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First Transnational Learning Network Meeting
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Support & Training for an Excellent Energy Efficiency Performance

Case study

Textile company

Co-funded by the Intelligent Energy Europe Programme of the European Union

and coordinated by

EUROCHAMBRES

General information

- The company started operations in 1980
- It processes various types of synthetic polyester cloths, with an installed processing capacity of around 3 200 tons of fabric per year.
- By 2002, the company was processing around 2 400 tons of fabric per year with a workforce of around 550 people.
- LDPM operates around 300 days per year, on three shifts a day.

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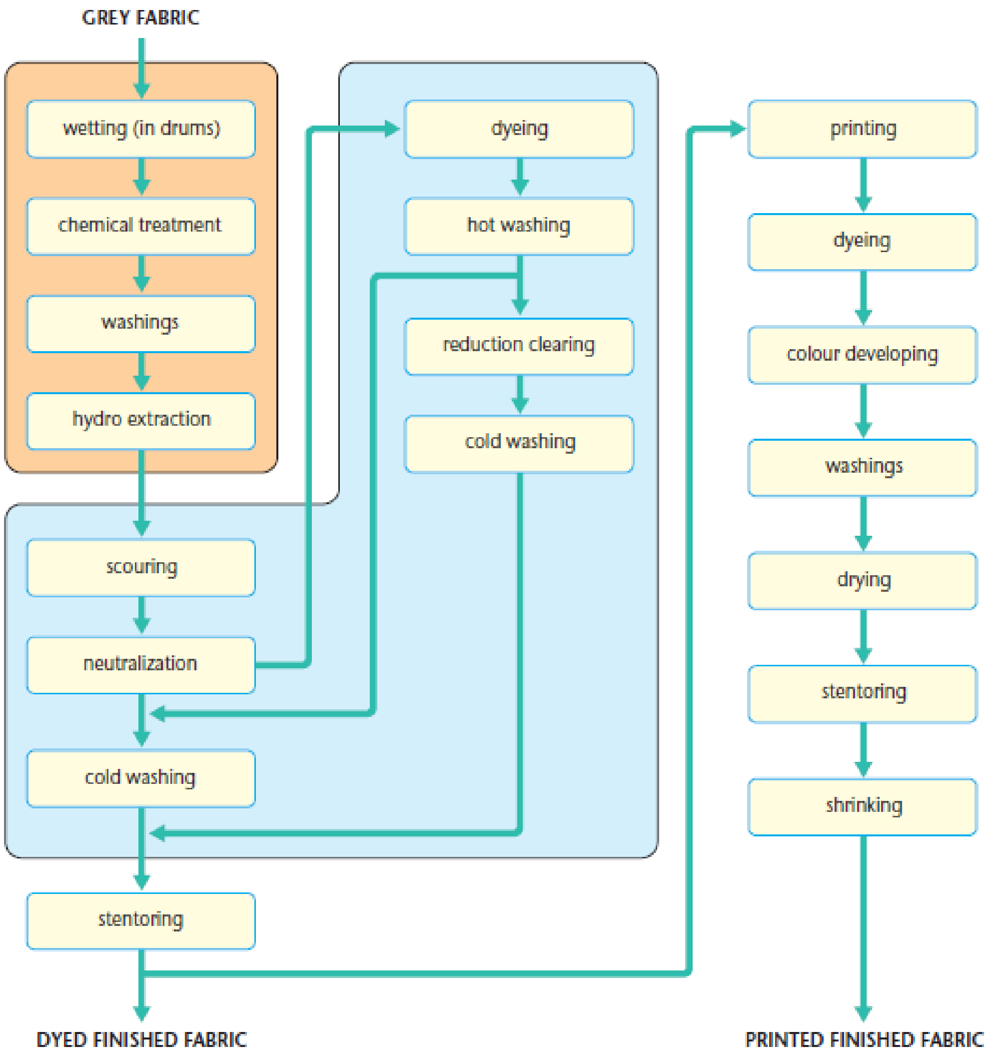
Main processes

- **Pre-treatment**, which comprises drumming and scouring, weight reduction and bleaching
- **Dyeing**
- **Printing**
- **Finishing**
- **Ageing**
- **Washing**

(washing is carried out after every operation)



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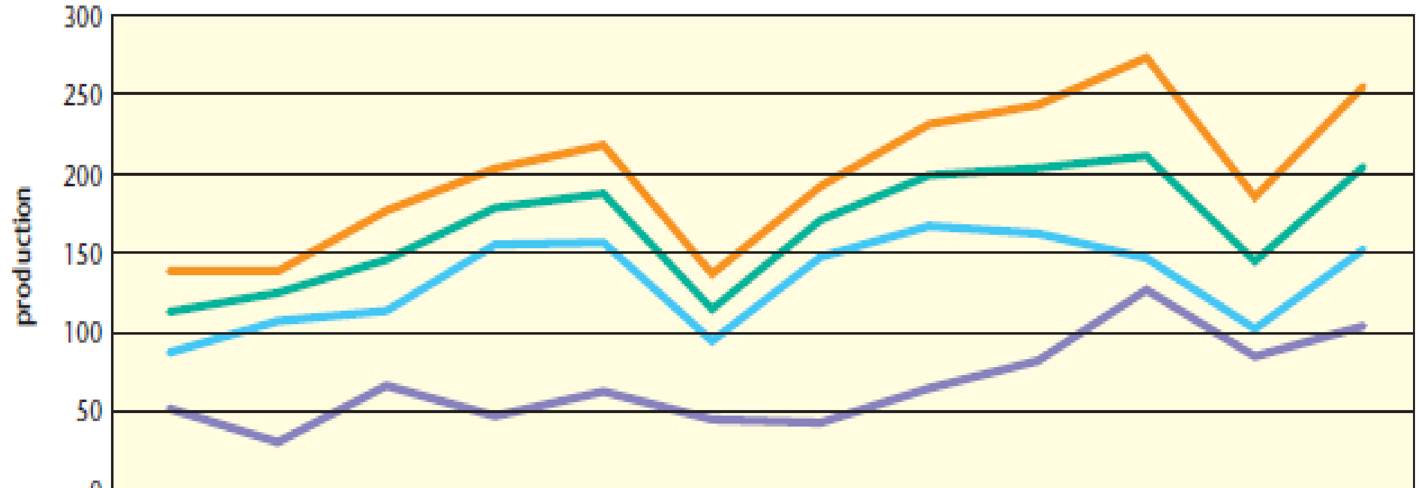
Production data



month	1	2	3	4	5	6	7	8	9	10	11	12
cloth dyed (tons)	51	30	65	48	62	44	42	63	80	126	83	104
cloth printed (tons)	87	108	112	155	157	92	148	168	162	148	101	151
total dyed + printed (tons)	138	138	177	203	219	136	191	231	242	274	184	256
total cloth normalized (tons)	112	123	145	179	188	114	170	199	202	211	143	203

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Baseline data

Resources	Unit/ton fabric	Months												
														Average
Purchased water (tanker or municipal supply)	m^3	115	122	136	148	136	172	143	133	123	136	135	125	135
Bore well water	m^3	36	30	2 4	20	40	48	42	50	46	30	34	32	36
Recycled water (from ETP)	m^3	50	56	62	66	46	38	44	36	40	56	52	54	50
Total water	m^3	201	208	222	234	222	258	229	219	209	222	221	211	221
Coal (lignite)	ton	3	4	4	4	3	3	4	4	4	4	4	3	3
Gas	m^3	772	846	697	625	611	804	629	656	582	576	623	553	664
Grid electricity	kWh	698	663	345	1 587	234	294	225	234	208	1 469	1 641	1 356	746
Diesel	litre	247	256	363	0	608	417	421	366	361	0	0	0	253
Equivalent electricity from diesel	kWh	827	858	1 216	0	2 037	1 395	1 410	1 227	1 209	0	0	0	848
Total kWh electricity	kWh	1 525	1 521	1 561	1 587	2 272	1 690	1 636	1 461	1 417	1 469	1 641	1 356	1 595
Dyes	kg	61	65.4	60.5	65.1	60.1	74.2	61	61.4	61.8	61.3	64	63.5	63.2
Gums	kg	82	80	88	93	85	110	100	93	87	90	99	85	91

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Cause analysis

Waste stream	Problem cause	EE Option (53 options identified in total)
Low power factor in drum motors	Variable loading of drums and sudden load during start up operations	Installation of soft starter and variable speed/frequency drives in motors
Thermal energy loss in existing boiler	No Excess air control Higher blow down from boiler drum due to high TDS in feed water No waste heat recovery system from the boiler flue gases High level of unburnt fuel in ash Old and obsolete technology with efficiency of around 65%	Preheat the feed water to boiler by exit flue gases Use low TDS municipal water in place of tanker water Replace existing boiler system with a new FBC boiler of 32 kg/cm2 pressure, coupled with back pressure turbine for cogeneration of 2 MW electrical power
Thermal energy losses in steam distribution system	Uninsulated flanges Condensation of steam forming pools of water in the steam carrying pipes	Insulate all 125 existing flanges Install thermodynamic steam traps in the main header

Techno-economic and environmental feasibility of EE measures

CP-EE Option	Technical feasibility			Env. benefit	Invest (US$)	Annual saving (US$)	Pay back period
	Techno logy Availability	Space Availability	Product ion quality*				
Installation of soft starter and variable speed/frequency drives in motors	yes	yes	+	Increase power factor and reduced GHG emission	909/machi ne	682	18 months
Replace existing boiler system with a new FBC boiler of 32 kg/cm2 pressure coupled with back pressure turbine for cogeneration of 2 MW electrical power	yes	yes	0	Reduced GHG emissions (about 3 200 t/year)	181 779	153 149	
Preheat the feed water to boiler by exit flue gases	yes	yes		Reduced GHG emissions due to lignite savings of 784 t/yr	2272	28 403	7 months

Benefits and achievements

CP-EE Option	Savings	GHG reduction (tons/year)
Installation of soft starter and variable speed/frequency drives in drum motors	Increase power factor and reduced GHG emission	
Preheat the feed water to boiler by exit flue gases	Reduced GHG emissions due to lignite savings of 784 t/yr	1200

Total environmental benefit expresses in Reduction in energy consumption respectively avoidance of CO_2 remissions was : 7756 tons CO_2/year

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Baseline data, before and after CP-EE

Table 1.10: LDPM before and after CP-EE

Section no.	Parameters	Values before CP-EE	Value after CP-EE implementation	average change (%)	Remarks	Average cost[1] (US$)	Annual economic benefit (basis = 2 400 tons production/year)[1] (US$)
		monthly average 2002	monthly average 2002				
1	**Production (tons of fabric)**						
	Normalized	153.4	145				
2	**Water (m^3/t fabric)**						
	Purchased	135	102	24.4		0.46/m^3	364 240
	Bore well	36	36	0		0.017/m^3	
	Recycled	50	30	40			
	Total	221	168	24			
3	**Electrical power** (kWh/t fabric)	1 595	1 268	20.5		0.11/kWh	85 595
4	**Thermal**						
	Lignite (t/t fabric)	3.0	2.15	28.3		36/t	73 552
	Natural gas (m^3/t fabric)	664	482	9.9		0.20/m^3	31 879

References / Literature

- References: CP-EE Manual, UNEP 2004

Energy Efficiency Assessment at Printing Mills Surat, India (July 2002)

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