

# The Hot Spot in Al-Rod Extrusion Investigated by FEM-analysis

Henry S. Valberg<sup>1, a)</sup>, Martin Lefstad<sup>2, b)</sup> and André L. M. Costa<sup>3, c)</sup>

<sup>1</sup>*Department of Mechanical and Industrial Engineering, Norwegian University of Science and Technology, 7491 Trondheim, Norway*

<sup>2</sup>*XXX, Norway*

<sup>3</sup>*Department of Mechanical Engineering, Federal University of Sergipe, Brazil*

<sup>a)</sup> Corresponding author: [valberghenry@gmail.com](mailto:valberghenry@gmail.com)

<sup>b)</sup> [martin.lefstad@gmail.com](mailto:martin.lefstad@gmail.com)

<sup>c)</sup> [andre.costa@ufs.br](mailto:andre.costa@ufs.br)

**Abstract.** FEM-analysis has been used to study thermo-mechanical conditions in an industrial Al-rod extrusion process where long billets are used as stock material. In the analysis, focus is on the conditions in the hot-spot present inside the metal of the billet material as it flows over the die edge in the extrusion process. In this spot strain-rate and temperature in the flowing metal will reach critical conditions if the extrusion speed is set too high. Moreover, when there are overcritical conditions speed-cracking will occur in the metal. The Lagrangian version of the software DEFORM 3D is applied to model the process numerically. It is investigated how the distribution of deformational state-variables is predicted to be here in the hot-spot region, and how they depend on the used extrusion conditions. Through this analysis new information on the issue is obtained.