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Technical Presentation
Engineering Management Program

Decision Analysis Methods to Make Product Take-back Systems Profitable

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Abstract:
Environmental protection legislation, consumer interest in "green" products, and a trend towards corporate responsibility have resulted in increased interest in product take-back. In addition, many products reach the end of their first lifecycle with components or subassemblies that still contain a significant portion of the value added by the original manufacturing process. This can create a considerable economic incentive for developing product take-back systems. However, there are several impediments to cost-effective take-back. Disassembly operation is one of the significant cost drivers in end-of-life (EOL) decision making. Another impediment is that, unlike the original manufacturing process, the feedstock to take-back operations varies significantly, as many different models, ages and conditions are returned to the remanufacturer.

There are many issues to consider. Is it necessary or desirable to disassemble the product down to individual components? How can the disassembly processes be made more efficient? What EOL decisions should be made for each resulting component or subassembly? Which upgrade level maximizes the market value of a product where the quality of the product may vary during time?

This talk discusses several methods that can be applied to overcome different sorts of the uncertainties involved in the product recovery activities. The result of applying these methods is to make the product recovery operations profitable. In addition, involving in product recovery often generates some design insights regarding EOL products such as the ease of unfastening assemblies, the probability of no-damage during disassembly, and relative durability of their components. These insights can result in design modifications that facilitate EOL product disassembly, management of product recovery and reduce the amount of non-recyclable residual.

Biography:
Sara Behdad is a PhD candidate in the Industrial and Enterprise Systems Engineering (ISE) department with specialty in Energy and Sustainability Engineering at the University of Illinois at Urbana-Champaign. Prior to joining University of Illinois, she received her B.S. and M.S. degrees in Industrial Engineering from the Tehran Polytechnic University, Tehran, in 2003 and 2006. Currently, she is a member of the Decision Systems Laboratory where she has been involved in several projects funded by NSF Engineering Design Division. The focus of her research is on developing mathematical models to tackle the difficult problem of making product take-back systems profitable. Closed-loop Supply Chain, Disassembly Sequence Planning, Sustainable Design Optimization, and Products End of Life Recovery Management are some of her research interests.

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