



# RESOURCE EFFICIENT AND CLEANER PRODUCTION CENTRE

We strive for green industries in Ukraine

## Case Study

### PAPER PROCESSING SECTOR: CARDBOARD PACKAGING COMPANY

#### COMPANY DESCRIPTION

This company is specialized in corrugated cardboard packages production. The installed capacity is 70 million m<sup>2</sup>/year of corrugated cardboard (41 kilotons/year). The company has 300 employees, processed 160 million m<sup>2</sup> of cardboard, 116 million m<sup>2</sup> of paper, 780 tons of starch, 70 tons of flexographic paint, 30 tons of PVA adhesive and consumed 4'500 MWh of electricity, 9'200 MWh of gas, 3'100 MWh of steam, produced from a nearby heat and power station, and 50'800 m<sup>3</sup> of water in 2011.

#### PROCESS DESCRIPTION

The enterprise has 2 corrugators, a gluing line with gluing machine, 2 cutting and 4 nibbling machines (2 for rotary cutting and 2 for flat cutting), a painting line with painting aggregate, 1 big shredding machine, a number of smaller shredding machines and a modern boiler plant with 5,2 MW gas-fired-boiler (8 tons/h steam capacity, 1.8 MPa maximum pressure, 210 °C maximum temperature).



The manufacturing processes were conducted in three shifts, so that they have at least 3 stops during every 24 working hours. The company used to change the orders during these 3 stops, so that was the reason they used to discharge almost all the materials that didn't reached the end of the production process.

#### GOALS of the RECP PROJECT

Together with the management and processing engineers the following goals and objectives for the analyzed processes were identified:

- Reduction of paper waste and energy (gas) consumption;
- Reduction of paint losses;
- Glue usage reduction.

#### OPTIONS AND IMPROVEMENTS

Table 1 summarizes the key financial and environmental performance parameters of the proposed improvement options. In August 2013 two out of five options have been realized.



Schweizerische Eidgenossenschaft  
Confédération suisse  
Confederazione Svizzera  
Confederaziun svizra



\*IMAGES references:  
<http://labcowelding.com>,  
<http://www.pdssheetmetal.co.uk>

**Table 1: COSTS AND BENEFITS OF PROPOSED MEASURES**

MEASURES	FINANCIAL			ENVIRONMENTAL	
	Investments [€]	Savings [€/y]	Payback [y]	Energy [MWh/y]	Material [Units/y]
1. Cutting process optimization	0	380'000	0	670	1'800 tons of paper
2. Use of potato-starch	0	12'500	0	0	3 tons of additives
3. Use of modifying additives	20'000	12'500	1,6	0	78 tons of glue
4. Use of additional aniloxes and paint adjustment equipment	120'000	50'000	2,4	0	13,3 tons of paint
5. Substitution of PVA adhesive by hot-melt glue	10'500	3'300	3,2	0	27 tons of glue
<b>TOTAL</b>	<b>150'500</b>	<b>485'300</b>	<b>0,31</b>	<b>670</b>	<b>See above</b>

**Low cost measures:**

1. Cutting process optimization i.e. cutting process optimization and transition to system of accounting in kilos, instead of square meters, which is accepted in international practice and reorganization of the operating shifts with minimal changes of orders (no investments needed), that allows to save 1'800 tons of paper and cardboard and 670 MWh of gas, from corrugated cardboard boxes production per year. 2. Use of potato-starch instead of corn-starch allows to save 3 tons of additives.

**Investing required measures:**

3. Use of modifying additives: starched paste modification by modifying admixtures, for example, by the hydrophobic admixture of CP-88\* (solid residual for 3-side cardboard production will be reduced in this case from 15-18 g/m<sup>2</sup> down to 12-14 g/m<sup>2</sup>). This leads to a reduction of glue consumption of 20% (savings of over 12'500 €/year).

4. Use of additional aniloxes and use of paint adjustment equipment: reduction of waste paint of at least 20% (will result in savings of 50'000 €/year).

5. Substitution of PVA adhesive by hot-melt glue: acceleration of gluing process, increase of case-hardening and reduction of defects and waste.

**FINANCING**

The company has no need of external funding. The RECP-options are realized by the company using its own resources and at its own expense.

**FOR MORE INFORMATION****Resource Efficient and Cleaner Production Centre (RECPC) – UKRAINE**

National Technical University of Ukraine "Kyiv Polytechnic Institute",  
Building #6, Office #3, 37, Peremogy Ave., Kyiv, Ukraine, 03056,  
tel.: +380 44 406 80 62, ncpc@ukr.net, <http://www.recpc.kpi.ua>