

HISTORY OF THE INTENSIVE SHORT COURSE

Versions of the intensive short course on Polymer Rheology and Processing have been presented by Prof. J. Vlachopoulos in Canada, Greece, Sweden, Venezuela, Mexico, USA, Finland, Czechoslovakia, Belgium, Brazil, Australia, Japan, Germany, Italy, Luxembourg, Spain, Netherlands and New Zealand. Over 2000 polymer professionals have attended the lectures and provided their suggestions for improvement of the course content and the presentation style. The present international intensive short course will cover fundamentals, recent developments and will show how to use rheology to solve practical problems in the polymer industry.

LECTURER

Dr. JOHN VLACHOPOULOS started teaching at McMaster University after receiving his doctorate from Washington University, St. Louis, Mo., USA. He served as department Chairman (1985-88) and he is currently Professor Emeritus of Chemical Engineering and Past Director of the Centre for Advanced Polymer Processing and Design (CAPPA-D). He was on sabbatical research leave at I.K.T. Stuttgart, Germany (1975) and CEMEF, Ecole des Mines de Paris, Sophia Antipolis, France (1981-82, 1988-89). He is the author of more than 300 publications on polymer processing, rheology and computer aided methods. Over the years he has served as consultant to several hundred corporations. With his coworkers, he has developed the commercially available POLYCAD®, SPIRALCAD, CALENDERCAD, FLATCAD, PROFILECAD, EXTRUCAD (renamed NEXTRUCAD), LAYERCAD, T-FORMCAD, B-FILMCAD, RHEO-MWD, XTRU-XPART and CALCUTRUDE software packages, which have been licensed to more than 500 corporations in 30 countries through the company that he founded, POLYDYNAMICS, INC. He has lectured in 43 countries around the world in seven languages (mostly in English, but also in French, German, Spanish, Greek, a few hours in Italian and two hours in Portuguese). He received from the Society of Plastics Engineers (SPE) the 2001 Education Award at ANTEC in Dallas, and from the Extrusion Division of SPE the 2004 Distinguished Achievement Award at ANTEC in Chicago and the 2014 Bruce Maddock Award at ANTEC in Las Vegas. He is also the recipient of the Stanley G. Mason Award of the Canadian Society of Rheology (2007) and Fellow of the Canadian Academy of Engineering (FCAE). He was the President of the Polymer Processing Society (PPS) 2005-2007, and member of several other professional associations. Prof. Vlachopoulos' research work and expertise includes applied rheology, computer simulation of several processes, extrusion instabilities and defects, calendaring, die design, coextrusion, injection molding, thermoforming, rotational molding, powder particle coalescence, film blowing, plastic wood composites (WPC) extrusion, rheology of bioplastics and nanocomposites.

The software packages have been licensed to several Fortune 500 corporations in the USA and many other large, medium and small companies in 30 countries around the world.

www.polydynamics.com

GENERAL INFORMATION

REGISTRATION

- Total fee: US \$1130.00 includes registration, lecture notes, the CALCUTRUDE LITE software, coffee and refreshments and two lunches and 13% Harmonized Sales Tax (US \$ 130.00)
- The number of participants is very limited and it is therefore recommended that you register as early as possible.
- Companies may *substitute* a registered participant without notification, however, an advance notice would be greatly appreciated.

CANCELLATION

An administration fee of US \$150.00 will be charged for cancellations received two weeks before the course starts. After this date there will be no refunding of registration fees but full credit can be given for another person from the same company or full credit for the next international course. SUBSTITUTIONS MAY BE MADE AT ANY TIME.

ACCOMMODATION AND VENUE

The lectures will be held at the WATERFRONT HOTEL, 2020 Lakeshore Road, Burlington, Ontario L7R 4G8. Phone 1-905-6815400 Fax 1-905-6815410, EMAIL for reservations: frontdesk@waterfronthotelburlington.com. WEBSITE: www.waterfronthotelburlington.com. The hotel is located on the shores of Lake Ontario with panoramic views. Facilities include an indoor pool, a whirlpool and a fitness centre. The hotel offers complimentary daily breakfast buffet for all overnight guests and free parking. Participants wishing to stay overnight must make their own reservations, directly with the hotel. Corporate room rates currently range from CAD \$ 151.05+13% tax to CAD \$ 179.55+13% tax (per room/per night). At printing time the exchange rate was approximately CAD \$1=US \$0.75

HOW TO GET THERE

The WATERFRONT HOTEL is a lakefront property located at 2020 Lakeshore Road at the foot of Brant Street in Burlington, Ontario, Canada approximately 50 KM west of (Pearson) Toronto International Airport (YYZ). If you are driving from Toronto along QEW/403 take the Brant Street exit south. If you are driving from Buffalo N.Y. (approximately 100 KM) take the North Shore Blvd/Eastport Drive exit, turn right on North Shore and the hotel will be on the right about 1km away.

PREVIOUS COMPANY REGISTRATIONS from CANADA and USA (partial listing)

CANADA: DUPONT CANADA, DOW CANADA, ORTECH, CANADIAN GENERAL TOWER, U. TORONTO, HUSKY I.M. POLYSAR, XEROX RESEARCH, WEDTECH, TREMCO, SCHLEGEL CANADA, HERCULES CANADA, MACRO ENGINEERING, MOBIL, PLASTMO, WINPAK, CRYOVAC, TWINPAK, AMERICAN BILTRITE, BAYFORM, INTERTAPE, NOVA CHEMICALS, SHAW INDUSTRIES, CO-EX-TEC, GEOPLAST, DECOMA, CRILA, AT PLASTICS, POLY EXPERT INC., ASTRA PHARMA, POLY PLUS, SONIPLASTICS, BENLAN, BTR, ENGINEERED PROFILES, IND. REHAU, RTICA, SPRUNG.BRETT, SIGNATURE PLASTICS, ALCAN INTERNATIONAL, ATLANTIC PACKAGING PRODUCTS, ENHANCE PACKAGING, EXXON MOBIL, IPEX, PLASTEX EXTRUDERS, ASTRAZENECA, COOPER STANDARD, PMC GILM, PETROMONT, T.J. MANUFACTURING, LAVERGE GROUP, AIR LIQUIDE, IMPERIAL OIL, ATHENA AUTOMATION

USA: HOECHST CELANESE, AMERICAN NATIONAL CAN, E.I. DUPONT, 3M COMPANY, AMTX, NABISCO, GENERAL ELECTRIC, B.F. GOODRICH, DOW CHEMICAL, EXXON, QUANTUM, USI, UNION CARBIDE, MOBIL CHEMICAL, EASTMAN KODAK, HERCULES, WELDING ENGINEERS, BAYCHEM, EASTMAN CHEMICAL, ARISTECH, VISKASE, LINEAR FILMS, EGAN DAVIS STANDARD, CONAIR JETRO, GEON, VELCRO, RJF INTNTL, JAMES RIVER CORP, ADEPT, ALLIED SIGNAL, HOLD INDUSTRIES, M.A. HANNA, MASLAND INDUSTRIES, MEDTRONIC, ORAL-8, PRESTO PRODUCTS, UNIROYAL, LEAR CORP, ALLIED DIES, TENNECO, FERRO, DYNEON, WITT PLASTICS, ESSEX GROUP, DELPHI AUTOMOTIVE, EXTRUSION DIES, SOLUTIA, DUPONT DOW ELASTOMERS, ATLANTECH INTERN., LIFETIME PLASTICS, KANSAS STATE U., TREDEGAR, OWENS-ILLINOIS, AIRTECH INTERN", N.S. WARFARE CENTER, GEMCO, EOUISTAR, GENERAL CABLE, INTERTAPE POLYMER GROUP, ATOFINA PETROCHEMICALS, BOSTON RETAIL PRODUCTS, CAPPLUGS LLC, CRAFTED PLASTICS, PRINSCO, LYONDELL CHEMICAL, TYCO HEALTHCARE, R.I.T., UNITED TECHNOLOGIES

Participants from other countries:

AUSTRALIA, AUSTRIA, BRAZIL, BELGIUM, CZECHOSLOVAKIA, CZECH REPUBLIC, DENMARK, FINLAND, FRANCE, GERMANY, GREECE, IRELAND, ISRAEL, ITALY, JAPAN, MALAYSIA, MEXICO, NEW ZEALAND, NORWAY, PORTUGAL, QATAR, ROMANIA, SAUDI ARABIA, SLOVAKIA, SLOVENIA, SPAIN, SWEDEN, SWITZERLAND, TURKEY, U.K., VENEZUELA

77th International Intensive Short Course on POLYMER RHEOLOGY AND EXTRUSION

A Problem Solving Approach

OCTOBER 26-27, 2017

Burlington
(near TORONTO)
CANADA

LECTURER

JOHN VLACHOPOULOS
POLYDYNAMICS INC.

**REGISTRATION FORM
RHEOLOGY AND EXTRUSION
OCTOBER 26-27, 2017**

(Please photocopy for additional registrations)

Name _____

Company Name & Mailing Address:

Telephone _____

Email _____

Highest Degree Earned _____

(B.Sc., M.Sc., Ph.D. and year earned)

Specialty _____

(Chem., Chem. Eng, Mech. Eng etc.)

Number of years experience
in polymer processing _____

Fees per person: US \$1000.00 plus 13% H.S.T. US\$ 130.00
TOTAL: US \$ 1130.00

Cheque enclosed VISA

Send me an invoice MasterCard

CARD NUMBER _____

EXPIRATION DATE _____

CARDHOLDER NAME _____

SIGNATURE _____

Send by Post, Fax or Email as attachment to:

POLYDYNAMICS, INC..

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Phone: +1-905-592-3507

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For electronic Bank Transfers, the account number etc.
will be included in the invoice.

www.polydynamics.com

**77th International
Intensive Short Course
on
POLYMER RHEOLOGY
and
EXTRUSION**

OCTOBER 26-27, 2017

Burlington (near Toronto), CANADA

WHO SHOULD ATTEND

Engineers, chemists, physicists, and managerial personnel involved with plastics extrusion, applied rheology, blow molding, mixing and compounding, reactive processing, production of synthetic polymers, recycling and process equipment design and manufacturing will find this course beneficial. Engineers will gain an increased understanding of rheological behaviour including the role of molecular structure and will learn some of the unique engineering problems associated with polymer extrusion. Chemists will learn about fluid flow and heat transfer involving polymers and troubleshooting of extrusion equipment. Managers will obtain an overview of the technical problems associated with plastics extrusion.

Everyone will benefit from learning problem solving techniques based on rheological characterization and polymer flow considerations.

**FOR INFORMATION ABOUT
POLYDYNAMICS, INC.
VISIT OUR SITE ON THE INTERNET
www.polydynamics.com**

PROGRAM OUTLINE

THURSDAY, OCTOBER 26, 2017

9:00-12:30 **Introduction to Rheology**

Brief introduction to polymer basics. Unusual rheological phenomena exhibited by polymer solutions and melts. The importance of rheology in polymer processing. Viscosity, melt flow index and melt strength, and their relation to molecular structure. The role of temperature, pressure, additives and fillers.

12:30-14:00 **Lunch**

14:00-17:00 **Advanced Rheological Concepts and Applications**

Shear and normal stresses. Viscoelasticity. Stress relaxation. Extensional viscosity. G' and G'' measurement and significance in polymer characterization. The role of rheology in mixing and blending. Rheological modifications by blending certain polymers, such as LLDPE and LDPE. Determination of MWD from rheological measurements. Predicting processability from rheology. Viscosity of suspensions. Rheology of wood plastic composites (WPC). Rheology of some nanocomposites. Problem solving using rheology.

FRIDAY, OCTOBER 27, 2017

9:00-12:30 **Melt Flow Through Dies, Extrudate Swell,**

Die Lip Build-up, Sharkskin and Melt Fracture

Unidirectional and multidimensional flows. Pressure drop and frictional heating (viscous dissipation). The mechanisms responsible for extrudate swell. Die lip build-up (drool) causes and remedies. Relation to molecular structure. Causes for the onset of sharkskin and gross melt fracture. The effects of adhesion and slip. The role of additives and processing aids. Dies for extrusion and coextrusion (flat film, blown film, profile, pipe and wire/cable).

12:30 - 14:00 **Lunch**

14:00 - 17:00 **Screw Extrusion and Troubleshooting**

Principles of solids conveying, melting, mixing and melt pumping in single screw extrusion. Simple formulas for calculation of Throughput, Power and Torque. Smooth and grooved barrels. Screw design considerations and review of modern designs. Conventional versus barrier screws. Screws with mixing elements. Surging, gels, screw and barrel wear, the role of moisture, interfacial instabilities, weldlines, flow lines, and thickness non-uniformities. Systematic fault diagnosis and troubleshooting.

LECTURE NOTES AND SOFTWARE

• Each participant will receive a copy of the annually updated book of lecture notes on POLYMER RHEOLOGY AND EXTRUSION. This fact-filled book includes copies of the presentation slides, theory, detailed derivations of several important equations and numerous worked out problems. It is highly recommended for follow-up reading either as a quick information sourcebook or for in-depth study. It is easy to follow with the mathematical level kept to a minimum. Several key references are also given for persons wishing to continue upgrading their knowledge and understanding. It shows how to do simple calculations of shear rate, shear stress, pressure drop, temperature rise due to viscous dissipation, Rabinowitsch and Bagley corrections in capillary viscometry, rheology of composites, wall slip velocity, flow throughput in extruders and much more. Whether you want practical problem solving information and troubleshooting tips or you want to understand the importance of recent developments, you will find this book indispensable.

• Each participant will also receive a copy of the CALCUTRUDE LITE software package which enables quick calculations of important polymer flow quantities, such as pressures, shear rates, shear stresses etc. in simple flow geometries. In the opinion of the lecturer Prof John Vlachopoulos, the best way to learn rheology is by doing calculations. But, calculations can be very tedious. CALCUTRUDE LITE takes the tedium out of the calculation process.

For course registration or other questions contact:

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