

Progress Report #1

Buffering strategies in transportation construction projects

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Eric Forcael (1)

INTRODUCTION

This report consists of a brief explanation about the conceptual model which is going to be used as basis for the proposed model. Also, the report includes the proposed model which is currently being tested.

THE CONCEPTUAL MODEL

The model has been built based on the activities which are present in a transportation construction project. Figure 1 schematically shows the simulation model used for n linear sequential activities or processes.

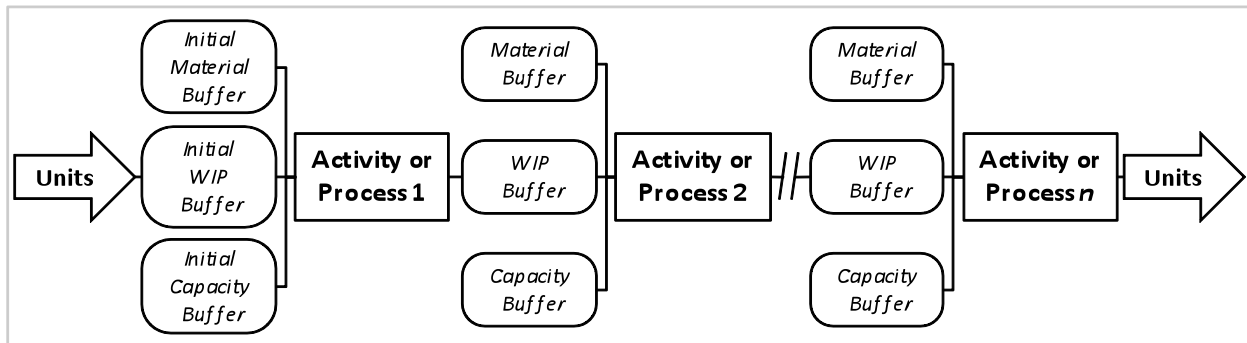


Figure 1 – Schematic simulation model for n linear sequential activities.

Within the schematic model, the first “Units” arrow represents the number of units to be created by the model, in this case, meters of highway and the final “Units” arrow represents the number of units that are leaving the model. “Initial material buffer” represents the initial number of trucks with material which are needed to build a unit of highway. “Initial Capacity buffer”

represents the initial number of available machines and the initial number of available workers needed to initiate the construction process. “Initial Work-In-Process buffer” represents the initial physical space between the first activities. All these initial buffers are used as start point for the algorithm. Activities or Processes 1, 2 and n , represent the activities which are present in a transportation construction project. The other buffers illustrated in Figure 1 are similar to the initial buffers; except for they are calculated automatically instead of given (initial buffers).

The following section addresses the description of activities which were used to create the model.

THE PROPOSED MODEL

Based on the previously-mentioned conceptual model, ExtendSim was used to create a model to represent the most significant transportation construction activities or processes. Figure 2 shows the proposed model with three activities as an example (the full model includes about eight activities).

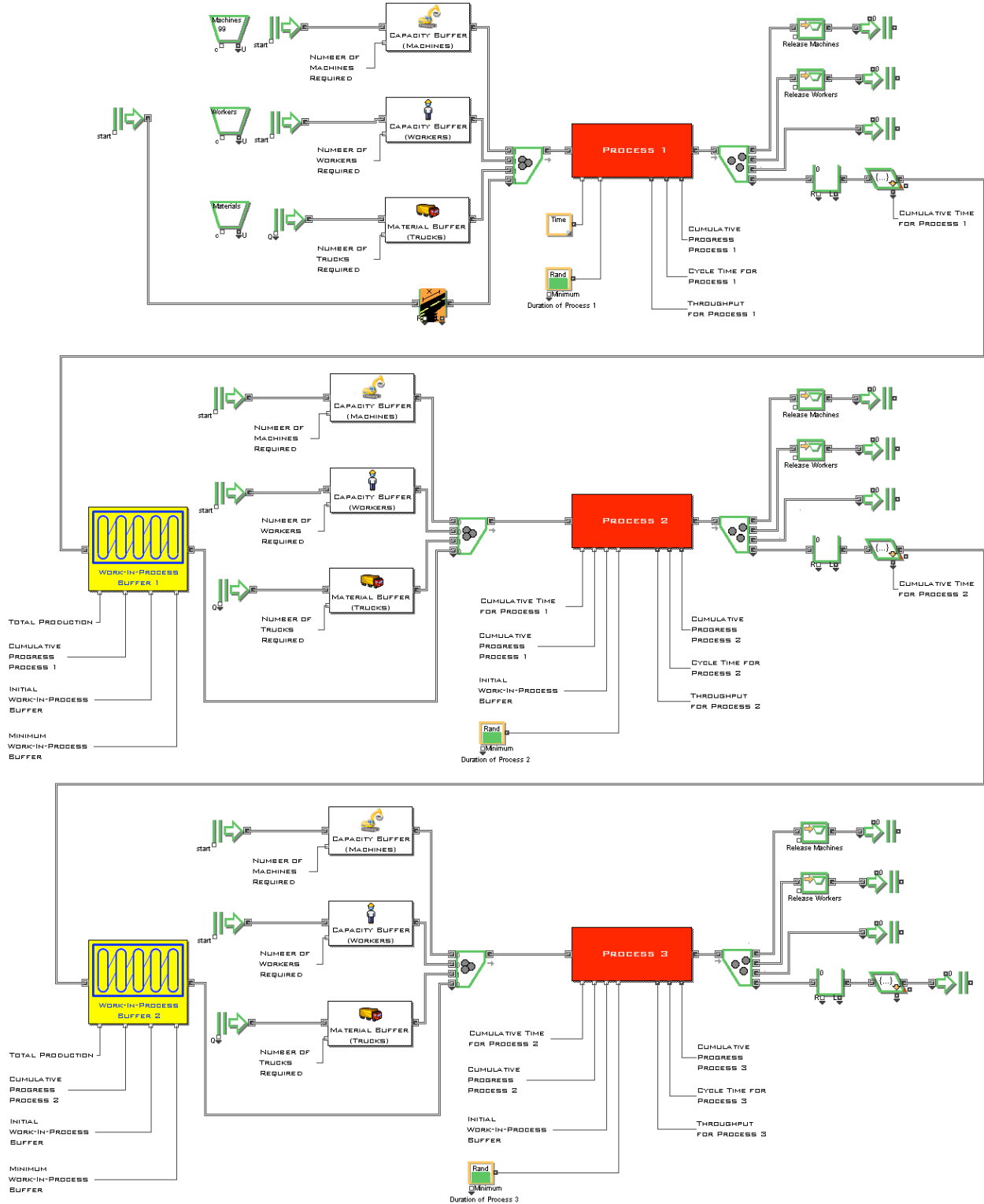
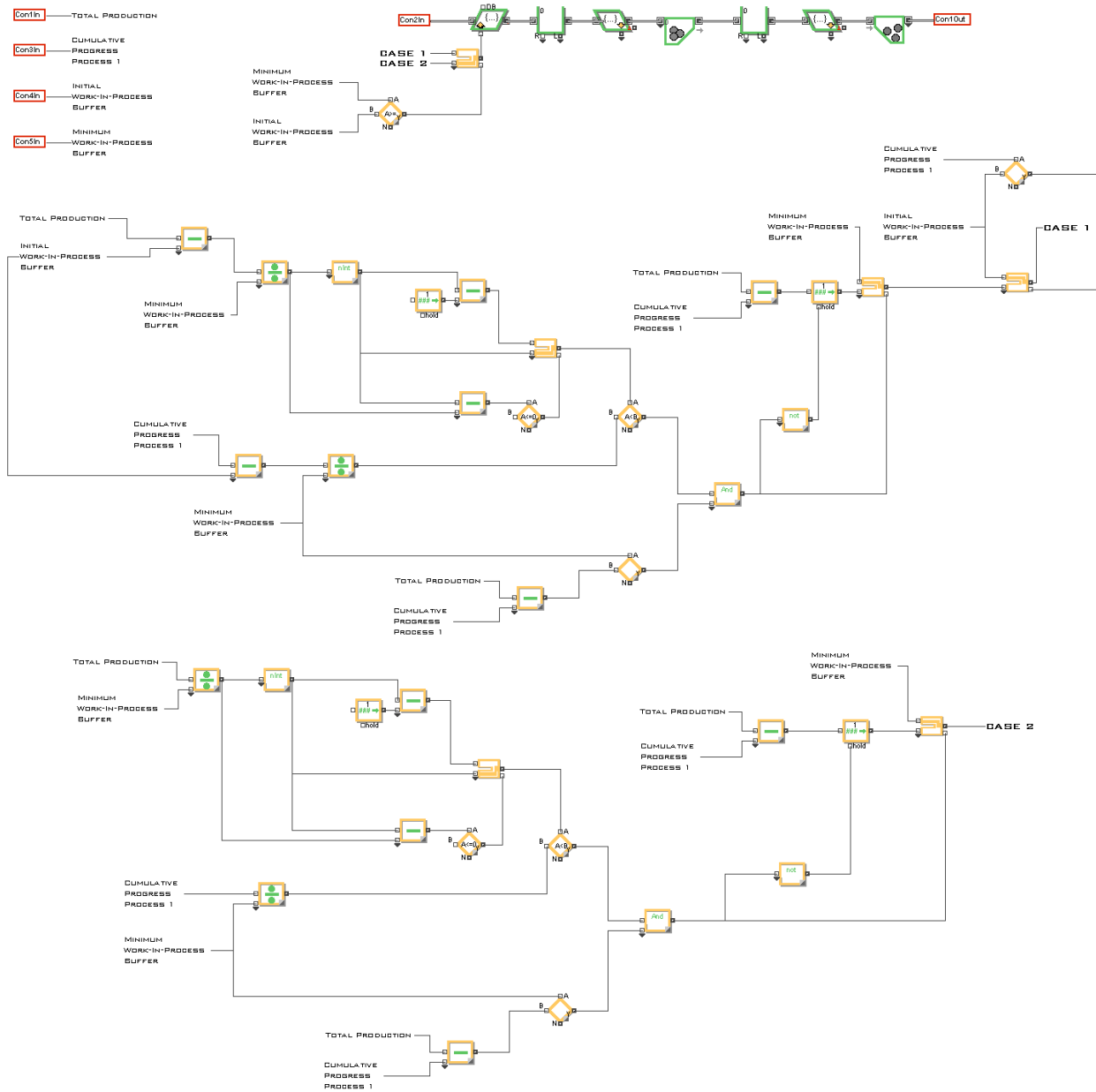


Figure 2 – Proposed model with three activities as an example

Capacity buffer and material buffer are simply modeled as queues which store the number of workers, machines and material available. However, the calculation of WIP is not directly obtained; therefore, it is necessary to calculate it using the algorithm shown in Figure 3.



Preliminary Conclusions

This current research is now focused on testing the above-mentioned model. The next step will be to validate the model using three case studies, which outputs will be including within the next progress report.