

Simulation of Buffering and Batching Practices in the Interface Detailing-Fabrication-Installation of HVAC Ductwork

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Paper Objective

Objective

Buffers

Assumptions

Model

Results

Q & A

Illustrate how the choice of the inventory buffer between activities impact the system output and the parts lead times.

Simulate the behavior of the supply chain for HVAC sheet metal ducts.



Model **buffers and batches sizes** and their impact on **lead times** and **output** for this supply chain.

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Buffers are resource cushions, i.e., inventory, time, capacity, plan, used to protect processes against variation and resource starvation.



“Large buffers reduce the need for reliable planning as they allow some work to get done despite uncertain flows.”

(Howell and Ballard 1996, p. 41)

Model Assumptions

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Buffers

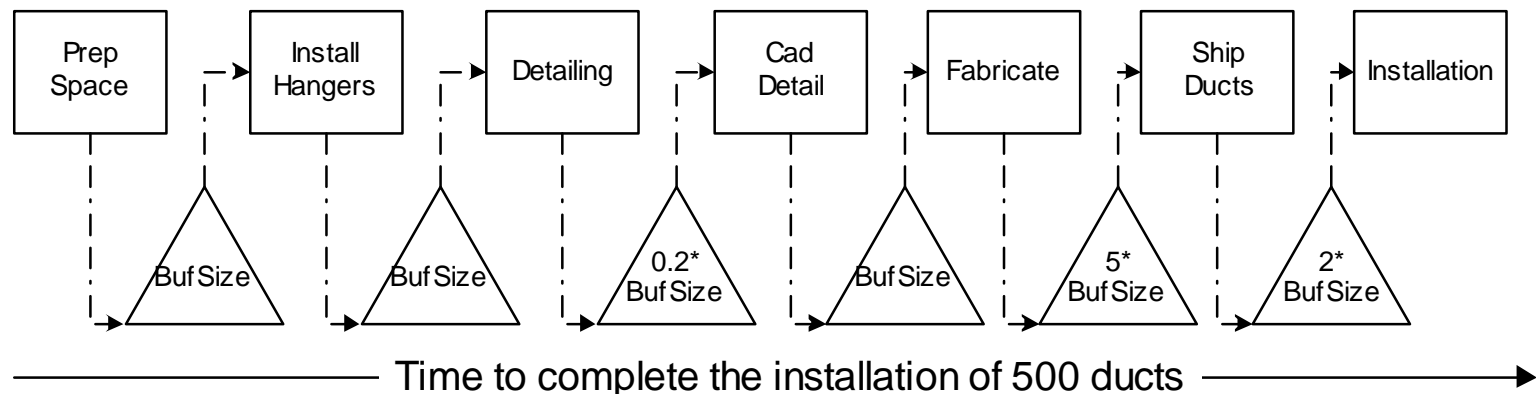
Assumptions

Model

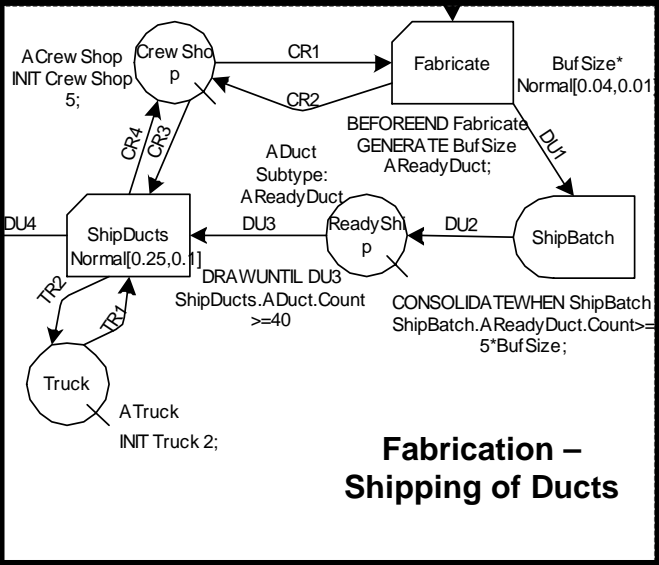
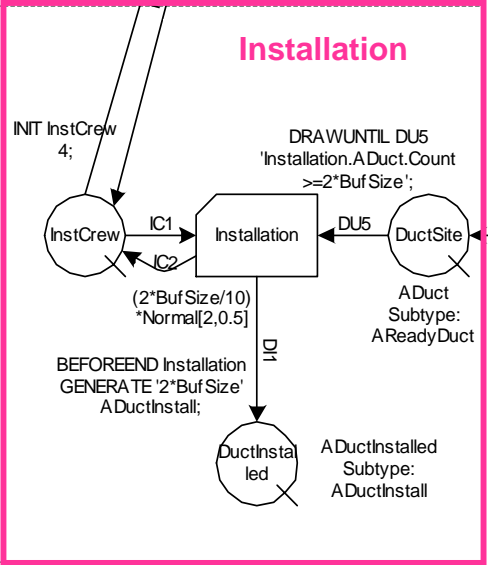
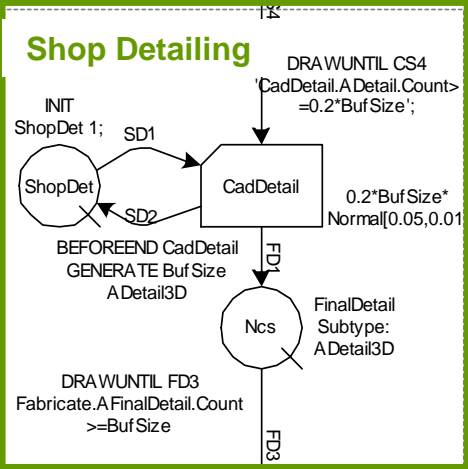
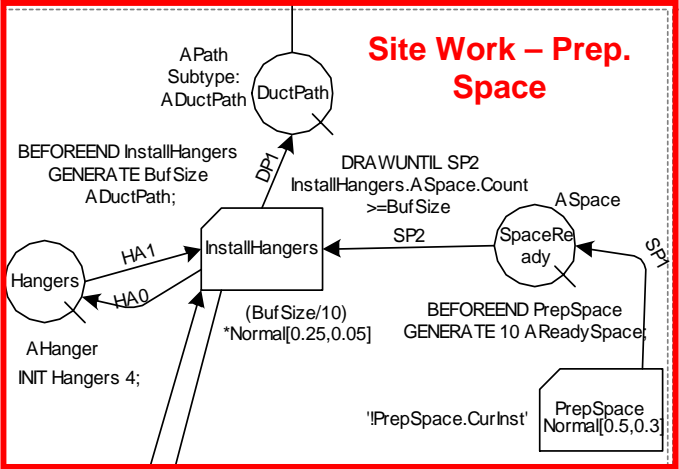
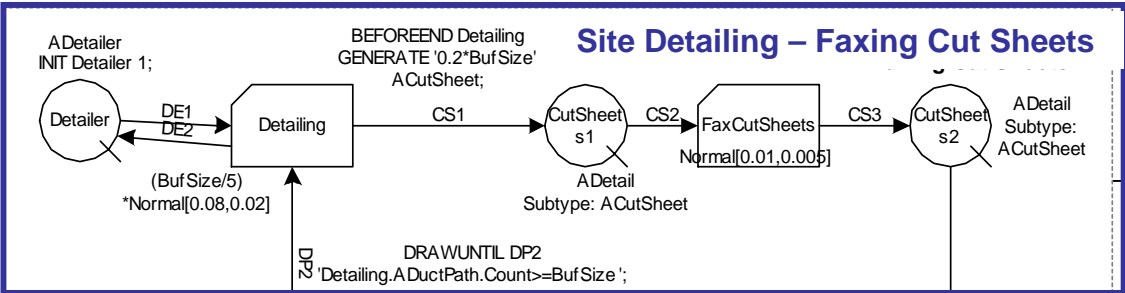
Results

Q & A

- **Durations** were defined based on conversations with mechanical contractors.
- All **parts are assumed to be equal** and are detailed, fabricated, and installed on a first-in-first-out (FIFO) basis.
- The **number of resources** necessary to detail, fabricate, and install parts is the **same for all parts**.
- A **relationship** is assumed between buffers in the system and the activities they precede.



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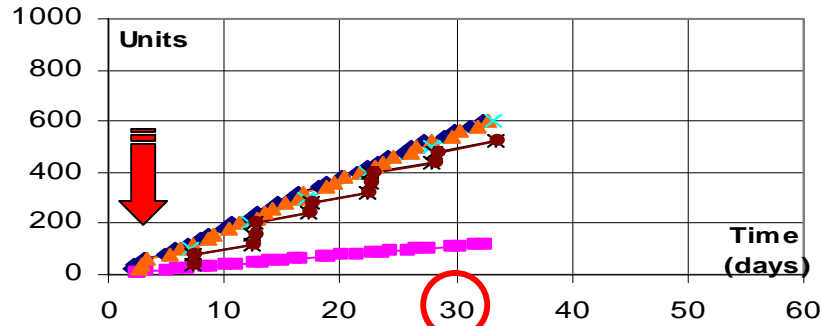


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Results

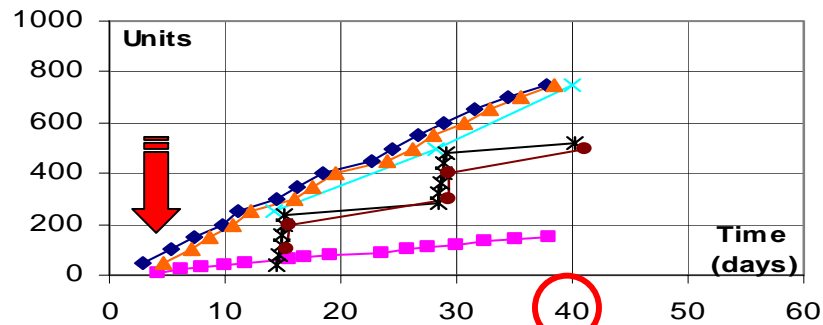
- Objective
- Buffers
- Assumptions
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- Results**
- Q & A

Production vs. Time - BufSize = 20

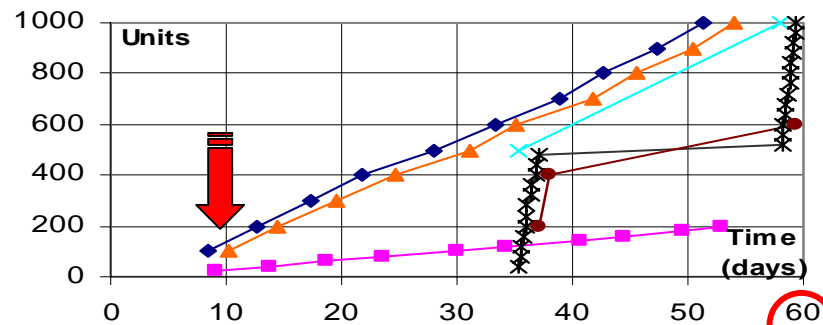


- ◆ DuctPath
- CutSheets1
- ▲ Ncs
- ✕ ReadyShip
- * DuctSite
- DuctInstalled

Production vs. Time - BufSize = 50



Production vs. Time - BufSize = 100



Results - Conclusions

Objective

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Q & A

- Large piles of inventory between activities result on:
 - **lead times and work in process increase**
 - **throughput decrease**
 - e.g., time to install the first group of ducts
- Contractors are sacrificing lead times and inventory levels in their systems by trying to improve the reliability of their systems using this approach.
- The implementation of a pull system fails with an inadequate definition of buffer's profiles.
- **Future research:**
 - **Cross-case study** ♦ different fabrication shops
 - Investigation ♦ **lead times, buffers, batching**

Questions?

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