


```

80  obj[gen-1] = 80.10  temp_best_value_gen = 80.10
81  No, maintain solution and obj[gen] = 80.10 , and the tolerance_counter = 5
82  solution chromosome =
83    first level: [ [ 4.  9.5 4.5 21. 25.5 3.  1.5 2.5 2.  2.5 4.  4.  3.5 2.
84  2.  4. 14.5 2. ]
85    second level: [ 1.  0. 27.  0.  3.  3.  5.  7.  0. 21. 13. 10. 16. 18. 11. 23.  5. 30.]
86    third level: [4. 3. 3. 5. 2. 3. 3. 3. 4. 2. 2. 6. 5. 2. 4. 2. 6. 2.] ]
87  The No. 5 iteration is finished!
88
89  Beging the No. 6 iteration:
90  obj[gen-1] = 80.10  temp_best_value_gen = 80.10
91  No, maintain solution and obj[gen] = 80.10 , and the tolerance_counter = 6
92  solution chromosome =
93    first level: [ [ 4.  9.5 4.5 21. 25.5 3.  1.5 2.5 2.  2.5 4.  4.  3.5 2.
94  2.  4. 14.5 2. ]
95    second level: [ 1.  0. 27.  0.  3.  3.  5.  7.  0. 21. 13. 10. 16. 18. 11. 23.  5. 30.]
96    third level: [4. 3. 3. 5. 2. 3. 3. 3. 4. 2. 2. 6. 5. 2. 4. 2. 6. 2.] ]
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: [ [ 4.  9.5 4.5 21. 25.5 3.  1.5 2.5 2.  2.5 4.  4.  3.5 2.
104  2.  4. 14.5 2. ]
105   second level: [ 1.  0. 27.  0.  3.  3.  5.  7.  0. 21. 13. 10. 16. 18. 11. 23.  5. 30.]
106   third level: [4. 3. 3. 5. 2. 3. 3. 3. 4. 2. 2. 6. 5. 2. 4. 2. 6. 2.] ]
107 Objective function values and some other indicators:
108 Obj0 = 32.00      Obj1 = 193.00      Obj0 + Obj1 = 225.00
109 Total movement of crane: 0.00
110 Total waiting time in berth position: 193.00
111 Total index of q during berthing: 339.00
112 Specific arrangement for each vessel:
113   V_id: 0      li: 8.0      xi: 4.0      bow of i: 0.0      tail of i: 8.0      gama_i0: 1.0      gama_i1: 3.0
114           duration_time_i: 2.0      demand_i: 120.0      work load_i: 120.0      work load gap_i: 0
115   V_id: 1      li: 3.0      xi: 9.5      bow of i: 8.0      tail of i: 11.0      gama_i0: 0.0      gama_i1: 2.0
116           duration_time_i: 2.0      demand_i: 80.0      work load_i: 80.0      work load gap_i: 0
117   V_id: 2      li: 7.0      xi: 4.5      bow of i: 1.0      tail of i: 8.0      gama_i0: 27.0      gama_i1: 29.0
118           duration_time_i: 2.0      demand_i: 100.0      work load_i: 100.0      work load gap_i: 0
119   V_id: 3      li: 6.0      xi: 21.0      bow of i: 18.0      tail of i: 24.0      gama_i0: 0.0      gama_i1: 1
120           duration_time_i: 1.0      demand_i: 60.0      work load_i: 60.0      work load gap_i: 0
121   V_id: 4      li: 9.0      xi: 25.5      bow of i: 21.0      tail of i: 30.0      gama_i0: 3.0      gama_i1: 5
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: 6.0      xi: 3.0      bow of i: 0.0      tail of i: 6.0      gama_i0: 3.0      gama_i1: 5.0
124           duration_time_i: 2.0      demand_i: 100.0      work load_i: 100.0      work load gap_i: 0
125   V_id: 6      li: 3.0      xi: 1.5      bow of i: 0.0      tail of i: 3.0      gama_i0: 5.0      gama_i1: 7.0
126           duration_time_i: 2.0      demand_i: 120.0      work load_i: 120.0      work load gap_i: 0
127   V_id: 7      li: 5.0      xi: 2.5      bow of i: 0.0      tail of i: 5.0      gama_i0: 7.0      gama_i1: 10.0
128           duration_time_i: 3.0      demand_i: 160.0      work load_i: 160.0      work load gap_i: 0
129   V_id: 8      li: 4.0      xi: 2.0      bow of i: 0.0      tail of i: 4.0      gama_i0: 0.0      gama_i1: 1.0
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: 5.0      xi: 2.5      bow of i: 0.0      tail of i: 5.0      gama_i0: 21.0      gama_i1: 23.0
132           duration_time_i: 2.0      demand_i: 60.0      work load_i: 60.0      work load gap_i: 0
133   V_id: 10     li: 8.0      xi: 4.0      bow of i: 0.0      tail of i: 8.0      gama_i0: 13.0      gama_i1: 16.
134           duration_time_i: 3.0      demand_i: 120.0      work load_i: 120.0      work load gap_i: 0
135   V_id: 11     li: 8.0      xi: 4.0      bow of i: 0.0      tail of i: 8.0      gama_i0: 10.0      gama_i1: 11.
136           duration_time_i: 1.0      demand_i: 100.0      work load_i: 100.0      work load gap_i: 0
137   V_id: 12     li: 7.0      xi: 3.5      bow of i: 0.0      tail of i: 7.0      gama_i0: 16.0      gama_i1: 18.
138           duration_time_i: 2.0      demand_i: 140.0      work load_i: 140.0      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: 18.0      gama_i1: 21.
140           duration_time_i: 3.0      demand_i: 120.0      work load_i: 120.0      work load gap_i: 0
141   V_id: 14     li: 4.0      xi: 2.0      bow of i: 0.0      tail of i: 4.0      gama_i0: 11.0      gama_i1: 13.
142           duration_time_i: 2.0      demand_i: 120.0      work load_i: 120.0      work load gap_i: 0
143   V_id: 15     li: 8.0      xi: 4.0      bow of i: 0.0      tail of i: 8.0      gama_i0: 23.0      gama_i1: 27.
144           duration_time_i: 4.0      demand_i: 140.0      work load_i: 140.0      work load gap_i: 0
145   V_id: 16     li: 9.0      xi: 14.5      bow of i: 10.0      tail of i: 19.0      gama_i0: 5.0      gama_i1
146           duration_time_i: 2.0      demand_i: 140.0      work load_i: 140.0      work load gap_i: 0
147   V_id: 17     li: 4.0      xi: 2.0      bow of i: 0.0      tail of i: 4.0      gama_i0: 30.0      gama_i1: 33.
148           duration_time_i: 3.0      demand_i: 100.0      work load_i: 100.0      work load gap_i: 0
149
150 Algorithm finished and the total CPU time: 1262 s
151 End
152

```