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Tool`s profiling for rotational volumetric deformation - analytical study

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Abstract. The paper develops in an analytical form an algorithm for the profiling of the active elements of the upper half-die forming which generates by means of plastic rotary volumetric deformation of the frontal teeth. The half die has the revolving axis inclined with respect to the axis of the deformed blank, which rotates around its own axis of symmetry. In the generation process, the generating half die also performs a movement of the blank. The constitutive surfaces of the tooth flanks to be generated are complex surfaces, formed of circular arcs with variable radius and disposed on a conical base surface, on the same axis with the half-die axis. Such teeth are used for front blades in the textile industry or drilling machines which performs, besides the rotational movement of the tool and an alternate rectilinear motion thereof, creating a percussion effect on the work piece. The surfaces of the upper half and the half die teeth may be regarded as reciprocal wrapping surfaces, so that the entire generation process is based on the analytical principles of surface winding. Starting from the constructive shape of the frontal tooth plate, in a classical scheme of the structure of the oscillating motion mechanism of the upper half matrix, the shape of the deformation teeth is determined based on a specific algorithm, based on the general theory of surface winding, and dedicated software products for it.

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