

August  
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# PEPT-Flow Newsletter

## Project Consortium

### SMEs

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

### Research Organisations

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

### Associations

ASSOCOMAPLAST	<a href="http://www.assocomplast.org">http://www.assocomplast.org</a>
CCIAA	<a href="http://www.mi.camcom.it">http://www.mi.camcom.it</a>
BPF	<a href="http://www.bpf.co.uk">http://www.bpf.co.uk</a>
GKV	<a href="http://www.gkv.de">http://www.gkv.de</a>
PAGEV	<a href="http://www.pagev.org.tr">http://www.pagev.org.tr</a>

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

<http://www.peptflow.com>



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## 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 to further develop both new and existing commercial simulation and modeling software.

## this issue

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## Development of a software mapping technique to quantify mixing in the twin screw extruder

The PEPT-Flow project is now entering the final six months of the project and developments are coming thick and fast.

In this newsletter we will discuss the size of the task to interpret the data, the advancements being made in flow predictive software and the use of industrial case studies.

- The PEPT technique generates enormous quantities of data. The technique generates an X,Y,Z location for the particle every few milliseconds but behind every point lies thousands of pairings of gamma photons.
- The camera software handles this initial pairing of photons and locates the particle. For every screw configuration, screw speed or feed rate we will run up to 30 or more trials, with each trial collecting hundreds or thousands of individual particle locations with time.
- The project has been developing spreadsheets to handle this data so that we can calculate flow characteristics such as residence time and distance traveled for the individual screw elements. All the trials for an individual screw configuration and run conditions will be combined to give distribution profiles for individual elements. Assuming that we run 40 to 50 different trials, this gives over 1 million location results to handle.



# Software

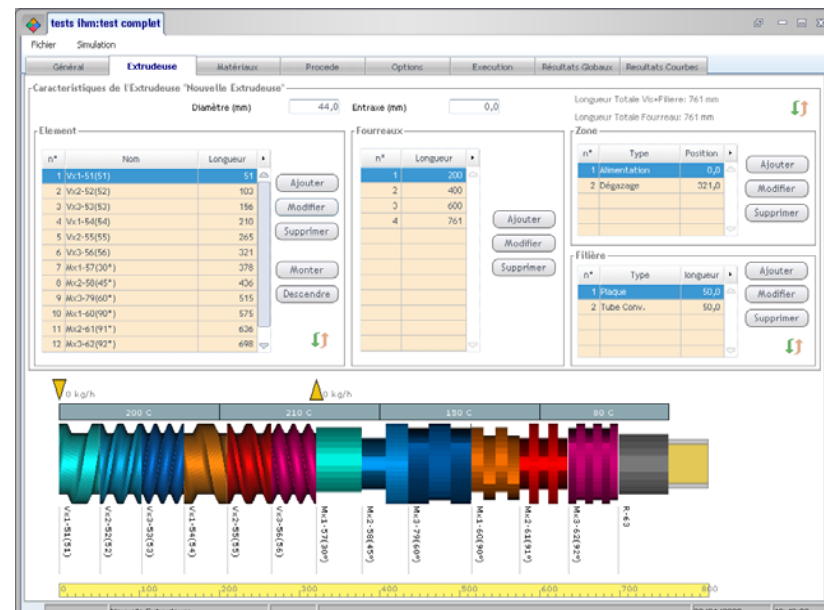
One of the uses for the data generated will be to validate the software being developed during the project.

The Technical University of Eindhoven has been further developing its mapping method technique to quantify mixing in the twin screw extruder. This has been a big step from the simpler mixing devices successfully modeled in the past.

There are two major challenges with extending the technique to the twin screw extruder:

- The screws are modular and can be constructed from a range of elements in different combinations.
- Even when the screw element order has been assigned, the geometry and flow path varies with the turn of the screws.

The models have now been developed and are currently being validated with data from the PEPT experiments. The models are also being inserted into the Ludovic extrusion software from SCC.



Example of the Ludovic interface.

This again has not been without its challenges, trying to seamlessly add one software package into another. The result however, will enhance the Ludovic and provide a fast modeling system that will give a measure of mixing as well as the standard temperature, pressure and residence time information. It is expected that the demo version will be available from the end of September.

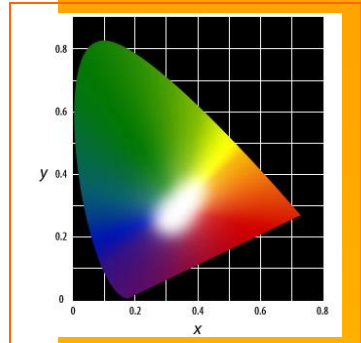
# PEPT-Flow Case Studies

The key to the success of any project is its applicability to the real world.

- In PEPT-Flow we are undertaking eight industrially based case studies.
- The case studies will use the results generated by PEPT-Flow or the new Ludovic software to improve the screw profiles currently used.
- Some case studies will be studied in more detail on the PEPT extruder to try to understand the differences observed. The benefits anticipated could be better mixing, lower energy, higher output or reduced scrap.
- The case studies, run with our industrial partners, will cover areas such as:

- Pigment dispersion
- Recycling
- Nano-additives
- Flame retardants
- Wear in extruders
- Conductive materials
- Industrial scale-up

*More details of the case studies will feature in September's issue of the PEPT-Flow newsletter.*



## Upcoming Event! Free PEPT-Flow Workshop

9<sup>th</sup> December 2009, Frankfurt

Would you like to find out more about the work of the PEPT-Flow project directly from the partners involved?

The PEPT-Flow workshop will take place on **9<sup>th</sup> December 2009** at **Holiday Inn Frankfurt City-South** and anybody is welcome to attend – free of charge!

The workshop will feature presentations by the project partners on the results of the project and how these can be used to benefit industry.

In order to view the Programme and download a Registration Form, please visit:

[www.peptflow.com](http://www.peptflow.com)