

RECP Best Practice Catalogue

Improve heat transfer in drying ovens

*Developed within the framework of
MED TEST II*



UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION



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Best Practice - Improve heat transfer in drying ovens

SECTOR:	Food & Beverage
SUBSECTOR:	Bakery and farinaceous products
PRODUCTS	Breadcrumbs
CATEGORY	Process control or modification
APPLICABILITY	Process
COMPANY NAME	--
COMPANY SIZE	Small

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Description of the problem (Base scenario):

The company has a drying oven that is utilized to remove the humidity from the bread slices before milling to produce breadcrumbs. The existing dryer oven operates through natural gas fired burners heating the bottom side of the dryer, enhanced with electric heaters introducing hot air from the top. Ambient air is directed to the heaters through a fixed speed air fan upstream of the heaters. This setup results in the flow rate of the hot air coming out of the heaters being low; not assisting in the temperature distribution within the dryer.

Therefore, the humidity does not diminish easily and thus the drying process takes longer than normal.

Description of the solution

It is advised to increase the hot air flow in order to reduce the drying time. A fan with an inverter can be installed at the bottom of the drying oven and the hot air can be recirculated partly. The drying cycle can be monitored by measuring the humidity in the exhaust air.

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Economic Benefits

Saving in electricity by about 21,695 Kwh/year (80% of electricity used in the drying process and 20% from the total electricity consumption).

Cost saving in electricity is about 835.25 Euro/y

Saving in natural gas by about 19,448.4 m³/yr (60% of natural gas used in the drying process and 15% from the total natural gas consumption).

Cost saving in natural gas is about 3,354.85 Euro/y

Total cost saving = 4,190 Euro/y

Environmental Benefits

Saving in electricity used for the drying = 21,695 Kwh/year (20% from the original baseline).

Saving in natural gas used for the drying = 19,448.4 m³/year (15% from the original baseline).

The implementation of this measure will save on total energy consumption by about 240.5 Mwh/y

CO2 emissions reduction reaches 55 t/y

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Capital investments & financial indicators	<p>An investment of around 2,000 Euro is envisioned for fan, a recirculation shaft and a humidity meter.</p> <p>Payback period is around 6 months (0.5 year)</p>
Suppliers	<p>Local suppliers.</p>
Other aspects	<p>The company would need to consider studying the air circulation and how to optimize it.</p>
Implementation	<p>This measure is in full feasibility phase.</p>

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Replicability sectors

The same concept can be replicated in:

Baking companies.

Any other industries that have drying oven.

Aspects to investigate for replicability

Humidity records before & after the drying oven.

Time needed for drying process.

Flow rate of the hot air inside the drying oven.

Energy consumption for the drying process.

Useful resources
