



```

80     second level: [ 5. 2. 3. 4. 6. 7. 1. 10. 0. 4. 12. 14. 17.]
81     third level: [4. 6. 3. 6. 2. 2. 2. 6. 6. 4. 6. 3. 7.]]
82     The No. 5 iteration is finished!
83
84     Beging the No. 6 iteration:
85     obj[gen-1] = 55.90 temp_best_value_gen = 55.90
86     No, maintain solution and obj[gen] = 55.90 , and the tolerance_counter = 6
87     solution chromosome =
88     first level: [ [ 3. 10. 18. 26. 27. 3.5 2. 4.5 4. 3.5 4.5 3.5 4.5]
89     second level: [ 5. 2. 3. 4. 6. 7. 1. 10. 0. 4. 12. 14. 17.]
90     third level: [4. 6. 3. 6. 2. 2. 2. 6. 6. 4. 6. 3. 7.]]
91     The No. 6 iteration is finished!
92
93     Beging the No. 7 iteration:
94     obj[gen-1] = 55.90 temp_best_value_gen = 55.90
95     No, maintain solution and obj[gen] = 55.90 , and the tolerance_counter = 7
96     solution chromosome =
97     first level: [ [ 3. 10. 18. 26. 27. 3.5 2. 4.5 4. 3.5 4.5 3.5 4.5]
98     second level: [ 5. 2. 3. 4. 6. 7. 1. 10. 0. 4. 12. 14. 17.]
99     third level: [4. 6. 3. 6. 2. 2. 2. 6. 6. 4. 6. 3. 7.]]
100    The No. 7 iteration is finished!
101
102
103    -----
104    The iteration is terminated and then visulize the solution:
105    solution chromosome =
106    first level: [ [ 3. 10. 18. 26. 27. 3.5 2. 4.5 4. 3.5 4.5 3.5 4.5]
107    second level: [ 5. 2. 3. 4. 6. 7. 1. 10. 0. 4. 12. 14. 17.]
108    third level: [4. 6. 3. 6. 2. 2. 2. 6. 6. 4. 6. 3. 7.]]
109    Objective function values and some other indicators:
110    Obj0 = 17.00 Obj1 = 236.00 Obj0 + Obj1 = 253.00
111    Total movement of crane: 60.00
112    Total waiting time in berth position: 85.00
113    Total index of q during berthing: 542.00
114    Specific arrangement for each vessel:
115    V_id: 0 li: 6.0 xi: 3.0 bow of i: 0.0 tail of i: 6.0 gama_i0: 5.0 gama_i1: 7.0
116    duration_time_i: 2.0 demand_i: 120.0 work load_i: 120.0 work load gap_i: 0
117    V_id: 1 li: 8.0 xi: 10.0 bow of i: 6.0 tail of i: 14.0 gama_i0: 2.0 gama_i1: 3
118    duration_time_i: 1.0 demand_i: 80.0 work load_i: 80.0 work load gap_i: 0
119    V_id: 2 li: 8.0 xi: 18.0 bow of i: 14.0 tail of i: 22.0 gama_i0: 3.0 gama_i1: 6
120    duration_time_i: 3.0 demand_i: 140.0 work load_i: 140.0 work load gap_i: 0
121    V_id: 3 li: 8.0 xi: 26.0 bow of i: 22.0 tail of i: 30.0 gama_i0: 4.0 gama_i1: 6
122    duration_time_i: 2.0 demand_i: 160.0 work load_i: 160.0 work load gap_i: 0
123    V_id: 4 li: 6.0 xi: 27.0 bow of i: 24.0 tail of i: 30.0 gama_i0: 6.0 gama_i1:
124    duration_time_i: 4.0 demand_i: 160.0 work load_i: 160.0 work load gap_i: 0
125    V_id: 5 li: 7.0 xi: 3.5 bow of i: 0.0 tail of i: 7.0 gama_i0: 7.0 gama_i1: 10.0
126    duration_time_i: 3.0 demand_i: 100.0 work load_i: 100.0 work load gap_i: 0
127    V_id: 6 li: 4.0 xi: 2.0 bow of i: 0.0 tail of i: 4.0 gama_i0: 1.0 gama_i1: 4.0
128    duration_time_i: 3.0 demand_i: 120.0 work load_i: 120.0 work load gap_i: 0
129    V_id: 7 li: 9.0 xi: 4.5 bow of i: 0.0 tail of i: 9.0 gama_i0: 10.0 gama_i1: 12.0
130    duration_time_i: 2.0 demand_i: 140.0 work load_i: 140.0 work load gap_i: 0
131    V_id: 8 li: 8.0 xi: 4.0 bow of i: 0.0 tail of i: 8.0 gama_i0: 0.0 gama_i1: 1.0
132    duration_time_i: 1.0 demand_i: 80.0 work load_i: 80.0 work load gap_i: 0
133    V_id: 9 li: 7.0 xi: 3.5 bow of i: 0.0 tail of i: 7.0 gama_i0: 4.0 gama_i1: 5.0
134    duration_time_i: 1.0 demand_i: 80.0 work load_i: 80.0 work load gap_i: 0
135    V_id: 10 li: 9.0 xi: 4.5 bow of i: 0.0 tail of i: 9.0 gama_i0: 12.0 gama_i1: 14.
136    duration_time_i: 2.0 demand_i: 160.0 work load_i: 160.0 work load gap_i: 0
137    V_id: 11 li: 7.0 xi: 3.5 bow of i: 0.0 tail of i: 7.0 gama_i0: 14.0 gama_i1: 17.
138    duration_time_i: 3.0 demand_i: 140.0 work load_i: 140.0 work load gap_i: 0
139    V_id: 12 li: 9.0 xi: 4.5 bow of i: 0.0 tail of i: 9.0 gama_i0: 17.0 gama_i1: 18.
140    duration_time_i: 1.0 demand_i: 120.0 work load_i: 120.0 work load gap_i: 0
141
142    128
143    129 Algorithm finished and the total CPU time: 1271 s
144    130 End
145    131

```