Report on sorting and monitoring: methodology and results

Deliverable 5.4
WP5. Demo Case C. Creation of an effective after-use plastic economy by means of multisectorial cascaded approaching, adapting sorting technologies and in-line monitoring system

CIRC-PACK - Towards circular economy in the plastic packaging value chain

Grant agreement: 730423
From May 2017 to April 2020

Prepared by: AITIIP

Date: 31/10/2019

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 730423.

PUBLISHABLE SUMMARY

In the work published in this report, are summarized the activities performed to establish a methodology that increases the recycling material quality and ensures its feasibility for specific applications.

To this end, a state of the art of the different technologies currently used in the recycling processes have been described.

Afterwards, the possibility of applying the industry 4.0 principles in the compounding sector has been addressed, improving the current technology used. The update of compounding technology to the industry 4.0 requires certain changes.

The needed changes for the application of the industry 4.0 principles into compounding sector, requires extruder sensorization. All the different data gathered and recorded by the utilization of the different sensors and mechanisms will allow their in depth analysis.

Once the data obtained during the extrusion process has been analysed and compared with the mechanical and rheological properties of the extruded material, the objective is to replicate the material and all its properties by means of the control of the extrusion parameters. Also, it is possible to control the properties of the extruded material by changing the percentage of different materials introduced to the extruder.

This will allow the recycling process to be more independent of the feed material's sorting process and to be able to generate materials with different features by just changing the extrusion parameters.

Finally, during the development of the methodology a database for each of the plastic matrixes will be generated, allowing the system to anticipate and modify the precise required parameters to generate a recycled material that fulfil the requirements of a specific application. Once the database has been obtained, the protocols for their exploitation and utilization will allow to increase the amount and quality of the recycled material.

Those extrusions in which the systems control the extruder will not only use the data on the database but will also feed it with new data. Thus a first step in the development of an essential data base has been taken. It will promote collaboration in future projects for the development and application of the machine learning technology. It has also opened the doors for the application of a new digital transformation in the plastic sector for injection and blowing processes.