Life Cycle Optimization for Infrastructures

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Abstract: Life cycle optimization of infrastructures is concerned with the automatic planning of buildings, plants etc from the first line of drawing up to the final polishing of the windows. Turning this into a mathematical model results in a very complex problem. There are a vast number of influencing factors, which have to be considered and which have a strong impact on the final solutions. In the cases of our two application scenarios, namely public buildings and pipelines in power plants, this leads to huge mixed-integer nonlinear programs. To develop solution methods for the applications we decompose the problem into subproblems, which stay hard to solve individually, too. In the buildings scenario we present the room allocation problem with its various side constraints and take a closer look at the planning of escape routes, which we formulate as a graph theoretical problem. We analyze its complexity and present some first computational results with a branch-and-cut algorithm.

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