BALL MILL FOR ALL YOUR NEEDS

Contents

FORTY YEARS OF PRODUCTION EXPERIENCES

FOTE HEAVY MACHINERY

Henan Fote Mining Machinery Co., Ltd. is a joint-stock mining machinery enterprise integrated in scientific research, production and marketing, which mainly produces heavy-duty mining machines. The advanced technologies have been introduced from America, Germany, Japan and Australia.

The international advanced production line, first-class modern testing base and research centers of sand making, powder grinding, ore beneficiation and building material equipment are established.

The enterprise has

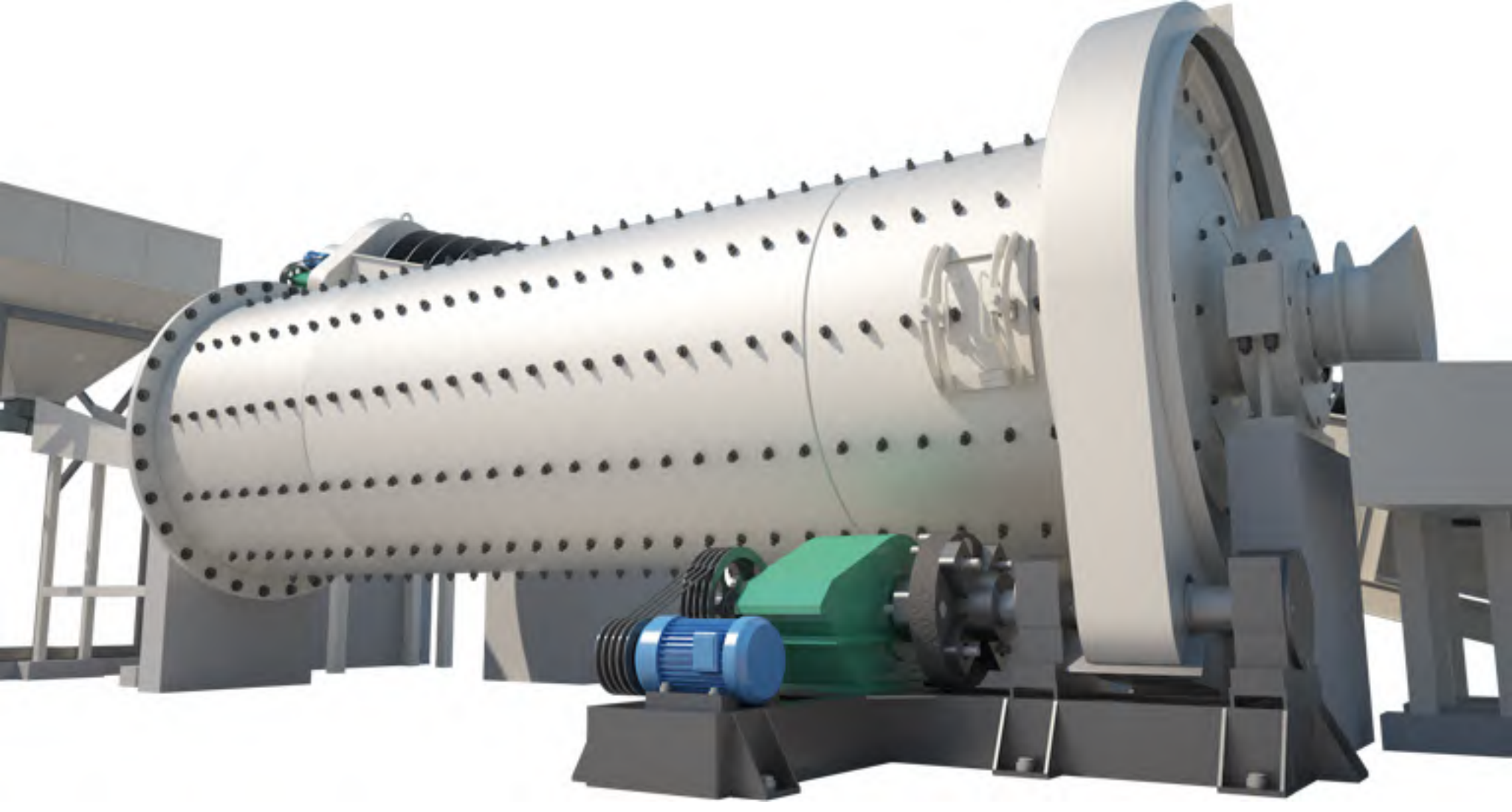
- Scientific management
- Excellent manufacturing technologies
- Creative manufacturing ideas
- Rapidly developed intohigh-end production and export base.

The enterprise covers an area of over 350,000 ㎡

Standardized heavy-duty industrial plants of 260,000 ㎡

More than 600 large and medium-sized equipment

More than 2,300 employees, including more than 360 high-tech talents



Introduction

Ball Mill

Ball mill is the key equipment for grinding materials after crushing and screening.
It is also commonly used in grinding equipment.

Dry Ball Mill:

I . It is mainly used in refractory, fertilizer, cement and glass industries;

II . The dry ball mill has strict requirements on the moisture content of the raw ore, and the material must be dry;

III. If the product is required to be stored and sold in powder form, you can only using dry ball mill;

IV. If the material will react with water, you can only choose dry ball mill, such as cement, marble and other construction stone;

Wet Ball Mill:

I . It is mainly used in chemical and ceramic industries;

II . The wet ball mill with wide range applications, it is suitable for the most minerals;

III. It can process the ore with high moisture and mud content;

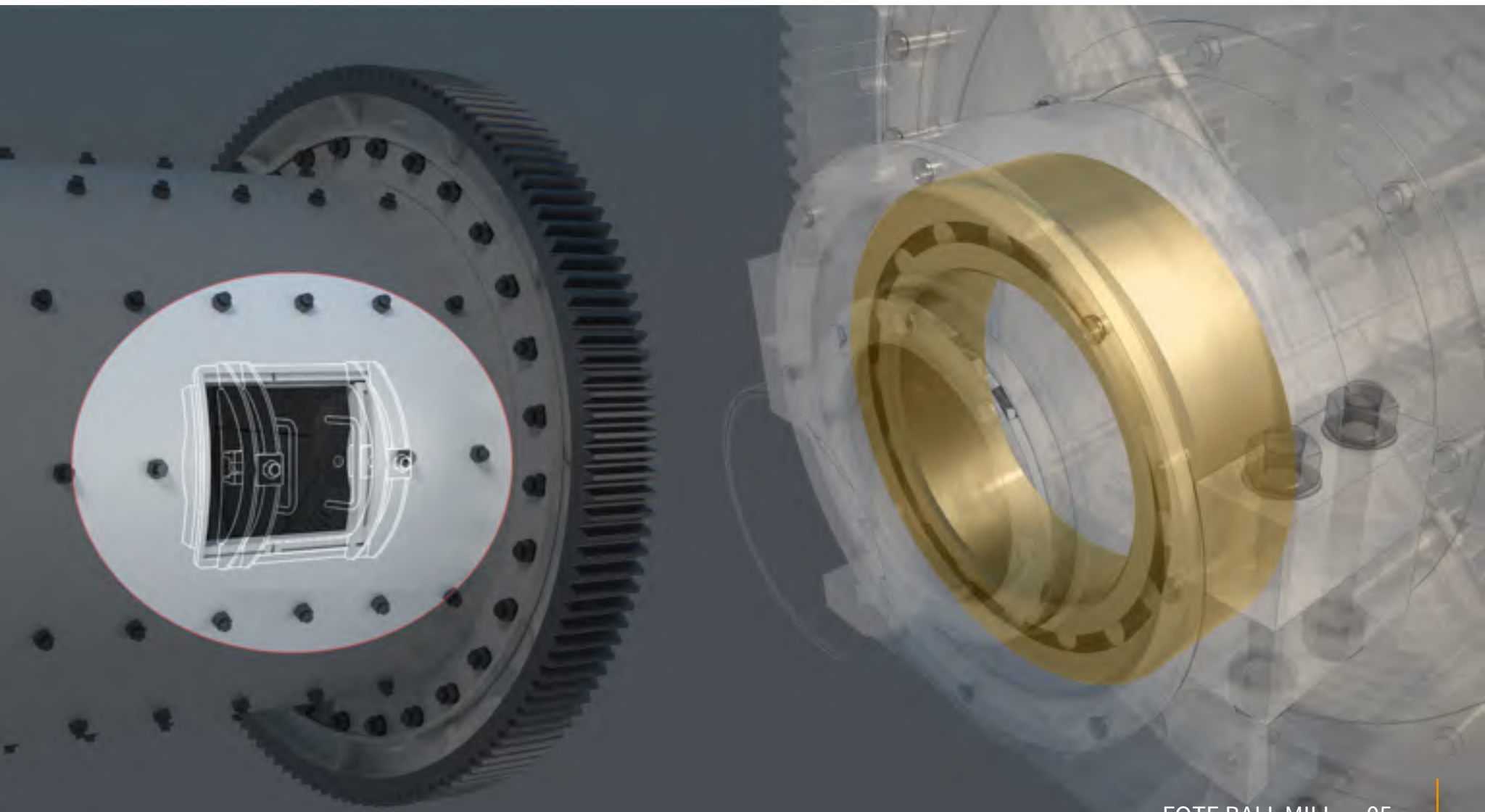
IV. Wet ball mill is usually used in ore processing project;

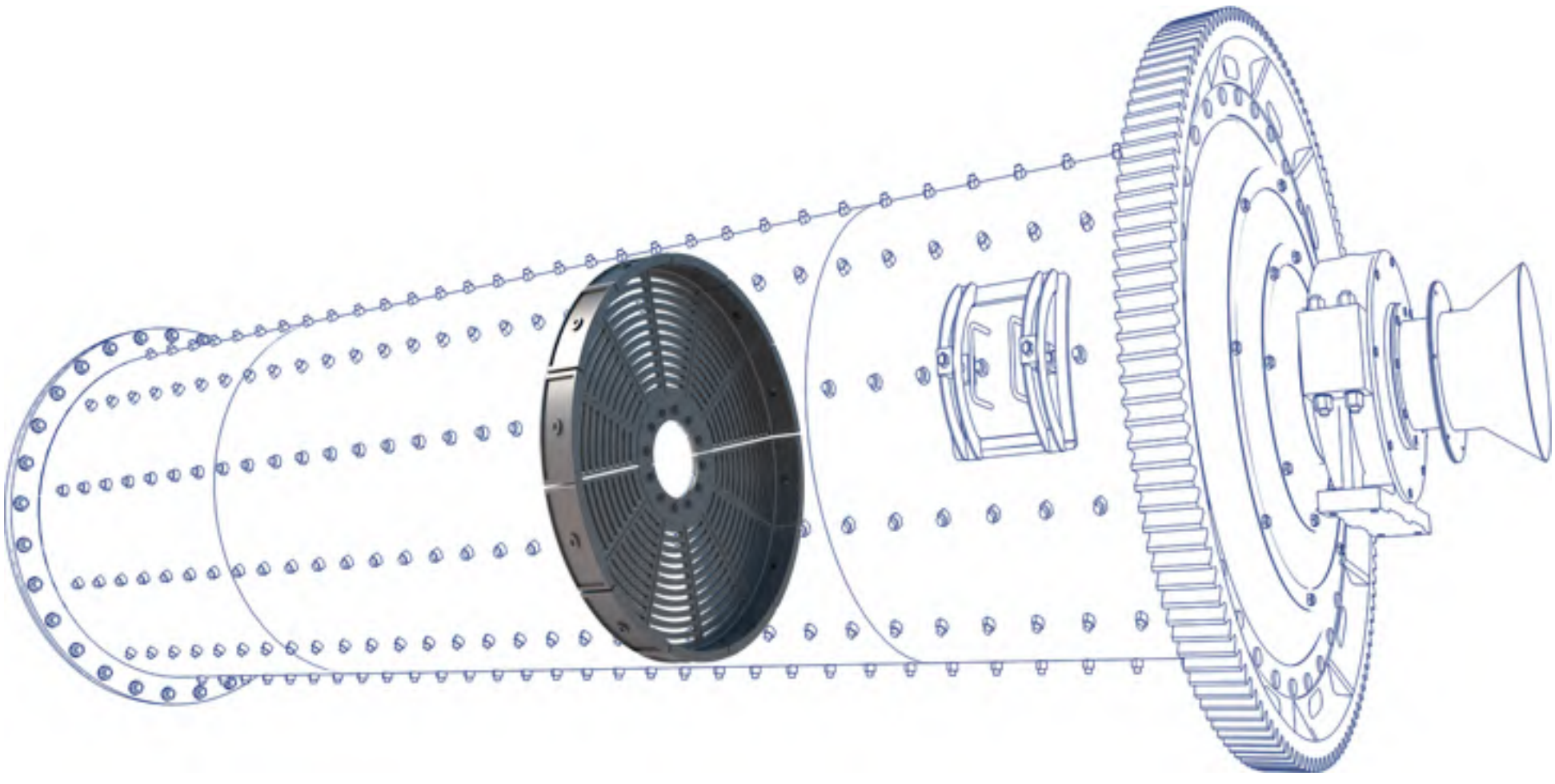
The Structures of Ball Mill

The ball mill is made up by several parts, as follow

1. Combine feeder, used for feeding.
2. The tube part, there is a man’ s hole in tube that can be used for examining and repairing and changing line.
3. The output part , used for discharging proper product.
4. Main bearing part.
5. Driving part.

! According to requirement of process line, ball mill is divided into the left rotary or the right rotary. It depends on contract.





The Structures of Ball Mill

Dry and wet ball mills have the same basic components, but there are some structural differences:

① Partition

The dry ball mill is double-wall or three partitions
The wet ball mill is single-wall partition

② Feeding device

Dry ball mill: drum feeder, feed hopper, combined feeder
Wet ball mill: feed hopper, combined feeder

The drum feeder is suitable for adding dry materials to the ball mill,
while the feed hopper and combined feeder can feed both dry ore and wet materials.

Note: the combined feeder is convenient to add steel balls to the ball mill, and can also be used in the second stage of grinding, so it is widely used.

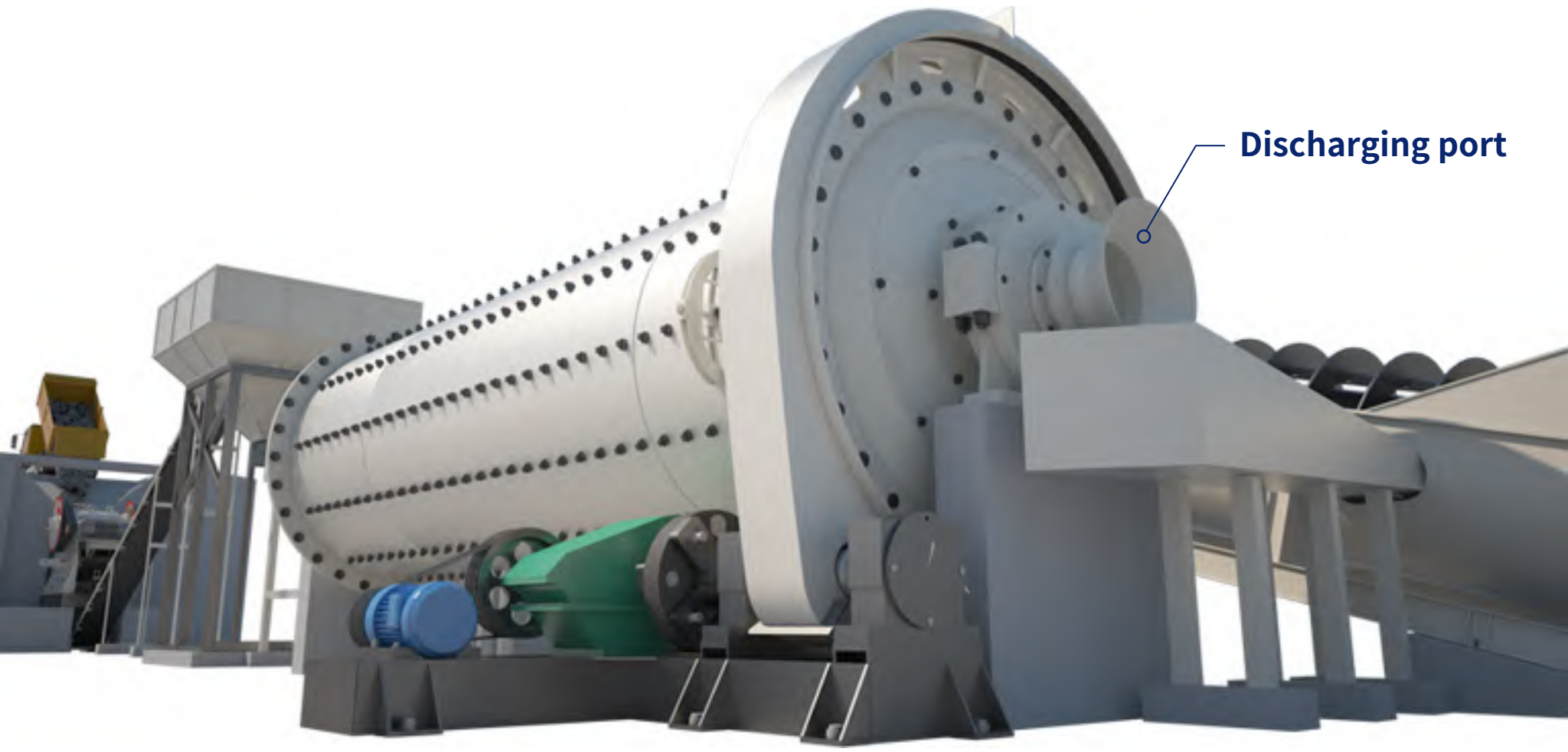
The Structures of Ball Mill

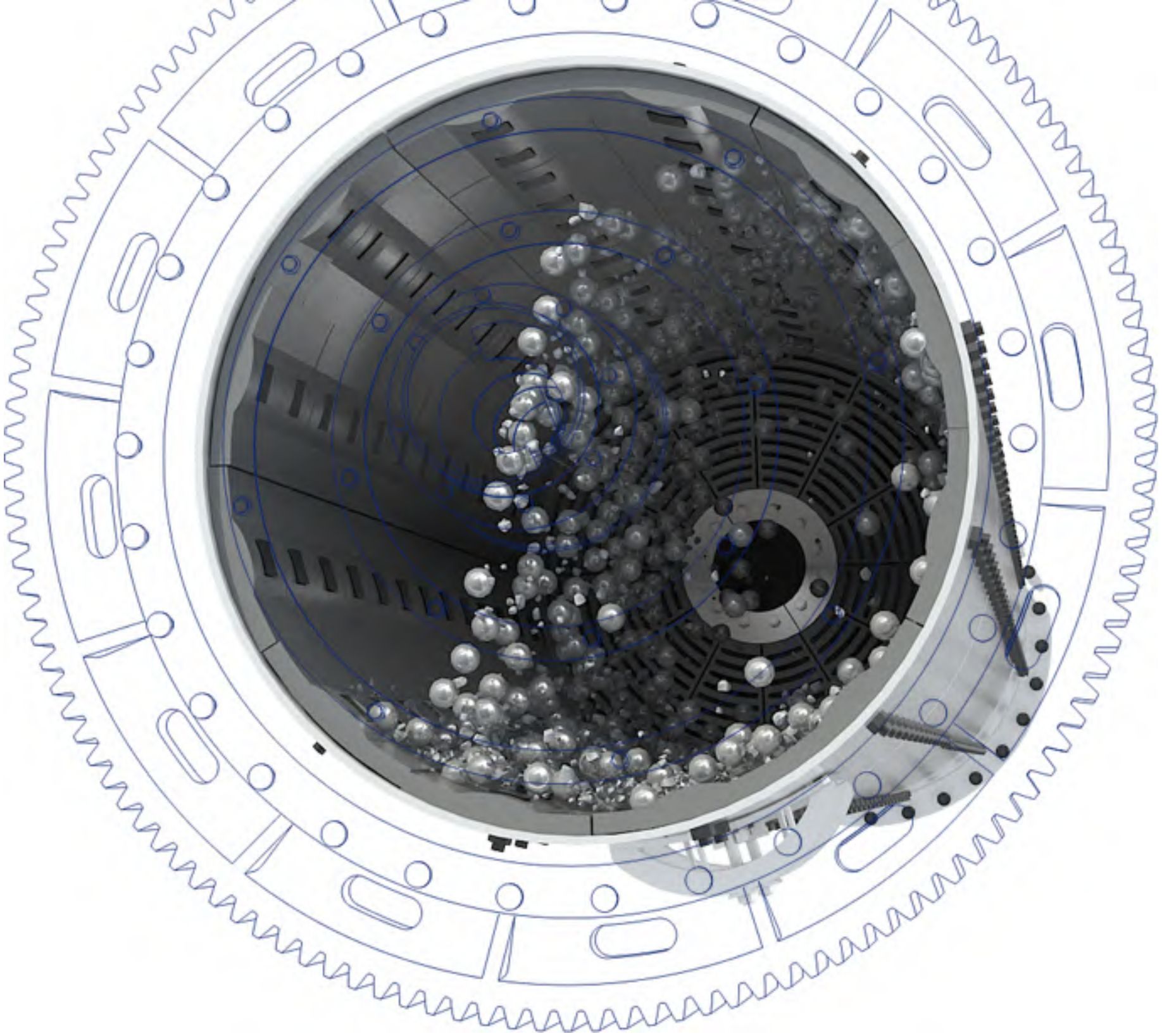
Dry and wet ball mills have the same basic components, but there are some structural differences:

③ Discharging part

- Discharging port:
  Dry ball mill: The ball mill needs to be equipped with an air induction device, a dust exhaust pipe and a dust collector. The structure is more complicated, and the discharge port is straight.
  Wet ball mill: There is no need to add auxiliary accessories, the discharge port is trumpet-shaped, and the built-in screw device is convenient for discharging;

- Discharging methods
  Dry ball mill: the material is brought out by the air flow drawn out of the barrel;
  Wet ball mill: the material is discharged out of the cylinder through the discharge part with the ore pulp;





The working principle of ball mill

Dry Ball Mill:

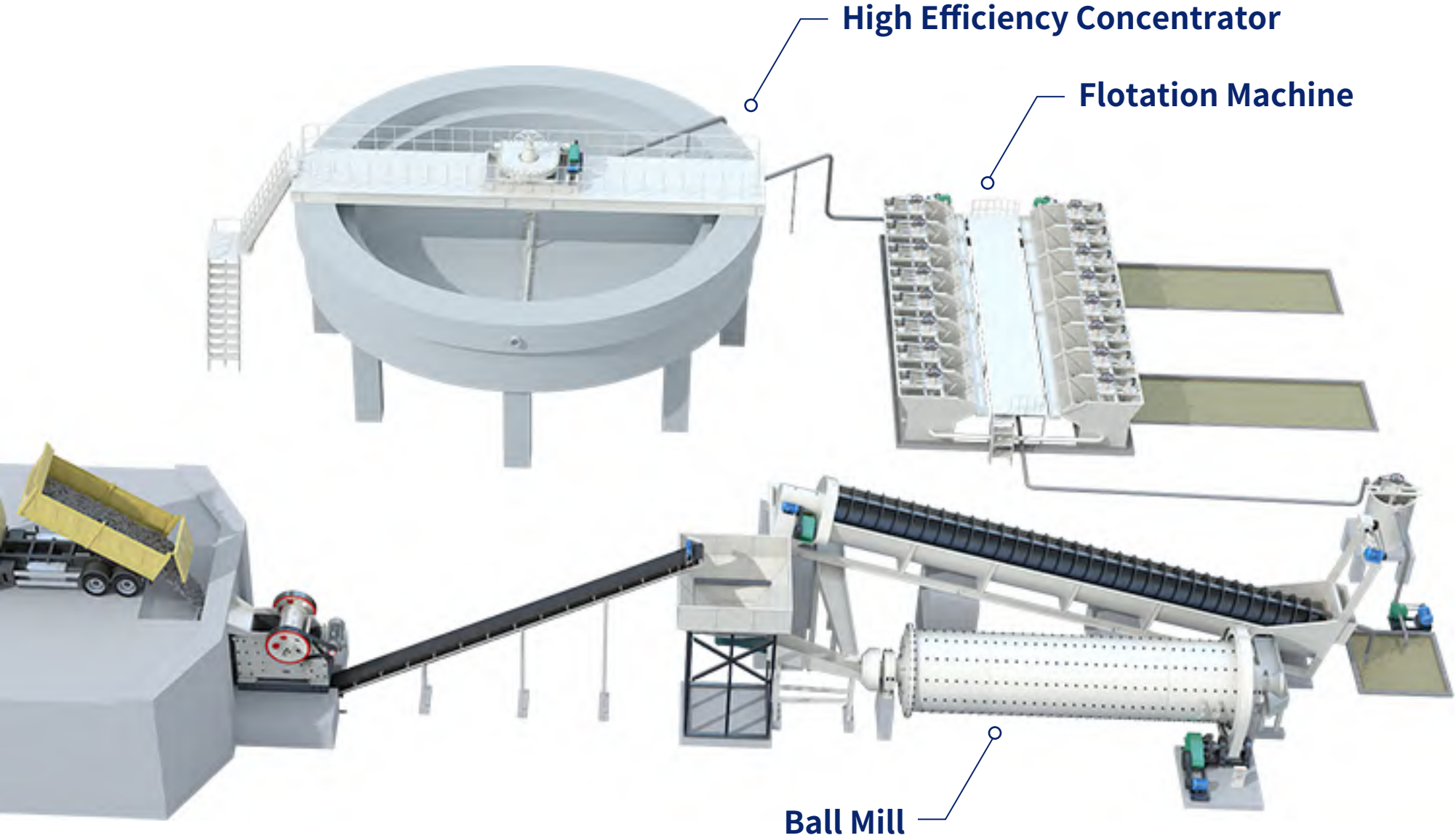
When the dry ball mill is running, the material enters the first bin of the mill by the feeding device. The bin is equipped with stepped liner or corrugated liner and steel balls of different specifications. The centrifugal force generated by the rotation of the ball mill barrel will bring the steel ball down to a certain height, thus causing crushing and grinding effect on the material.

After the material is coarsely ground in the first silo, it enters the second silo through a single-layer partition board. The silo is equipped with a flat lining and equipped with steel balls of different specifications to further grind the material. In the end, qualified materials are discharged through the discharge grate plate to complete the grinding operation.

The working principle of Ball Mill

Wet ball mill:

The working principle of the wet ball mill is similar to that of the dry ball mill, but there are differences. The wet ball mill needs to add an appropriate amount of water or absolute ethanol during the grinding process, which means that there are certain requirements for the concentration of grinding. The amount of water is determined by the nature of the material. Qualified materials are discharged out of the cylinder through the discharge part, and unqualified materials are returned to the wet ball mill again for re-grinding.



Ball Mill parameters

Model	Shell rotation speed (r/min)	Ball load (t)	Feeding size (mm)	Discharging size (mm)	Capacity (t/h)	Motor power (kw)	Total weight (t)
Φ900×1800	36-38	1.5	<20	0.075-0.89	0.65-2	18.5	5.85
Φ1200×2400	36	3	<25	0.075-0.6	1.5-4.8	30	13.6
Φ1200×4500	32.4	5	<25	0.074-0.4	1.6-5.8	55	15.6
Φ1500×4500	27	11	<25	0.074-0.4	3-6	110	22
Φ1830×3000	25.4	11	<25	0.074-0.4	4-10	130	34.5
Φ1830×6400	24.1	21	<25	0.074-0.4	6.5-15	210	43
Φ2100×3000	23.7	15	<25	0.074-0.4	6.5-36	155	45
Φ2100×7000	23.7	26	<25	0.074-0.4	12-48	280	59.5
Φ2200×6500	21.7	35	<25	0.074-0.4	14-26	380	61
Φ2200×7500	21.7	35	<25	0.074-0.4	15-30	380	64.8
Φ2400×4500	21	30	<25	0.074-0.4	8.5-60	320	72
Φ2700×4500	20.7	48	<25	0.074-0.4	26-90	480	102
Φ3600×4500	17	90	<25	0.074-0.4	As per process conditions	850	169
Φ3600×8500	18	131	<25	0.074-0.4	45.8-256	1800	260
Φ4000×6000	16.9	146	<25	0.074-0.4	65-248	1600	242
Φ5030×6400	14.4	216	<25	0.074-0.4	98-386	2500	320
Φ5500×8500	13.8	338	<25	0.074-0.4	148-615	4500	525

The installing of ball mill

1.Installation of foundation

The ball mill should install on steady concrete groundwork. The foundation designed and the construction looks at general drawing and foundation drawing. In order to make change of location accurate assembly small in use, the foundation of ball mill adopts full piece structure.

2.Requirements of foundation

If the compression resistance of concentrate foundation is more than 75%, the ball mill can be installed. Before installing ,the quality of foundation should be examined that the concentrate has no effect on resistance and quantity of prep hole and the location .

There is no dust in the prep hole . Adopts the ground wire method, should prep bury the center label board on the surface of the basic. Before installing all the center line should be remarked clearly on the center label board on the basic and as the norm.

3.References for parts installation

Before hoisting, every part of ball mill should be examined. If found questions; it should be dealt at once.

- **The detailed requirement of main bearing part to see the main bearing part equip drawings.**
- **The tube part to see rotary part equip drawings.**
- **Driving part to see the driving part equip drawings.**
- **The whole relatively position to see the general drawings.**

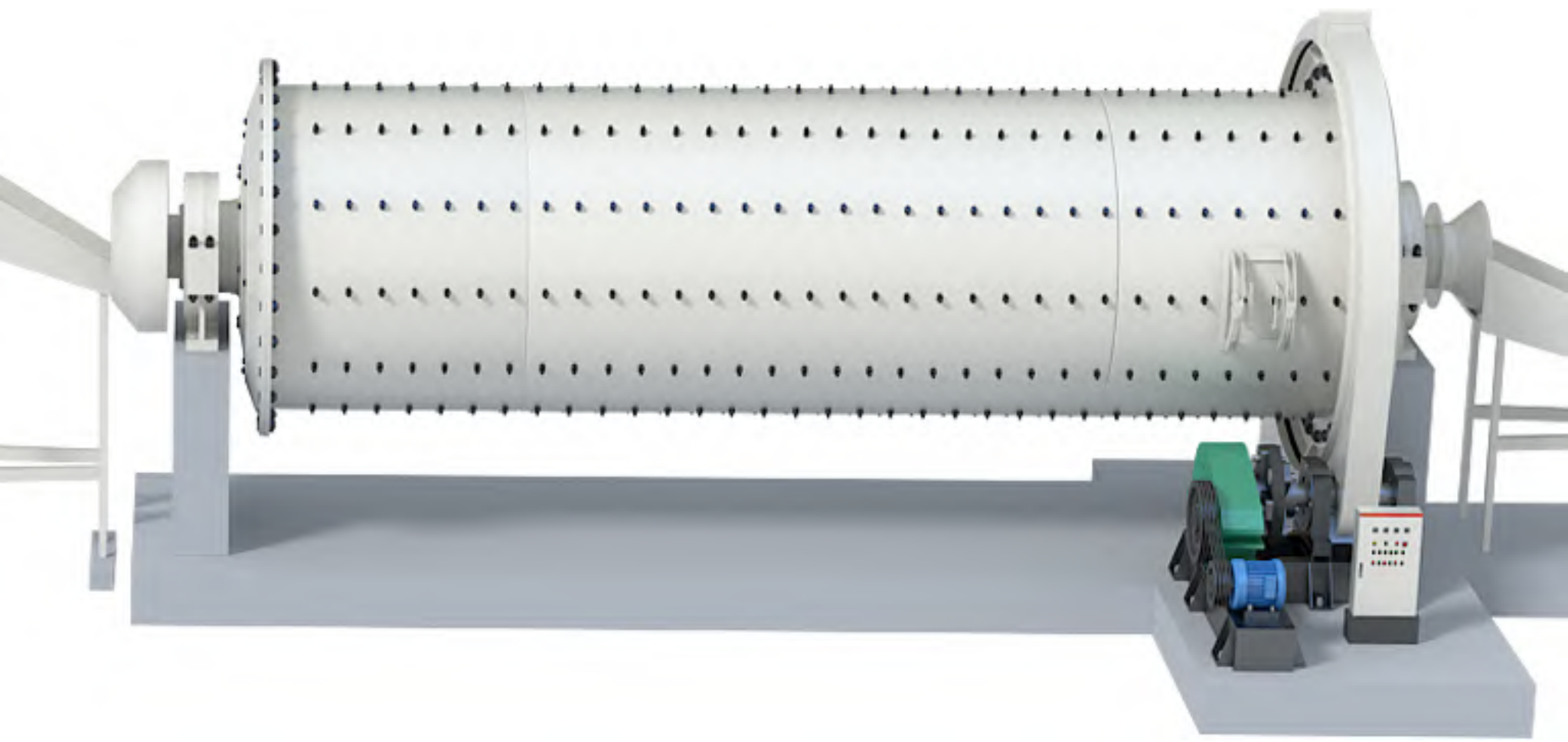
The general requirement of Energy saving ball mill for installing:

① The installing of mainframe:

The axes of ball mill main frame should be level, measured on top of big flange of medium-altitude bearing that on two ends, the height should be identical. If has error, it is allowed that feeder is higher the output 1mm .Seen from bearing cover of medium-altitude bearing on two ends, the around gap between medium-altitude bearing and bearing cover should be identical, and the out and the inside bearing cover too.

② The installing of driving part:

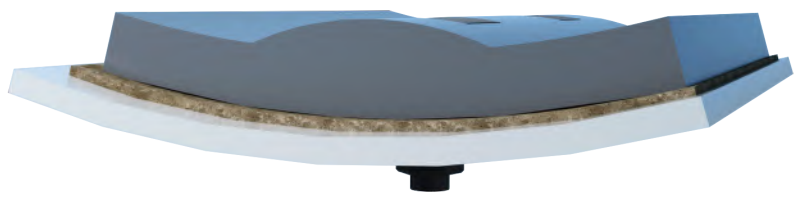
After mainframe is identical, driving part can be installed .First, check quality of driving part, especial check concentric of small gear wheel bearing and reducer low speed bearing; concentric of reducer high speed bearing and motor bearing, if necessary to adjust and tighten.。
Set the big gear wheel of mainframe as standard, install and adjust driving part. Make the width between small gear wheel and big gear wheel even. Make the side of the small gear wheel and the big gear wheel parallel. The smallest gap is 0.25mm. Seen from track of big and small touched, the touched track takes up 60% from whole length, and 40%from whole height.
If the touched track leans to one side, means the gear side is not parallel. If the driving big gear wheel crowded, means the gap of the gear wheel is too small, adjust it bigger.



The general requirement of Energy saving ball mill for installing:

③ The installing of ball mill liners:

I .Before installing liners, should make tube inside clean.



II .When installing the liners, should scrawl the 1:2 concentric mortars between inside tube and liners. And make screw of liners tighten when it is wet. The clearance between liners should make be even by the mortar.

III.Tighten the liner bolt, should carefully make the airproof mat good to prevent material leaking.

IV.The liners should be examined and repaired evenly before installing, make the opposite side and around, screw hole smooth to make screw enter freely .The opposite side and around should repair by grinding wheel if necessary.

V .The directive liners should be installed correct .Long ball mill is generally divided into two storehouses by interlayer. The feeding side is first storehouse that installs the step liners. When installing, the thin side of step liners should be identical with the rotary direction of ball mill .The shape of fine-toothed comb for interlayer is cone, when installing, should make bid side of cone mouth be identical with direction of discharging.

VI.When installing interlayer, should make all screws right and screw tighten gradually. Mean while, should screw tighten of center disk first, and the screw tighten of tube. When all screws are tighten, make the screw of center disk loosen that inside tube by electric welding.

VII.The liners of tube cannot have ring clearance.

VIII.When strength of concentric mortar is proper, feed the mine to test drive .If screw is loosen should be screwed tighten in time.

The general requirement of Energy saving ball mill for installing:

④ The installing of ball mill liners:

When working, moisture will be higher, tube will have a certain protraction by heat and expand .To change it, there is repair equipment in the bearing seat of feeding side. The ball mill is installed over and experimental works can reach requirement, before feeding the material and starting, the prepared expand space works should be done. The detailed is as follow: take apart the big bearing of feeding side. and take away adjustable bolts of side cover, and equip again. So, when the tube is protraction ,the big bearing can move and can not expand to death. This works should be done after installing and adjusting and can not be advance and forgetful. Or else, it may have bad result, the big bearing will expand to death and make loudly noises and reduce its life.

⑤ The fault judged:

The bearing is hot, check it is lack of oil. The mainframe bearing and small gear wheel bearing adds the butter for lubricating; the reducer adds the engine oil for lubricating. If it is not lack of oil ,examine concentric of every part and mainframe and driving part .As the result of big gear wheel bearing and medium-altitude bearing are not concentric that medium-altitude bearing presses bearing cover comes out of the heat .As result of driving small gear wheel bearing and bearing are not concentric that driving bearing press bearing cover comes out of heat .Not concentric of the reducer with small gear wheel bearing and reducer with motor can comes out of heat .If medium-altitude bearing with big bearing is heavy concentric ,it can come out of starting difficulty ,the motor comes out of heat etc. So, when installing, making sure the concentric is very important.

The experimental work of ball mill

After installing, verifying proper, and then can start the hollow experimental work. The experimental work is in the charge of skilled the operator and obey the operation procedure strictly.

1. The hollow experimental work time is not less than 12to 24 hours, if found faults should be solved in time.

2. If hollow experimental work is normal it can start the experimental work with load .This time should divide into steps. The feeding quality should depend on the output, so as to get rid of not necessity damage of steel ball and tube with liner

   I .Adding proper mine and one third of steel ball to test drive 12-24 hours.

   II .Adding the two thirds of steel ball to test drive 24 to 48 hours.

   III.According to the output and proper product quality and the actual installing quality of ball, make sure the proper installing quality of the ball to test drive no less than 72hours.

3. The adding of lodge and time of experimental work depend on the situation (such as temperature, noise, gear touched etc) of big or small gear wheel and reducer. Before the accurate of gear touched does not reach design requirement, it can not work full lodge.

4. In the experimental work time, cooling and lubricating should work normally .And temperature of main bearing, driving bearing, reducer should be normal.

5. After installing the two thirds of steel ball and works for 24to 48 hours, should examine every part and relax all bolts.

6. When starting the experimental work, should make notes carefully.

The operating of Ball mill

1 The prepare works before starting:

Ⅰ.Check that if anyone is in the dangerous place.

Ⅱ.Checked that if the quantity of the lube is correct, if not should add in time.

Ⅲ.Check that if the adding steel ball rate is correct.

Ⅳ.Check that if bolt is loosened.

Ⅴ.Make man’ hole cover steady.

Ⅵ.Check that does the water leak.

Ⅶ.After the first turn or long time milling, start again first adds the lube to medium-altitude bearing.

Ⅷ.Contact with referred work station, if get start signal, and then start mill.

2 The order to start:

Ⅰ.Starting dry powder conveying equipment.

Ⅱ.Start ball mill.

Ⅲ.Start feeder machine.

3 The order to stop machine:

Ⅰ.Stop feeding.

Ⅱ.Stop ball mill .If stop for a long time, should discharge steel ball and mine.

Ⅲ.Stop dry powder conveying equipment.

4 Operating attentive things:

Ⅰ.Feeding evenly, which can make sure the ball mill have the high capacity and steady quality (fineness), is important thing. To adjust feeding quantity by granularity of mine. If humidity and rigidity are steady: fineness is low, the feeding capacity is large; the fineness is high, the feeding capacity is proper. Adjust the feeding capacity by this rule.

Ⅱ.Adding balls proper in time to make ball mill have high capacity .If balls are fret and not added in time, it can make low grinding capacity and low capacity.

The maintains and examine repair of ball mill

1. All the lubes should change once a month, and in the future, according to the repair and examine change the lube once per six month.

2. Every lubricant part and the surface height of the oil should be examined once per four hours.

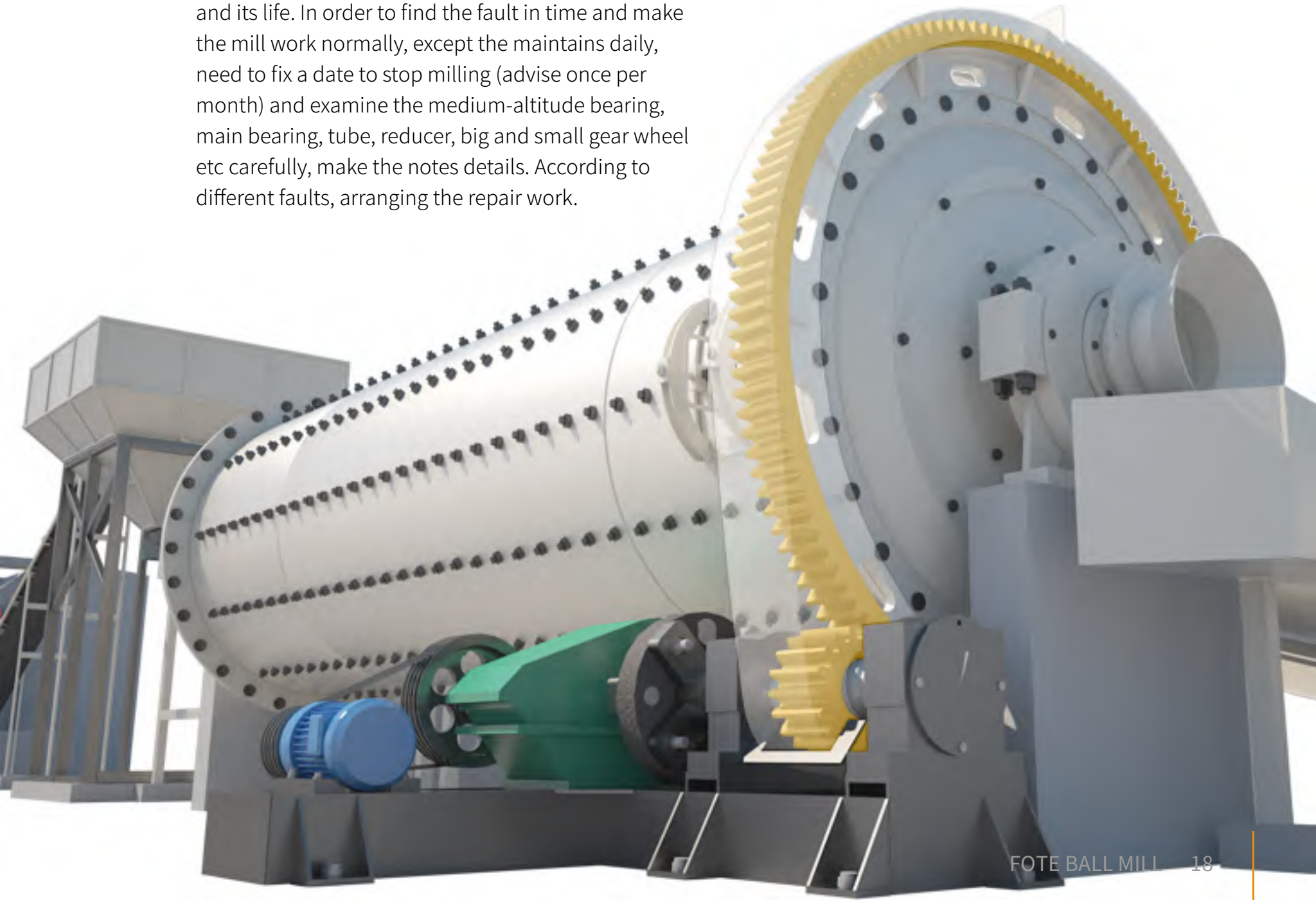
3. When the mill works normally, the temperature of lube that in the main bearing is no more than 55°C.

4. If the mill works normally ,the temperature of driving bearing and reducer is no more than 55°C ,the highest is 60°C.

The maintains and examine repair of ball mill

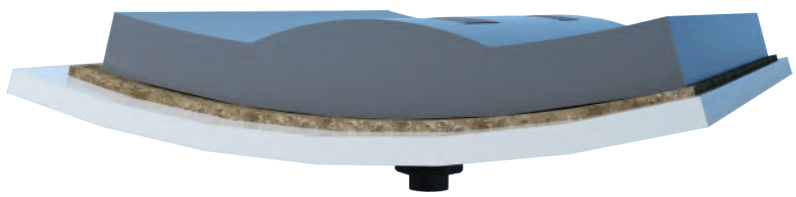
5. The big and small gear wheel drive evenly, no noises .If necessary, should adjust the gap in time.
6. The ball mill rotaries evenly, no strong shake.
7. The electricity of the motor should be provided evenly.
8. Each connected tighten parts are no loosen, no oil and material leaks.
9. The quantity of adding steel ball depends on the fray case.
10. If found the deviant thing, it should stop work and repair at once.

The maintains of the mill is a piece of regular work. The effect of the maintains can affect the rotary rate and its life. In order to find the fault in time and make the mill work normally, except the maintains daily, need to fix a date to stop milling (advise once per month) and examine the medium-altitude bearing, main bearing, tube, reducer, big and small gear wheel etc carefully, make the notes details. According to different faults, arranging the repair work.



The maintains and examine repair of ball mill

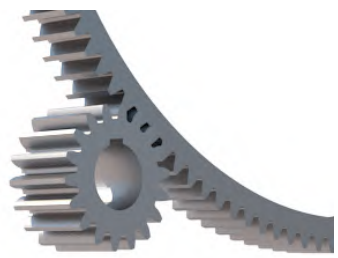
11 If the liner of mill is frayed 70percent or the length of gap is 70mm, it should be changed.



12 If the bolt of liner is destroyed, it should be changed.

13 If the main bearing is frayed heavily, it should change.

14 The fine-tooth comb of the grid ball mill is frayed heavily, it should change.



15 If the small gear wheel frayed heavily, should change it.

16 If the bolt of the feeder or output destroys, should be repaired in time .If can not repair, should change it.

17 If the foundation bolt is loosened or destroyed, should be repaired at once.

WE ARE THE CHOICE
OF MORE THAN
200,000 CUSTOMERS FROM
120 COUNTRIES

Email: contact@sinoftm.com
Website: www.ftmmachinery.com