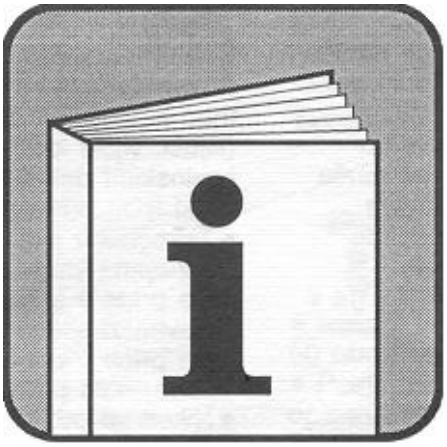
gostol TST TOLMINSKE STROJNE TOVARNE

TST BlastTech

OPERATING AND MAINTENANCE MANUAL



HIGH PRODUCTIVE SHOTBLASTING
THROWING WHEEL

PEP TW 300

Code: 09028-00-000, 09047-00-000

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We are much obliged to you for choosing our product and are proud because you have become our dear customer.

Our manual contain all necessary information about specification, fitting, maintenance of throwing wheel,... , which have to be carefully revised and considered.

We keep the right to minor detailed difference between instructions and delivered device because of improvements.

Contents:

TECHNICAL DATA

Dimensions of rotor	mm	300
Number of blades		8
Shape of blade		forward curved
Length of blade	mm	118
Width of blade	mm	42
Manner of abrasive scooping		tangential
Nominal number of rotations	r/min	2900
Abrasive ejection velocity	m/s	77
Max. declared power	kW	18,5

INSTRUCTIONS FOR SAFE OPERATING

1. PURPOSE

This device is equipped with various safety devices and parts, with the intention of protecting employees who manage with device and machine itself from accidents. Manager may not rely on these safety devices and parts but he has to consider operation manual for safety operating, as presented in continuation.

Operation manual for safety operation treats only dangers which can be expected for manufacturer GOSTOL – T.S.T.
Consider that manual do not treat all potential dangers!

Because of more evident review we use the following symbols:

In that case wrong handling with device can lead to **unavoidable danger**, which causes serious injury or death of person.

In that case wrong handling with device can lead to **potential danger**, which causes minor injuries of person or device.

It marks **important information** and **all due precautions**, regarding to fitting, working and maintenance of device.

2. GENERALLY

- Do not touch rotating and movable parts on any conditions during movement!
- Do not touch electric equipment during connecting on network, which can cause dangerous situation because of higher voltages!
- Only authorized electrician may handle with electric parts; otherwise it happens electric stroke!
- Do not touch switches with wet hands because it can lead to electric stroke!
- Check if all parts of device regular mounted, installed or fixed. In the case of error you must switch the current off at once!
- Check the functionalism and position of switches to prevent wrong working!

- The injury can be caused by switching the device on while the other manager repair the device. In the case of several managers of device always check the others and after that continue with the following step!
- Before maintenance of interior of device switch off the plug of electric network, which supply the device!
- Do not change or remove parts of device without permission of manufacturer GOSTOL – T.S.T.

- Keep in mind the position ‘STOP’ switch to exclude it in case of danger!
- Be careful not to touch the switches during working!
- Keep carefully the clean floor (oil, water) to prevent the slide of workers!
- The surroundings of device should be always clean and passable not to put obstacles in worker's!
- Do not place the tools and other things on the device!
- Switch off the device in the case of disappearing current!
- Do not remove or injury labels or other marks which serve as warning, identifikation number of work,...
- Provide to remove the errror in the case of strange sounds from throwing wheel, elektromotor,...

3. CLOTHES AND PERSONAL SAFETY

- Always use all necessary protective means as helmet, protective goggles, protective shoes, gloves....
- Do not wear the lax and wide working clothes!
- Fix the buttons on clothes strong enough to prevent contact between clothes and device!

- Always tie the longer hair together to prevent contact with the device!
- Do not manage the device if you are under the influence of forbidden drugs or alcohol!
- Do not manage the device if you are feel inclined to giddiness or swoon!

4. SAFETY BEFORE BEGINNING OF WORK

- Check the electric installation because of damages which can cause electric stroke!
- Carefully read the instructions to understand all functions and this way can manage the device!

- Used electric cables should be correct dimensions, necessary length (not to long, not to short if not necessary). Cables, which lie on the floor, should be protected against damages because of cutting, abrasive parts,...).
- Check the quantity and adequateness of lubrication means!

5. SAFETY DURING WORKING

- Do not open the throwing wheel cover during working!
- Do not place hand or tools into interior of the device during working!
- Do not exchange parts or change the device appointment during working!
- Do not work without all necessary safety devices!
- Device trouble during working can cause unexpected accident or injures!

6. SAFETY AFTER FINISHED WORK

- Clean the machine and other devices!
- Change and repair damaged parts or notify authorized service!
- Change or fill lubricated devices and parts!
- The corrodion prevent the alluvium of oil to interacting movable surfaces after finished work!

7. SAFETY DURING MAINTENANCE AND CHECKING THE DEVICE

- Keep ready the spare parts which will be changed in advance!
- Keep ready the pocket book and pencil to record the maintenance!
- Maintenance can be performed only by authorized person!

- Maintain only when the device is switched off and is idle!

- Check if the machine is idle and switch off electric supply before beginning of cleaning the machine for maintenance or checking!
- Read the instructions of maintenance before beginning of work carefully!
- Use only authorized tools for repairing!

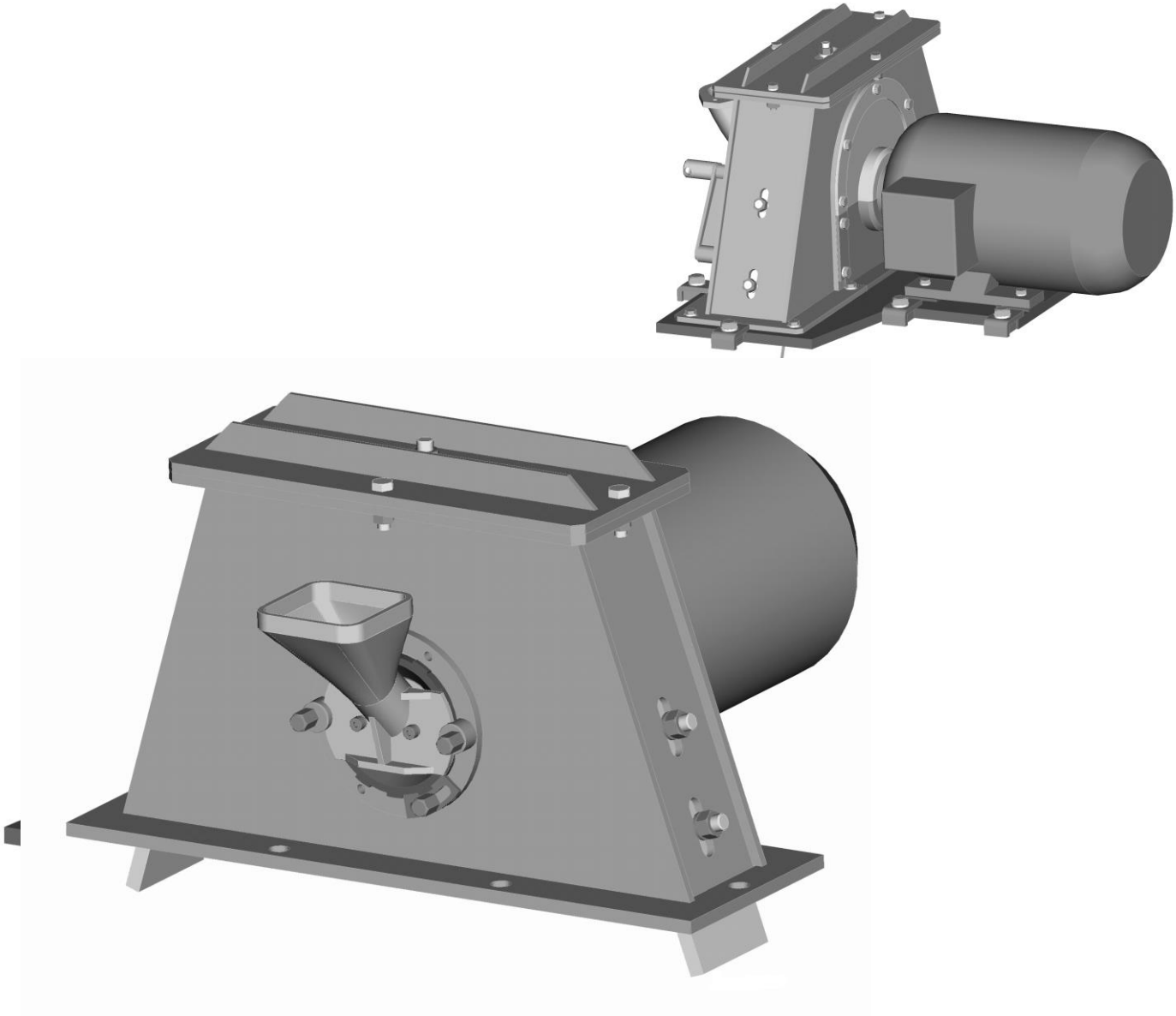
8. SAFETY AFTER MAINTENANCE OR CHECKING THE MACHINE

- Remove tools and other elements and clean the machine and surroundings!
- Deposit the annotation which are written during maintenance!

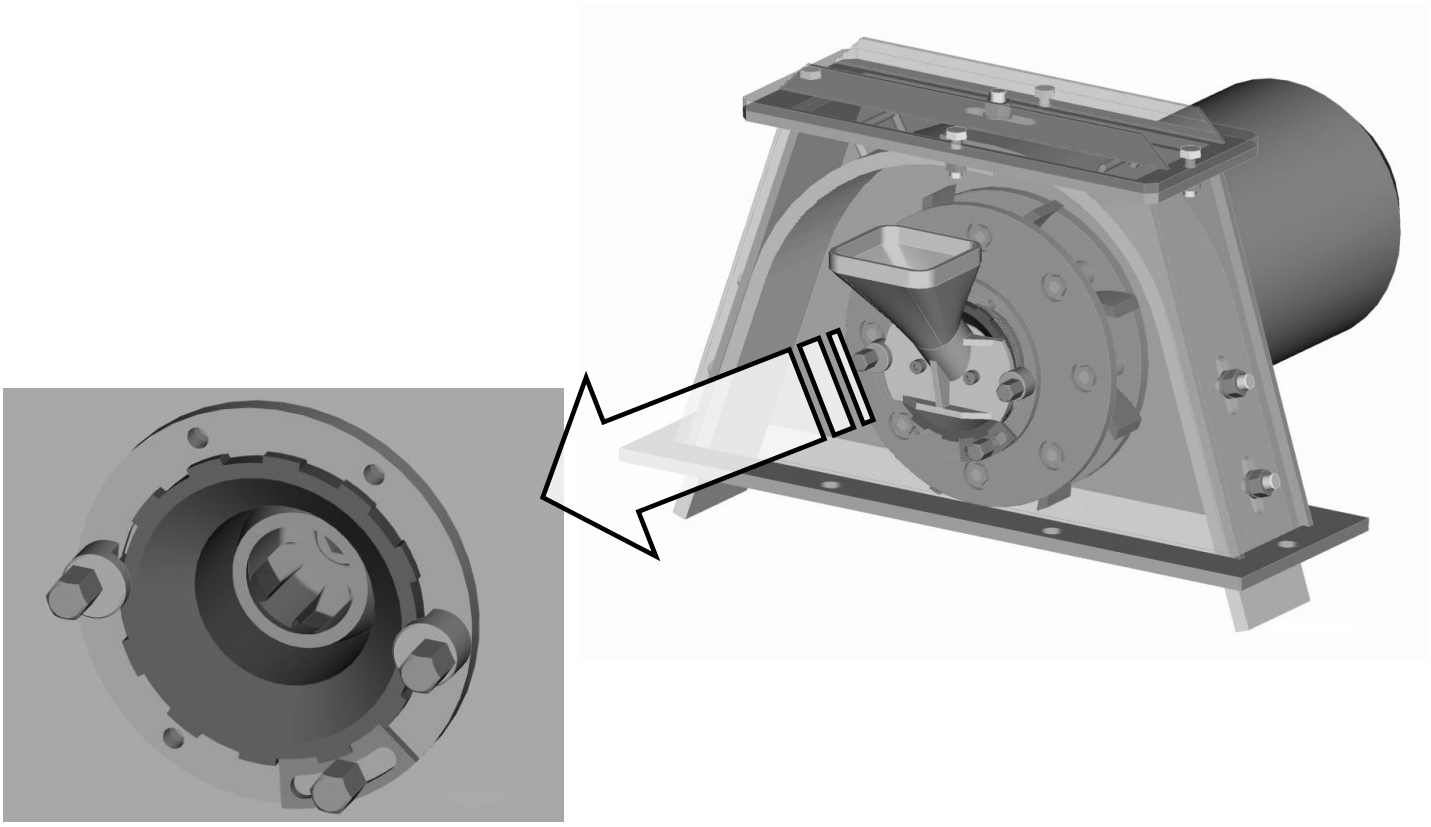
DEVICE SPECIFICATION

1. GENERALLY

Throwing wheels are central units of shotblasting machines regarding both the function and the wear of individual composite elements which is why thea are very carefully dimensioned.
Constructions of the PEP type throwing wheels enables extraordinary characteristics as well as faultless functioning and simple maintenence.
The PEP type throwing wheels family provides optimalno shotblasting in a wide range of machines of different power and size!



Drawing 1: Throwing wheel PEP TW 300



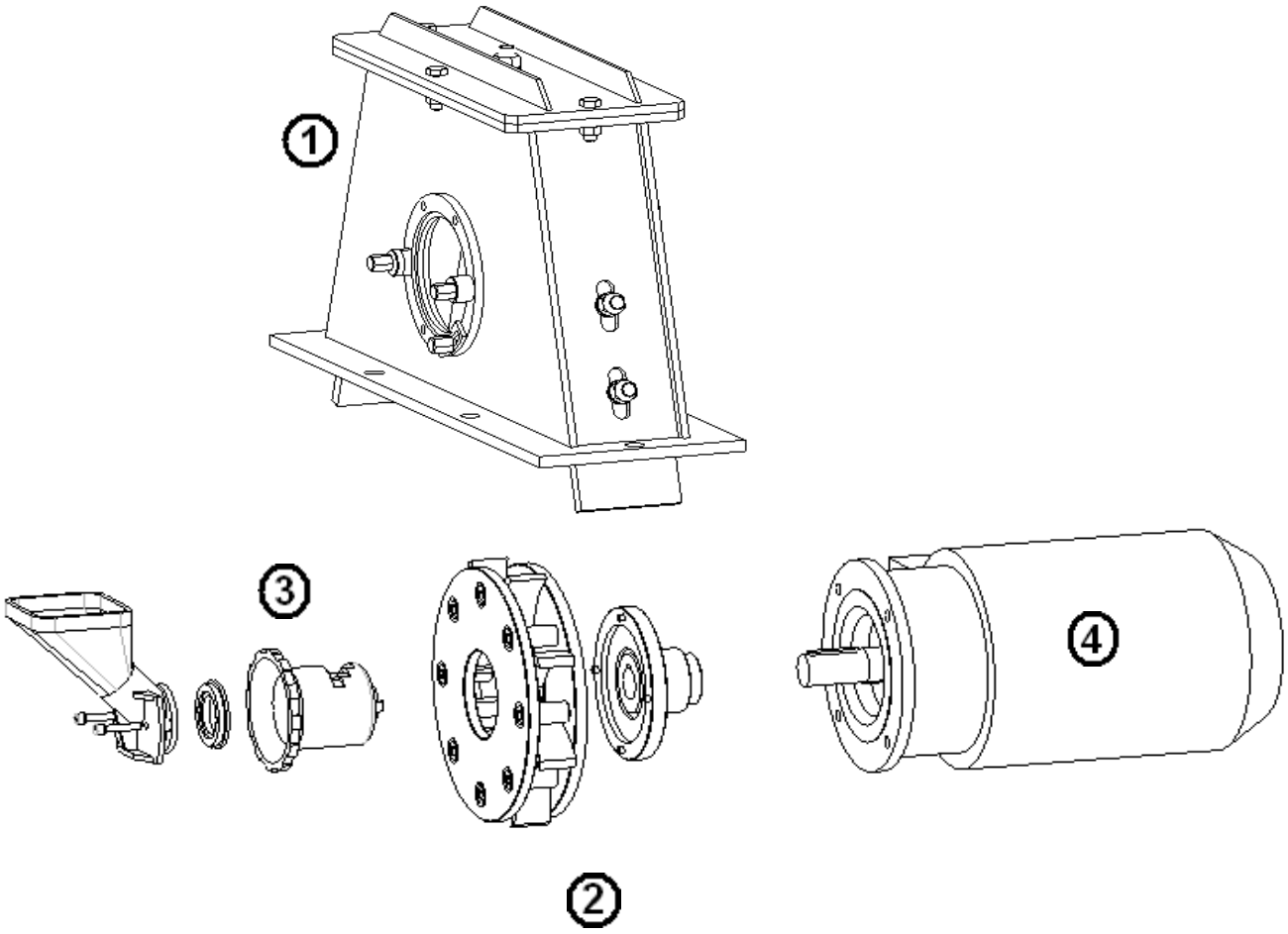
Drawing 2: Interior of throwing wheel PEP TW 380 (right) and control cage and impeller with feed sprout (left)

Specifically characteristics of throwing wheel type PEP TW 300 are:

- High efficiency of input energy
- High shotblasting power
- High resistance of wearing parts
- Wide range of output abrasive velocity with adding frequency converter
- Smooth and silence functioning
- Reducing of costs during life of the device
- Rotation of rotor into one direction, because of carved blades (left and right typ of rotor)
- Fitting up into any space position because of revolvable feed sprout
- Eveness of abrasive distribution
- Quick and simple replacement of a standard throwing wheel with the PEP throwing wheel

Throwing wheel is composed of following smaller parts and elements:

1. - Electromotor with strengthened shaft and bearing
2. - Rotor with curved blases, fixing hub and fixing screws.
3. - Feed system with feed sprout, control cage and impeller
4. - Housing with covers, shields and regulating segments



Drawing 3: Basic elements of throwing wheel

2. SPECIFICATION OF INDIVIDUAL IMPORTANT ELEMENTS

2.1. Rotor and fixing hub

This part consists of the following important elements:

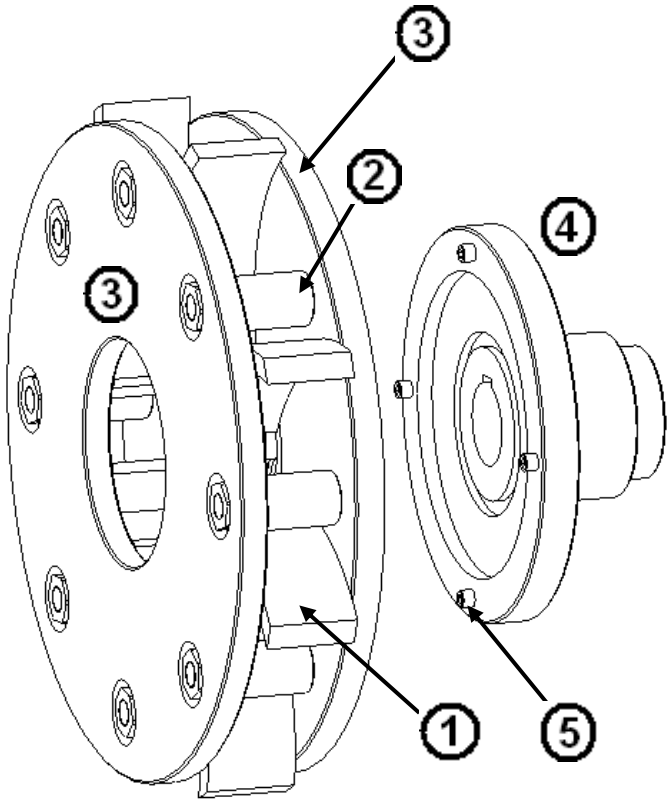
① - Forward curved blades.

② - Distance ring between carrying plates of rotor.

③ - Carrying plates of rotor (right plate with made groove in which the impeller is placed).

④ - Fixing hub of rotor placed on the shaft of electromotor.

⑤ - Screws for fixing the rotor to hub.



Drawing 4: Component part of rotor

2.2. Feed system

This part consists of the following important elements:

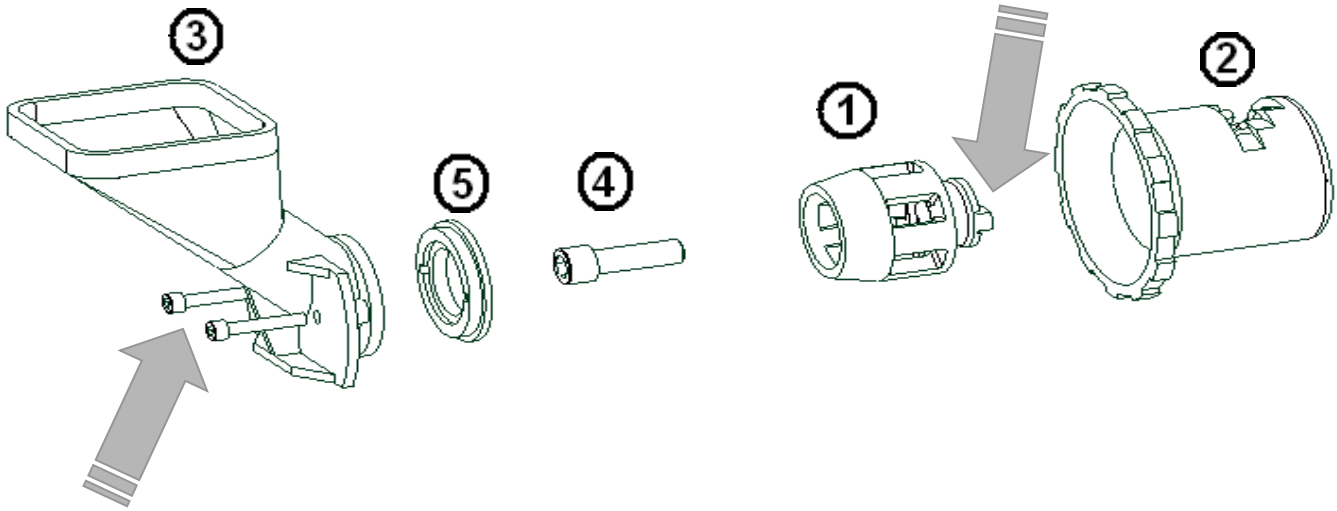
① - Impeller which is by imbus screws (element 4) fixed to throwing wheel rotor and rotates together with it. Impeller is design in this way, that center accessory is placed to groove, which is made in carrying plate.

② - Impeller to regulate abrasive jet.

③ - Feed sprout with two ‘imbus' screws for fixing of lining on feed sprout.

④ - Screw for fixing of impeller and rotor (Drawing 4) on motor shaft.

⑤ - Lining of feed sprout.



Drawing 5: Component part of feed system

2.3. Housing

This part consists of the following important elements (drawing 6):

① - Main part of housing and:
- **a** - nuts with washers for fixing the shields

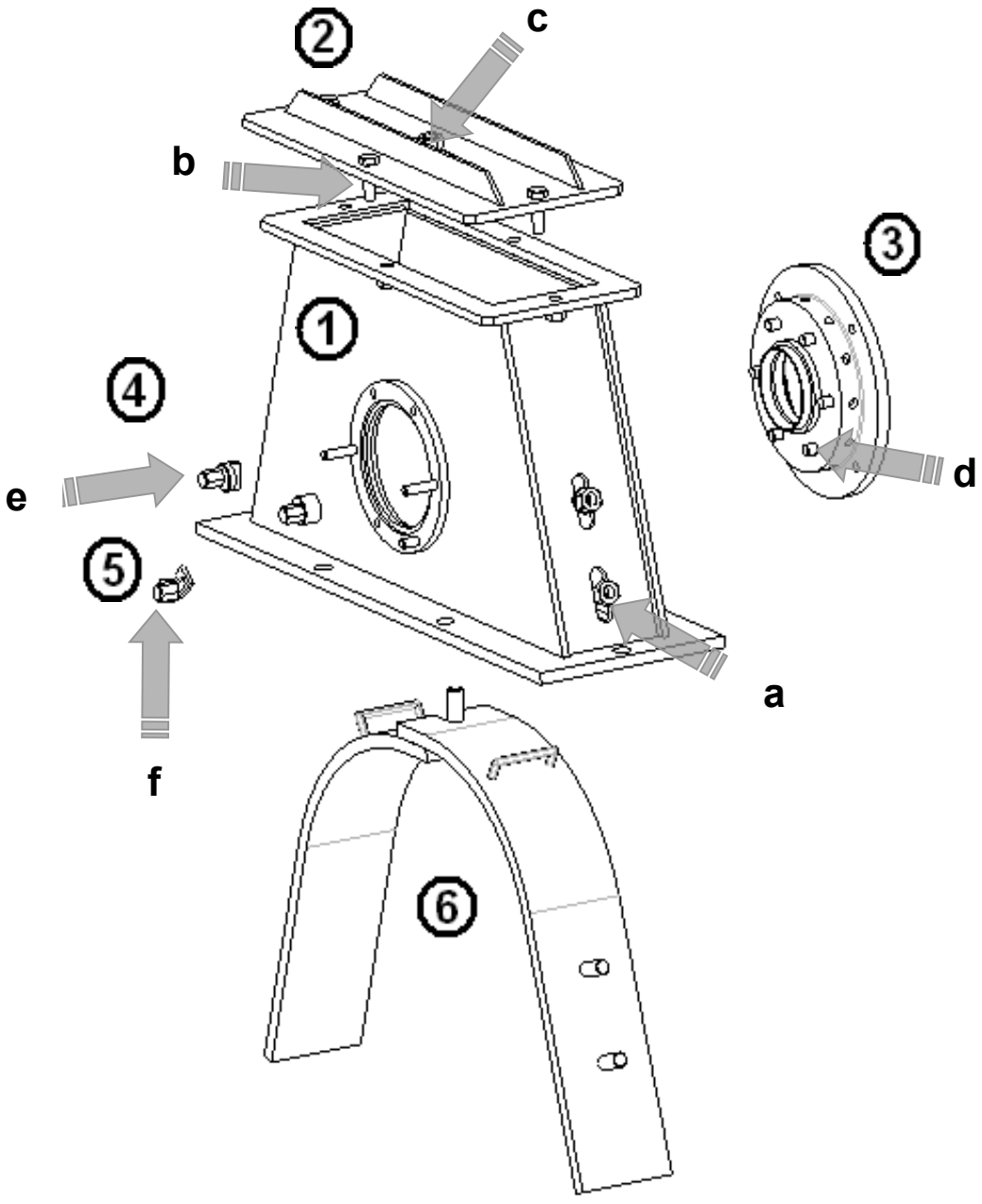
② - Cover of housing and:
- **b** - screws with washers for fixing the cover on main part of housing
- **c** - nut with washer for fixing the shields

③ - Flange, which serves as fixing of electromotor on housing and:
- **d** - screws with washers for fixing

④ - Segment for fixing the feed sprout on housing and:
- **e** - nuts with washers for fixing the feed sprout

⑤ - Regulating segment and:
- **f** - nut for fixing the regulating segment

⑥ - Left and right shield, which protect the housing against abrasion

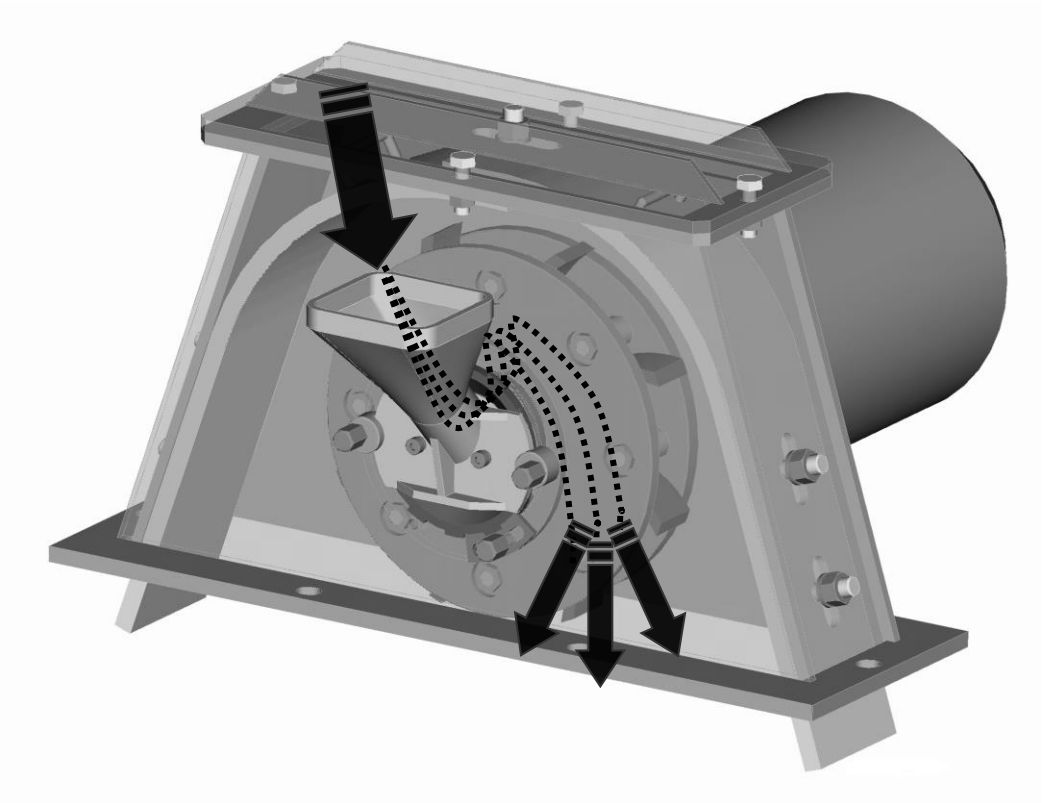


Drawing 6: Component part of housing

DESCRIPTION OF FUNCTIONING

Abrasive mean is conveyed through feed sprout, which is fixed (by stretching support) to housing under desired angle, into the impeller, which revolves together with rotor. Impeller by help of control cage doses abrasive mean tangential to the blades of rotor. Apertures in the walls of impeller and control cage define the entering conditions of steel shot to the blades.
Because of rotation of blades and rotor, there is the effect of centrifugal force to the abrasive grain, which accelerates the grain to desired velocity and energy necessary for effectively shotblasting.

All revolving parts revolve with high velocity of rotation, therefore they are balanced. In the course of time throwing blades and rotor wear out, the run of the throwing wheel becomes irregular, the throwing wheel begins to vibrate. At that moment the set of the throwing blades with rotor has to be replaced. (see the chapter about maintenance).



Drawing 8: The line of traveling the abrasive part through feed system over impeller and then rotor with blades to the treated object

MOUNTING

NOTICE

The process of assembling is explained step by step. Because of correct positioning and consecutivly functioning you have to consider the instructions.

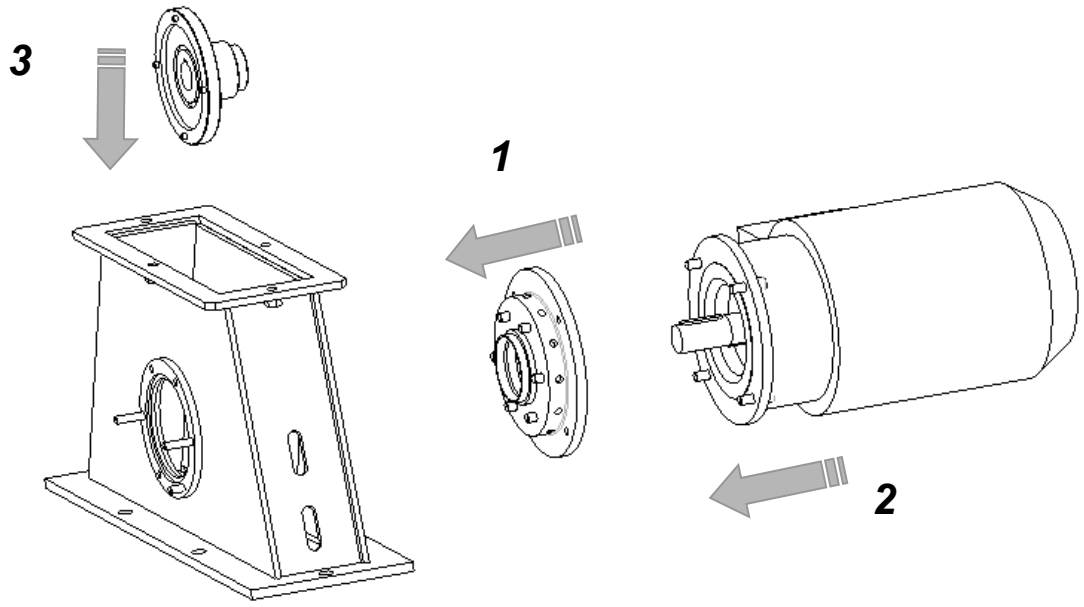
1. PROCEDURE OF MOUNTING

To present the process of assembling more clearly we use the following symbols (examples):

[**1**/dwg.**6**] - show element **1** on drawing **6**

[**3e**/dwg.**2**] - show element **3e** on drawing **2**

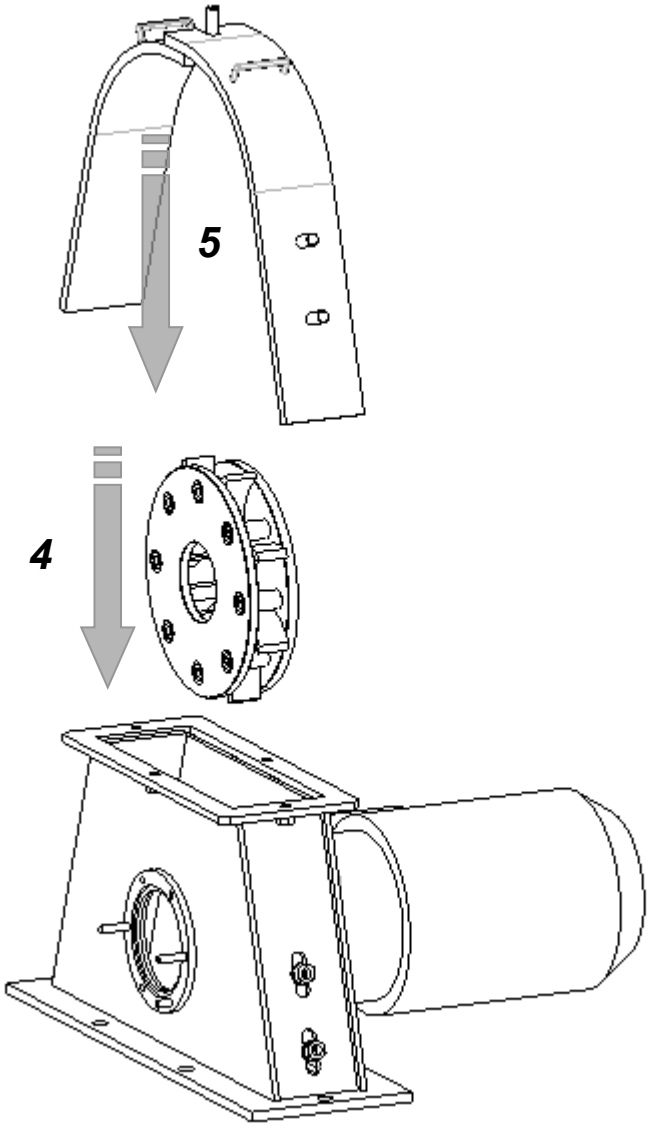
1. The flange [**3**/dwg.**6**] fix on housing [**1**/dwg.**6**] with screws and washers [**3d**/dwg.**6**].
2. Put into the motor shaft [**4**/dwg.**3**] into flange and fix it on flange by screws and washers.
3. The fixing hub [**4**/dwg.**4**] put into housing and put it on motor shaft.



Drawing 9: The procedure of assembling from step 1 to 3

4. From top through upper apperture of housing insert the rotor [**1,2,3**/dwg.**4**] and with the help of four position bolts [**5**/dwg.**4**] on hub correctly put on the hub.

5. From the top through upper aperture on housing insert left and right shield [**6**/dwg.**6**] and fix it with nuts and washers [**1a**/dwg.**6**]. First insert that shield, which has three coil end-pieces, then that, which has two coil end-pieces and groove at the top. The position of right and left shield can be replaced (inversed) however the orientation of the shields must be such, that abrasive parts do not hit head-on (at shield connection) on shield with three coil end-pieces.



Drawing 9: The procedure of assembling from step 4 to 5

6. Into rotor insert the control cage [**2**/dwg.**5**]. Be careful that the control cage is inserted in this way as required in chapter about regulation.

7. Into control cage insert the impeller [**1**/dwg.**5**], which revolve with rotor, so it is fixed on motor shaft. At mounting we have to assured the correct position of impeller. This can be achieved by special formal connection (formal coupling) between impeller and supporting motor plate [**3**/dwg.**4**] (right). Centering mount, which is shaped on impeller (see arrow drawing 5) must “sit down” to groove, which is made on carrying motor plate. After that fix the impeller and rotor with socked head screw with washer [**4**/dwg.**5**] on motor shaft. After fixing there is no interacting contact between impeller and control cage; rotor

is rotating (manual) with electromotor without any physical contact the others elements.

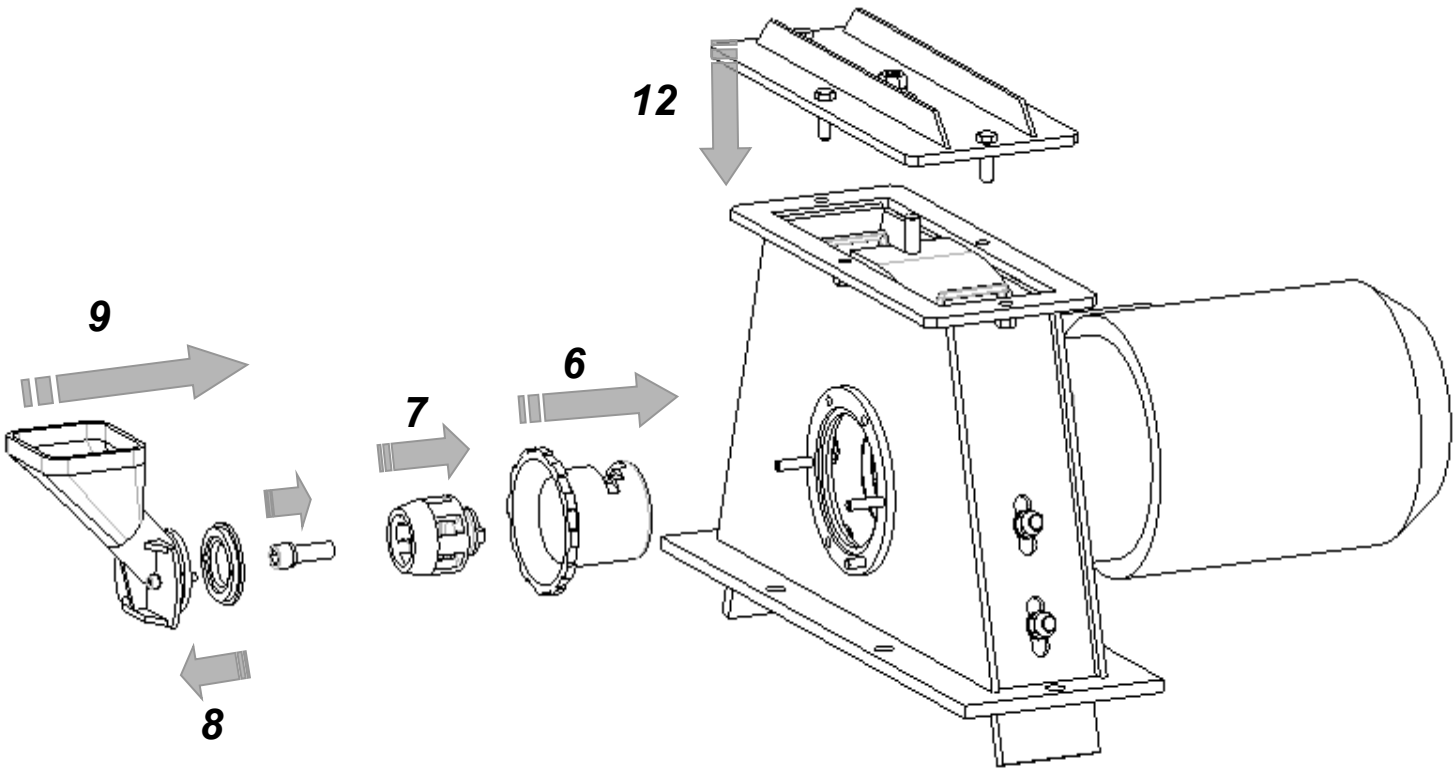
8. The lining of feed sprout [**5**/dwg.**5**] fix on pipe with two 'imbus' screws with washers.

9. The feed sprout [**3**/dwg.**5**] insert into control cage and direct as requested.

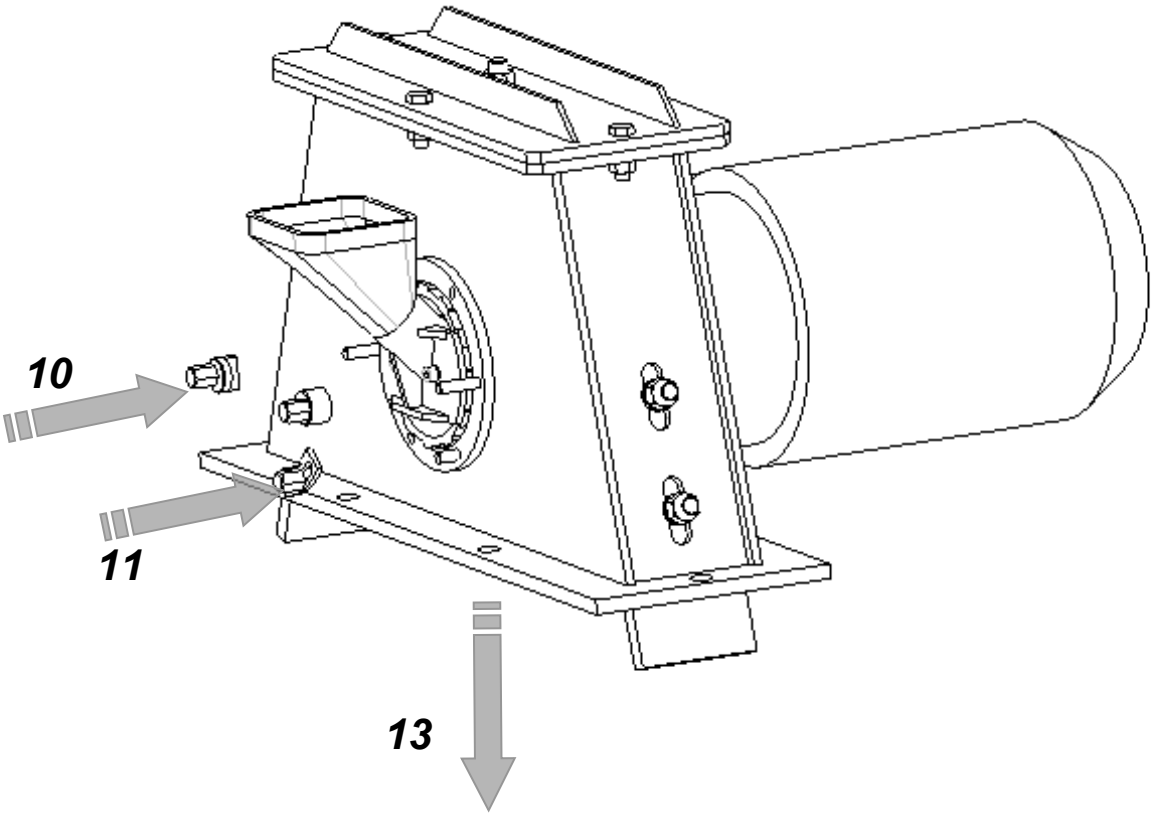
10. When the feed sprout is correctly positioned, screw down it with two screws with nuts and segments [**4e**/dwg.**6**], which have made groove, into which "sit down" the edge of feed sprout.

11. Set the regulation segment [**5**/dwg.**6**] and fix it with nut [**5f**/dwg.**6**].

12. From the top cover the housing with the cover of housing [**2**/dwg.**6**] and fix it with screws, washers and nuts [**2b**/dwg.**6**]. Screw down still nut with washer [**2c**/dwg.**6**] and fix the shields on this way. Throwing wheel is assembled and ready to mount to shotblasting machine.



Drawing 10: The procedure of assembling from step 6 to 9 and step 12



Drawing 11: The procedure of assembling step 10, 11 and 13

13. By help of arrows and screws with washers fix throwing wheel to proper or desired place on shotblasting machine.

14. Take care of connection on electric network and machine is ready to work.

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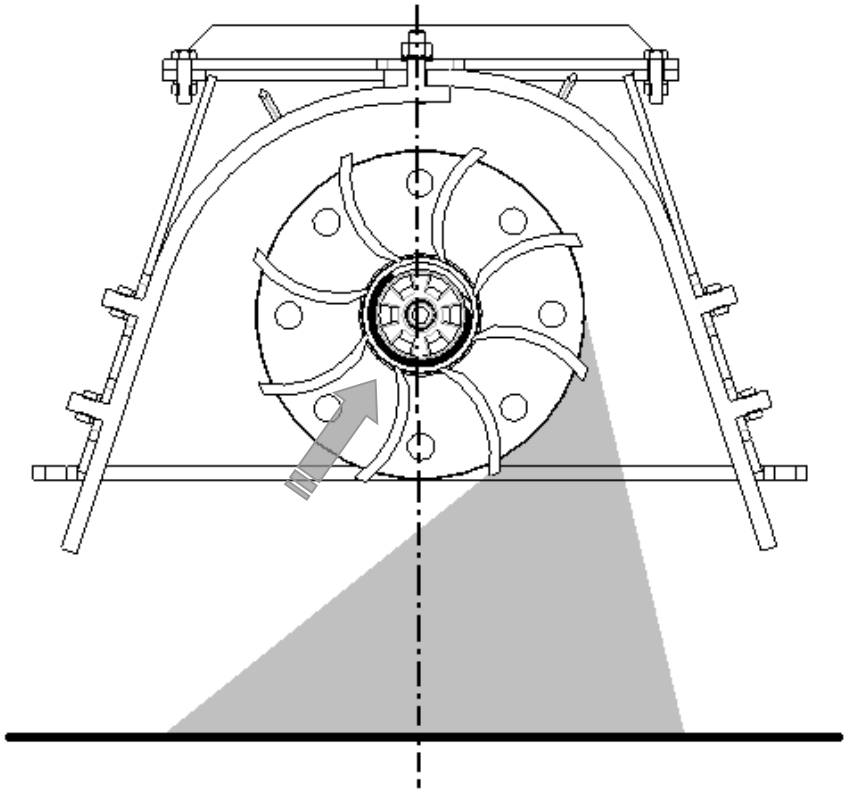
REGULATION OF THROWING WHEEL

At throwing wheel we adjust the direction of jet of steel shot. The regulation of jet is achieved by rotating the control cage [**2**/dwg.**5**] clockwise or anticlockwise. The goal of regulation is to take advantage of jet as maximal as possible; the jet can be focused to the desired “target”.
Try to avoid the situation when steel sand hits and wear down left and right shield.

1. THE PROCEDURE OF REGULATION

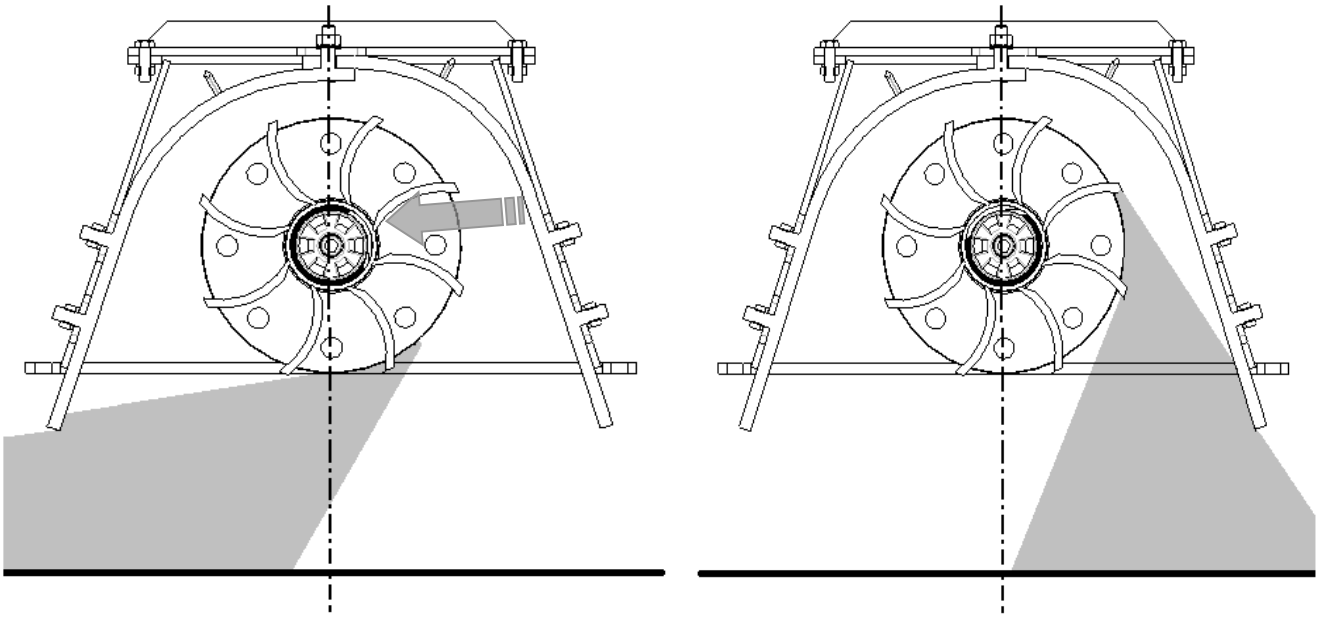
As a resource a piece of steel plate of 1200x200x3-5 mm is used, which is placed beneath the throwing wheel at a distance of 1m from the centre of the throwing wheel (drawing 12, 13).

At regulation we can be met with three examples, which are the concequence of different position of control cage (drawing 12,13):



Regular oriented jet (dissipation on plate is symmetrical regarding to middle line) - control cage has the correct position

Drawing 13: Regular oriented jet (transverse section of throwing wheel viewing from direction of abrasive supply)gledano s smeri dovoda abraziva)

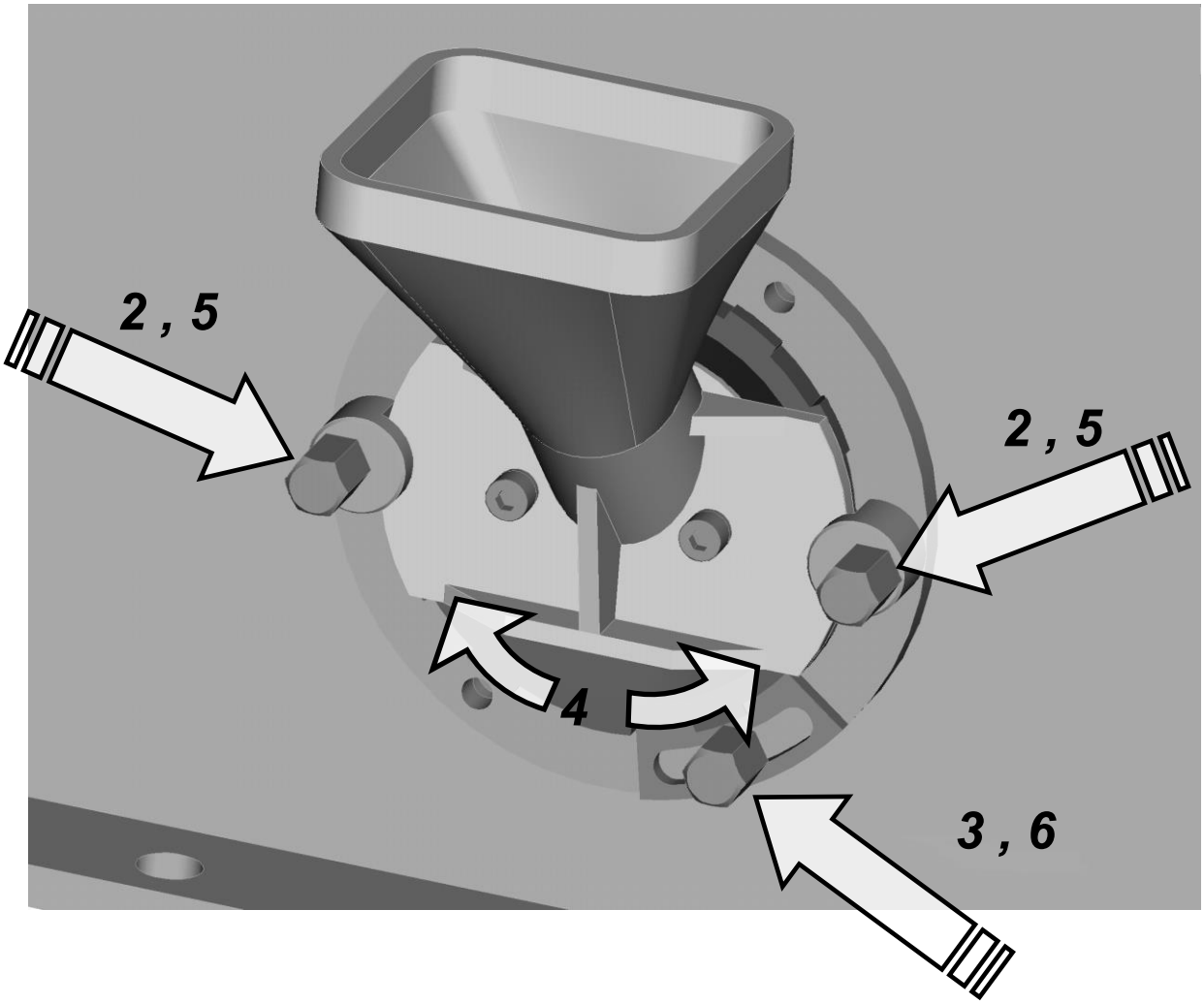


Irregular oriented jet.
Control cage has to be **rolled up against clockwise.**

Irregular oriented jet.
Control cage has to be **rolled up into clockwise.**

Drawing 13: Irregular oriented jet (transverse section of throwing wheel viewing from direction of abrasive supply)

1. Steel plate is exposed to the acting of steel shot for a short time (20s). Then we examine the effect of shotblasting. Regarding to the result of shotblasting by the help of drawings mentioned before (Drawing 11,12) define the direction of rotation and estimate the angle of control case turn . If steel shot has been beating too much to the left it is necessary to turn the control cage against clockwise; if steel shot has been beating too much to the right it is necessary to turn the control cage into clockwise.
2. To do the regulation first relax the stretching screw [**4e**/dwg.**5**] and this way set free the feed sprout.
3. Relax also tightened nut of regulating segment [**5f**/dwg.**5**]. Now the control case [**2**/dwg.**5**] is free and can be revolvable. Tightened nuts are screwed down as necessary.
4. Rotate the control cage to desired position.
5. Screw down the tightened nuts [**4e**/dwg.**5**], which fix the feed sprout [**3**/dwg.**5**] and the control cage this way [**2**/dwg.**5**].
6. Screw down the tightened nut of regulating segment [**5f**/dwg.**6**].
7. Expose the plate to shotblasting again. Regarding on satisfactory result of regulation continue with work, on the contrary regulate the throwing wheel again from step 1. to step 6.



Drawing 14: The procedure of throwing wheel regulation from step 2 to 6

MAINTENANCE

NOTICE

If we want that the machine reaches expected life of functioning, it has to be correct maintenanced and controlled.

1. GENERALLY

Throwing wheel is the most exposing part of the machine regarding its wear.Therefore it should be given the most careful maintenance possible.
The maintenence of throwing wheel includes:

- regular control of worn parts,
- replacement of worn parts,
- lubrication of bearings wheel drive shaft

Every part of the throwing wheel which is continually in active contact with steel shot is exposed to wear. The durability of those parts depends on the construction and working of abrasive cleaner, on sort of steel shot and on pieces we want to clean (casts or forged parts).

Parts become worn in the following succession:

1. throwing blades - rotor
2. control cage
3. impeller
4. shields
5. feed sprout

According to that proportion we should keep an appropriate numer as spare parts in store.

2. THE COURSE OF MAINTENANCE

Every day visual control of correct operation for each throwing wheel separately is given by the amperemeter, fixed to the control panel. By normal way of operation the amperemeter, depending on motor power, gives the following values:

Motor power (kW)	Current (A)
5,5	11
7,5	15,5
11	21

If amperemeter gives lower values, the position of the sliding flap should be corrected. These lower values result also when the line for conveying steel shot between the hopper (situated beneath abrasive cleaner) and the throwing wheel becomes shocked up.

NOTICE

Because of wear individual parts should be controlled every seven days. This control is visual, we only need to raise the cover of the throwing wheel. [**2**/dwg.**6**] (see the chapter about fitting up, step 12).

The bearings of electromotor have to be lubricatred with grease as mentioned in enclosed instructions. (Grease LIS 1/3, lubricating with pressure pump every 100 hours).

2.1. Rotor with blades

The blades are made of high-alloyed wear-resistant steel.

Manufacturer of machine GOSTOL – T.S.T. put together throwing wheel rotor from set of blades, previously weighed, rotor is balanced. In that case the throwing wheel runs smoothly and without vibrations.

The result of unproportional wear by individual blades is that the throwing wheel begins to vibrate. That moment the entire set rotor with blades must be replaced (see the chapter about fitting up, dismounting of rotor from step 12 to 4, mounting the new one from step 4 to 12).

Rotor with blades should be replaced when the throwing wheel begin to vibrate. It's better to control the frequency of rotor replacement and this way you can yourself determine the time of replacement.

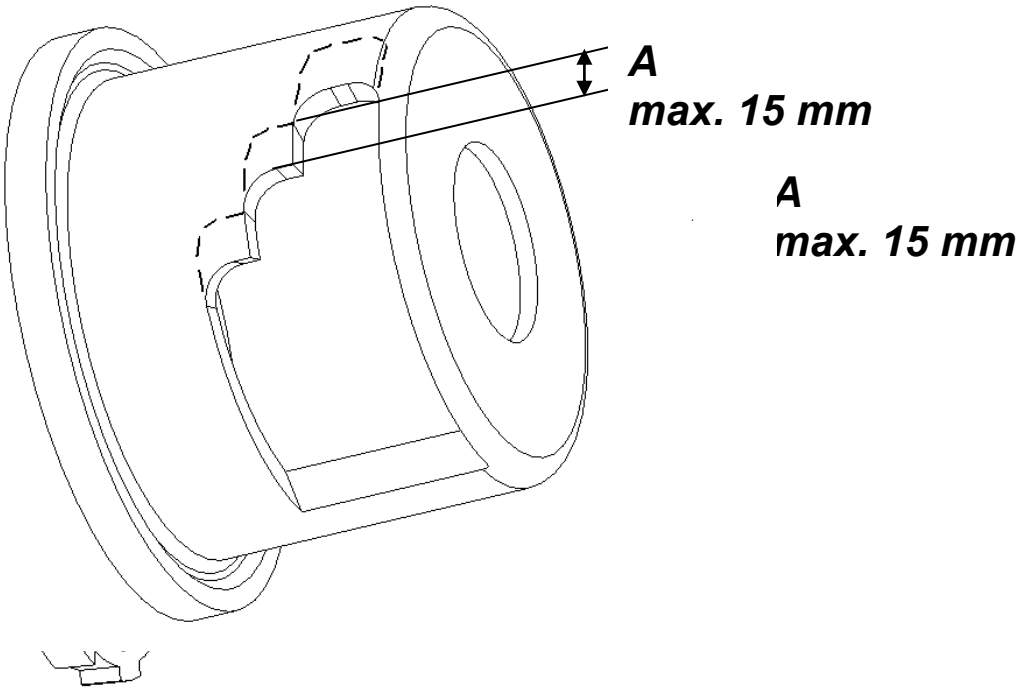
NOTICE

When the difference in weight between individual blades, because of wear, is more than 50 g, we have to carry out the replacement to prevent damages on drive electromotor because of vibrations.
In case of troubles of bearing or other electromotor elements, as consequence of excessively vibrations the warranty can not be recognized.

2.2. Control cage

The edges of control opening are exposed to high wasting, especially outlet edge . Control opening is increased by wasting and this way the inlet conditions of grains on blades. The jet of steel sand is spreading, its kernel of working is traveling to direction of rotating and this way moving away from desired direction of working. To avoid this effect, we have to control the direction of working of jet after 100 hour of operating and regulate the throwing wheel in case of need (see the chapter of throwing wheel regulation, from step 1 to 6).

Control cage should be exchanged when dosen opening is increased (dimension A, drawing.15) for 15 mm (see the chapter about mounting, dismounting of control cage from step 10 to 6, mounting of new one from step 6 to 10).

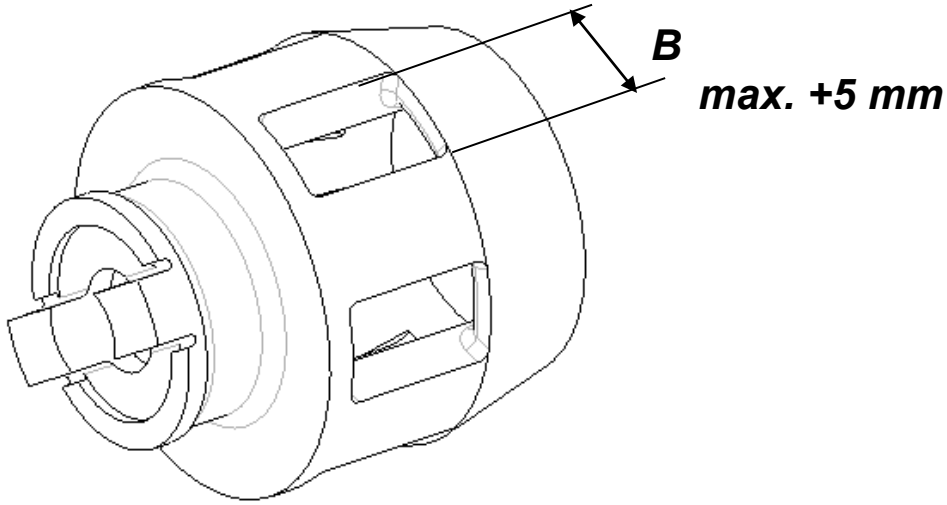


Drawing 5: Max. wasting of control cage before replacement

2.3. Impeller

Because of constant active contact with steel sand impeller is very exposed to wasting. It have to be frequently controlled and exchanged in time.

Impeller have to be exchanged at this time, when dozen opening is increased (dimesion B, drawing 16) for 5 mm (see the chapter about mounting, dismounting of impeller from step 10 to 7, mounting the new one from step 7 to 10).

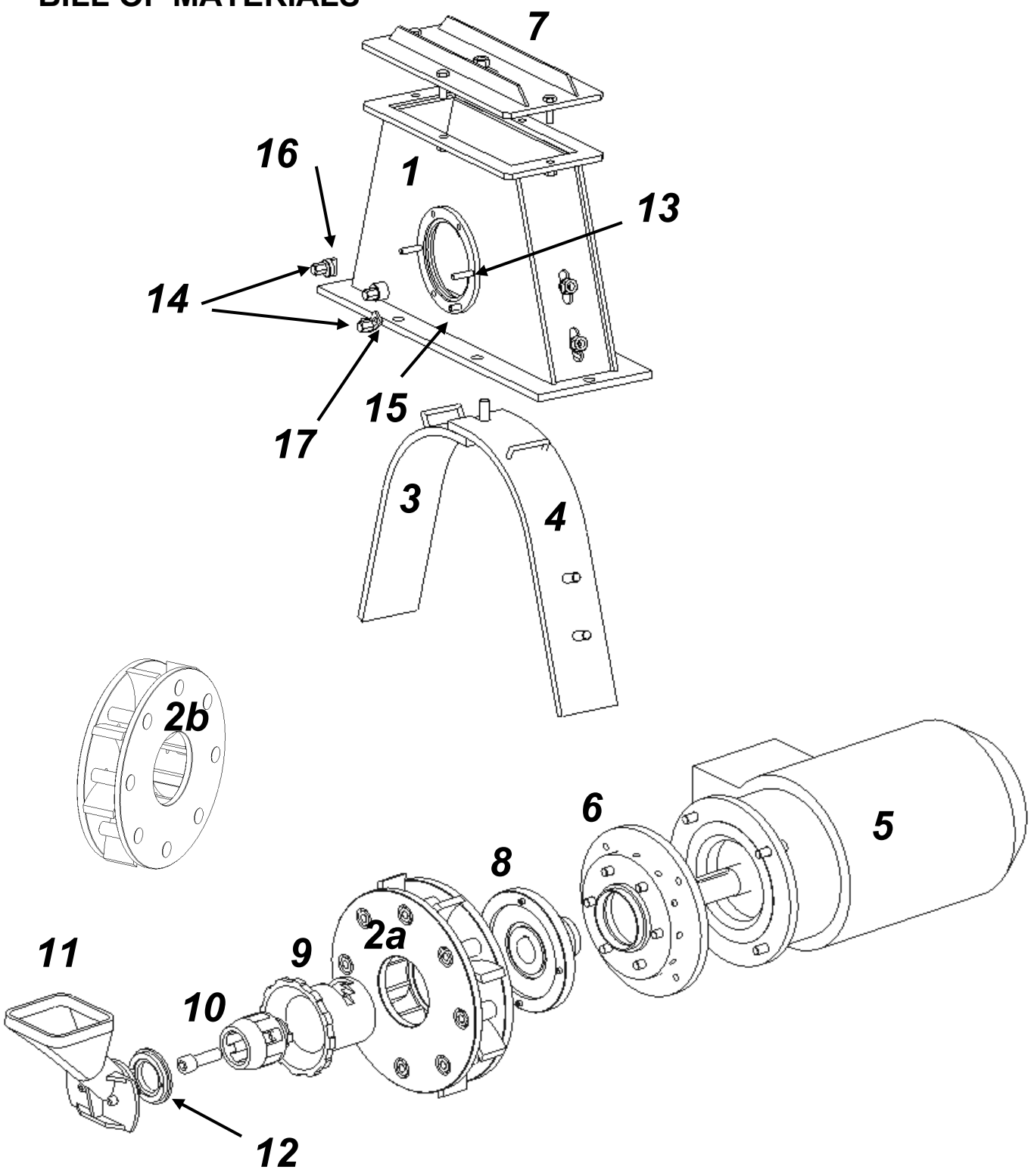


Drawing 16: Max. wasting of impeller before replacement

2.4. Other elements

The life of other elements is incomparable higher and are exchanged at that time, when they are not able to perform the function correctly.

BILL OF MATERIALS



Drawing 17: Elements, quoted in the bill of materials

Name of elements	Code	Pos	Quantity
Housing - throwing wheel 300-NA	09024-01-000	1	1
Rotor - throwing wheel 300-NA – left	09024-02-000	2a	1
Rotor - throwing wheel 300-NA - right	09024-02-008	2b	1
Shield 1 - throwing wheel 300-NA	09024-00-003	3	1
Shield 2 - throwing wheel 300-NA	09024-00-004	4	1
Electromotor	T45143	5	1
Flange fixing - motor support	06564-00-02	6	1
Cover of housing - throwing wheel 300-NA	09024-05-000	7	1
Fixing hub	09024-06-000	8	1
Control cage 300 - NB - throwing wheel 300-NB left	06919-04-000	9b	1
Control cage 300 - NB - throwing wheel 300-NB-A right	06919-05-000	9a	1
Impeller 300	S-1753	10	1
Feed sprout	S-1758	11	1
Linning of feed sprout	S-1759	12	1
Screw AM-10/50	S-1795	13	2
Nut AM-10/22	S-1779	14	3
Screw AM-10/33	S-1796	15	1
Tightened nut - segment	S-1794	16	2
Regulating segment	S-1760	17	1