



HONG KONG AIRCRAFT ENGINEERING COMPANY LIMITED

ENVIRONMENTAL REPORT 2005

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1. Business overview

This report covers the Hong Kong Aircraft Engineering Company Ltd.'s (HAECO) operations in Hong Kong. It does not cover its subsidiary in Xiamen (TAECO) or its associate and jointly controlled companies. HAECO is a member of the Swire Group with Cathay Pacific Airways as one of its major shareholders. It was established in 1950, and is the only full-service maintenance provider at the Hong Kong International Airport. It offers comprehensive line and heavy maintenance packages, including extensive aircraft component overhaul support.

At the end of 2005 HAECO had approximately 3,900 employees in Hong Kong, with around 3,540 staff working at the heavy maintenance at Chek Lap Kok, and the remaining 370 staff at Tseung Kwan O. Its three major operating divisions are:

LINE MAINTENANCE (Chek Lap Kok): located in the Passenger Terminal Building offers transit servicing, component replacement and minor structural repairs as well as comprehensive cleaning, refueling and apron services.

BASE MAINTENANCE (Chek Lap Kok): located in the CLK aircraft maintenance area provides airframe overhaul, refurbishment and modification for many types of aircraft, including corrosion control and aircraft modifications.

COMPONENT AND AVIONICS OVERHAUL (Tseung Kwan O): HAECO's component overhaul facilities have extensive capability on a wide range of both mechanical and avionics components fitted on different aircraft models.



2. Mission statement and environmental policy objectives

HAECO attaches high importance to minimizing the impact of its operations on the environment. Environmental considerations are part of its mission statement:



HAECO's commitment to environmental issues is embodied in its policy objectives to:

- conform to the legal requirements and endeavour to adopt higher environmental standards.
- quantify all emissions, pollutants and effluents discharged from operations and minimize the release of such.
- implement schemes to minimize waste by conserving material resources, recycle waste at source whenever practicable and dispose of all wastes in a safe and responsible manner.
- adopt high standards of operational integrity to minimize the risk of environmental incidents to staff and neighbouring communities by employing safe technologies and operating procedures.
- encourage awareness of environmental issues amongst staff at all levels, emphasizing the responsibility of individuals for environmental performance through appropriate operating practices and training.
- increase the use of environmentally acceptable materials, equipment and technology in its operations.
- always take suppliers' environmental performance into consideration in formulating its purchasing strategies.
- aim to achieve environmental saving and commit to continual improvement on environmental performance.

3. Progress on environmental issues during 2005

The environmental policy objectives guide the work of HAECO's Environmental Protection and Industrial Safety ('EP&IS') Department which reports to its Director of Finance. Staff from other departments are encouraged to report any environmental problems to the EP&IS Department.

At the beginning of each year new environmental improvement programmes are devised and targets are set to improve HAECO's environmental performance. The progress of 2005 was:

3.1 Energy and resource use

Objective	Reduction in energy consumption per unit of output
Target	Implement energy conservation programme to achieve 5% energy reduction from existing consumption
Reported information	<p>Electricity:</p> <ul style="list-style-type: none"> ✓ Electricity consumption in base maintenance reduced by 1.01Kwh per manhour sold. There were also reductions per unit of output for line maintenance and CAO. The growth of HAECO's business volume, however led to a 4.3% increase in total electricity consumption in 2005. ✓ An automatic condenser tube cleaning system was installed for the air-conditioning system at a cost of \$450k generating savings of around HK\$285k per annum. <p>Town gas:</p> <ul style="list-style-type: none"> ✓ Reduction of approximately 19.5% consumption in 2005. ✓ 12% reduction in Component Avionics Overhaul's consumption due to installation of two high efficiency town-gas heaters in the kitchen. ✓ Base Maintenance gas consumption was also reduced by the introduction of a heat pump system installed in April 2005 with the potential to save approximately 164×10^3 Kwh per annum.

3.2 Water conservation

Objective	To prevent water wastage
Target	Promote water conservation to optimize water consumption
Reported information	<p>Compared with 2004, water consumption volume dropped by approximately 15%.</p> <ul style="list-style-type: none"> ✓ Most of the reduction in Hong Kong water consumption is due to some aircraft painting work being moved to TAECO. This is not a net saving for the HAECO Group as it will have led to an increase in consumption in Xiamen. ✓ A trial at using automatic faucets in 4/F toilet in 2005 is estimated to have saved around 1,500 liters of water per annum. The cost of the trial faucets is high so the extension to other toilets is dependent upon sourcing of lower cost equipment.

3.3 Pollution prevention

Objective	Recover as many recyclable waste products as practical
Target	Increase recovery rate of recyclable wastes by 5%
Reported information	<ul style="list-style-type: none"> ✓ Recycled paper rate dropped approx. 30% partly due to waste reduction activities in the wastewise scheme. ✓ Cardboard recycled volume doubled due to a new waste collector carrying out the services. ✓ 675 printing cartridges recycled in 2005

3.4 Environmental management

Objective	Improve indoor Air Quality
Target	Perform IAQ measurement for 80% of HAECO's offices.
Reported information	<ul style="list-style-type: none"> ✓ Excellent Indoor Air Quality Certificate was issued by the Environmental Protection Department.

3.5 Purchasing and contracting

Objective	To purchase environmentally acceptable materials, equipment and technology to be used on HAECO's operations
Target	Develop environmentally friendly procurement policy and guidelines for suppliers
Reported information	<ul style="list-style-type: none"> ✓ A 'green' purchasing policy statement was issued in October 2005

3.6 Legal compliance

Objective	Compliance with environmental laws and regulations
Target	100% compliance with the relevant Environmental Laws and Regulations
Reported information	✓ Regular inspections were conducted at all sites

4. Environmental conservation activities

HAECO is carrying out the following environmental conservation activities.

4.1 Prevention of global warming

HAECO measures the greenhouse gases resulting from its operations and continuously seeks ways to reduce these emissions.

4.2 Air pollution control

HAECO has signed to Business Coalition for the Environment's 'Clean Air Charter'. It is taking the following action on areas covered by the charter.

Statement of commitment	Actions taken
1. To operate under a recognised world class standard on emissions of air pollutants, even when it is not required.	HAECO controls all emissions to world-class standards.
2. Use continuous emissions monitors (CEMs) at significant sources.	Regular monitoring will be carried out and an emission inventory will be plotted with reference to staff health standards.
3. Publish information on energy, fuel use and total emissions of air pollutants annually and as required, if emissions are significant.	The information at the end of this report is published on the Company's website.
4. Undertake to adopt energy-efficient measures in our operations.	HAECO has a program to continually review and reduce energy consumption.
5. Identify and encourage business relevant measures to be taken on days when air pollution is high.	Nearly 99% of staff take public transport for work.
6. Share air quality expertise with others.	1. HAECO continues to spread this information through field visits, seminar, etc. 2. Work closely with our subsidiaries such as TAECO in mainland China and GAP in Fanling.

CO₂ frequency inverter installed in the air duct

CO₂ frequency inverters are installed in approximately 80% of HAECO's ventilation to sense the concentration of CO₂. If the concentration of CO₂ exceeds 800ppmv, these inverters automatically increase the air circulation in order to lower the level of CO₂.

Good air quality maintained in the staff canteen

Electrostatic precipitators are installed in the Chek Lap Kok staff canteen and ramp tea-house to remove smoke particles from the air via induced electrostatic charge.



Air scrubber installed in the canteen

An air scrubber has been installed in the canteen to reduce oil and grease particles discharged into the atmosphere. Exhaust air is forced into a spray chamber where fine water particles cause the pollutants to drop from the air stream.



HVLP paint sprayer

HAECO uses High Volume Low Pressure ('HVLP') paint sprayers. A high volume of air at very low pressure atomizes the particles of paint coating being applied. This reduces the amount of material lost to the atmosphere as spraying at low pressure causes less

bounce back from the surface being painted. The resulting transfer efficiency is 85%-90%, as compared to 30-50% with conventional spraying which reduces the paint being released into the atmosphere and also reduces the amount of material used.



Indoor Air Quality Monitoring

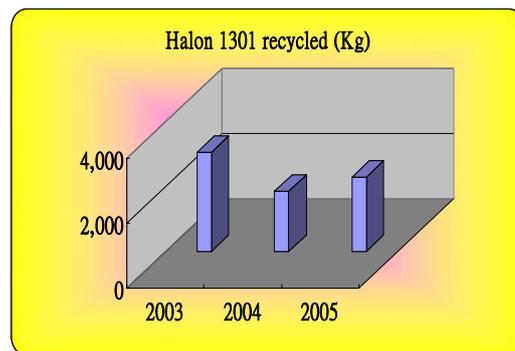
HAECO was awarded the “Excellent class indoor air quality” Certification on its administration building in 2005. Twelve parameters were measured including temperature, humidity, carbon dioxide, the level of respirable

suspended particles, radon and the total volatile organic compounds.



Use of Halon Collecting Devices

Halon 1301 and Halon 1211 are used in aircraft fire-extinguishing systems. Halons are controlled ozone depleting substances. HAECO operates a recycling machine to reuse or store them during maintenance inspection of fire extinguishing systems. In 2005, the recycled amount of Halons increased 24% as compared with last year.



Keep air clean

Under Hong Kong Environmental Protection Department’s “WAIT GREEN ENGINE OFF” campaign, drivers are encouraged to turn engines off when idling and plan ahead to reduce the number of trips and hence fuel consumption.



Particulate trap device

Particulate removal devices were installed in the exhaust systems of all HAECO's diesel vehicles below 4 tonnes. These devices typically remove up to 90% of the particulate matter from the exhaust gas.



4.3 Prevention of water pollution

HAECO's approach to preventing water pollution is based on water conservation coupled with reducing pollutant sources in the wastewater treatment plant. Changes made during 2005:

1. The paint stripper has been changed from phenolic to non-phenolic "SPC-909" whose treatment requires less hydrogen peroxide and water.
2. The chemical dosing for HAECO's wastewater treatment plant was changed from manual to auto mode in order to enhance the efficiency of chemical usage.

4.4 Waste management

HAECO continues to apply the 4R (reduce, reuse, recycle and recover) approach to waste management. HAECO's waste comes from three major areas:

1. General refuse from aircraft servicing
2. Cleaning activities
3. Daily operations of hangar, workshops, canteen and offices.

The total amount of industrial and commercial waste disposed in 2005 was 1,373,780kg, an increase of about 17% compared with that in 2004. Waste generated in Base Maintenance increased by about 7% less than the growth in manhours sold. Waste generated by Component Avionics Overhaul increased by about 37% due to building work on re-laying out the workshops.

Waste Recycling

Waste recycling bins are provided throughout the company. They are colour-coded for different types of waste. Blue bins are for paper, yellow bins for aluminum cans and brown bins for plastic bottles. The service contractor collects the material from these bins for recycling without additional service charge.



Chemical waste management

HAECO's sources of the chemical wastes are:

- ✓ Solid wastes: used rags, used chemical cans, and spent empty chemical drums.
- ✓ Liquid wastes: drained lubrication oil for aircraft and ramp equipment, hydraulic oil, waste paint and thinners, used battery acids, (200-L), and spent non-halogen organic solvents.

HAECO uses the concept of "Cradle to grave" controls on chemical waste and participates in the EPD's trip-ticket system which track of the chemical waste to confirm it is correctly disposed.

The recycled amount of drained lubrication oil and kerosene increased 1.1% and reduced 6% respectively in 2005.

Wastewise scheme

HAECO has demonstrated the commitment towards conservation of environmental resources by joining the Wastewise scheme and achieving the waste reduction target required to acquire the Wastewi\$e Scheme logo and Gold Wastewi\$e Scheme logo. HAECO continued to perform well in reducing paper consumption in 2005, achieving a further reduction of 17% over 2004. In 2005, the amount of paper recycled dropped 17% partly due to the enhancement of environmental awareness and the waste reduction activities in the wastewise scheme.

Wastewi\$e
明智減廢



Wastewi\$e logo
certificate

4.5 Noise protection

HAECO carries out noise assessment in different areas to evaluate potential noise hazards. Controls have then been implemented to prevent the noise problem. Areas covered during 2005:

Chek Lap Kok

Apron background noise

RS cleaner waiting beside aircraft for servicing aircraft

Background noise inside Sheet Metal General Workshop (Rm. C020)

Band saw inside Carpenter Shop (Rm. B020)

Drilling in Sheet Metal General Workshop (Rm. C020)

Sanding Machine inside Carpenter shop (Rm. B020)

Fixed Ground Power Unit

Fixed air-conditioner at the bridge at the apron

Hydraulic mule

Metal punching in Sheet Metal General Workshop (Rm. C020)

Circular saw inside Carpenter Shop (Rm. B020)

Planning machine inside Carpenter shop (Rm. B020)

Sanding of fibre lan (floor panel) inside Corrosion Treatment Workshop (Rm. C027)

Air Compressor Room (Rm. E2P3)

Milling machine inside Carpenter Shop (Rm. B020)

Grinding Workshop inside Composite Workshop (Rm. D027)

Sanding of metal plate inside Corrosion Treatment workshop (Rm. C027)

Mobile Ground Power Unit (GPU)

Metal sawing using band saw in Sheet Metal Workshop (Rm. C020)

Mobile air-conditioning Unit (ACU)

Portable Milling machine inside Carpenter shop (Rm. B020)

Sawing of fibre lan (floor panel) inside Corrosion Treatment Workshop (Rm. C027)

Metal Grinding in Sheet Metal General Workshop (Rm. C020)

Swing saw inside Carpenter Shop (Rm. B020)

Tseung Kwan O

Blasting inside TKO Cleaning Area (Rm. G127)

NDT Test Room (Rm. G120) (with ventilation turned on)

Chemical cleaning Workshop (Rm. G119) (with ventilation turned on)

Fuel test Equipment Room (Rm. G139)

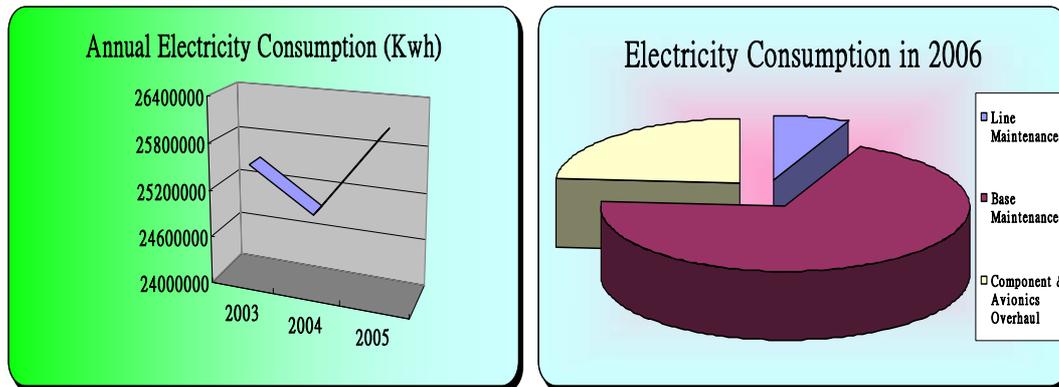
Using compressed air nozzle for de-watering component inside Cleaning Area (Rm. G127)

Fuel Component Test Room (Rm. G141)

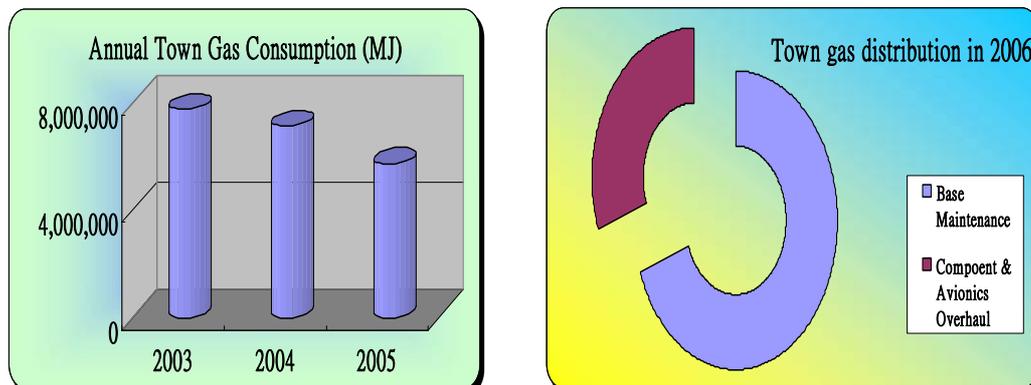
Riveting inside training classroom

4.6 Energy management

HAECO has identified a number of energy management opportunities and has a program of investment to realize these opportunities. This work kept HAECO's increase in electricity consumption to 4.3% in 2005 – substantially below the increase in manhours sold.



Town gas consumption has reduced due to installation of two high efficiency town gas heaters for the kitchen at Component Avionics Overhaul.



Note: There is no town gas consumption in our Line Maintenance division

Energy saving of the automatic condenser tube cleaning system

This system was introduced in October 2005. It uses specially designed absorbent sponge balls that automatically circulate through the water system and act as a chemical-free water treatment. It continuously removes impurities, sediment, scaling deposits and corrosive elements from heat

exchangers and cooling system's tubes, thus allowing them to operate at optimum efficiency and hence minimize power consumption.



Lighting control

HAECO has installed automatic lighting controls linked to photocells and motion sensors to reduce energy consumption.



Light dimming: under normal condition



Light turn on: the person was in the detection area

Use natural light

The use of natural lighting at HAECO's buildings has been increased to reduce energy consumption on lighting and the subsequent air conditioning required to shed the heat produced by artificial lighting.



Heat pump for canteen

A heat pump was installed in the canteen to supply hot water for washing and cleaning activities. It is estimated that this equates to savings of approximately 164×10^3 KWH of electricity per annum.



5. Environmental social activities

HAECO donated old uniforms and used computing equipment to charities.



300 old uniforms were donated to Christian Action



101 old computers and other equipment were donated to Caritas Hong Kong

6. Global reporting initiatives (GRI)			
REF	Environmental performance indicators	Adoption to GRI	Relevant page(s)
Aspect: Materials			
EN1	Material use other than water	Partial	Appendix
EN2	Percentage of materials used that are recycled		Not included
Aspect: Energy			
EN3	Direct energy use segmented by primary source	Partial	Appendix
EN4	Indirect energy used		Not included
Aspect: Water			
EN5	Total water use	Partial	Appendix
Aspect: Biodiversity			
EN6	Location and size of land owned, leased and managed of high biodiversity	N/A	N/A
EN7	Description of significant impacts of activities in terrestrial and marine areas		Not included
Aspect: Emissions, Effluents, and Waste			
EN8	Greenhouse gas emissions	Partial	p.5, appendix
EN9	Use and emission of ozone depleting substances	Partial	p.7, appendix
EN10	NOx, SOx and other significant air emissions by type	Partial	p.8
EN11	Total amount of waste by type and destination	Partial	Appendix
EN12	Significant discharges to water	Partial	Appendix
EN13	Total number and volume of significant spills of chemicals, oils and fuels		Not included
Aspect: Products and Services			
EN14	Significant environmental impacts of products and services	Included	Appendix
EN15	Percentage of products sold that is reclaimed at the end of the products' useful life by product category	N/A	N/A
Aspect: Compliance			
EN16	Incidences and fines for environmental regulatory non-compliance	Included	Appendix

- REMARK:
1. N/A: Not applicable to HAECO's service business
 2. Partial: Partly applicable to HAECO's service business
 3. Included: Fully applicable to HAECO's business
 4. Indicator materials obtained from the web site: www.grig3.org

Summary of statistics 2005

Appendix

Environmental statistic	Quantity for the year				Quantity per unit of production				Change	
	Unit	2005	2004	2003		2005	2004	2003	Total	per unit
Business Volume Indicators										
BM manhours sold	Hour	1,637,906	1,415,553	1,346,432						
LM aircraft handled	No.	92,202	81,465	64,762						
Component Avionics Overhaul (CAO) manhours sold	Hour	243,212	247,611	252,244						
Energy and Fuel Use										
Electricity consumed (Total)	KWh	26,040,691	24,965,716	25,504,751					4.3%	
Base Maintenance (BM)		18,178,921	17,141,241	17,675,387	KWh/manhour	11.10	12.11	13.13	6.1%	-8.3%
Line Maintenance (LM)		1,711,608	1,685,605	1,578,668	KWh/movement	18.56	20.69	24.38	1.5%	-10.3%
Component Avionics Overhaul (CAO)		6,150,162	6,138,870	6,250,696	KWh/manhour	25.29	24.79	24.78	0.2%	2.0%
Town gas consumed (Total)	MJ	5,733,264	7,119,504	7,756,848					-19.5%	
Base Maintenance (BM)		3,976,416	5,124,576	5,686,896	Mj/manhour	2.43	3.62	4.22	-22.4%	-32.9%
Component Avionics Overhaul (CAO)		1,756,848	1,994,928	2,069,952	Mj/manhour	7.22	8.06	8.21	-11.9%	-10.3%
Diesel consumed (Total)	L	2,886,941	2,605,942	2,498,754					10.8%	
Industrial diesel consumed mainly by AVL vehicles		2,784,423	2,520,153	2,417,329	L/movement	30.20	30.94	37.33	10.5%	-2.4%
Vehicle diesel consumed mainly by PRL vehicles		102,518	85,789	81,425					19.5%	
Water Use										
Potable water consumed (Total)	m ³	104,059	122,823	142,005					-15.3%	
Base Maintenance (BM)		94,572	113,357	132,307	m3/manhour	0.06	0.08	0.10	-16.6%	-27.9%
Component Avionics Overhaul (CAO)		9,487	9,466	9,698	m3/manhour	0.04	0.04	0.04	0.2%	2.0%
Use of Chemicals										
Chemicals used for Aircraft Maintenance	L	362,490	297,625	258,601	L/manhour	0.22	0.21	0.19	21.8%	5.3%
Chemicals used for other than aircraft maintenance (e.g. waste water treatment)	L	1,713,438	1,665,297	1,846,705					2.9%	
Use of Other Materials										
Paper and paper products consumed	kg	55,390	66,783	58,261					-17.1%	
Plastics consumed	kg	139,186	127,388	103,048					9.3%	
Metals consumed	kg	3,714	2,382	2,331					55.9%	
Paints consumed for Aircraft Maintenance	L	6,312	17,337	14,705					-63.6%	
Aircraft tyres consumed	kg	390,876	422,244	325,718					-7.4%	
Vehicle tyres consumed	kg	30,925	31,538	24,240					-1.9%	
Greenhouse Gas (GHG)										
CO2 emissions	kg	25,473,549	22,134,748	22,169,856					15.1%	
SCOE 1: Industrial diesel + town gas		7,977,975	8,058,390	7,087,407					-1.0%	
SCOE 2: Electricity + HFC		17,495,574	16,772,265	17,134,244						
Water Quality										
Process wastewater disposed of (Total)	m ³	92,220	109,350	129,769					-15.7%	
Base Maintenance (BM)		85,267	102,428	122,260	m3/manhour	0.05	0.07	0.09	-16.8%	-28.1%
Component Avionics Overhaul (CAO)		6,953	6,922	7,509	m3/manhour	0.03	0.03	0.03	0.4%	2.3%

Summary of statistics 2005

Appendix

	Quantity for the year				Quantity per unit of production				Change	
	Unit	2005	2004	2003		2005	2004	2003	Total	per unit
Solid Waste Arisings										
Industrial & Commercial waste disposed of (Total)	kg	1,373,780	1,170,820	1,147,860					17.3%	
Base Maintenance (BM)		874,190	806,820	727,860	kg/manhour	0.53	0.57	0.54	8.4%	-6.4%
Component Avionics Overhaul (CAO)		499,590	364,000	420,000	kg/manhour	2.05	1.47	1.67	37.3%	39.7%
Food waste disposed of	kg	328,050	318,450	316,050					3.0%	
Grease trap waste disposed of (Total)	kg	327,000	282,000	266,950					16.0%	
Base Maintenance (BM)		179,000	169,000	175,000	kg/manhour	0.11	0.12	0.13	5.9%	-8.5%
Component Avionics Overhaul (CAO)		148,000	113,000	91,950	kg/manhour	0.61	0.46	0.36	31.0%	33.3%
Materials Recycling										
Paper recycled (Total)	kg	24,823	39,701	11,381					-37.5%	
Base Maintenance (BM)		12,422	29,740	4,772	kg/manhour	0.01	0.02	0.00	-58.2%	-63.9%
Component Avionics Overhaul (CAO)		12,401	9,961	6,609	kg/manhour	0.05	0.04	0.03	24.5%	26.7%
Aluminum sheet recycled	kg	6,135	10,225	6,135					-40.0%	
Metal turning recycled	kg	693	2,140	648					-67.6%	
Cardboard recycled	kg	59,863	24,080	19,692					148.6%	
Number of printing cartridges recycled (Total)		675	622	832					8.5%	
Base Maintenance (BM)		506	460	480					10.0%	
Component Avionics Overhaul (CAO)		169	162	352					4.3%	
Vehicle tyres recycled	kg	35,237	25,175	18,530					40.0%	
Chemical Waste Arisings										
Solid chemical waste disposed of (incl. spent rags, empty chemical drums & cans)	kg	138,250	129,185	130,190					7.0%	
Liquid chemical waste disposed of (incl. paint, lube oil, battery acid, etc.)	L	66,440	61,240	89,880					8.5%	
Spent kerosene (aircraft fuel) disposed of	L	82,000	81,000	168,600					1.2%	
Chemical Waste Recycling										
Spent lube oil recycled	L	72,000	71,200	15,400					1.1%	
Spent kerosene (aircraft fuel) recycled	L	34,600	36,800	0					-6.0%	
Halon 1301 recycled	kg	2,283	1,842	3,049					23.9%	
Compliance with Legal Requirements for Air Pollution Control, Water Pollution Control and Waste Disposal										
No. of new warning letters received from relevant authorities	No.	0	0	0						
Number of new prosecution actions	No.	0	0	0						