


```

80  obj[gen-1] = 92.50  temp_best_value_gen = 92.50
81  No, maintain solution and obj[gen] = 92.50 , and the tolerance_counter = 5
82  solution chromosome =
83    first level: [ [ 1.5  5.  8.5 14.5 21.5 25.5 28.  1.5  4.5  3.5  4.5  2.5  4.5  2.
84  1.5  3.5  3.5  4.5]
85    second level: [ 6.  3.  0.  4.  1.  3. 18. 21. 24. 25. 10. 29. 14. 30. 33.  1.  2. 27.]
86    third level: [2. 2. 2. 5. 2. 3. 2. 2. 6. 4. 2. 4. 3. 3. 3. 6. 6. 3.] ]
87  The No. 5 iteration is finished!
88
89  Beging the No. 6 iteration:
90  obj[gen-1] = 92.50  temp_best_value_gen = 92.50
91  No, maintain solution and obj[gen] = 92.50 , and the tolerance_counter = 6
92  solution chromosome =
93    first level: [ [ 1.5  5.  8.5 14.5 21.5 25.5 28.  1.5  4.5  3.5  4.5  2.5  4.5  2.
94  1.5  3.5  3.5  4.5]
95    second level: [ 6.  3.  0.  4.  1.  3. 18. 21. 24. 25. 10. 29. 14. 30. 33.  1.  2. 27.]
96    third level: [2. 2. 2. 5. 2. 3. 2. 2. 6. 4. 2. 4. 3. 3. 3. 6. 6. 3.] ]
97  The No. 6 iteration is finished!
98
99
100 -----
101 The iteration is terminated and then vizulize the solution:
102 solution chromosome =
103   first level: [ [ 1.5  5.  8.5 14.5 21.5 25.5 28.  1.5  4.5  3.5  4.5  2.5  4.5  2.
104  1.5  3.5  3.5  4.5]
105   second level: [ 6.  3.  0.  4.  1.  3. 18. 21. 24. 25. 10. 29. 14. 30. 33.  1.  2. 27.]
106   third level: [2. 2. 2. 5. 2. 3. 2. 2. 6. 4. 2. 4. 3. 3. 3. 6. 6. 3.] ]
107 Objective function values and some other indicators:
108 Obj0 = 34.00      Obj1 = 279.00      Obj0 + Obj1 = 313.00
109 Total movement of crane: 28.00
110 Total waiting time in berth position: 251.00
111 Total index of q during berthing: 551.00
112 Specific arrangement for each vessel:
113   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: 10.0
114           duration_time_i: 4.0      demand_i: 140.0      work load_i: 140.0      work load gap_i: 0
115   V_id: 1      li: 4.0      xi: 5.0      bow of i: 3.0      tail of i: 7.0      gama_i0: 3.0      gama_i1: 6.0
116           duration_time_i: 3.0      demand_i: 100.0      work load_i: 100.0      work load gap_i: 0
117   V_id: 2      li: 3.0      xi: 8.5      bow of i: 7.0      tail of i: 10.0      gama_i0: 0.0      gama_i1: 4.0
118           duration_time_i: 4.0      demand_i: 140.0      work load_i: 140.0      work load gap_i: 0
119   V_id: 3      li: 9.0      xi: 14.5      bow of i: 10.0      tail of i: 19.0      gama_i0: 4.0      gama_i1: 5
120           duration_time_i: 1.0      demand_i: 80.0      work load_i: 80.0      work load gap_i: 0
121   V_id: 4      li: 5.0      xi: 21.5      bow of i: 19.0      tail of i: 24.0      gama_i0: 1.0      gama_i1: 3
122           duration_time_i: 2.0      demand_i: 80.0      work load_i: 80.0      work load gap_i: 0
123   V_id: 5      li: 3.0      xi: 25.5      bow of i: 24.0      tail of i: 27.0      gama_i0: 3.0      gama_i1: 6
124           duration_time_i: 3.0      demand_i: 140.0      work load_i: 140.0      work load gap_i: 0
125   V_id: 6      li: 4.0      xi: 28.0      bow of i: 26.0      tail of i: 30.0      gama_i0: 18.0      gama_i1:
126           duration_time_i: 3.0      demand_i: 120.0      work load_i: 120.0      work load gap_i: 0
127   V_id: 7      li: 3.0      xi: 1.5      bow of i: 0.0      tail of i: 3.0      gama_i0: 21.0      gama_i1: 24.0
128           duration_time_i: 3.0      demand_i: 120.0      work load_i: 120.0      work load gap_i: 0
129   V_id: 8      li: 9.0      xi: 4.5      bow of i: 0.0      tail of i: 9.0      gama_i0: 24.0      gama_i1: 25.0
130           duration_time_i: 1.0      demand_i: 60.0      work load_i: 60.0      work load gap_i: 0
131   V_id: 9      li: 7.0      xi: 3.5      bow of i: 0.0      tail of i: 7.0      gama_i0: 25.0      gama_i1: 27.0
132           duration_time_i: 2.0      demand_i: 120.0      work load_i: 120.0      work load gap_i: 0
133   V_id: 10     li: 9.0      xi: 4.5      bow of i: 0.0      tail of i: 9.0      gama_i0: 10.0      gama_i1: 14.
134           duration_time_i: 4.0      demand_i: 140.0      work load_i: 140.0      work load gap_i: 0
135   V_id: 11     li: 5.0      xi: 2.5      bow of i: 0.0      tail of i: 5.0      gama_i0: 29.0      gama_i1: 30.
136           duration_time_i: 1.0      demand_i: 80.0      work load_i: 80.0      work load gap_i: 0
137   V_id: 12     li: 9.0      xi: 4.5      bow of i: 0.0      tail of i: 9.0      gama_i0: 14.0      gama_i1: 17.
138           duration_time_i: 3.0      demand_i: 160.0      work load_i: 160.0      work load gap_i: 0
139   V_id: 13     li: 4.0      xi: 2.0      bow of i: 0.0      tail of i: 4.0      gama_i0: 30.0      gama_i1: 33.
140           duration_time_i: 3.0      demand_i: 140.0      work load_i: 140.0      work load gap_i: 0
141   V_id: 14     li: 3.0      xi: 1.5      bow of i: 0.0      tail of i: 3.0      gama_i0: 33.0      gama_i1: 35.
142           duration_time_i: 2.0      demand_i: 80.0      work load_i: 80.0      work load gap_i: 0
143   V_id: 15     li: 7.0      xi: 3.5      bow of i: 0.0      tail of i: 7.0      gama_i0: 1.0      gama_i1: 2.0
144           duration_time_i: 1.0      demand_i: 100.0      work load_i: 100.0      work load gap_i: 0
145   V_id: 16     li: 7.0      xi: 3.5      bow of i: 0.0      tail of i: 7.0      gama_i0: 2.0      gama_i1: 3.0
146           duration_time_i: 1.0      demand_i: 120.0      work load_i: 120.0      work load gap_i: 0
147   V_id: 17     li: 3.0      xi: 4.5      bow of i: 3.0      tail of i: 6.0      gama_i0: 27.0      gama_i1: 29.
148           duration_time_i: 2.0      demand_i: 80.0      work load_i: 80.0      work load gap_i: 0
149
150 Algorithm finished and the total CPU time: 1222 s
151 End
152

```