



CIRCIE 2019

Challenges for the Islands in the era of the Circular Economy

Exploring circular economy practices in a manufacturing context

Vesna Žepič Bogataj

TECOS, Slovenian Tool and Die Development Centre

Under the auspices of



SMile 2019

6th Sustainable Mobility & Intelligent Transport conference



TECOS - Slovenian Tool and Die Development Centre is private non profit organisation, founded in 1994 on the initiative of Slovenian Tool, Die and Mould-making (TDM) Industry.

Toolmaking is one of the key strategic branches of the Slovenian Economy

- 4,000 to 4,500 employees in Slovenian Tool-Making Industry
- In come revenue is around €350 million annually
- Export revenue represent more than 75% of their turnover
- The ratio between import and export of produced moulds & tools is 1 : 3



Technology, partners & leadership play a key role in the Circular Transformation



AUTONOMOUS PRODUCTION
SYSTEMS



PLASTIC MATERIALS & PRODUCTS TO
BE KEPT IN CLOSED CYCLE



TRANSFORMATION OF WASTES
INTO NEW RAW MATERIALS



Industry 4.0 technologies integrated with CE practices?

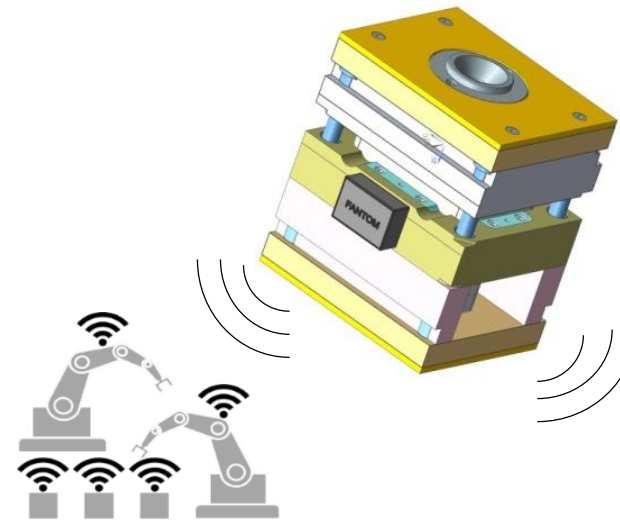


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Autonomous production systems → An opportunity to realize sustainable manufacturing and its potential for a circular economy

- Development of adaptable unit controller for in-line monitoring of injection moulding process, based on acoustic sensorics measurements.
- Software platform development for process control and/or entire autonomous plant production operation.
- Modular IoT connected systems for self-detection and correction of deviations of critical process parameters.



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GREEN GROWTH



Turning agro-wastes into new bioplastic products



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Revalorization strategies within the circular economy for the use of citrus waste in green packaging and cosmetics

Close to market demonstration on how natural fibres from **citrus waste peels** can be used as a cheap and natural additive for the reinforcement of 100% biodegradable plastic bottles and cosmetic packaging and antioxidant substances in cosmetic cremes.



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Turning agro-wastes into new bioplastic products



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*Orange waste
(60.000 tons/year)*



*Lemon waste
(20.000 tons/year)*



*Clementine waste
(20.000 tons/year)*



*Citrus Fibers &
Antioxidant additives*



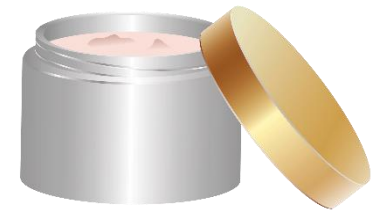
*PLA reinforced
with citrus fibers*



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*Biodegradable Packaging:
Juice bottles and cosmetic jars*



*New cosmetic product
(creme with peeling effect)*



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Improving paper & plastic waste recycling rates



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Utilization of post-consumer PLastic waste and reclaimed newsprint FIBer for new products in packaging, automotive and construction sectors

Combining recycled post-consumer plastic & reclaimed pulp fibers into new composite materials with superior mechanical performances for the direct use in mass application sectors: industrial packaging, caravanning and construction-building industry.



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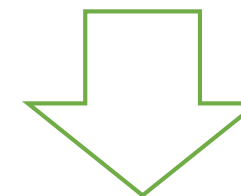
WASTE PAPER

60 million tonnes
collected in Europe
each year



RECYCLING RATE

Europe a global
champion in paper
recycling with 72% rate



PLASTIC WASTE

27.1 **million tonnes**
collected plastic post-
consumer waste



RECYCLING RATE

EU plastic packaging
recycling rate is
close to 41%

AIM TO DEMONSTRATE:

- ❖ Recycled rate can be increased by 40%
- ❖ Greenhouse emissions can be reduced by 40%



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NEWSPRINT FIBRES

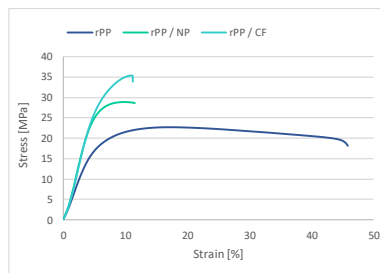
Recovered fibre
selection, treatment
and production



RECYCLED PP & PE

Plastic waste sorting,
grinding, washing,
extruding & testing

NEW COMPOSITE MATERIALS



Improved Modulus and
Strength up to 86% and
63%, respectively



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Distance holder & protective
panel for RV' sector



Tray inserts for Industrial
packaging sector



Building isolation panel
for construction sector



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Thank you for your attention



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**Challenges
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Thursday 28 - Friday 29 March 2019, Nicosia, Cyprus

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