*soft*EXTRUSION 2004

Workshop

National Science Foundation, NSF
Luso-American Development Foundation, FLAD

October 14-18,

Hotel D. João II, Alvor (Algarve) PORTUGAL

Programme & Abstracts

SCIENTIFIC PROGRAMME

Thursday October 14th P.M.	15:00-17:45	*Registration*
	Coffee	
	17:45-17:55	Welcome (***C. Buchanan***)
	17:55-18:05	Presentation of the programme (***J. A. Covas***)
	18:05-18:25	NSF Partnership for innovation (***C. Hill-Herndon***)
	18:25-19:00	Innovation and technology transfer (***C. Bernardo/J. Kennedy***)
	Dinner	
Friday October 15th A.M.	09:00-09:50	**State-of-the-art on extruder modeling** Fundamentals of polymer melt flow in single screw extruders - from analytical modeling to computer simulations (***Ica Manas Zloczower***, *Case Western Reserve University, USA*)
	09:50-10:40	Modeling and simulation of plasticating single screw extrusion, state of the art and remaining challenges (***C. Rauwendaal***, *Rauwendaal Extrusion Engineering, USA*)
	Coffee break	
	11:00-11:50	Modeling of flow and chemistry in twin screw extruders (***B. Vergnes***, *Cemef, France*)
	11:50-12:40	Modeling of polymer flow in forming tools (***J. M. Nóbrega***, *University of Minho, Portugal*)
	Lunch	
Friday October 15th P.M.	14:30-15:20	Quantitative analysis of mixing in extrusion processes (***Ica Manas Zloczower***, *Case Western Reserve University, USA*)
	15:20-16:10	Stress, velocity and temperature field measurements in polymer melt flows (***P. D. Coates***, *University of Bradford, UK*)
	Coffee break	
	16:30-17:20	Optimization-based design of extruders (***J. A. Covas***, *University of Minho, Portugal*)
	17:20-18:10	Recent developments in die design (***O. S. Carneiro***, *University of Minho, Portugal*)
	Dinner	
	21:00-22:30	**POSTER SESSION**

Saturday October 16th A.M.	09:00-09:50	Numerical methods for modeling fiber and film formation (***S.D. Phillips,*** *Massachusetts Institute of Technology, USA*)
	09:50-10:40	Real-time monitoring of microstructure during film processing (***A. Ogale,*** *Clemson University, USA*)
	Coffee break	
	11:00-11:50	Modeling flow-enhanced crystallization in fiber spinning and film blowing (***A. McHugh,*** *Lehigh University, USA)*
	11:50-12:40	Molecular simulation of polymer crystallization during processing (***R. Rutledge,*** *Massachusetts Institute of Technology, USA*)
	Lunch	
Monday October 18th A.M.		**Presentation of modeling packages**
	09:00-09:30	BEMflow (***C. Rauwendaal,*** *Rauwendaal Extrusion Engineering, USA*)
	09:30-10:00	Polyflow - Getting the right balance in extrusion (***T. Marchal,*** *Fluent Benelux, Belgium*)
	10:00-10:30	Presentation of Ludovic© software (***B. Vergnes,*** *Cemef, France*)
	Coffee break	
	10:50-11:40	ITXtrude, REE*flow* (***C. Rauwendaal,*** *Rauwendaal Extrusion Engineering, USA*)
	11:40-12:10	FISIM (***C. Cox,*** *Clemson University, USA*)
	12:10-12:40	Flow 2000 (***J. Perdikoulias,*** *COMPUPLAST, USA)*
	Lunch	
Monday October 18th P.M.		**Successful application of software to solve industrial problems**
	14:30-16:10	***C. Rauwendaal,*** *Rauwendaal Extrusion Engineering, USA* ***T. Marchal,*** *Fluent Benelux, Belgium* ***J. Perdikoulias,*** *COMPUPLAST, USA*
	Coffee break	
	16:30-18:00	Discussion Panel: the requirements for the optimal use of modelling packages *(software providers, lecturers, participants*)
	18:00-18:10	Closure (*C. Bernardo / J. Kennedy*
	Dinner	

Laboratorial Extrusion Line for the Production of Biaxially Oriented Tubular Film

O. S. Carneiro[1], J. A. Covas[1], H. J. Costa[2], M. E. Cunha[2], J. M. Neiva[2]

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Biorientation techniques are required to produce high performance films, i.e., films with demanding specifications concerning optical, mechanical and barrier properties. Industrial extrusion lines for the production of bioriented films require high investments, operate at high outputs and take long periods to reach steady state and begin production. Consequently, using this type of equipment to perform experimental studies to develop new products, or optimize the processing conditions, is economically prohibitive. Therefore, a laboratorial biorientation co-extrusion line was developed, by modifying and instrumenting one existing small machine for the production of conventional tubular film.

Scale down from the industrial to the laboratory scales was performed considering that the polymer should be submitted to similar thermo-mechanical histories (extrusion and stretching temperatures, primary tube and final bubble cooling rates, stretching and blow-up ratios). The new machine is capable of producing both conventional and bioriented tubular films. Although the equipment is still in its final stages of development, the mechanical characteristics of the films produced are close to those of their industrial counterparts.

The Influence of Geometrical and Operating Parameters on the Performance of the Calibrators

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A 3D numerical code, based on the finite volume method, able to model the cooling stage of an extrusion line is used for investigating the effect of various process and geometrical parameters onto the efficiency of calibration/cooling units. The code is able to tackle accurately various practical situations such as the presence of several individual cooling units, the presence of complex cooling channels layouts and the existence of a thermal resistance between the plastic profile and the cooling medium.

The effect of process and geometrical parameters on the cooling performance can be quite distinct. Often, when a reduction of the profile average temperature is imparted, lower temperature homogeneity is also obtained. The only exceptions are variations in the extrusion velocity and splitting the calibrator into several units.

User interface for the FISIM modeling software package

E. Duffy, A. Drewes, J. B. von Oehsen, C. Goodlett

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This poster describes the latest graphical user interface for the FISIM modeling package. The poster describes the plugin-architecture, polymer database interactions, integration of various modeling components, and visualization of modeling output.