



```

80     second level: [ 5. 7. 0. 2. 5. 1. 8. 3. 11. 13. 16. 17.]
81     third level: [3. 2. 4. 8. 2. 4. 2. 3. 6. 2. 7. 5.] ]
82     The No. 5 iteration is finished!
83
84 Beging the No. 6 iteration:
85     obj[gen-1] = 50.00   temp_best_value_gen = 50.00
86     No, maintain solution and obj[gen] = 50.00 , and the tolerance_counter = 6
87     solution chromosome =
88     first level: [ [ 2.5 9. 16.5 24. 27.5 2. 1.5 3. 4.5 3. 3.5 4. ]
89     second level: [ 5. 7. 0. 2. 5. 1. 8. 3. 11. 13. 16. 17.]
90     third level: [3. 2. 4. 8. 2. 4. 2. 3. 6. 2. 7. 5.] ]
91     The No. 6 iteration is finished!
92
93 Beging the No. 7 iteration:
94     obj[gen-1] = 50.00   temp_best_value_gen = 50.00
95     No, maintain solution and obj[gen] = 50.00 , and the tolerance_counter = 7
96     solution chromosome =
97     first level: [ [ 2.5 9. 16.5 24. 27.5 2. 1.5 3. 4.5 3. 3.5 4. ]
98     second level: [ 5. 7. 0. 2. 5. 1. 8. 3. 11. 13. 16. 17.]
99     third level: [3. 2. 4. 8. 2. 4. 2. 3. 6. 2. 7. 5.] ]
100    The No. 7 iteration is finished!
101
102 Beging the No. 8 iteration:
103     obj[gen-1] = 50.00   temp_best_value_gen = 50.00
104     No, maintain solution and obj[gen] = 50.00 , and the tolerance_counter = 8
105     solution chromosome =
106     first level: [ [ 2.5 9. 16.5 24. 27.5 2. 1.5 3. 4.5 3. 3.5 4. ]
107     second level: [ 5. 7. 0. 2. 5. 1. 8. 3. 11. 13. 16. 17.]
108     third level: [3. 2. 4. 8. 2. 4. 2. 3. 6. 2. 7. 5.] ]
109    The No. 8 iteration is finished!
110
111 Beging the No. 9 iteration:
112     obj[gen-1] = 50.00   temp_best_value_gen = 50.00
113     No, maintain solution and obj[gen] = 50.00 , and the tolerance_counter = 9
114     solution chromosome =
115     first level: [ [ 2.5 9. 16.5 24. 27.5 2. 1.5 3. 4.5 3. 3.5 4. ]
116     second level: [ 5. 7. 0. 2. 5. 1. 8. 3. 11. 13. 16. 17.]
117     third level: [3. 2. 4. 8. 2. 4. 2. 3. 6. 2. 7. 5.] ]
118    The No. 9 iteration is finished!
119
120
121 -----
122 The iteration is terminated and then visulize the solution:
123 solution chromosome =
124     first level: [ [ 2.5 9. 16.5 24. 27.5 2. 1.5 3. 4.5 3. 3.5 4. ]
125     second level: [ 5. 7. 0. 2. 5. 1. 8. 3. 11. 13. 16. 17.]
126     third level: [3. 2. 4. 8. 2. 4. 2. 3. 6. 2. 7. 5.] ]
127 Objective function values and some other indicators:
128     Obj0 = 18.00      Obj1 = 158.00      Obj0 + Obj1 = 176.00
129     Total movement of crane: 20.00
130     Total waiting time in berth position: 88.00
131     Total index of q during berthing: 363.00
132 Specific arrangement for each vessel:
133     V_id: 0      li: 5.0      xi: 2.5      bow of i: 0.0      tail of i: 5.0      gama_i0: 5.0      gama_i1: 8.0
134           duration_time_i: 3.0      demand_i: 140.0      work load_i: 140.0      work load gap_i: 0
135     V_id: 1      li: 8.0      xi: 9.0      bow of i: 5.0      tail of i: 13.0      gama_i0: 7.0      gama_i1: 11.
136           duration_time_i: 4.0      demand_i: 140.0      work load_i: 140.0      work load gap_i: 0
137     V_id: 2      li: 7.0      xi: 16.5      bow of i: 13.0      tail of i: 20.0      gama_i0: 0.0      gama_i1: 1
138           duration_time_i: 1.0      demand_i: 60.0      work load_i: 60.0      work load gap_i: 0
139     V_id: 3      li: 8.0      xi: 24.0      bow of i: 20.0      tail of i: 28.0      gama_i0: 2.0      gama_i1: 3
140           duration_time_i: 1.0      demand_i: 80.0      work load_i: 80.0      work load gap_i: 0
141     V_id: 4      li: 5.0      xi: 27.5      bow of i: 25.0      tail of i: 30.0      gama_i0: 5.0      gama_i1: 9
142           duration_time_i: 4.0      demand_i: 140.0      work load_i: 140.0      work load gap_i: 0
143     V_id: 5      li: 4.0      xi: 2.0      bow of i: 0.0      tail of i: 4.0      gama_i0: 1.0      gama_i1: 3.0
144           duration_time_i: 2.0      demand_i: 120.0      work load_i: 120.0      work load gap_i: 0
145     V_id: 6      li: 3.0      xi: 1.5      bow of i: 0.0      tail of i: 3.0      gama_i0: 8.0      gama_i1: 11.0
146           duration_time_i: 3.0      demand_i: 120.0      work load_i: 120.0      work load gap_i: 0
147     V_id: 7      li: 6.0      xi: 3.0      bow of i: 0.0      tail of i: 6.0      gama_i0: 3.0      gama_i1: 5.0
148           duration_time_i: 2.0      demand_i: 100.0      work load_i: 100.0      work load gap_i: 0
149     V_id: 8      li: 9.0      xi: 4.5      bow of i: 0.0      tail of i: 9.0      gama_i0: 11.0      gama_i1: 13.0
150           duration_time_i: 2.0      demand_i: 140.0      work load_i: 140.0      work load gap_i: 0
151     V_id: 9      li: 6.0      xi: 3.0      bow of i: 0.0      tail of i: 6.0      gama_i0: 13.0      gama_i1: 16.0
152           duration_time_i: 3.0      demand_i: 100.0      work load_i: 100.0      work load gap_i: 0
153     V_id: 10     li: 7.0      xi: 3.5      bow of i: 0.0      tail of i: 7.0      gama_i0: 16.0      gama_i1: 17.
154           duration_time_i: 1.0      demand_i: 60.0      work load_i: 60.0      work load gap_i: 0
155     V_id: 11     li: 8.0      xi: 4.0      bow of i: 0.0      tail of i: 8.0      gama_i0: 17.0      gama_i1: 19.
156           duration_time_i: 2.0      demand_i: 120.0      work load_i: 120.0      work load gap_i: 0
157
158 Algorithm finished and the total CPU time: 1202 s
159 End
160

```