# **Life-Cycle Assessment**



A systematic set of procedures for compiling and examining the inputs and outputs of materials and energy and the associated environmental impacts directly attributable to the functioning of a product or service system throughout its life cycle.

# **Life-Cycle Assessment**

## LCA most important applications:

- Analysis of the contribution of the life cycle stages to the overall environmental load, usually with the aim to prioritize improvements on products or processes
- Comparison between products for internal or external communications

## LCA stages:

- goal definition (i.e. study objectives) and scope
- preparing the inventory of burdens (e.g. resources used, pollutants emitted)
- assessment of the environmental impact of these burdens
- interpretation of the study



Typical environmental evaluation in an LCA

# **Research Interests**

**Environmental Impact Assessment of Grind-Hardening Process** 

2.5

2.0

1.5

1.0

28.1 %

## Subject:

Environmental impact comparison between the grind-hardening process and the respective impact, caused by the utilization of conventional heat treatment methods.



Salonitis K., Tsoukantas G., Drakopoulos S., Stavropoulos P. and Chryssolouris G. (2006) "Environmental Impact Assessment of Grind-Hardening Process", 13th CIRP International Conference on Life Cycle Engineering

# **Research Interests**

## **Environmental Impact of Ship Hull Repair**

## Subject:

Environmental impact comparison between welding and cutting processes used in the ship repair industry

### Processes:

- -Flux Core Arc Welding (FCAW)
- -Shielded Metal Arc Welding (SMAW)
- -Submerged Arc Welding (SAW)
- -Oxy-Acetylene Cutting (OAC)
- -Plasma Arc Cutting (PAC)





Drakopoulos S., Salonitis K., Tsoukantas G., Chryssolouris G. (2006) "Environmental Impact of Ship Hull Repair", 13th CIRP International Conference on Life Cycle Engineering

# **Research Interests**

## Life Cycle Assessment of complex products: An industrial case study

### Goal:

Evaluation of the environmental damage due to manufacturing, use and end of life of a commercial refrigerator and the formation of new design solutions to reducing the environmental impact.

#### C:\SIMAPRO4\DATABASE\STANDARD; Coffee machine demo - [Main data] - 🗆 × 😴 File Edit View Calculate Scripts Options Help Window \_ 8 × 9 4 ≕ Project description Boxes Processes Report setups Process databases All projects Name (15,1) Category (971,1) Sub-category (621,1) -Cement blast furnace Material Building mat Energy Chemicals Cement Hoogoven I Ferro metals Cement mortar Transport Processing Fuels Cement Portland Glass+Ceram. Cement Portland ash Use Non Ferro Waste scenario Cement Portland I Waste treatment Others Concrete (reinforced) I Paper+ Board Concrete I Plastics Crushed concrete I x Aluminiums Gravel I x Cast irons Hoogoven slags l x Codders Sand I Project/Process database Waste fraction Unit Comment Patras

#### Software tool SimaPro interface



Chryssolouris G., Tsirbas K., Karabatsou V., Maravelakis G. and Sillis S. (2001) "Life Cycle Assessment of complex products: An industrial case study", *Proceedings of the 34<sup>th</sup> CIRP International Seminar on Manufacturing Systems 2001,* pp. 399-405