

Collaborative Engineering

Design for Environment (LCA using SolidWorks)



- Definition
- Example
- Comparison

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Life Cycle Assessment (LCA)

- A method to assess the environmental impact of a product throughout its entire lifecycle



Imp. Terminologies

- Air Acidification:** Sulfur dioxide, nitrous oxides other acidic emissions to air. Measured in kg SO₂ or moles H⁺ equivalent.
- Carbon Footprint:** Carbon-dioxide and other gases which result from the burning of fossil fuels.
- Total Energy Consumed:** Measure of the non-renewable energy sources in MJ.
- Water Eutrophication:** Occurs when an over abundance of nutrients are added to a water ecosystem. Measured in kg phosphate or kg nitrogen equivalent.

Example - Femoral condyle

- Parameters
 - Material (Ti-6Al-4V)
 - Volume
 - Surface Area
 - Weight
 - Manufacturing Process
 - Manufacturing Region
 - Use Region (India)



Femoral condyle results



Comparison

- Parameters
 - Material (AISI 316 SS)
 - Manufacturing Region (North America)
 - Use Region (India)



Comparison results

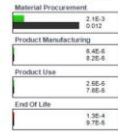
Carbon Footprint - Comparison

Total: 402.114 Annotated Stainless Steel Bar (10) - 3.7 kg CO₂e
 1.0 kg CO₂e (Global Warming Potential) (10) - 9.3 kg CO₂e



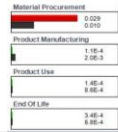
Water (Subcategory) - Comparison

Total: 402.114 Annotated Stainless Steel Bar (10) - 0.113 kg CO₂e
 1.0 kg CO₂e (Global Warming Potential) (10) - 2.32E-7 kg CO₂e



Air Acidification - Comparison

Total: 402.114 Annotated Stainless Steel Bar (10) - 0.014 kg SO₂e
 1.0 kg CO₂e (Global Warming Potential) (10) - 6.1E-6 kg SO₂e



Total Energy Consumed - Comparison

Total: 402.114 Annotated Stainless Steel Bar (10) - 30 MJ
 1.0 kg CO₂e (Global Warming Potential) (10) - 1.0E-3 MJ

