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Author's name[1,*] - Co-author's name[2] *(Style: Times New Roman, 10pt)*
[1] Author's institution *(Style: Times New Roman, 10pt)*
[2] Co-Author's institution *(Style: Times New Roman, 10pt)*

Finite element method (FEM) is used for simulation of two-pass processing tube tension-reducing of the new steel 33Mn2V for oil well tubes. The simulated results visualize dynamic evolution of equivalent stress, especially inside the work-piece.

It is shown that the non-uniform distribution of equivalent stress on the longitudinal and transverse sections is a distinct characteristic of the processing tube tension-reducing, which can be used as basic data for improving tool and technics design, predicting and controlling the micro-structural evolution for manufacturing oil well tubes. (Style: Times New Roman, 10pt, Italic)

Keywords: word, word, word,... *(Style: Times New Roman, 10pt, Bold)*

0 INTRODUCTION
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In recent year, with the improvement of FEM (finite element method) and the development of computer technology, numerical simulation technology based on FEM is increasingly becoming a powerful tool to analyze the hot rolling and the hot forging process of steel and so on [1] to [5].

The processing tube tension-reducing is an important and complex deformation process in the producing seamless tubes, which is influenced by the materials properties, deformation temperature and rolling rate, stress, contact and friction condition, reducing size and others, which are a non-isothermal steady-state coupled with non-steady-state three-dimensional thermo-mechanical process. *(Style: Normal text)*

1.1. Subtitle 1 *(Style: Times New Roman, 10pt, Bold)*

This study's aim is to get metal flow and distributions of equivalent stress on some special sections such as longitudinal and transverse sections under processing tube tension-reducing.

1.1.1 Subtitle 2 (Style: Times New Roman, 10pt, Italic)

Eight-node hexahedral element type is taken, at the same time 2280 elements and 3239 nodes are obtained for the work-piece. The work-piece is assumed to be elasto-plastic and described by updated Lagrange method, i.e., it obeys the Mises yield criterion and Prandtl-Reuss flow rule, and its deformation is simulated in a step-by-step manner, updating the coordinates of material points and the property after each step. The rolls are assumed to be rigid and of heat-transfer, and they were analytically described.

FEM was used for simulation of two-pass processing tube tension-reducing of the new steel 33Mn2V for oil well tubes using.

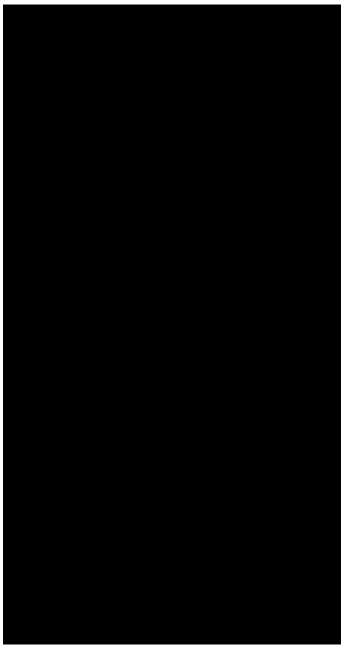

Fig.1. *Axial flow fan ∅ 630 mm with five profiled blades(Style: Times New Roman, 10pt, Italic)*

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MARC/AutoForge3.1 software. The material database of MARC/AutoForge3.1 software do not have the data of the flow stress of steel 33Mn2V, so its database should be set up. The experimental material was taken from the same part of a barren tube billet, and then manufactured into dozens of specimens with a diameter of 8mm and a length of 15mm.

$$P/A = -\lambda \, \partial T / \partial L \, . \tag{1}$$

According to various process parameters based on practice production, the hot upsetting experiments was conducted on a thermal/dynamic simulation tester and then their flow stress curves were written down, and stored into the computer by MARC/AutoForge3.1 software's format. The whole flow stress curves are shown in Figure 3. The thermo-physical parameters including heat conductivity, specific FEM was used for simulation of two-pass processing tube tension-reducing of the new steel 33Mn2V for oil well tubes using MARC/AutoForge3.1 software. The material database of MARC/AutoForge3.1 software do not have the data of the flow stress of steel 33Mn2V, so its database should be set up. The experimental material was taken from the same part of a barren tube billet, and then manufactured into dozens of specimens with a diameter of 8mm and a length of 15mm. According to various process parameters based on practice production, the hot upsetting experiments was conducted on a thermal/dynamic simulation tester and then their flow stress curves were written down, and stored into the computer by MARC/AutoForge3.1 software's format. The whole flow stress curves are shown in Figure 1. The thermo-physical parameters including heat conductivity, specific. While numerically simulating the above process, it is necessary to conduct a coupled analysis, and give a consideration to the contact heat transfer by contact between the:

$$I_{\mathrm{E}} = A_{\mathrm{M}} \left(\sum_{i} \frac{A_{\mathrm{M,i}}}{I_{\mathrm{E,i}}} \right)^{-1} \tag{2}$$

while numerically simulating the above process, it is necessary to conduct a coupled analysis, and give a consideration to the contact heat transfer by contact between the work-piece and the roll, convection and radiation between the work-piece and the environment, and the heat generation due by contact between the work-piece and the roll,

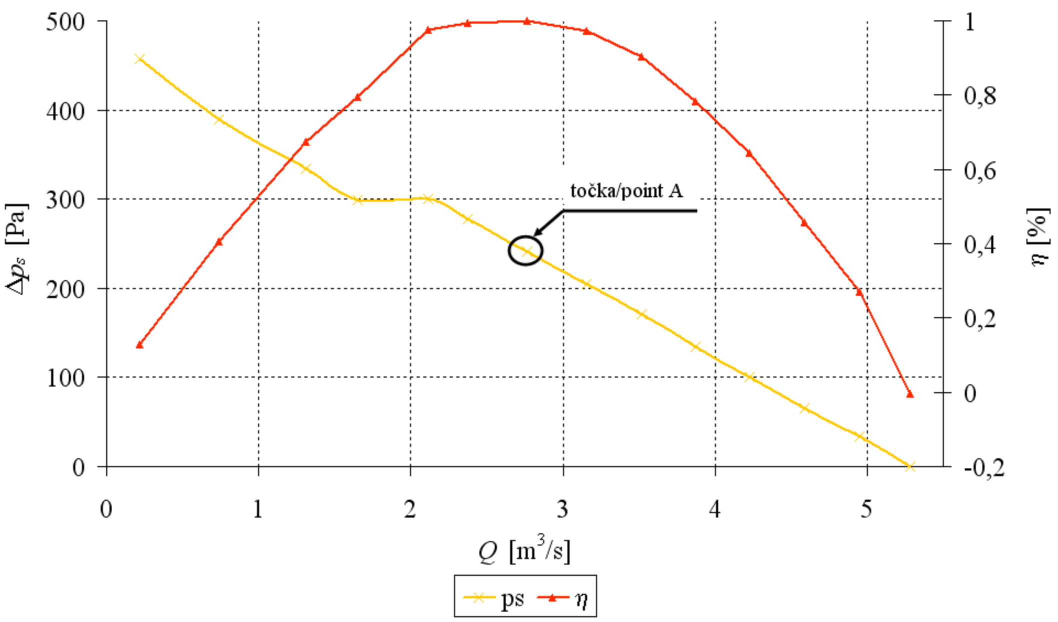

Figure xx: *Figure figure figure (Style: Times New Roman, 10pt, Italic)*

Table 1. *Chemical and mechanical properties of AA6351 alloy (Style: Times New Roman, 10pt, Italic)*

a) Chemical composition of AA6351 alloy (% weight)

Si	Fe	Cu	Mn	Mg	Zn	Al
1,03	0,237	0,0723	0,584	0,665	0,003	Balance

b) Mechanical properties of AA6351 alloy

Density (x1000 kg/m^3)	Elastic modulus GPa	Tensile Strength MPa	Elongation %	Hardness BHN
2.7	75	250	20	102

Material was taken from the same part of a barren tube billet, and then manufactured into dozens of specimens with a diameter of 8mm and a length of 15mm. According to various process parameters based on practice production, the hot upsetting experiments was conducted on a thermal/dynamic simulation tester and then their flow stress curves were written down, and stored into the computer by MARC/AutoForge3.1 software's format. The whole flow stress curves are shown in Figure 1. The thermo-physical parameters including heat conductivity, specific

The displacement of all nodes on symmetrical planes perpendicular to their corresponding symmetrical plane is zero. The friction between the work-piece and the roll contact surface keeps to shear law, and their friction coefficient is set as 0.7. The equivalent heat-transfer coefficient between the free surface of the work-piece and the ambience is set as 0.17 kW/(m^2 °C).

The contact heat-transfer coefficient between the work-piece and the roll is set as 23 kW/(m^2°C). The initial temperature of the work-piece, the ambient temperature and roll temperature is set as 860 °C, 20 °C and 200 °C, respectively. The conversion factor from plastic work to heat was set as 0.9 [8] and [9]. 3-D thermo-mechanical coupled elasto-plastic heat capacity and thermal expanding coefficient at different temperature were directly input on the software windows, and the thermo-physical parameters at high temperature can be extrapolated based on.

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