

RECP Best Practice Catalogue

Optimize operating time of rotary ovens
Developed within the framework of MED TEST II



UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION



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Best Practice - Optimize operating time of rotary ovens

SECTOR:	Food & Beverage
SUBSECTOR:	Bakery and farinaceous products
PRODUCTS	Arabic bread, French bread, cakes, Arabic sweets, confectionary, ice cream
CATEGORY	Good Housekeeping
APPLICABILITY	Process

COMPANY NAME	NOT DISCLOSED
COMPANY SIZE	SME

Best Practice - Optimize operating time of rotary ovens

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

Rotary ovens are used for baking French bread, cakes, salted or sweet pastries and other products that start as a dough (except Arabic bread).

The ovens are started some one hour or more before introducing the trays loaded with the dough. This is necessary in order for the oven to reach steady operating temperature. Also between two baking cycles the ovens are kept operating while empty or sometimes the doors are kept open.

The issue is that the time interval between two baking cycles may be several hours or there may be no other baking cycle and ovens keep operating empty till the end of the shift. This practice is not conducive to good resource efficient and cleaner production.

The ovens under consideration consume 5% of final energy demand of the plant.

Best Practice - Optimize operating time of rotary ovens

Description of the solution

The proposal consists of simple good housekeeping measures that do not involve any cost. A brief listing is as follows:

- Establish the production program one day ahead.
- Decide which ovens will be operating, give priority to ovens that have good operating performance.
- Start the oven no more than 1 hour before first batch.
- Program dough preparation of the different products so that no operating oven stays idle for more than 15 minutes.
- Shut off ovens that are no more used.

Estimated percentage reduction in ovens operating time after measure implementation:
15%

Estimated percentage reduction in diesel/electricity consumption after implementation:
4%

(Diesel/electricity consumption during idle time is much less than during full load operation)

Best Practice - Optimize operating time of rotary ovens

Economic Benefits

The results below relate to 11 operational rotary ovens:
 Base case diesel consumption of ovens during monitoring period: 120 Tonnes/year
 Base case electricity consumption of ovens during monitoring period: 35,000 Kwhre/year
 Estimated percentage reduction in diesel and electricity consumption after implementation: 4%
 Estimated reduction in diesel consumption: $120 \times 0.04 \sim 5$ Tonnes/year
 Estimated reduction in electricity consumption: $35,000 \times 0.04 = 1,400$ Kwhre/year
 Cost of Diesel fuel: 600 EUR/Tonne
 Cost of electricity: 0.14 EUR/Kwhre
 Base case cost of energy to operate ovens: $120 \times 600 + 35,000 \times 0.14 \sim 77,000$ EUR/year
 Expected savings after improvement: $5 \times 600 + 1400 \times 0.14 \sim 3,200$ EUR/year (4% savings)

Environmental Benefits

Specific CO₂ emissions of diesel fuel: 3,200 kgCO₂/Tonne
 Specific CO₂ emissions of electricity: 1 kgCO₂/kwhre
 Base case CO₂ emissions: $120 \times 3,200 + 35,000 \times 1 = 420,000$ kg CO₂/year
 Estimated Avoided CO₂ after implementation: $420,000 \times 0.04 = 17,000$ kg CO₂/year (4% reduction)

Health and safety impact

Not applicable

Best Practice - Optimize operating time of rotary ovens

Capital investments & financial indicators	Cost of intervention: EUR 0 Return on investment (simple payback): 0 year
Suppliers	Not applicable, no special equipment required
Other aspects	<ul style="list-style-type: none">- Accurate fuel consumption values were obtained thanks to the information system installed by the company at the start of the project at the request of the MED TEST II team. An hour meter was installed for each oven and a diesel meter was installed on the service mains feeding the ovens. Readings were taken on a daily basis.- Above calculations are based on production period between September 2016 and October 2017.
Implementation	Measure has been implemented starting from end 2017