


```

80     second level: [0. 4. 2. 6. 4. 5. 5. 1. 1.]
81     third level: [3. 3. 2. 2. 6. 2. 3. 3. 3.]
82     The No. 5 iteration is finished!
83
84     Beging the No. 6 iteration:
85     obj[gen-1] = 22.60 temp_best_value_gen = 22.60
86     No, maintain solution and obj[gen] = 22.60 , and the tolerance_counter = 6
87     solution chromosome =
88     first level: [ [ 3. 7.5 10.5 14.5 21. 1.5 27. 3.5 26.5]
89     second level: [0. 4. 2. 6. 4. 5. 5. 1. 1.]
90     third level: [3. 3. 2. 2. 6. 2. 3. 3. 3.]
91     The No. 6 iteration is finished!
92
93     Beging the No. 7 iteration:
94     obj[gen-1] = 22.60 temp_best_value_gen = 22.60
95     No, maintain solution and obj[gen] = 22.60 , and the tolerance_counter = 7
96     solution chromosome =
97     first level: [ [ 3. 7.5 10.5 14.5 21. 1.5 27. 3.5 26.5]
98     second level: [0. 4. 2. 6. 4. 5. 5. 1. 1.]
99     third level: [3. 3. 2. 2. 6. 2. 3. 3. 3.]
100    The No. 7 iteration is finished!
101
102    Beging the No. 8 iteration:
103    obj[gen-1] = 22.60 temp_best_value_gen = 22.60
104    No, maintain solution and obj[gen] = 22.60 , and the tolerance_counter = 8
105    solution chromosome =
106    first level: [ [ 3. 7.5 10.5 14.5 21. 1.5 27. 3.5 26.5]
107    second level: [0. 4. 2. 6. 4. 5. 5. 1. 1.]
108    third level: [3. 3. 2. 2. 6. 2. 3. 3. 3.]
109    The No. 8 iteration is finished!
110
111    Beging the No. 9 iteration:
112    obj[gen-1] = 22.60 temp_best_value_gen = 22.60
113    No, maintain solution and obj[gen] = 22.60 , and the tolerance_counter = 9
114    solution chromosome =
115    first level: [ [ 3. 7.5 10.5 14.5 21. 1.5 27. 3.5 26.5]
116    second level: [0. 4. 2. 6. 4. 5. 5. 1. 1.]
117    third level: [3. 3. 2. 2. 6. 2. 3. 3. 3.]
118    The No. 9 iteration is finished!
119
120    Beging the No. 10 iteration:
121    obj[gen-1] = 22.60 temp_best_value_gen = 22.60
122    No, maintain solution and obj[gen] = 22.60 , and the tolerance_counter = 10
123    solution chromosome =
124    first level: [ [ 3. 7.5 10.5 14.5 21. 1.5 27. 3.5 26.5]
125    second level: [0. 4. 2. 6. 4. 5. 5. 1. 1.]
126    third level: [3. 3. 2. 2. 6. 2. 3. 3. 3.]
127    The No. 10 iteration is finished!
128
129
130 -----
131 The iteration is terminated and then visulize the solution:
132 solution chromosome =
133 first level: [ [ 3. 7.5 10.5 14.5 21. 1.5 27. 3.5 26.5]
134 second level: [0. 4. 2. 6. 4. 5. 5. 1. 1.]
135 third level: [3. 3. 2. 2. 6. 2. 3. 3. 3.]
136 Objective function values and some other indicators:
137 Obj0 = 8.00 Obj1 = 74.00 Obj0 + Obj1 = 82.00
138 Total movement of crane: 46.00
139 Total waiting time in berth position: 28.00
140 Total index of q during berthing: 496.00
141 Specific arrangement for each vessel:
142 V_id: 0 li: 6.0 xi: 3.0 bow of i: 0.0 tail of i: 6.0 gama_i0: 0.0 gama_i1: 1.0
143 duration_time_i: 1.0 demand_i: 60.0 work load_i: 60.0 work load gap_i: 0
144 V_id: 1 li: 3.0 xi: 7.5 bow of i: 6.0 tail of i: 9.0 gama_i0: 4.0 gama_i1: 6.0
145 duration_time_i: 2.0 demand_i: 80.0 work load_i: 80.0 work load gap_i: 0
146 V_id: 2 li: 3.0 xi: 10.5 bow of i: 9.0 tail of i: 12.0 gama_i0: 2.0 gama_i1: 6
147 duration_time_i: 4.0 demand_i: 160.0 work load_i: 160.0 work load gap_i: 0
148 V_id: 3 li: 5.0 xi: 14.5 bow of i: 12.0 tail of i: 17.0 gama_i0: 6.0 gama_i1: 9
149 duration_time_i: 3.0 demand_i: 120.0 work load_i: 120.0 work load gap_i: 0
150 V_id: 4 li: 8.0 xi: 21.0 bow of i: 17.0 tail of i: 25.0 gama_i0: 4.0 gama_i1: 5
151 duration_time_i: 1.0 demand_i: 100.0 work load_i: 100.0 work load gap_i: 0
152 V_id: 5 li: 3.0 xi: 1.5 bow of i: 0.0 tail of i: 3.0 gama_i0: 5.0 gama_i1: 9.0
153 duration_time_i: 4.0 demand_i: 160.0 work load_i: 160.0 work load gap_i: 0
154 V_id: 6 li: 6.0 xi: 27.0 bow of i: 24.0 tail of i: 30.0 gama_i0: 5.0 gama_i1: 7
155 duration_time_i: 2.0 demand_i: 100.0 work load_i: 100.0 work load gap_i: 0
156 V_id: 7 li: 7.0 xi: 3.5 bow of i: 0.0 tail of i: 7.0 gama_i0: 1.0 gama_i1: 3.0
157 duration_time_i: 2.0 demand_i: 100.0 work load_i: 100.0 work load gap_i: 0
158 V_id: 8 li: 3.0 xi: 26.5 bow of i: 25.0 tail of i: 28.0 gama_i0: 1.0 gama_i1: 3
159 duration_time_i: 2.0 demand_i: 100.0 work load_i: 100.0 work load gap_i: 0
160
161 Algorithm finished and the total CPU time: 1047 s
162 End
163

```