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ADDITION TO A PROJECT STUDY OF MECHANICAL ENCUMBRANCE AT GRINDING OF Ti ALOYS

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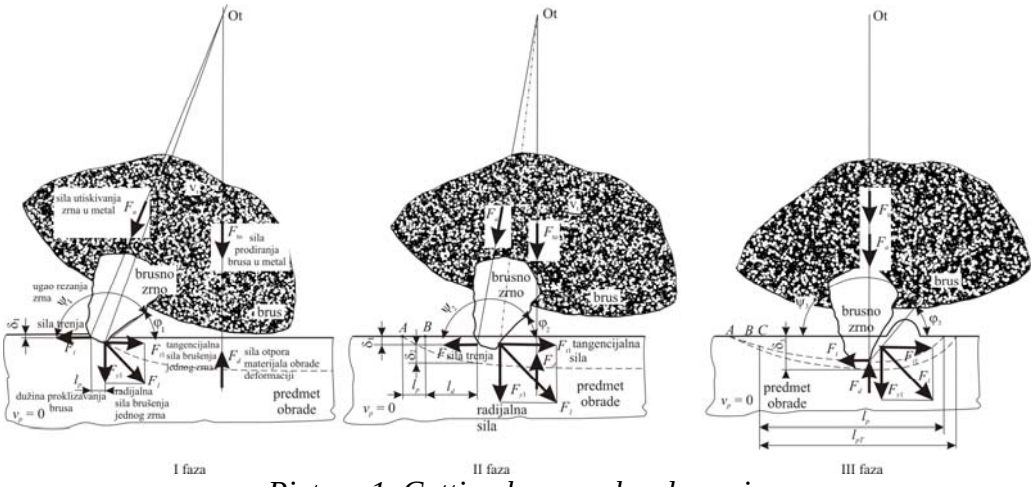
ABSTRACT
More and more strict demands in sense of decrease of weight, increase of toughness, increase of corrosive resistance and others mechanical-physical and chemical characteristics of contemporary constructions (reactors, astronautic, aviation) impose a need for wider use of titan and it's aloys. Considering that the use is still limited by possibilites of carving work, in terms of that, great efforts and funds are being invested for studying of mechanic process of carving and for defining parameters of processing.
Working in this direction, and on the basis of technical literature data it is tried to point to some specific qualities at grinding work. The results given in this work are shown in forms of expresions and diagrams and goal of that is proper use in product practice.

1. INTRODUCTION
During the grinding process we can look at power as power of one abrade grain and as power to affect on the whole abrade. Power intensity is necessary to know from the reason of energy analysis needed for the grinding process, scuffing abrade anticipation, processing accuracy and processing temperature.



Picture 1. Cutting by one abrade grain

2. PRELIMINARY MEASURING OF TANGENTIAL COMPONENTS OF CUTTING RESISTANCE

We tried to find functional dependence between tangential component od cutting resistance and grinding time during the experimental testing. Another words, we were looking for blunt abrade effect on tangential component change in cutting resistance.

Experiment, which is derived with different cutting regimes, gave the following results:

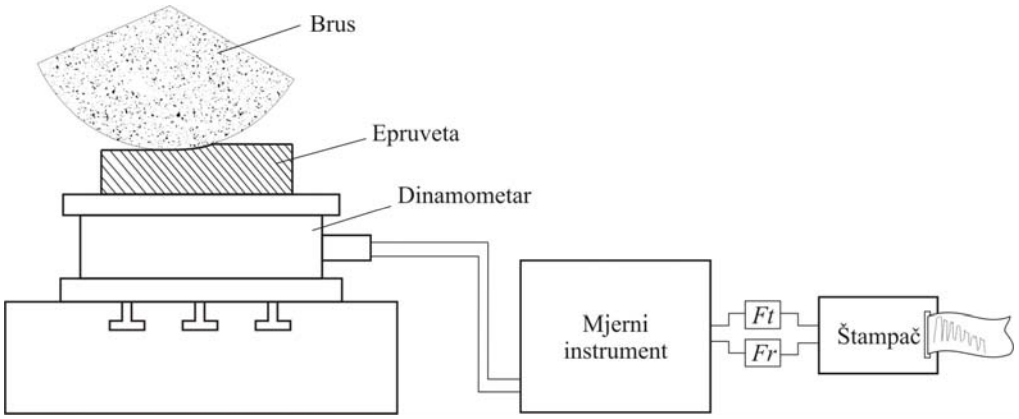
- ✓ For both cutting regime power and time dependence, for about ten minutes, it was quite the same,
- ✓ In is noticed that tangential component of cutting resistance for about 2,5 minutes experiences constant growth, and after that it comes to sudden power reduction, which we can explain by spontaneous abrade sharpening process.

During the experimental testing it is noticed considerable sealing of subject processing's metal on the abrade surface.

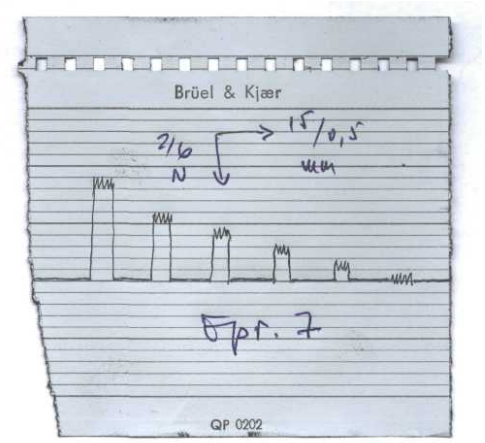
Mentioned experiment is partly reliable for the conclusion about advent inconstant in testing, but it was the only one possible to achieve because of the lack of measuring instruments.

During the above experimental testing, sintasol A of concentration at 4% is used as SHP.

3. TANGENTIAL COMPONENT USCERTAINING OF CUTTING PROCESS



Picture 2. Power measuring engine scheme



Picture 3. Clip of the tape

Results overview of radial component measuring in grinding resistance , in usage SHP sintasol A 4%															
exp. point	X0	X1	X2	X3	V_R	t [mm]	S_b [mm]	Y [mm]	Kx [N/mm]	Fx [N]	log Fx	X0*Fx	X1*Fx	X2*Fx	X3*Fx
1	1	-1	-1	-1	3.5	0.005	1	0.50	1.45	0.73	-0.1367	-0.1367	0.1367	0.1367	0.1367
2	1	1	-1	-1	16.1	0.005	1	1.00	1.45	1.45	0.1614	0.1614	0.1614	-0.1614	-0.1614
3	1	-1	1	-1	3.5	0.03	1	3.00	1.45	4.37	0.6405	0.6405	-0.6405	0.6405	-0.6405
4	1	1	1	-1	16.1	0.03	1	8.00	1.45	11.64	1.0660	1.0660	1.0660	1.0660	-1.0660
5	1	1	-1	1	16.1	0.005	4	4.33	1.45	6.30	0.7993	0.7993	0.7993	-0.7993	0.7993
6	1	-1	-1	1	3.5	0.005	4	2.83	1.45	4.12	0.6149	0.6149	-0.6149	-0.6149	0.6149
7	1	-1	1	1	3.5	0.03	4	22.50	1.45	32.74	1.5151	1.5151	-1.5151	1.5151	1.5151
8	1	0	0	0	7.5	0.012	2	5.83	1.45	8.48	0.9284	0.9284	0.0000	0.0000	0.0000
9	1	1	1	1	16.1	0.03	4	35.63	1.45	51.84	1.7147	1.7147	1.7147	1.7147	1.7147
10	1	0	0	0	7.5	0.012	2	4.67	1.45	6.79	0.8319	0.8319	0.0000	0.0000	0.0000
11	1	0	0	0	7.5	0.012	2	5.00	1.45	7.28	0.8621	0.8621	0.0000	0.0000	0.0000
12	1	0	0	0	7.5	0.012	2	4.83	1.45	7.03	0.8470	0.8470	0.0000	0.0000	0.0000

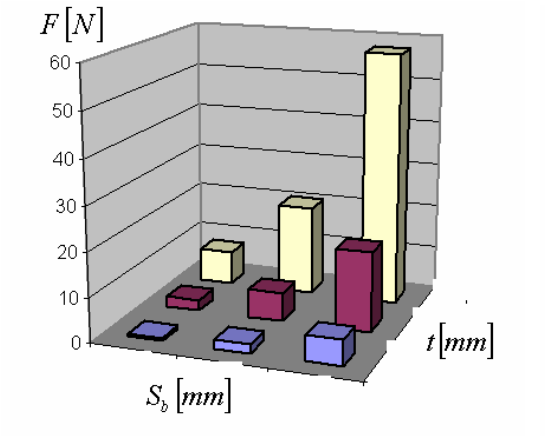
Results overview of tangential component measuring in grinding resistance , in usage SHP sintasol A 4%															
exp. point	X0	X1	X2	X3	V_R	t [mm]	S_b [mm]	Y [mm]	Kx [N/mm]	Fx [N]	log Fx	X0*Fx	X1*Fx	X2*Fx	X3*Fx
1	1	-1	-1	-1	3.5	0.005	1	-1.00	1.8	0.77	-0.1135	-0.1135	0.1135	0.1135	0.1135
2	1	1	-1	-1	16.1	0.005	1	0.13	1.8	2.03	0.3075	0.3075	0.3075	-0.3075	-0.3075
3	1	-1	1	-1	3.5	0.03	1	0.73	1.8	4.14	0.6170	0.6170	-0.6170	0.6170	-0.6170
4	1	1	1	-1	16.1	0.03	1	1.85	1.8	9.11	0.9595	0.9595	0.9595	0.9595	-0.9595
5	1	1	-1	1	16.1	0.005	4	2.50	1.8	10.21	1.0090	1.0090	1.0090	-1.0090	1.0090
6	1	-1	-1	1	3.5	0.005	4	1.38	1.8	4.50	0.6532	0.6532	-0.6532	-0.6532	0.6532
7	1	-1	1	1	3.5	0.03	4	3.10	1.8	19.88	1.2984	1.2984	-1.2984	1.2984	1.2984
8	1	0	0	0	7.5	0.012	2	1.62	1.8	9.45	0.9754	0.9754	0.0000	0.0000	0.0000
9	1	1	1	1	16.1	0.03	4	4.23	1.8	46.80	1.6702	1.6702	1.6702	1.6702	1.6702
10	1	0	0	0	7.5	0.012	2	1.62	1.8	5.94	0.7738	0.7738	0.0000	0.0000	0.0000
11	1	0	0	0	7.5	0.012	2	1.62	1.8	5.94	0.7738	0.7738	0.0000	0.0000	0.0000
12	1	0	0	0	7.5	0.012	2	1.62	1.8	6.89	0.8382	0.8382	0.0000	0.0000	0.0000

5. RADIAL COMPONENT USCERTAINING OF CUTTING PROCESS

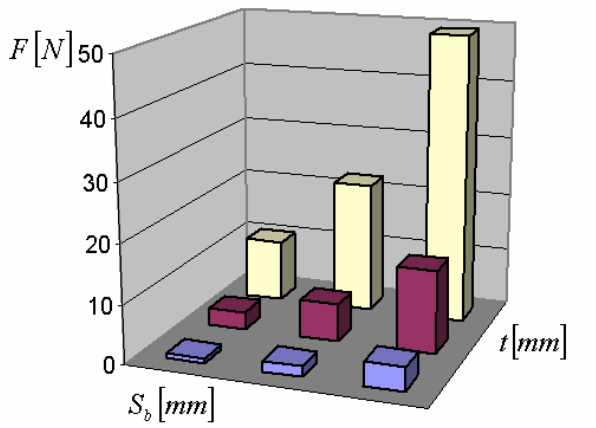
In the aim of the importance of regression coefficient, we have:

$$S^2(b_{ij}) = 0{,}0559$$

since it is $t = 1{,}716$ we have: $1{,}796 \cdot 0{,}0559 = 0{,}1 \lhd B_0, B_1, B_2, B_3$, what confirms the importance of regression coefficient. On the base of obtained mathematics' models for radial component of cutting resistance and used SHIP, it is possible to show the graphic regime of parameter's processing influence on that.



Picture 4. Cutting regime influence on the value of radial cutting power



Picture 5. Cutting regime influence on the value of tangential cutting power

6. CONCLUSION

On the base of the collected pieces of information from the literature and made grinding testing of titanium alloy TA6V, we can conclude the following:

- ✓ titanium alloy treatment by grinding process is made difficult by bad thermal transmission, just as relatively huge ductility (titanium is soft, it pastes on abrade desktop), and because of the hard oxide layer which is the result of long cost air,
- ✓ during the experimental testing it is noticed that huge influence on titanium workability has the choice of the cutting tools – abrade and cooling and lubricant, and it is necessary to pain attention on that,
- ✓ during the titanium grinding in higher deepness, and relatively low speed of the processing subject, the burned places are noticed (which can be explained by bad thermal titanium transmission). Usage of the softer abrades than the used ones would probably give better results.

7. LITERATURE

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