Software Support For Sustainable Product Development

Funding Sources: Industrial Affiliates of LMAS

Motivation

■ Weak Software Support for Environmental Sustainability
■ Interest increases among product developers.
■ LCA Software Sales 25M/Year (~2005)
■ LCA usage is not active in product development yet.

Problem

■ Challenges to applicability of LCA tools
■ Excessive data input requirement
■ Poor interface with conventional tools
■ Uncertainty resulting from averaged information

Product Development Hierarchy

■ Product data has complex hierarchical structure.
■ Each phase has different perspective in LCA.
■ Environmental Impact = \text{Sum}(\text{Lower level impact})

Implementation Strategy

■ Strategy
■ Sharing information with product database
■ Integrating with existing development tools
■ Minimizing additional input parameter
■ Designing models for different working environments

Operation Level Software

■ Rectangular Pocket (100X100X40)
■ Rough cut (Ø20) and Finish cut (Ø10)
■ 5 tool-path schemes compared.
■ Web-based S/W for evaluation
■ Performance variation is small, energy distribution is large.

Process Level Software

■ Pocket with slender boss
■ HSM, EDM, Hybrid (HSM+EDM)
■ \text{E}_{\text{con}}/\text{E}_{\text{tot}}=2.5, \text{Constant MRR}
■ \text{E}_{\text{con}}/\text{E}_{\text{tot}}=0.40
■ \text{E}_{\text{con}}/\text{E}_{\text{tot}}=0.25

Conclusion

■ Software specific to working environment is needed.
■ Complementary to general LCA tools
■ Relevant to problem solving and product improving
■ Maximizing product data usability
■ Custom API and universal data format are required.

Future Work

■ PLC & Sustainability
■ Various products manufacturing methods
■ Data completion flow and communication methods
■ Relationship between product specification and sustainability
■ Software support
■ Analysis of existing tools (GaBi4)
■ Custom tools availability (API, XML, etc.)