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SOLUTIONS FOR BREED THE AVAILABILITY OF THE PARALLEL GANG SHEARS ASSIGNED FOR CUTTING THE METALLURGICAL PRODUCTS

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ABSTRACT: *In this paper proposed some solutions for the decrease of the unschedule stops of the 8000Kn shear with parallel gang assigned for cutting the metallurgical products. Analysis of data collected through observation of operation/failure of the shear allow construction of the so-called Pareto diagram, which is an analysis and assessment method that at the same time allow identification of several failures on which should be droved with priority. Based on the study which has been performed is proposed solutions meant to increase the availability of the 8000 kN shear, existent in exploitation.*
KEYWORDS: *cutting, metallurgical products, unschedule stops, Pareto diagram*

INTRODUCTION

Analyze yes obtained from the observation operation/breakdown of the scissors permits the construction of the Pareto diagram which is a method of analysis and of permissive evaluation therewith the identification of the categories of which bugs must resolve without delate.

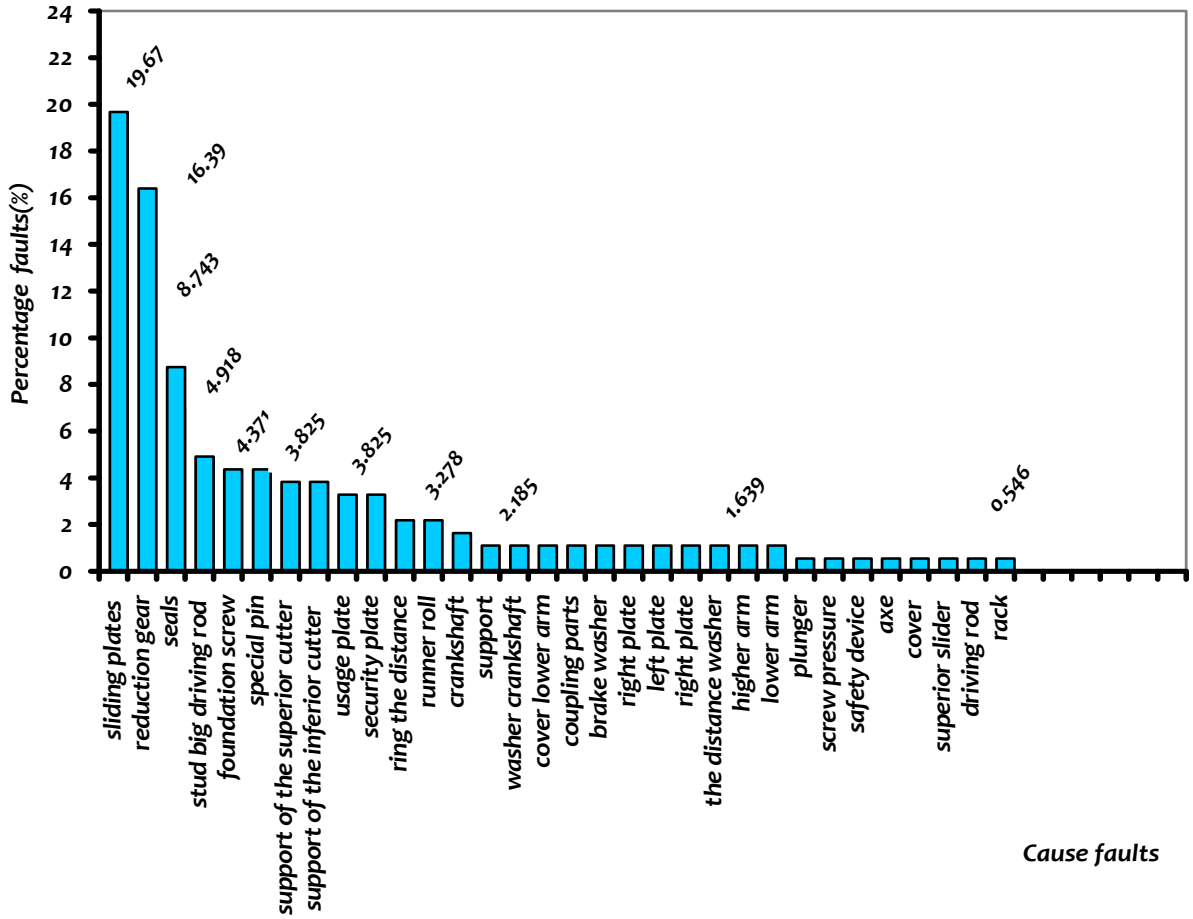

Figure 1. Pareto Diagram for scissors of 8000kN from the framework of the line of rool S.F.1

From the figure 1 consisted as through his degrease the dismission of the bonus forteen guys of out of order, the number accidental stops are reduced with approximate 80% [2].

According to the results obtained by Pareto diagram, elements with the highest percentage of failure weight observation (19,67%) are the sliding plates which are mounted on the shear body, at the contact area of the upper slide.

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SOLUTIONS FOR BREED THE AVAILABILITY

Sliding plates are performed currently from CuZn37. As per gives obtained from exploitation and through the determination reaction from the translational couple is can caused the speed of effeteness volumetrically scilicet $v=0,42380 mm^3/s$.

A proposal for the decrease of the speed of coupled respectively is the execution sliding plates from steel OL60 and these veneering with an alloy a cast-iron appointed sormait for witch by-paths characteristic date in the table 1.

Table 1. Characteristic date of the alloy a cast-iron appointed sormait

sormait	Addition agents [%]								
	C	Si	Mn	P	S	Ni	Cr	Cu	Mo
	3,46	3,28	1,35	0,066	0,070	2,0	21,65	-	-

The sormait due to of a big content of silicon (3,28%), assure a higher resistance to abrasive effeteness and the mechanical sock. In this choice the cemented carbide he considered the chemical composition satisfies following condition:

- the contents of carbon and the chromium, of which it depends the amount of primary carbides the eutectic, assure a optimal combination between resistor to effeteness and the tenacity of the layer applied;
- the content silicon, manganese, molybdenum, nickel and cooper am thus choosed that the plated its layer don't contains the pearlite in the structure.

Experimental tests to determine the wear speed for the coupling sormait-OT50-3 have been accomplished on an existent installation at the Specialized Laboratory of the faculty of Engineering in Hunedoara, the results being shown in figure 2.

Figure 2. Installation for attemps

The attempts they did so that coupled cylinder-disk is like with the bearing load from couple Sliding plates - upper slide.

Following of tests has been determined a volume wear speed of $4,71 \cdot 10^{-3} mm^3/s$, which is much lower that the one obtained through exploitation.

Also, according to the same Pareto diagram, at the 4th position is placed the pin of the upper bar with a weight observation of failures of 4,918%. This pin is manufactured of OLC 35 and the diameter of 370mm. In that coupling, pin – big connecting rod, appears the phenomenon of semi-wet friction. This leads to high values of friction coefficient, intense wear.

Another proposals meant to reduce the non-programmed entity shutting downs are manufacturing the pin of 28TiMnCr12 and its cementation (face hardening). This type of steel [3], after the thermic specific treatment has a top-side constitute from martensite of return with erect content of carbon, very hard and a resistant core but tenacious ghift with a ferrito structure. The manganese from the content of the steel raises resistance traction, limit of flow the steel, and the chromium confers the great effeteness resistance and good qualities of chip removal.

Forwards, has been performed the analysis of pin resistance by the method of finite element using a specialized software (Algor) in the two alternatives of materials: OLC35 and 28TiMnCr12.

ANALYSE THE RESISTOR OF THE BOLT THROUGH METHOD OF FINITE ELEMENTS

Analyse the mechanical systems through the method of finite elements, represents solution mathematics of the engineering problems, what it has to base division the studios bodies in discreet elements (finite) formally of a cubbies or tetrahedrons. Analyse through the method of finite elements permits the determination of the stress distribution, specifically strains, to the movements, analyse vibrations, etc, for requirement of connection and load yes. Analyse the mechanical systems through the method of finite elements can be done with matrical calculation complex utilizing software packages such as: Algor, Ansys, Cosmos, etc. Afterwards, is presented the analyse of the pin resistance with help of the program Algor4.

Analyse of the pin resistance with software specialized presupposed run next stages:

- the transfer of the pin model from Inventor in Algor (stp. format) and the settlement type of the analyse (static analyse), the figure 3.
- the settlement parameters digitization and the digitization (mesh area) the model (figure 4.)
- the settlement of the compulsions motional in the linkers, respectively shall kept the motion of rotation around axis Z as per the figure 5;
- the settlement of the load: reaction from couple big bolt has the maxim value $7,384 \cdot 10^6 N$. With this value, can cause the bearing load between elements (71,27Mpa), as per figure 6;

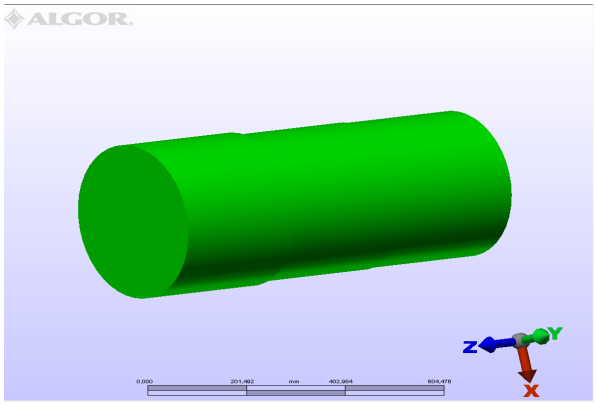

Figure 3. Transfer of the pin model

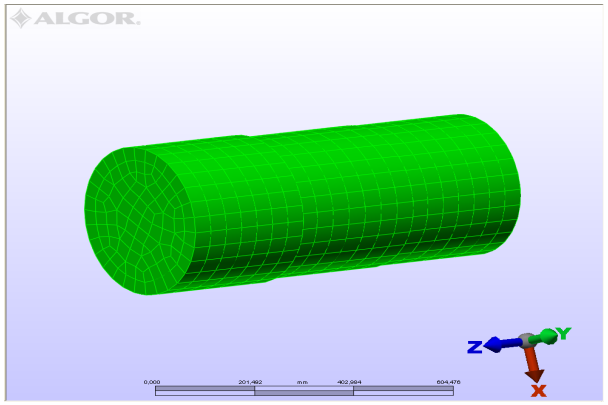

Figure 4. Digitization the model

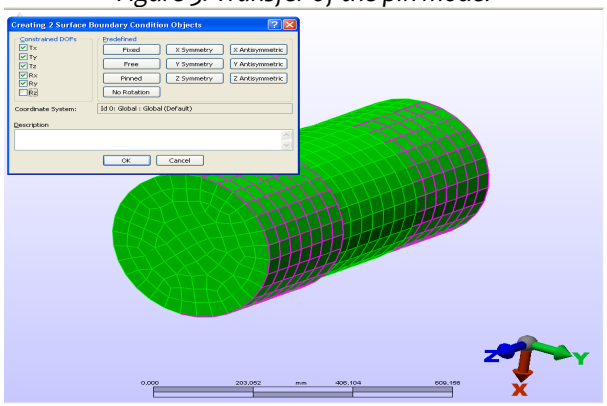

Figure 5. Settlement of the compulsions motional

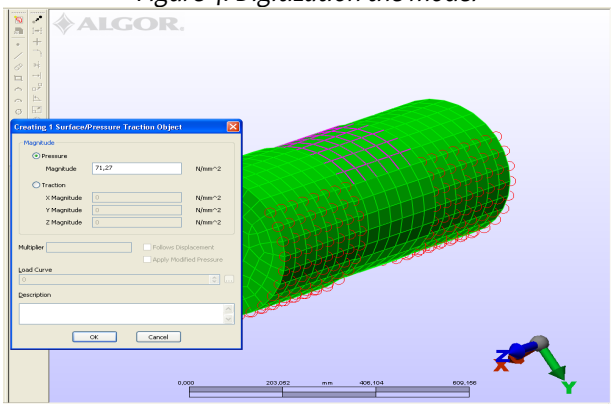

Figure 6. Settlement of the load

□ *analyse own said the bolt executed from OLC35, the state tensional von Misess (figure 7), the specific deformation (figure 8) and the nodal movements (figure 9);*

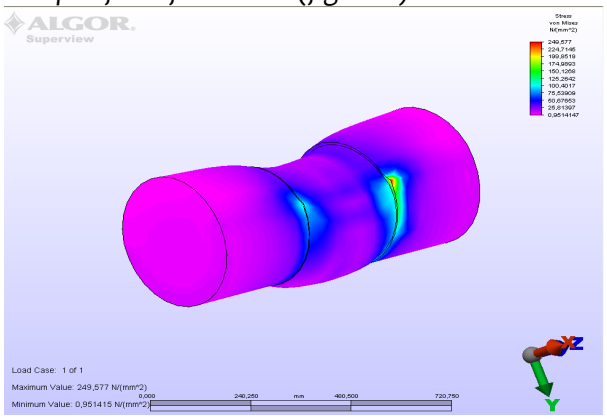

Figure 7. The state tensional

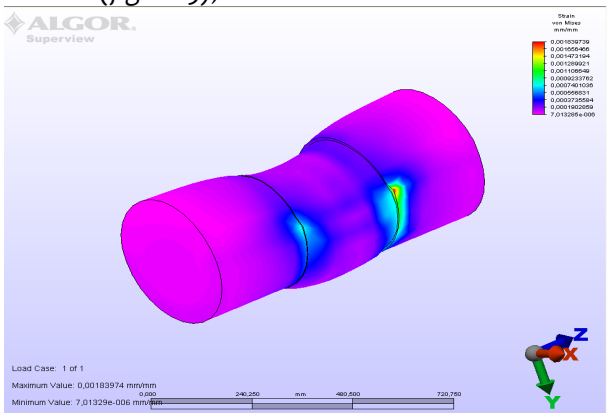

Figure 8. The specific deformation

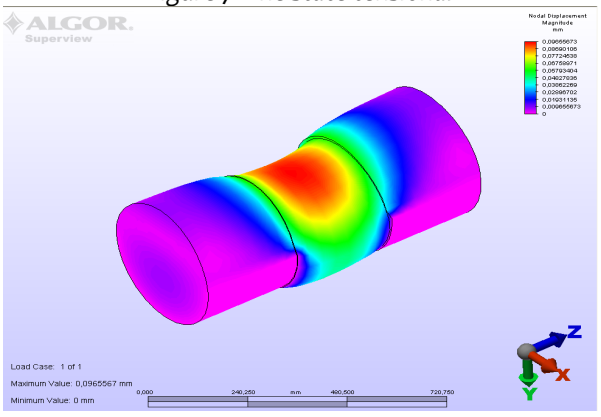

Figure 9. The nodal movements

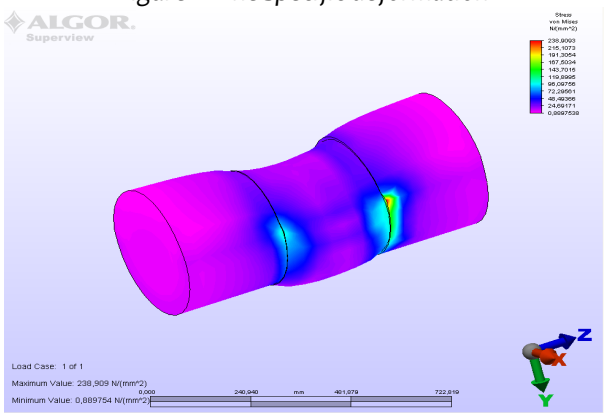

Figure 10. The state tensional

Afterwards, is presented the analyse of the bolt executed from 28TiMnCr12, the state tensional von Misess (figure 10), the specific deformation (figure 11) and the nodal movements (figure 12):

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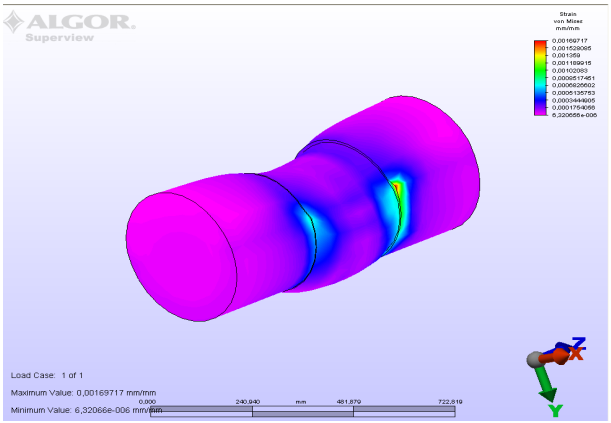

Figure 11. The specific deformation

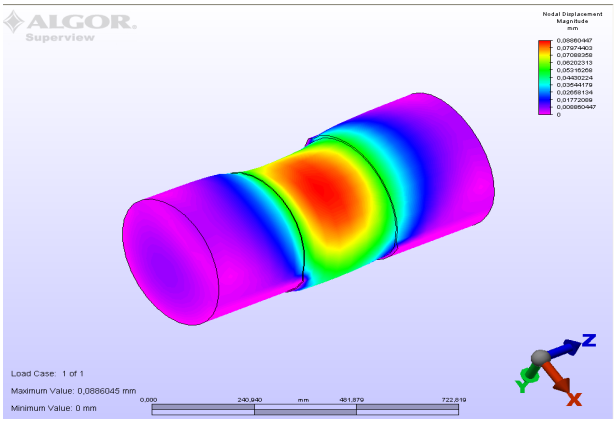

Figure 12. The nodal movements

From analysis presented on the two types of materials has been ascertained that in the situation of the cementation alloyed steel, 28TiMnCr12, both specific deformations and node movements are smaller for the same burden.

Other proposals meant to reduce the non-programmed entity shutting downs are manufacturing the pin of OL37 and its plating with polytetrafluor-ethylene. The polytetrafluor-ethylene abreviated PTFE [5], [6], can replaced material metallic antifrictions in certain conditions presenting the plasticity, god thermic resistance and reduced friction coefficient. Is proof to the low and higer temeratures and presented the chimical resistance to the most corrosive agents. It are present notably non-adhesiviness.

The features the mechanics for polytetrafluoroethyls are presented in the table 2.

Table 2. The features the mechanics for PTFE

Mechanical property	Method of test ISO(ASTM)	Stone	Values
Attempts to traction:			
- Limit of flow/resistance to rupture through traction	527	MPa	15,2/28
- The breaking elongation through traction	527	%	300
- The module of longitudinal elasticity	527	MPa	625
- The module of transversal elasticity	(D790)	MPa	562
Hardness Shore	2039-1	Sh.D	57
Densitate	-	g/cm^3	2,17
To temperature	-	^0C	-200...250

The dynamic friction coefficient, without lubrication is contained between 0,04... 0,1.

CONCLUSIONS

Consequently, the proposed solutions: plating of sliding plates with Sormait, manufacturing of the pin of OL37 steel and its plating by polytetrafluor-ethylene and manufacturing the pin of cementation alloyed steel using a specific thermal and chemical treatment are accomplishable and relative easy from technological point of view and with the best practical results.

The suggested solutions, if they shall be selected, can reduce the times of maintenance preventively.

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