

PROJECT PROFILE

PCL INDUSTRIAL MANAGEMENT



AN AUTOMATED MOBILE CRANE SELECTION SYSTEM FOR HEAVY INDUSTRIAL PROJECTS

PCL Industrial Management (PCL) is one of the leading construction companies that have implemented off-site construction methodology to improve the productivity and efficiency of their projects. These improvements include shorter project timelines, reduced costs, and improved workplace safety. Over the past decade, PCL has developed an integrated system to cope with the challenges of heavy mobile crane planning in industrial constructions, such as selecting the location of the cranes, path planning for mobile cranes, and sequence of lifting the modules that are part of the off-site construction method.

PROJECT BACKGROUND

An application was developed in collaboration between the Off-site Construction Research Centre (OCRC) and PCL to automate the crane election process. This application includes two different methods, heuristic and artificial neural network. Both methods can work individually for crane selection, and the heuristic method can be used to generate training dataset for the neural network model.

RESULTS

The results of the heuristic method were compared with historical data. The proposed cranes by the heuristic method were more economical, since this algorithm considers parameters such as project duration, safety, and cost simultaneously. In addition, the results of the neural network model, including two hidden layers, shows 74% accuracy on the test set. This model can be used for predicting crane configurations in any construction project.

RECOMMENDATIONS

It has been recommended that a 3D visualization for clash detection and improving path planning for mobile cranes be developed to improve the current algorithm. Additionally, the OCRC suggests improving the neural network mode for use in other parts of the construction projects, such as cost prediction.