

July
2009

PEPT-Flow Newsletter

Project Consortium

SMEs

CESAP	http://www.cesap.com
COLOREX	http://www.colorex.nl
EXTRICOM	http://www.extricom.de
EXTRUDER EXPERTS	http://www.extruder-experts.com
GENESIS	http://www.genesisps.co.uk
MAPEA	http://www.mapea.com
POLIMER TEKNIK	http://www.polimerteknik.com
RCT	http://www.rctsr.com
ROSSETER	http://www.e-nanoscience.com
SCC	http://www.sccconsultants.com
TREFFERT	http://www.treffert.org

Research Organisations

EINDHOVEN UNIVERSITY OF TECHNOLOGY	http://www.mate.tue.nl
FRAUNHOFER-ICT	http://www.ict.fraunhofer.de
SMITHERS RAPRA	http://www.rapra.net
UNIVERSITY OF BIRMINGHAM	http://www.bham.ac.uk

Associations

ASSOCOMAPLAST	http://www.assocomplast.org
CCIAA	http://www.mi.camcom.it
BPF	http://www.bpf.co.uk
GKV	http://www.gkv.de
PAGEV	http://www.pagev.org.tr

For more information on the PEPT-Flow project, please visit our website:

<http://www.peptflow.com>



The PEPT-Flow project is supported by funding under the Sixth Framework Programme of the European Union. Contract N° COLL-CT-2006-030191.



About the project...

The PEPT-Flow project aims to apply the flow analysis technique of positron emission particle tracking (PEPT) for investigation of polymer flow and mixing behaviour within industrial twin-screw processes, determining the influence of machine design, process operation and polymer system.

The results generated will be used to establish knowledge based machine design criteria and operation guidelines, and the further develop both new and existing commercial simulation and modeling software.

First PEPT Studies of Polymer Flow in Twin Screw Extrusion

The PEPT-Flow consortium can announce that the first PEPT studies of polymer melt flow in a twin screw extruder have been carried out.

The successes include:

- Real-time particle trajectories recorded as tracer particle moves with polymer through the extruder.
- Visibility window 90mm (equivalent to over 3 screw diameters).
- Data frequency up to 200Hz (equivalent to 9° of shaft rotation at 300rpm).
- Reasonable 'survival rate' of tracer particles. Several passes achieved by each tracer particle.

this issue

First PEPT Studies of Polymer Flow in Twin Screw Extrusion **P.1**

First PEPT Studies, continued... **P.2**

Real-time Flow Analysis Video **P.3**

- The particle separation device installed after the pelletiser, designed and built by Fraunhofer-ICT Institute in Germany. A Geiger counter detects the particle in the strand as it enters the pelletiser and, after a suitable delay, activates the separation flap to divert the stream of pellets to a collection box from which the active pellet can be straightforwardly recovered using the Geiger counter.

More details inside...



First PEPT Studies of Polymer Flow in Twin Screw Extrusion, continued...



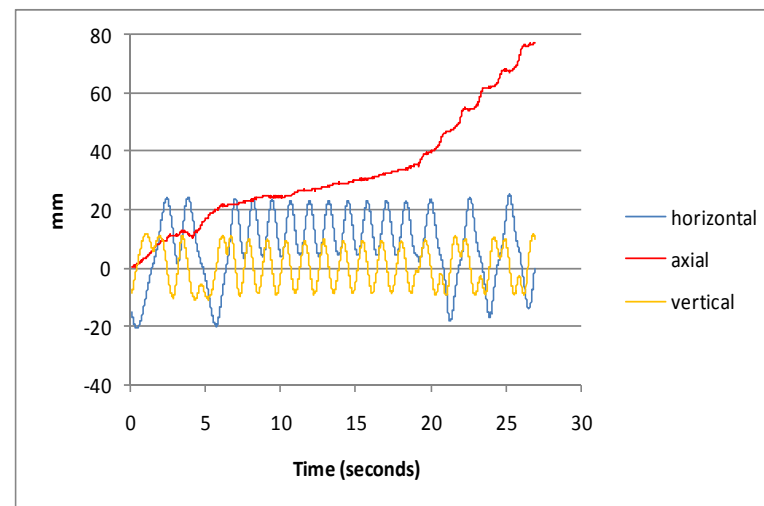
The data collected can be analysed and the following items calculated:

Work will continue in order to optimise and evaluate the data output from the scanning cameras.

The figures below give an indication of the quality and type of data that has been generated from one of the runs.

Example Trajectory:

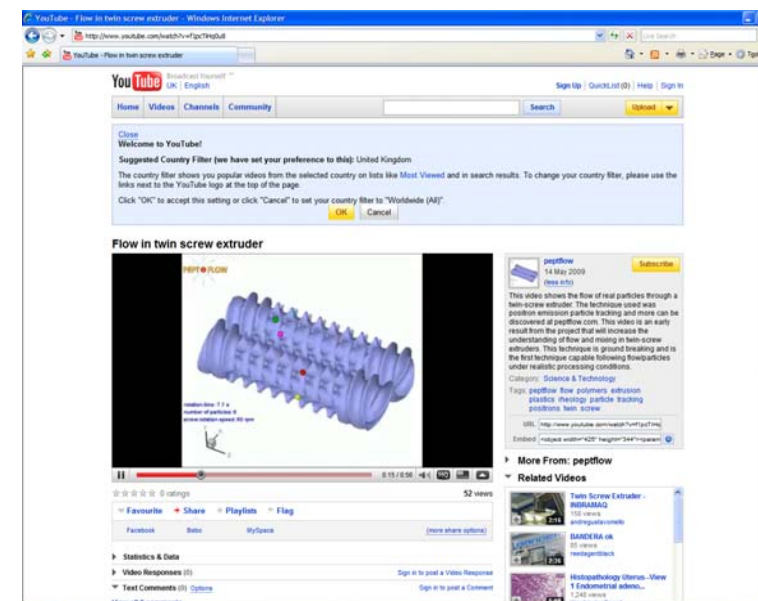
This figure shows the horizontal, axial and vertical position of the particle as it moves through the extruder window. In this trajectory example, the particle spends a considerable period on one side of the barrel and the axial velocity, while steady, is much slower during this period.



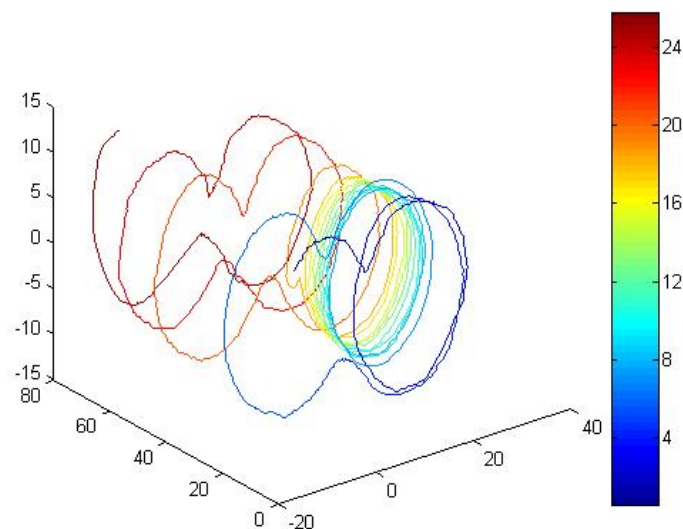
- Average residence time and residence time distribution.
- Velocity and acceleration profiles.
- Other ratios used to give an indication of mixing effect.

Real-time Flow Analysis Video

PEPT-Flow partners have produced a video illustrating the flow of real particles through a twin screw extruder!



The video is available to view on YouTube.com - <http://www.youtube.com/watch?v=f1pcTiHq0u8>



A 3D plot of the particle moving through the extruder. The trajectory is colour coded according to the time spent in the field of view.

PEPT-Flow Website

You can find a whole range of information about the PEPT-Flow project by visiting the project website:

<http://www.peptflow.com>

Here you can access the following information:

- Overview of the project.
- Organisations involved.
- Downloads
- Project news and updates.

