



ECO-DESIGN CHALLENGES
Roberto Rinaldi
Tech.Director High Speed Group
ALSTOM

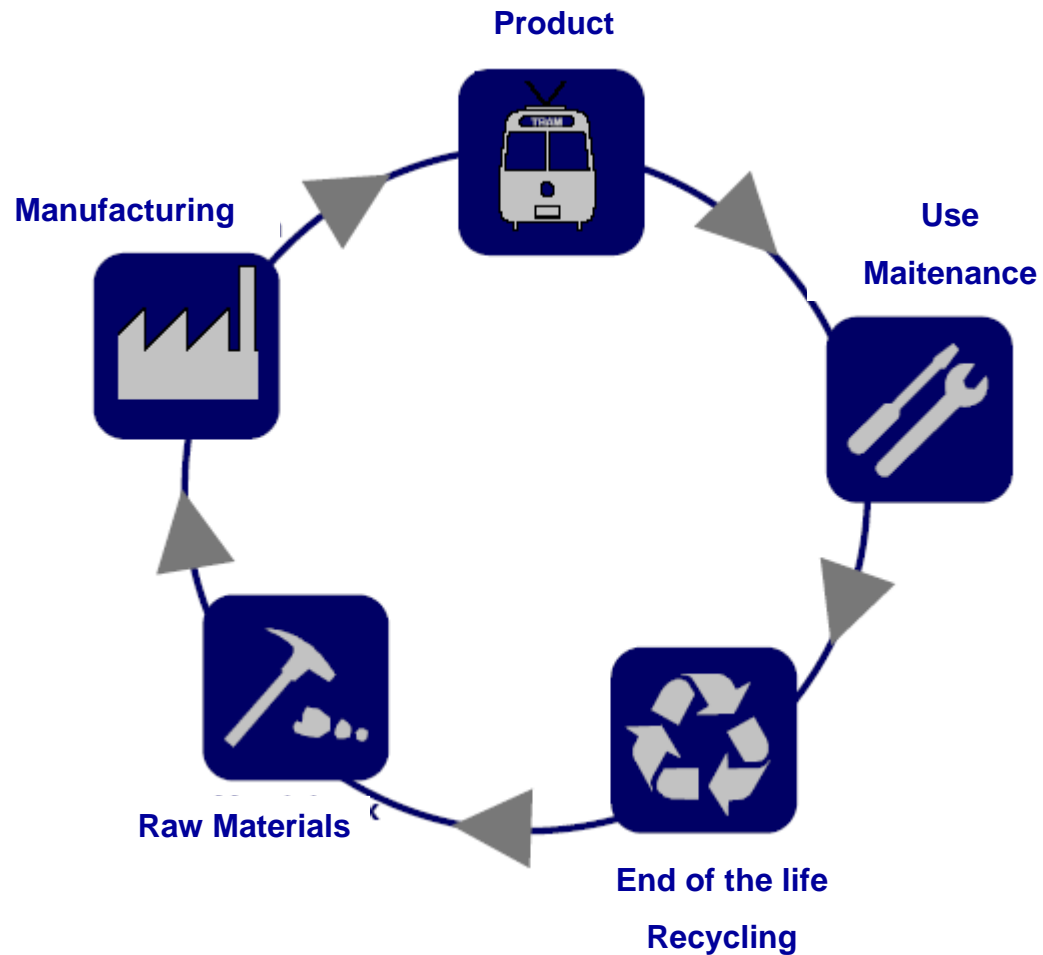
Eco Design



Systemic approach to design environment friendly products

To design products that comply to customers expectations and that reduce environmental impacts on its life cycle

Eco design : Product Life Cycle



Eco design : Key Aspects Friendly for Environment

1. Low Energy consumption

4 . Low emissions:
gas (CO₂,..), fluids and particles

2. Clean Materials

Respectful for Environment

5 . Electromagnetic compatibility

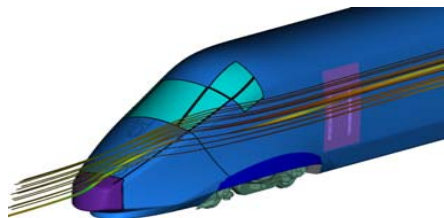
3. Low Noise Emissions

ALSTOM High Speed Products vs. Eco design key aspects

Eco design : Low Energy Consumption

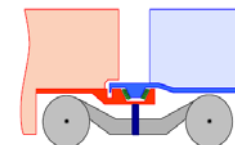
- Weight reduction
- Aerodynamic performance

- Materials, PMM (Permanent Magnet Motors)
- Ext. Shape optimisation by CFD, wind tunnel tests



- Traction Equipment Efficiency → Regen.electric brake,PMM (Perm.Magnet Motors)

.... and with the Articulated Train Configuration



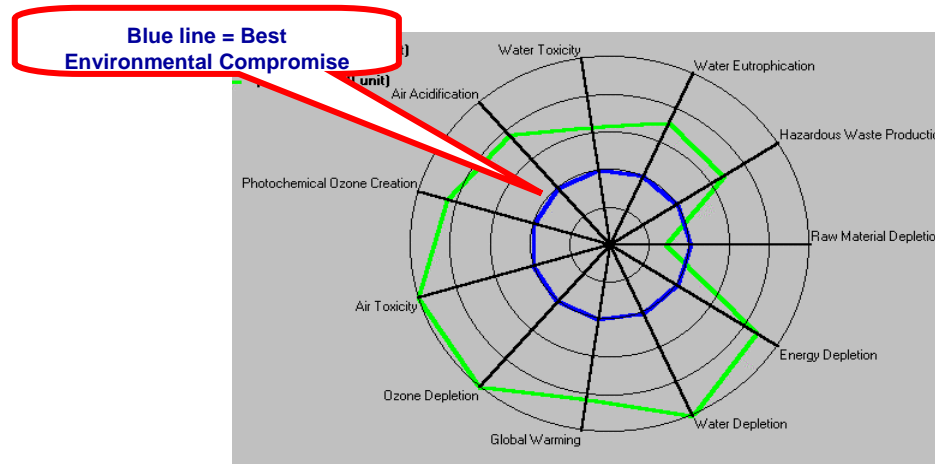
- Less bogies
 - Less overall train weight : -15%
 - Less aerodynamic drag



additional Energy saving of approx. 15%

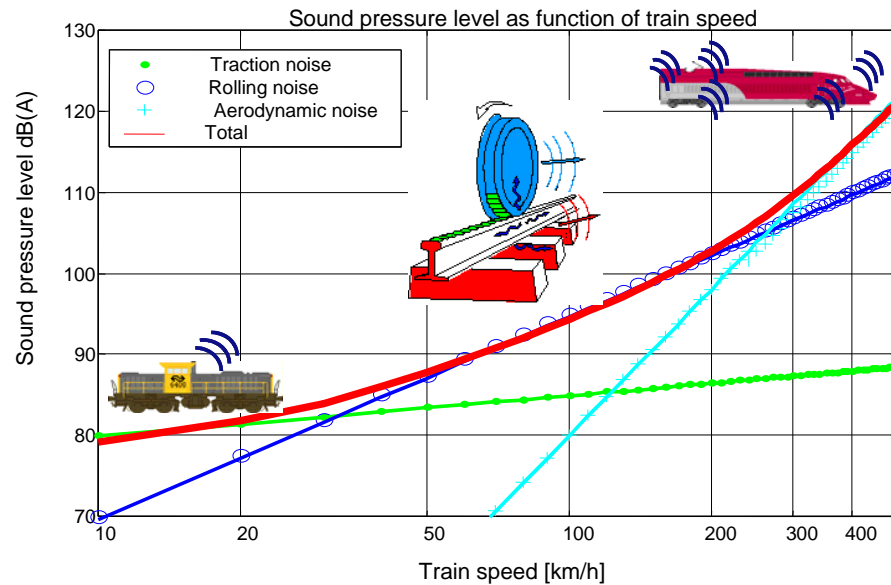
Eco design : Clean Materials

- EIME ® (Environmental Information and Management Explorer), a tool to assess LCA (Life Cycle Assessment) taking in account 11 environmental indicators , enables to evaluate the environmental impact of the materials:

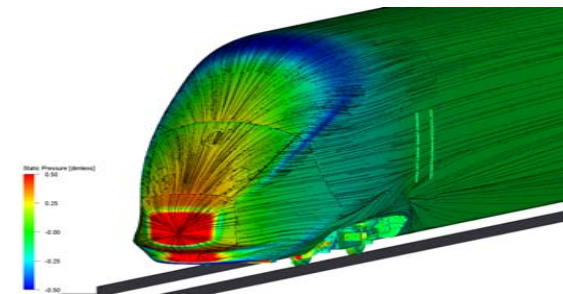
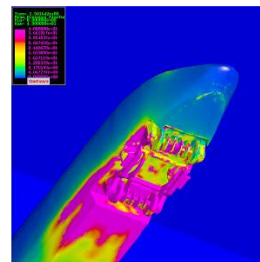
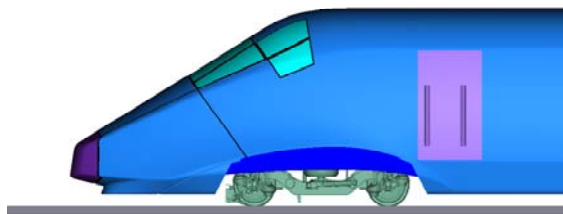


- Current recycling parameter 85% → target for the next 5 years 98%

Eco design : Low noise emission



•To reduce the aerodynamic noise at high speed → Aeroacoustic optimisation



Eco design : Low Emission



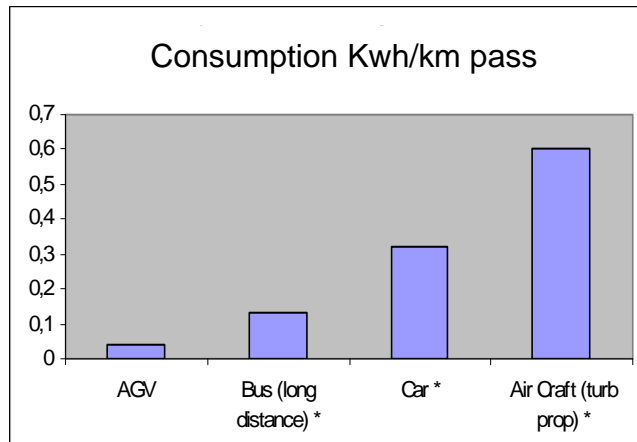
0,4 l/100 km/pass
5 g CO2/km/pass



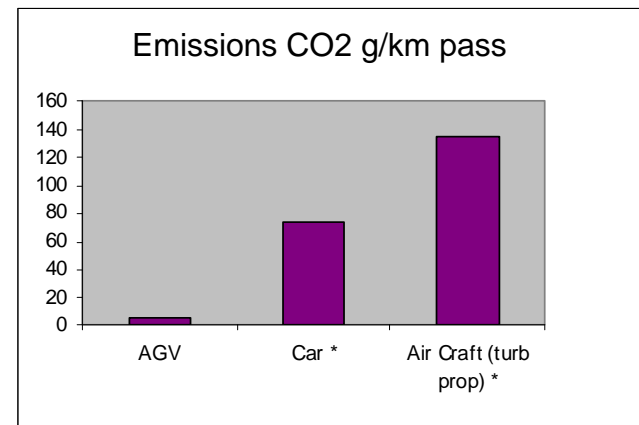
2à3 l/100 km/pass
73,5 g CO2/km/pass



5 à 7 l/100 km/pass
130 g CO2/km/pass



* Royal Institute of Technology



* Royal Institute of Technology

Train CO₂ emissions (g/Km pass):

- 15 times less than car
- 25 times less than aeroplane

OUR COMMITMENT:



DESIGN TRAIN FOR BETTER LIVING

SAFE AND ENVIRONMENTAL FRIENDLY PRODUCTS