

Abstract

Due to the central role of cranes in construction operations, specialists in the construction industries have cooperated in the development of structured methods and software to help select the best crane type in construction sites. Crane selection is a time consuming process which needs extensive data exploitation. Moderately few systems have been developed to aid in selecting cranes and in setting their lifts. These systems although may have rich databases, they lack the support of knowledge based decision making. The process of crane selection is a multi-criteria decision-making problem with conflicting and diverse objectives. In this work, a systematic methodology is presented under the consideration of multiple factors and objectives that are witnessed to be crucial to the construction process. The model includes building an analytic hierarchy structure with a tree of hierarchical criteria and alternatives to ease the decision-making. Three alternative crane types were considered, namely, Tower, Derrick and Mobile cranes. An Analytical Hierarchy Process (AHP) was used to assist in building the model and help draw decisions. While deploying the crane selection objectives into layered sub-goals, conclusions could be drawn on the type to be used in construction according to knowledge based evaluation and assessment. Expert Choice™ software is used to conduct the experimental assessments. The judgments were found to be consistent, precise and justifiable with narrow marginal inconsistency values. The paper also presents a thorough sensitivity analysis to demonstrate the confidence in the drawn conclusions.