END3032 – SYSTEMS SIMULATION

Laboratory Practice #6

The El Segundo Composites Problem

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Problem Definition

- El Segundo Composites company receives orders on average 1 per hour, exponentially
- Raw materials go through three operations as cutting, laying up and bonding. Then they are prepared for shipment by a shipment clerk.
- Bonding is done in batches of five parts and after this operation is completed, they are sent to the shipment clerk one by one.
- Process times are given in Table 1:

Process	Time (min)
Cutting	Uniform (20, 5)
Laying up	Uniform (30, 10)
Bonding	Uniform (100, 10)
Preparing for shipment	Normal (20, 5)

- The material handling time between each process takes 15 minutes.
- Make a simulation model and estimate WIP. Run the simulation model for 1000 hours.

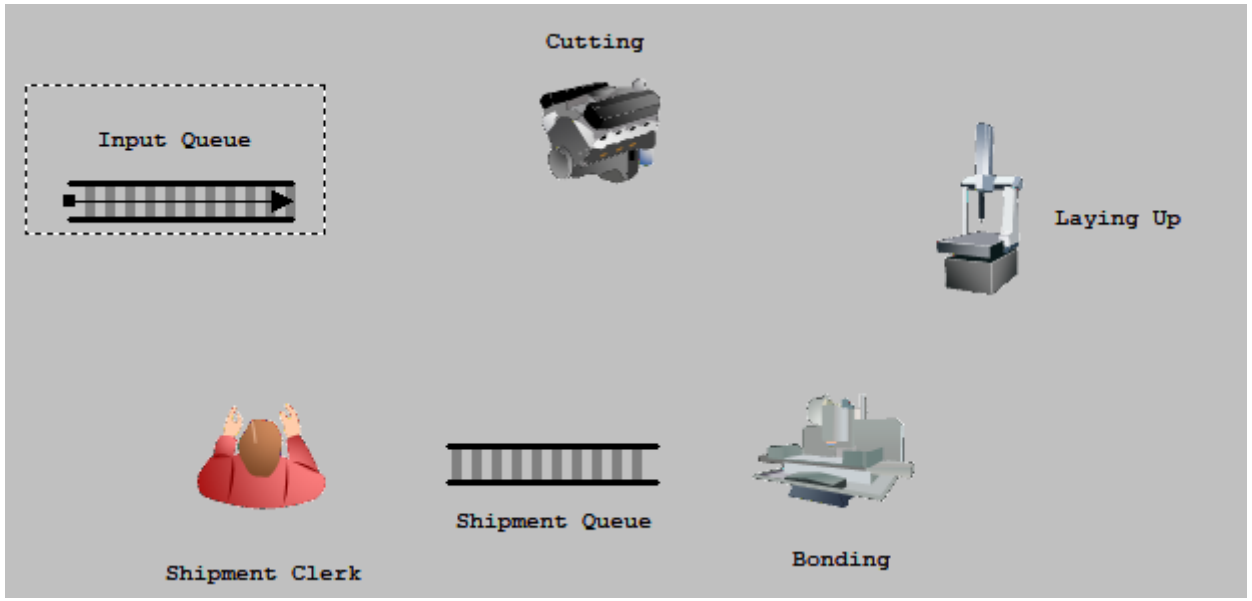
Discuss what would happen if we sent parts to the shipment clerk in a batch, not one by one.

Implementation on ProModel

- Define the locations

Locations

Icon	Name	Cap.	Units	DTs...	Stats	Rules...
	Input_Queue	INFINITE	1	None	Time Series	Oldest, FIFO
	Cutting	1	1	None	Time Series	Oldest
	Laying_Up	1	1	None	Time Series	Oldest
	Bonding	INFINITE	1	None	Time Series	Oldest
	Shipment_Queue	INFINITE	1	None	Time Series	Oldest, FIFO
	Shipment_Clerk	1	1	None	Time Series	Oldest



Implementation on ProModel

- Define the entities

Entities

Icon	Name	Speed (fpm)	Stats
	Raw_Material	150	Time Series
	Batch	150	Time Series

- Set entity arrivals

Arrivals

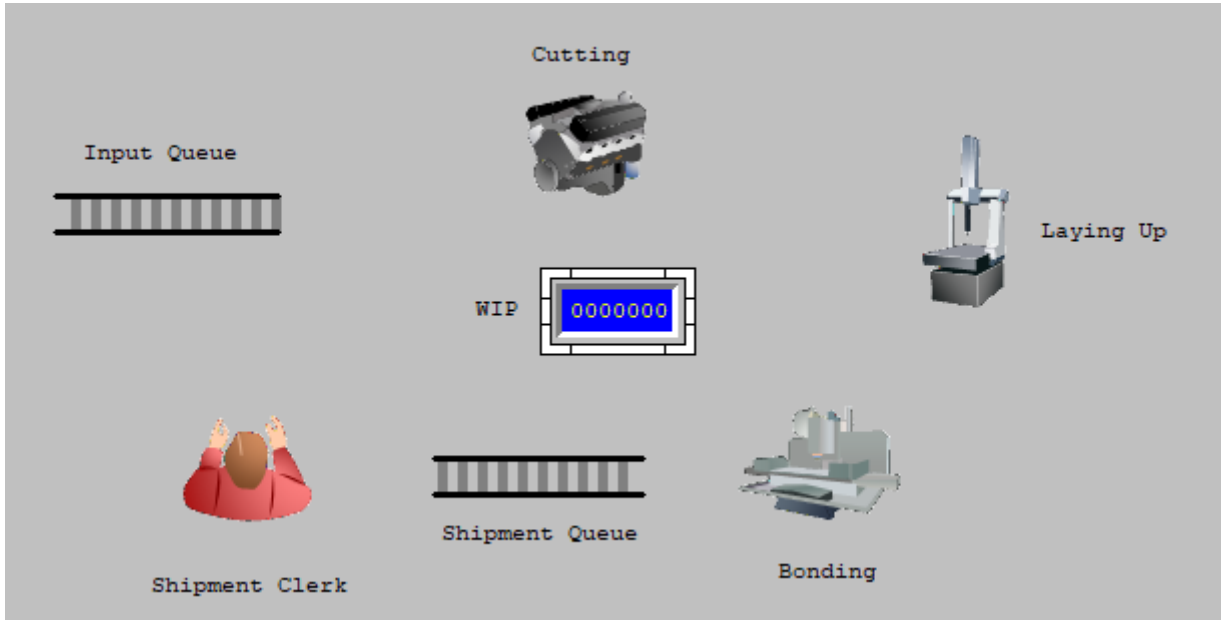
Entity...	Location...	Qty Each...	First Time...	Occurrences	Frequency
Raw_Material	Input_Queue	1	0	INF	E (60) MIN

Implementation on ProModel

- Define a variable in order to calculate WIP and put an icon on the layout

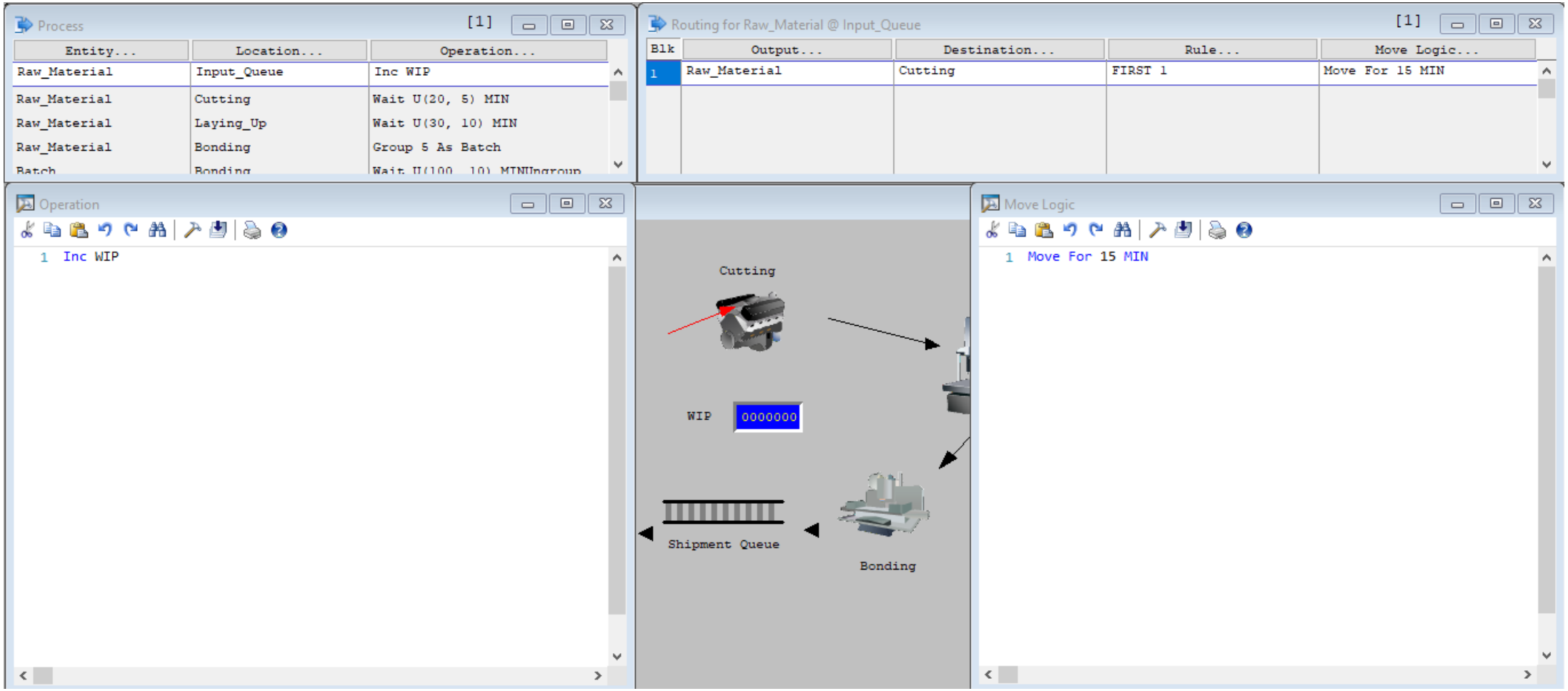
Variables (global)

Icon	ID	Type	Initial value
Yes	WIP	Integer	0



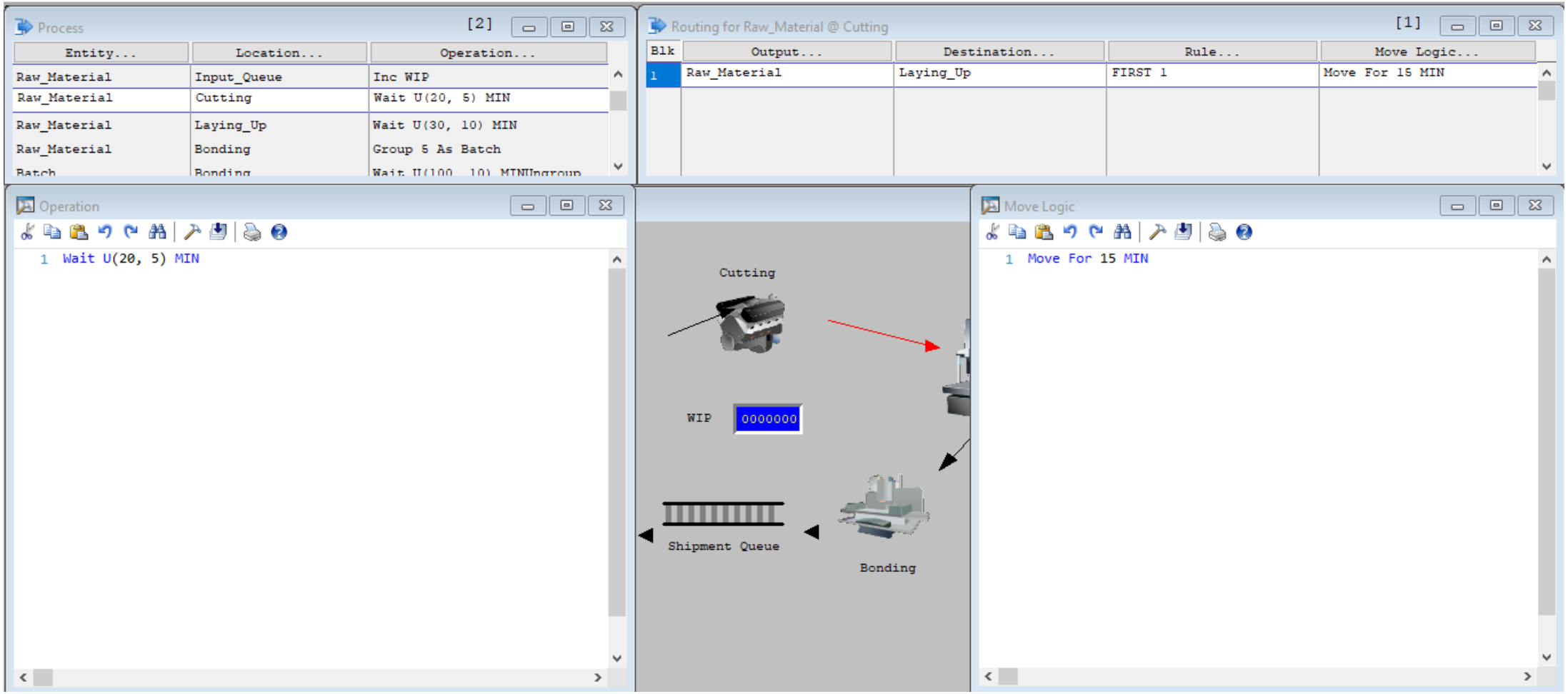
Implementation on ProModel

- Processing: Input Queue → Cutting



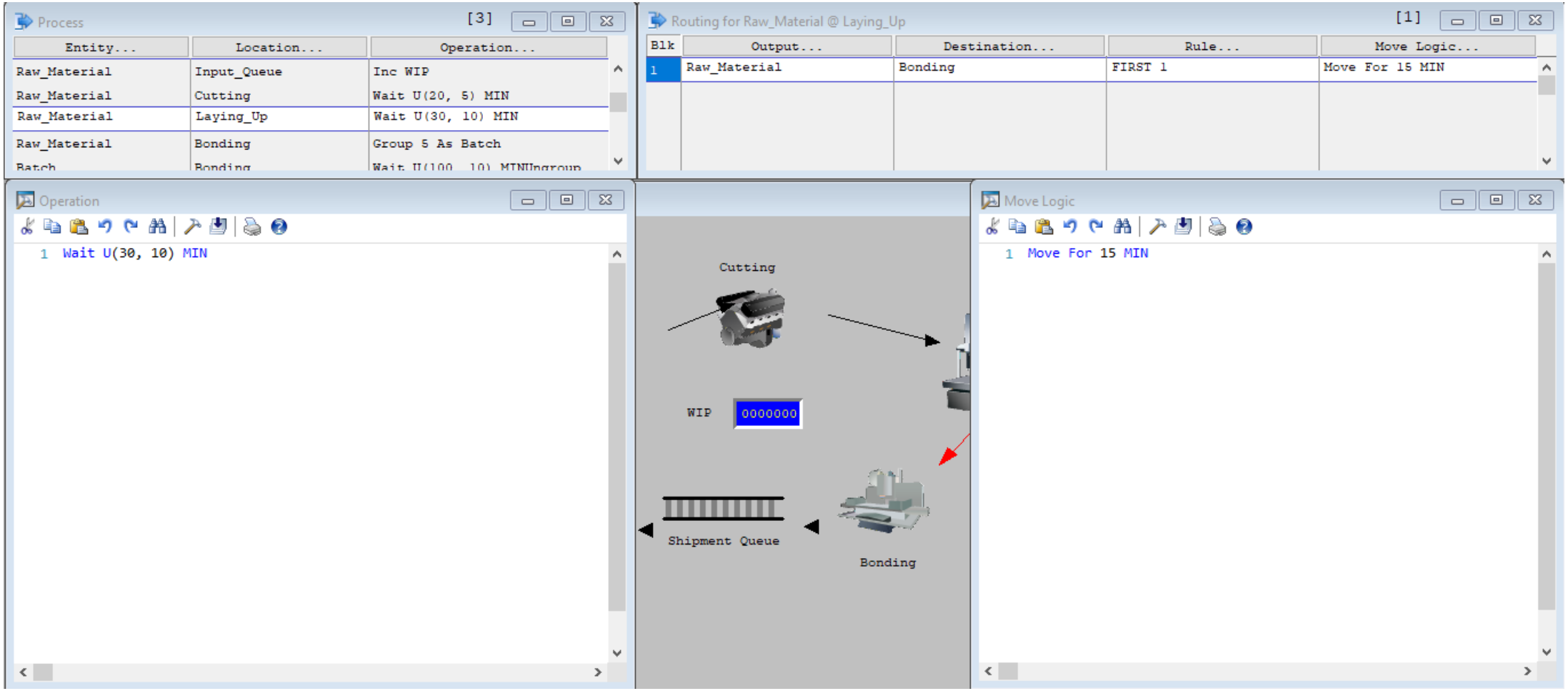
Implementation on ProModel

- Processing: Cutting → Laying Up



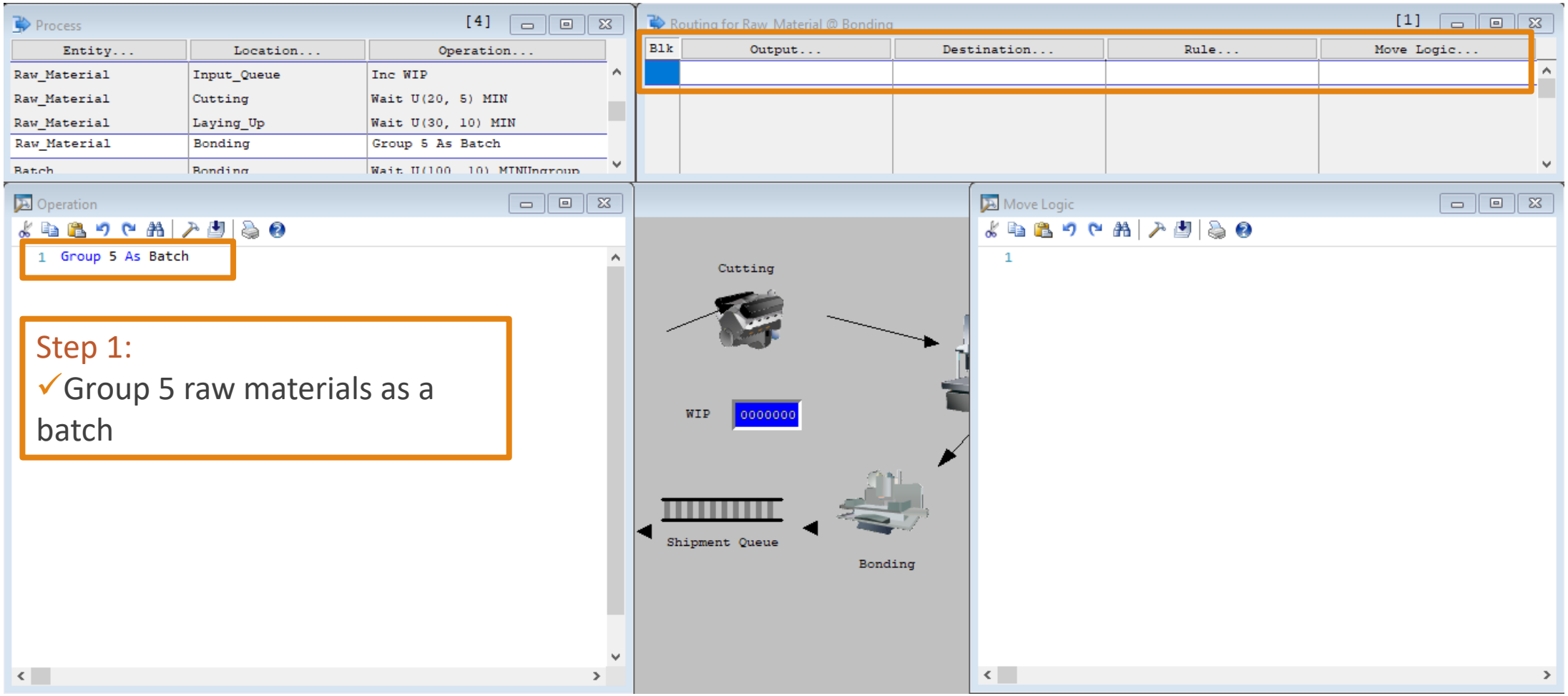
Implementation on ProModel

- Processing: Laying Up → Bonding



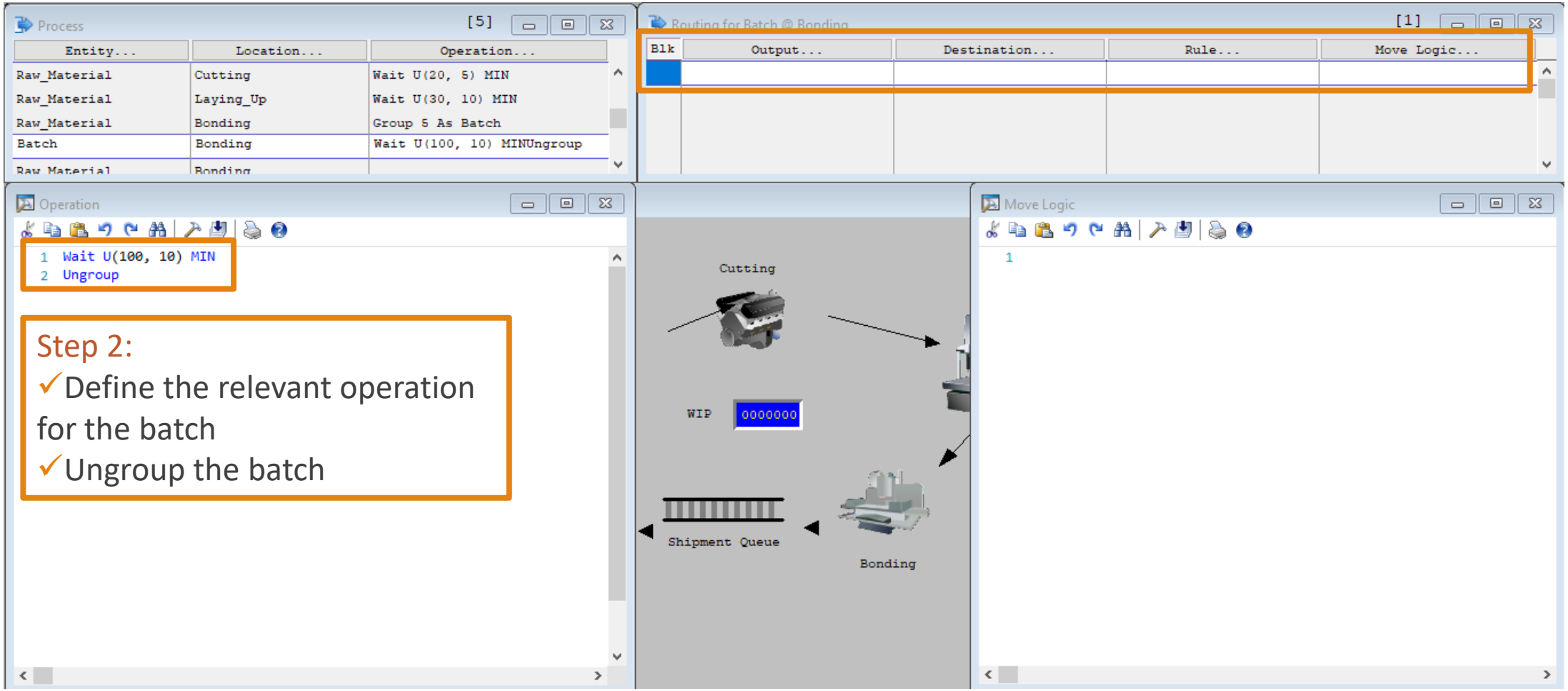
Implementation on ProModel

- Processing: Bonding → Shipment Queue (<GROUP> and <UNGROUP> functions)



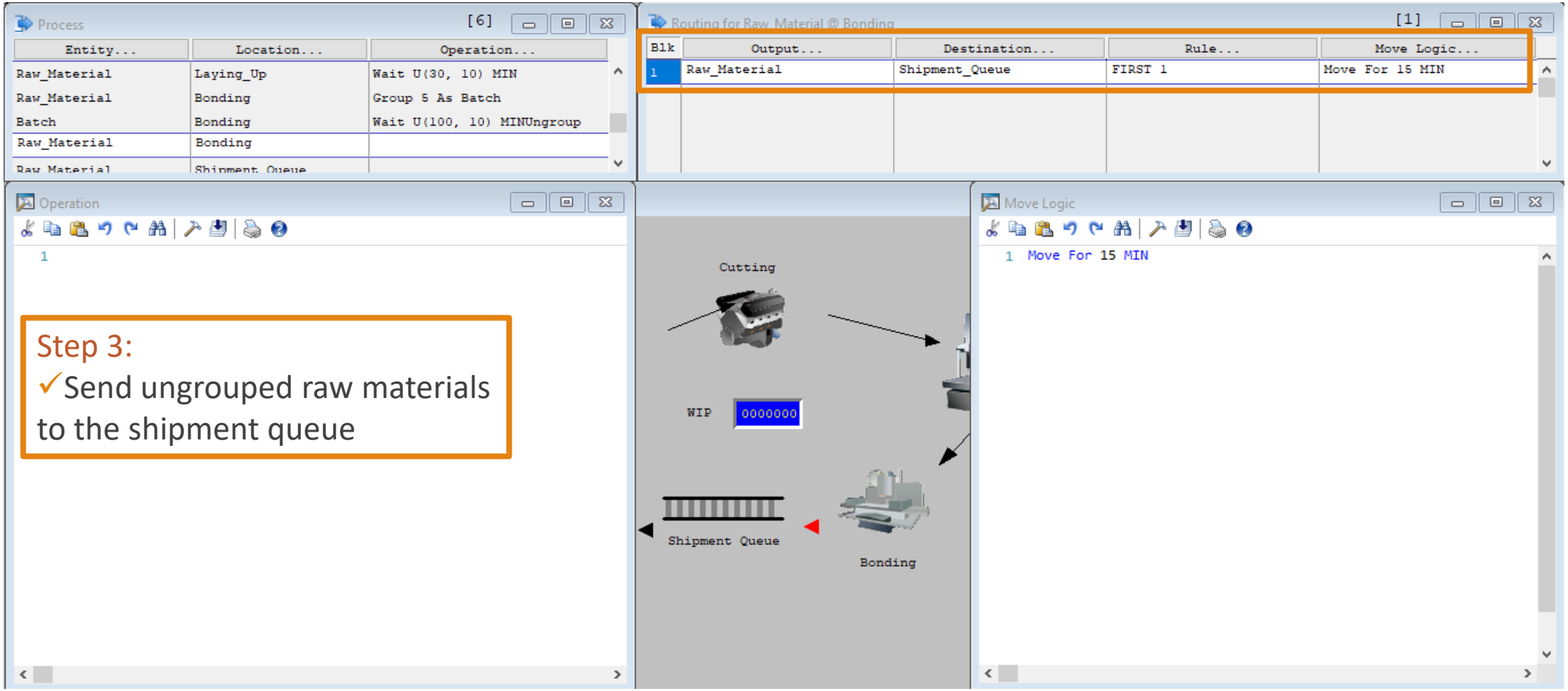
Implementation on ProModel

- Processing: Bonding → Shipment Queue (<GROUP> and <UNGROUP> functions)



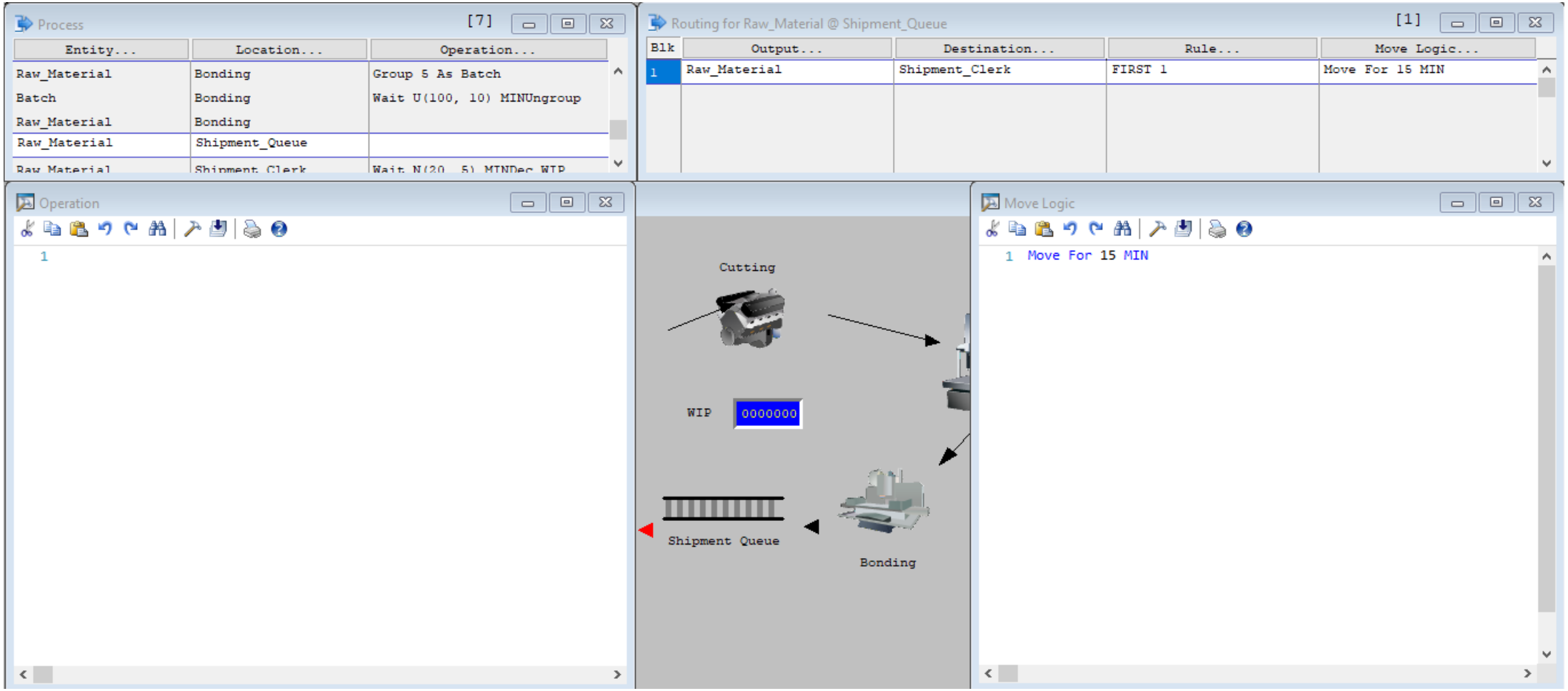
Implementation on ProModel

- Processing: Bonding → Shipment Queue (<GROUP> and <UNGROUP> functions)



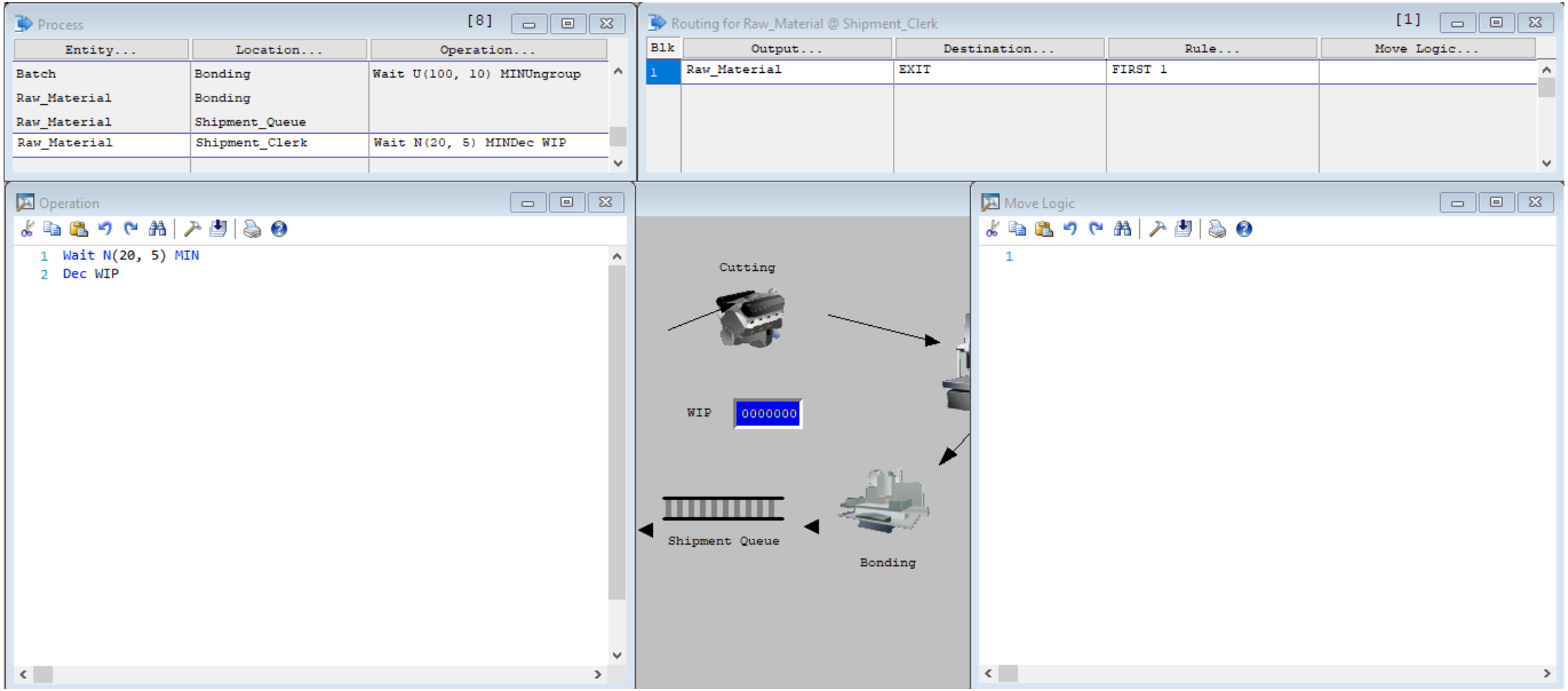
Implementation on ProModel

- Processing: Shipment Queue → Shipment Clerk



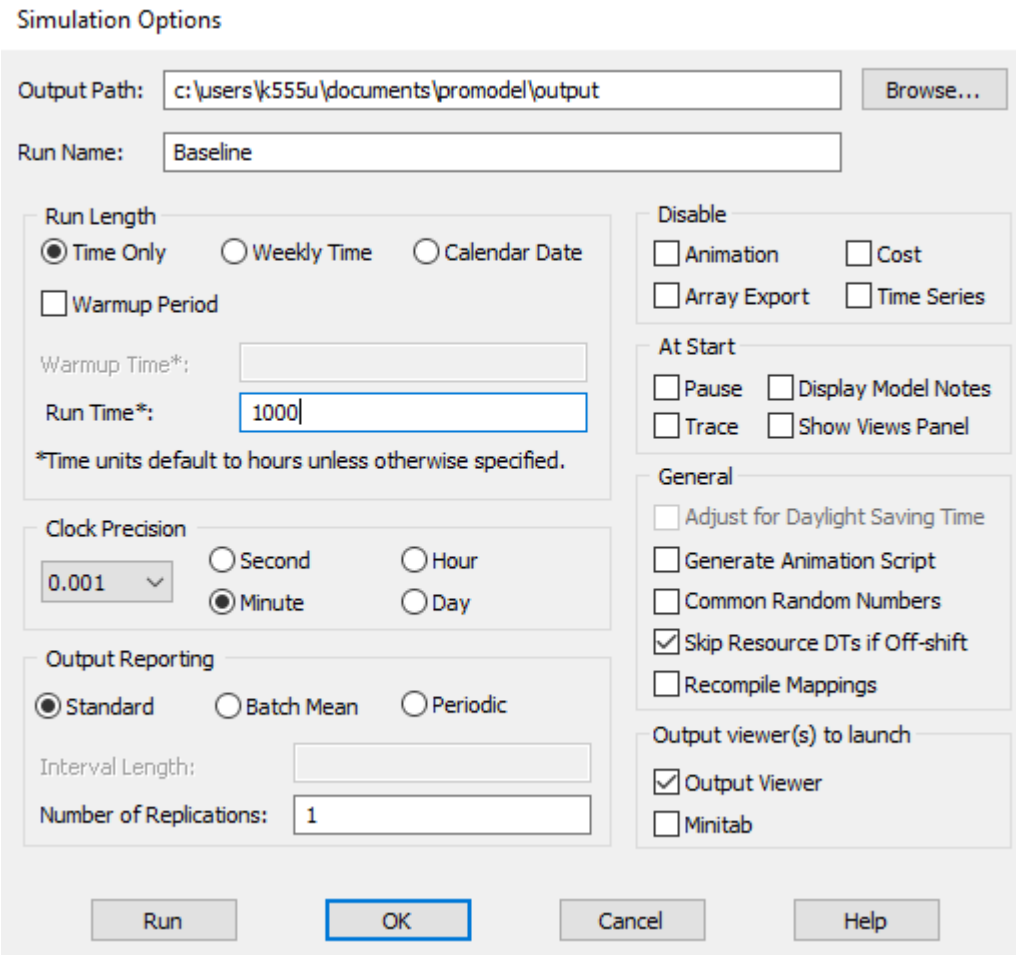
Implementation on ProModel

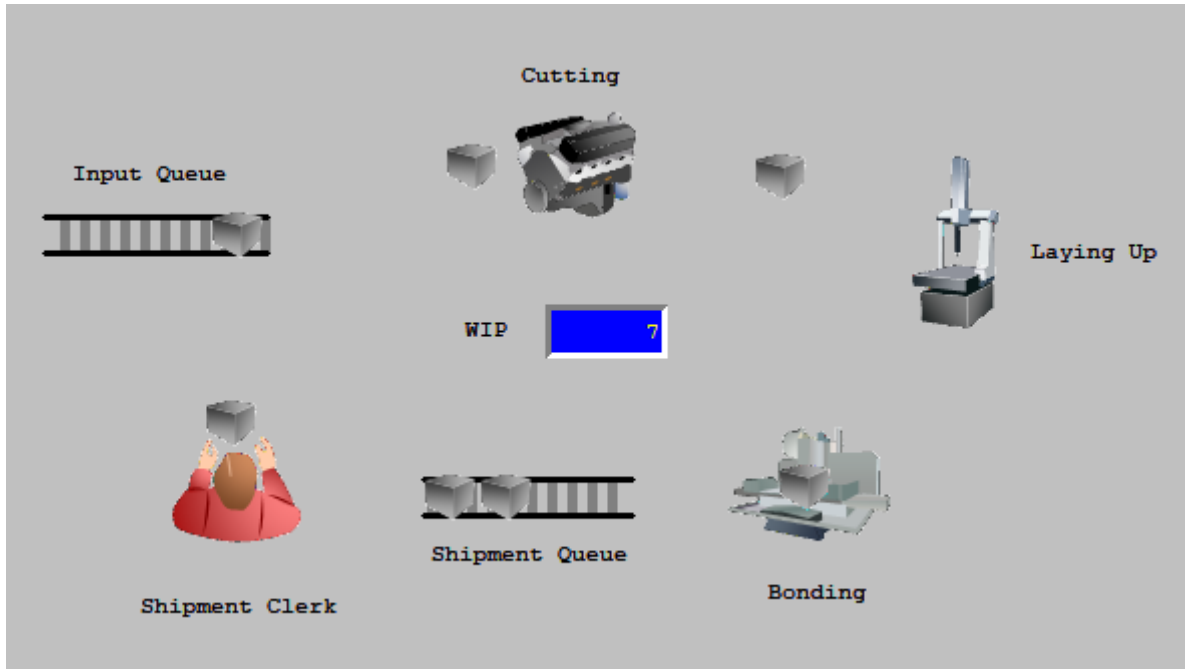
- Processing: Shipment Clerk → EXIT



Implementation on ProModel

- Run the simulation for 1000 hours and get the results

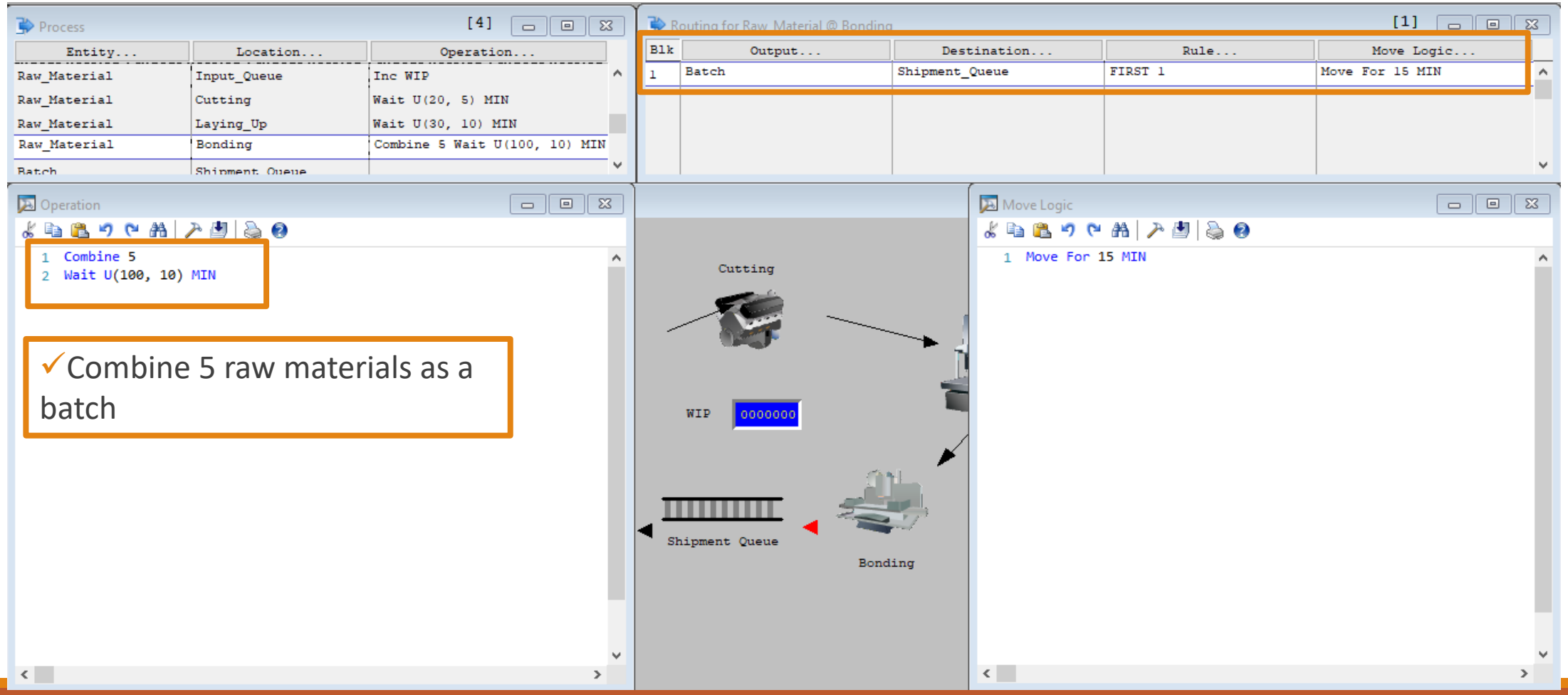




Implementation on ProModel

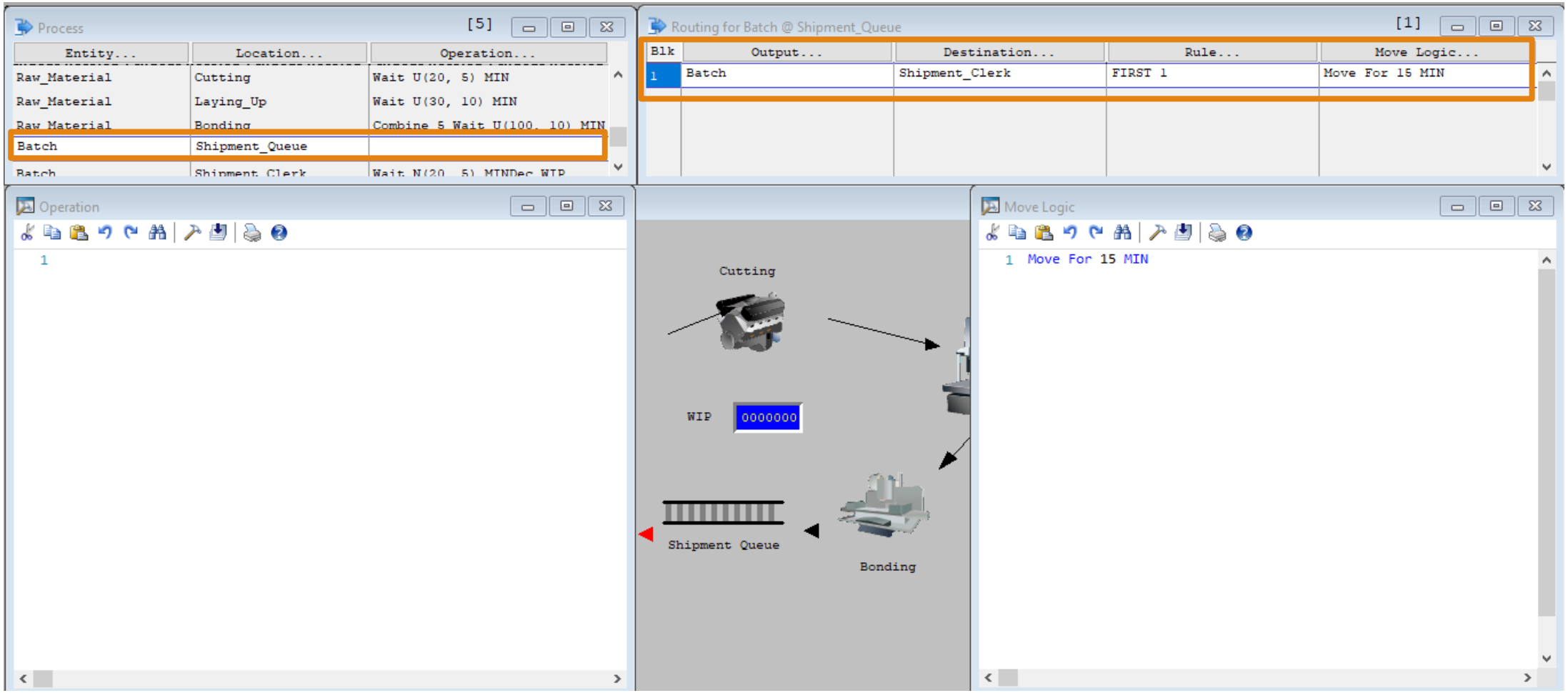
Discuss what would happen if we sent parts to the shipment clerk in a batch, not one by one.

- Processing: Bonding → Shipment Queue (<COMBINE> function)



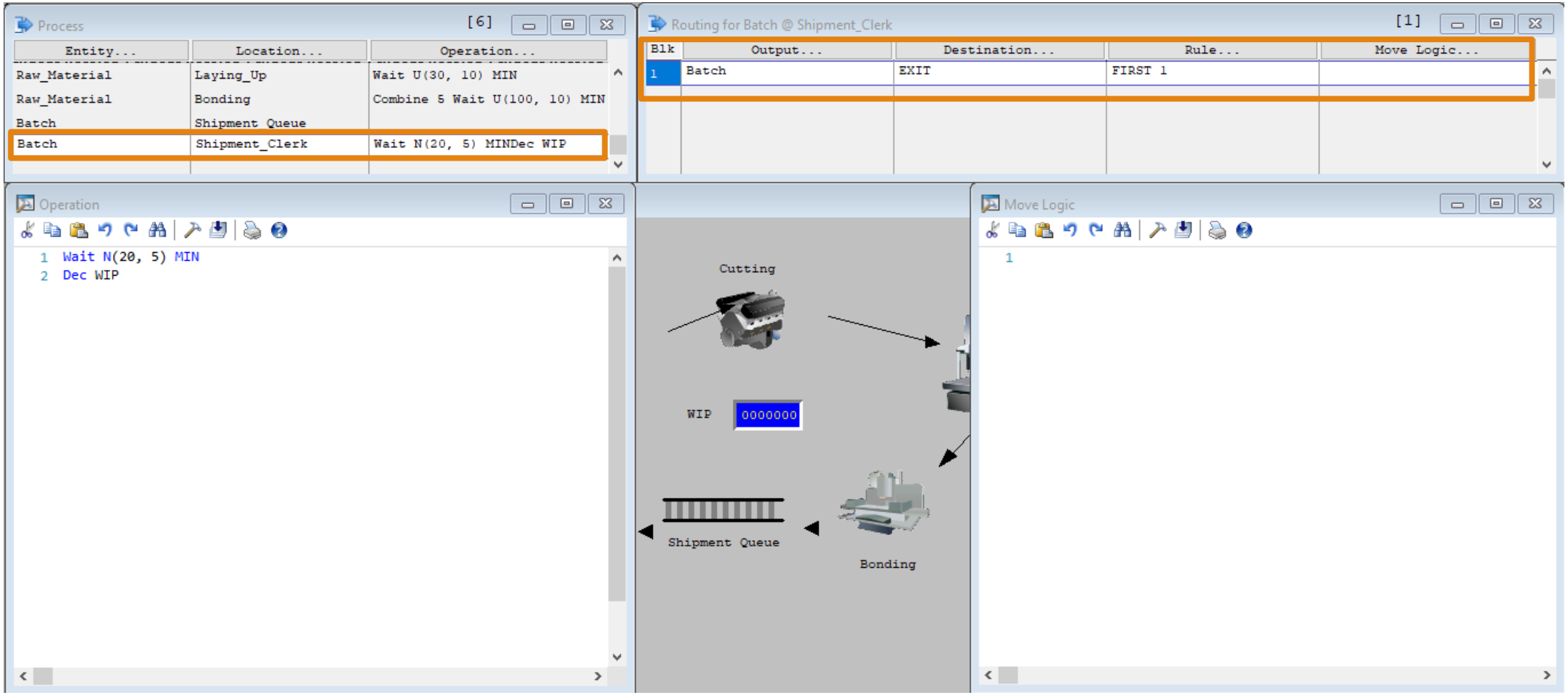
Implementation on ProModel

- Processing: Shipment Queue → Shipment Clerk



Implementation on ProModel

- Processing: Shipment Clerk → EXIT



Thanks!...

Questions?

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