

**M.I.M.E. Fall 2009
Graduate Seminar Series**

**Friday, November 6, 2009
12:00—1:00 PM
Nitschke Auditorium (NA 1000)**

***Component Level Reuse for
Environmentally Conscious
Optimal Product Design***

Presented by: Dr. Vijitashwa Pandey

Engineering design is becoming increasingly interdisciplinary. Environmentally conscious product design, while providing societal benefits, is also a great test-bed for applying mechanical engineering design principles in an interdisciplinary context. One of the strategies explored for including environmental considerations in product design is product take-back and reuse. Past research by the presenter and his coworkers has shown that considerations of component level reuse opens up the possibility of value recovery for the manufacturers and results in a superior design. More recent work has focused on enhancing the scope to better address computational issues, and perform engineering what-if analyses. Integrating different aspects of this challenging problem not only helps arrive at an optimal design, it also provides valuable design insights. A model has been created for product take-back and reuse that solves for the optimal product or a set of products that a manufacturer can create, utilizing some or most of the recovered components, and come up with optimal lifecycle lengths. Recent research has explored information entropy based methods as they provide a normative way of modeling uncertain decision variables. A metric of effective age that utilizes recent mathematical results will be discussed in particular. The computational model presented encompasses utility analysis, environmental impacts modeling and multi-objective optimization using genetic algorithms. This talk will show how all these can come together in an engineering design context and help make informed optimal design decisions.



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