Backward Rod Extrusion of Bimetallic Aluminum-Copper Alloys at Room Temperature

V. Sanabria[1, a)], S. Gall[1, b)], F. Gensch[2, c)], R. Nitschke[2, d)], S. Mueller[2, e)]

[1]*INGWERK GmbH. Gustav-Meyer-Allee 25, Gebäude 17a, Treppe 5, 13355 Berlin.*
[2]*Extrusion Research and Development Center, TU Berlin. Forschungszentrum Strangpressen, Sekr. TIB 4/1-2. Gustav-Meyer-Allee 25, 13355 Berlin*

[a)]Corresponding author: vidal.sanabria@ingwerk.com
[b)]sven.gall@ingwerk.com
[c)]felix.gensch@strangpressen.berlin
[d)]rene.nitschke@strangpressen.berlin
[e)]soeren.mueller@strangpressen.berlin

Abstract. Bimetallic aluminum-copper extruded profiles are used in applications where an excellent electrical and thermal conductivity and a reduced weight are required. This process is especially complex due to the flow stress difference between aluminum and cooper. At the present, such profiles are manufactured by means of the hydrostatic extrusion process, since the friction between workpiece and die is drastically reduced and therefore a more uniform material flow is possible. In this work, a systematic investigation of several parameters such as temperature, die design and block configuration was carried out in order to make possible a successful backward extrusion of bimetallic aluminum-copper alloys. The copper alloy Cu-ETP and aluminum alloy EN AW-1080A were selected to prepare the shell and core of the billet respectively. Experimental results demonstrated that a room temperature backward extrusion of mentioned alloys can be possible if the friction between the copper alloy Cu-ETP and the conic die face is significantly reduced. Additionally, the whole extrusion process was simulated applying the FEM-based software Deform 2D. Moreover, the die and stem temperature evolution, as well as the die extrusion force were measured and applied to validate the numerical analysis. Figure 1 shows the comparison between the experimental and simulated material flow of the cooper and aluminum alloys at the beginning of the extruded profile.

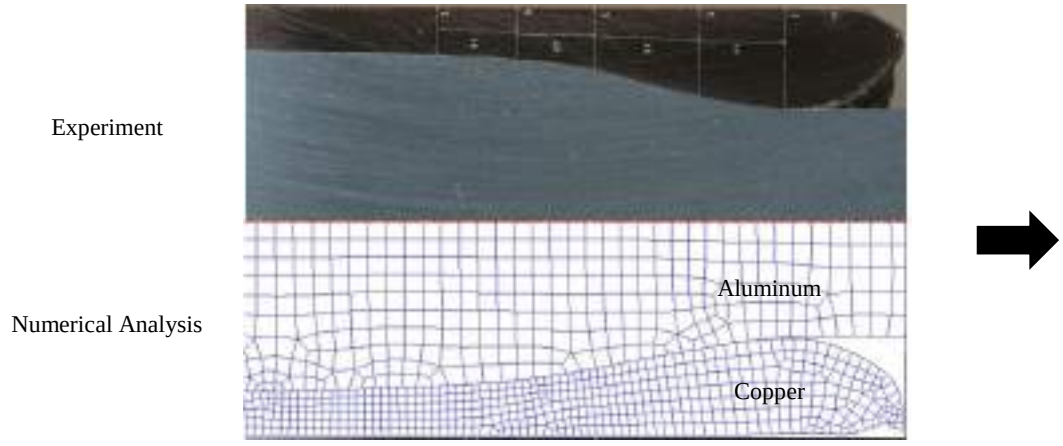

FIGURE 1. Experimental and numerical material flow of the cooper and aluminum alloys at the beginning of the extruded profile.