

# RECP Best Practice Catalogue

*Optimization of operating parameters for solid state polycondensation*

*Developed within the framework of MED TEST II*



UNITED NATIONS  
INDUSTRIAL DEVELOPMENT ORGANIZATION



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# Best Practice - Optimization of operating parameters for solid state polycondensation

SECTOR:	Others
SUBSECTOR:	Materials recovery
PRODUCTS	Recycled PET pellets
CATEGORY	Process control or modification
APPLICABILITY	Process
COMPANY NAME	---
COMPANY SIZE	Medium

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**Description of the problem**  
(Base scenario):

The recycling of plastic bottles to pellets includes two main processes; washing line, and solid state polycondensation. The output product from the washing line is in the form of flakes, while the pellet production is conducted through a contamination removal process, accompanied with an extruder, crystallization and reactor.

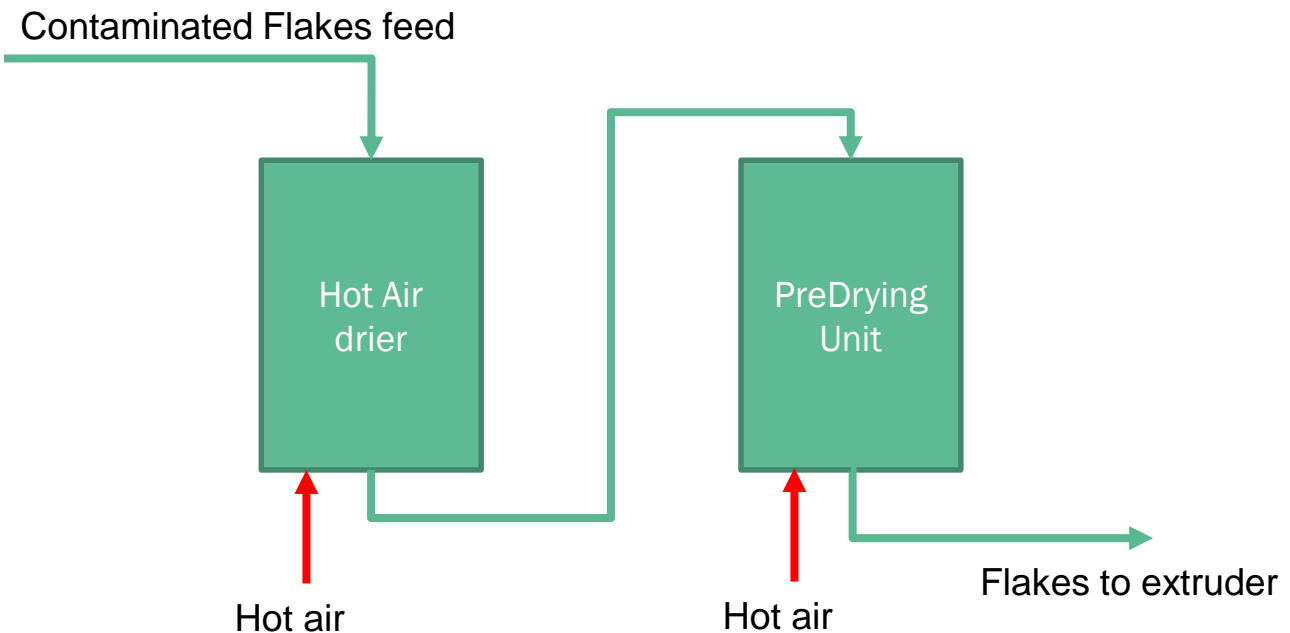
The contamination removal process is achieved in both the Hot Air Drier and the Pre-Drying Unit through introducing hot air from the bottom of a tank, having the flakes falling from its top. This heats up the material and evaporates the contaminants. The temperature settings for the Hot Air Drier was at 120 degrees, while the Pre-Drying Unit was at 150 degrees.

**Description of the solution**

Reset the temperature for the Hot Air Drier and Pre-Drying Units to the supplier recommended values, that is 110-120 degrees for the Hot Air Drier, and 120-140 degrees for the Pre-Drying Units.

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Schematic for the process



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<b>Economic Benefits</b>	<p>Saving will be mainly in electric energy that was used to heat the drying air through electric heaters. The estimated savings from this action was calculated to be 600,000 kWh/year (5 % of the baseline), with a production of 10,494 ton/year, this results in a saving of 57.2 kWh/ton product. Cost savings is equivalent to 23,100 Euro/year</p>
<b>Environmental Benefits</b>	<p>Reduction in energy consumption by 57.2 kWh/ton ~ 600,000 kWh/year (5% of baseline) CO<sub>2</sub> reduction associated with the energy savings is equivalent to 288 ton/year</p>
<b>Health and safety impact</b>	<p>Reduction of heat stress in the production hall which will provide better workplace environment to the workers.</p>

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<b>Capital investments &amp; financial indicators</b>	No cost option Payback is immediate
<b>Suppliers</b>	Company internal staff
<b>Other aspects</b>	Reducing the temperature of the hot air will minimize the Yellowing of product resulting from Thermal impact (Quality improvement)
<b>Implementation</b>	The company implemented this measure, and real savings were close to the estimated values.

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**Replicability sectors**      The same concept can be replicated in

- Plastic recycling processes

**Aspects to investigate for replicability**      Set temperatures for the hot air in the decontamination stage  
Recommended values from the supplier

**Useful resources**

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