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THE COMPARATIVE ANALYSIS OF THE BLANKING TOOL WEAR USING THE OPTICAL METHOD BY COMPARING THE RIDGE MEASURE

Alin STĂNCIOIU*
Gheorghe GÎRNICEANU**
Gheorghe POPESCU***
** Lect. dr. eng. U.C.B, Tg-Jiu, e-mail* alin@utgjiu.ro
*** Prof. dr. eng. U.C.B,Tg-Jiu, e-mail* girniceanu@utgjiu.ro
**** Prof. dr. eng. U.C.B,Tg-Jiu, e-mail* gepo@utgjiu.ro

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Abstract: In the case of the tools for metallic materials cold trim, as a duration measure for assuring the adequate development of the technological process both the force plug or the matrix dimensional modifications measure are taken, but also the ridge height (the degree) which is determined by the tool wear degree.When the degree (ridge) overcomes a certain value (prescribed through the quality requirements of the processed pieces) the continuing use of the tool (therefore increasing its use duration) there is no longer admitted even if the technologic process may continue. The experiment proved that the ridge measure is directly proportional with the active elements wear.

1.Introduction.

The ridge cutting is executed both by obtaining finite pieces, and through bar strips for later operations of deformation processing.

Blanking contains several procedures like: fret sawing, boring, corrugation, clipping, graduation, etc.

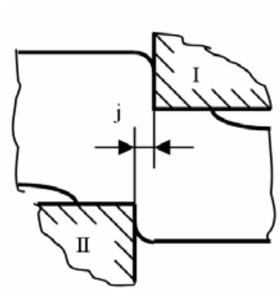

Fig. 1 The cold cutting process diagram of a metallic material

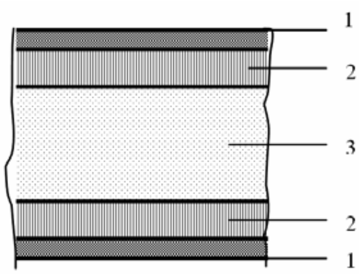

Fig. 2 Areas that appear in a cutting and bar stripping section

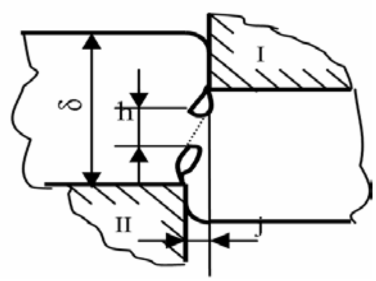

Fig. 3 Micro and macrocracks development mechanism into the cutting and bar stripping process: δ, blanking thickness.

The mechanism of the cutting and boring process is schematically presented in figure 1 it includes 3 characteristic phases:

- the request of the elastic state material (figure 4), when combined efforts do not overcome the processed material flow limit: the cutting edges go into the material causing a slight sheet curving within the limit of j slack between the two cutting edges I and II. Zone 1 (fig. 2) that corresponds to this phase, has a shiny aspect, without flowing lines.
- the request of the plastic state material (figure 5), while combining efforts due to the cutting edge pressing, they overcome the processed material flow limit, that flows towards the direction of the mobile cutting element hauling direction (the knife or the scissors disk, perforating force plug). The zone aspect (2, fig. 2) is even, due to specific plastic flow.

- The breaking phase (fig. 6) corresponding to the central portion which, by reducing itself while the cut edge enters the material, cannot take over the efforts caused by cutting edges pressing and it breaks. The surface aspect in this area (3, figure 2) is uneven, specific to breaking.

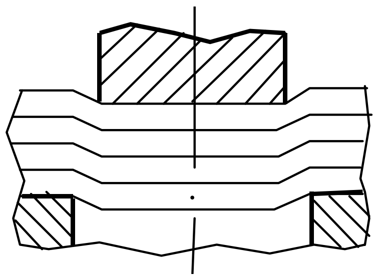

Fig.4. The request of the elastic state material

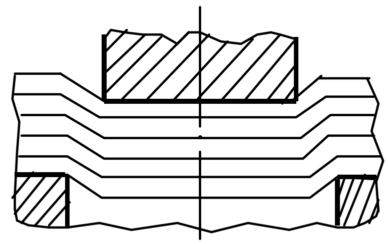

Fig.5 The request of the plastic state material

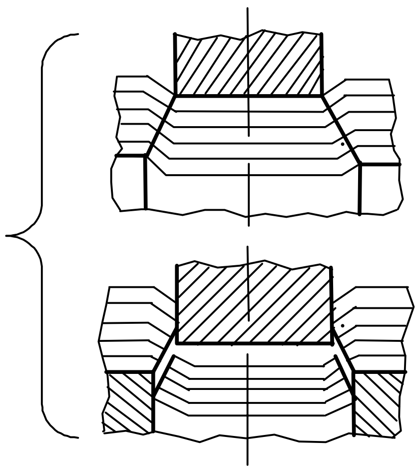

Fig.6 The breaking phase

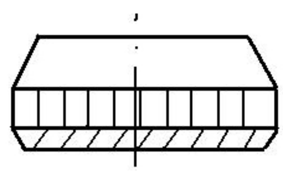

Fig.7 Piece

The material separation begins when the unitary efforts transmitted through the two cutting edges I and II (figure 1) creates plastic deformation areas on the material (section) thickness, which coalesces. When plastic flow is no longer possible in this area, microcracks and macrocracks begin to appear, and they propagate into the material on its thickness, favouring the breaking of the remained h section, (figure 3).

The thickness (height) in the area where macrocracks began to appear, the h zone, is the uneven aspect zone (zone 3 in figure 2) and represents “the ridge” or “the degree”, characterizes through its height, evenness and the quality of the finished product surface, obtained by processing; the bigger this zone is, the least the evenness of the processed surface is and the lower the product quality.

2. Comparison using the optical method between the disk plate obtained through dry blanking with lubricant.

Next, they investigated the weight of the disk plates ridges obtained by blanking with all the force plugs used in experiments: improved 205Cr115 die, chromate OSC10 die, covered sparks OSC10 die, nitride OSC10 die, improved OSC10 die, improved OSC10 unworn die.

In the figures 8-13 there are displayed the images of the cutting sections in two cases: with dry friction (above) and with lubricated friction (the bottom part) with the increase degree 5X.

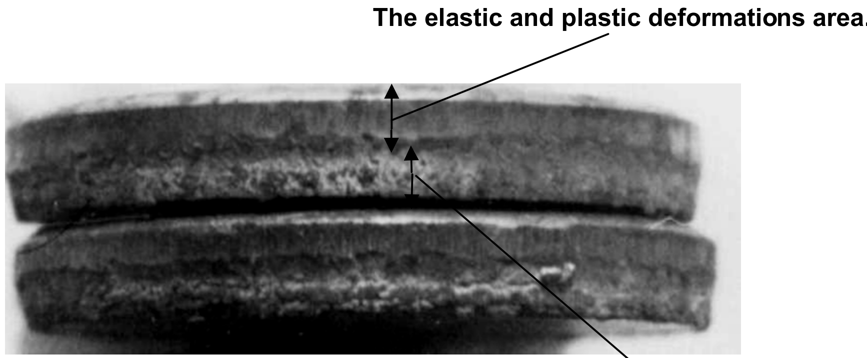

Fig.8 Improved 205Cr115 die 5X

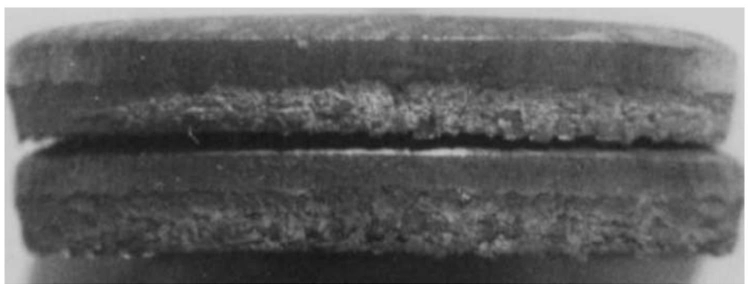

Fig.9 Chromate OSC10 die 5x

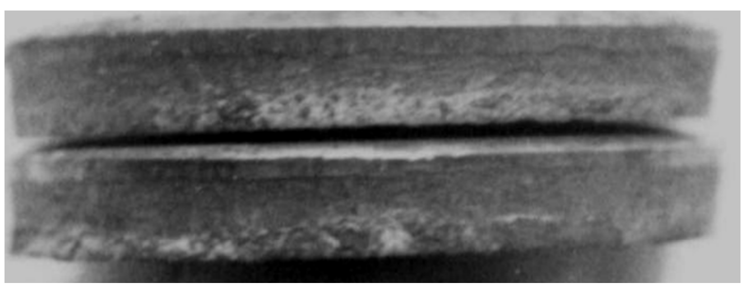

Fig.10 Covered sparks OSC10 die 5x

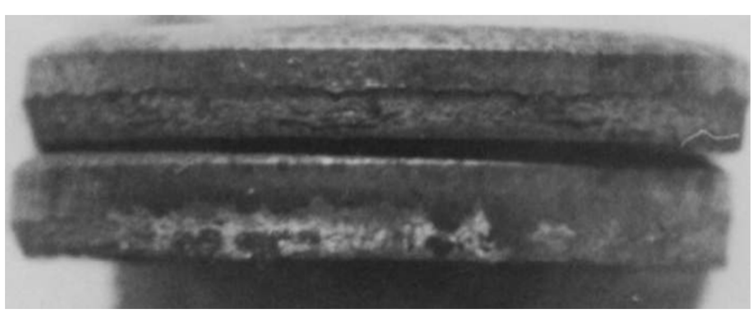

Fig.11 Nitride OSC10 die 5X

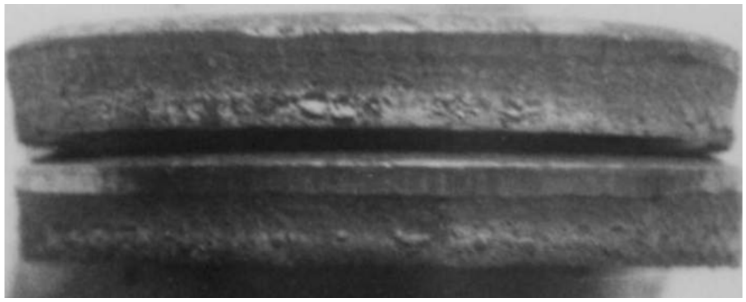

Fig.12 Improved OSC10 die 5x

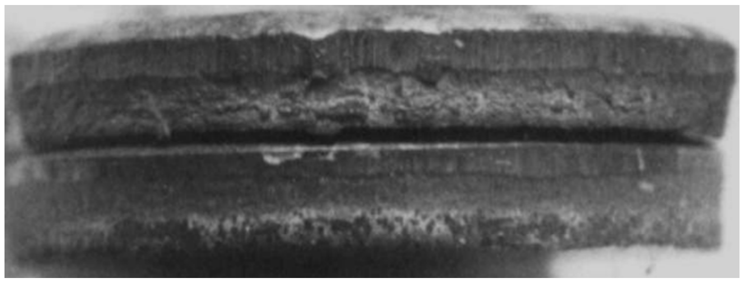

Fig.13 Improved OSC10 unworn die 5x

3. Conclusions:

In the resulted section after cutting, we can observe an even, shiny area, specific to plastic deformation and an uneven area, typically for breaking.

The smallest ridges are met at the blanked disk plates with OSC10 force plug covered with sparks and chrome.

The ridges of the disk plates blanked under dry friction conditions are more visible than those of the disk plates obtained under conditions of dry friction. In conclusion, the OSC10 force plug covered by sparks has had the least wear.

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