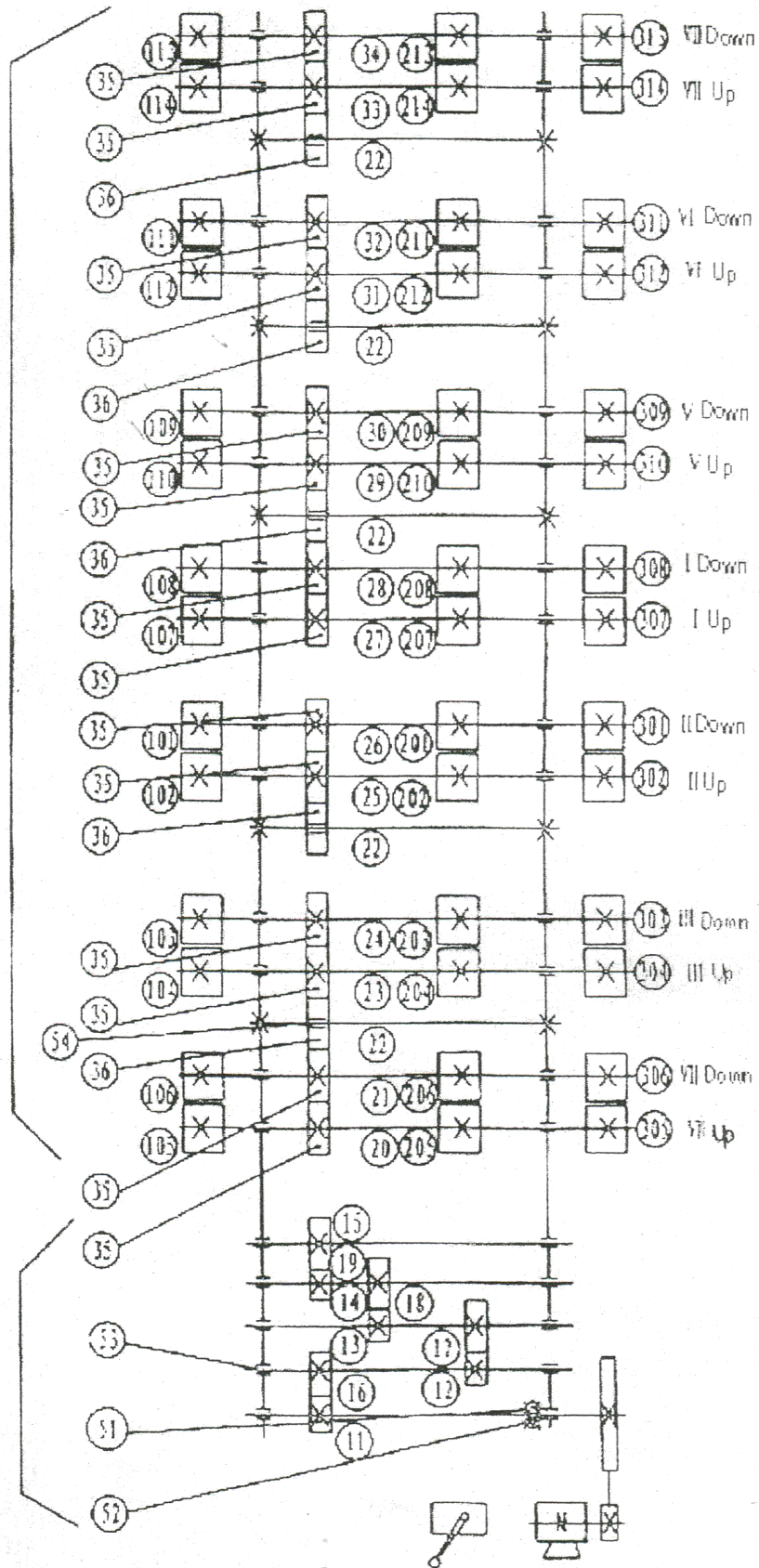
#### D: Bending unit (Power flange attachment)

The bending unit of the Pittsburgh lock machine is located on the top of the machine. With this unit installed, it is possible to produce a right angle bend on inner and outer rounded section plates that are necessary for certain tube connections.

# Drive System

Forming rolls drive train

Main drive train



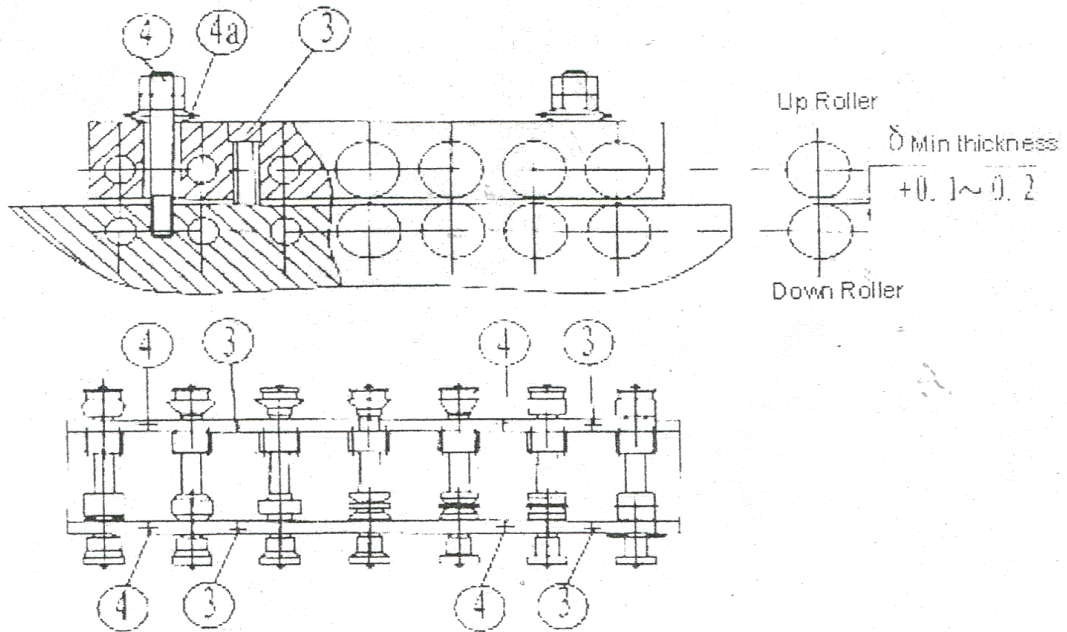
## 5. Clearance / Profile Adjustment

5.1 Clearance—to adjust the clearances between the upper and lower profile rollers, first have to loosen the four screws (4) and loosening the screws (3). Will raise and lower the upper block. Using a feeler gauge testing the clearance between upper and lower rollers, After ensuring the clearance between the upper and lower rollers are correctly adjusted, retighten the screws (4)

5.2 Profile—to adjust the profile produced by the Pittsburgh lock forming machine, first have to loosen the screws securing the guide plates. Move the guide plate to the marked position and slightly tighten in case further adjustments are necessary. Feed the material through. When the material reaches the last form station, turn off the machine. Check the profile formed. If the profile formed is good but the material is not running flush with the guide plate, then you have to loosen the guide plate push it flush with the material retighten the screws.

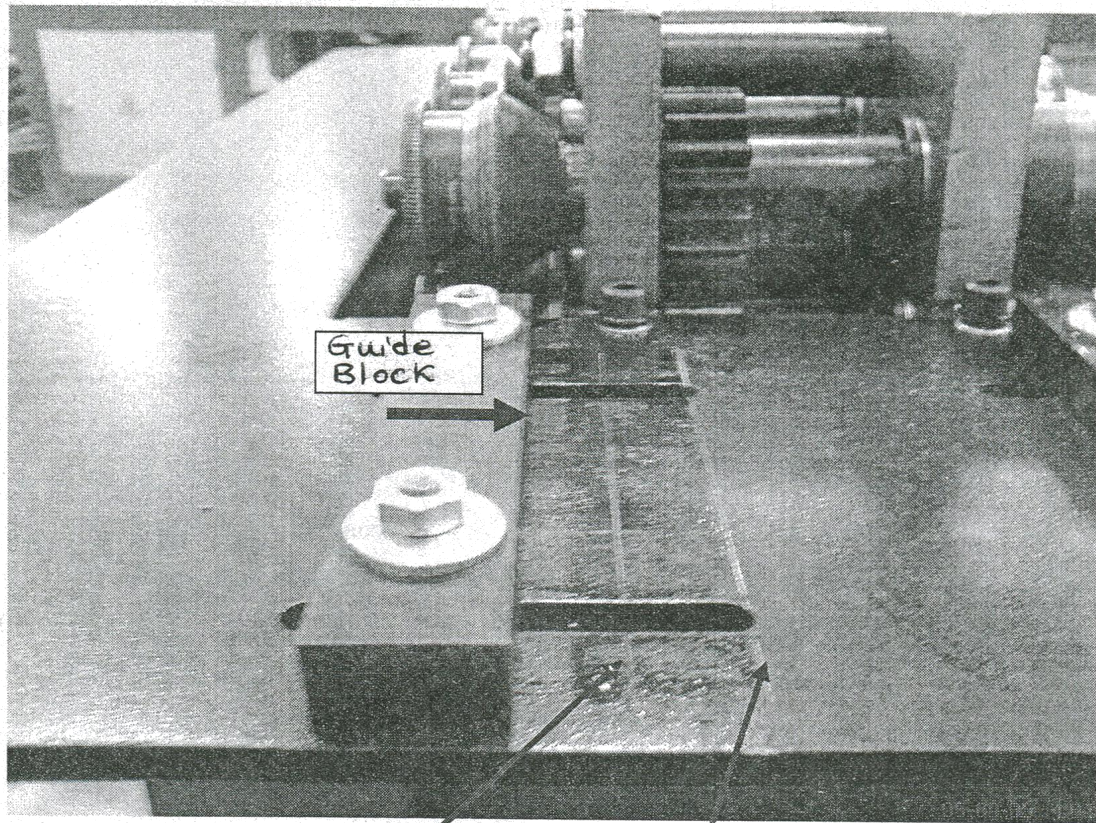
Plate thickness	Clearance of front wheel	Clearance of black wheel
0.8 mm	0.9 mm	0.5 mm
0.9 mm	1.0 mm	0.6 mm
1.0 mm	1.1 mm	0.7 mm
1.2 mm	1.3 mm	0.8 mm
1.5 mm	1.6 mm	0.95 mm

The shape as:



Please move the black guide block to the line #1 for double seams

And move the black guide block to the line #2 for Pittsburgh lock seams (as below picture):



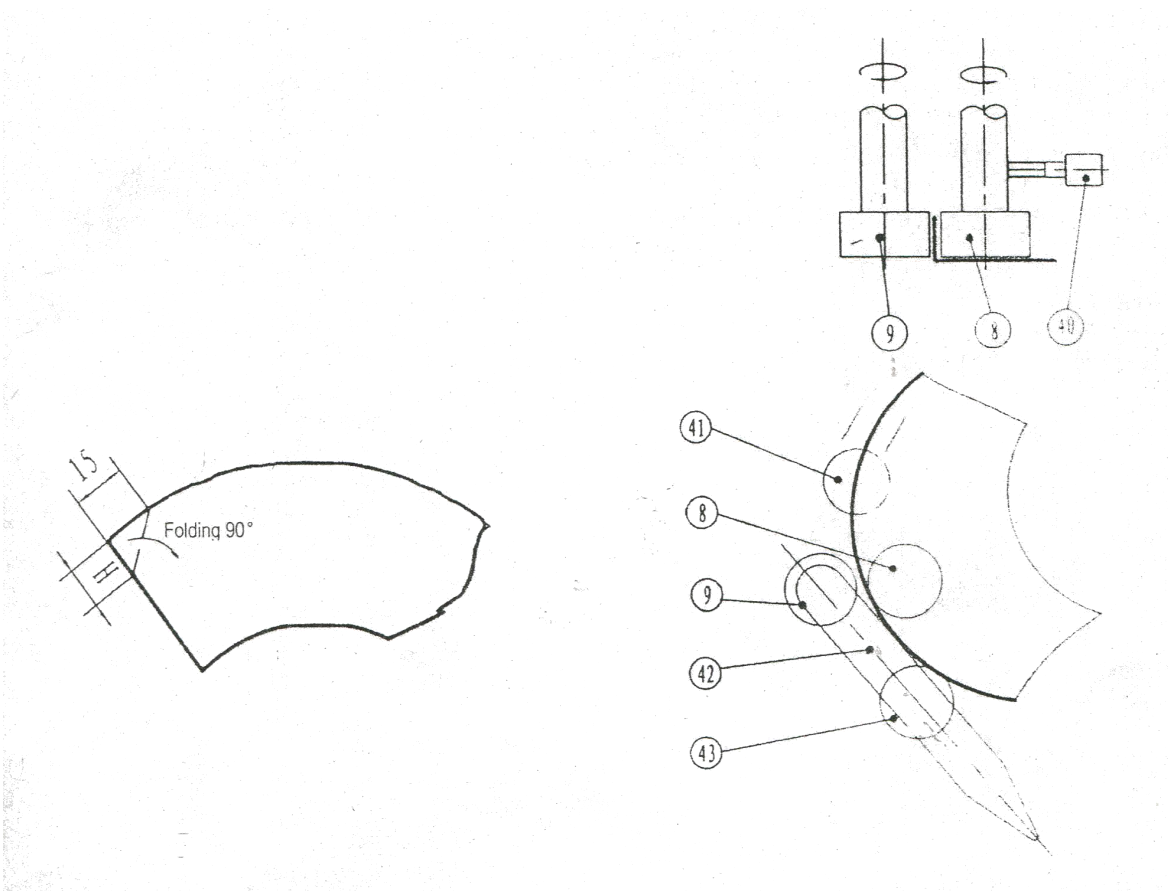
Line # 1 FOR DOUBLE SEAMS

Line # 2 FOR PITTSBURGH LOCK SEAMS

## 6. Using bending unit (Power flange attachment)

To use the bending unit, first have to bend a right angle on the first 15mm of the work piece (sector plate). The height of the bend is "H".

We will call the edge the bend was made on (B)



## 7. Electric System

7.1 Before connecting to the main power supply, check that the operating voltage and frequency specifications on the name tag of the motor matches the local power supply.

7.2 All electrical connections should be checked for being tight after transportation.

7.3 After connecting to the main power supply, the phase sequence of the 3 phases current must be measured by a phase sequence meter. If necessary, the phases may have to be changed.



Before changing phases, the main power supply must be isolated.

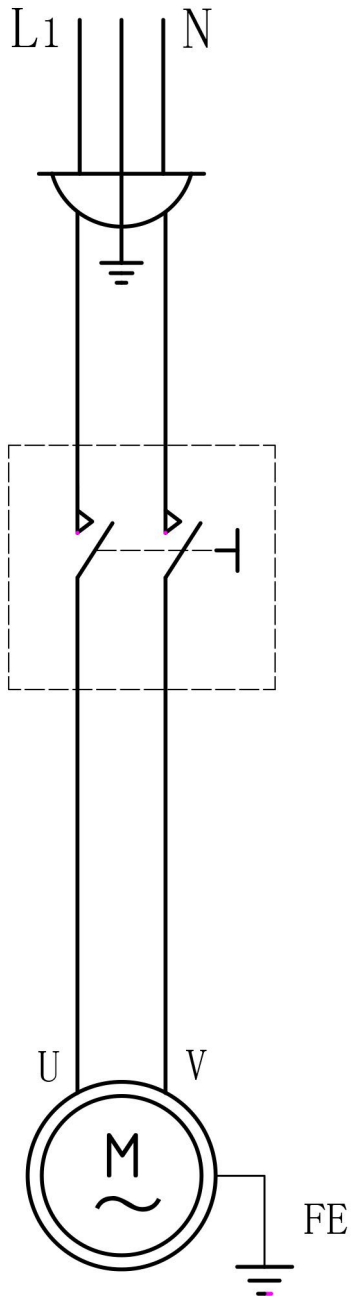
The direction of the profile rollers should be turning clockwise

7.4 Only qualified personnel should be allowed to work on the machines electrical system.

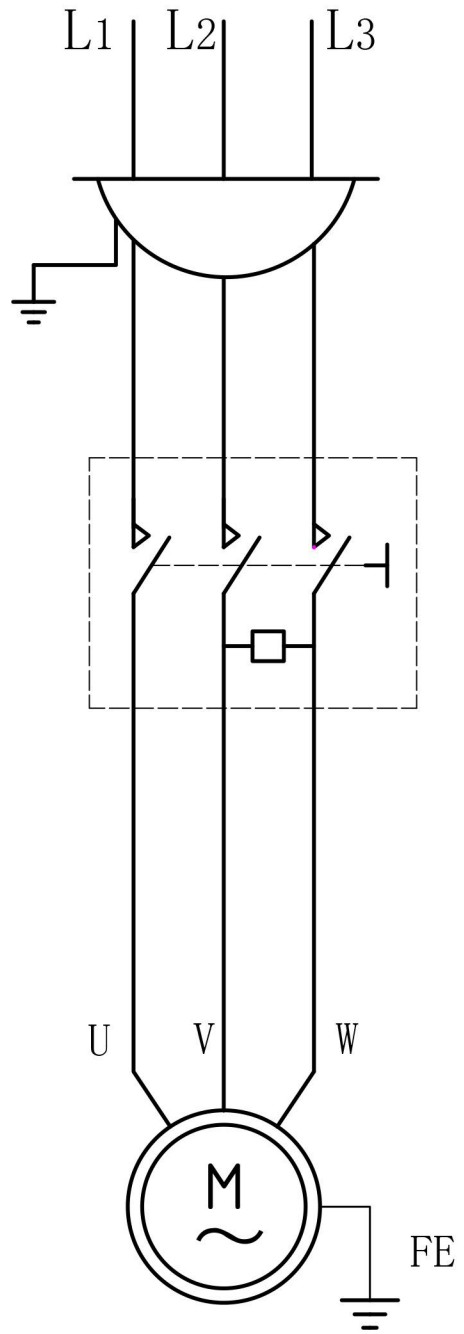
7.5 Do not operate the machine without an adequate ear thing system

7.6 Electric diagram

110-127V



240-380V



## 8. Maintenance

8.1 The machine must be disconnected from the power source before any maintenance and/or adjustment work can be performed

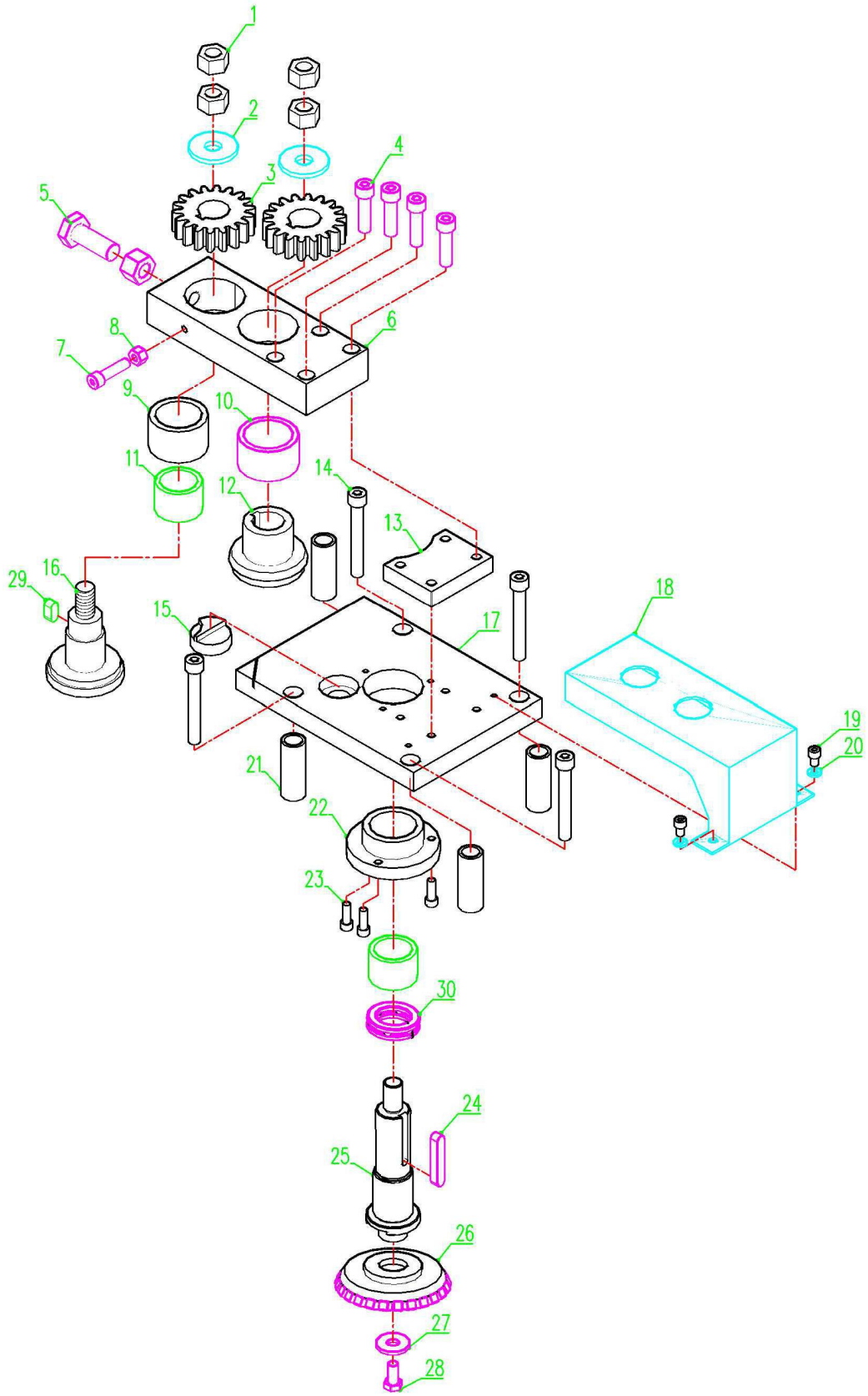
8.2 Qualified personnel, who has read and fully understands this manual and is aware of the dangers involved, must only carry out adjustment and maintenance work

### 8.3 Diagram for maintenance

Daily	Weekly	Monthly	Annually
Clean and lightly oil profile rollers	Clean machine with cloth		
Keep the work area clear of all waste materials	Check for adequate amounts of lubrication on moving parts		
	Inspect machine setting adjust if necessary	Check all screws and bolts for tightness	
	Check for malfunctioning parts both electrical of mechanical	Clean and remove all foreign material from with the machine	
	Check V belt for correct tension (adjust if necessary)	Lubricate all moving parts	
		Grease all bare metal parts to prevent corrosion	Remove all lubrication and reduplicate with high quality lubricant
		Visually check for damage to the machine	Thoroughly check machine for any sign of damage

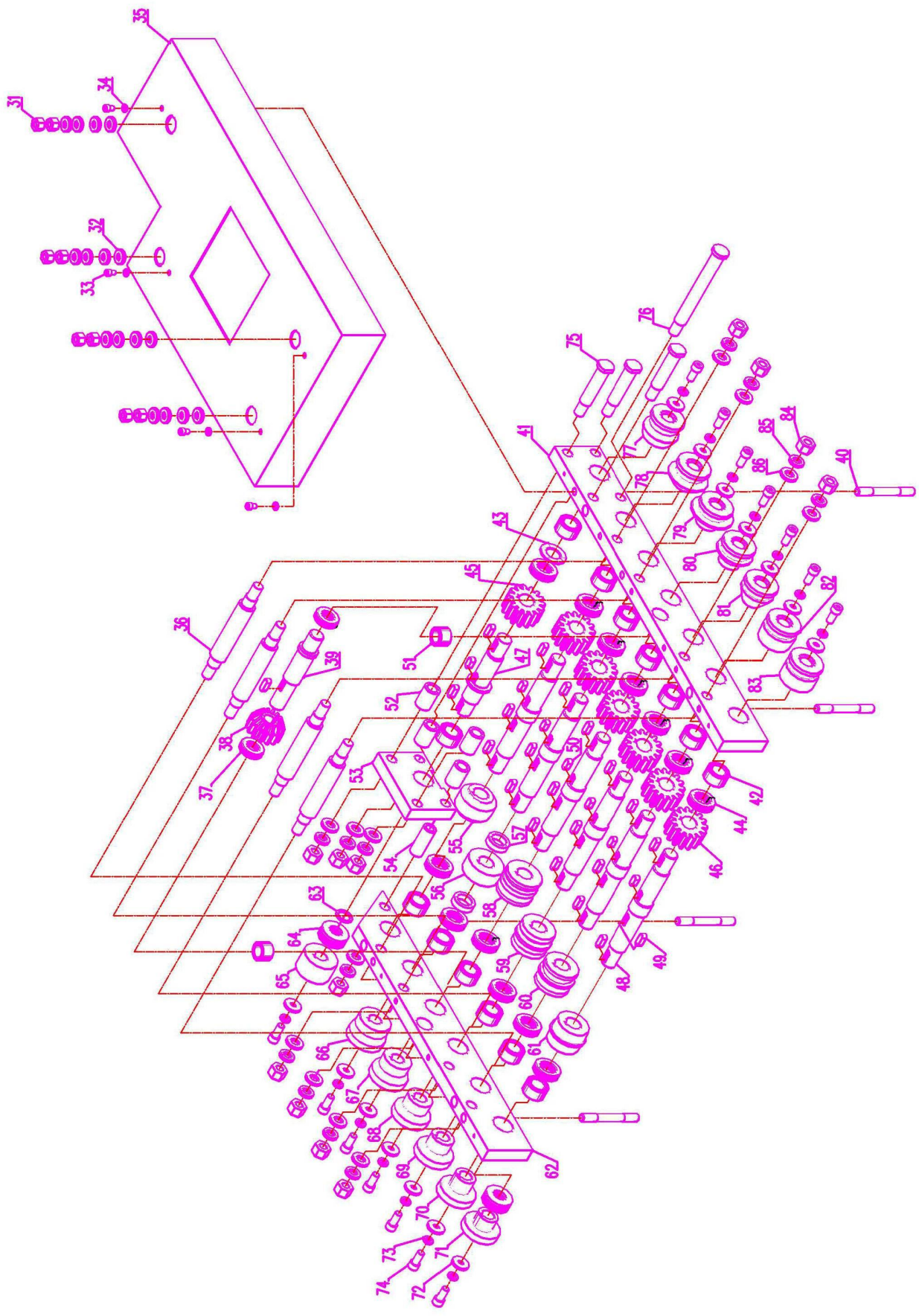
8.4 Never use paint thinner on the machine in any situation. It might attack the painted surfaces of the machine

9. Drawing and packing list



## PARTS LIST 1

Serial No.	Name	Figure No.	Qty.
1	Nut	M16	5
2	Flat washer	PF16G-1002	2
3	Gear	PF16G-1004	2
4	Inner hexagon screw	M8X60	4
5	Outer hexagon bolt	M16X45	1
6	Upper plate	PF16G-1003	1
7	Inner hexagon screw	M8X35	1
8	Nut	M8	1
9	Bearing bush	PF16G-1006	1
10	Needle bearing	NK45/30	1
11	Needle bearing	NK354325	2
12	Rolling bush	PF16G-1008	1
13	Fix plate	PF16G-1009	1
14	Inner hexagon screw	M10X80	4
15	Guide locating block	PF16G-1012	1
16	Rolling shaft	PF16G-1010	1
17	Upper plate	PF16G-1011	1
18	Upper shield	PF16G-1001	1
19	Inner hexagon screw	M6X10	2
20	Flat washer	φ6	2
21	Spacer bush	PF16G-1014	1
22	Bearing bush	PF16G-1005	1
23	Inner hexagon screw	M6X20	3
24	Flat key	8X55	1
25	Shaft	PF16G-1007	1
26	Bevel gear	PF16G-1013	1
28	Flat mat	φ10	1
29	Outer hexagon bolt	M8X20	1
30	Flat key	8X20	1

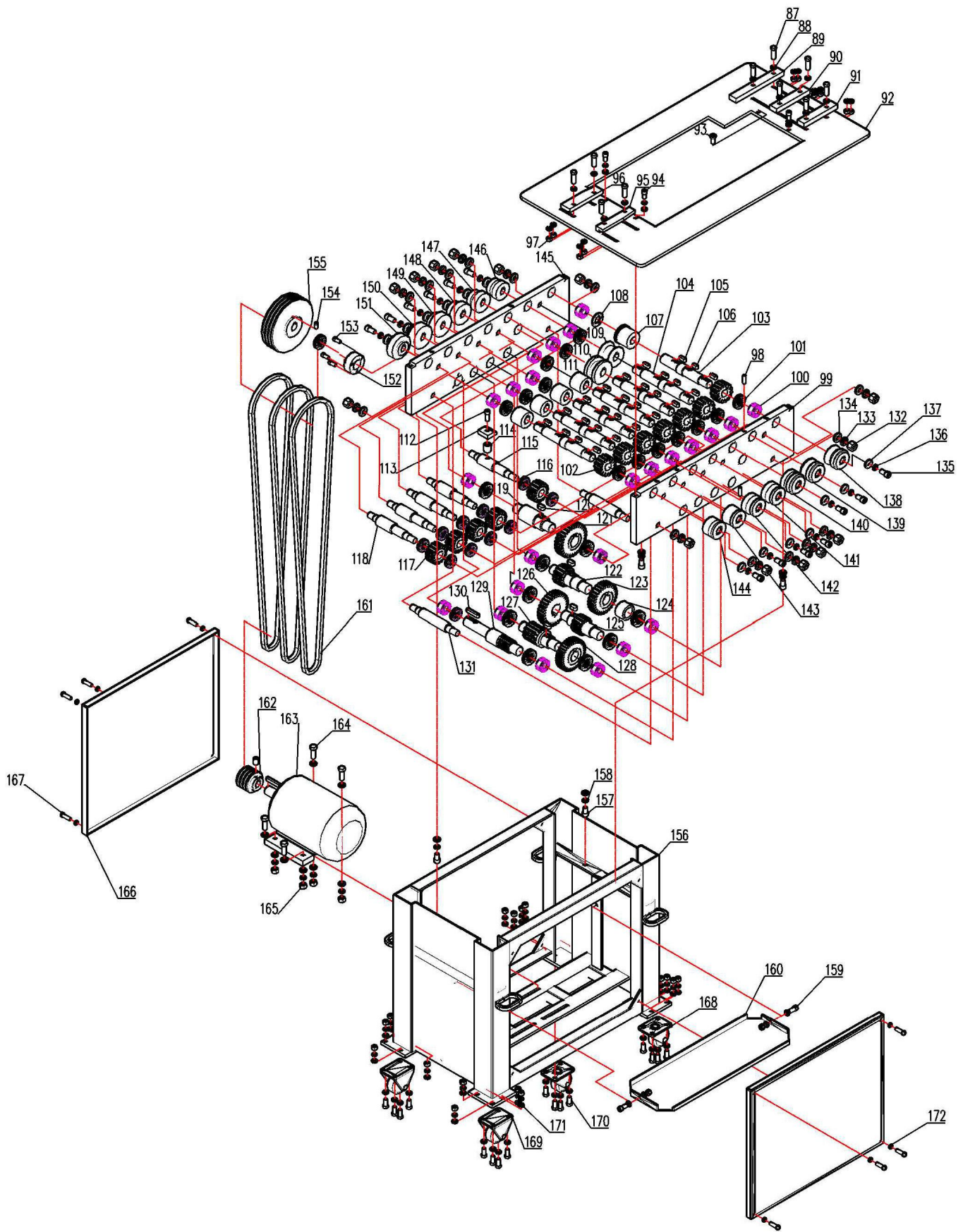


## PARTS LIST 2

Serial No.	Name	Figure No.	Qty.
31	Nut	M12	8
32	Butterfly Spring	φ12	32
33	Inner hexagon screw	M6X10	4
34	Flat mat	φ6	4
35	Upper shield	PF16G-0003	1
36	Locating shaft	PF16G-2003	4
37	Thrust ball bearing	51105	2
38	Gear Shaft	PF16G-2005	1
39	Shaft	PF16G-2004	1
40	Double end bolt	M12X160	4
41	Junction plate	PF16G-2001	1
42	Needle bearing	NK30/20	14
43	Brake mat	PF16G-2012	1
44	Thrust ball bearing	51106	13
45	Gear	PF16G-2013	1
46	Gear	PF12G-2014	6
47	Shaft	PF16G-2010	1
48	Shaft	PF16G-2011	6
49	Flat key	8X25	21
50	Flat key	8X20	7
51	Needle bearing	7943/25	2
52	Spacer bush	PF16G-2007	4
53	Small connection plate	PF16G-2002	1
54	Spacer bush	PF16G-2009	1
55	DC1 Roller	PF16G-4032	1
56	DC2 Roller	PF16G-4034	1
57	Checking ring	PF16G-4033	2
58	DC3 Roller	PF16G-4035	1
59	DC4 Roller	PF16G-4036	1
60	DC5 Roller	PF16G-4037	1



Serial No.	Name	Figure No.	Qty.
61	DC6 Roller	PF16G-4038	1
62	Junction plate	PF16G-2015	1
63	Checking ring	PF16G-4027	1
64	Butterfly Spring	φ25	8
65	Upper roller blade	PF16G-4031	1
66	ZS1 Roller	PF16G-4001	1
67	ZS2 Roller	PF16G-4002	1
68	ZS3 Roller	PF16G-4003	1
69	ZS4 Roller	PF16G-4004	1
70	ZS5 Roller	PF16G-4005	1
71	ZS6 Roller	PF16G-4006	1
72	Flat Mat	φ10	14
73	Spring washer	φ10	14
74	Inner hexagon screw	M10X25	14
75	Bolt	PF16G-2006	3
76	Long bolt	PF16G-2008	1
77	RFDS-S1 Roller	PF16G-4013	1
78	RFDS-S2 Roller	PF16G-4014	1
79	RFDS-S3 Roller	PF16G-4015	1
80	RFDS-S4 Roller	PF16G-4016	1
81	RFDS-S5 Roller	PF16G-4017	1
82	RFDS-S6 Roller	PF16G-4018	1
83	RFDS-S7 Roller	PF16G-4019	1
84	Nut	M16	12
85	Spring washer	φ16	12
86	Flat mat	φ16	12



### PARTS LIST 3

Serial No.	Name	Figure No.	Qty.
87	Outer hexagon bolt	M8X35	10
88	Flat mat	φ8	59
89	ZJ Feeding plate	PF16G-0007	1
90	DC Feeding plate	PF16G-0011	1
91	RFDS Feeding plate	PF16G-0009	1
92	Table board	PF16G-0001	1
93	Inner hexagon screw	M8X20	1
94	Inner hexagon screw	M8X25	3
95	RFDS Discharging plate	PF16G-0010	1
96	ZJ Discharging plate	PF16G-0008	1
97	Nut	M8	28
98	Round pin	Φ10x30	2
99	Lower junction plate	PF16G-3001	1
100	Needle bearing	NK30/20	24
101	Thrust ball bearing	51106	24
102	Gear	PF16G-2014	7
103	Roller shaft	PF16G-3002	1
104	Roller shaft	PF16G-2011	6
105	Flat key	8X25	20
106	Flat key	8X20	7
107	Lower roller blade	PF16G-4039	1
108	Check ring	PF16G-4028	1
109	DCX1 Roller	PF16G-4040	1
110	DCX2 Roller	PF16G-4041	1
111	DCX3 Roller	PF16G-4042	4
112	Inner hexagon screw	M8X30	1
113	Guide plate	PF16G-4030	1
114	Sheath	PF16G-4029	1
115	Locating shaft	PF16G-3003	1

Serial No.	Name	Figure No.	Qty.
117	Gear	PF16G-3005	5
118	Locating shaft	PF16G-3004	4
119	Transmission shaft	PF16G-3006	1
120	Flat key	12X25	4
121	Gear	PF16G-3007	1
122	Gear shaft	PF16G-3008	1
123	Helical gear	PF16G-3013	1
124	Spacer bush	PF16G-3009	1
125	Helical gear shaft	PF16G-3010	1
126	Helical gear	PF16G-3014	1
127	Helical gear shaft	PF16G-3011	1
128	Helical gear	PF16G-3015	1
129	Helical gear	PF16G-3012	1
130	Flat key	8X25	1
131	Locating shaft	PF16G-2003	2
132	Nut	M16	14
133	Spring washer	φ16	14
134	Flat mat	φ16	14
135	Inner hexagon screw	M10X25	13
136	Spring washer	Φ10	21
137	Flat mat	φ16	13
138	RFDS-X1 Roller	PF16G-4020	1
139	RFDS-X2 Roller	PF16G-4021	1
140	RFDS-X3 Roller	PF16G-4022	1
141	RFDS-X4 Roller	PF16G-4023	1
142	RFDS-X5 Roller	PF16G-4024	1
143	RFDS-X6 Roller	PF16G-4025	1
144	RFDS-X7 Roller	PF16G-4026	1
145	Lower junction plate	PF16G-3016	1

Serial No.	Name	Figure No.	Qty.
147	ZX2 Roller	PF16G-4008	1
148	ZX3 Roller	PF16G-4009	1
149	ZX4 Roller	PF16G-4010	1
150	ZX5 Roller	PF16G-4011	1
151	ZX6 Roller	PF16G-4012	1
152	Bearing bush	PF16G-3017	1
153	Inner hexagon screw	M6X20	3
154	Set screw	M6X20	2
155	Big pulley wheel	PF16G-3018	
156	Body	PF16G-0002	1
157	Inner hexagon screw	M10X20	4
158	Flat mat	Φ10	12
159	Inner hexagon screw	M8X30	2
160	Crumb bord	PF16G-0004	1
161	Triangular belt	A1150	3
162	Motor pulley wheel	PF16G-0006	
163	Motor	2.2KW	1
164	Outer hexagon bolt	M10X40	4
165	Nut	M10	4
166	Front and back dorrs	PF16G-0005	2
167	Screw	M6X35	8
168	Rotary foot wheel		2
169	Fix foot wheel		2
170	Outer hexagon Screw	M8X25	16
171	Flat mat	Φ6	8
172	Spring washer	Φ8	19

**Note:** This manual is only for your reference. Owing to the continuous improvement of the machine, changes may be made at any time without obligation on notice. And please note the local voltage while operating this electric machine.