


```

80     second level: [7. 0. 2. 4. 1. 3. 2. 4.]
81     third level: [2. 4. 6. 2. 4. 4. 5.] ]
82     The No. 5 iteration is finished!
83
84 Beging the No. 6 iteration:
85     obj[gen-1] = 24.40   temp_best_value_gen = 24.40
86     No, maintain solution and obj[gen] = 24.40 , and the tolerance_counter = 1
87     solution chromosome =
88         first level: [ [ 1.5  5.  10.5 17.5 25.5 25.5 3.  3.5]
89         second level: [7. 0. 2. 4. 1. 3. 2. 4.]
90         third level: [2. 4. 6. 2. 4. 4. 5.] ]
91     The No. 6 iteration is finished!
92
93 Beging the No. 7 iteration:
94     obj[gen-1] = 24.40   temp_best_value_gen = 24.40
95     No, maintain solution and obj[gen] = 24.40 , and the tolerance_counter = 2
96     solution chromosome =
97         first level: [ [ 1.5  5.  10.5 17.5 25.5 25.5 3.  3.5]
98         second level: [7. 0. 2. 4. 1. 3. 2. 4.]
99         third level: [2. 4. 6. 2. 4. 4. 5.] ]
100    The No. 7 iteration is finished!
101
102 Beging the No. 8 iteration:
103     obj[gen-1] = 24.40   temp_best_value_gen = 24.40
104     No, maintain solution and obj[gen] = 24.40 , and the tolerance_counter = 3
105     solution chromosome =
106         first level: [ [ 1.5  5.  10.5 17.5 25.5 25.5 3.  3.5]
107         second level: [7. 0. 2. 4. 1. 3. 2. 4.]
108         third level: [2. 4. 6. 2. 4. 4. 5.] ]
109    The No. 8 iteration is finished!
110
111 Beging the No. 9 iteration:
112     obj[gen-1] = 24.40   temp_best_value_gen = 24.40
113     No, maintain solution and obj[gen] = 24.40 , and the tolerance_counter = 4
114     solution chromosome =
115         first level: [ [ 1.5  5.  10.5 17.5 25.5 25.5 3.  3.5]
116         second level: [7. 0. 2. 4. 1. 3. 2. 4.]
117         third level: [2. 4. 6. 2. 4. 4. 5.] ]
118    The No. 9 iteration is finished!
119
120 Beging the No. 10 iteration:
121     obj[gen-1] = 24.40   temp_best_value_gen = 24.40
122     No, maintain solution and obj[gen] = 24.40 , and the tolerance_counter = 5
123     solution chromosome =
124         first level: [ [ 1.5  5.  10.5 17.5 25.5 25.5 3.  3.5]
125         second level: [7. 0. 2. 4. 1. 3. 2. 4.]
126         third level: [2. 4. 6. 2. 4. 4. 5.] ]
127    The No. 10 iteration is finished!
128
129 Beging the No. 11 iteration:
130     obj[gen-1] = 24.40   temp_best_value_gen = 24.40
131     No, maintain solution and obj[gen] = 24.40 , and the tolerance_counter = 6
132     solution chromosome =
133         first level: [ [ 1.5  5.  10.5 17.5 25.5 25.5 3.  3.5]
134         second level: [7. 0. 2. 4. 1. 3. 2. 4.]
135         third level: [2. 4. 6. 2. 4. 4. 5.] ]
136    The No. 11 iteration is finished!
137
138 Beging the No. 12 iteration:
139     obj[gen-1] = 24.40   temp_best_value_gen = 24.40
140     No, maintain solution and obj[gen] = 24.40 , and the tolerance_counter = 7
141     solution chromosome =
142         first level: [ [ 1.5  5.  10.5 17.5 25.5 25.5 3.  3.5]
143         second level: [7. 0. 2. 4. 1. 3. 2. 4.]
144         third level: [2. 4. 6. 2. 4. 4. 5.] ]
145    The No. 12 iteration is finished!
146
147 Beging the No. 13 iteration:
148     obj[gen-1] = 24.40   temp_best_value_gen = 24.40
149     No, maintain solution and obj[gen] = 24.40 , and the tolerance_counter = 8
150     solution chromosome =
151         first level: [ [ 1.5  5.  10.5 17.5 25.5 25.5 3.  3.5]
152         second level: [7. 0. 2. 4. 1. 3. 2. 4.]
153         third level: [2. 4. 6. 2. 4. 4. 5.] ]
154    The No. 13 iteration is finished!
155
156
157 -----
158 The iteration is terminated and then visulize the solution:
159     solution chromosome =
160         first level: [ [ 1.5  5.  10.5 17.5 25.5 25.5 3.  3.5]
161         second level: [7. 0. 2. 4. 1. 3. 2. 4.]
162         third level: [2. 4. 6. 2. 4. 4. 5.] ]
163     Objective function values and some other indicators:

```

```

164      Obj0 = 10.00      Obj1 = 54.00      Obj0 + Obj1 = 64.00
165      Total movement of crane: 31.00
166      Total waiting time in berth position: 23.00
167      Total index of q during berthing: 341.00
168      Specific arrangement for each vessel:
169      V_id: 0      li: 3.0      xi: 1.5      bow of i: 0.0      tail of i: 3.0      gama_i0: 7.0      gama_i1: 11.0
170      duration_time_i: 4.0      demand_i: 140.0      work load_i: 140.0      work load gap_i: 0
171      V_id: 1      li: 4.0      xi: 5.0      bow of i: 3.0      tail of i: 7.0      gama_i0: 0.0      gama_i1: 2.0
172      duration_time_i: 2.0      demand_i: 100.0      work load_i: 100.0      work load gap_i: 0
173      V_id: 2      li: 7.0      xi: 10.5      bow of i: 7.0      tail of i: 14.0      gama_i0: 2.0      gama_i1: 3
174      duration_time_i: 1.0      demand_i: 80.0      work load_i: 80.0      work load gap_i: 0
175      V_id: 3      li: 7.0      xi: 17.5      bow of i: 14.0      tail of i: 21.0      gama_i0: 4.0      gama_i1: 6
176      duration_time_i: 2.0      demand_i: 80.0      work load_i: 80.0      work load gap_i: 0
177      V_id: 4      li: 9.0      xi: 25.5      bow of i: 21.0      tail of i: 30.0      gama_i0: 1.0      gama_i1: 3
178      duration_time_i: 2.0      demand_i: 140.0      work load_i: 140.0      work load gap_i: 0
179      V_id: 5      li: 4.0      xi: 25.5      bow of i: 23.5      tail of i: 27.5      gama_i0: 3.0      gama_i1: 4
180      duration_time_i: 1.0      demand_i: 60.0      work load_i: 60.0      work load gap_i: 0
181      V_id: 6      li: 6.0      xi: 3.0      bow of i: 0.0      tail of i: 6.0      gama_i0: 2.0      gama_i1: 4.0
182      duration_time_i: 2.0      demand_i: 100.0      work load_i: 100.0      work load gap_i: 0
183      V_id: 7      li: 7.0      xi: 3.5      bow of i: 0.0      tail of i: 7.0      gama_i0: 4.0      gama_i1: 6.0
184      duration_time_i: 2.0      demand_i: 140.0      work load_i: 140.0      work load gap_i: 0
185
186      Algorithm finished and the total CPU time: 1222 s
187      End
188

```