



**Ivane Javakhishvili Tbilisi  
State University**



**Batumi Shota Rustaveli  
State University**

**6<sup>th</sup> International Symposium on  
Polymers and Advanced Materials**

**ICSP & AM 6**

გათავილ  
შოთა რუსთაველის სახელმწიფო  
უნივერსიტეტი



BATUMI  
SHOTA RUSTAVELI  
UNIVERSITY

**17-20 July**

**Batumi 2019**





თსუ 100  
1918-2018

## Welcome

Dear Colleagues,

On behalf of the Organizing Committee I wish to extend cordial welcome to all participants of the 5th International Caucasian Symposium on Polymers and Advanced Materials. 12 years ago, 2007, this symposium took place in Tbilisi, Georgia. We are delighted to host you in this year country Georgia, in very beautiful town Batumi. This year is significant for Ivane Javakhishvili Tbilisi State University since we celebrated the 100th anniversary of the foundation. This year, Professor M. Abadie was awarded the title of honorary doctor of Ivane Javakhishvili Tbilisi State University. These meetings led to the fact that we cooperate with Polish Universities in the Erasmus+ program. We hope that this symposium will in the future lead to the strengthening of close scientific relations.

The purpose of the conference is to encourage scientists working in polymer chemistry and advanced materials to present their investigations dedicated to problems and discoveries in above mentioned fields. Also "ICSP&AM 6" will help to introduce effectively innovative scientific researches of Georgian, Caucasian and neighboring scientific teams, which are less known for world scientific society. We hope that this year meeting, gathering almost 120 participants, shall provide a good platform for academic and industrial scientists to discuss recent advances in the area of polymers and advanced materials.

Professor Omar Mukbaniani



Organizing committee: Chair – Prof. Omar Mukbaniani

Co. Chair – Dr. Vazha Tskhovrebashvili

Co. Chair – Prof. Marc J.M. Abadie

Secretariat of conference:

Tamara Tatrishvili - Executive Secretary of Organizing committee, PhD, TSU

Marina Gakhutishvili -PhD, TSU

Lali Kemkhadze – PhD, TSU

Tamara Gokadze – TSU MA student

## Abstract

### A NEW SOLUTION OF THE ROTARY BARREL SEGMENT OF A SINGLE-SCREW EXTRUDER

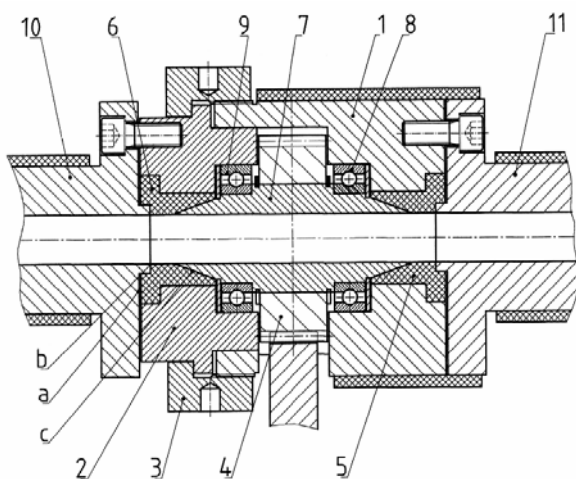
**J. W. Sikora<sup>1</sup>, J. Varga<sup>2</sup>**

<sup>1</sup>Faculty of Mechanical Engineering, Lublin University of Technology, 36 Nadbystrzycka Str., 20-618 Lublin, Poland

<sup>2</sup>Faculty of Mechanical Engineering, Technical University of Kosice, Masiarska 74, 040 01 Kosice, Slovakia

E-mail: janusz.sikora@pollub.pl

Until now, the general construction of the plasticizing system has assumed placing the screw in a fixed barrel. However, at the end of the 20th century, a completely new concept of the design of an extruder was put forward, which had never been used before in the industry or in experimental machines. This new solution consisted in kinematic activation of the barrel itself, which meant it could rotate in the direction identical or opposite to the direction of screw rotation. So far, several design solutions concerning kinematic activation of the barrel of the plasticizing system have been proposed. The idea of this solution is presented in the picture.



*Fig. Schematic of a plasticizing system equipped with an active rotary segment: 1,2 - parts of the housing, 3 - special nut, 4 - gear drive, 5,6 - sealing bushes, 7 - rotary sleeve, 8,9 - bearings, 10,11 - stationary components of the barrel; a, b, c - areas of contact of the housing and sealing bushes with the fixed part of the barrel*

As a result of the implementation of the international NEWEX project within H2020-MSCA-RISE several new construction concepts were developed for which CAD models were created using the SolidWorks programme. All CAD models were made in such a way that they could constitute the modification of W-25 single-screw extruder, and all of them present a classic or modified screw placed in the barrel plasticizing system, therefore screw diameter  $D$  equals 25 mm. The joint length of rotational barrel elements equals  $4D$ . The main reason for using such constructional solutions is the intensification of the mixing process and the increase of homogenization of the processed polymer, filled polymer or a composite. The strength and thermal calculations of selected models were carried out and computer simulations were performed concerning the optimization of the adopted solutions.

The most important aim is to maximize the mixing, quantified here by WATS, with little changes in the remaining criteria, *i.e.*, output, melt temperature at die exit ( $T_{melt}$ ), mechanical power consumption ( $Power$ ), length of the screw required for melting ( $L_{melting}$ ) and viscous dissipation.

#### Acknowledgment.



The project leading to this application has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 734205”.

#### References:

1. Królikowski Bogusław, Frąszczak Zbigniew and others: Plasticizing system, preferably of the screw extruding press. Polish Patent No. 217558 (2008).