Exploring circular economy practices in a manufacturing context

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TECOS - Slovenian Tool and Die Development Centre is a private non-profit organisation, founded in 1994 on the initiative of the 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 the Slovenian Tool-Making Industry
- Income revenue is around €350 million annually
- Export revenue represents more than 75% of their turnover
- The ratio between import and export of produced moulds & tools is 1 : 3
Circular Economy - Driver of TDM competitiveness

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?

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.
Turning agro-wastes into new bioplastic products

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.

LIFE ENV/ES/000171 LIFE-CITRUSPACK
Turning agro-wastes into new bioplastic products

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

Biodegradable Packaging: Juice bottles and cosmetic jars

New cosmetic product (creme with peeling effect)
Improving paper & plastic waste recycling rates

Utilization of post-consumer PLAs tic waste and reclaimed newsprint flber 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.
Improving paper & plastic waste recycling rates

**WASTE PAPER**
60 million tonnes collected in Europe each year

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

**RECYCLING RATE**
Europe a global champion in paper recycling with 72% rate

**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%
Improving paper & plastic waste recycling rates

NEWSPRINT FIBRES
Recovered fibre selection, treatment and production

NEW COMPOSITE MATERIALS
Improved Modulus and Strength up to 86% and 63%, respectively

RECYCLED PP & PE
Plastic waste sorting, grinding, washing, extruding & testing

Possible applications:
- Distance holder & protective panel for RV’ sector
- Tray inserts for Industrial packaging sector
- Building isolation panel for construction sector
Thank you for your attention

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CIRClE 2019
Challenges for the Islands in the era of the Circular Economy

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