

SEMINAR SERIES  
Department of Quantitative Analysis and Operations Management  
College of Business Administration  
University of Cincinnati

## **“Applications of Compressed Annealing in Fleet Replacement and Vehicle Routing”**

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12:30 p.m.  
111 Lindner Hall**

Operations managers are often faced with large-scale decision-making problems that are difficult to solve to optimality. We analyze compressed annealing, a variant of simulated annealing that integrates a variable penalty method with heuristic search to address optimization problems with relaxed constraints. The concept of pressure is introduced to parameterize the value of the penalty multiplier. We present a theoretical framework to study the behavior of compressed annealing. Guided by theoretical insight, we develop practical joint cooling and compression schedules.

We employ compressed annealing on an asset replacement problem considering the issues of stochastic deterioration, budget limits, and time-variant costs due to technological change. We perform computational experiments on data sets constructed from information provided by trucking companies. Empirical results illustrate the effectiveness of compressed annealing; replacement plans obtained via compressed annealing outperform a trade cycle approach commonly implemented in the trucking industry.

To test compressed annealing's robustness, we apply the algorithm to the traveling salesman problem with time windows (TSPTW). The variable penalty approach of compressed annealing allows a search considering tours infeasible with respect to the time windows. Compressed annealing obtains best-known results on numerous data sets from the literature.

Jeff Ohlmann is an Assistant Professor in the Department of Management Sciences at the University of Iowa Business School. He graduated with High Distinction with a BS in Mathematics from the University of Nebraska (1998). Then he went on to earn a MS and PhD in Industrial & Operations Engineering at the University of Michigan (2001, 2003). His research interests include heuristic search, discrete optimization, logistics, and applied operations research. Recreational pursuits include the application of quantitative methods on sports management problems, particularly those faced by the Cincinnati Bengals.