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THE STUDY OF THE EFFECT OF A SHEET BLANK SURFACE EMBOSSING IN THE DRAWING PROCESS OF A CYLINDRICAL PART

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Hollow thin-walled asymmetric parts, produced from sheet metal by the process called extrusion, have a wide variety of usage in aviation due to their hardness and low weight.

Practice shows that extrusion coefficient decreases with thickness of a blank. The explanation to this effect is that we have to use a much stronger blank holder to avoid the formation of flange. This causes the increase of friction force and the tension in dangerous cross-section as well as the rupture of a blank. So, what can we do to avoid these problems?

One of the obvious ways to avoid these problems is the decrease of friction force on the side of a blank that contacts with matrix and blank holder. The lubrication is ineffective because the lubricant will just leak out from the zone of contact.

The possible solution to this problem is forming a rough surface in a form of a large number of micro-diggings that will hold the lubricant. As a result the friction force should decrease as well as tension in dangerous cross-section areas of the part that we're making.

We've used specifically developed way of producing embossed metal sheets with shallow micro-diggings by rolling it in smooth cylindrical rolls with office paper as the follower (picture 1).



Fig. 1. The surface of aluminum sheet after rolling with office paper

The goal of this experiment was to see how the thickness of the part on the bottom side and on its surface changed.

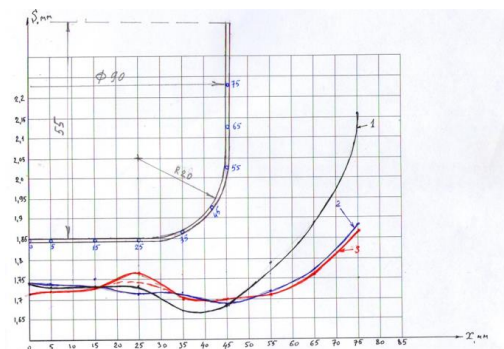


Fig. 2. Changes of cylindrical part thickness along the generatrix after extrusion

As we can see in picture 2 the difference of parts thickness that were produced from blanks with embossed surface is much lower rather than of parts produced from blanks with smooth surface.

Taking into account the results of the experiment it can be concluded that micro-diggings cause positive affect on the size and the way of tension distribution on acontact surface of a blank [1–3].

References

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