


```

80  obj[gen-1] = 93.50  temp_best_value_gen = 93.50
81  No, maintain solution and obj[gen] = 93.50 , and the tolerance_counter = 5
82  solution chromosome =
83      first level: [ [ 5.88 4.4 3.48 1.85 6.84 5.89 2.07 3.54 8.8 3.71 7.5 3.15
84  2.28 12. 9.5 4.64 10.5 10.5 ]
85      second level: [ 6. 1. 4. 8. 12. 13. 15. 16. 10. 27. 8. 29. 31. 4. 1. 19. 15. 22.]
86      third level: [3. 3. 3. 2. 6. 5. 3. 3. 3. 3. 6. 3. 2. 1. 1. 2. 3. 2.] ]
87  The No. 5 iteration is finished!
88
89  Beging the No. 6 iteration:
90  obj[gen-1] = 93.50  temp_best_value_gen = 93.50
91  No, maintain solution and obj[gen] = 93.50 , and the tolerance_counter = 6
92  solution chromosome =
93      first level: [ [ 5.88 4.4 3.48 1.85 6.84 5.89 2.07 3.54 8.8 3.71 7.5 3.15
94  2.28 12. 9.5 4.64 10.5 10.5 ]
95      second level: [ 6. 1. 4. 8. 12. 13. 15. 16. 10. 27. 8. 29. 31. 4. 1. 19. 15. 22.]
96      third level: [3. 3. 3. 2. 6. 5. 3. 3. 3. 3. 6. 3. 2. 1. 1. 2. 3. 2.] ]
97  The No. 6 iteration is finished!
98
99
100 -----
101 The iteration is terminated and then visulize the solution:
102 solution chromosome =
103     first level: [ [ 5.88 4.4 3.48 1.85 6.84 5.89 2.07 3.54 8.8 3.71 7.5 3.15
104  2.28 12. 9.5 4.64 10.5 10.5 ]
105     second level: [ 6. 1. 4. 8. 12. 13. 15. 16. 10. 27. 8. 29. 31. 4. 1. 19. 15. 22.]
106     third level: [3. 3. 3. 2. 6. 5. 3. 3. 3. 3. 6. 3. 2. 1. 1. 2. 3. 2.] ]
107 Objective function values and some other indicators:
108 Obj0 = 34.00      Obj1 = 288.96      Obj0 + Obj1 = 322.96
109 Total movement of crane: 47.96
110 Total waiting time in berth position: 241.00
111 Total index of q during berthing: 340.00
112 Specific arrangement for each vessel:
113 V_id: 0      li: 9.0      xi: 5.9      bow of i: 1.4      tail of i: 10.4      gama_i0: 6.0      gama_i1: 8.0
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: 7.0      xi: 4.4      bow of i: 0.9      tail of i: 7.9      gama_i0: 1.0      gama_i1: 4.0
116      duration_time_i: 3.0      demand_i: 160.0      work load_i: 160.0      work load gap_i: 0
117 V_id: 2      li: 6.0      xi: 3.5      bow of i: 0.5      tail of i: 6.5      gama_i0: 4.0      gama_i1: 6.0
118      duration_time_i: 2.0      demand_i: 80.0      work load_i: 80.0      work load gap_i: 0
119 V_id: 3      li: 3.0      xi: 1.8      bow of i: 0.3      tail of i: 3.3      gama_i0: 8.0      gama_i1: 12.0
120      duration_time_i: 4.0      demand_i: 140.0      work load_i: 140.0      work load gap_i: 0
121 V_id: 4      li: 8.0      xi: 6.8      bow of i: 2.8      tail of i: 10.8      gama_i0: 12.0      gama_i1: 13.
122 0 V_id: 5      li: 9.0      xi: 5.9      bow of i: 1.4      tail of i: 10.4      gama_i0: 13.0      gama_i1: 15.
123 0      duration_time_i: 2.0      demand_i: 140.0      work load_i: 140.0      work load gap_i: 0
124 V_id: 6      li: 4.0      xi: 2.1      bow of i: 0.1      tail of i: 4.1      gama_i0: 15.0      gama_i1: 16.0
125      duration_time_i: 1.0      demand_i: 60.0      work load_i: 60.0      work load gap_i: 0
126 V_id: 7      li: 5.0      xi: 3.5      bow of i: 1.0      tail of i: 6.0      gama_i0: 16.0      gama_i1: 19.0
127      duration_time_i: 3.0      demand_i: 160.0      work load_i: 160.0      work load gap_i: 0
128 0 V_id: 8      li: 3.0      xi: 8.8      bow of i: 7.3      tail of i: 10.3      gama_i0: 10.0      gama_i1: 12.
129      duration_time_i: 2.0      demand_i: 120.0      work load_i: 120.0      work load gap_i: 0
130 V_id: 9      li: 5.0      xi: 3.7      bow of i: 1.2      tail of i: 6.2      gama_i0: 27.0      gama_i1: 29.0
131      duration_time_i: 2.0      demand_i: 80.0      work load_i: 80.0      work load gap_i: 0
132 10.0 V_id: 10      li: 8.0      xi: 7.5      bow of i: 3.5      tail of i: 11.5      gama_i0: 8.0      gama_i1:
133      duration_time_i: 2.0      demand_i: 140.0      work load_i: 140.0      work load gap_i: 0
134 0 V_id: 11      li: 4.0      xi: 3.2      bow of i: 1.2      tail of i: 5.2      gama_i0: 29.0      gama_i1: 31.
135      duration_time_i: 2.0      demand_i: 100.0      work load_i: 100.0      work load gap_i: 0
136 V_id: 12      li: 4.0      xi: 2.3      bow of i: 0.3      tail of i: 4.3      gama_i0: 31.0      gama_i1: 35.
137 0      duration_time_i: 4.0      demand_i: 140.0      work load_i: 140.0      work load gap_i: 0
138 V_id: 13      li: 3.0      xi: 12.0      bow of i: 10.5      tail of i: 13.5      gama_i0: 4.0      gama_i1
139 : 8.0      duration_time_i: 4.0      demand_i: 80.0      work load_i: 80.0      work load gap_i: 0
140 V_id: 14      li: 3.0      xi: 9.5      bow of i: 8.0      tail of i: 11.0      gama_i0: 1.0      gama_i1: 4
141 .0      duration_time_i: 3.0      demand_i: 60.0      work load_i: 60.0      work load gap_i: 0
142 V_id: 15      li: 9.0      xi: 4.6      bow of i: 0.1      tail of i: 9.1      gama_i0: 19.0      gama_i1: 22.
143 0      duration_time_i: 3.0      demand_i: 100.0      work load_i: 100.0      work load gap_i: 0
144 V_id: 16      li: 5.0      xi: 10.5      bow of i: 8.0      tail of i: 13.0      gama_i0: 15.0      gama_i1
145 : 18.0      duration_time_i: 3.0      demand_i: 140.0      work load_i: 140.0      work load gap_i: 0
146 V_id: 17      li: 5.0      xi: 10.5      bow of i: 8.0      tail of i: 13.0      gama_i0: 22.0      gama_i1
147 : 24.0      duration_time_i: 2.0      demand_i: 80.0      work load_i: 80.0      work load gap_i: 0
148
149 Algorithm finished and the total CPU time: 1241 s
150 End
151

```