Modelling of Air Bending Using Neural Networks

M.R. Barbosa\textsuperscript{1,3}, Abel D. Santos\textsuperscript{2,3} and J. Bessa Pacheco\textsuperscript{3}

\textsuperscript{1} IDMEC–Pólo Feup, Faculty of Engineering, University of Porto
\textsuperscript{2} INEGI, Institute of Mech. Eng. and Ind. Management, University of Porto
\textsuperscript{3} FEUP– Faculty of Engineering, University of Porto
Rua Dr. Roberto Frias 400, 4200-465 Porto, Portugal
mbarbosa@fe.up.pt, abel@fe.up.pt, jpacheco@fe.up.pt, www.fe.up.pt

Key Words: Press Brake Bending, Air Bending, Neural Networks.

Abstract
The main problem considered in this work is the development of a method capable of establishing the required punch displacement to obtain a given forming angle, in Press Brake bending. Current solutions can be based on analytical methods derived from geometrical formulations and additional correction factors [1, 2]. These methods provide a quick solution but its applicability can be limited, especially if localized deformation is to be considered. Numerical simulation is increasingly been used and provides accurate results, accordingly to the models used [2]. However the time frame for a solution to be obtained can be a limiting factor. An alternative heuristic method, based on the use of artificial neural networks (NN), is presented in this work. The main justification for this approach lies on the inherent capability of NN to map nonlinear functions [3, 4] and generalization. The experiments were based on data obtained from numerical simulation of the forming process using different sheet metal thicknesses and tool geometries. The results obtained show that NN can provide a better approximation of the function relating the forming angle with the punch displacement.

REFERENCES
