

PROJECT PROFILE

MACGREGORS INDUSTRIAL GROUP



REVIEW OF 5D BIM TECHNOLOGIES, IDEAS FOR WORKFLOW IMPROVEMENTS AND IMPLEMENTING COST ESTIMATION WITHIN AN EXISTING DATA STRUCTURE.

MacGregors Industrial Group (MacGregors) is a business serving several industrial and construction markets throughout North America. The modular building division at MacGregors, which uses a design-build project delivery method, meets market demand for customizable solutions for clients with varying degrees of prefabrication and system integration.

PROJECT BACKGROUND

MacGregors approached the Off-site Construction Research Centre (OCRC) with an interest in collaborating on a research project focused on cost estimating and work improvement for their prefabrication projects. The OCRC prepared a report as a review of the preliminary work done with MacGregors on improving the modular divisions workflow and implementing new software into their cost estimating procedure.

RESULTS

- **5D COST ESTIMATING.** The OCRC looked at 16 existing cost estimating software and summarized them based on a set of characteristics: price, company, overview, allowed desktop, available support, training, available features (from a list of like terms collected from the software websites/advertising), project phase, connectivity with other software, other comments, and sources.
- **CUSTOMER REQUIREMENTS.** Excessive reliance on communication between project managers and the customer for completion of a project was identified as a gap. Ideas for addressing this focused on either a general hierarchy system for logging communications or a system that focused on project delivery.
- **PURCHASE ORDERS.** Using BIM and an estimating software was suggested to make more efficient purchases. Creating a BIM model at the beginning of the project and performing a cost estimation with a

software that connects to and automatically updates the model would improve the current approach.

- **TIMESHEETS.** Another suggestion was to divide the timesheets into multiple forms based on project and workstation. The existing timesheet was also highlighted to show the most important elements for storage in a relational database. Two solutions were offered to facilitate the digitization of forms: a centralized, tablet-on-the-wall approach, or a scanning approach.
- **NETWORK IMPROVEMENTS.** Gaps were identified for the network, specifically the database portion. It could not accommodate a large amount of historical data, which is required for cost estimation using a prediction algorithm, and the details of the current/past projects had to be entered manually. The OCRC suggested replacing the MS Access database with an SQL database, as it has larger storage. Integration of the network with BIM through one of the reviewed "Excel-like" cost estimating software was suggested to improve the cost estimation process. The process would be transferred from the database to the software, and MacGregors could create estimates that update in parallel with a Navisworks or similar BIM model.

RECOMMENDATIONS

Further collaboration is required to improve, implement and monitor the improvements suggested. The most immediate project will involve researching the best implementation of the network and workflow improvements described in the report. The OCRC and MacGregors will determine which software best meets the needs of the modular division, or they would create a custom solution, if required. The OCRC will also address MacGregors' desire to improve their production factory and task level productivity tracking. Finally, long-term collaborations will include the implementation of a decision algorithm to verify and improve bids without the need of conceptual design. This can be done once a historical cost database is built.