

*Supplementary materials*

# Improving Marine Concrete Performance Based on Multiple Criteria Using Early Portland Cement and Chemical Superplasticizer Admixture

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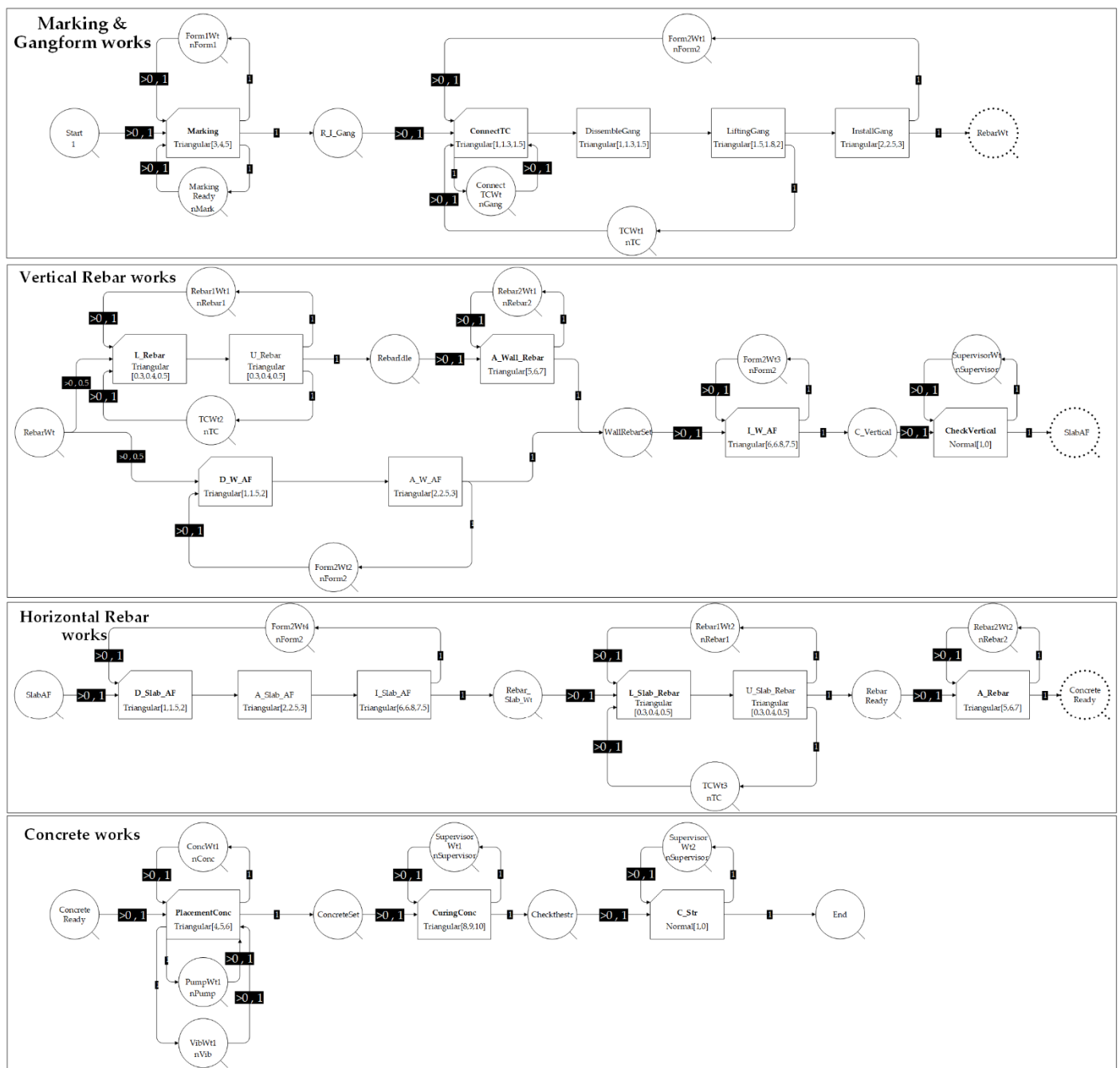


Figure. S1 The discrete event simulation diagram for analysis of the construction productivity

**Table S1.** The data of the crew members of structure works for the discrete event simulation.

Crew Member	Description	The Number of Workers
nMark	The number of Marking worker	1 (Unskilled Labour 1)
nForm1	The number of Formwork #1	2 (Foreman 1 + Form worker 1)
nForm2	The number of Formwork #2	8 (Foreman 1 + Form worker 7)
nTC	The number of Tower Crane	1 (Tower crane 1)
nRebar1	The number of Rebar worker #1	2 (Foreman 1 + Rebar worker 1)
nRebar2	The number of Rebar worker #2	5 (Foreman 1 + Rebar worker 4)
nSupervisor	The number of Supervisor	1 (Supervisor 1)
nConc	The number of Concrete worker	5 (Foreman 1 + Concrete worker 4)
nPump	The number of Pump car	1 (Pump car 1)
nVib	The number of Vibrator	1 (Vibrator 1)

**Table S2.** The data of the working hours of structure works for the discrete event simulation.

Work Activity	Working Hours		
	Min	Mean	Max
Conducting marking	3	4	5
Connection with T/C	1	1.3	1.5
Disassemble gang form	1	1.3	1.5
Lifting gang form	1.5	1.8	2
Installation of gang form	2	2.5	3
Lifting rebar	0.3	0.4	0.5
Unloading rebar	0.3	0.4	0.5
Arranging rebar for wall	5	6	7
Disassemble wall al-form	1	1.5	2
Arranging wall al-form	2	2.5	3
Installation of wall al-form	6	6.8	7.5
Disassemble slab al-form	1	1.5	2
Arranging slab al-form	2	2.5	3
Installation of slab al-form	6	6.8	7.5
Arranging rebar for slab	5	6	7
Placement of concrete	4	5	6
Concrete curing and finishing	Based on the elapsed time		
Checking concrete strength	1	1	1