

BIM Based Quantity Take-off, Estimating and Scheduling

This white paper describes the basic concepts and the process of BIM based quantity take-off, estimating and scheduling. Each software vendor have their own terminology, but our principles should be generic. The paper also describes Tocoman's solution for BIM based estimating and scheduling.

Basic Concepts

Building information model (BIM) contains information about the design of a building. Such a model consists of object types (e.g. spaces) and their properties (e.g. name, number and area). The BIMs may be created either by designers or by the construction company from the 2D drawings produced by the designers. The latter option is typically seen as a temporary solution while designers are adopting BIM.

Construction recipes describe a building from the construction point of view – as building elements and components (or activities) required making them (see figure 1).

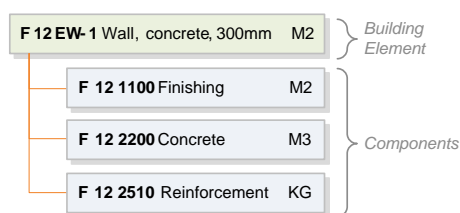


Figure 1 – Construction recipe.

Building elements and components are typically classified by system and trade. This enables to query the information in a flexible way, e.g. concrete works (trade) in the foundations (system).

Process

The properties of BIM objects cannot be used directly for cost estimating or scheduling in most cas-

es. Foundations objects, which are different from the design point of view, might be grouped together because they will be built using the same production method. Single space, on the other hand, could produce quantity information for multiple cost estimating items, like surface materials, equipment and furniture. Thus construction quantities need to be calculated from the design quantities in BIM.

The quantity take-off is done by linking the design quantities with recipes. The result is component quantities, which can be used e.g. for cost estimating and scheduling (see figure 2).

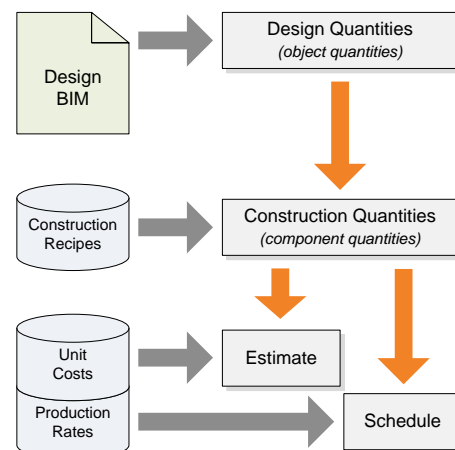


Figure 2 – Process for BIM based cost estimating and scheduling.

The cost estimating and scheduling happens by applying unit cost and production rate information into the BIM based quantities (see figure 2).

Tocoman's Solution

Tocoman has developed a suite of applications bridging the gap between current BIM applications and existing cost estimating and scheduling applications. The Tocoman solution contains two applications (see figure 3).

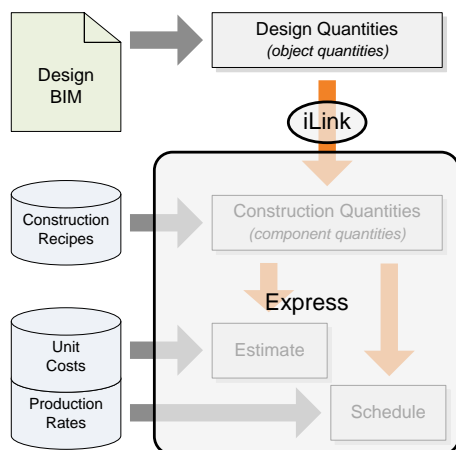


Figure 2 – Tocoman BIM solution.

- **Tocoman iLink** for calculating the quantities from various BIMs and linking them with recipes.
- **Tocoman Express** for integration with various estimating and scheduling applications. The application enables to read the recipes from a cost estimating application and write BIM quantities back into the estimate of various scheduling applications.

Tocoman's solution is implemented in a way, which decouples end user's choice of BIM application from the choice of the cost estimating and/or scheduling application. Any supported BIM application can provide quantities for any estimating and/or scheduling application.

Tocoman also uses intelligent linking technology, which minimizes the requirements for the building model's content. The solution does not require using certain BIM object

properties e.g. for identifying wall types. Instead the user can select, which property he wants to use.

Tocoman's requirements for building models, which are used for BIM based quantity take-off, are generic by nature.

- **Must be consistent**

All building model contents must be modeled as agreed between the project team.

- **Must be identifiable**

It must be possible to identify all objects from the viewpoint of quantity take-off. The exact BIM object and property is not relevant, if it is consistently used.

- **Must be measurable**

All building model content must be modeled using objects, which offer the required information for quantity take-off. Modeling walls e.g. using a generic mass object is not recommended, if the BIM application has a native wall tool.