



```

80  obj[gen-1] = 64.00  temp_best_value_gen = 64.00
81  No, maintain solution and obj[gen] = 64.00 , and the tolerance_counter = 5
82  solution chromosome =
83    first level: [ [ 1.5  5.  8.5 12. 15.5 19.5 25.5 28.  3.5 4.  2.  3.  1.5 2.
84  2.5]
85    second level: [ 6.  1.  1.  3.  5.  0.  1.  5.  4.  9. 10. 12.  1. 14. 16.]
86    third level: [2. 3. 2. 4. 3. 4. 2. 4. 4. 8. 2. 4. 3. 3. 2.] ]
87  The No. 5 iteration is finished!
88
89  Beging the No. 6 iteration:
90  obj[gen-1] = 64.00  temp_best_value_gen = 64.00
91  No, maintain solution and obj[gen] = 64.00 , and the tolerance_counter = 6
92  solution chromosome =
93    first level: [ [ 1.5  5.  8.5 12. 15.5 19.5 25.5 28.  3.5 4.  2.  3.  1.5 2.
94  2.5]
95    second level: [ 6.  1.  1.  3.  5.  0.  1.  5.  4.  9. 10. 12.  1. 14. 16.]
96    third level: [2. 3. 2. 4. 3. 4. 2. 4. 4. 8. 2. 4. 3. 3. 2.] ]
97  The No. 6 iteration is finished!
98
99  Beging the No. 7 iteration:
100 obj[gen-1] = 64.00  temp_best_value_gen = 64.00
101 No, maintain solution and obj[gen] = 64.00 , and the tolerance_counter = 7
102 solution chromosome =
103   first level: [ [ 1.5  5.  8.5 12. 15.5 19.5 25.5 28.  3.5 4.  2.  3.  1.5 2.
104 2.5]
105   second level: [ 6.  1.  1.  3.  5.  0.  1.  5.  4.  9. 10. 12.  1. 14. 16.]
106   third level: [2. 3. 2. 4. 3. 4. 2. 4. 4. 8. 2. 4. 3. 3. 2.] ]
107 The No. 7 iteration is finished!
108
109 -----
110
111 The iteration is terminated and then visulize the solution:
112 solution chromosome =
113   first level: [ [ 1.5  5.  8.5 12. 15.5 19.5 25.5 28.  3.5 4.  2.  3.  1.5 2.
114 2.5]
115   second level: [ 6.  1.  1.  3.  5.  0.  1.  5.  4.  9. 10. 12.  1. 14. 16.]
116   third level: [2. 3. 2. 4. 3. 4. 2. 4. 4. 8. 2. 4. 3. 3. 2.] ]
117 Objective function values and some other indicators:
118 Obj0 = 17.00      Obj1 = 317.00      Obj0 + Obj1 = 334.00
119 Total movement of crane: 56.00
120 Total waiting time in berth position: 88.00
121 Total index of q during berthing: 583.00
122 Specific arrangement for each vessel:
123   V_id: 0      li: 3.0      xi: 1.5      bow of i: 0.0      tail of i: 3.0      gama_i0: 6.0      gama_i1: 9.0
124   duration_time_i: 3.0      demand_i: 120.0      work load_i: 120.0      work load gap_i: 0
125   V_id: 1      li: 4.0      xi: 5.0      bow of i: 3.0      tail of i: 7.0      gama_i0: 1.0      gama_i1: 4.0
126   duration_time_i: 3.0      demand_i: 140.0      work load_i: 140.0      work load gap_i: 0
127   V_id: 2      li: 3.0      xi: 8.5      bow of i: 7.0      tail of i: 10.0      gama_i0: 1.0      gama_i1: 3.0
128   duration_time_i: 2.0      demand_i: 80.0      work load_i: 80.0      work load gap_i: 0
129   V_id: 3      li: 4.0      xi: 12.0      bow of i: 10.0      tail of i: 14.0      gama_i0: 3.0      gama_i1: 5
130   duration_time_i: 2.0      demand_i: 100.0      work load_i: 100.0      work load gap_i: 0
131   V_id: 4      li: 3.0      xi: 15.5      bow of i: 14.0      tail of i: 17.0      gama_i0: 5.0      gama_i1: 8
132   duration_time_i: 3.0      demand_i: 140.0      work load_i: 140.0      work load gap_i: 0
133   V_id: 5      li: 5.0      xi: 19.5      bow of i: 17.0      tail of i: 22.0      gama_i0: 0.0      gama_i1: 2
134   duration_time_i: 2.0      demand_i: 120.0      work load_i: 120.0      work load gap_i: 0
135   V_id: 6      li: 7.0      xi: 25.5      bow of i: 22.0      tail of i: 29.0      gama_i0: 1.0      gama_i1: 3
136   duration_time_i: 2.0      demand_i: 80.0      work load_i: 80.0      work load gap_i: 0
137   V_id: 7      li: 4.0      xi: 28.0      bow of i: 26.0      tail of i: 30.0      gama_i0: 5.0      gama_i1: 7
138   duration_time_i: 2.0      demand_i: 120.0      work load_i: 120.0      work load gap_i: 0
139   V_id: 8      li: 7.0      xi: 3.5      bow of i: 0.0      tail of i: 7.0      gama_i0: 4.0      gama_i1: 6.0
140   duration_time_i: 2.0      demand_i: 160.0      work load_i: 160.0      work load gap_i: 0
141   V_id: 9      li: 8.0      xi: 4.0      bow of i: 0.0      tail of i: 8.0      gama_i0: 9.0      gama_i1: 10.0
142   duration_time_i: 1.0      demand_i: 80.0      work load_i: 80.0      work load gap_i: 0
143   V_id: 10     li: 4.0      xi: 2.0      bow of i: 0.0      tail of i: 4.0      gama_i0: 10.0      gama_i1: 12.
144   duration_time_i: 2.0      demand_i: 80.0      work load_i: 80.0      work load gap_i: 0
145   V_id: 11     li: 6.0      xi: 3.0      bow of i: 0.0      tail of i: 6.0      gama_i0: 12.0      gama_i1: 14.
146   duration_time_i: 2.0      demand_i: 160.0      work load_i: 160.0      work load gap_i: 0
147   V_id: 12     li: 3.0      xi: 1.5      bow of i: 0.0      tail of i: 3.0      gama_i0: 1.0      gama_i1: 4.0
148   duration_time_i: 3.0      demand_i: 140.0      work load_i: 140.0      work load gap_i: 0
149   V_id: 13     li: 4.0      xi: 2.0      bow of i: 0.0      tail of i: 4.0      gama_i0: 14.0      gama_i1: 16.
150   duration_time_i: 2.0      demand_i: 100.0      work load_i: 100.0      work load gap_i: 0
151   V_id: 14     li: 5.0      xi: 2.5      bow of i: 0.0      tail of i: 5.0      gama_i0: 16.0      gama_i1: 18.
152   duration_time_i: 2.0      demand_i: 60.0      work load_i: 60.0      work load gap_i: 0
153
154 Algorithm finished and the total CPU time: 1207 s
155 End
156

```