

Springback behaviour of Al6022 sheets: Evaluating the influence of the sitting time variable.

*R.J. Alves de Sousa¹, J.P.M. Correia², F.J.P. Simões¹, J.J. Gracio¹, R.P.R. Cardoso¹, J.A.F. Ferreira¹, J.-W. Yoon^{1,3}

¹ Department of Mechanical Engineering, Center for Mechanical Technology and Automation, University of Aveiro, 3810-193 Aveiro, Portugal

Email: {rsousa, jgracio, rcardoso, jaff, jyoon}@ua.pt
<http://www.ua.pt>

² IMFS - UMR 7507, Université Louis Pasteur, 2 rue Boussingault 67000 Strasbourg, France

³ Alcoa, Inc., Alcoa Technical Center, 100 Technical Drive, Alcoa Center, PA 15069-0001, USA

Key Words: *Springback, FEM, Solid-Shell, Enhanced Assumed Strain.*

ABSTRACT

The time-dependent springback behavior of the commercial 6022 aluminum alloy in temper aging (T4) is investigated taking into account that the sheets, prior to deformation process, are initially pre-strained and then submitted to various sitting times at room temperature. The unconstrained cylindrical bending test based on the NUMISHEET2002 proceedings (Yoon et al., 2002) is selected as validation benchmark. For finite element numerical simulations, the material behaviour is described based on the work of Correia et al. [1] and the geometry is modeled by solid-shell finite elements using the formulation of Alves de Sousa et al. [2]. The results of conducted experiments and numerical simulations are compared. It can be concluded about the good agreement between experiments and simulations attesting the effectiveness of the material model utilized to describe the time-dependent behaviour and the finite element used for the numerical simulations.

ACKNOWLEDGMENTS

The financial support given by the Portuguese FCT under grants PTDC/EME-TME/66435/2006 and SFRH/BPD/28313/06 (Pos-doc scholarship) is gratefully acknowledged.

REFERENCES

- [1] Correia, J.P.M., Simões, F., Gracio, J.J., Barlat F., Ahzi, S., “A simple hardening rule accounting for time-dependent behavior in Al-Mg-Si alloys”, *Materials Science Engineering A* (2007), in Press.
- [2] Alves de Sousa, R.J., Yoon, J.W., Cardoso, R.P.R., Fontes Valente, R.A., Grácio, J.J., “On the use of a reduced enhanced solid-shell (RESS) element for

sheet forming simulations”, *International Journal of Plasticity*, 23 (2007), pp. 490-515.