

*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

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

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

Modeling of polymer flow in forming toolsextrusion die
(true exit)**J. M. Nóbrega⁽¹⁾, O. S. Carneiro⁽¹⁾, F. T. Pinho⁽²⁾, P. J. Oliveira⁽³⁾,***(1)IPC, Department of Polymer Engineering, Universidade do Minho,
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The major objective of any extrusion line is to produce the required profile at the highest rate and quality. These goals are usually conflicting, i.e., the increase in speed generally affects the product quality negatively, and vice-versa. Therefore, the improvement of the extrusion line performance demands a systematic approach and a careful study of the phenomena involved. The forming tools of a typical extrusion line, die and calibrator, are the extrusion line components that play the major role in the establishment of the product dimensions, morphology and properties and are also those that limit the maximum allowable production rate. Due to the large number of variables involved the design of these tools is generally tackled using experimental trial-and-error procedures, which slow the design process and have direct implications on the cost and performance of the products.

The development of powerful computational tools, able to model the different stages of profile production, give the designer a better insight of the phenomena involved and enable the improvement of the design procedures.

This work describes and discusses the important issues involved on the design of extrusion forming tools and illustrates how the currently available computational tools can be employed to aid the process.

Notes:

Do parametric investigation using different inlet temperature profiles