Think

Environmental Product Declaration

A presentation of quantified environmental life cycle product information for the **Think** task chair.

ENVIRONMENTAL PRODUCT DECLARATION EPD

Product Description

The model chosen for analysis is the most frequently ordered task chair (model 465 200 MP) from the **Think** seating range. It is a highly adjustable ergonomic chair equipped as follows:

1. *"Your Power™" weight activated mechanism*
2. *"Your Profile™" seat and back flexors*
3. *seat depth*
4. *seat height*
5. *"Your Preference™" 4 comfort settings*
6. *lumbar support*
7. *height, pivot and retractable adjustable armrests*
8. *plastic base*

Manufacturer

The **Think** task chair is manufactured in Sarrebourg, France, by Steelcase.

Steelcase, which was founded in 1912, has been dedicated to creating innovative products and helping people work more effectively for almost a century. Steelcase has management systems for Quality (ISO 9001) and for the Environment (ISO 14001), ensuring that our customers are guaranteed the same level of product quality and environmental performance, wherever they are in the world.

Steelcase is committed to continually reducing the environmental impacts of its products and activities on a global scale.

The **Think** task chair is also manufactured in Grand Rapids, Michigan, USA, for the North American market and, starting 2005, in Kuala Lumpur, Malaysia for the Asian market.

For further information see www.steelcase.com.

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Material Declaration

The **Think** task chair consists of the materials listed below. The total weight is 15.1 kg including packaging.

Metals	kg	%
aluminium	0.692	4.6
steel	4.776	31.7
zinc alloy	2.111	14.0

Plastics	kg	%
PA	5.015	33.2
LDPE (for packaging)	0.318	2.1
PET	0.380	2.5
POM	0.533	3.5
PP	0.680	4.5
PU	0.330	2.2

Other materials	kg	%
cardboard (for packaging)	0.227	1.5
rubber	0.024	0.2

Environmental Product Declaration

The potential environmental impacts of the **Think** task chair throughout its entire life cycle – including raw materials extraction, production, transport, use, and end of life – were assessed using Life Cycle Assessment (LCA), during the chair's development (early 2004).
The functional unit used in the LCA was chosen as *provision of comfortable office seating – with the features stated in the product description – for an average person (45 – 110 kg) for 8 hours a day, 5 days a week over a lifetime period of 15 years*.

Life Cycle Inventory Analysis

The Life Cycle Inventory Analysis covers all life cycle stages as shown below.

Materials
This stage includes raw materials extraction and transformation, as well as supply of parts and semi-manufactured parts until their final delivery to the production site in Sarrebourg.

Production
This stage comprises all production and assembly processes. Data was obtained from suppliers and from the ISO 14001 environmental management system of the production site in Sarrebourg.
This data was then applied to the product.

Transport
Transport from suppliers to Sarrebourg and transport from Sarrebourg to major European markets is considered.

Use
No relevant environmental exchanges occur during use of the product.

End of life
Any product can be disposed of in different ways, or become a resource itself. Based on current European averages it was assumed that about 60% of the products are landfilled, 27% incinerated and 13% recycled at the end of their useful life.

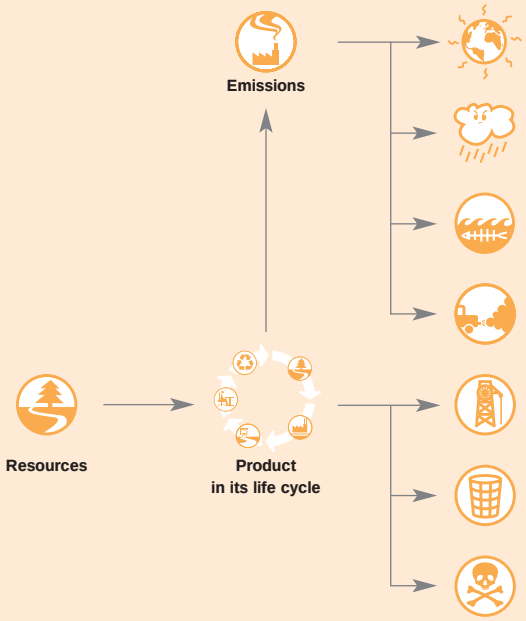
Distribution of the environmental impacts for the relevant life cycle stages

	Category	Unit	Total	Materials	Production	Transport	End of life
	Global warming	[g CO_2-eq.]	106 440.0	67 800.0	26 400.0	6 660.0	5 580.0
	Acidification	[g SO_2-eq.]	831.4	535.0	254.0	66.3	-23.9
	Eutrophication	[g NO_3-eq.]	745.0	471.0	172.0	114.0	-12.0
	Photochemical smog	[g C_2H_4-eq.]	25.1	18.0	0.7	6.2	0.2

No relevant environmental exchanges occur during the use stage of the product.

Life Cycle Assessment

Environmental impact categories



Global warming
is the rising of the global temperature due to emissions of greenhouse gases.

Acidification
is the damage to trees and life in lakes and rivers, as well as accelerated degradation of materials such as metals, limestone and concrete, both due to acid emissions.

Eutrophication
is the loss of plants and animals in aquatic ecosystems due to oxygen depletion following blooms of algae, stimulated by high nutrient concentrations.

Photochemical smog
is a type of air pollution harmful to the environment and human health caused by emissions of nitrogen oxides and volatile organic components.

Abiotic resource depletion
is the depletion of non-renewable resources such as oil, coal and metals due to their extraction and consumption.

Waste
is the bulk waste and hazardous waste created during the whole life cycle of the product.

Toxic substances
are substances which cause harm to the natural environment or human health, emitted during the whole life cycle of the product.

Environmental aspects of Think task chair

The contributions of inventory parameters to different impact categories throughout the entire life cycle of the **Think** task chair are listed below. Life cycle inventory parameters are mentioned only if they contribute more than 1% of the total impact in that impact category.

Category	Parameter		Inventory value	*Unit*	Characterised impact value	*Unit*
Global warming					**Total 106 440.0**	**g CO_2-eq.**
	CO_2	(carbon dioxide)	89 940	g	84.5	%
	N_2O	(nitrous oxide)	21	g	6.2	%
	CH_4	(methane)	233	g	5.5	%
	HCs	(hydrocarbons)	12	g	3.4	%
Acidification					**Total 831.4**	**g SO_2-eq.**
	SO_x	(sulphur oxides)	481	g	58.4	%
	NO_x	(nitrogen oxides)	490	g	41.3	%
Eutrophication					**Total 745.0**	**g NO_3-eq.**
	NO_x	(nitrogen oxides)	490	g	88.7	%
	N_2O	(nitrous oxide)	21	g	7.8	%
	NH_4^+	(ammonium)	4	g	1.8	%
Photochemical smog					**Total 25.1**	**g C_2H_4-eq.**
	C_5H_{12}	(n-pentane)	25	g	39.5	%
	CO	(carbon monoxide)	213	g	25.3	%
	NMVOCs*	(from diesel engines)	8	g	18.0	%
	CH_4	(methane)	233	g	6.5	%
	VOCs*	(from diesel engines)	2	g	5.4	%
	C_xH_y	aromatic	1	g	1.8	%
Abiotic resource depletion						
	Brown coal (lignite)		1.3	kg	-	-
	Coal		12.6	kg	-	-
	Crude oil		14.5	kg	-	-
	Iron (in ore)		3.5	kg	-	-
	Natural gas		10.3	kg	-	-
	Zinc (in ore)		2.1	kg	-	-
Waste						
	Bulk waste		6 623	g	-	-
	Hazardous waste		382	g	-	-
Toxic substances						
	Toxic substances		251	g	-	-

No characterised impacts were calculated for Abiotic resource depletion, Solid waste and Toxic substances, due to lack of credible, internationally agreed characterisation factors.

** VOCs = volatile organic compounds, NMVOCs = non-methane VOCs*

Additional environmental information

Certifications

- By the end of 2004 **Think** will officially comply with the French environmental certification “NF – Environnement”, awarded by the CTBA (Centre Technique du Bois et de l’Ameublement).
- **Think** is GREENGUARD Indoor Air Quality™ certified - for North America.

Results achieved in life cycle stages

End of life

- **Think** can be easily disassembled in about 5 minutes, using only common hand tools.
- **Think** is 99% recyclable by weight.
- Parts weighing more than 50 g are clearly labelled for recycling.
- The cardboard and LDPE film used for packaging are suitable for recycling.

Materials

- To reduce overall material usage, **Think** weighs only 15 kg.
- It is made from 44% recycled materials and contains no hazardous materials (no PVC, no Chrome, no Mercury and no Lead).
- The foam does not contain CFC and HCFC.
- The packaging consists of cardboard (manufactured from recycled material) and LDPE film (Low Density Polyethylene) that contains 30% recycled material.
- Paper and packaging use water based inks without solvent.

Use

- To maximise **Think**’s working life, seat and back cushions, arms, headrest, and lumbar support can be added or replaced.
- Maintenance information is available in the User’s manual.

Production

- **Think** was designed to be made with minimal waste, energy consumption and environmental impact.
- Powder-coat painting is VOC-free and free of heavy metals. No gluing processes are used in assembly, and all urethane foam is water-based.

Transport

- To reduce shipping, chairs are manufactured close to customers, in Europe and Asia as well as North America.
- Because the **Think** chair is light weight and small-volume packaged it requires less energy for shipping.

Together with Steelcase, Mc Donough Braungart Design Chemistry (MBDC) analysed key materials according to their strict protocols, endorsing only those deemed safe to the environment.

Compilation and Verification Process

- The LCA study and the EPD of the **Think** task chair (reference 465 200 MP) were carried out by Steelcase together with :
  - Institute for Product Development - Denmark (Instituttet for Produktudvikling, IPU)
  - Institute for Engineering Design, Vienna University of Technology - Austria (Institut für Konstruktionslehre, Ecodesign, Technische Universität Wien, TUW).
- The LCA study was verified through a critical review by Institute of Chambéry - France (Ecole Nationale Supérieure des Arts et Métiers, ENSAM)

References

Form of document

- ISO/TR 14025: Environmental labels and declarations – Type III environmental declarations,15-03-2000
- Lee, K.M., Park, P. : “Application of Life-Cycle Assessment to Type III Environmental Declarations”, Environmental Management, Vol. 28, No. 4, 2001, pp. 533-546

LCA method and characterisation factors

- EDIP method: Wenzel, Hauschild, Alting : “Environmental Assessment of Products” Volume 1 (Methodology, tools and case studies in product development), Chapman and Hall, 1997, ISBN 0 412 80800 5
- Intergovernmental Panel on Climate Change (IPCC), Status report, 1994
- World Meteorological Organization (WMO), Status report on global ozone research and monitoring project, 1992/1995
- Nordic LCA guideline, 1995
- UNECE report, 1990/1992

End of life scenario

- European Topic Centre on Waste and Material Flows, Copenhagen, Denmark, Sept. 2002, http://waste.eionet.eu.int

Contact

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