

# Troubleshooting Extrusion Seminar, Nov 14-15, 2012

## 1. Requirements for efficient troubleshooting

- Instrumentation
- Understanding the process
- Collection of historical data.
- Condition of the equipment
- Information on the feedstock

## 2. Tools for troubleshooting

- Temperature measurement devices
- Data acquisition systems
- Microscopy
- Thermochromic materials
- Thermal analysis
  - \* DTA and DSC
  - \* TGA
  - \* FTIR
  - \* TMA
  - \* Torque rheometer
  - \* Other thermal characterization

## 3. Systematic troubleshooting

- Upsets versus development problems
- Troubleshooting techniques
  - \* Brainstorming sessions
  - \* Flow charts
  - \* Fishbone diagrams
- Machine related problems
  - \* The drive system
  - \* The feed system
  - \* The heating and cooling system
  - \* Wear problems
- Screw binding
  - \* Mechanism of screw binding
  - \* Solving screw binding problems

## 4. Polymer degradation

- Thermal degradation
- Mechanical degradation
- Chemical degradation
- Effect temperature and residence time
- Melt temperatures in extrusion
- Residence times in extrusion
- Solving degradation problems

Location:

Sheraton Sand Key Resort  
Clearwater Beach, FL  
727-595-1611

## 5. Extrusion instabilities

- Frequency of instability
  - \* High frequency instabilities
  - \* Screw frequency instabilities
  - \* Low frequency instabilities
  - \* Very slow fluctuations
  - \* Random fluctuations
- Functional instabilities
  - \* Solids conveying problems
  - \* Melting related problems
  - \* Melt conveying problems
  - \* Mixing related instabilities
- Solving extrusion instabilities

## 6. Air entrapment

- Mechanism of air entrapment
- Avoiding air entrapment
- Removing entrapped air

## 7. Gel problems

- How and where gels can be produced
- Gels created in polymerization
- Gels created in the extrusion process
- How to measure gels
- Solving gel problems

## 8. Die flow problems

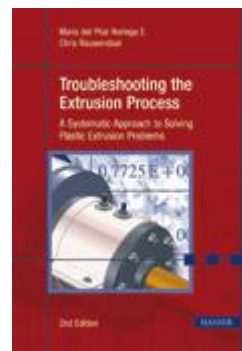
- Melt fracture
- Die lip buildup
- V- or W-patterns
- Specks and discoloration
- Die lines and weld lines
- Solving die flow problem

## 9. Various Extrusion Operations

- Troubleshooting blown film extrusion
- Troubleshooting sheet extrusion
- Troubleshooting tubing & pipe extrusion
- Troubleshooting profile extrusion

## 10. Case studies

Attendees are encouraged to bring actual extrusion problems to the seminar for a hands-on application of the material presented



The book "[Troubleshooting the Extrusion Process](#)" can be purchased from Hanser Publications [www.hanserpublications.com](http://www.hanserpublications.com) for a 20% discount. Code for discount will be in your confirmation of registration letter.

The course fees are:	# of attendees	Through Oct 12	After Oct 12	Total
Und & Opt Extrusion:		\$850.00	\$950.00	
Troubleshooting Extr:		\$850.00	\$950.00	
If taking 2 courses per person:		-\$100.00	-\$100.00	
3 <sup>rd</sup> attendee discount (5%):				
Total:				

A 5% discount will be given for the 3<sup>rd</sup> and up attendees from the same company. The course fees include lunch for each day and the handout material.

**Cancellations:** A refund, less \$100.00 cancellation fee, will be made if the registration is cancelled in writing by or on Oct 12, 2012. REE Inc. reserves the right to cancel one or more seminars or substitute instructors. Should this occur the attendees will be notified. We do not rake any responsibility for penalty fees or any other cost that may be incurred due to cancellation. We recommend that you book travel with refundable fares. Registrants who fail to attend are liable for the fees of the course registered for.

**Fax registration to:** 530-269-1084 or register on-line at [www.rauwendaal.com](http://www.rauwendaal.com)

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Billing Address:			
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Country:		Zip:	
Phone:			
Fax:			
E-Mail:			
Additional Attendee Name:			
Additional Attendee Name:			
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PO# or CC#			Exp.: <input type="text"/>
			CVC: <input type="text"/>



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