

Table of Contents

Committees

Preface

I. Extrusion Benchmark

Extrusion Benchmark 2007 – Benchmark Experiments: Study on Material Flow Extrusion of a Flat Die

M. Schikorra, L. Donati, L. Tomesani and A.E. Tekkaya 1

II. Keynotes

Modifications of the Extrusion Process of Magnesium Alloys for Improved Mechanical Properties

S. Müller, K. Mueller and W. Reimers 9

Experimental Techniques to Characterize Large Plastic Deformations in Unlubricated Hot Aluminum Extrusion

H.S. Valberg 17

Innovative Methodologies for the Simulation of Static Recrystallisation during the Solution Soaking Process of Shape Extrusion

T. Sheppard and X. Velay 25

III. Material Flow and Constitutive Equations

Flow Front Tracking in ALE/Eulerian Formulation FEM Simulations of Aluminium Extrusion

A.J. Koopman, B. Geijselaers and J. Huétink 39

Numerical Optimization of Bearing Length in Composite Extrusion Processes

T. Kloppenborg, M. Schikorra, M. Schomäcker and A.E. Tekkaya 47

Recent Developments in the Manufacture of Complex Components by Influencing the Material Flow during Extrusion

N. Ben Khalifa, D. Becker, M. Schikorra and A.E. Tekkaya 55

FE Simulation of Extrusion to Produce a Thin-Walled Wide Profile through a Spreading Pocket Die

G. Fang, J. Zhou, J. Duczyk and X.K. Wu 63

Aluminum Rod Extrusion and Material Modeling

P.T. Moe, Y.A. Khan, H.S. Valberg and S. Støren 71

Hot Workability and Constitutive Equations of ZM21 Magnesium Alloy

M. El Mehtedi, L. Balloni, S. Spigarelli, E. Evangelista and G.I. Rosen 79

Constitutive Models for AZ31 Magnesium Alloys

C. Bruni, L. Donati, M. El Mehtedi and M. Simoncini 87

IV. Microstructure

Insights to Extrusion from Finite Element Modeling

H.J. McQueen and E. Evangelista 95

Study on Thixo-Extrusion of Semi-Solid Wrought Magnesium Alloy

H. Yan, M.F. Fu, X.C. Tao and H.W. Hu 103

Microstructure Prediction of Hot-Deformed Aluminium Alloys

L. Donati, J.S. Dzwonczyk, J. Zhou and L. Tomesani 107

Application of Adaptive Mesh and ALE Method in Simulation of Extrusion of Aluminum Alloys

T. Kayser, F. Parvizian, C. Hortig and B. Svendsen 117

V. Seam Welds and Process Optimization

Seam Welds Modeling and Mechanical Properties Prediction in the Extrusion of AA6082 Alloy	
L. Donati and L. Tomesani	125
A Laboratory Scale Equipment to Relieve Force and Pressure in Cold Extrusion of Lead Hollow Components	
L. Filice, F. Gagliardi and F. Micari	137
Analysis of Metal Flow through a Porthole Die to Produce a Rectangular Hollow Profile with Longitudinal Weld Seams	
G. Liu, J. Zhou, K. Huang and J. Duczczyk	145
Simulation-Based Design of Ram Speed Profile for Isothermal Extrusion	
L.X. Li, H. Zhang, J. Hu, J. Zhou and J. Duczczyk	153
Input Parameters Determination for Predicting Ram Speed and Billet Temperature for the First Billet	
M. Sabater, M.L. García-Romeu and J. de Ciurana	161

VI. Dies and Tools

Creep and Fatigue Damage in Hot Work Tools Steels during Copper and Aluminium Extrusion	
C. Sommitsch, T. Wlanis, T. Hatzenbichler and C. Redl	169
Microscopic Examination of the Fracture Surfaces of an H 13 Hot Extrusion Die due to Failure at the Initial Usage Stage	
D. Tseronis, I.F. Sideris, C. Medrea and I. Chicinaş	177
Simulation of Direct Extrusion Process and Optimal Design of Technological Parameters Using FEM and Artificial Neural Network	
D. Karayel	185
Numerical Simulation of Combined Forward-Backward Extrusion	
B. Grizelj, M. Plancak and B. Barisic	193
Mechanical Solutions for Hot Forward Extrusion under Plane Strain Conditions by upper Bound Method	
R. Domingo, A.M. Camacho, E.M. Rubio Alvir and M.A. Sebastián	201
Different Possibilities of Process Analysis in Cold Extrusion	
M. Plancak, B. Barisic and B. Grizelj	209
A New Low Friction Die Design for Equal Channel Angular Extrusion	
T. Canta, D. Frunză, E. Szilagyí and M. Lungu	215
Modeling Approach for Determination of Backward Extrusion Strain Energy on AlCu5PbBi	
B. Barisic, B. Grizelj and M. Plancak	221