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University of Applied Sciences
Northwestern Switzerland

Final report

Support activities for the NCPC in South Africa

Project No. 1: US/SAF/02/069

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Muttenz, 8 December 2008

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on the job training of national consultants to enter the automotive sector

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Mission March 2007

Execution of IPA at Tubecon and ZF Boge
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Ort, Datum Benglen, November 5th 2007

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1 Goal of the mission

During the Toolkit trainings in March and September 2006 two quickScans were carried out at Tubecon and ZF Boge Elsatmetal. After the presentation of the QuickScan findings at the companies most of the companies decided to go further i.e. to have the consultants (in co-operation with the NCPC) elaborate a quantified In-plant-assessment (IPA) in the focus areas decided on after the QS presentation.

Due to several problems, mainly due to restrictions in the personnel sector, the IPA could not be carried out. Therefore the NCPC and UNIDO Vienna decided jointly to arrange another mission by the two CTA from the UNIDO reference centres. Their task should be - jointly with the NCPC staff and the representative from AIDC - to finalise the IPA at Tubecon and ZF Boge.

2 Mission to complete two IPA

2.1 Programme

2.1.1 Saturday March 3rd / Sunday March 4th

Flight from Zurich to Johannesburg

2.1.2 Monday March 5th

Introduction of new staff in the NCPC. Agenda setting. Preparation of visits.

2.1.3 Tuesday March 6th

Whole day:

visit at Tubecon. Data collection.

2.1.4 Wednesday March 7th

Morning:

Data evaluation, option generation and calculation

Preparation of presentation to Tubecon management.

Afternoon:

presentation of results to Tubecon Management

2.1.5 Thursday March 8th

Whole day:

visit at ZF. Data collecting. Discussion with staff.

Evaluation of data. Generation of options to improve processes. Elaboration of calculation files. Preparation of presentation.

2.1.6 Friday March 9th

Morning:

Presentation of results to ZF management.

Writing of IPA reports.

Afternoon:

Assessment of the week's work. Planning of next steps: follow up with the two companies by NCPC staff.

2.1.7 Saturday, March 10th /Sunday March 11th

Flight from Johannesburg to Zurich

2.2 Finalising the two IPA

During the mission, the two IPA reports were finalised, see respective reports (separate documents "UNIDO IPA Report Tubecon.pdf" and "UNIDO IPA Report ZF.pdf").

3 Status of the NCPC

The situation met in South Africa was slightly surprising: when the two representatives of the reference centres arrived in the NCPC they were informed on a) the leave of the manager of the food/agricultural programme (Mano Ram Reddi), who was also in charge of the automotive sector programme and b) on the leave of the assistant to the director (Thanyani). Moreover the manager of the chemical sector programme (Kevin Cilliers) was completely covered with work on his programme, so that no relevant support from the NCPC side could be expected.

Last but not least: Monday, March 5th (the first day of the mission) was the first working day of a new staff member in the NCPC (Podesta Maepa), who should start her work as a project manager. She has a technical background and comprehensive experience in private industries, but not specifically in CP.

Therefore the mission programme was changed in that way, that the mission was a combination of i) carrying out the IPA in the two (automotive sector related) companies by the reference centres solely; ii) continuous training and refreshing CP with one external consultant (from AIDC), who accompanied and supported the work with the IPA, iii) preparing and presenting the results to the company managers, and iv) starting to introduce the new NCPC staff member, incl. making a plan how to follow up the two companies.

4 Final appreciation

The mission showed, that the NCPC is duly introduced in the market. The co-operation with external consultants takes speed, especially with the representatives from the AIDC. They seem to have integrated the training during the UNIDO toolkit training into their daily work and used it to improve the services of the staff to com0panies in the automotive related sectors.

The situation at the NCPC is ambivalent. ON the one hand, the director is engaged strongly in spreading out the NCPC and the CP philosophy in the country. With regional focal

events, a large audience was reached. The credibility of the director and the centre seems to be high.

The same can be said on the work of the remaining project manager. The sector programme (focal point chemical industries) is well managed and sold. The work is on a good track and companies seem to trust in the services of the NCPC. The results, the support by the NCPC produced in the respective companies are convincing: the financial benefits generated through the NCPC support are impressive. These show cases are used to divulge CP constantly in the country.

On the other hand the fluctuation rate of the staff has to be mentioned. The replacement of project managers by new people always means i) a loss of knowledge end experience and ii) considerable efforts to introduce new staff into CP and a lot of time to acquire the necessary knowledge.

Currently, the situation is so, that one experienced manager brings the sector programme strongly forward and a second project manager has started her work. Anyhow, the two UNDIO experts came to the conclusion after the introduction of the new project manager, that she was a good choice and seems to be capable to acquire the necessary know how and execution experience within a relative short time.

NCPC South Africa

Mission June 2008

UNIDO-Toolkit Training for National Experts

University of Applied Sciences Northwestern Switzerland
School of Life Sciences

NCPC South Africa

Mission June 2008

UNIDO-Toolkit Training for National Experts

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Annex 2 by Dr. Hannes Fresner

Ort, Datum Benglen, June 16th 2008

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Contents

1 Goals of the mission

Main goal was to carry out a 5 days UNIDO CP toolkit training course, in which between 10 and 20 South African national experts are to be trained to apply Cleaner Production according to the UNIDO methodology. The means are theoretical training and practical exercises based on the UNIDO CP toolkit. An important part of the training shall be two company visits (QuickScans) to give the participants an opportunity to experience the learnt stuff in practice.

In parallel, the experienced NCPC staff was to be integrated into the training and the new staff was to be trained.

In the week before the training, talks and discussions shall be hold on the following subjects:

- follow up on the (in the current course not covered) training of government staff concerning understanding of CP and law enforcement (or law creation / adaptation) in the context with CP;
- discussions with the permanent UNIDO officer on the energy efficiency programme of UNIDO;
- participation at the 5th African Roundtable on Sustainable Consumption and Production (ARSCP 5);
- discussions with the director of the NCPC on current problems and developments

2 Course of the mission

2.1 Tuesday, June 4th and Wednesday, June 5th

Talks at the NCPC on various subjects. Preparation of the toolkit training (organisation) as well as pre-visit the two selected companies.

2.1.1 Training for Members of Authorities/Government

Discussion with Ms Petra Schwager (UNIDO Vienna), Ndivhuho Rahpulu (Director NCPC) and staff of the NCPC on the training for members of authorities/government.

The goals and the contents of this training were roughly defined at the meeting. It should deal with:

- improve the understanding within authorities on CP and the companies' issues on that;
- clarify the context of CP and law enforcement;
- touch possibilities an further development of laws, bylaws, acts, decrees etc. interacting with the implementation of CP.

Three trainings should be carried out in three regions (Cape Province, KZN, and Gauteng), wherefrom the 1st training to be hold by Dr. Hannes Fresner and Dr. Thomas Bürki, the second by the NCPC and the 3rd by Fresner/Bürki and the NCPC together. The 3rd training should be held in Gauteng, combined with the closing ceremony of the five years supporting period of the NCPC by UNIDO.

Excursus

In an additional discussion on Wednesday, June 11th, the three representatives of the DEAT presented ToR for the training. Compared to the earlier discussions, a considerable difference had to be stated: the DEAT focussed on waste minimisation only, whereas the NCPC and UNIDO experts aimed at a broader approach. In the discussion the following procedure was agreed upon:

- *the length of the training is most probably three days, i.e. 3x3days in the three regions;*
- *the DEAT and the NCPC propose jointly ToR for the training;*
- *the NCPC sends a "400 pages overview on the current legislation concerning CP in South Africa" to Fresner/Bürki;*
- *Fresner/Bürki will revise and finalise the ToR;*
- *after the acceptance of the ToR by DEAT and UNIDO, the training will be elaborated in detail by Fresner/Bürki;*
- *the first training is foreseen in week 36 (i.e. from Sept 1st to 5th), the second in October, and the third in the last week of November, i.e. between November 24th and 27th (to be finished by November 27th for closing ceremony).*

2.1.2 UNIDO's programme on energy efficiency programme

Discussion with Ms Petra Schwager (UNIDO Vienna), Ms Laurence Ansermet (permanent UNIDO officer in Pretoria), and Ndivhuho Rahpulu (Director NCPC).

The programme draft was shortly presented by Ms Laurence Ansermet. Thomas Bürki is asked to give a first comment on the draft. UNIDO likes to develop the contents of the programme in close co-operation with him.

2.1.3 Participation at the African Roundtable on Sustainable Consumption and Production;

The participation was limited from agenda reasons to Wednesday, June 4th afternoon. The session hold was on energy, energy efficiency, and climate change and their interaction with industries.

Several NCPC directors could be met and some intensifying discussions on the topic took place.

2.1.4 Pre-visit of the two Selected Companies

Thursday, June 5th a short visit to the two companies took place. Participants: Ms Morien van Blerk (AIDC and participant to the toolkit training), Kevin Cilliers (NCPC) Thomas Bürki (FHNW).

The experience with the last training (March 2006) showed, that the companies seemed not to be enough informed on the visits, which is why - partially serious - troubles occurred. Therefore the main goal was to inform the plant managers on CP, the NCPC, the course of the visit, what the NCPC expected them to contribute and what result/benefit the companies could expect from the visits.

In the morning Flextech was visited (Wessel du Plessis, general manager of the plant), in the afternoon Bosal (Hendrik, general manager of the plant).

It could be stated, that the choice was good in two senses: i) the management is very open minded and literally keen on getting informed on concrete measures to get more efficient and ii) the companies were rather small (Flextech) or rather simple processes are run (Bosal). Therefore the participants are not overstrained with to complex processes, which should be overviewed and options should be generated for.

This way, the visits to be effectuated during the training were prepared in order to produce a maximum of outcome for both sides.

2.1.5 Discussions with the director of the NCPC

Due to time constraints the focus was limited to future work of the NCPC and its positioning in the market. According to first indications, the NCPC (financed by the dti) shall get a new status and get independent from the CSIR. Thus the NCPC would be free to act as an organisation in the market according to the industries necessities and will have no longer be hampered due to constraints coming from the ringfencing situation within the CSIR. The NCPC could act then as a company, that offers high level CP consulting services. Moreover the NCPC could better respond to demands of the market.

On the other side, the capabilities and competences as well as the capacities of the NCPC will have to reinforced accordingly. The NCPC will be challenged to act strictly deliver professional consulting work and follow up and further develop CP services.

2.2 Monday June 9th to Friday 13th

The UNIDO Cleaner Production Toolkit training was conducted during the week from June 9th to 13th at the CSIR facilities in Pretoria. The workshop had been prepared expertly by Kevin Cilliers of the NCPC.

The participants partly represented the South African automobile cluster (AIDC), partly ministries and partly private consultancies.

The training consisted of three days of theoretical training in the UNIDO Cleaner Production Toolkit including practical exercises, two company visits to practically collect experiences in the quick scan methodology, and a written test.

At the training 15 national experts took part (see annex 1).

The programme saw five days in the different topics of the toolkit, consisting of theoretical and practical training during two company visits. The theoretical training included

- an introduction to the systemic and holistic Cleaner production approach of UNIDO
- the difference of Cleaner production and end of pipe treatment
- instruments of Cleaner production like input/output analysis, energy analysis, indicators, feasibility analysis, hazardous materials management, purchasing
- an introduction to team work and systematic identification of options
- an introduction to conducting a walkthrough and its evaluation.

A number of exercises was included in the training to supply the participants with practical experience as quickly as possible. During the two company visits the participants could apply their knowledge and test their comprehension of the concept of Cleaner production.

In the end there was a test to qualify the participants as UNIDO CP experts. The list of participants, the schedule, the test questions and the evaluation of the training is included in the annex.

The evaluation of the workshop showed, that the participants highly appreciated the training. They feel they have benefited from the training for their professional work and will be glad to work for the NCPC in the future. The participants asked for a routine repetition of the training and for follow up to deepen their knowledge.

Picture 1 *the director of the NCPC welcoming the participants of the training*

Picture 2 *Discussion of Cleaner Production case studies in the workshop*

Picture 3 Presentation of the results of a material flow analysis

Picture 4 : Presentation of the results of a brain storming for option identification

3 Course of the UNIDO-Toolkit Training

The detailed programme looked as follows:

from		to	Monday June 9th	Trainers
09:25	-	09:45	registration, welcome	Raphulu/Cilliers/ NCPC
09:45	-	11:00	Introduction of the wholistic UNDIO approach to CP	Fresner/Bürki
11:00	-	11:30	coffee break	
11:30	-	12:15	exercise samll measure	Fresner/Bürki
12:15	-	12:30	Team, Policy, and Motivation I	
[illegible]			[illegible]	
13:10	-	14:05	the NASA game	Fresner/Bürki
14:05	-	14:50	Team policy and motivation, part 2	Fresner/Bürki
14:50	-	15:00	small biobreak	
15:00	-	15:30	Material flow analysis, part 1	Fresner/Bürki
15:30	-	16:30	Exercise material flow	Fresner/Bürki
			Tuesday June 10th	
08:50	-	09:35	Material flow analysis, part 2	Fresner/Bürki
09:35	-	09:50	coffee break	Fresner/Bürki
09:50	-	11:40	creativity, options generation	
11:40	-	12:30	exercise option generation (brainstroming)	Fresner/Bürki
[illegible]			[illegible]	
13:30	-	14:05	presentation results brainstorming exercise	Fresner/Bürki
14:05	-	14:20	TERI film	Fresner/Bürki
14:20	-	15:00	options generation	
15:00	-	15:45	coffee break	
15:45	-	16:30	indicators	Fresner/Bürki
			Wednesday June 11th	
08:55	-	09:45	Energy flow analysis, part I	Fresner/Bürki
09:45	-	10:10	Exercise energy flow (coffee making)	Fresner/Bürki
10:10	-	10:50	coffee break	
10:50	-	11:30	Energy flow analysis, part II	Fresner/Bürki
11:30	-	12:30	exercise energy (heat recovery)	Fresner/Bürki
[illegible]			[illegible]	
13:00	-	14:40	Energy flow analysis, part III (compressed air, chillers)	Fresner/Bürki
14:40	-	15:15	coffee break	
15:15	-	16:00	Energy flow analysis, part IV (heat pumps), EcoInspector	Fresner/Bürki
16:00	-	17:00	hazardous material, safety, MSDS	Fresner/Bürki
			Thursday June 12th	
08:30	-	09:00	Transport to company	NCPC
09:00	-	12:30	Visit Flextech	Fresner/Bürki
12:30	-	13:00	Transport to NCPC	NCPC
[illegible]			[illegible]	
14:00	-	17:00	evaluation of company visit, material/energy flows, options generation	Fresner/Bürki
			Friday June 13th	
08:30	-	09:00	Transport to company	NCPC
09:00	-	12:00	Visit Bosal	Fresner/Bürki
12:00	-	12:30	Transport to NCPC	NCPC
[illegible]			[illegible]	
12:30	-	13:30	short evaluation of company visit, options generation	Fresner/Bürki
13:30	-	15:00	Test	Fresner/Bürki
15:00	-	15:30	evaluation of training	participants
15:30	-	16:00	Closure, apéritif	Cilliers / NCPC

The visited companies were (Thu) Flextech, a manufacturer of flexible cables which serve to open boots/hoods or to activate handbrakes, acceleration cables etc. of cars. The second company (Fri) was Bosal, a manufacturer of tubes, silencers, etc. Both companies are 3rd tier suppliers to automotive OEM.

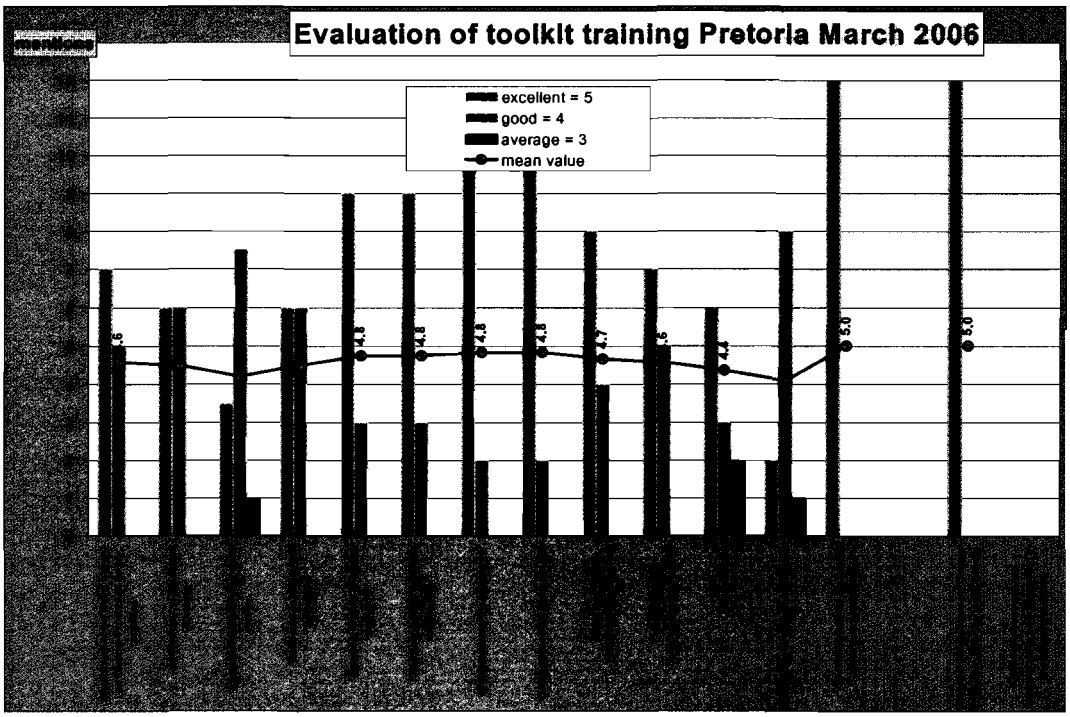
The companies were visited for roughly 3 hours. One hour covered the introduction to the participants by the management followed by a walkthrough of approximately 1½ hours and closed with a discussion in the meeting rooms to answer questions and clarify problems.

The detailed company reports can be found in annexes 2 and 3.

4 Evaluation of the Training

The course was evaluated by the participants with a questionnaire Friday afternoon at the end of the course. The questionnaire used was the standard UNIDO questionnaire, see annex 4.

The result shows, that the participants highly appreciated the training and were convinced to have profited for their daily CP work.



Picture 5 overall evaluation of the course by participants

5 Findings, Recommendations

Basically the toolkit training is aimed at engineers or professionals with a (at least intensive basic) technical education. This has to be kept in mind when inviting participants to evtl. further training, which would then be executed most probably by the NCPC. For this reason it turned out, that some of the participants did not dispose of the necessary background to follow the training best. Although the participants were called in the run up to the training "very experienced consultants" it turned out that many of them had serious difficulties in catching the basic stuff of the training for not being enough technical basic education and experience in CP.

Thus it is recommended that the NCPC makes follow-up courses to deepen the knowledge of the consultants and to continuously strengthen their knowledge and experience in CP. This should be accompanied by carrying out IPA in companies to enable the consultants to get more practise in applying CP in the field.

Annex 1

List of Participants

Cleaner Production Training / Workshop 9th - 13 June 2008 (NCPCSA)
List of Participants

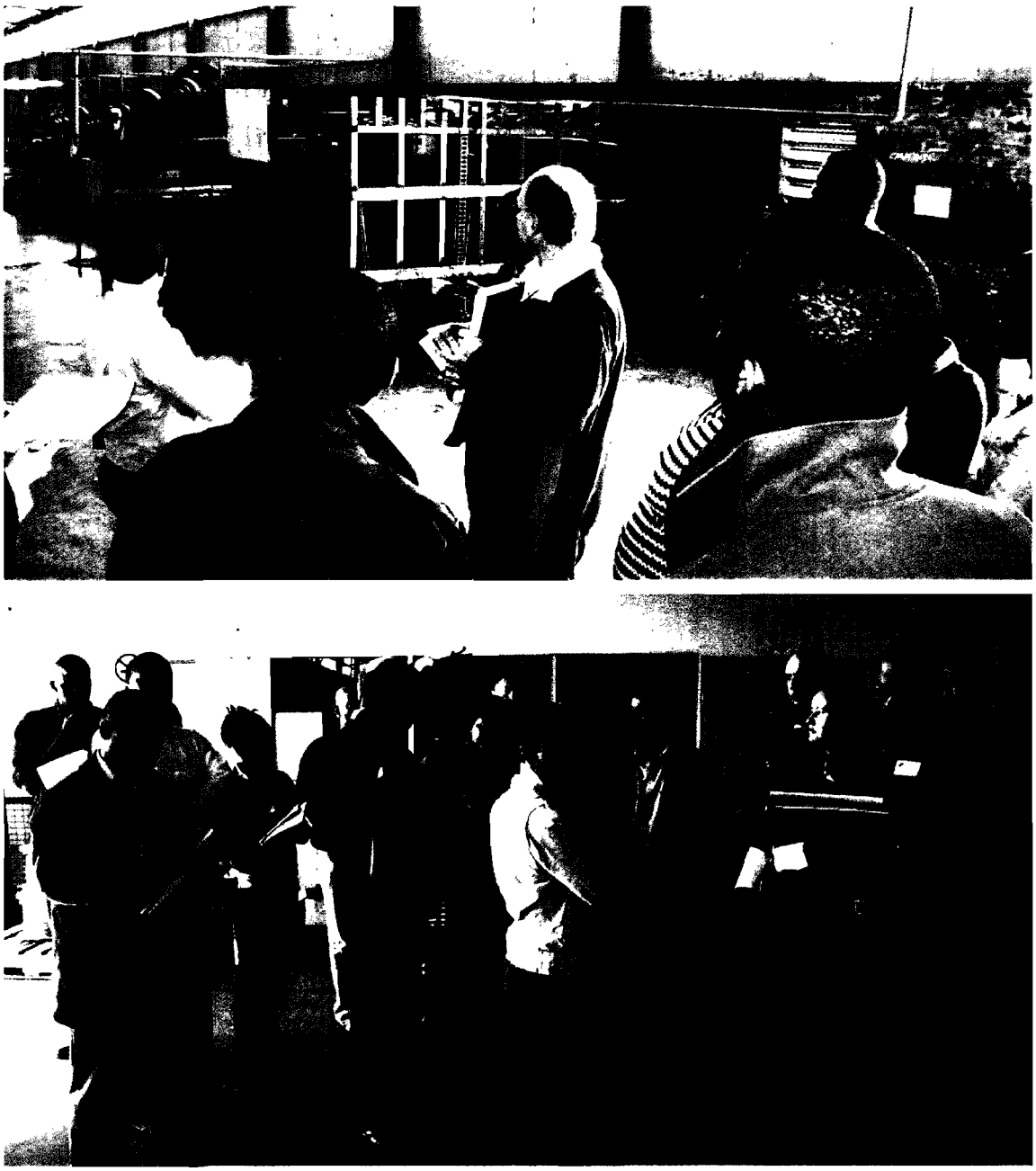
No.	Surname	Name	Company	E-mail address	Cellphone Number	Telephone	Mon	Tues	Wed	Thurs	Fri
1	Revel	Thierry	Planet Agro Ecology Concepts CC	tar@planetac.co.za	0733031554	21-887080	[illegible]	[illegible]	[illegible]		
2	van Blerk	Morten	AIDC	mvanblerk@aidc.co.za	0824564937						
3	Camagu	Sibo	AIDC	scamagu@aidc.co.za	0846023888						
4	Viljoen	Henning	HV CC	viljoenh11@vodamail.co.za							
5	Godschalk	Seakle	Theo Doulos CC	godschalk@mweb.co.za	0823957582		✓	✓			
6	Molelekwa	Gomotsegang	Gomotsegang Consultancy	telex@absamail.co.za	0829729522		GFM	GFM			
7	Thobela	Moekatsi	Energy solutions Africa	thobela@energysolutionsafrica.com			[illegible]	[illegible]			
8	Mdlopane	Ndabe	Mabophe Energy Solutions	ndabe@mabophe.co.za	0827878367		NM	NBM			
9	Mdlopane	Ayanda	Mabophe Energy Solutions	energy@mabophe.co.za	0732242491		AM	AM			
10	Chivizhe	Shingi	Tanaka ENERGY PROJECTS	shingie@tanakaprojects.co.za	0828001648		SC	SC	SC		
11	Tshabalala	Busi	DWAF	Tshabalalab@dwaf.gov.za	0836544906		BT	Bi			
12	Leshabane	Lebo	Black Jills	Mashotone@yahoo.com	0829025942		LM	LM			
13	[illegible]	[illegible]									
14	[illegible]	[illegible]									
15	KUMALO	THEMBISILE	REDLEX PROJECTS	gtkumalo@yahoo.co.uk	0726514018		GK	GK			
16	KIBA	PALESA	BECC ISB	[illegible]	[illegible]		PK	PR			
17	MAMABOLO	MABU	DWAF DEAT	MMamabolo@deat.gov.za	0784961152	012 310 3090	MM	MM			
18	MOKOENA	SYLVESTER	DEAT	smokoena@deat.gov.za	0836421453	012 3103568	SM	SM			
19	Minelo	Philip	DEAT	[illegible]	[illegible]	[illegible]	PM	PM			
20.	Podesta	Magpa		pmaepa@csir.co.za	079 1375782	012 841 3136	Mon.	Tue.			

Annex 2

Report of Company Visit to Flextech

Flextec currently employs 65 staff.

Part of the company mission is to act as a training centre for apprentices, which are educated in metal manufacturing. Because the demand has decreased sharply, they are currently looking for new products. At the moment they are running at one shift only. They are certified to ISO 14001 and TS16469.



Picture 6 : The director of Flextec explaining the process

They produce cable assemblies as a 1st tier supplier for OEMs and also to a minor part PNA. Their products include park brake cables, luggage door cables, tank flap cables, accelerator cables. They are the only OEM manufacturer of cables in Africa. Therefore they are cooperating with the major design centres.

They have one new line which produces cables for Toyota and several older lines. Production is about 40.000 cables per month in total. Their products are cable assemblies.

They have a pressing shop and a welding shop. They are making their own tools in a toolshop, where also apprentices are trained.

The input includes 60.000 to 70.000 meters of carbonised spring wire and galvanized wire, plus 50.000 to 55.000 meters of conduit.

As a material for the covers they are using PVC and polypropylene. All runners are recycled. They are using 10 tons per month of PVC.

The cooling water for dye casting and extrusion of the sheaths is recycled via a cooling tower.

The consumption of zinc is 250 kg/month.

The boxes for transport of the finished cables to the client are rented.

The production process:

The cable assemblies consist of:

- a sheath
- a conduit
- the cable
- a zinc end
- seals
- metal connectors

The connectors are made in the pressshop or machined in the machine shop. The conduit is produced from spring wire, which is at first flattened, then rolled and finally sheathed with PVC or PP. The cable is bought, cut to length, part of it is coated with PP, and then a zinc end is applied by dye casting. A part of the rubber parts are pressed, some additional plastic parts are injection moulded.

In the pressshop, there is socalled design waste from pressing, which apparently is quite high. The layout of the pattern of the parts is not optimum, and the width of the gaps between parts is too high. This design waste and the chips from machining apparently amount to 16 tons per month.

Picture 7 Scrap containers

It is estimated that by inversing the position of every second part and more closely approaching the parts, the consumption of steel and rubber can be reduced by approximately five percent.

In the pressshop a waterbased lubricant is used mixed with 20% oil. It starts to smell quite quickly and has to be replaced every two weeks. The reason for this should be checked: apparently the sumps are not clean, and the combination of temperature, lack of oxygen etc. fosters a decomposition of the lubricant.

PP runners and zinc runners are recycled. The barrels of the injection moulding machines could be better insulated, as the surface temperatures arre between 60 and

100 °C. Three Klöckner injection moulding machines are used (each consuming 15 kW for the hydraulic system and 8 kW for heating).

Picture 8 Potential for improvement in the layout of the pressing tools

The total energy consumption is 42.000 kWh per month at a cost of 14 cents per kWh, the connected load is 275 kW at 58 Rands per kW.

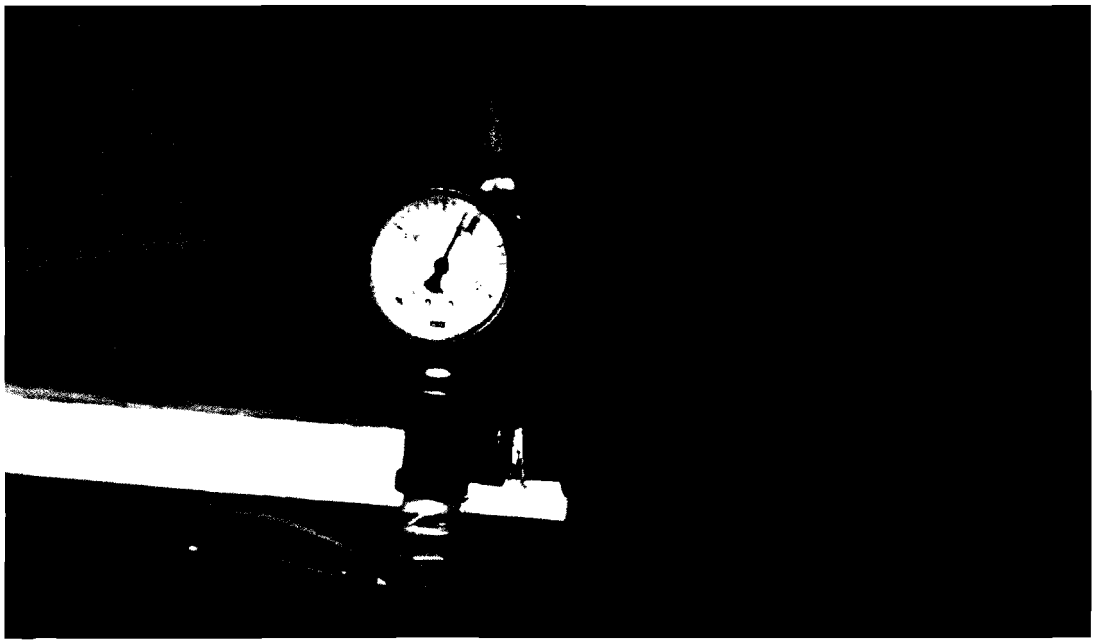
Illumination is a significant energy consumer in this plant: Some 180 bulbs are installed with a connected power of 400 Watts each, this results in a total connected power for light of about 70 kWs, assuming all lights are on. Assuming operating hours of 45 hours per week only (the lights are not switched off during breaks) this indicates, that approximately 30% of the total electricity consumed is spent for lights.

Picture 9 Lights in the workshop

The older machines do not have a timer. At night all the machines are cut off from power.

Another important consumer of electricity is the air compressor (22 kW). It is a on/off controlled screw compressor, working between 5.5 and 9.9 bars with a very short on/off interval. Apparently the air tanks are too small. There are significant losses, as about 10 air leaks were identified during the walk through.

A leak test should be done during a break by monitoring the pressure drop at the storage tank when there is no consumption by machines.



Picture 10 Pressure gauge at the air tank

LPG is used to melt the zinc in the dye casting machines. The pots are not insulated, the surface temperature is more than 300 °C. Assuming dimensions of approximately 0.25 * 0,25 * 0,25 meters, each of the pots has a surface of 0.4 m². The losses are in the range of 30 kW/m², or approximately 12 kW per pot, which is an equivalent of 1 m³ of LPG per hour per pot.

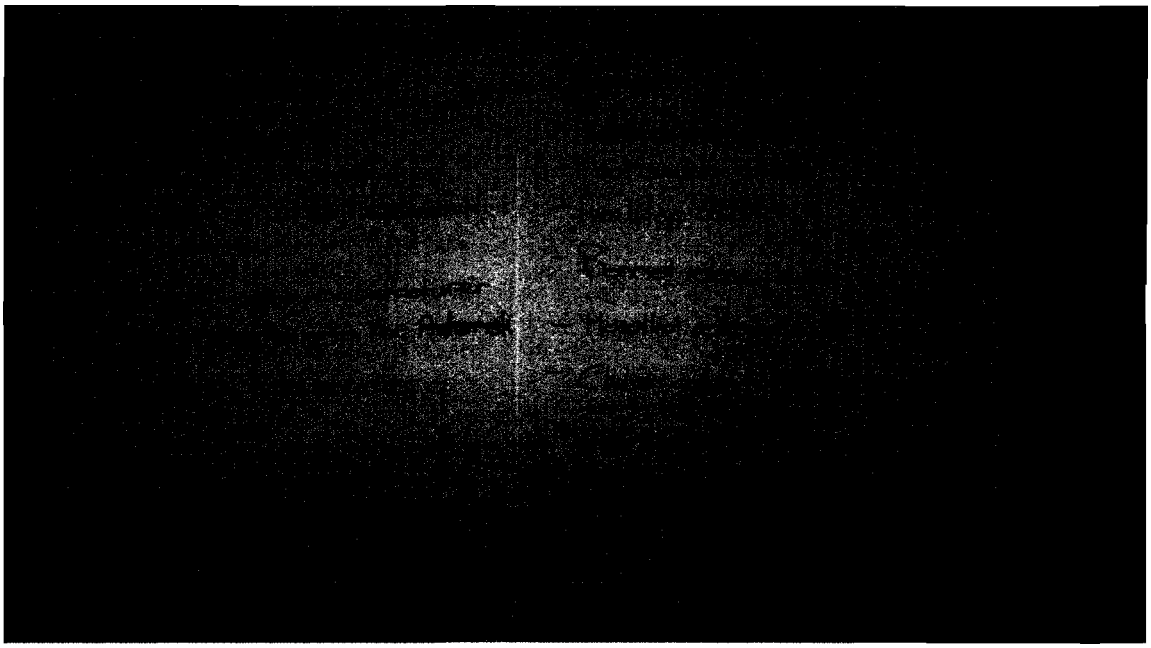
Currently they stopped removing the top layer of zinc oxide from the pots, as a new layer is immediately generated by the oxidation of the top layer. This brought along considerable savings in zinc.

Gas is also used for soldering some parts. They have an automatic cutoff device to minimise the loss of gas during the time when no soldering is done.

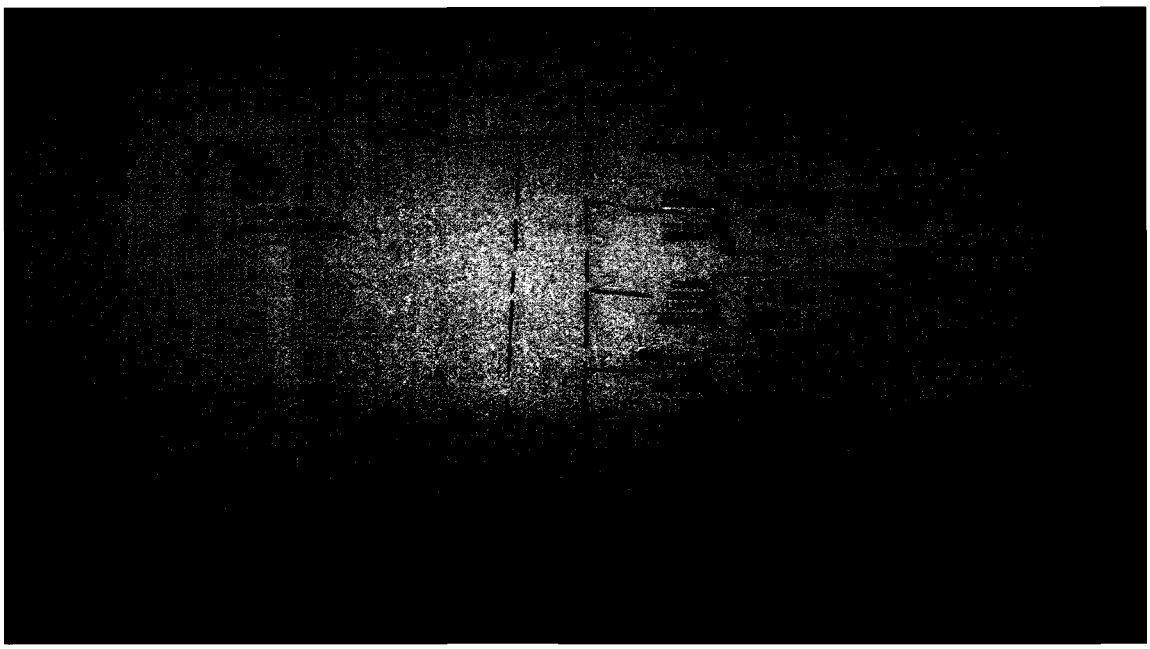
Identified options include:

- check efficiency of lighting: switch off lights in areas where daylight is strong enough (centre walkway, outer parts of the premises), check possibility of automatic control by measuring light intensity and dimming/switching lights
- check feasibility of changing the mercury vapour lamps to sodium low pressure lamps
- classify scrap and check volumes regularly
- switch off machines during breaks (including pumps for coolant)
- identify contributions to peak load by analysing a load curve and try to schedule the morning start up sequence to avoid high peaks
- improve insulation of the zinc pots on the dye casting machines
- It is estimated that by inversing the position of every second part and more closely approaching the parts, the consumption of steel and rubber can be reduced by approximately five percent
- Check the hysteresis of the air compressor
- Introduce a red tag approach
- Do a pressurized air audit
- Reduce cut off pressure to 6 bars after providing bigger storage tanks
- Check optimum concentration of oil in cooling lubricant
- Monitor pH of cooling lubricant
- When changing, clean the sumps carefully to remove residual organic matter which starts then the decomposition process
- Minimize the input of lubrication oils and hydraulic oils, respectively remove them to allow oxygen to enter the lubricant.

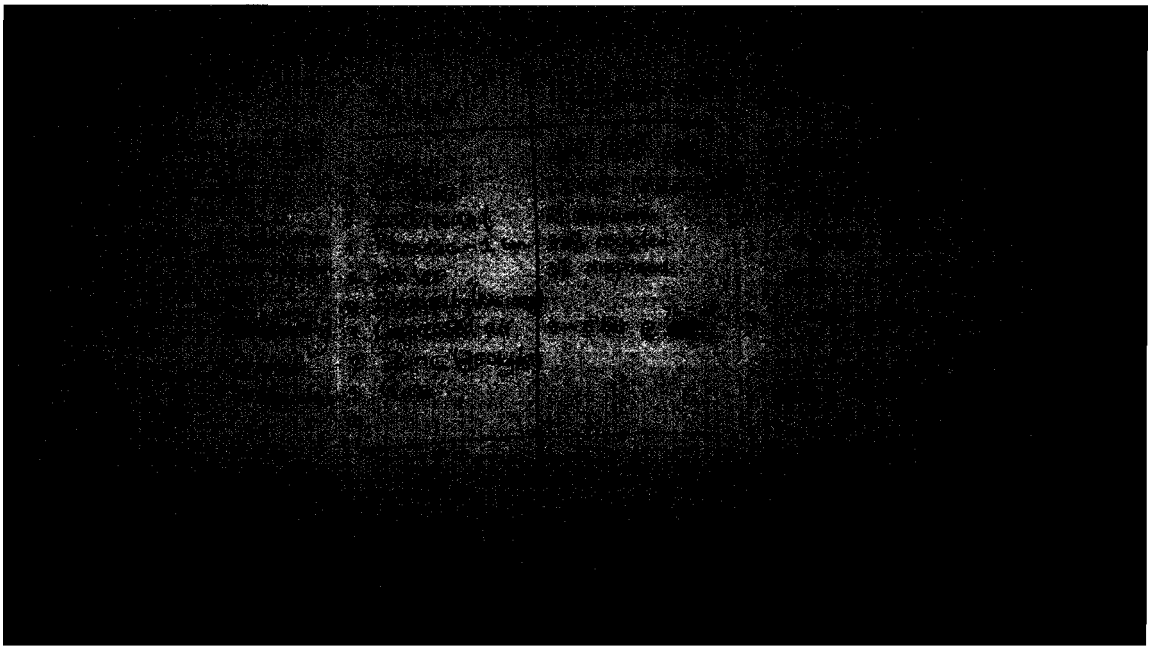
The evaluation of the company visit was done in two groups. The groups summarized a company description, compiled a flow chart, identified data for a preliminary input/output analysis and collected options for improvement.



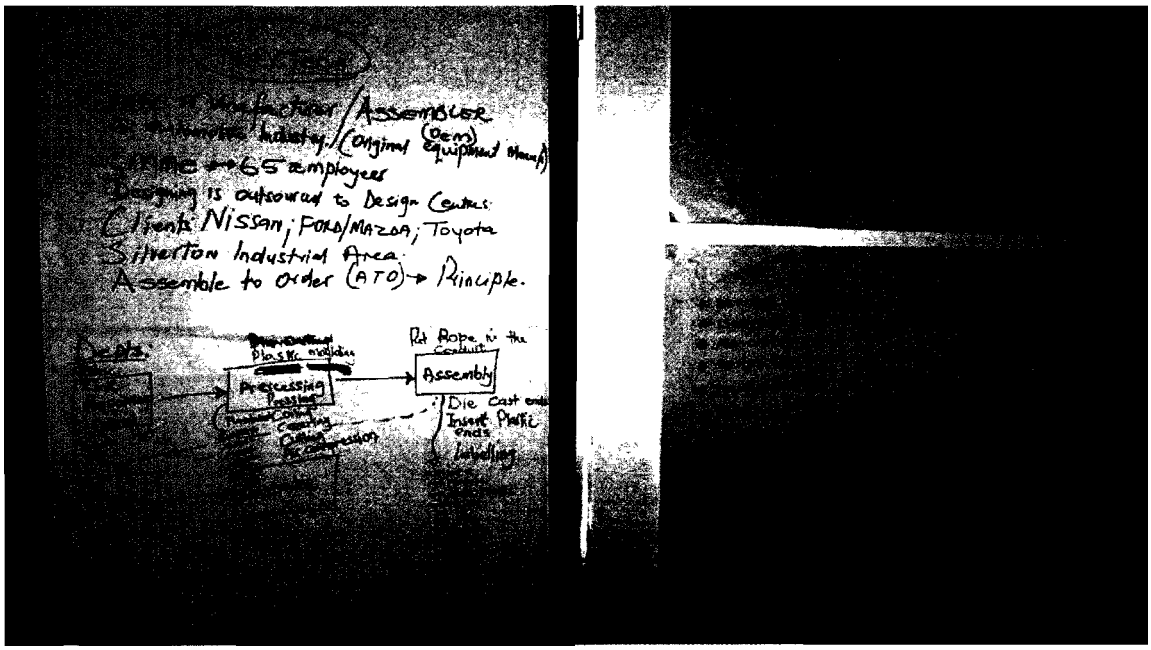
Picture 11 company description



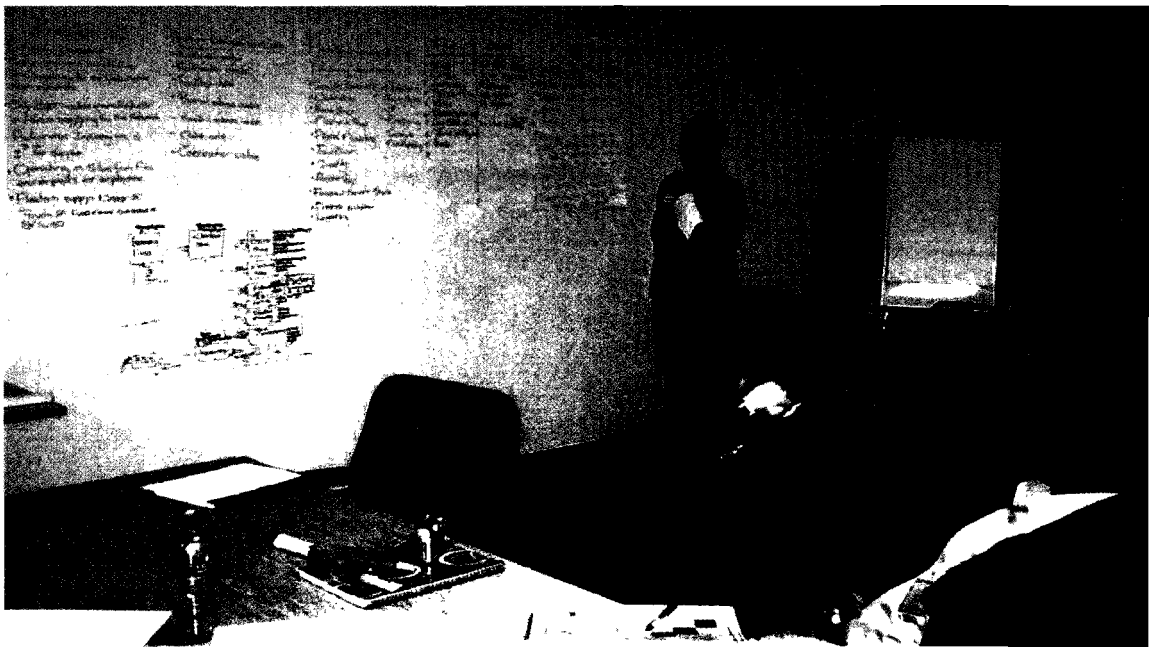
Picture 12 Flowsheet



Picture 13 Input/Output table



Picture 14 Options for improvement



Picture 15 presentation of the results of the evaluation

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School of Life Sciences

Annex 3

Report of Company Visit to Bosal

General Description of the company

Bosal is an international company with the headquarters in the Netherlands. The company runs 9 plants in South Africa. The visit was given to plant #9 (number 2 in size in SA) in Pretoria. The plant was built in 1982. Roughly 50% of the turnover is made in the automotive sector.

In plant #9 mainly tubes are manufactured. The usage of the tubes is manifold: for irrigation purposes, various agricultural applications, the mining sector - but the main focus is the automotive industry. As a 3rd tier supplier Bosal manufactures tubes for cars, e.g. silencers.

The processes carried out with of Bosal are:

- slitting of metal sheet, coming in from coils;
- bending and welding the sheets to tubes of various diameters;
- cutting it to length;
- value added department (bending to e.g. seats, producing irrigation tubes with fast couplings etc.);
- for certain lots, a small phosphatising (Zn and Fe-phosphatising) plant is installed.

Some rough key production data:

- slitting of 25'000 t of sheet metal
- production of 15 mn meters of tube
- scrap 4% of input, shall be reduced by 1%

Some financial data:

- electricity costs ≈ 150'000 ZAR/mth
- water costs ≈ 12'000 ZAR/mth

In terms of energy costs, electricity bills were shortly analysed. It turned out, that the electricity bill consists to nearly 50% of energy costs (kWh) and to more than 50% of the demand charge (per kW peak load). This means, that the company has to observe in first priority their peak load.

Walkthrough on Friday, June 13th 2008

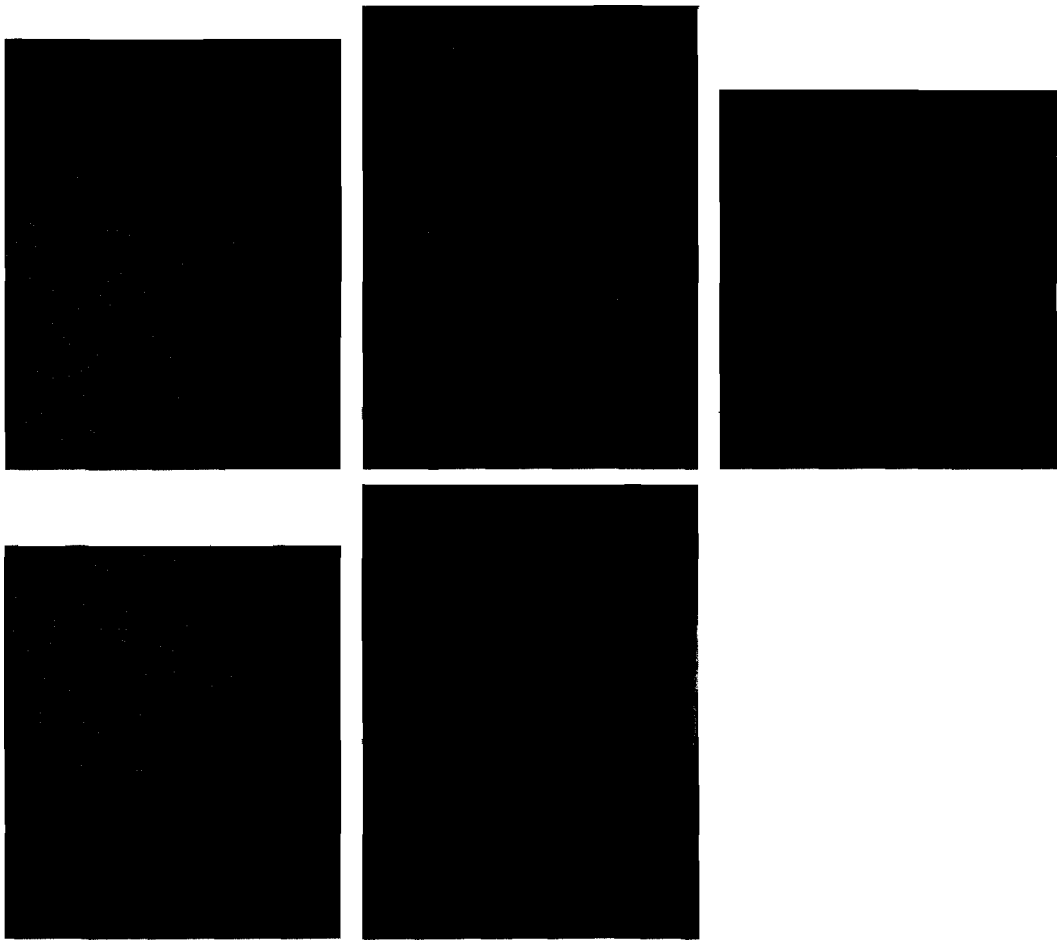
The visit started with introductory explanation by Hendrik on main products, the company produces, processes, that occur, key figures on consumption, scrap rates etc. After a short round of questions, the walk through the workshop took place.

The participants were divided into two groups, each accompanied by i) one member of the technical management of Bosal and ii) by one of the international experts. The disposable time was roughly 1½ hours.

Observations and Generated CP Options

The options generation process was carried out at the NCPC ("in classroom") in two mixed groups (not same as walkthrough).

The result of the group work was compiled on flip charts:

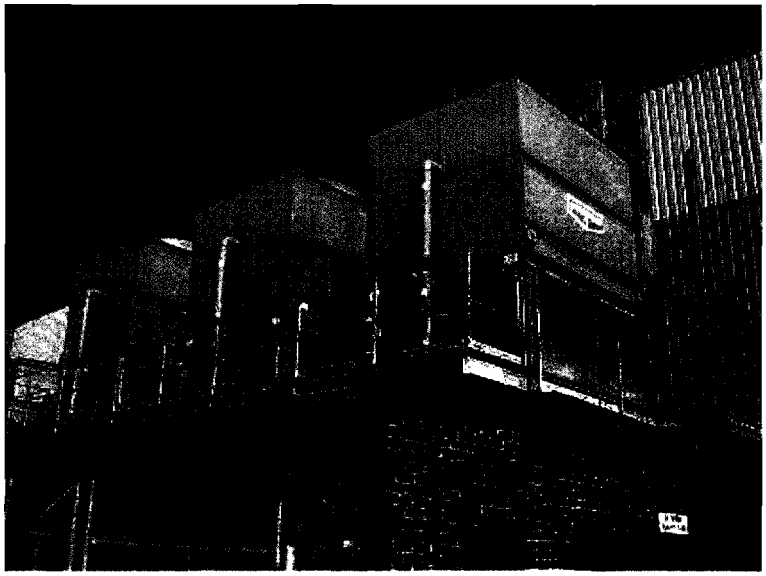


Picture 16 Flip charts of the found options during group working session

The following chapters contain some detailed information on the options.

Water Leakage at Cooling Tower, Compressed Air

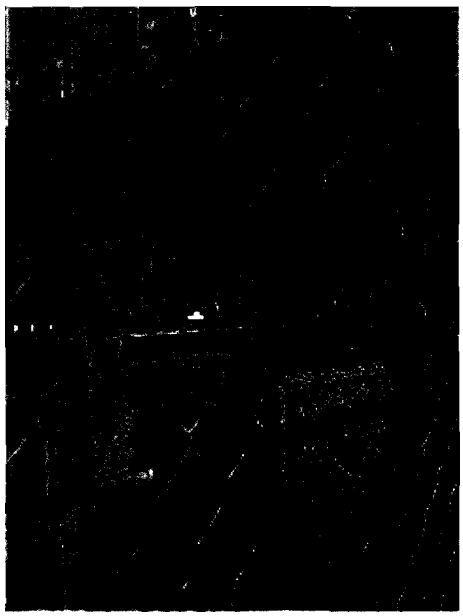
The air compressors are situated in a separate room outside the mill hall. On the roof of the compressor room the wet cooling towers are arranged.



Picture 17 cooling towers atop of compressor room

Two observations were made:

i) The air intake is rather unfortunately arranged. the air is intaken at a very sun exposed place.



Picture 18 air intake situation for air compressors

The air to be compressed should be as cool as possible. Therefore at least a shading device would be advisable.

ii) spilled water from the cooling towers ran directly into the air intake of the compressor. Because the compressed needs to be dried (which is done with a small chiller, that is run on electricity), additional water in the air leads to a bigger energy consumption of the dryer.

This water loss is due to a not properly working discharge valve. Thus costly water is spilled without necessity and causes two cost problems: higher water bill (and cost for water treatment) and higher electricity consumption at the compressor station.

Remedy to both problems: repair the valve and control the purge of the cooling tower according to conductivity of the cooling water.

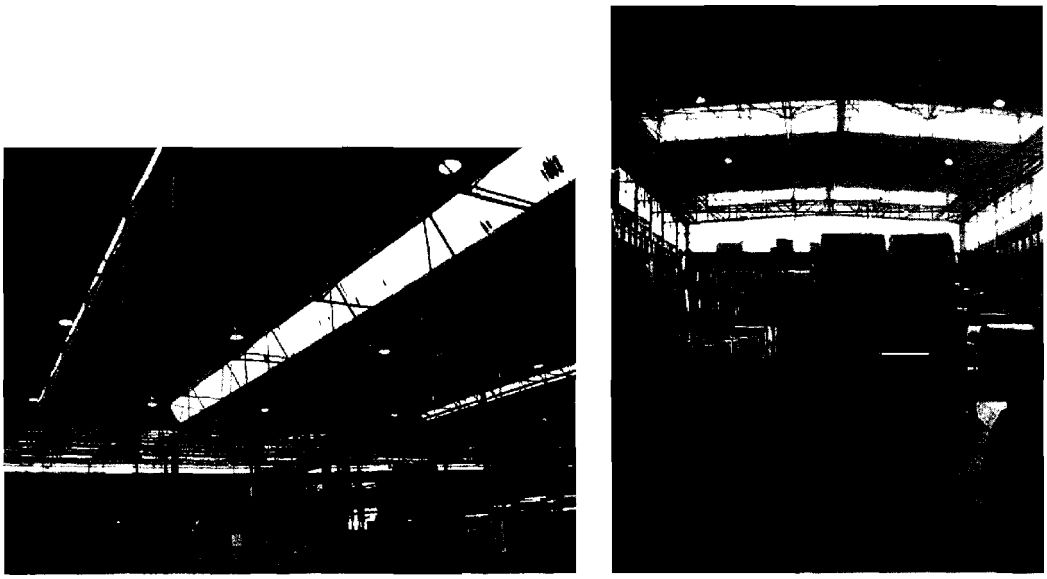
Tube Mill Oil Spillages

The lubrication and cooling agent is a mixture of oil and water.

- The concentration of oil in the water shall be checked, whether it can be reduced;
- the usage has to be improved:
  - the nozzles have to be directed more precisely to the place of usage;
  - the flow must be more constant. Currently the flow varies strongly, thus parts of the liquid splash over and are lost on the floor (and additionally cause safety issues);
  - moreover it could be considered, not to pour the liquid over the tubes, but to rather spray (at an defined angle). Thus the liquid would have to be put under (light) pressure, but the circulated amount of liquid could be considerably reduced - as well as the spillage.

Lighting

The installed lighting power is high. During day time, a considerable amount of these lights are in use unnecessarily. During the walkthrough some 30 kW of lighting power were used.



Picture 19 lighting in milling station (left) and coil department (right)

Picture 19 shows, that (especially in the coil dept) lights could most probably be switched off, the natural light through the roof would be enough. In the milling station at

least a control system to adapt the artificial light according to daylight intensity should be considered.

Thus the lighting concept has to be thought over. Moreover, new lighting technology has to be taken into account, e.g. FL tubes where possible (combined with bringing the light nearer to the place, where it is needed). In future, the use of very efficient LED-lights would be a cost effective solution (less consumption of electric energy, less power demand, longer lifetime).

Collection and Disposal of Chemicals, Waste Handling

Waste handling is far away from being optimal. A waste separation concept should be introduced as quick as possible.

Some impressions from the waste yard:

Picture 20 impressions from the waste yard at Bosal

Argon Evaporation

Today, Ar (inert gas for welding) is stored as liquid under a pressure of 23 bar. Thus, 1 kg Ar needs 204 kJ to be evaporated and heated up to 20°C. At a consumption of (as indicated) 9'000 kg/14 days, a heating power of roughly 5 kW is necessary. Currently, the heat is taken from the environment. The usage in an evaporator would be feasible, but the power which could be used to cool water (5 kW) is to small to pay a possible change. But the proposal to use at least the ice, which builds up at the evaporator could be - after having fallen from the evaporator - caught in a bin and put into the basin of the cooling tower.

Phosphating Dept

The baths are heated up with warm water, which is heated up by three small LPG burners.

Picture 21 degreasing and phosphating baths

The pictures in Picture 21 show, that the losses at the surface are big. Lids or similar would help to reduce dramatically.

Miscellaneous

Peak Load

The peak in electricity is told to be regularly after tea break in the morning. Therefore, the load at this time has to be analysed and reduced. It deals with switching off certain second priority consumers for some 2 - 5 minutes. The system (hand operated) is in place but currently not used, for a accordingly trained staff member does not exist after the leave of the responsible engineer.

Even an automatic load control should be evaluated.

Small consumers

Small *electric heaters* installed for unknown purpose. Check the necessity.

Pneumatic pump

In the waste yard a pneumatic pump is in operation.

These pumps are very energy inefficient and should be replaced by electric pumps (ex protected if this was the reason for the choice).

An indication: the overall efficiency of the compressed air system is roughly 5 - 10%. The efficiency of the pneumatic pump is also remarkably below 100%; therefore an overall efficiency from electricity to hydraulic power is approximately 5%. An electric motor has an efficiency of roughly 90%, an impeller pump works at maybe 65%; thus an overall efficiency electricity to hydraulic power is approximately 55%. Consequently, 90% of electricity could be saved.

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Annex 4

Evaluation of Training by Participants in Detail

The training was evaluated with the following questionnaire.

Workshop on Cleaner Production
Toolkit training – Pretoria

University of Applied Sciences Basel
FHBB
STENUM
Stoff · Energie · Umwelt

Date: June 9th - 13th 2008
Time: 8:30 am to 5:00 pm each day
Place: NCPC / CSIR Pretoria

UNIDO

Date: 6.6.08 ThB

1- Usefulness of thetoolkit training on Cleaner Production for my activities

( ) Excellent ( ) Good ( ) Average ( ) Bad

Comments: _____

_____

2- Assessment of the course contents:

( ) Excellent ( ) Good ( ) Average ( ) Bad

Comments: _____

_____

3- Didactical material used in the course:

( ) Excellent ( ) Good ( ) Average ( ) Bad

Comments: _____

_____

4- Mix between lecture and exercises:

( ) Excellent ( ) Good ( ) Average ( ) Bad

Comments: _____

_____

5- Teaching method within the course:

Dr. Hannes Fresner, Stenum GmbH ( ) Excellent ( ) Good ( ) Average ( ) Bad

Dr. Thomas Bürki, FHBB ( ) Excellent ( ) Good ( ) Average ( ) Bad

Comments: _____

_____

6- Competence of the lecturer:

Dr. Hannes Fresner, Stenum GmbH ( ) Excellent ( ) Good ( ) Average ( ) Bad

Dr. Thomas Bürki, FHBB ( ) Excellent ( ) Good ( ) Average ( ) Bad

Comments: _____

_____

7- Clearness of the lecture/presentation:

Dr. Hannes Fresner, Stenum GmbH ( ) Excellent ( ) Good ( ) Average ( ) Bad

Dr. Thomas Bürki, FHBB ( ) Excellent ( ) Good ( ) Average ( ) Bad

Comments: _____

_____

8- Time planning:

( ) Excellent ( ) Good ( ) Average ( ) Bad

Comments: _____

_____

9- Installations at the place of lecture:

( ) Excellent ( ) Good ( ) Average ( ) Bad

Comments: _____

_____

10- To what extent did the course meet your expectations:

( ) Complete ( ) Partially ( ) Not satisfied

Comments: _____

_____

11- Personal Competence on Cleaner Production after the toolkit training

( ) Increase ( ) Unchanged ( ) Confused ( ) Not interested

Comments: _____

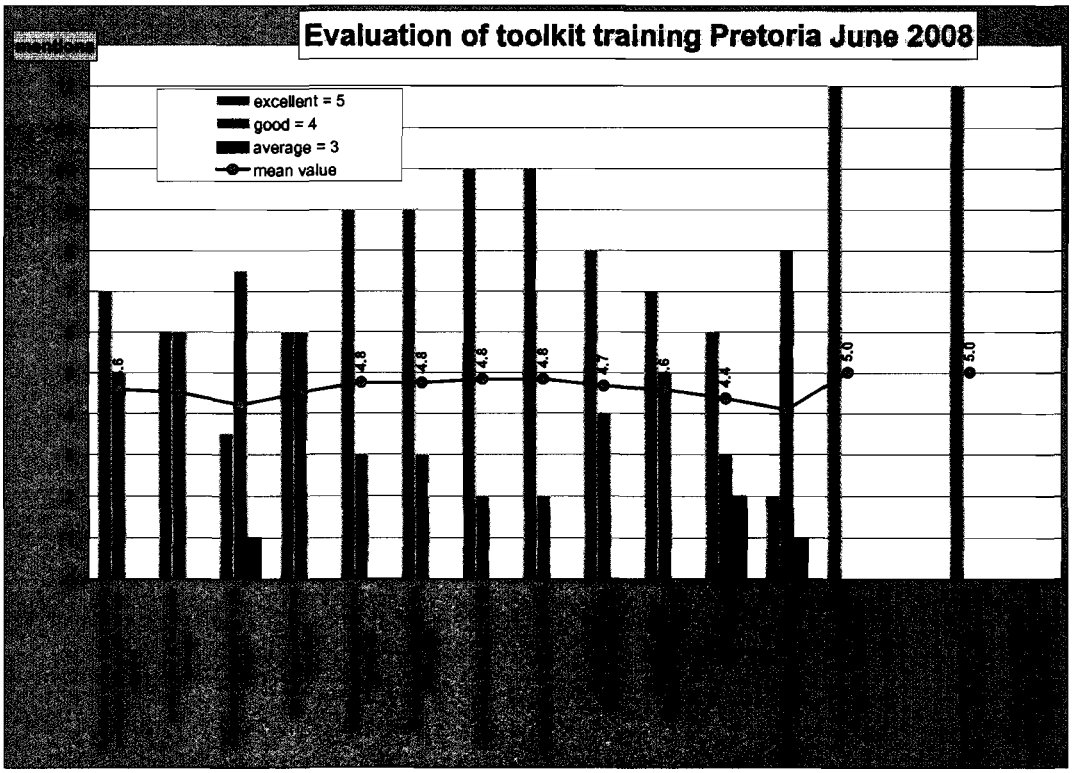
_____

12- Additional comments and suggestions to be implemented in the following modules:

_____

_____

The evaluation of the questionnaires showed the follwoing results:



Picture 22 evaluation results

The comments given are wrapped up in the following table:

Evaluation toolkit training Pretoria

	Item	comment
1	Usefulness of the toolkit training on Cleaner Production for my activities	the tool will defintiely help me to do CP assessments
		learnt a lot
		the best part is the genetrfation of the different reports
		good understanding of the relation between CP and CDM (my speciality)
2	Assessment of the course contents:	very informative and well packaged
		look at more time/duration of the course
		The fun was the winner
3	Didactical material used in the course	some of the slides were not readable; Font size to small on some slides
		the levels of the course participants need to be homogenised to the course content
		the electronic toolkoit would have been good to have
4	Mix between lecture and exercises	maybe provide more exercises and site visits
		effective
5	Teaching method within the course HF	very good teaching methods
		thank you so much guys, we really learned a lot
		balance between didactic and narrative is good between the two personalities
6	Teaching method within the course ThB	very good teaching methods
		thank you so much guys, we really learned a lot
		balance between didactic and narrative is good between the two personalities
7	Competence of the lecturer HF	both were knowledgable about the topics; very freindly and approachable
		know how to present content in simple and understandable fashion
		these guys are truly veterans and competent, pragmatic and not too academic
		patient but think they are technical experts ????? couldn't understand our challenges
8	Competence of the lecturer ThB	both were knowledgable about the topics; very freindly and approachable
		know how to present content
		these guys are truly veterans and competent, pragmatic and not too academic
		experienced lecturer

9	Clearness of the lecture/presentation HF	
10	Clearness of the lecture/presentation ThB	
11	Time planning	all material contents were covered and were elaboratedd in details were necessary
		some sldie sessions too long
		there were some extended periods of non activity
		I had a very late notice to participate in the course. So I apologise to have skipped two ac
12	Installations at the place of lecture	use a warmer room
13	To what extent did the course meet your expectations	very comprehensive covered all areas that needed a lot of calrity. Especially with flow dia
		we definitely need practise - we shall call upon you for benchmarking our consulting wor
14	Personal Competence on Cleaner Production after the toolkit training	concept of CP was well interpreted, my knowledge on the subjects has increased
		I will defintivela improve on my methodologoies
15	Additional comments and suggestions to be implemented in the following modules	it will take more practical work to be totally competent and champion in CP
		site visits should be strudtured to allow more time for questions and observatrions. not ru
		Everything was useful. I have no complaints whatsoever. I am very happy with teh trainin
		I would suggest that we have experst available within SA to assist us. Bacause after the tr
		thank you very much. I think the courseshould be offered in 3 months or more and more
		give more time to energy section/module also include the different consumers as well as
		sometimes some engineering concepts were assuemd to be known to participants. Not a
		We need a permanent CP institute in SA. UNIDO must push the NCPC-SA forward
		well plannned and executed. However, the training was pretty long

Cleaner Production Assessment Report

of

Tubecon SA Ltd

Introduction

1. Objectives and description of the CP report form:

Cleaner Production in the view of this project is a systematic approach to operational improvement of the client company. In this context it is quite important to state that company know-how is the most important expertise to develop economically and environmental friendly and safe solutions for the benefit of organisations. They know their procedures best and it is essential for the success of a CP project that this knowledge, detailed information about the company, is compiled and transferred to the external CP consultant. Only with the help of this data the CP consultant will be able to analyse the strengths and weaknesses of the organization as a hole and be able to generate reasonable business solution from an external point of view.

The methodology of this knowledge and data collection depends on the specific situation of the company, and may sometimes be rather exhaustive. In larger companies, a big amount of data may already be available and electronically retrievable by simply pressing some keys. In other companies only few data will be available and need to be generated during the assessment phase of this project. In any way the result of the first project phase will be a comprehensive collection of the company data to identify feasible CP options, to assess the development and results of the measures and to provide the management with figures for project review.

To facilitate an efficient and effective data acquisition in compliance with the UNIDO CP methodology the present format for the CP report has been elaborated, containing all necessary instructions, data form sheets and tables to develop the final CP report. This report will be completed during the project by developing and completing step by step the stated sheets and tables. In addition, photos documenting the „situation before and after" the assessment should be included in the report.

The report should provide basic information on the clients company, a detailed data inventory, the priority areas for CP intervention and reasonable measures, an action plan and appropriate indicators for the implementation and monitoring of the identified CP options. The report will- in the final stage - also contain an environmental policy and technology recommendations.

The report will be evaluated by the UNIDO evaluation committee. All company specific data will be kept confidential.

Cleaner Production Assessment Report

of

Tubecon South Africa

NCPC South Africa

Dube Mazimba (AIDC)
Podesta Maepa NCPC
Dr. Johannes Fresner (UNIDO)
Dr. Thomas Bürki (UNIDO)

Introduction

Podesta: please write intro

Abstract

Podesta: please write abstract
(not more than 200 words)
This should include:

- short description of the company (refer to QuickScan report and tubecon report of Dube)
- description of the audit focus and reason for the choice
- main CP options identified
- achievements: economic savings and environmental benefits (differentiate between options already implemented and options planned)
- main recommendations for follow-up

Table of Contents

1. Initial Environmental Assessment

	☺	😐	☹
Storm Water		x spillage of lubricant	
Waste Separation			x gloves, plastics etc. in scrap
Waste Water			x
Solid Waste			
Air Quality		x saw dust problems backside, zinc dust, no lids / covers on galvanising baths	
Noise			x discharge after cutting, no ear plugs worn
Hazardous Materials (including intermediates and by-products)			x used acids
Energy		x no insulation with baths, compressed air, lighting, PC screens in offices	
Environmental Policy			

Environmental questionnaire

CAN YOU ANSWER YES TO THESE QUESTIONS?

If you answer **NO** to one or more of these questions then you could be missing opportunities to save money, or you could be harming the environment.

N/A stands for "not applicable". Podesta: please complete (evtl. with Dube)

Water quality management

Storm water

Do you know where the storm water drains on your premises are located?

☐Yes ☐No ☐N/A

Do you have any features or procedures in place to prevent storm water pollution?

☐Yes ☐No ☐N/A

Are the storm water drains around your business free of pollution? (litter, sand, metal shavings etc.)

☐Yes ☐No ☐N/A

Do you store all equipment, materials and liquids so that spills or leaks could not enter the storm water system?

☐Yes ☐No ☐N/A

Do you regularly clean up the surface areas around your premises?

☐Yes ☐No ☐N/A

Do you use a broom instead of a hose to sweep and clean up the surface areas around your premises?

☐Yes ☐No ☐N/A

Wastewater

Do you have a permit from the local water authority (if needed)?

☐Yes ☐No ☐N/A

Do floor drains in the work area drain to either a storage tank or direct to the sewer?

☐Yes ☐No ☐N/A

Do you use a vacuum cleaner (appropriate to the process) to clean up dust and sand?

☐Yes ☐No ☐N/A

Groundwater

Do you know if your site has groundwater under it?

☐Yes ☐No ☐N/A

If there is groundwater under your site, do you take precautions to prevent pollutants from entering the groundwater?

☐Yes ☐No ☐N/A

Raw Material

Do you know the composition of your materials?

☐Yes ☐No ☐N/A

If a supplier was willing to take your waste for reuse can you guarantee a regular supply?

☐Yes ☐No ☐N/A

Do you have a licensed waste transporter to transport:

General production waste? ☐Yes ☐No ☐N/A

waste chemicals? ☐Yes ☐No ☐N/A

liquid wastes? ☐Yes ☐No ☐N/A

Air quality management

Do you take measures to prevent dust from leaving your premises?

☐Yes ☐No ☐N/A

Do you take measures to prevent fumes and vapour (including odorous emissions) from leaving your premises?

☐Yes ☐No ☐N/A

Hazardous materials

Do you store all hazardous materials (such as resins, catalysts) in a bunded, covered area that will not allow any spilled or leaked materials to enter the storm water system?

☐Yes ☐No ☐N/A

Do you have a Dangerous Goods Licence, if needed?

☐Yes ☐No ☐N/A

Do you have all the relevant material safety data sheets (MSDS) and keep them in an accessible place?

☐Yes ☐No ☐N/A

Do you have a spill fighting equipment and written procedures?

☐Yes ☐No ☐N/A

Noise management

Do you regularly check and carry out maintenance on noisy equipment?

☐Yes ☐No ☐N/A

If you have had complaints about noise, have you identified the source of the noise and taken steps to reduce its effects?

☐Yes ☐No ☐N/A

Management of premises

Have you made any changes to your business for environmental reasons?

☐Yes ☐No ☐N/A

Do you have an environmental policy or plan?

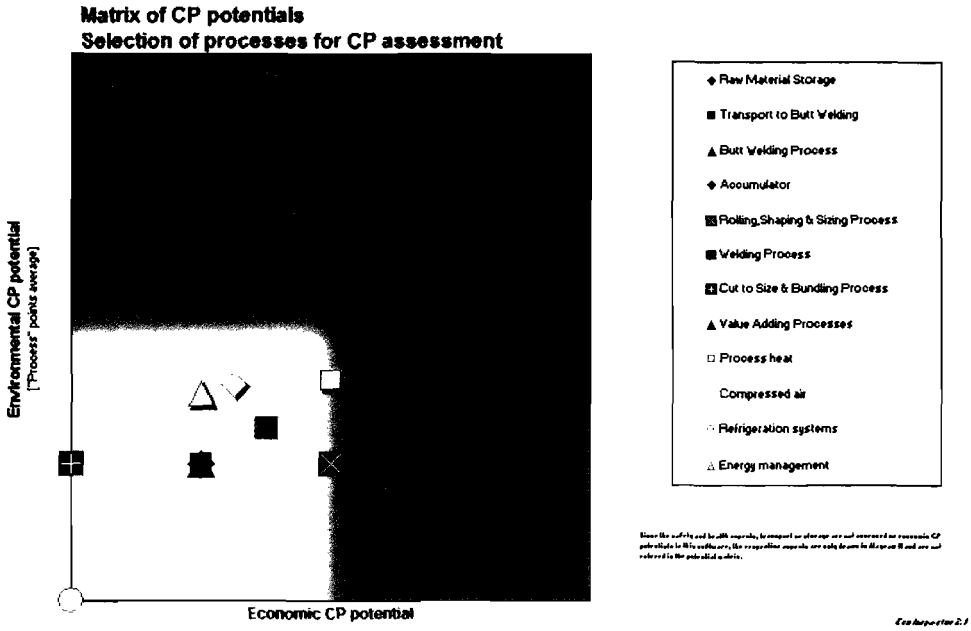
☐Yes ☐No ☐N/A

If you answered NO to any of the questions in this checklist you can use the information in this package to develop an environmental improvement program that will be good for you, your staff and customers. Now that you have completed this checklist and identified the areas where you can make improvements:

- Read through the environmental information sheets.
- Get started on an environmental improvement program that will be good for you, your staff and your customers.

Evaluation of the initial assessment:

The Quick Scan carried out in August 2006 led to the following overall assessment:



The following recommendations were given:

Health and Safety (general recommendations)

Cleaner production and improved environmental performance needs to be institutionalised, and monitoring undertaken if environmental impact is to be reduced and continued financial savings realised. Experience shows that, where this is not the case, some regression occurs. To this end, the following is recommended:

1. The **job description** of a selected staff member should formally include **environmental performance** management **(energy, waste, water)**, including monitoring **safety and health** issues.
2. **Employees should be provided with information** on how they can be environmentally responsible, including water, energy and waste efficiency, as well as safe in the workplace.
3. The **company needs to review its safety plan and align themselves to safety regulations** (see Appendix A for details). This includes ensuring that the workers also adhere to regulations. For example, the company indicated a problem with workers not complying with the policy to wear earplugs in certain areas. A **brainstorming session** among staff could develop **incentives and disincentives** for staff to adhere to safety standards. This should be done hand-in-hand with a **training session** for staff so that they fully understand why it is important for them to adhere to regulations.
4. All **fire extinguishers need to be made visible and easily accessible**, so that they can be reached in case of an emergency.
5. All machines need to have **safety guidelines** easily accessible to the staff.
6. An **extractor fan on the phosphate baths** area should be installed to ensure the safety of the staff working with these chemicals.

Good Housekeeping

The company needs to do maintain good housekeeping habits. The factory is dirty and there is spillage of oil and lubricant all over the factory floor making it slippery, which is a danger to staff. Poor floor conditions are a leading cause of accidents so cleaning up spilled oil and other liquids at once is important. Allowing chips, shavings and dust to accumulate can also cause accidents.

1. The company should implement **a housekeeping programme** for all the different departments and this should be **linked to performance**, giving an **incentive** to staff to take it seriously.
2. Trapping chips, shavings and dust before they reach the floor or **cleaning them up regularly** can prevent their accumulation. Areas that cannot be cleaned continuously, such as entrance ways, should have **anti-slip flooring**. Keeping floors in good order also means **replacing any worn, ripped, or damaged flooring** that poses a tripping hazard.

Waste management

Household waste was mixed with metal scrap.

1. The regular **collection, grading and sorting of scrap** contribute to good housekeeping practices. It also makes it possible to **separate materials** that can be **recycled** or sold from those going to waste disposal facilities.
2. Allowing material to build up on the floor wastes time and energy since additional time is required for cleaning it up. **Placing scrap containers near where the waste is produced encourages orderly waste disposal and makes collection easier.** All waste receptacles should be clearly labelled (e.g., recyclable glass, plastic, scrap metal, general waste, etc.).

Storage

Good organization of stored materials is essential for overcoming material storage problems whether on a temporary or permanent basis. There will also be fewer strain injuries if the amount of handling is reduced, especially if less manual materials handling is required. The location of the stockpiles should not interfere with work but they should still be readily available when required. Stored materials should allow at least one metre (or about three feet) of clear space under sprinkler heads.

1. **Stacking drums on a firm foundation and cross tying them**, where necessary, reduces the chance of their movement.
2. **Stored materials <u>should not</u> obstruct aisles, stairs, exits, fire equipment, or first aid stations.**
3. **All storage areas should be clearly marked.**
4. **Flammable, combustible, toxic and other hazardous materials should be stored in approved containers in designated areas** that are appropriate for the different hazards that they pose. Storage of materials should meet all requirements specified in the fire codes and the regulations of environmental and occupational health and safety.

Raw Material Storage

The Stock management system could be improved as there seems to be no strict adherence, to the system. There are sight variations to the documented system making the system inefficient. The FIFO system is difficult to maintain as material is being loaded from the floor up, making a LIFO

system effectively. There is also a big safety issue where the exposed burrs in the tube could cause serious injury

Conclusions and comments

From observations during the walk-through assessment, it is quite clear that health and safety regulations are not adhered to persistently. This can cost a company a lot in time, money, employee turnover rates, and possible lawsuits if the regulations are ignored. It is very important for management to insure that Health and Safety measures are enforced.

1. Company Information

Company table:

- Company Name	Tubecon South Africa
- Address	Piet Rautenbachstr Street Rosslyn 0200
- Phone, Fax	+27 12 541 3211
- e-mail	
- web	www.tubecon.co.za
- Trading Since (year)	
- No. of Employees	
- Industrial Process used	pipe manufacturing
Environmental Team:	
- assigned Environmental Manager and position within the organization	
- Team members and positions	o
Contact Person: Name Phone Fax and e-mail Position	

Brief Company profile

Tubecon (Pty) Ltd manufactures a range of hot- and cold-rolled and galvanized tubular products. The company is located in Rosslyn and has a total of 127 employees.
Products ranges from 12.7mm to 152.4mm round tube with wall thickness from 0.7mm to 5mm. There are different material grades being used such as SAE 1010, SAE 1008, Z450, Z275, 300WA, CORTEN A and DOCOL. Tubecon supplies its products to the following markets: automotive, furniture, agricultural, mining, engineering and construction.
To explain the manufacturing process, steel rolls are feed through a mill which converts the rolls into tubes through a process of forming the metal, then folding the steel into circular form and finally welding the seam together. The tube is then resized or the shape is changed to square, rectangle and various polygons. The tubes then go through a process of cutting to length as the last stage in the process.

Different tube sizes require different roller sets to be fitted onto the mill. The biggest challenge is to keep tool changeovers to a minimum when changing to manufacture different parts, this aspect became one of the focus areas for improvement. This is a process of linking each roll set to the total number of products in that product family.

Tubecon utilizes 3 mills to manufacture all of its tubing per annum. The mills are the main value adding processes in tube manufacturing but offer little opportunity for improvement as the equipment configuration and performance would be capital intensive to change. Current production in various wall thickness and outside dimensions is about 6950 tons per annum

2. Summary of production data

WORKSHEET 1
The most important products / services

Company: Tubecon Created by: Team

No.	Product or service / Intended use	Quantity per year	Measuring unit
1	tubes from mill 1, small diameters	2'695	t/yr
2	tubes from mill 2, small to medium diameters	5'225	t/yr
3	tubes from mill 4, large diameters	3'725	t/yr
4	tubes via value added department		t/yr

Add rows if needed - place cursor at the beginning of this line, go back one position by pressing the "←"-button and press "Enter".

WORKSHEET 2
The most important types of waste and emissions

Company: Tubecon Created by: Team Page:

No.	Waste and/or liquid or gaseous emissions	Quantity per year	Measuring unit	Purchase costs	Disposal costs	Total costs
1	scrap	900	t			
2	out of spec / 2nd quality					
3	lubricant					
4	waste water					
5	zinc					
8	acid					
9	waste heat					
10						

Add rows if needed - place cursor at the beginning of this line, go back one position by pressing the "←"-button and press "Enter".

WORKSHEET 3
The most important raw and process materials

Company: Tubecon Created by: team

No.	Material	Quantity per year	Measuring unit	Unit costs	Total costs	Use	Percentage in the product
1	steel coils						
2	lubricant						
3	electricity						
4	water						
5	lubricant (flexilube)						
6	acetylene / oxygen						
7	zinc						
8	degreaser						
9	phosphoric acid						
10	sulphuric acid						
11	paint						

Add rows if needed - place cursor at the beginning of this line, go back one position by pressing the "←"-button and press "Enter".

WORKSHEET 4 (see raw materials worksheet)
Major toxicological raw and process materials

Company: Created by: Page:

No.	Material	Quantity per year	Measuring unit	Unit cost	Total cost	Use	Percentage in the product
1	phosphoric and sulphuric acids						
2	detergent /caustic soda						
3	chromate						
4	cooling lubricant						
5							

3. Flow Chart and Process Description

Out-sourced Processes:

- Raw steel
- Raw steel sheets cut into 5 – 20 slits
- delivered to Tubecon

In-house Processes:

- Receiving
- Plant (Storage 4-5 km from processing plant; overflow stored at factory)
- Decoiler (20 kW)
- Butt Welder (20 kW)
- Accumulator (60 kW)
- Forming (170 kW)
- Seem Welder (300 kW)
- Sizing (50 kW)
- Turks (pressure powered)
- Cut off (cold saw 5 kW)
- Bundling (Electric Crane 15KW)
- End - Scrap, Factory, Customer.

4.2 Value Added:

- Cut to length
- pressure testing (~80 bar)
- threading
- flaring
- swaging
- end facing
- precision drawing (100 kW; 7 stage process)
- drawing
- dipping/painting (3 stages)
- bending (outsourced)
- galvanizing (outsourced)

Worksheet 5

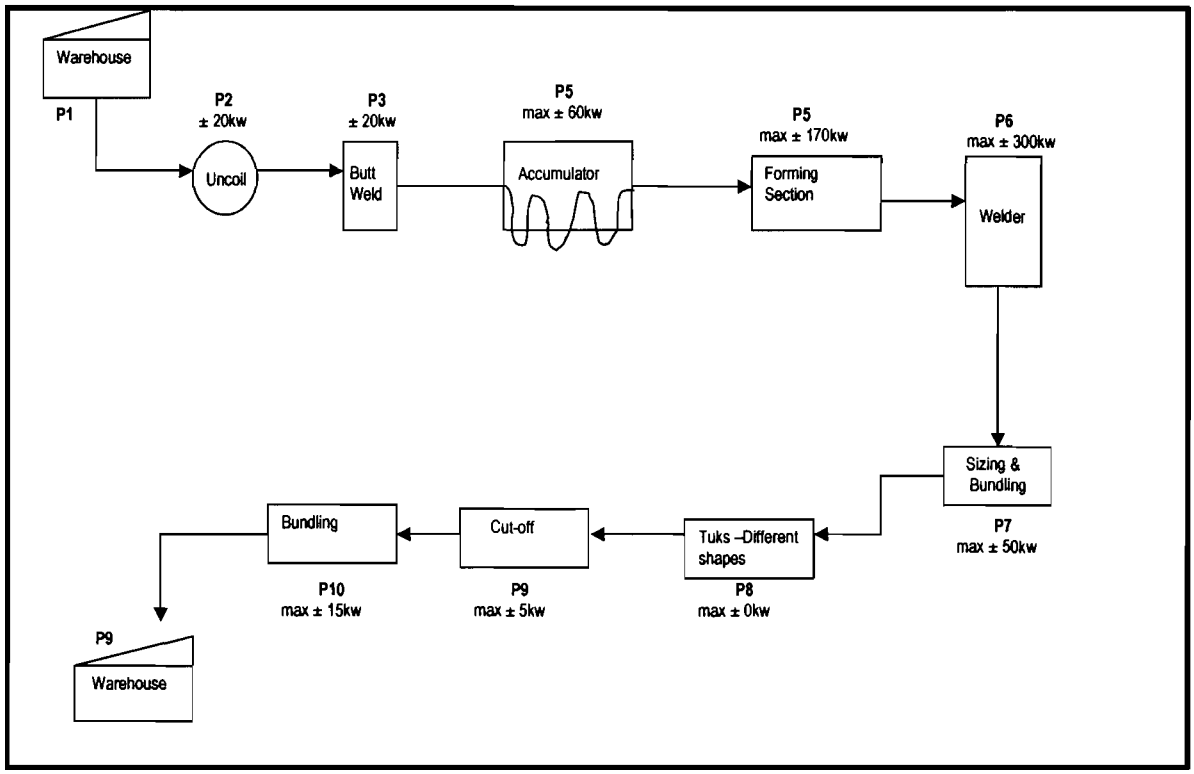


Figure 1 **flowchart of pipe rolling process**

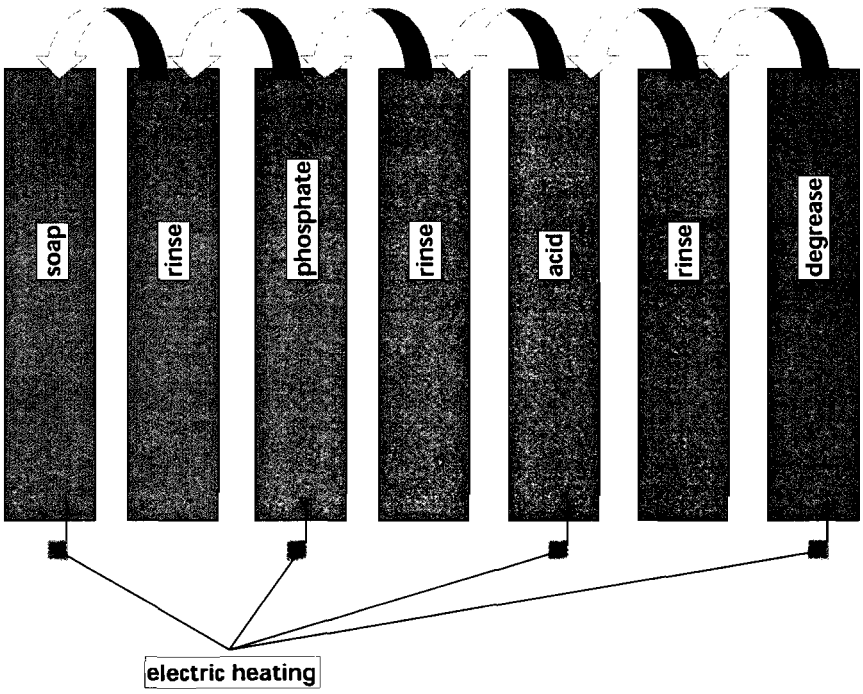


Figure 2 **flowchart of galvanising process**

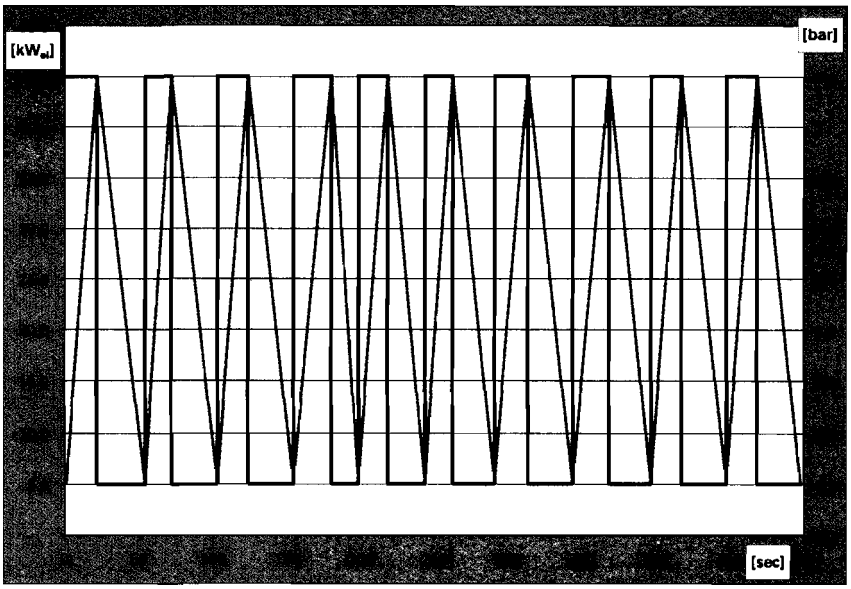


Figure 3 **evaluation of air compressor load cycles**

Worksheet 6
Description of the used technology in the production process

Process: Number	Process Name:	Equipment in Use
1	pipe rolling	3 mills
2	galvanising	conventional electrically heated baths; no counter flow rinsing
3	air compression	screw type compressor, on-off-control. Pressure variation 6,3 - 7,1 bar

4. Detailed Assessment Phase

Register of environmental aspects and evaluation of significant processes

Worksheet 7
Red is a significant process
Orange: process needs to be observed
Green: Process need to be further investigated

Impacts: 1 is significant - 2 is minor significant – 3 not significant

Department:
Process:
Responsibilities:

Evaluation Result: significance red

Activity Product	Aspect - normal - abnormal Operation	Environmental and Economical Impacts					overall signifi-cance traffic light			Action
		Nature	Human	Raw Material	Energy	Legal compliance				
Write the process step	**In normal use Accident or brake down**	**Impacts to flora, fauna…**	**health and safety …**	**Raw material and waste**	**Loss of heat, energy**	**Danger of non compliance**				further assessment observation no action
unwiring from coil	n	3	2	2	3	3			■	
forming	n	3	3	2	2	3		■		
welding	n	3	3	1	1	3	■			
zincing	n	3	2	2	1	2	■			
cutting	n	3	2	2	2	3			■	
storage	n	3	2	3	3	3			■	
value added	n	3	1	2	1	2	■			
painting	n	3	2	3	2	2		■		

Selection of audit focus

Worksheet 8

In the table below the areas initially identified as having opportunities for implementation of CP within the production process concerned are given. In the second column ('CP Focus') the specific part(s) on which the CP audit should concentrate are indicated. Finally, the implementation priority and remarks about the prioritization is stipulated.

Identified (sub-)processes with CP opportunities		CP Focus	Priority	Remarks
1.	Forming / welding	identification of problem /cause analysis lubricant collection	1	saving potential 1,8 Mio Rand/yr
2.	storage	tray optimisation for lubricant recovery	2	saving potential
3.	value added	conductivity control install counter flow rinsing cascade insulation of treating baths / cover	1	saving potential
4.	painting	install counter flow rinsing cascade reduce water flow (check conductivity)	1	saving potential
5.	compressed air	install VSD, adjust pressure level to 6,3 bar ± constant	2	saving potential
6.	lighting	replace shed windows install daylight depending dimmers (lumen sensors) control the various light lines independently	1	saving potential
7.				saving potential
8.				
Add rows if needed - place cursor at the beginning of this line, go back one position by pressing the "←"-button and press "Enter".				

Worksheet 9:
Mass and energy balances on steel for option finding

Mass and energy balances on water for option finding

Department	water usage	percentage of total water usage
	m3/yr	%
sanitary	1'200	20.9
painting	2'500	43.5
galvanising	1'500	26.1
lubricant make up	550	9.6
Cooling tower		-
total	5'750	100

5. CP Options Generation and Implementation

Worksheet 10
CP options generated per identified Focus of Audit

Per CP Focus give the CP Options according to the table below. The number in the upper left corner of the table corresponds with the selected CP Focus (see 5, 'Selection of audit focus').

		Only fill out **Pos** (= positive, yes), **Neut** (= neutral, don't know), **Neg** (= negative, no) or **n.a.** (= not applicable, not available)						
	Description of CP Option[1]	**Directly Implemented[2]**	**Technical Feasibility**	**Economic Viability**	**Environmental Evaluation**	**Implementation Decision**	**Investment (€)**	**Savings (€)**
1.	modify rinsing in paint shop (→ counter flow rinsing). Install conductivity measuring / check							
2.	modify rinsing in galvanising department (→ counter flow rinsing). Install conductivity measuring / check							
3.	insulate treatment baths in galvanising and paint shop							
4.	improve cover of hot baths in galvanising dept with plastic fingers							
5.	replace windows in shed							
6.	install daylight dependant control of lights (lumen sensors)							
7.	control each lighting line separately (new wiring)							

8.	improve air compression by installing a VSD to the compressor (and be prepared to buy a ready installed VSD compressor with accordingly reduces power when due)							
9.	repair leakages							
10.	disconnect appliances / installations not in operation from the grid							
11.	install system to relate scrap to cause (e.g. install a DMS 2000 system). Collect and interpret data on a weekly basis							
12.	use bigger coils to reduce cross welding scrap							
13.	reduce stops during pauses							
14.	reduce lubricant losses							
Add rows if needed - place cursor at the beginning of this line, go back one position by pressing the "←"-button and press "Enter".								

[1] Try to describe exactly, what should be changed, for example: change of raw material by using recycled material, change manual control of fuel feed for boiler to automatic control consisting of preventative maintenance etc.

[2] Without further assessment

Implementation and continuation

Worksheet 11: Action Plan

Give a detailed action plan table for every CP Focus separately (F1, F2,...etc).
Podesta. Please make proposal

F1	Task	Resources needed (if any)	Responsible person	Date due	Date accomplished
1.					
2.					
3.					
4.					
5.					

Worksheet 12: Monitoring

Give an overview of the achievements for every CP Focus separately (F1, F2,...etc). If not, consider the full production process concerned with total production figures.

The figures should include the savings and benefits achieved for all options **already or partly implemented**. Please also add a separate table showing the benefits expected from the CP options that are planned for the next year but not yet implemented.

Kindly consider shifts of waste load from one flow to another (e.g. from waste water to solid waste/sludge)

F1	***If table is not complete for your purposes kindly add new components but keep lay out settings***	**Quantity or %**	**Explanation (if necessary)**
Increased production	type of product		
Savings - use '+' to indicate %-increase - use '-' to indicate %-decrease	steel purchased		
	lubricant	25%	
	water consumption		
	energy (electricity)	266 MWh/yr	
	time		
Environmental impact - use '+' to indicate %-increase - use '-' to indicate %-decrease	scrap	25%	
	waste water discharge		
	- BOD		
	- COD		
	- etc.		
	gas emissions		
	- NO_x		

	- CO_2		
	- SO_2		
	- CFC		
	- ODS		
	- VOGs		
	- Global warmers		
	- etc.		
Add rows if needed - place cursor at the beginning of this line, go back one position by pressing the "←"-button and press "Enter".			

Note: if data are not available or the component is not applicable, do not fill out a blank but kindly delete component or fill out **n.a.**

For every focus a table can be added by copying the table above.

6. Sustain Cleaner Production activities

It has been agreed upon during the meeting with the management (among others the MD) that the NCPC will follow up the implementation and contributes to the monitoring of the results. For the management of the company is heavily loaded with work, the following plan was developed:

- the NCPC inquires on the state of implementation every two months
- during the calls the NCPC shall analyse whether further support (acquiring information, data, calculations etc.) are desired from the NCPC
- after measurements have been implemented, the NCPC monitors the results and evaluates them (plus makes a comparison between expected and achieved)

7. Environmental Policy

8. Annex

Containing all relevant additional data.

Cleaner Production Assessment Report

of

ZF Boge Elastmetal SA (Pty) Ltd

Abstract

ZF is a subsidiary of ZF Germany. The company manufactures automotive components for various automotive manufacturers. The company employs 63people at the site and has a turnover of 32 million Rand per year. The products range includes hydro-mounts, spring eye bush, shock absorber eye bush, elastic control eyebush, and rubber mountings. The raw materials are steel components and uncured rubber raw material. The customers include Volkswagen, Nisan, General Motors, Transwerk, BMW, Toyota, Gabriel, Armstrong, and Ford Motor Company. A full scale inplant assessment was conducted at the companies premises in Doreen Avenue, Rosslyn Ext. 1, Pretoria in February 2007. The findings include:

- by reducing the pressure of the pressurized air compressor, closing leaks, improving control approximately 7.000 Rands can be saved annually
- hot air of the compressor can be used in the driers (appr. 15 – 30.000 Rand per year savings)
- refurbishing the control of rinsing water in the pretreatment line can save 10.000 m^3 of water per year (60.000 R)
- using lids on hot tanks, using centrifugal pumps in the pretreatment line instead of pneumatic ones can save 30.000 R per year
- improved maintenance of tools and redesign of some tools together with training of operators and control can reduce rubber consumption by more than 5% (200.000 R per year)

Table of Contents

1. INITIAL ENVIRONMENTAL ASSESSMENT

A first assessment of the current situation is provided by the "initial diagnosis" with the "Smiley diagram". An assessment of the situation with these symbols will probably give better results than grades or percentages.

	☺	😐	☹
Storm Water		x	
Waste Separation			X rubber mixed with all sort of waste
Waste Water			X controls in place, but not working
Solid Waste		x	
Air Quality	x		
Noise	x		
Hazardous Materials (including intermediates and by-products)		X trays	
Energy		x	
Environmental Policy	x		

Environmental questionnaire

Water quality management

Storm water

Do you know where the storm water drains on your premises are located?

XYes ☐No ☐N/A

Do you have any features or procedures in place to prevent storm water pollution?

XYes ☐No ☐N/A

Are the storm water drains around your business free of pollution? (litter, sand, metal shavings etc.)

☐Yes ☐No XN/A

Do you store all equipment, materials and liquids so that spills or leaks could not enter the storm water system?

XYes ☐No ☐N/A

Do you regularly clean up the surface areas around your premises?

XYes ☐No ☐N/A

Do you use a broom instead of a hose to sweep and clean up the surface areas around your premises?

XYes ☐No ☐N/A

Wastewater

Do you have a permit from the local water authority (if needed)?

☐Yes ☐No ☐N/A

Do floor drains in the work area drain to either a storage tank or direct to the sewer?

XYes ☐No ☐N/A

Do you use a vacuum cleaner (appropriate to the process) to clean up dust and sand?

☐Yes ☐No XN/A

Groundwater

Do you know if your site has groundwater under it?

XYes ☐No ☐N/A

If there is groundwater under your site, do you take precautions to prevent pollutants from entering the groundwater?

XYes ☐No ☐N/A

Raw Material

Do you know the composition of your materials?

XYes ☐No ☐N/A

If a supplier was willing to take your waste for reuse can you guarantee a regular supply?

XYes ☐No ☐N/A

Do you have a licensed waste transporter to transport:

General production waste? XYes ☐No ☐N/A

waste chemicals?XYes ☐No ☐N/A

liquid wastes? ☐Yes ☐No ☐N/A

Air quality management

Do you take measures to prevent dust from leaving your premises?

☐Yes XNo ☐N/A

Do you take measures to prevent fumes and vapour (including odorous emissions) from leaving your premises?

☐Yes ☐No XN/A

Hazardous materials

Do you store all hazardous materials (such as resins, catalysts) in a bunded, covered area that will not allow any spilled or leaked materials to enter the storm water system?

XYes ☐No ☐N/A

Do you have a Dangerous Goods Licence, if needed?

XYes ☐No ☐N/A

Do you have all the relevant material safety data sheets (MSDS) and keep them in an accessible place?

XYes ☐No ☐N/A

Do you have a spill fighting equipment and written procedures?

☐Yes XNo ☐N/A

Noise management Do you regularly check and carry out maintenance on noisy equipment? X Yes ☐No ☐N/A If you have had complaints about noise, have you identified the source of the noise and taken steps to reduce its effects? ☐Yes xNo ☐N/A **Management of premises** Have you made any changes to your business for environmental reasons? XYes ☐No ☐N/A Do you have an environmental policy or plan? XYes ☐No ☐N/A	

Evaluation of the initial assessment:

The company has an environmental policy and an environmental management system managed by an environmental officer. Audits are conducted regularly as per the South African legislation. There is also a health and safety management system implemented.

The potential areas for improvement by the company are as follows:

1. Rubber losses due to inefficient process in injection moulding.
2. Optimization of water usage.
3. Reduction of wastewater to municipality.
4. Heat losses in the metal preparation process.
5. Compressed air losses and leaks.

Figure 2: Bar plot of CP potentials at ZF Boje

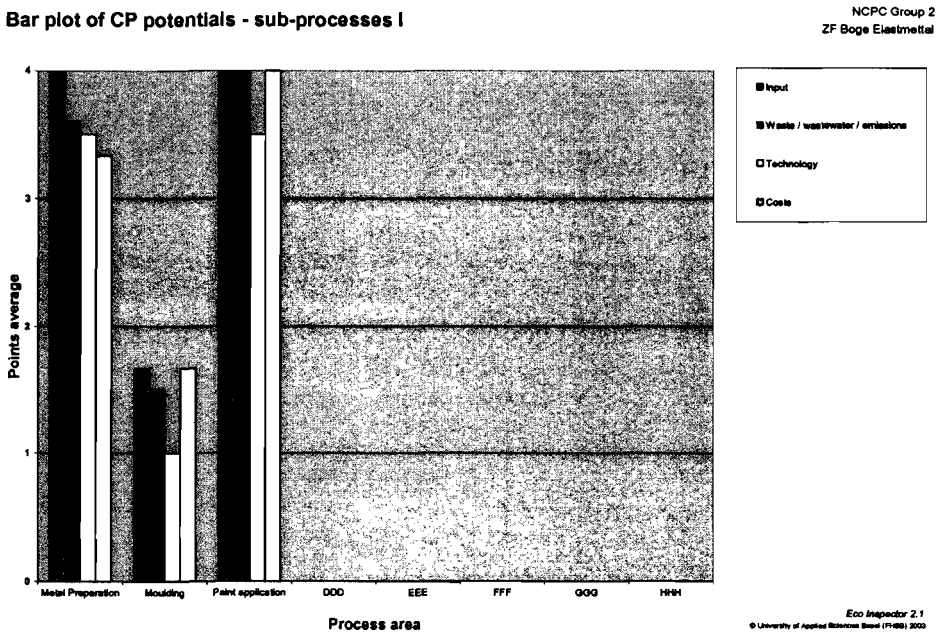
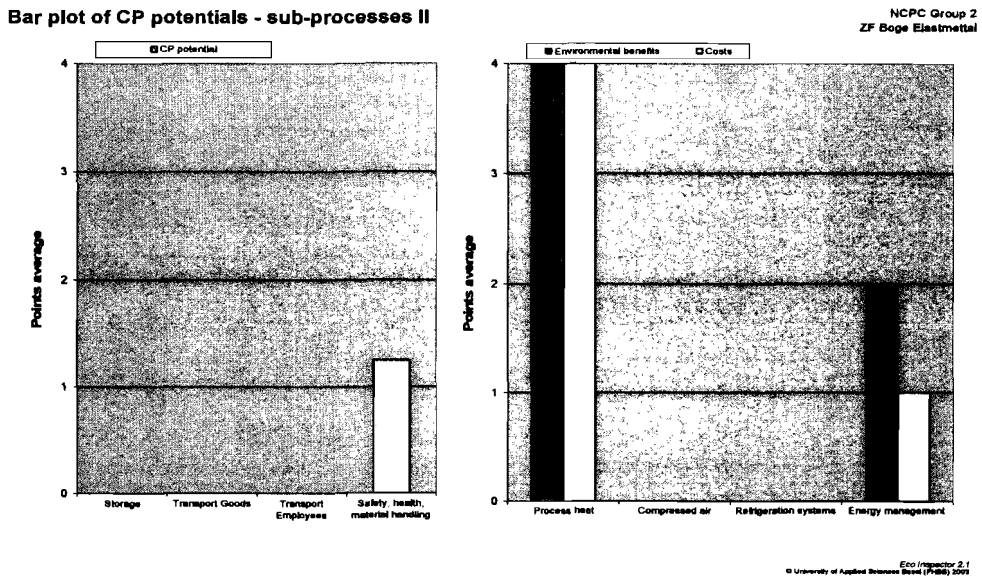


Figure 2 illustrates the CP potential areas of metal preparation and paint application.

Figure 2: Bar plot of CP potentials at ZF Boje



Company Information:

- Company Name	ZF Lemforder
- Address	Rosslyn, 120 Doreen Avenue, Pretoria, South Africa
- Phone, Fax	
- e-mail	
- web	
- Trading Since (year)	1998
- No. of Employees	*63*
- Industrial Process used	Cleaning metal parts, bonding, injection moulding of rubber
Environmental Team:	
- assigned Environmental Manager and position within the organization	
- Team members and positions	- - - - - -
Contact Person: Name Phone Fax and e-mail Position	Mr Jaco Vorster

Brief Company profile

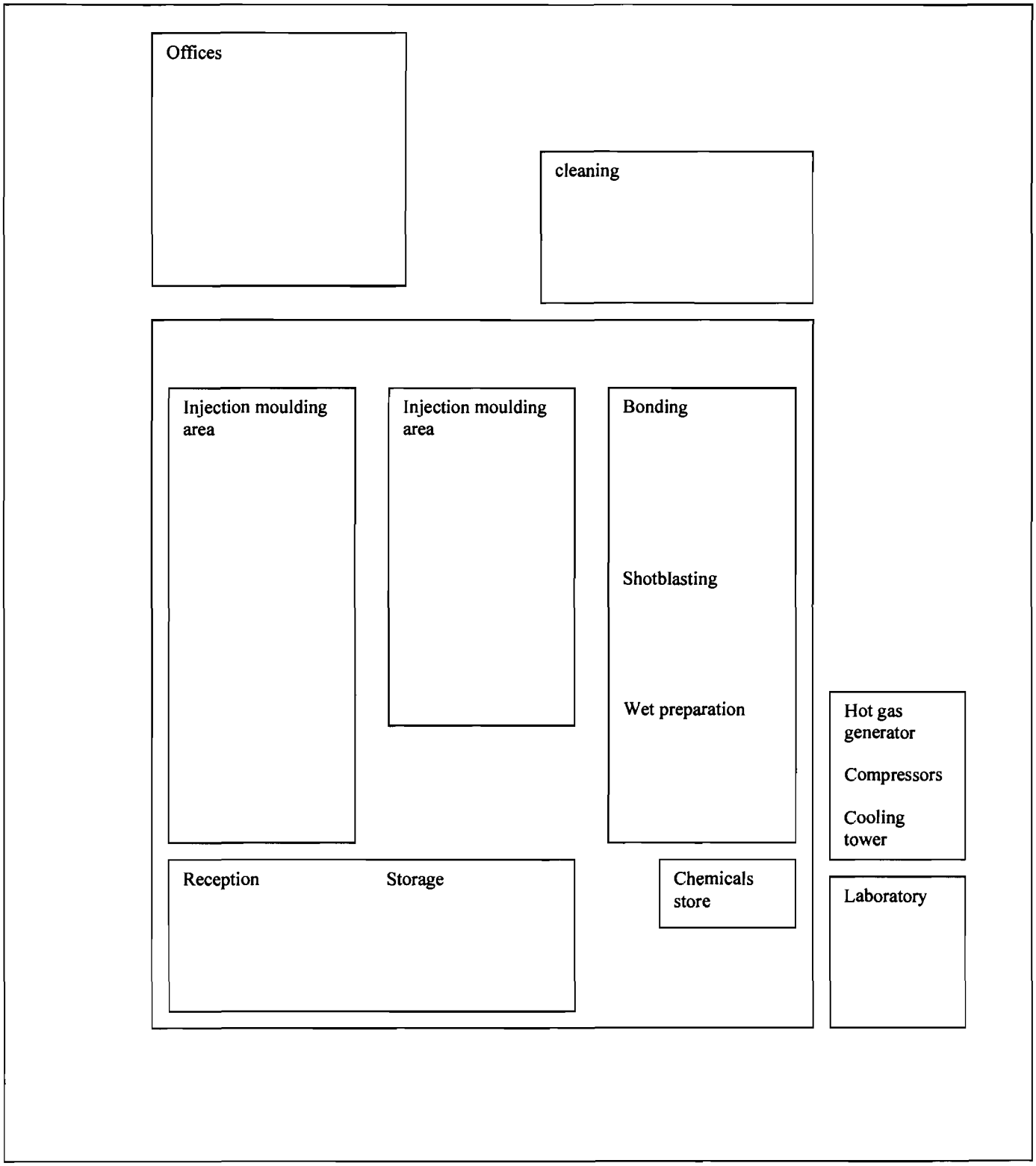
The company ZF Boge SA (Pty) Ltd is a subsidiary in the ZF Group based in Germany. The acquisition of ZF Boge SA (Pty) Ltd was made in 1998. The company is domiciled at 120 Doreen Avenue, Rosslyn Ext. 1, Pretoria, South Africa. The company manufactures automotive components for various automotive manufacturers. The company employs 63 people at the site and has a turnover of R32million per annum.

The products range includes hydro-mounts, spring eye bush, shock absorber eye bush, elastic control eyebush, and rubber mountings. The raw materials are steel components and uncured rubber raw material. The suppliers are LDB Engineering, Gloman Engineering, and Malben for steel components; Tensile Rubber, and S&N Rubber for rubber raw materials; and Chematal for solvents. Utilities are supplied by Eskom for electricity and Rand Water for water usage in plant.

The customers include Volkswagen, Nisan, General Motors, Transwerk, BMW, Toyota, Gabriel, Armstrong, and Ford Motor Company.

The company has an environmental policy and an environmental management system managed by an environmental officer. Audits are conducted regularly as per the South African legislation. There is also a health and safety management system implemented.

Site Map


Offices
cleaning
Injection moulding area
Injection moulding area
Bonding
Shotblasting
Wet preparation
Hot gas generator
Compressors
Cooling tower
Reception
Storage
Chemicals store
Laboratory

6. SUMMARY OF PRODUCTION DATA

Production figures and all main waste and emissions in quantity are compiled in the worksheets 1 to 4

WORKSHEET 1
The most important products / services

Company: Name Created by: Page:

No.	Product or service / Intended use	Quantity per year	Measuring unit
1	Parts with rubber bond to steel (for motor suspensions, suspensions, shock absorbers, ...)		
2			
3			
4			
5			

Add rows if needed - place cursor at the beginning of this line, go back one position by pressing the "←"-button and press "Enter".

WORKSHEET 2
The most important types of waste and emissions

Company: Created by: Page:

No.	Waste and/or liquid or gaseous emissions	Quantity per year	Measuring unit	Purchase costs	Disposal costs	Total costs
1	Rubber steel mix	2% of production, or 5 tons				
	Waste rubber	Appr. 50	T	750.000 R	Not available	
2	Waste water	12000	M^3			
3	Spent shotblast sand					
4	Waste phosphate slurry	30000	Kg			
5	Target bond paint waste	2400	Kg			
6						
7						
8						
9						
10						

Add rows if needed - place cursor at the beginning of this line, go back one position by pressing the "←"-button and press "Enter".

WORKSHEET 3
The most important raw and process materials

Company: Created by: Page:

No.	Material	Quantity per year	Measuring unit	Unit costs	Total costs	Use	Percentage in the product
1	Steel parts						
2	Rubber mix	307000	kg	**4605000R**			
3	Bond paint	**7200**	kg				
4	Degreaser	3	T				
5	acid	3	T				
	phosphates	3,7	T				
6	**Water**	**12000**	**M³**	**72000 R**			
7	**Electricity**	**6950**	**MWh**	**903500 R**			
8	**LPG**	**6000**	**kg**				
9	**MEK**	**3570**	**Kg**				
10	**Xylene**	**1470**	**Kg**				
11	**Release agent**	**1014**	**kg**				
12	**Monocote**	**370**	**kg**				
13	**Formula 28**	**1676**	**Kg**				
14	**Klee 10870**	**3050**	**kg**				
15	**Gard 73680**	**2925**	**kg**				

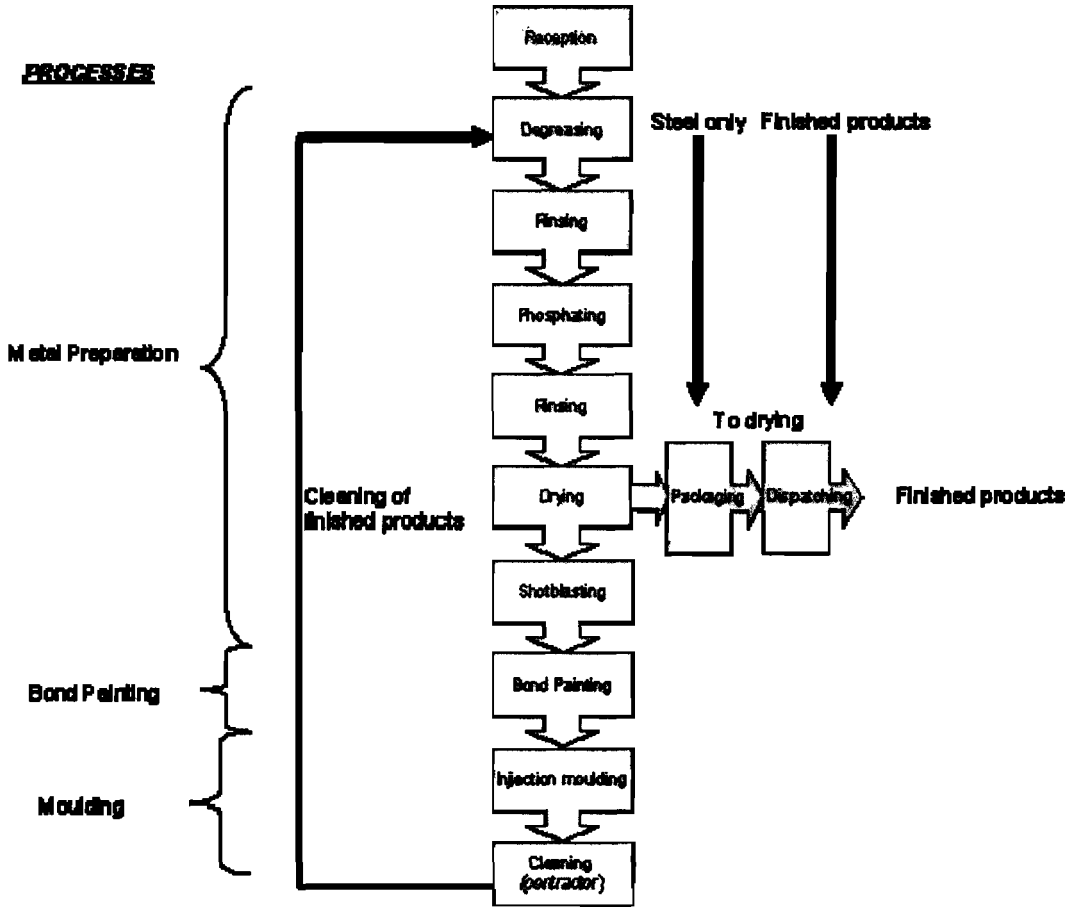
WORKSHEET 4
Major toxicological raw and process materials

Company: Created by: Page:

No.	Material	Quantity per year	Measuring unit	Unit cost	Total cost	Use	Percentage in the product
1	MEK	3570	Kg				0
2	Xylene	1470	Kg				0
3	Release agent	1014	kg				0
4	Monocote	370	kg				0
5	Formula 28	1676	Kg				0
6	Klee 10870	3050	kg				
7	Gard 73680	2925	kg				
8							
9							
10							

7. FLOW CHART AND PROCESS DESCRIPTION

Worksheet 5
Description of the production process in a flow diagram

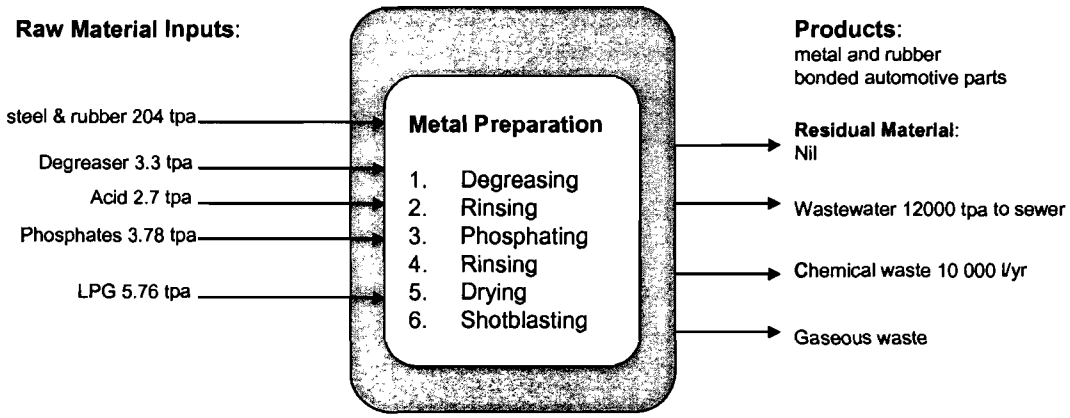


Worksheet 6
Description of the used technology in the production process

Process 1 – Metal Preparation

The metal preparation process involves six stages as shown in the following diagram. Raw steel parts and raw rubber material are sent to the degreasing tanks to remove surface dirt and grease. The parts are placed in steel cages which are dipped for periods of up to 10 minutes per tank. Degreasers and acid are used. Then water is used for rinsing. There are twelve tanks in total, for degreasing, rinsing, phosphating, and rinsing again. Phosphating makes the metal surface corrosion resistant and re-orientates the surface molecules to make it a smooth surface.

Six of the tanks are heated to 70^0C and maintained at this temperature for 24 hours per day. Six electric immersion heaters are utilized per tank.

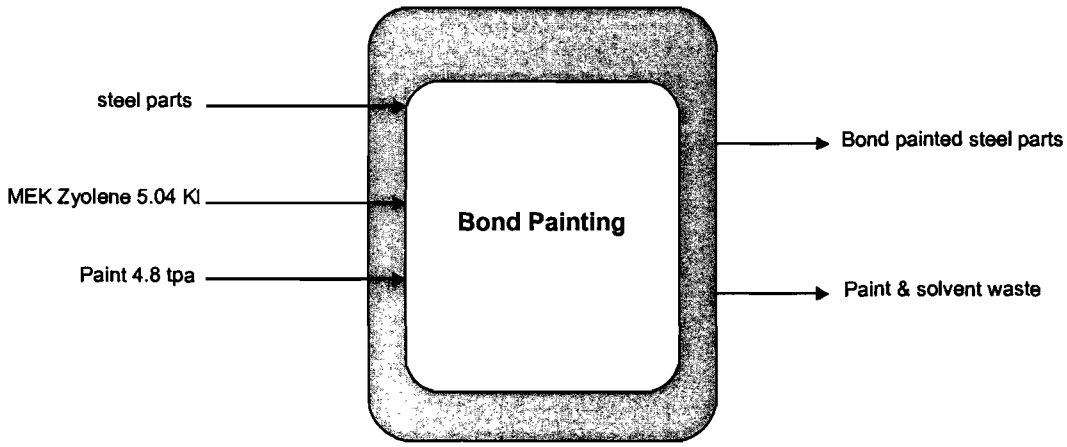


The dimensions of the tanks are 2m length X 1m breadth X 1m height. The water from the tanks are dumped once the water is dirty. The heated tanks lose heat from the surface of the water to air by convection and from steel walls by not being insulated.

More use of the water can be achieved by removing the grease from the surface of the water in the tanks using a scraper that is continuously scraping the surface of the floating water sludge.

Process 2 – Bond Painting

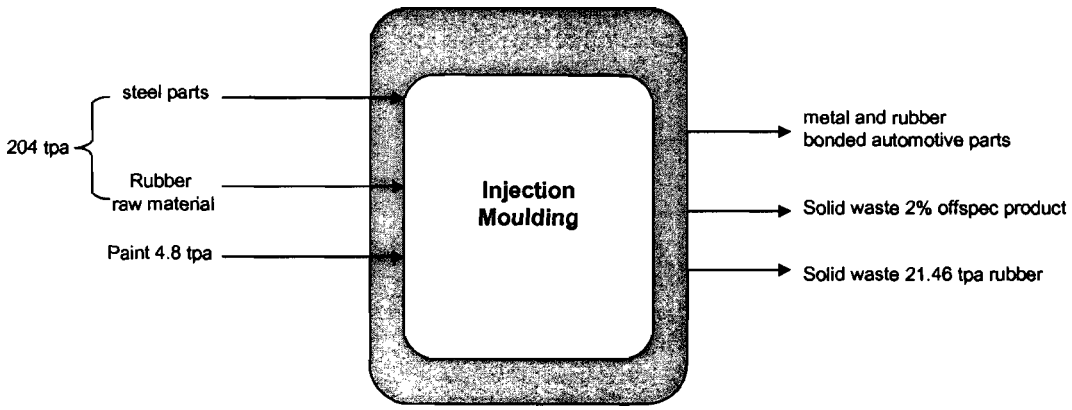
After the metal parts are cleaned and phosphated, it is shotblasted to make the surface uniformly coarse and ready for bond painting. Painting is done in spray booths. The parts are placed in holders in the booth and sprayed manually.



Two types of spray booths are used. One being a circular ring that rotates as the spray paint is applied at one position. A lot of paint is wasted by missing the steel part. The second is done in a spray booth against a water curtain were paint is lost to the water. This also is not an efficient method.

Process 3 – Injection Moulding

Once the metal is prepared and painted, it is sent to the injection moulding process were it is fed with rubber in the hydraulic pressurized moulding machines.



The rubber waste from the injection moulding machines is a cause for concern. The waste is very visible and obvious. The re-design of the moulds should be considered by operational management. There is an operator at each of the eight machines. At lunch break the machines are left idle wasting power. The lunch breaks should be staggered to allow one operator to operate 2 machines and not waste time and energy.

The machines being hydraulically driven had excessive amounts of oil leaking from the cylinders onto the ground. Maintenance should be carried out at a higher frequency.

8. DETAILED ASSESSMENT PHASE

Register of environmental aspects and evaluation of significant processes

Department: Furnace
Process: Name and Number Melting of raw material in the cupola
Responsibilities: Foreman

Evaluation Result: significance red

Activity Product	Aspect - normal - abnormal Operation	**Environmental and Economical Impacts**					overall signifi-cance traffic light			Action
		Nature	Human	Raw Material	Energy	Legal compliance				
Write the process step	In normal use Accident or brake down	**Impacts to flora, fauna…**	**health and safety …**	**Raw material and waste**	**Loss of heat, energy**	**Danger of non compliance**				further assessment observation no action
Preparation	High water consumption	3	2	1	1	2				
Painting	Waste of paint	3	3	2	1	2		X		
Injection molding	Waste of rubber, energy consumption	**3**	**3**	**1**	**1**	**2**	x			

Selection of audit focus

Identified (sub-)processes with CP opportunities		CP Focus		Priority	Remarks
1.	preparation	Waste water generation, heat recovery from compressor,	(F1)	1	
2.	Injection moulding	Waste of rubber, energy consumption of machines	(F2)	1	
3.	Bond painting		(F3)	2	
4.			(F4)		
5.			(F5)		
6.			(F6)		
7.			(F7)		
8.			(F8)		
9.			(F9)		
10.			(F10)		
Add rows if needed - place cursor at the beginning of this line, go back one position by pressing the "←"-button and press "Enter".					

Worksheet 9:
Mass and energy balances for option finding

Water input total	Process	consumption	Percentage of total water input
6 m³/h (data for 2006)	Rinsing tank A4	2 m³/h (measured during audit)	
	Rinsing tank S3	2 m³/h (measured during audit)	
	Rinsing line 1 tank 3	2 m³/h (measured during audit)	
	Top up of baths		
	Water for floor cleaning		
	Water for sanitary purposes		
	Cooling tower makeup		
	Irrigation water		

9. CP OPTIONS GENERATION AND IMPLEMENTATION

Worksheet 10
CP options generated per identified Focus of Audit

Per CP Focus give the CP Options according to the table below. The number in the upper left corner of the table corresponds with the selected CP Focus (see 5, 'Selection of audit focus').

F1	***If table is not complete for your purposes kindly add new components but keep lay out settings***	Only fill out **Pos** (= positive, yes), **Neut** (= neutral, don't know), **Neg** (= negative, no) or **n.a.** (= not applicable, not available)						
	Description of CP Option[1]	**Directly Implemented[2]**	**Technical Feasibility**	**Economic Viability**	**Environmental Evaluation**	**Implementation Decision**	**Investment (€)**	**Savings (€)**
1.	Repair of automatic control of rinse water flows (time control or better conductivity control)							10.000 m³/a, or 60.000 R
2.	Reuse of compressor cooling air as preheated air for drier							15.000 to 30.000 R
3.	Switch of air pump in skimmerspart time							
4.	Use lids or polyethylene balls to cover surface of hot baths							5,5 kW/m², 2 m² per tank, 6 tanks, 400000 kWh, 50.000 R
5.	Combine two static tanks to rinsing cascade							
6.	Increase dripping time to 15 seconds							
7.	Temperature controlof cooling tower fan							
8.	Dose chemiclas after measuring concentrations							
9.	Follow up rubber losses							
10.	Switch to electrically driven injection machines							
11.								
12.								
13.								
14.								
15.								
Add rows if needed - place cursor at the beginning of this line, go back one position by pressing the "←"-button and press "Enter".								

[1] Try to describe exactly, what should be changed, for example: change of raw material by using recycled material, change manual control of fuel feed for boiler to automatic control consisting of preventative maintenance etc.

[2] Without further assessment

For every focus a table can be added by copying the table above.

10. IMPLEMENTATION AND CONTINUATION

Worksheet 11: Action Plan

	Task	Resources needed (if any)	Responsible person	Date due	Date accomplished
1.	Repair control in rinsing tanks	Already bought	Technical director	April 30th	
2.	Install hot air duct		Technical director	April 30th	
3.	Install quality circles		Financial director	April 30th	
4.	Use balls to cover hot tanks		Technical director	April 30th	
5.	Train operators		Technical director	April 30th	

Worksheet 12: Monitoring

		Quantity or %	Explanation (if necessary)
Increased production	type of product		
Savings - use '+' to indicate %-increase - use '-' to indicate %-decrease	raw material 1		
	raw material 2		
	etc.		
	water consumption	-70%	
	energy	-15%	
	time		
Environmental impact - use '+' to indicate %-increase - use '-' to indicate %-decrease	non-product output 1		
	non-product output 2		
	etc.		
	waste water discharge	-70%	
	- BOD		
	- COD		
	- etc.		
	gas emissions	-15%	
	- NO_x		
	- CO_2	-15%	
	- SO_2		
	- CFC		
	- ODS		
	- VOGs		
	- Global warmers		

11. ENVIRONMENTAL POLICY

See anex

12. ANNEX

Environmental policy
Presentation to ZF management: Findings of the CP-IPA

Report on CP Trainings for Government Officials in Gauteng and Western Cape Provinces

Dr. Johannes Fresner

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September 26th 2008

Table of contents

1. Goal of the Trainings

The goal of the mission was to support the National Cleaner Production Center in providing input and conducting two workshops to government officials in the Gauteng and the Western Cape Provinces. Each workshop should provide basic knowledge on Cleaner Production, relate Cleaner Production to current South African legislation, share experiences on how in Europe Cleaner Production is used in the implementation of environmental law and to stimulate out of the box thinking to explore possibilities of introducing Cleaner Production into the execution of South African environmental laws.

On completion of the workshop the participants should

- Have an in depth understanding and awareness of the principles of CP
- Be versed in UNIDO's holistic and sectoral CP strategy
- Have gained a clear and concise understanding of CP and the economic, social and environmental benefits thereof
- Understand the basic principles of material flow analysis and energy balances
- Understand the interdependency between aims of laws/by-laws/decrees etc. and industrial requirements
- Understand practical application of CP principles in enforcement and monitoring systems

Each workshop was presented jointly by DEAT, CP experts from the National Cleaner Production Centre South Africa and UNIDO affiliated consultants.

The following list gives an indication of the topics which were to be covered:

- Introduction to CP – CP Basics
- Introduction in Material & Energy Flow Analysis
- Interdependence between (cleaner) production, waste generation, waste management and recycling
- Green Procurement and Hazardous Materials
- Indicators and Environmental Controlling
- Policies/ legislation and industrial reality: interrelation and economics. Typical situations and problems, possible approaches
- Industry case studies

The workshop should include group and individual exercises to assess the participants' understanding of the discussed concepts and to recognise the influence on law enforcement. Candidates should also receive a full set of lecture notes expanding on the topics discussed as well as additional information pertaining to links, sector information and case studies.

This training would include real case studies on selected processing companies, where delegates would be exposed to practical application of CP and mechanisms that can be used for monitoring and enforcement.

The programme (see Annex 1) consisted of

- introduction to the philosophy and instruments of Cleaner Production

- Energy analysis
- Material flow analysis
- European environmental law
- South African environmental law
- Case studies to explore potential for including Cleaner Production into execution
- Evaluation and conclusions

2. Workshop in Gauteng

The workshop in Gauteng was conducted on September 22nd and 23rd. The list of participants is included in Annex 2. The following pictures show some impressions from the workshop.

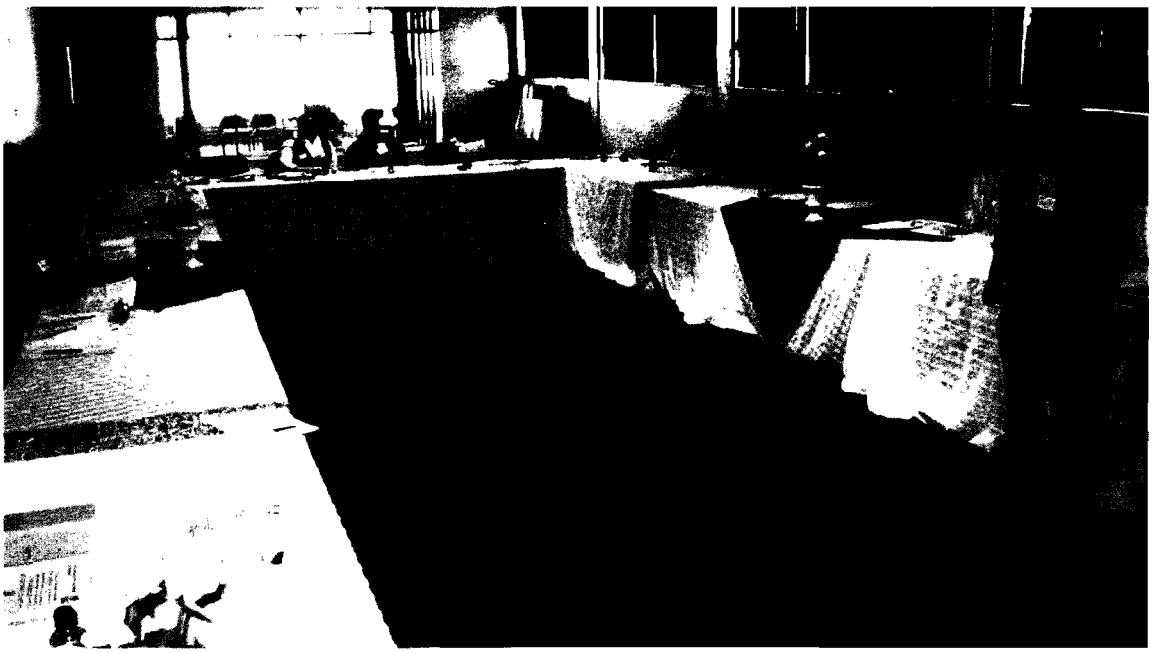

Figure 1: Presentation of South African environmental law structure

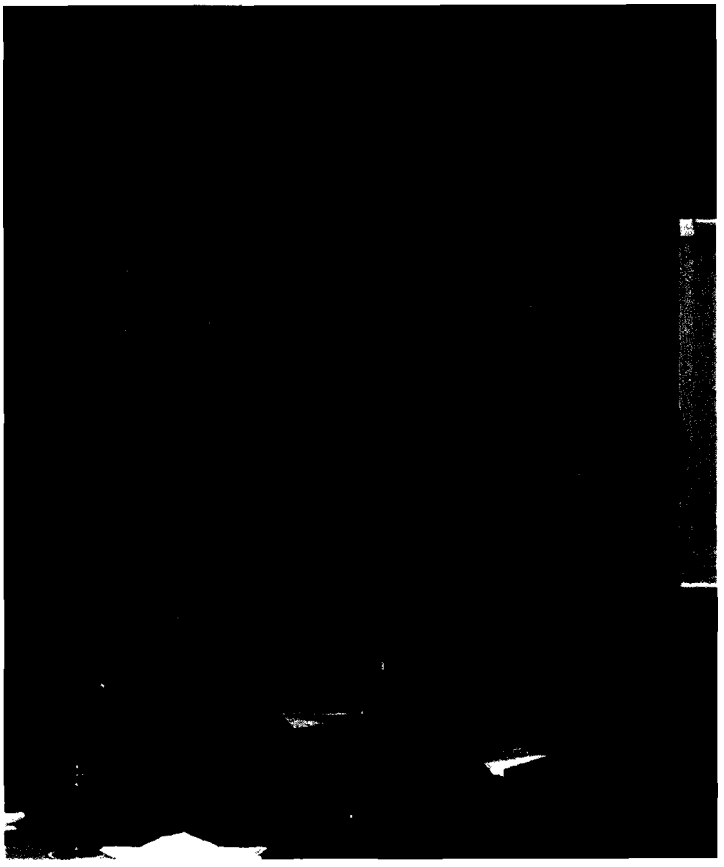

Figure 2: Introduction of CP to participants

Figure 3: Working group working on using the Cleaner Production principles in environmental law enforcement

Figure 4: Work group working on using the Cleaner Production principles in permitting

Figure 5: Presentation of certificates

3. Workshop in Somerset West (Western Cape Province)

The workshop in Somerset was conducted on September 25th and 26th . The list of participants is included in Annex 2. The following pictures give some impressions from the workshop. In the programme, there was a small shift in that some energy related concepts (e. g. efficiency) were explained more in details and more time was allowed for explaining central concepts of including Cleaner Production in European environmental law.

Figure 6: Group work on energy problems

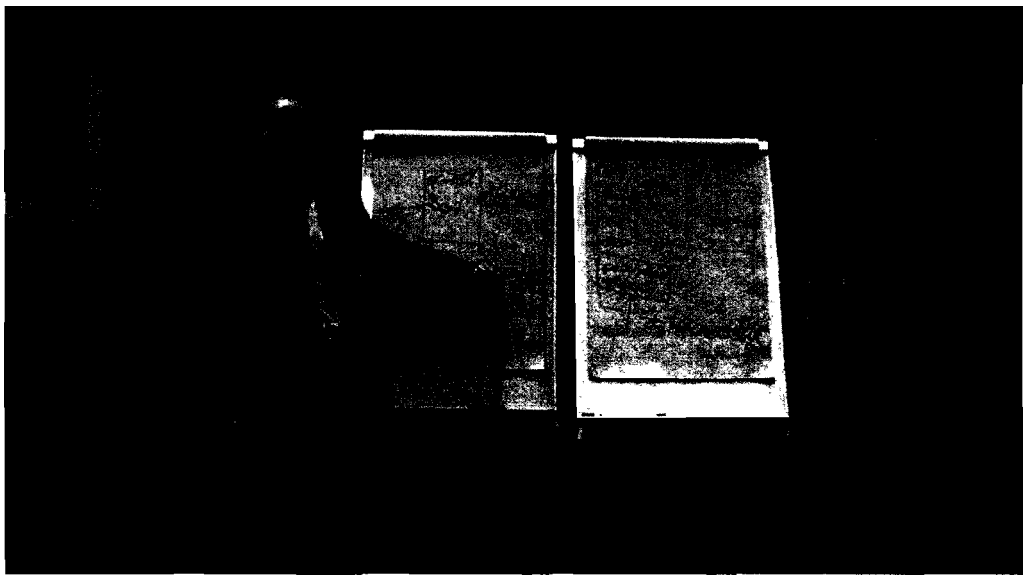

Figure 7: Presentation on energy efficiency

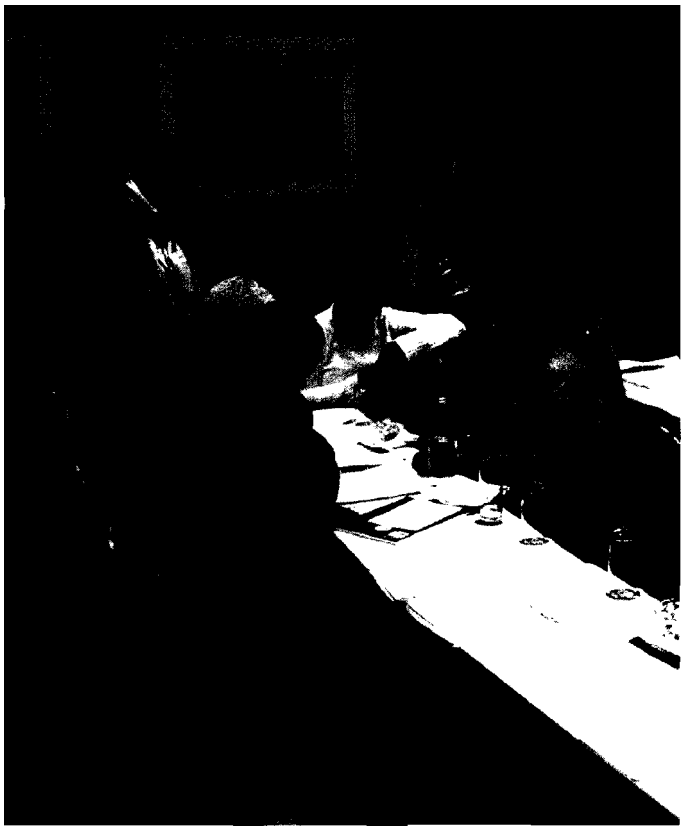

Figure 8: Intensive discussions during the exercises

The results of the group work suggested

- that the adoption of key elements of environmental management systems could be conditions in permits
- that solutions involving groups or associations of companies could be elaborated in participative processes
- that conditions in permits could include references to Cleaner production and the application of best practice.

It was also agreed upon that the application of target agreement instead of permits including a set of detailed conditions could be a way forward. The feasibility of this option will be further discussed within DEAT, together with the viability of financial measures like the application of a bonus on penalties in case cleaner production options are applied within a given timeframe.

4. Conclusions and Recommendations

The two workshops for government officers in the Gauteng and the Western Cape Provinces provided the participants basic knowledge on Cleaner Production, related Cleaner Production to current South African legislation, demonstrated experiences on how in Europe Cleaner Production is used in the implementation of European Environmental law and stimulated out of the box thinking to explore possibilities of introducing Cleaner Production into the execution of South African environmental law.

The programme consisted of

- Introduction to the philosophy and instrument of Cleaner Production
- Energy analysis
- Material flow analysis
- European environmental law
- South African environmental law
- Case studies to explore potential for including Cleaner Production into execution
- Evaluation and conclusions

The results of group work show, that the potential exists, already today, to include Cleaner Production principles during permitting and during enforcement.

During permitting, the application of Cleaner Production principles can be requirements in conditions imposed upon the companies CP approaches might be included into performance standards

During enforcement, the application of Cleaner Production could result in the cancellation of penalties and fees.

The results of the evaluation show, that the participants would appreciate more detailed information on material flow analysis, energy analysis, and other Cleaner Production tools. They would also look forward to discussing more case studies, especially more South African ones. For this, the NCPC could well supply a platform for meeting and exchange of experience.

These two workshops will be followed up by a third one in November for the KwaZulu Natal Province.

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Annex 1

Programme for the Training

Government Officials CP Training Gauteng Province					
from		**to**	**duration**	**Monday, 22nd September 2008**	**Trainers**
08:00	-	08:30	00:30	**Registration**	NCPC
08:30	-	09:00	00:30	**Welcome & Opening by NCPC and DEAT, Expectations round with the audience**	NCPC, DEAT, All
09:00	-	10:00	01:00	**Introduction to the wholistic UNIDO approach to CP**	Fresner/Bürki
10:00	-	10:15	00:15	**Coffee Break**	
10:15	-	10:35	00:20	**Exercise - Teamwork**	Fresner/Bürki
10:35	-	12:00	01:25	**Energy and Energy Flows, Environmental Pollution & Climate Change I**	Fresner/Bürki
12:00	-	12:30	00:30	**Energy and Energy Flows, Environmental Pollution and Climate Change II**	Fresner/Bürki
12:30	-	13:30	01:00	**Lunch break**	
13:30	-	14:05	00:35	**Energy and Energy Flows, Environmental Pollution and Climate Change II**	Fresner/Bürki
14:05	-	14:35	00:30	**Material Flows I**	Fresner/Bürki
14:35	-	15:00	00:25	**Material Flows II**	Fresner/Bürki
15:00	-	15:15	00:15	**Coffee Break**	
15:15	-	15:50	00:35	**Material Flows II**	Fresner/Bürki
15:50	-	16:20	00:30	**Waste Minimisation in SA**	NCPC
16:20	-	16:30	00:10	**Case of an Industry (intro to day 2)**	Fresner/Bürki
16:30				**Closure Day 1**	

				Tuesday, 23rd September 2008	
08:00	-	08:30	00:30	**Arrival & Refreshments**	
08:30	-	09:30	01:00	**The History of European Legislation**	Fresner/Bürki
09:30	-	10:00	00:30	**Review of Cleaner Production & Waste related Laws in South Africa**	SA expert
10:00	-	10:15	00:15	**Coffee Break**	
10:15	-	10:45	00:30	**Review of Cleaner Production & Waste related Laws in South Africa**	SA expert
10:45	-	11:15	00:30	**Making CP Legally Enforceable (ROD's, Pemitting, Licensing)**	SA expert/NCPC
11:15	-	11:45	00:30	**Objectives Concerning the Environment**	Fresner/Bürki
11:45	-	12:30	00:45	**Exercise - Permitting**	Fresner/Bürki
12:30	-	13:30	01:00	**Lunch Break**	
13:30	-	14:30	01:00	**Exercise - Permitting**	Fresner/Bürki
14:30	-	15:00	00:30	**Lessons Learnt / Outlook**	All
15:00	-	15:15	00:15	**Coffee Break**	
15:15	-	15:45	00:30	**Lessons Learnt / Outlook**	All
15:45	-	16:15	00:30	**Evaluation & Closure**	Fresner/Bürki
16:15		17:00	00:45	**Closure & Aperitif**	NCPC

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Annex 2

List of Participants, Gauteng Workshop

CLEANER PRODUCTION / WASTE MINIMISATION WORKSHOP FROM 22 - 23 SEPTEMBER 2008

Name & Surname	Organisation	Telephone	Fax	E-mail	Signature
Basadi Moselakgomo	NWDACE	018 389 5731	018 3895006/0865212660	bmoselakgomo@nwpg.gov.za	
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Linda Phalatshe	City of Joburg	011 407 6255	011 403 4142	LindaP@joburg.org.za	
Hlongwane Eugene	City of Joburg				
Eugene Hlongwane	City of Joburg	011 407 6748	011 339 1814	EugeneHla@joburg.org.za	
Justice Netshandama	City of Joburg	011 407 6725	011 403 4142	justinee@joburg.org.za	
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Sylvster Dube	Sedibeng DM	016 427 1015	016 427 1014	sylvester@sedibeng.gov.za	
Mandisa Mdhlane	CEW: Sedibeng DM	not confirmed			
Lerato Kome	West Rand DM	011 411 5159	011 412 3663	Lkome@wrdm.gov.za	
Enoch Mhlanga	CEW: West Rand DM	not confirmed			
Mr. J. Nkuna	Metsweding DM	To attend WC			
M. Masipa	CEW: Metsweding DM	not confirmed			
Arnot Ravele	Capricorn DM	015 294 1021	086 555 3201	ravelea@cdm.org.za	
Lekhu Lebogang (FS)	Motheo DM	051 407 3200/31	051 407 3306 / 0865362963	lebo@motheo.co.za	
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Maria Mandiwana	Mogale City	011 660 2597	011 660 1507	Mariama@mogalecity.gov.za	
Lebohang Raliapeng	Ekurhuleni Municipality	011 456 0102	011 456 0084	lebohang2@ekurhuleni.com	
Ntombi Mkhosi	DEAT				
Mofojjeng Johnny	Westamzria local municipality				
Philip Nineke	DEAT				
Bubu Ananda	NWDACE				
Makhado Ruckani	CSIR				
	OTHER GOVERNMENT DEPARTMENT				
Teheko Modise	the dti	012 394 1651		stmodise@thedti.gov.za	
Bernard Pick	National Treasury				
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Sharlin Hemraj	National Treasury	012 315 5875	012 315 5516	Sharlin.Hemraj@Treasury.gov.za	
Hanlie Schoeman	National Treasury	012 315 5788	012 315 5423	Hanlie.schoeman@treasury.gov.za	
Marie van Niekerk	National Treasury	011 395 6588	012 315 5516	marie.vanniekerk@treasury.gov.za	
	National Treasury				
Xolile Mabusela	Indalo Yethu	012 665 1457	012 665 1382	XolileM@indaloyethu.co.za	
Ramsook Loykisoonlal	National Department of Health	012 312 3256	012 312 3181	LoykiR@health.gov.za	

List of Participants, Western Cape Workshop

Cleaner Production/ Waste Minimisation Workshop: 25-26/09/2008,
The Lord Charles, Somerset West, Western Cape

	Name & Surname	Organisation	Tel	Fax	Email	STATUS
1	[illegible]	Western Cape Province	(021) 483 2705	(021) 483 2979	[illegible]	Confirmed
2	[illegible]	Western Cape Province	(021) 483 2705	(021) 483 2979	[illegible]	Confirmed
3	[illegible]	Western Cape Province	(021) 483 2705	(021) 483 2979	[illegible]	Confirmed
4		West Coast DM	(022) 433 8400	(022) 086 8113		Confirmed
5	[illegible]	Overberg DM	(028) 425 1157	(028) 425 1814	[illegible]	Confirmed
6	Mr. G van Zyl	Central Karoo DM	(023) 449 1000	(023) 415 1253	[illegible]	Confirmed
7	[illegible]	Swellendam Municipality				Confirmed
8		City of Cape Town Metro				
9	[illegible]	Metsweding DM	(013) 933 3483	(013) 933 3486	[illegible]	Confirmed
10	[illegible]	DEAT / West Coast MD	(022) 433 8400	(022) 086 8113	[illegible]	Confirmed
11	[illegible]	DEAT / Cape Winelands DM	(021) 886 8186	(021) 887 4797	[illegible]	Confirmed
12	[illegible]	DEAT / Central Karoo DM	(023) 449 1000	(023) 415 1253	[illegible]	Confirmed
13	[illegible]	DEAT/ City of Cape Town	(021) 391 7124	(021) 391 7125	[illegible]	Confirmed
14						
15	Ms. Tembela Mapukata	Eastern Cape Province	(040) 609 3119	(040) 635 2535	tembela.mapukata@deaet.ecape.go	Confirmed
16		Eastern Cape Province				
17		Eastern Cape Province				
18	Ms. Nozuko Zamxaka	Nelson Mandela Metro	041-506 7405	041-585 7261	nzamxaka@mandelametro.gov.za	Confirmed
19		Cacadu DM				
20		OR Tambo DM				
21		Amatole DM				
22	Ms. Honjiwe Mayapi	DEAT: East London	(043) 722 3283	(043) 722 6299	hmayapi@deat.gov.za	Confirmed
23	Mr. Xolisa Sirayi	DEAT: N. Mandela M	(041) 508 7030	(041) 508 7000	Xsirayi@mandelametro.gov.za	Confirmed
24	Ms. Nomfundiso Mtalan	DEAT:OR Tambo	(047) 501 6400	(047) 532 4166	Nmtalana@deat.gov.za	Confirmed
25		Northern Cape Province				
26		Northern Cape Province				
27		Northern Cape Province				
28		Kgalagadi DM	(053) 712 1543	(053) 712 3480	Scakiso@deat.gov.za	Confirmed
29		Frances Baard DM				
30		Siyanda DM				
31	Mr. Sibongile Cakiso	DEAT: Kgalagadi DM	073 369 9435	(053) 712 2602	Scakiso@deat.gov.za	Confirmed
32	Ms. Molebogeng Matha	DEAT: Frances B. DM	083 298 2136	(053) 861 1638	Mmathaba@deat.gov.za	Confirmed
33	Ms. Madeleine Parsons	DEAT: Siyanda DM	076 516 5709	(053) 337 2886	Mparsons@deat.gov.za	Confirmed
34	Sipokazi Dumalisile	DEAT - Chris Hani DM	083 549 9321	046 807 3500	sdumalisile@deat.gov.za	Confirmed

Annex 3

Evaluation Form

Workshop on Cleaner Production
Training for government officials– Pretoria

Date:	Sept 22nd - 23rd 2008
Time:	8:30 am to 5:00 pm both days
Place:	NCPC / CSIR Pretoria

Date: 21.9.08 ThB

- ***Usefulness of the training on Cleaner Production for my activities***

( ) Excellent ( ) Good ( ) Average ( ) Bad

Comments: _____

_____

- ***Assessment of the overall course contents:***

( ) Excellent ( ) Good ( ) Average ( ) Bad

Comments: _____

_____

- ***To what extent did the course meet your expectations:***

( ) Complete ( ) Partially ( ) Not satisfied

Comments: _____

_____

- ***Which topics were especially useful for your daily work***

_____

_____

- ***Which topics should be presented and discussed additionally:***

- ***Which topics should be left out:***

- ***Additional comments and suggestions to be implemented in the following modules:***

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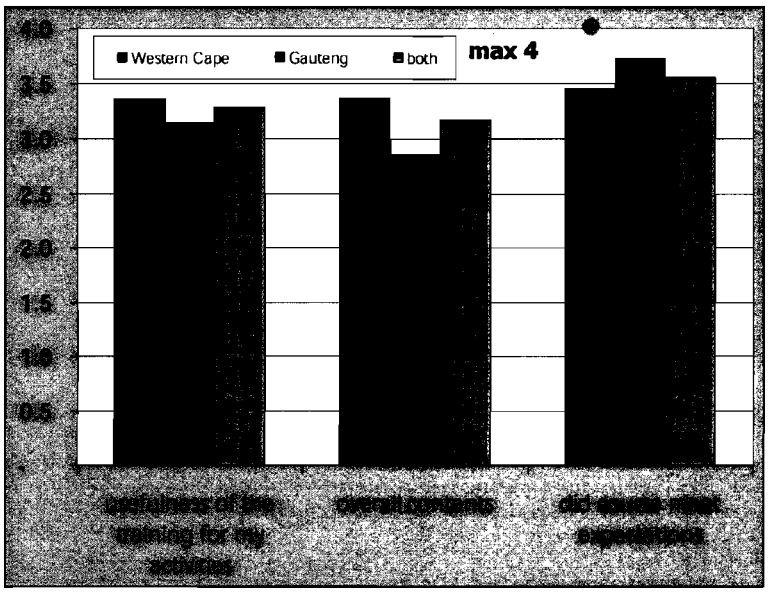
Annex 4

Evaluation of the Workshops



Additional comments

usefulness of the training for my activities

gave broader understanding of the concept
excellent intro to CP
a bit too technical (2x)

more focus on case studies & group exercises
exercises very practical and relevant for daily work
can start implementing CP
regulator should avdvise companies on profits from CP

overall contents

interested in energy and material flow and how to interpret flow charts
course very echnical in some cases
simple and clear presentations
has opened eyes and mind for energy efficiency
more notes, more case studies
methodology should be further simplified
very good as waste managemetn is serious issue in SA

did course meet expectations

thought, specific technologies would be discussed
practical examples of incorporatrion of CP into by-laws, regulation for SA valuable. Will encourage indutries & gov't

applic. To rural communities not well covered

which topics were especially useful

energy efficiency and flows
mass and energy flow
comparison EU and SA legislation
Monitoring of CP initiatives
backgound to legal framework
legislation and exercises on CP incorporation into companies
all (2x)
how can CP used to improve environmental compliance
what is CP and how is it enforcable
depth of NEMA, ECA legislation how to apply at work
SA legislation, policies and laws
waste related laws
CP, waste min, re-use, recycle
to know, that CP can be built in permitting and licensing as requirem't or condition
intro on CP, understand, that CP is at process level, not only technology
air quality and waste
application o fcp in processes
legislation

which topics should be presented additionally

technology CP and EE
practical implementation and case studies relevant to SA
development of standards to aid in enforcement
extract of legislations that include CP, especially by-laws
maybe energy calculations / analysis
local case studies of companies, which profitted from CP
role of local gov't in applic of CP
SA legislation and activities
NEMA to be discusse dmore deeply
waste min strategies
capacity building an dpilot project at gov't level
more on how to integrate CP on environmental disciplines and permitting
spatial planning with industries and community
making CP legally enforcable
more on CP in various industries in SA

which topics should be left out

none (6x)
detailed discussion of chillers; too technical. But overview of their impact on energy
little less calculations and technical exercise (or more for better understanding)
none. Increase time from 2 to 3 days
too much chemical engineering (energy flows)
technical part
none. More exercisesadd value; go for 5 days
none. Extend time
some topics focus too much on boilers. Boilers are only way to implement CP

NCPC South Africa

Mission November 2008

CP-Training for Government Officials in Durban / KZN

University of Applied Sciences Northwestern Switzerland
School of Life Sciences

NCPC South Africa

Mission November 2008

CP Training for Government Officials in Durban / KZN

Author Dr. Thomas Bürki

Benglen, November 7th 2008

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Contents

1 Goal and Contents of the Mission

The goal of the mission was to support the National Cleaner Production Centre in providing input and conducting the third workshop to government officials to be held in the KZN Province. The workshop should provide basic knowledge on Cleaner Production, relate Cleaner Production to current South African legislation, share experiences on how Cleaner Production is used in Europe with the implementation of environmental law and to stimulate out of the box thinking to explore possibilities of introducing Cleaner Production into the execution of South African environmental laws.

The BID and the project implementation plan for the training can be found in Annex 1.

On completion of the workshop the participants should

- Have an in depth understanding and awareness of the principles of CP
- Be versed in UNIDO's holistic and sectoral CP strategy
- Have gained a clear and concise understanding of CP and the economic, social and environmental benefits thereof
- Understand the basic principles of material flow analysis and energy balances
- Understand the interdependency between aims of laws/by-laws/decrees etc. and industrial requirements
- Understand practical application of CP principles in enforcement and monitoring systems

The workshop was presented jointly by DEAT, CP experts from the National Cleaner Production Centre South Africa and the UNIDO affiliated consultant.

The following list gives an indication of the topics which were covered:

- Introduction to CP – CP Basics
- Introduction in Material & Energy Flow Analysis
- Interdependence between (cleaner) production, waste generation, waste management and recycling
- Hazardous Materials
- Indicators and Environmental Controlling
- Policies/ legislation and industrial reality: interrelation and economics. Typical situations and problems, possible approaches
- Look at European law making and enforcement processes
- Industry law and permitting case studies

The workshop included group and individual exercises to assess the participants' understanding of the discussed concepts and to recognise the influence on law enforcement. Candidates also received a full set of lecture notes expanding on the topics discussed as well as additional information pertaining to links, sector information and case studies.

The training included real case studies on selected processing companies, where delegates would be exposed to practical application of CP and mechanisms that can be used for monitoring and law enforcement.

Compared to the trainings in Gauteng and Western Cape the schedule was slightly modified according to the lessons learnt.

The programme consisted of the following modules (for the detailed programme see Annex 2):

- Introduction to the philosophy and instruments of Cleaner Production
- Energy analysis
- Material flow analysis
- History of European environmental law
- South African environmental law
- Case studies to explore potential for including Cleaner Production into execution
- An introduction into a new philosophy of law making showing the example of Swiss energy and CO_2 laws
- Evaluation and conclusions

2 Course of the Training

The workshop in Durban was conducted on November 3rd to 4th 2008. The following pictures give some impressions from the workshop.

Figure 1: Big audience in Durban

Figure 2: Introduction of CP to participants

Figure 3: Intensive discussions during group working on using the Cleaner Production principles in permitting

Figure 4: Copies seem to be printed a bit to small ….

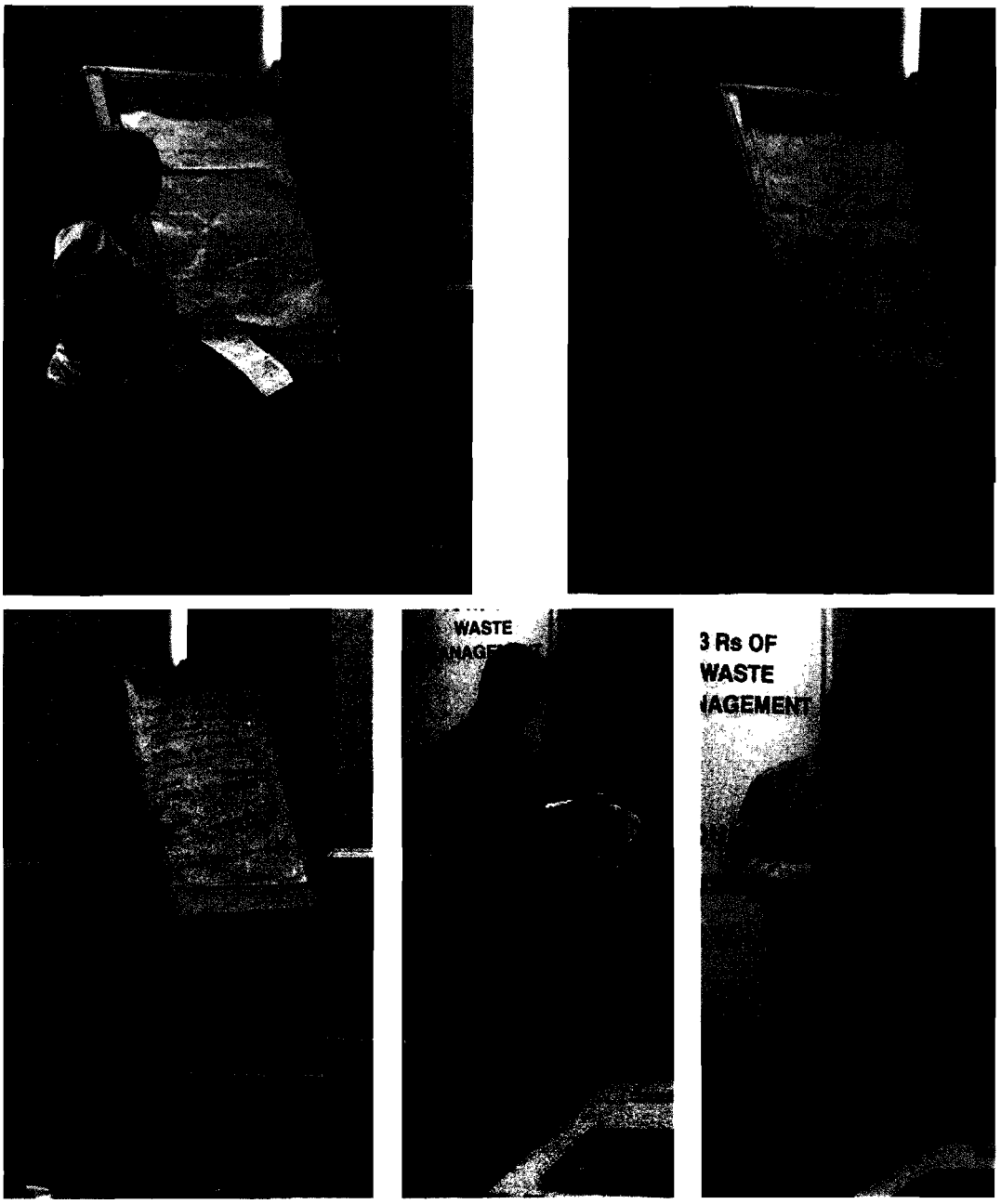

Figure 5: presentation of the groups works' results to the audience

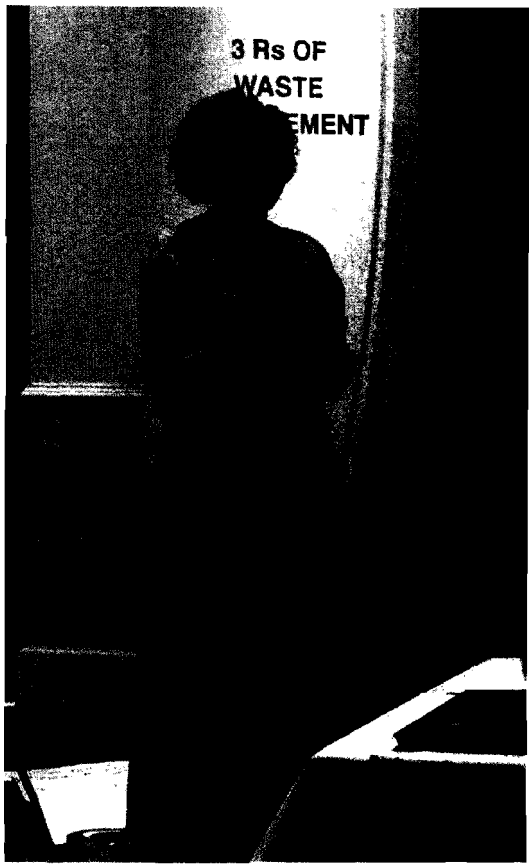

Figure 6: closing words

The results of the group work show, that it is already today possible to include Cleaner Production principles into the permitting process and during law enforcement. The flexibility, which is offered by the CP approach opens possibilities to better draw companies on board to improve production compared to current rather command-and-control-approach.

During permitting, the application of Cleaner Production principles can be to adapt the requirements imposed upon the companies (regarding record of decisions, application of the waste hierarchy in waste permit conditions, water, and atmospheric pollution) - but also to give incentives to companies to reduce their environmental pollution by reducing tariffs, by making competitions for the number one company per year etc. .

When a law case is opened, the application of CP principles into the process before sentencing the company to a penalty can lead to smoother proceedings and better relation between authorities and companies including leading the companies to a more efficient and more profitable production.

3 Evaluation of the Training

The course was evaluated by the participants with a questionnaire at the end of the course. The questionnaire used was the modified UNIDO questionnaire, see Annex 3.

The result shows, that the participants highly appreciated the training and were convinced to have profited for their daily CP work.

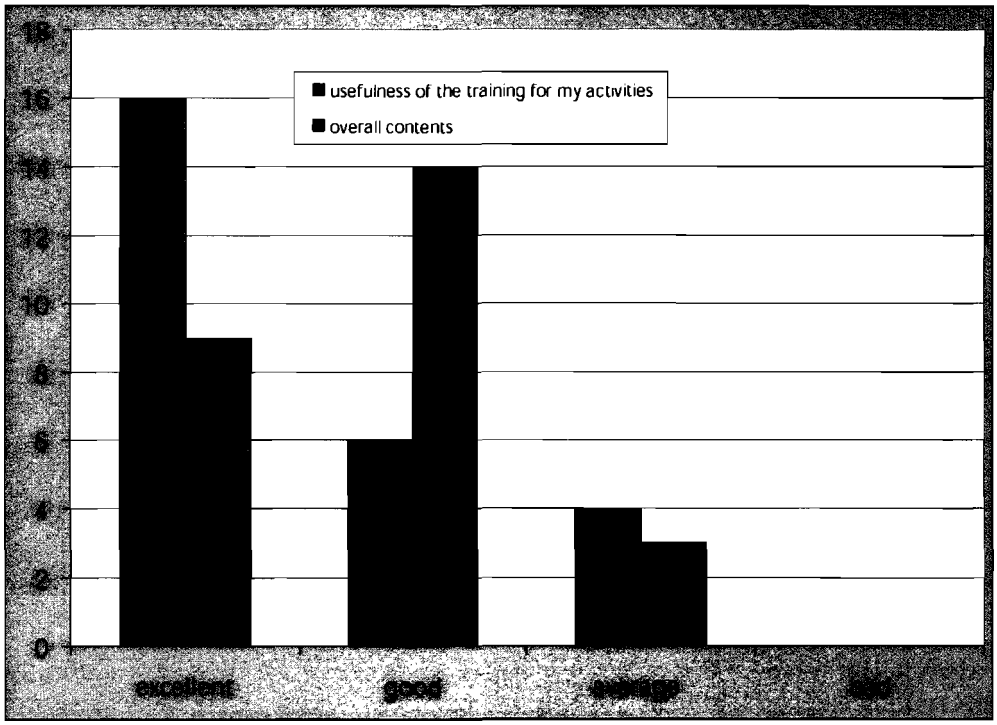

Figure 7 overall evaluation of the course by participants

More detailed information of the evaluation see Annex 3.

4 Conclusions, Recommendations

The third workshop for government officials in the KZN province provided the participants basic knowledge on Cleaner Production, related Cleaner Production to current South African legislation, demonstrated experiences on how in Europe Cleaner Production is used in the implementation of European Environmental law and stimulated out of the box thinking to explore possibilities of introducing Cleaner Production into the execution of South African environmental law.

The great number of participants shows, that there is a large interest in improving the current law enforcement process, to get acquainted with the CP approach as well as to acquire knowledge on how to integrate CP into the law enforcement process.

The programme consisted of

- Introduction to the philosophy and instrument of Cleaner Production
- Energy analysis
- Material flow analysis
- European environmental law
- South African environmental law
- Case studies to explore potential for including Cleaner Production into execution
- Evaluation and conclusions

The results of group work show, that the potential exists, already today, to include Cleaner Production principles during permitting and during enforcement and that the officials are keen to apply it in order to improve i) the law enforcement process and ii) the relation between the authorities and the industries.

During permitting, the application of Cleaner Production principles can be requirements in conditions imposed upon the companies CP approaches might be included into performance standards

During enforcement, the application of Cleaner Production could result in the cancellation of penalties and fees.

The results of the evaluation show, that the participants would appreciate more detailed information on material flow analysis, energy analysis, and other Cleaner Production tools. They would also look forward to discussing more case studies, especially more South African ones. For this, the NCPC could well supply a platform for meeting and exchange of experience.

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Annex 1

Background document and BID for the CP training to government officials

environment & tourism Department: Environmental Affairs and Tourism REPUBLIC OF SOUTH AFRICA	NCPC NATIONAL CLEANER PRODUCTION CENTRE SOUTH AFRICA
Document Type:	**BID**
Title:	**Background Information Document(BID) on Cleaner Production(CP) Workshops for Government Officials** **(September & November 2008)**
Document Status:	Draft for Information Document v 03

CP Workshops

- Three days training and interactive workshop focussing on CP methodology and application of CP in enforcement and monitoring. Outlook on influence of CP on law enforcement

OBJECTIVES

On completion of the workshop candidates will:

- Have an in depth understanding and awareness of CP and its principles
- Be versed in UNIDO's holistic and sectoral CP strategy
- Have gained a clear and concise understanding of CP and the economic, social and environmental benefits thereof
- Understand the basic principles of materials flow analysis and energy balances
- Understand the interdependency between aims of laws/by-laws/decrees etc. and industrial requirements.
- Understand practical application of CP principles in enforcement and monitoring systems

Contents of the workshops

This workshop covers approximately 6 topics which will be presented and discussed during the 3 days of theoretical training. The workshop will be presented jointly by DEAT, CP experts from the National Cleaner Production Centre South Africa and UNIDO affiliated consultancies.

The following list gives an indication of the topics to be covered:

- Introduction to CP – CP Basics
- Introduction in Material & Energy Flow Analysis
- Interdependence between (cleaner) production, waste generation, waste management and recycling
- Green Procurement and Hazardous Materials
- Indicators and Environmental Controlling
- Policies/ legislation (eg EIAs, Licences and Permits) and industrial reality: interrelation and economics. Typical situations and problems, possible approaches
- Industry case studies

The workshop will include group and individual exercises to assess the participants understanding of the discussed concepts and to recognise the influence on law enforcement. Candidates will also receive a full set of lecture notes expanding on the topics discussed as well as additional information pertaining to links, sector information and case studies.

This training will include real case studies on selected processing companies, where delegates will be exposed to practical application of CP and mechanisms that can be used for monitoring and enforcement.

Date, Place and Venue

- 03 - 05 November 2008, Western Cape Province, Cape Town, Province
- 08 – 10 September 2008, KZN Province, Pietermaritzburg, CEDARA
- 03 – 05 September 2008, Gauteng Province, Johannesburg

For more information you can contact:

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Project Implementation Plan

environment & tourism Department: Environmental Affairs and Tourism REPUBLIC OF SOUTH AFRICA		NCPC NATIONAL CLEANER PRODUCTION CENTRE SOUTH AFRICA	
Document Type:	**PROJECT IMPLEMENTATION PLAN**		
Title:	**WASTE MINIMISATION AND CLEANER PRODUCTION WORKSHOPS FOR NATIONAL, PROVINCIAL AND LOCAL GOVERNMENT OFFICIALS**		
Document Status:	Draft		
Reference:	12/	**Drafted:**	02 June 2008
Circulation:	Key Stakeholders	**Compiled by:**	Sylvester Mokoena

Objective

- Capacitate Government Officials on waste minimisation and Cleaner Production and advise on overall performance
- Implementation of the National Cleaner Production Strategy and Action Plan
- Respond to various requests from Provinces and Municipalities on CP and Waste Minimisation Capacity building
- Assist in promoting Cleaner Production and good waste management practices in industry.
- To increase CP awareness on authorities that are in contact with industries
- To demonstrate how to cooperate in a manner that will increase CP adoption in industry by looking at areas such as EIAs and other permitting processes.
- To promote efficiency in the use of natural resources such as energy, water and other materials

Target Audience

- DEAT, National DME, Dwaf, DoA and the dti,
- Nine provinces, Metros, and DCs

Date, Place and Venues

- 03 - 05 September 2008, Gauteng Province, Pretoria, CSIR
- 08 – 10 September 2008, Western Cape Province, Cape Town, Province
- 04 – 06 November 2008, KZN Province, Pietermaritzburg, CEDARA

Key Stakeholders

- DEAT,
- NCPC, and
- Provinces

Resources

- The NCPC to sponsor the training with R 90 000 to cover the Professional Service Providers
- The hosting province to sponsor with the venue, lunch and tea
- DEAT to coordinate the workshops together with the Provinces and the NCPC

Other Points to be considered

- Consideration will still be giving to the requests to address other areas of need as described by the key stakeholders for example at Mintech WGII.
- The venues are still to be confirmed.
- The final programme for the actual workshops is still to be developed, after all the speakers have been consulted with and the venues have been confirmed.
- For administrative purposes, arrangements will be done for 40-50 people in each workshop.

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Annex 2

Schedule of the training in Durban

GOVERNMENT OFFICIAL'S CP TRAINING WORKSHOP KZN PROVINCE, 149 PROTEA EDWARD HOTEL, NORTH BEACH DURBAN				
from		**to**	**Monday, 03 November 2008**	**Trainers**
08:00	-	08:30	**Registration**	NCPC
08:30	-	09:00	**Welcome & Opening by NCPC and DEAT, Expectations round with the audience**	NCPC, DEAT, All
09:00	-	10:00	**Introduction to the wholistic UNIDO approach to CP**	Bürki
10:00	-	10:15	**Coffee Break**	
10:15	-	10:35	**Exercise - Teamwork**	Bürki
10:35	-	12:00	**Energy and Energy Flows, Environmental Pollution & Climate Change I**	Bürki
12:00	-	12:30	**Energy and Energy Flows, Environmental Pollution and Climate Change II**	Bürki
12:30	-	13:30	**Lunch break**	
13:30	-	14:05	**Energy and Energy Flows, Environmental Pollution and Climate Change II**	Bürki
14:05	-	14:35	**Material Flows I**	Bürki
14:35	-	15:00	**Material Flows II**	Bürki
15:00	-	15:15	**Coffee Break**	
15:15	-	15:50	**Material Flows II**	Bürki
15:50	-	16:30	**Waste Minimisation in SA**	NCPC
16:30			**Closure Day 1**	NCPC/ DEAT

			Tuesday, 04 November 2008	
08:00	-	08:30	**Arrival & Refreshments**	
08:30	-	09:30	**The History of European Legislation**	Bürki
09:30	-	10:15	**Review of Cleaner Production & Waste related Laws in South Africa**	SA expert / DEAT
10:15	-	10:30	**Coffee Break**	
10:30	-	11:15	**Review of Cleaner Production & Waste related Laws in South Africa**	SA expert / DEAT
11:15	-	11:45	**Making CP Legally Enforceable (ROD's, Pemitting, Licensing)**	SA expert/ DEAT/ NCPC
11:45	-	12:15	**Objectives Concerning the Environment**	Bürki
12:15	-	12:45	**Exercise - Permitting, part 1**	Bürki
12:45	-	13:45	**Lunch Break**	
13:45	-	15:15	**Exercise - Permitting, part 2; presentations**	Bürki
15:15	-	15:45	**Lessons Learnt / Outlook: a new philosophy**	Bürki
15:45	-	16:00	**Coffee Break**	
16:00	-	16:30	**Evaluation & Closure**	Bürki/ DEAT
16:30			**Closure & Aperitif**	NCPC

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Annex 3

Evaluation of Training by Participants in Detail

The training was evaluated with the following questionnaire.

Workshop on Cleaner Production
Training for government officials– Pretoria

Date:	Nov. 3rd - 4th 2008
Time:	8:30 am to 5:00 pm both days
Place:	Edwards Hotel Durban

Date: 21.9.08 ThB

1- Usefulness of the training on Cleaner Production for my activities

( ) Excellent ( ) Good ( ) Average ( ) Bad

Comments: _____

_____

2- Assessment of the overall course contents:

( ) Excellent ( ) Good ( ) Average ( ) Bad

Comments: _____

_____

3- To what extent did the course meet your expectations:

( ) Complete ( ) Partially ( ) Not satisfied

Comments: _____

_____

4- Which topics were especially useful for your daily work

_____

_____

5- Which topics should be presented and discussed additionally:

6- Which topics should be left out:

7- Additional comments and suggestions to be implemented in the following modules:

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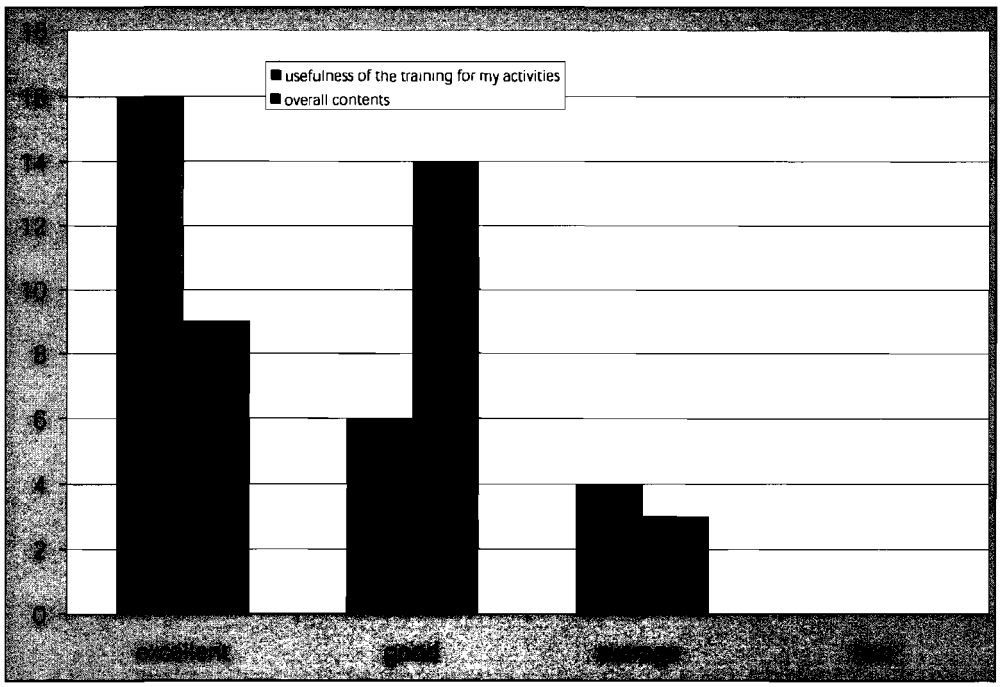
The evaluation of the questionnaires showed the follwoing results:



	excellent	good	average	bad	median
	4	3	2	1	
usefulness of the training for my activities	16	6	4		3.5

comments

It will help in assisting industries, especially the municipalities on their waste mgmt activities
some content was too much for those who have no scientific/technical background
the training was useful to us and we learnt a lot
the training broadened my experience in CP and the implementation thereof was made easier and understandable
more time should be given for the training
useful - just need back-up but various resources have made themselves available
training was excellent - but very complex
authorities represent a diverse mandate, so need to identify the comüonent that actually can implement or promote CP

overall contents	excellent	good	average	bad	median
	9	14	3		3.2

contents was too much for two days, no time to digest the contents
got a little lost on the frist afternoon
the course was based to the companies, but it is us as Dept to capacitate
too many information in 2 days it needs more than that
eye opening in terms fo promoting the need to understand industrial processes

did course meet expectations	complete	partially	not satisfied
	16	10	

now I am understanding Cpand know, whom to contqact when I am stuck
it has changed my mindset when it comes to CP ideas
hope that our industries could be trained and municipalities because they meet this on their daily lives
it would be good to have examples of conditions for environmental authorisations permits
need a follow up report but could be within companies internally

which topics were especially useful for your daily work

energy flow and environmental pollution. CP and waste related laws
energy efficiency
integrating material at source not only end-of-pipe
waste minimisation in SA energy and energy flows, environmental pollution and climate change
practical application of CP
waste minimisation
case studies
integration good practice, regulations, nat'l laws and grassroot implementation
energy, material flows, permitting exercise, case studies
legal
the case studies opened our mind
legislation and waste minimisation
waste minimation/CP
no handout to refer
waste minimisation Review on CP and waste related laws
review of CP and environmental law
energy savings
case studies
legal framework from the UN agency
savings that can be done by the industry through CP
legally enforceable condition for authorisation
the case studies as well as what to look out for - as well as motivations method for help and implementation of CP
waste related laws in SA
water balance
The "low hanging fruits" of CP to grab the companies' attention to buy in on the CP concept

which topics should be presented additionally

none 5
water balances for industries
more local efforts, more practically
implementatino guidelines on CP
more case studies
licensing
introduce NCPC talk as first talk
how to access the NCPC office, what technical and other support do you do on the ground
all: spend more time This workshop was rushed.
permit application process
no handouts to refer
makin gCP legally enforcable
CP for rural areas
good work was done
The challenges facin gthe implementation of CP
CP based on specific sector, e.g. abbatoirs
more time for CP initiatives and successes in SA
energy flows and climate change
more case studies / success stories from overseas, BREF e g.
need to show attendees teh additional skills need to implement CP e-g- maths and basic understanding of engineering

which topics should be left out

none 16
none, rather additions
calculations could be reduced
european legislation too long module
no handouts to refer
very technical issues
legislation
European legislation
legislation should be shorter though
the material flows should be discussed in detail
complex laws

additional comments und suggestions

all presented, thanks to DEAT and NCPC
presentations to be supplied electronically
more information on subject
the EIA section should be part of teh workshop at provincial level. They should be invited as they are the ones who draft conditions
kindly consider background knowledge of attendants in teh field of science. We were left a bit behind due to information gab
However thtat's not your problem, the workshop or training in general was too good
Also consider increasing number of days to avoid infopiling that keasds to somehow lordom towards the end of presentations
no hand outs/ not planned properly/more information for only 2 days. it was strainous/we had to leave late and travel on risk/exercises were interesting
time management very poor/avoid lot of information within short period/good involvement in terms of exercises were interesting
very good and informative workshop. I learnt a lot