

Operating Instructions

Grinding Machine



Machine Type: MD1

Date: 2017.2.15

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1 Safety Instruction

This operating instructions manual contains important prerequisite for safe and efficient working with the machine. It should be kept readily accessible in the vicinity of the machine.

Before installation and commissioning, carefully read and observe the operating instructions.

The operating instructions manual does not contain any repair information. Repairs should only be carried out by specialist personal of the competent customer service organization.

1.1 Safety Regulation

1.1.1 Intended Application

The DrillMasters Eldorado Tool grinding machine MD1 is designed for low volume production re-sharpening of single flute gundrills.

1.1.2 General Potential Hazards with This Machine

The machine was developed, designed and built according to technical safety aspects. Usage contrary to that intended or usage by unqualified personnel may result in danger.

- to life and health of the operator
- to the machine itself
- to other property of the operator
- to the performance of the machine
- and consequently to its economy

Insofar as permitted by the sequence of operations and the intended purpose of the machine, all danger areas have been guarded so that with proper and careful handling there is no risk to body and life of the operating personnel. During operation it is not necessary and therefore prohibited to tamper in the working area or remove safety guards in order to be able to interfere with the operation,

The general danger potential in improper and careless use of the machine consists of:

• Mechanical danger through

- impact, due to the kinetic energy of the moving masses
- maiming and shearing
- grabbing and wrapping and drawing-in
- sharp edges and corners
- fluids under pressure
- freely movable parts

• Electrical danger through

- electrical contact (direct or indirect)

- **Combination of dangers through**

- faulty assembly
- incorrect clamping of tools
- wheel wear
- failure and/or incorrect application of protective measures.

- **Danger through emission**

- The equivalent continuous sound pressure level of the grinding machines is less than 80 dB(A).

- **Residual dangers, i.e. potential, not obvious danger through**

- human error
- noise
- ejection of parts
- control system failure
- sharp tools in set-up work
- fire
- allergic reactions, mucous membrane irritation through dust or lubricants
- hot machine parts or tools
- injuries through rotating wheels

1.1.3 Requirements Imposed on the User/Operator

The operator must have the necessary technical qualifications to be able to operate the machine

- after instruction in how to operate it and
- reading the operating instructions.

It is of particular importance that he is able to recognize dangers resulting from the use of the machine.

The person in charge of the machine has the duty to make the operating instructions manual belonging to the machine available to the machine operator. The person in charge of the machine is responsible for working sure that the machine operator has attentively read and understood the operating instructions. The operating instructions should be kept in the immediate vicinity of the machine.

The operator must use the machine only in a serviceable condition. All factors impairing mental concentration of the operator should be eliminated from the outset, to ensure proper operation of the machine.

The machine must only be operated by personal of whom proper use can be expected.

The person in charge of the machine must make sure that no unauthorized person uses the machine. The operator is responsible for third persons the working area. The competencies for various activities on the machine must be clearly defined.

1.1.4 Personal Safety Equipment

- Wear appropriate protective clothing when working with the machine.
- Wear closely fitting clothing when operating the machine.
- Operators with long hair must wear a hair net.
- No protective gloves
- Wear safety goggles when operating the machine.

1.1.4 Safety during Repair and Maintenance

Before starting with maintenance and repair works, switch off main circuit breaker and lock to avoid restoration of power.

- Maintenance and repairs must only be carried out by authorized specialists. In this context special note should be taken of the dangers when working on electrical system.
- The relevant accident prevention and safety regulations as well as the information in the machine documentation and the supplementary documentation must be observed.
- Immediately renew damaged or removed information and warning signs as well as safety inscriptions.
- After completed repairs, correctly refit all removed guards. Unauthorized conversions or changes to the machine impair the safety of operating personnel and of the machine, therefore they are strictly forbidden.
- After completed maintenance and repair to grinding machine, units or fixtures, the final customer shall be responsible for the attachment and the function of the guards and other safety installations as part of the overall safety of the machine.

1.1.6 Safety during Tool Change and Set-up

Prior to every tool change and during set-up work on the machine, the main motor must be switched off.

1.1.7 Behavior in an Emergency

In emergency situations immediately

- press the red emergency-off switch or (if available)
- pull the emergency-stop line.

1.2 Warning Plate

Persons entrusted with transport, storage, operation or maintenance and repair of the machine must be familiar with the contents of the operating instruction manual. These instruction, particularly the safety instructions ,must be obeyed.

In addition to the operating instructions, observe the valid general, statutory and other regulations for the prevention of accidents and for environmental protection which are in force in the

particular country.

Some symbols used on the machine are explained below. Read the explanations of these symbols carefully so that you are quite sure what they mean:

The caution symbol is a warning of the danger of fatal accidents or injuries if the control and work instructions are not observed or not observed exactly.



This symbol is a warning against dangerous electric voltage. Failure to heed this safety direction in the operating instructions can result in personal hazard. In parts of the machine which are marked with this symbol repairs may only be carried out by trained maintenance and repair personnel.



2 Specification

2.1 Technical Data

Grinding Machine	MD01
Clamping Range	Φ 2.0~ Φ 32
Minimum flute length of tool	100.0mm
Power	0.55KW
Speed	2800r/min
Net Weight	70KG
Voltage	
- working voltage	380V
- frequency	50HZ

2.2 Machine Noise

The equivalent continuous sound pressure level of the grinding machine is less than 80 dB(A) .

2.3 Function of the machine

Machine base

- this is a found structure to accommodate the entire machine including the bottom box, the slide part and grinding fixture.
- precision-finished mounting surfaces

Slide Part

- constructed with linear guideways
- the profile guide beads are permanently bolted onto the machine

Grinding Fixture

- the grinding fixture is designed for low volume production re-sharpening of single flute gundrills.
- The fixture may be installed on a DrillMasters Eldorado Tool grinding machine MD1, or a standard tool grinding machine. The desired angles are on the grinding fixture using graduated scales.

Grinding fixture PS

- the grinding fixture PS was developed for re-sharpening single flute gundrill within a diameter range from 0.5~6.0mm.
- The fixture may be installed on a DrillMasters Eldorado Tool grinding machine MD1 or a standard tool grinding machine.

2.4 Legend of the Machine

1. machine base
2. slide part
3. grinding fixture
4. grinding fixture PS

3. Installation

3.1 Transport

CAUTION:

Incorrect handling when installing and transporting the machine can cause serious injuries. Observe safety regulations during unloading. Presence or working under suspended loads is strictly forbidden.

3.2 Installation

3.2.1 Setting-up and alignment of the machine

The installation and alignment of the machine must be carried out by authorized specialist personnel.

- the permanent stability of the machine must be assured
- the surface on which the machine is installed must carry the unladen weight of the machine.

3.2.2 Electrical connection

The mains input connection is located in the switch cabinet.

Check the input terminals for correct designation of the voltage before commissioning the plant. The actual value of the mains supply voltage must correspond to the nominal voltage rating of the plant. The main circuit breaker and the motor-protection circuit breakers must be closed before connecting the feed cable to the mains supply.

CAUTION: dangerous voltage

- Always keep the switch cabinet locked
- Access for maintenance and repair tasks is granted only to authorized personnel subject to compliance with the applicable safety precautions.
- Observe the instructions of the local electric supply company with regard to the maximum power rating of the mains supply.
- The sense of rotation must be checked for all motors, is a “clock-wise rotating field” present?

The direction of rotation can be reversed by interchanging two mains phase lines.

3.2.3 Preparation for the start-up of the machine

Mechanical inspection

A general inspection has to be carried out concerning the functional safety of the complete machine, of all mechanical components, as well as of all the protection devices.

Wheel inspection

- Cup wheel

For re-sharpening single flute gundrills within a diameter range from 0.5 to 2.0mm a cup wheel is most suitable. The gait of the wheel is chosen to keep an excellent grinding quality and sufficient stock removal without overheating the tool.

- Double grinding wheel

The double grinding wheel is ideal for re-sharpening single flute gundrills up to 45mm diameter. The coarse grit of the outer wheel is for roughing the tool with high stock removal and minimum heating of the tool. The fine grit of the inner grinding wheel provides optimum

Electrical inspection

The proper electrical assembly must be checked according to the regulations of the customer and local authorities. Check the setting of the protection devices, directions of rotation of the

electric motors and electrical connections.

Start-up of the machine

After the completion of all inspections is ready for operation. All machine functions are now checked in manual operation by trained and qualified personal. After completion of this work the test run of the machine can be started.

4 Operation

4.1 Start

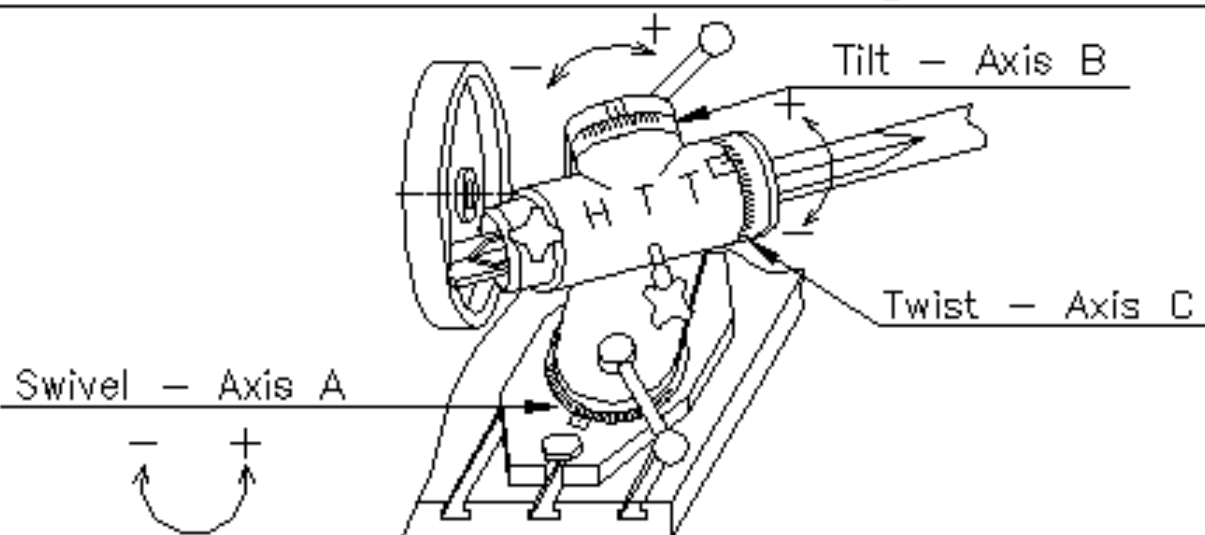
Before start please make sure that the machine voltage is right, and then open the electric tank, push the button make the machine start.

4.2 Operating with the grinding fixture

The gundrill is inserted into the clamping unit and a vee-shaped jaw holds the gundrill securely in the flute.

Considering the use of the gundrills, please chose the right angle following the pig 4.1 and pig 4.2.

Setting angles for HTT 3-Axis-Tool-Grinding-Device



Symbol	$\sphericalangle A$	$\sphericalangle B$	$\sphericalangle C$	measure	comment
1	-30°	$+12^\circ$	$+5^\circ$	$>D/4$	÷
2	-30°	$+20^\circ$	$+6,5^\circ$	Fase 0,3...0,5	
3	$+20^\circ$	$+12^\circ$	-5°	$D/4$	÷
4	$+30^\circ$	$+12^\circ$	$+55^\circ$	÷	÷
5	0°	$+25^\circ$	-5°	÷	÷
6	÷	÷	÷	÷	twist the drill at the circumference without damaging the the cutting edges

Table 4.1

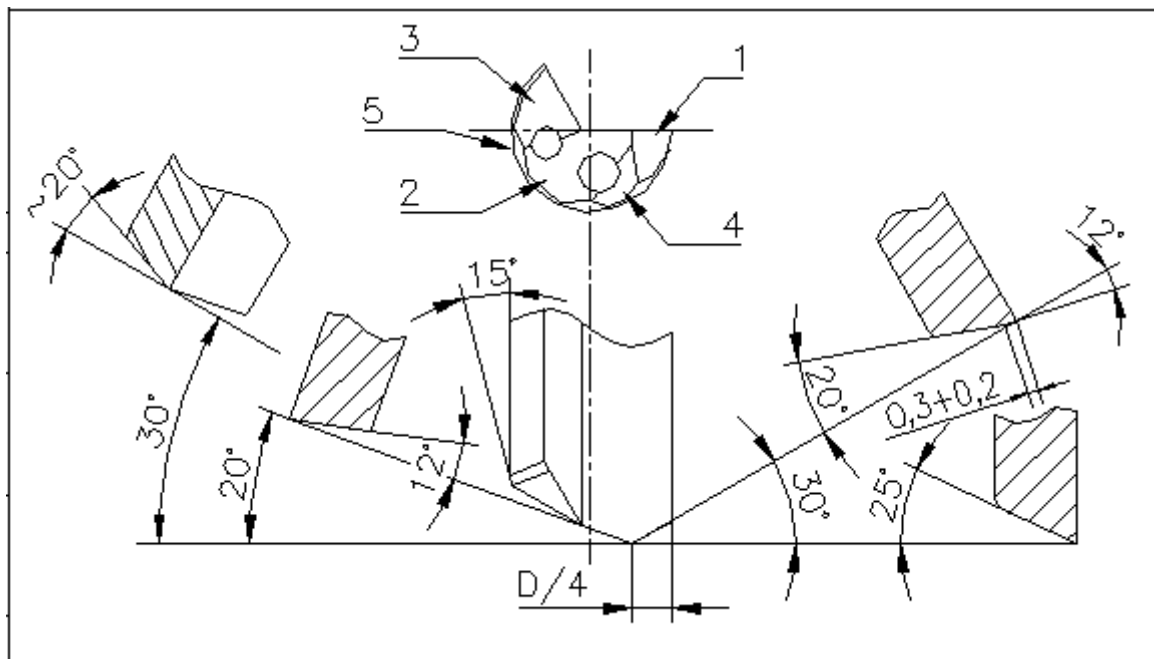


Fig 4.2

4.3 Operating Grinding fixture PS

By changing the grinding stations, our standard nose grinds can be produced. The angles of the cutting edges and fixed, depending on which grinding stations are chosen.

Single flute gundrills are clamped into a tool holder for re-sharpening. Each tool holder is suitable for one gundrill drive diameter of 10, 12 or 12.7mm. The tool holder is inserted into each grinding station and pressed against the adjustable stop and passed across a rotating diamond wheel. The relief angles are achieved by moving the grinding station to a second position.

Gundrill are clamped in the tool holder using a pre-setting fixture with microscope. A different tool holder bushing may be ordered for each gundrill diameter. Tool holders are available in specific gundrill diameter ranges and driver types. Please refer to the following page for further details.

Grinding fixture PS01

1. adjustment of pre-setting device for Model PS01(Pig 4.3~4.6)

- a. use the correct drill bushing ① to mount into the tool holder ②
- b. insert the gundrill carefully into the holder ②. Move the tool holder into the prism-guide of setting device (see view no.1)
- c. gently push the tool holder with centering pin ③ until making control against the stop screw ④.

Adjust the gap or space for dimension 'A' with length stop screw ④ shown in view 1. When regrinding drills up to 2.5mm diameter, dimension 'A' can vary, but should not exceed 3mm in length. After setting dimension 'A', clamp the tool holder with hand screw ⑤. Move gundrill gently against the carbide stop plate ⑥.

d. While looking through the microscope ⑦ rotate gundrill until the cutting edge of gundrill face is parallel with horizontal cross hair as shown in view no.2 lightly tighten the gundrill in this position with clamp screw ⑨. While looking through the microscope again, adjust the height of the carbide end stop ⑥ by turning knob no ③ to dimension 'B' shown in view 'X'. Dimension 'B' should be under the horizontal cross hair by 0.1~0.2mm allowing a sufficient view of the cutting edge on the gundrill. Now loosen the clamp screw ⑨ again and push lightly against carbide stop. Re-check alignment with microscope (view 2) and tighten clamp screw no ⑨.

2. Setting and grinding adjustments for grinding fixture model PS

a. Grinding facet of outer cutting edge (Facet 1)

- position centering pin ③ of tool holder guide slot ⑩
- loosen knob ⑱ and swing station 1 as far as possible to the left (Pos 1). Tighten the knob again.
- press centering pin of tool holder against the stop limit adjustment screw ⑭
- move table or grinding wheel across the gundrill until wheel actually touches gundrill
- grind tool with oscillating movement of the table
- take tool holder out and check point location using a magnifying glass with a scale of comparator.

The outer cutting edge should be smaller than $D/4$. Re-set adjustment screw ⑭ until result is satisfactory.

b. grinding of drill point relief (Facet 2)

- position centering pin ③ of tool holder into guide slot ⑪
- loosen knob ⑱ and swing station 1 as far as

- press centering pin of tool holder against the stop limit adjustment screw ⑮
- grind tool with oscillating movement of the table
- take tool holder out and check with a magnifying glass. Grind the drill point relief facet until it meets and blends into point location.

- adjust with stop limit adjustment screw ⑮

c. grinding facet of inner cutting edge relief (Facet 3)

- position centering pin ③ of tool holder into guide slot ⑫
- loosen knob ⑲ and swing station 2 as far as possible to the left (pos. 3). Tighten the knob again.
- press centering pin of tool holder against the stop limit adjustment screw ⑯
- grind tool with oscillating movement of the table
- check with magnifying glass inner cutting edge should meet and blend into point location
- adjust with stop limit adjustment screw ⑥

d. grinding oil chamber clearance angle (Facet 4)

- position centering pin ③ of tool holder into guide slot ⑬
- loosen knob ⑲ and swing station 2 as far as possible to the right (pos. 4). Tighten the knob again
- press centering pin of tool holder against the stop limit adjustment screw ⑰
- grind tool with oscillating movement of the table
- check with magnifying glass if sufficient clearance for oil chamber is achieved. This angle should blend into edge of flute only. The nose grind is now complete
- adjust with stop limit adjustment screw ⑦

3. exchange of grinding station (depending on nose grind)

a. exchange of grinding station 1

- pull spring loaded pin ⑳ down and rotate 90° to lock in lowered position
- loosen knob ⑱ and swing station to the right until station 1 is no longer clamped under the clamping plate ㉒

- lift station 1 out of the guide hole ②④

- position new station 1 (for different nose grind) at the same location. Insert pin ②⑤ into guide hole

②④

- lift clamping plate ②② by hand and swing new station 1 to the left until the clamping face of the station is completely underneath the clamping plate ②②

- rotate pin ②① 90° back again and turn the new station 1 slightly to the left and right until the spring loaded pin ②① snaps into the groove on the bottom side of the station

b. exchange of grind station 2

- pull spring loaded pin ②① down and rotate ② 90° to lock it in lowered position

- loosen knob ①⑨ and swing station 2 to the left until station ② is no longer clamped under the clamping plate ②③

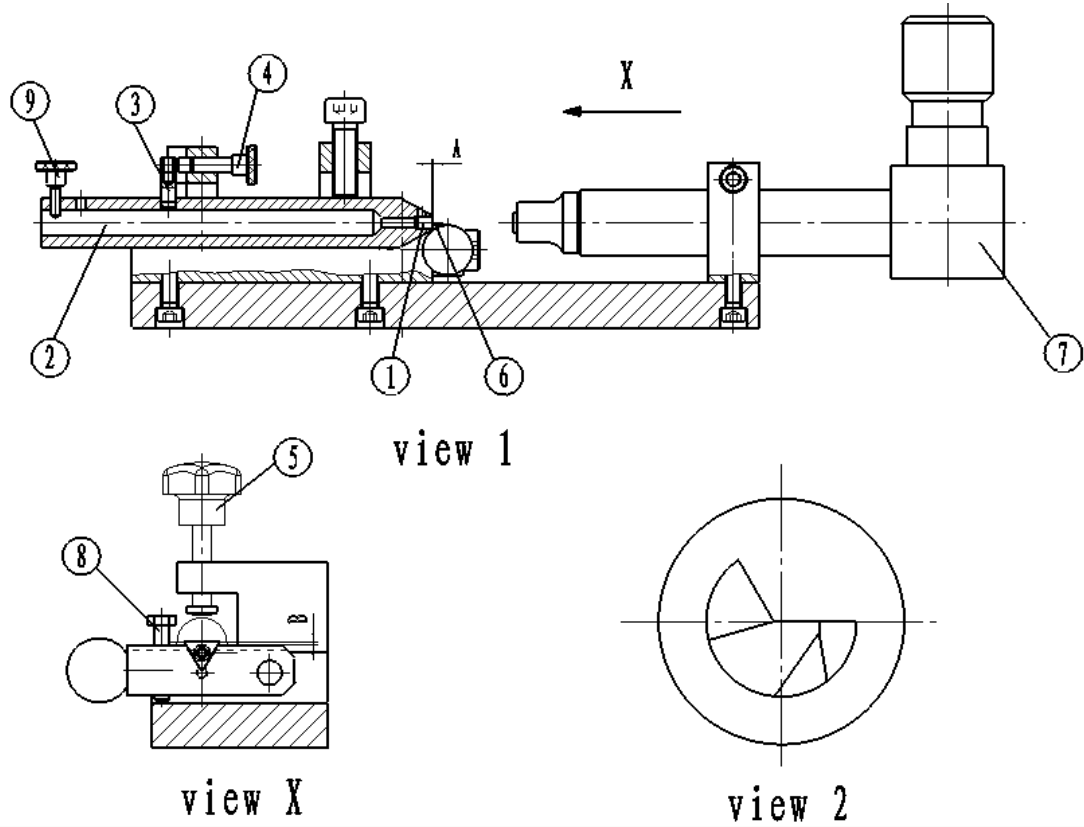
- lift station 2 out of the guide hole ②④

- position new station 2 (for different nose grind) at the same location. Insert pin ②⑤ into guide hole

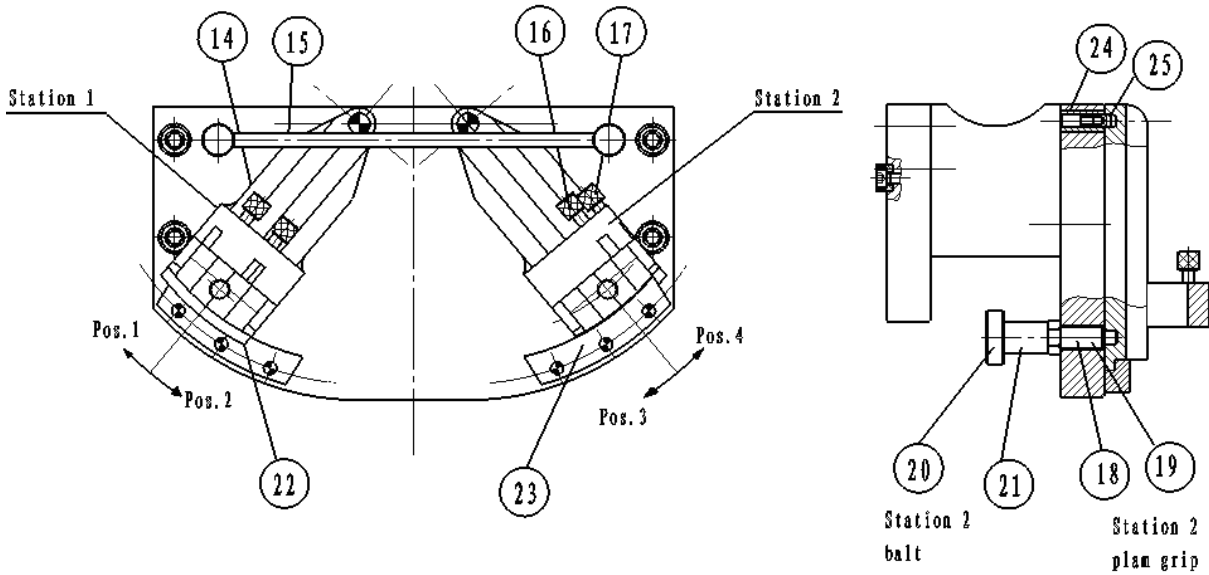
②④

- lift clamping plate ②③ by hand and turn new station 1 to the right until the clamping face of the station is completely underneath the clamping plate ②③

- rotate pin ②① 90° back again and turn the new station 2 slightly to the left and right until the spring loaded pin ②① snaps into the groove on the bottom side of the station.



Pig 4.3



Pig 4.4

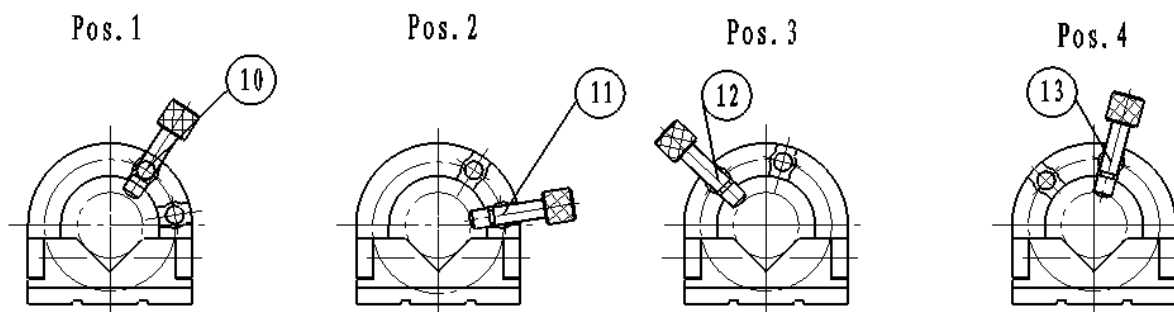


Fig 4.5

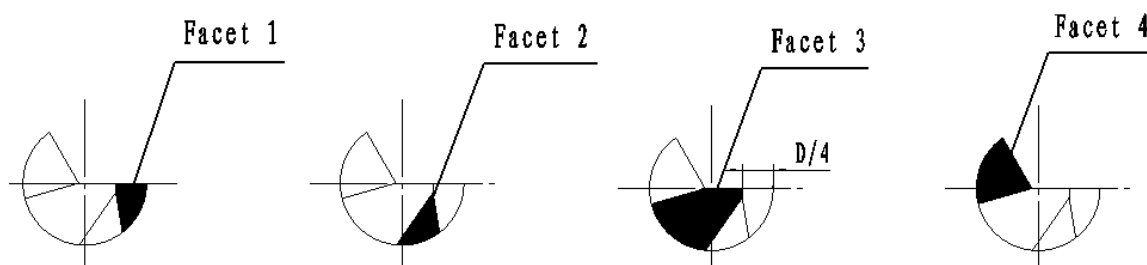


Fig 4.6

5 Maintenance

- Please clean the machine surface after grinding the gun drills.
- Turn off the grinding machine when you leave.

5.1 Lubrication

- The bearings of the machine have been lubricated before leave the company.
- The guideways have been lubricated before leave the company.

5.2 Common breakout and Solution

Number	Common Breakdown	Solution
1	Grinding wheel bearing is wear	Change the bearing
2	The fixture angle is off the mark	Checkout the fixture accuracy again
3	Grinding feed is too big, then make the motor burnout	Change the motor
4	The V support for holding the gun drill is wear	Change the V support