Supervisor evaluation of the Ing. Jan Musil and his Ph.D. thesis

Student evaluation: Jan Musil began his Ph.D. study in September 2008 at Polymer Centre, Faculty of Technology, Tomas Bata University in Zlin. During his Ph.D. study, he was participating on 6 different applied rheology oriented research projects with specific attention to 'Analysis of extrusion post-die instabilities for advanced viscoelastic macromolecular substances' project (MSMT ME08090) dealing with die drool phenomenon. In this area, he was working independently, creatively, precisely and actively. His capability to precisely summarize and graphically visualize experimental equipments, methodologies and obtained results is excellent. During his Ph.D. study, he spent 8 months at Interdisciplinary Research Centre in Polymer Science & Technology, University of Bradford, England, United Kingdom at the Prof. Phil Coates research group in order to perform visualization study of polymer melt instabilities by using birefringence technique. He was able to learn and apply in proper way a number of different rheological experimental techniques to reach all the aims of the Ph.D. thesis. During his study, he has already published three research papers in the following impact factor research journals:

- *Polymer Testing*: 2010 IF = 2.016, ISI Journal Citation Reports © Ranking in 2010: 2/32 (Materials science, Characterization & Testing); 22/79 (Polymer Science)
- *Chemical Engineering Science*: 2010 IF = 2.379, ISI Journal Citation Reports © Ranking in 2010: 22/135 (Engineering, Chemical)

Jan Musil has also showed ability to successfully present and defense his scientific work at different international conferences such as Novel Trends in Rheology and WSEAS international conference on FLUIDS before number of international experts from the same research field. It also should be mentioned that till this date (June 26, 2012), the number of Jan Musil's publication records in the Scopus database is 11 (author ID: 21935123700).

It can be stated that Jan Musil has demonstrated high independency, creativity and sufficient knowledge fulfilling the studied 'Chemistry and Materials Technology ' Ph.D. study program.

Evaluation of the Jan Musil's Ph.D. thesis entitled as 'Investigation of Die Drool Phenomenon during HDPE Melt Extrusion': The Ph.D. thesis is focused on the understanding the effect of processing conditions, polymer melt rheology, molecular characteristics and die design on die drool phenomenon by using newly proposed experimental set-up, methodology and digital image analysis technique. The following findings can be considered as the breakthrough in filed. First, the die drool phenomenon occurring during extrusion of HDPE polymers can be considered as the result of the flow induced molecular weight fractionation which is initiated under the slip-stick flow instability regime, second, an increase in HDPE chain branching, and a decrease in its elasticity reduces die drool phenomenon and finally, only those die exit modifications which promotes continuous release of low molecular weight species from the die exit region by the moving extrudate suppressing die drool phenomenon for HDPE. The Ph.D. thesis consists of two already published papers in prestigious Chemical Engineering Science journal and two manuscripts submitted for the publication in the same journal (where one of them, Paper 3, has recently been accepted for the publication). This demonstrates high quality, novelty and originality of the research, which has been done by the Jan Musil in the studied research filed.

Therefore, it is my pleasure to fully recommend Jan Musil and his Ph.D. thesis for the defense.

In Zlin, 26.6.2012

prof. Ing. Martin Zatloukal, Ph.D.