CONDITION OF RETRACTION OF SHEET MATERIAL WITH ROLLING PAIR

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Many technological processes of different industries are implementing with rolling pairs. The condition of capturing, drawing and missing material slice between rollers with considering particularity of exploring industries are developed by series of authors [1, 2].

By osculation of surfacing material with driving and working rolls, they exert pressure to surfacing material movement in two form summary pressure force *N*, which directed normally to covers working rolls and two summary friction force *T*, directed to them tangentially.

For initiation the capture of surfacing material by working rolls is necessary, that horizontal component of friction force T_x be more or equal to horizontal component of fiction force N_x [2].

For realization the capture of rolling pair material, low border of radius working rolls must possess following:

$$R \geq R\left(t, \delta, \beta_f, h\right), \tag{1}$$

where t and h- are thicknesses of sheet material and cover a working roll, in proportion; δ - primary bite between a working rolls; $\beta_f = arctgf_c \geq \beta_g$ - angle of friction and β_g - angle of capture a working rolls, in proportion; f - coefficient of friction between surfacing material and cover of working roll in initial moment of capturing.

For assurance qualitative behavior of material surfacing process, even date for clearing folding and defect formation, working rolls must retract and miss itself a material by one slice. For fulfill this requisition at the capturing moment and in process of surfacing at the tangent places working rolls with folding must hold a place $N_x \geq T_x$, or $\varphi_s \geq arctgf = \beta_f$, where φ_s - is angle between radius, traced in the tangent point of working roll with a folding, and with line, which connects centers of working rolls.

After some mathematical coverts we get functional dependence for identifying rolls radius in form (Figure 1),

$$R \le R\left(t, t_1, \beta_f, h, h_1\right), \tag{2}$$

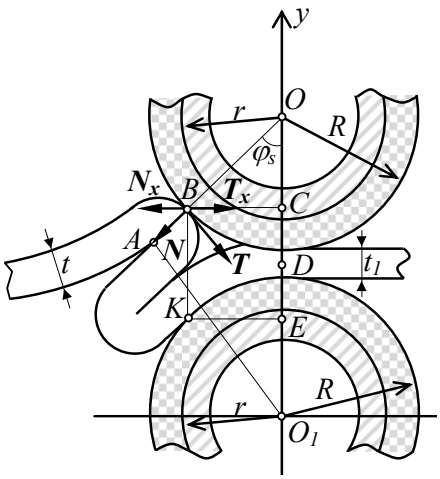

Figure 1

where t_1 - deformed material thickness by line, which connects centers of working rolls (specific gap of rolls). Amount of $t_1 = t(1-\varepsilon_m)$ depends on physic-mechanical feature of material, material cover of working rolls and pressure between them, ε_m - compressive strain coefficient of sheet material, $h_1 = h(1-\varepsilon_c)$ - is deformed material thickness of pair roll, by line, which connects centers of working rolls, depends on physic – mechanical feature material cover working roll and pressure between them; ε_c - is coefficient of compressive strain of cover material.

The form (1) and (2) corresponds conditions of surfacing material capturing and missing between working rolls by one slice. Thereby, knowing the thickness and physic – mechanical feature of surfacing material we may choose pair roll's rational parameters. Here, working rolls capture the surfacing material exclusive of slip and retract to the area of surfacing by one slice, with expanding possess defects.

Calculations tested on MATHCAD, permit to give certain recommendations by identifying concrete magnitudes radius's of working rolls in dependence from thickness and feature of surfacing material and covered working rolls.

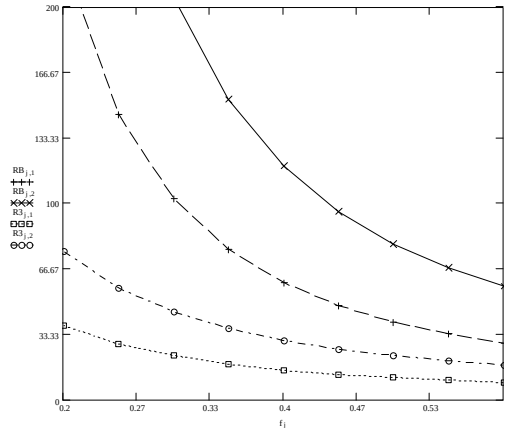

Figure 2

At the figure 2 presented graph of dependence R from rolling pair parameters, which is β_f, δ, t, t_1, h, h_1.

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