

IMPROVING THE EXCAVATOR BUCKET LOOP

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ANNOTATION

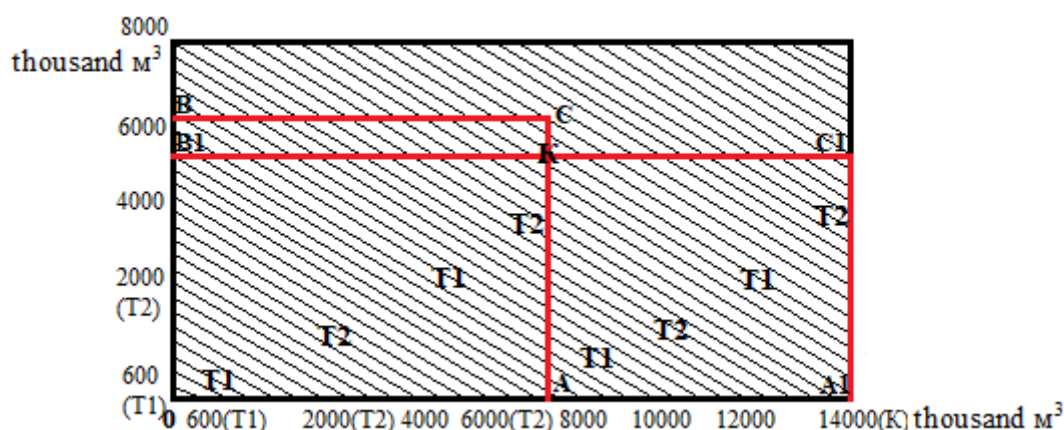
This article discusses the solution to the problem of increasing the service life of the bucket ring as a result of the reduction of productivity under the influence of weight, friction, adverse effects of impact forces on the excavator bucket during operation and the installation of the bushing using maintenance methods.

Keywords— *Technical Service, Excavator, Repair of Machines Periodicity, Minimum of Use of Machines Maintenance*

INTRODUCTION

The maximum number of maintenance and repair of excavators distributed types repair examination (TK), current repairs (T1, T2) and the main repair (K) are. Repairs repairman depending on the characteristics, parameters and size of the equipment, it differs by the place of transfer. Repair period - minimum of use of machines maintenance and at this time as a recurring period in the sequence in which the specified types of repair are determined it is done. Up to the first basic repair or two the time of the work the machine between the main repair and of the cycle duration constitutes the duration. Repair of machines periodicity of the parking a lot served eaten parts and details from the deadline, the duration of the stoppage to be timed the most due to the time required to complete the work determined [1-4].

ECG used in the condition of Daugiztau in this article weight force falling to the bottom of the sink of the excavators in Russian productivity through factors that arise as a result of the process of action is considered on the example of an ECG-10 excavator 1-image ECG excavator maintenance and repair nomogram for determining the number listed. In this nomogram rivets from A and B on the basis of AO and hunting cuts we store and subtract the C intersection point. Oblique the intersection of as cuts in the plane shows that during the year four current repairs T1 according to the structure of the repair period, T2 and technical examination must be completed TK. Next repair cycle A1C1 will be able to output the geltrib through the incision [4,5,6]



1-picture. ECG -10 technical service and repair of the excavator nomogram for determining the period. Technical service and along the intersection point of these lines related types of repair year with horizontal lines required period of maintenance and repair determines. ECG of course equipment for excavators between the periodicity of repair and the volume of their cocktails the binding is presented in Table 1.

Table 1.
Periodicity of repair of mining equipment and their cocktails expenses.

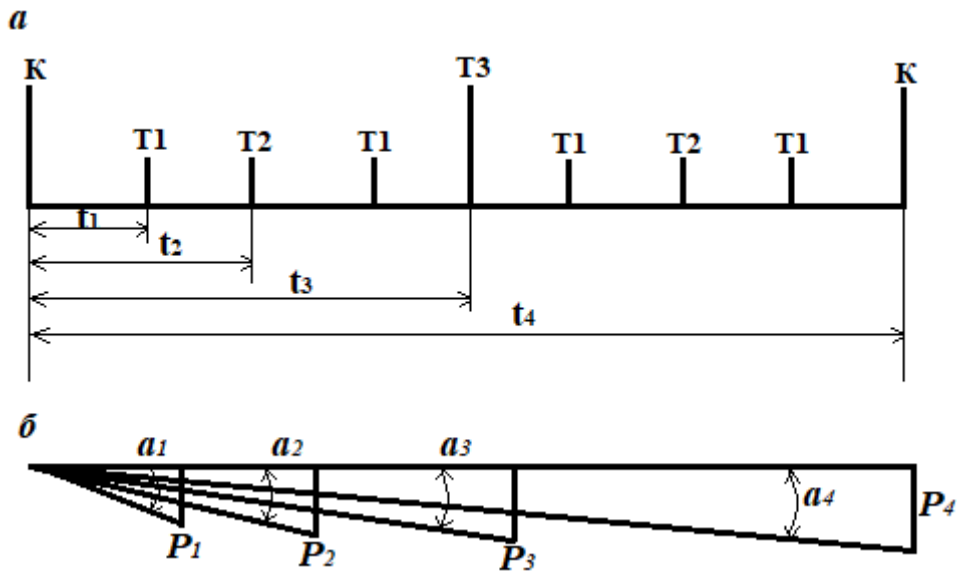
№ o/n	Devices naming	Repair			To stop duration (hours)		Cocktail size man/hour
		Unit	Unit of measurements	Working hours	Mechanical hours	Electric hours	
1	2	3	4	5	6	7	8
1	ECG – 5A	TK	thousand m ³	80	44	22	396
		T ₁	thousand m ³	400	77	33	660
		T ₂	thousand m ³	800	88	44	792
		K	thousand m ³	4300	At a time	At a time	9900
2	ECG – 8I	TK	thousand m ³	90	44	22	396
		T ₁	thousand m ³	450	88	33	792
		T ₂	thousand m ³	800	121	44	990
		K	thousand m ³	5400	At a time	At a time	9900
3	ECG – 10	TK	thousand m ³	120	44	22	396
		T ₁	thousand m ³	600	89	44	798
		T ₂	thousand m ³	1000	111	55	996
		K	thousand m ³	7200	At a time	At a time	9900

Table 1 which, which is presented for excavators of this series on the basis of which the graph is drawn up, with the months along the axis of the abscissa calendar period, along the ordinate arrows, in absolute units (m³, mash/hour and P) periodicity of maintenance and repair brought (2a-Photo). On th axis of the abscissa obtained in Figure 2b in a horizontal position the ability of the excavator to continuously generate a the course of the norm is listed. Keep this norm a smoothly in order to stand up for the above repair period restoration of the construction of the details using the structure listed in chart. Graphic based repair work through wasps ability to continuously prosses the machine and its details using increase the working life of the excavator by increasing you can. Required number of maintenance and repair technical servise along tehese curve intersection points and related types of repair with horizontal lines determined. The approximate duration of of the start of their transfer vertical from the intersection point to the axis of the abscissa to mark cut into strips.[6]

Vertical lines from the intersection point to the axis of the abscissa to begin wiyh the implementation of maintenance and they repair by dropping we find the approximate duration. From the received information using maintenance and repair annual plan it is formed.

Photo in the table column «time of completion of work» appropriate type of maintenance and repair and to the max the period of their transfer is set. Graphic of the beginning of work in accordance with the duration specified in Table 1 it is obtained.

The sink of the excavator is different in terms of structure and the functions of the sink distinguish the mountain rocks includes digging - loading processes.



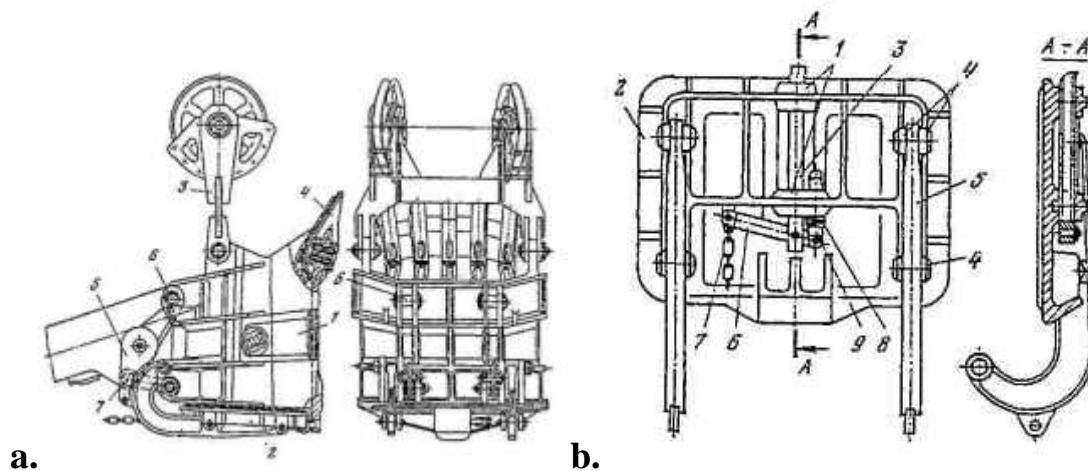
2-picture. Graph of the change in the performance of the machine.

a - the structure of the repair period, *b*-restoration of the achievement of the details,

$t_1 - t_4$ -time between repairs, a_1-a_4 -direct performance capability penetration angles, respectively increase of *P*-performance capability penetration angles, respectively increase of *P*-performance ability.

MATERIALS AND METHODS

8-10 m³ capacity welding - cast sink (3a-photo)1, from the bottom root part 2, from the Travesy 3, from the five teeth 4 and from bottom part of stop mechanism 5 configured. The chopper body is four the casting compound is welded. More edible previous wall is made of 110G13L high manganese steel. Low full cast back wall with the ughlerod steel two side welding adjacent to the walls. Sink on the back wall combine on the handle, hang the bottom and the cross the sink there are earplugs 6 and 7 for fastening. 3b - picture of the sink the bottom of the part the bottom is shownin alokhi. Zulfin in it 3 rectifier 1, kronshteynler 4 also poured from 110g 1z steel. Cross - country to keep the bottom part, the hoop is fastened 5. Zulfin richag 6 and the chain opens through 7. Zulfin absorption measurment the Sheeba, dressed 9 on the finger, is regulated by 8.

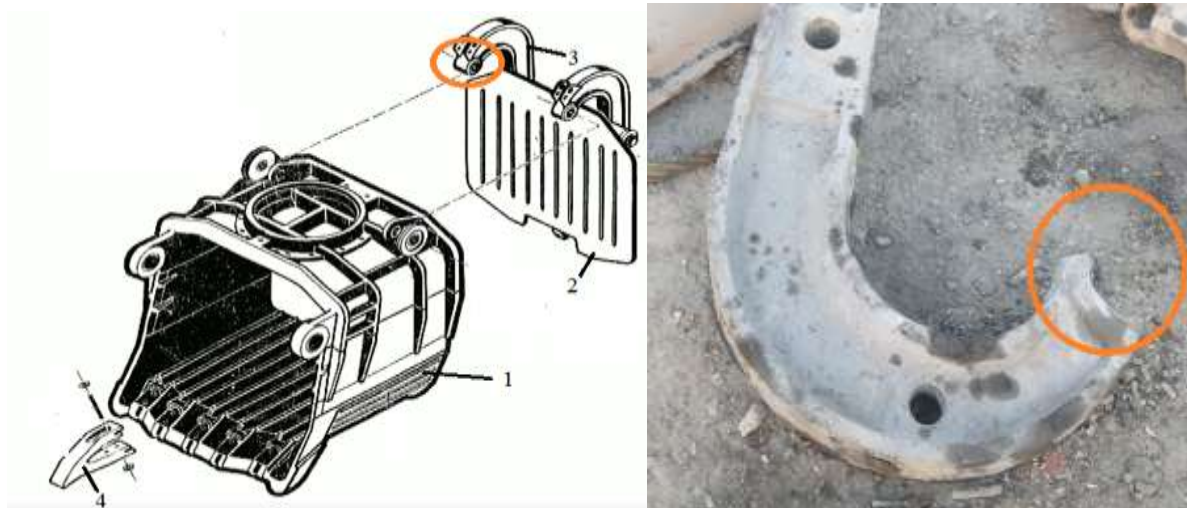




V.

3-picture. The Weld-cast sink of the excavator (a) and the bottom of the sink (b) and the appearance in the process of mining (v).

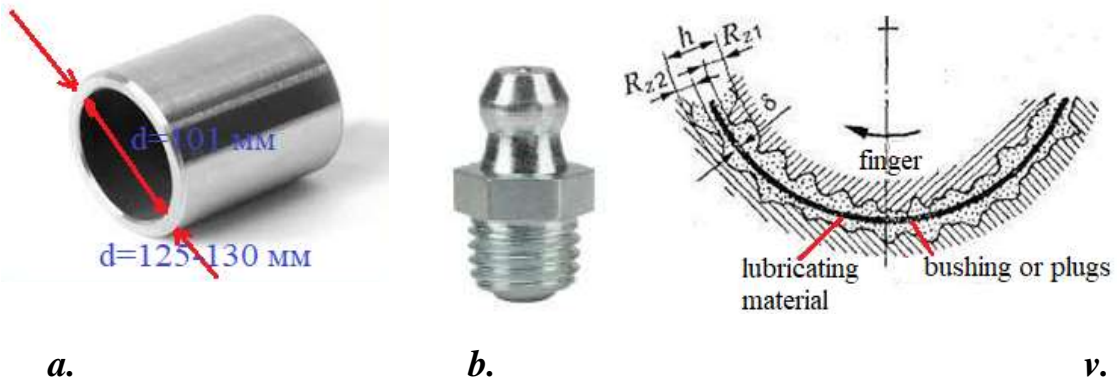
According to the plan, the one that holds the back of the sink and that is, the ring finger that serves the opening place of residence (4a - photo, marked with a colored line) from 12 months up to 26 months of production have passed the approval in the process of exploitation. Ring friction, fine-grained stones remain through the dust basically on account of the heavy strain quickly get out of work 100 mm the diameter of the finger housing is enlarged to 125-130 mm and it is in the crumbs of the ring or staying playing on the fingers in place hanging the back cover of the sink as a result of going to enlarge the ring the mold leads to the fact that the lid does not close well (4b - figure). Spilling of a certain part of the mountain rock, with eventually took the sink dust removal, productivity decline and work cost and time required to fix the output knob bringing.[10]



4-picture. Holder back of the sink and serve opening caller mechanism ring.

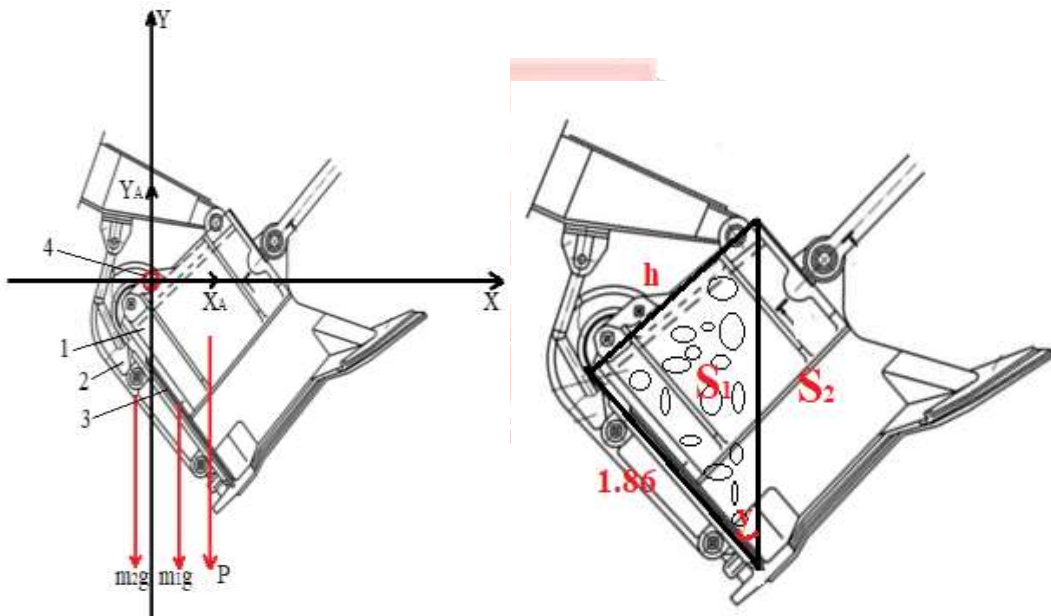
To eliminate this, rub the bottom part of it with a swab combination the place where the index finger stands, that is the ring diameter $d=125-130$ mm and internal to it considering that the if the diameter is $D=101$ mm put on the wafer (5a-photo) and grease with the processing time of the ring when the knob (5b - figure) is

applied for processing from 26 moths to 72 moths and opened the sink cover it will be easier to close. inside in the process of lubricating vtulka on 5v-figure through the grinding incision through the rolling pinches listed.



5-picture. The backpack is needed to increase the working life details.
a-vtulka, b-uzeli send oil, v- vtulka grease, ash process slice.

Round shape concealer hinged part of the sink and bottom of it reaction forces acting on the ring are the forces presented in figure 6 on the basis of the theoretical side, the accounting work was carried out.



6-picture. Trib conclaler the sink and the bottom part of it reaction forces acting on the ring. sharnir we determine the reaction forces acting on the ring:

1-sink; 2-the closing fixture (petlya) opening the bottom part of the sink; 3-bottom part of the bottom of the sink; 4-hinged-hoop;

RESULTS AND DISCUSSION

$$R_A = \sqrt{X_A^2 + Y_A^2} \tag{1}$$

here: the reaction force on the X_A – abscissa axis, on the Y_A -ordinate axis reaction force. We proect the forces relative to the point.

$$\sum F_x = 0;$$

$$\sum F_Y = 0; \quad (2)$$

$$\sum F_X = X_A;$$

$$\sum F_Y = m_1 g + m_2 g + P;$$

here $m_1 = 1.17$ sink bottom part mass t;

location $m_2 = 0.470$ closing fixture opening bottom part the sink (petlya) mass t;

P - the weight of the load on the sink kN;

$$P = m_y \cdot g = 4.2 \cdot 9.81 = 41 \text{ kN}; \quad (3)$$

Cutting surface of the bottom part of the sink $S_{um} = 2.3 \text{ m}^2$, it receives 17.6 tons of mountain sex in full condition.

The surface of the sink, which affects the ring of the side of the sink lets count

$$S_1 = \frac{h \cdot l}{2}; \quad (4)$$

$$\frac{h}{\sin 30^\circ} = \frac{c}{\sin 90^\circ} = \frac{l}{\sin 60^\circ}; \quad (5)$$

$$S = \frac{l}{2\sqrt{3}} = \frac{1.86}{2\sqrt{3}} = 0.55 \text{ m}^2 \quad (6)$$

The forces that affect the ring will be the same:

$$\left\{ \begin{array}{l} X_A = 0 \\ Y_A = (m_1 + m_2) \cdot g + m_{\text{ок}} \cdot g \end{array} \right\} \quad (7)$$

$$Y_A = (m_1 + m_2) \cdot g + m_{yu} \cdot g = (0.94 + 1.17) \cdot 9.81 + 4.2 \cdot 9.81 = 62 \text{ kN} \quad (8)$$

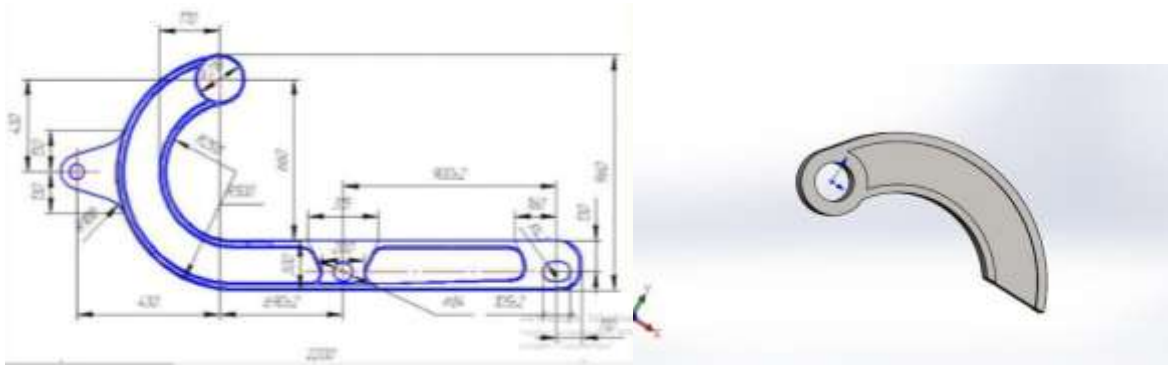
On the basis of the formula of the reaction forces acting on the ring will be found.

$$R_A = \sqrt{X_A^2 + Y_A^2} = \sqrt{0^2 + 62^2} = 62 \text{ kN}. \quad (9)$$

That fact the rings are 2 pieces and are symmetrical with each other for each of the forces acting on it are distributed:

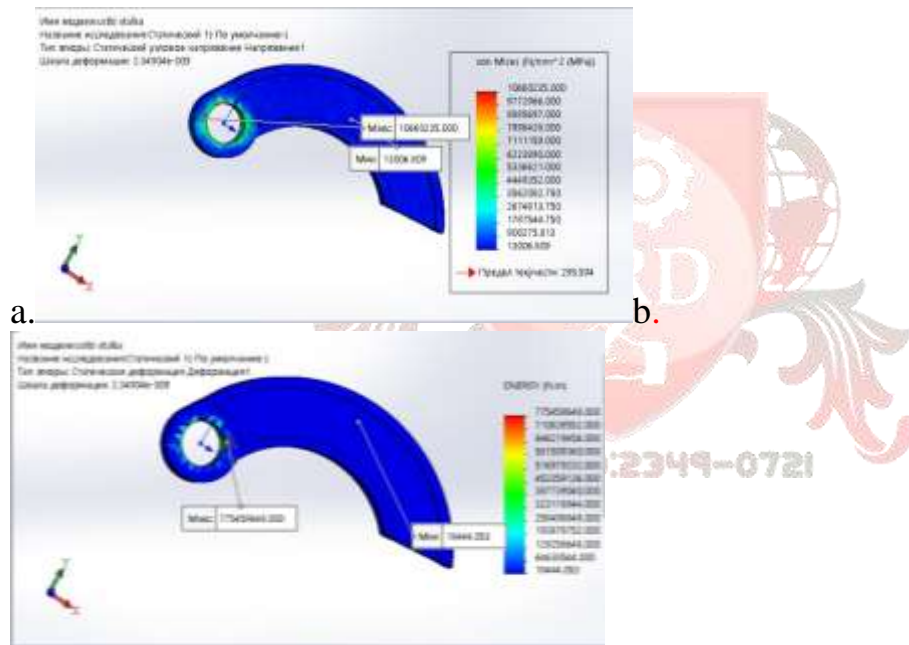
$$R_B = \frac{R_A}{2} = \frac{62}{2} = 31 \text{ kN} \quad (10)$$

Hence, each ring is affected by 31 kN of force.



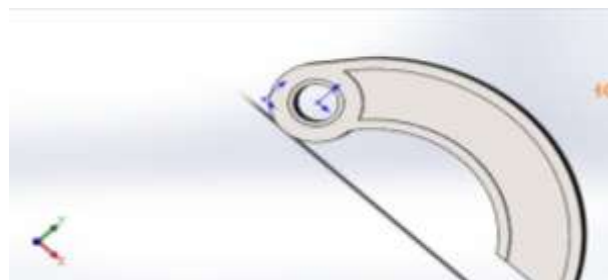
7-picture. Constructive curvation of the plugs ring (a) and its model (b).

Constructive view of the hoop ring 7a in the photo listed and model of this ring is based on Solid Works software formed picture 7b. Common falling into the sink ring the result of the force of gravity is shown in the Figure 8a, the ring is large because of tension falling, it can grow in size, fracture it proves that the consequences can arise. Deformation and status is given in Figure 8b and here is the affect of the both forces as a result, a tendency to absorption into the ring appeared it proves it.

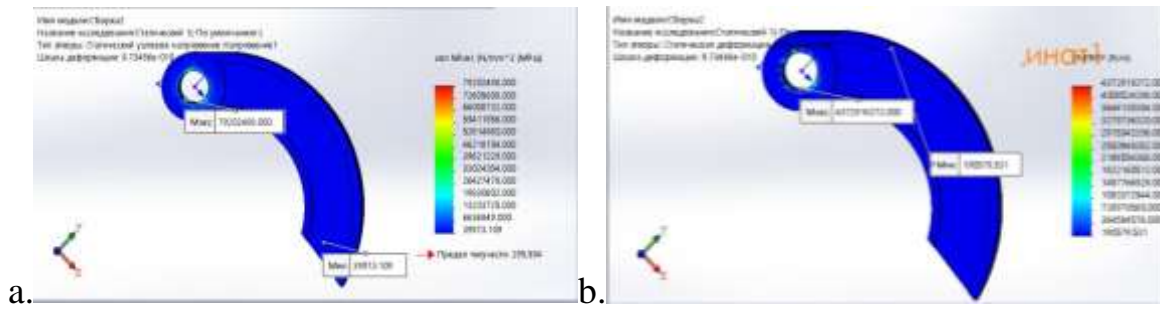


8-picture. Results of the model of the sink ring. a - tension, b - deformation.

As mentioned above, the tension that is falling on the ring to eliminate, the inner diameter is put on a wafer with $d=101$ mm(picture 9) and the resulting tension in the ring himself takes increases the duration of its production submission (10 a-b picture)

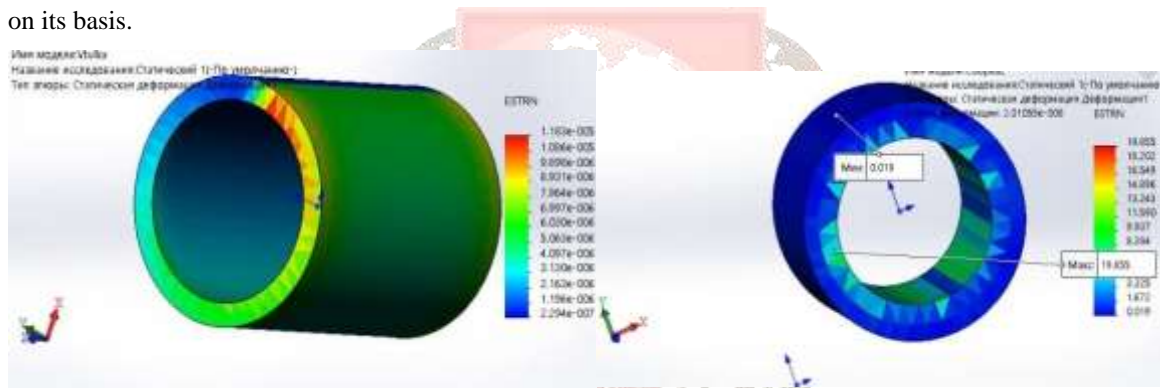


9-picture. Model of pocket ring with bush.



10-picture. Results the model of the sink ring. a-tension, b-deformation.

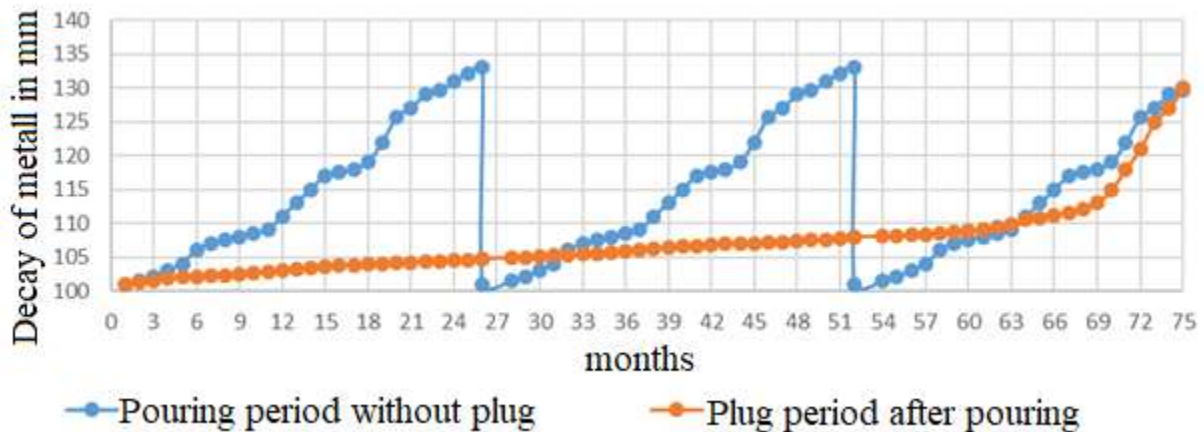
The results of the sink ring without a sink and with a sink 8 and 10 if we compare the pictures the the bush receives the general forces we can see that it would make and ultimate would exert less power on the ring. this leads to an increase in the service life of the ring. the power that is given as a binary option is given only without bushes and examine through the forces given to the main place of the ring of the plug our vision. To the ring without plug the forces calculated above we give (11a-picture), the result is marked with red colors one sided abrasion of the olishing ring in the production of our sight meaning that would lead to the departure of a finds confirmation of directional absorption. 11b-as in the picture we install a plug on the inner part of the this ring and the result is bush accept the basis of the general forces falling and we prove that the ring does not pass on its basis.



12-picture. Deformation of the ring model with and without screw.

CONCLUSION

As we have already mentioned above, the collapse of the ring as a result, defects in the opening and closing of the tub portion of the sink appears and a certain part of the genus of the mountain, from which the sink take spills, dusting, decreased productivity and out of work it turns out that the cost of correcting the outgoing knob will increase. The place where the ring finger of the grasshopper stands (photo 13) 26 until the month the manufacturer has passed approval in the process of exploitation. The above result is the installation of bush, account it works exactly the same way as one bush sink the solution of the ring dependent treatment is up to 76 months, that is 2 from year to 6 years, service life can be increased and a number of factors that reduce productivity were picked up.



13-picture. To the time of the formation of the metal of the crucible ring link chart.

Here is the period of work of the ring without the wart with the blue colour and the condition after installation of plug is given in brown colour. As a result, the problem with the excavator sink exactly ring plug to increase the productivity, service life of the installation evacuation will lead.

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