


```

80   third level: [6. 8. 6. 6. 4. 4. 3. 3. 6. 5. 5. 8. 3. 6. 2. 6. 4. 2. 5.] ]
81   The No. 4 iteration is finished!
82
83   Beging the No. 5 iteration:
84   obj[gen-1] = 84.10   temp_best_value_gen = 84.10
85   No, maintain solution and obj[gen] = 84.10 , and the tolerance_counter = 5
86   solution chromosome =
87   first level: [ [ 4.5 13.5 22. 25.5 4.5 4.5 1.5 2. 3. 4.5 2.5 4.5 3.5 3.5
88   3. 4. 2. 2.5 4. ]
89   second level: [14. 1. 0. 1. 5. 7. 3. 9. 12. 0. 15. 17. 18. 20. 23. 25. 27. 28.
90   30.]
91   third level: [6. 8. 6. 6. 4. 4. 3. 3. 6. 5. 5. 8. 3. 6. 2. 6. 4. 2. 5.] ]
92   The No. 5 iteration is finished!
93
94
95   -----
96   The iteration is terminated and then visulize the solution:
97   solution chromosome =
98   first level: [ [ 4.5 13.5 22. 25.5 4.5 4.5 1.5 2. 3. 4.5 2.5 4.5 3.5 3.5
99   3. 4. 2. 2.5 4. ]
100  second level: [14. 1. 0. 1. 5. 7. 3. 9. 12. 0. 15. 17. 18. 20. 23. 25. 27. 28.
101  30.]
102  third level: [6. 8. 6. 6. 4. 4. 3. 3. 6. 5. 5. 8. 3. 6. 2. 6. 4. 2. 5.] ]
103  Objective function values and some other indicators:
104  Obj0 = 30.00      Obj1 = 271.00      Obj0 + Obj1 = 301.00
105  Total movement of crane: 16.00
106  Total waiting time in berth position: 255.00
107  Total index of q during berthing: 351.00
108  Specific arrangement for each vessel:
109  V_id: 0          li: 9.0          xi: 4.5          bow of i: 0.0          tail of i: 9.0          gama_i0: 14.0          gama_i1: 15.0
110          duration_time_i: 1.0          demand_i: 60.0          work load_i: 60.0          work load gap_i: 0
111  V_id: 1          li: 9.0          xi: 13.5          bow of i: 9.0          tail of i: 18.0          gama_i0: 1.0          gama_i1: 2
112          duration_time_i: 1.0          demand_i: 140.0          work load_i: 140.0          work load gap_i: 0
113  V_id: 2          li: 8.0          xi: 22.0          bow of i: 18.0          tail of i: 26.0          gama_i0: 0.0          gama_i1: 1
114          duration_time_i: 1.0          demand_i: 60.0          work load_i: 60.0          work load gap_i: 0
115  V_id: 3          li: 9.0          xi: 25.5          bow of i: 21.0          tail of i: 30.0          gama_i0: 1.0          gama_i1: 2
116          duration_time_i: 1.0          demand_i: 80.0          work load_i: 80.0          work load gap_i: 0
117  V_id: 4          li: 9.0          xi: 4.5          bow of i: 0.0          tail of i: 9.0          gama_i0: 5.0          gama_i1: 7.0
118          duration_time_i: 2.0          demand_i: 100.0          work load_i: 100.0          work load gap_i: 0
119  V_id: 5          li: 9.0          xi: 4.5          bow of i: 0.0          tail of i: 9.0          gama_i0: 7.0          gama_i1: 9.0
120          duration_time_i: 2.0          demand_i: 160.0          work load_i: 160.0          work load gap_i: 0
121  V_id: 6          li: 3.0          xi: 1.5          bow of i: 0.0          tail of i: 3.0          gama_i0: 3.0          gama_i1: 5.0
122          duration_time_i: 2.0          demand_i: 120.0          work load_i: 120.0          work load gap_i: 0
123  V_id: 7          li: 4.0          xi: 2.0          bow of i: 0.0          tail of i: 4.0          gama_i0: 9.0          gama_i1: 12.0
124          duration_time_i: 3.0          demand_i: 160.0          work load_i: 160.0          work load gap_i: 0
125  V_id: 8          li: 6.0          xi: 3.0          bow of i: 0.0          tail of i: 6.0          gama_i0: 12.0          gama_i1: 14.0
126          duration_time_i: 2.0          demand_i: 160.0          work load_i: 160.0          work load gap_i: 0
127  V_id: 9          li: 7.0          xi: 4.5          bow of i: 1.0          tail of i: 8.0          gama_i0: 0.0          gama_i1: 1.0
128          duration_time_i: 1.0          demand_i: 60.0          work load_i: 60.0          work load gap_i: 0
129  V_id: 10         li: 5.0          xi: 2.5          bow of i: 0.0          tail of i: 5.0          gama_i0: 15.0          gama_i1: 17.
130          duration_time_i: 2.0          demand_i: 160.0          work load_i: 160.0          work load gap_i: 0
131  V_id: 11         li: 9.0          xi: 4.5          bow of i: 0.0          tail of i: 9.0          gama_i0: 17.0          gama_i1: 18.
132          duration_time_i: 1.0          demand_i: 100.0          work load_i: 100.0          work load gap_i: 0
133  V_id: 12         li: 7.0          xi: 3.5          bow of i: 0.0          tail of i: 7.0          gama_i0: 18.0          gama_i1: 20.
134          duration_time_i: 2.0          demand_i: 120.0          work load_i: 120.0          work load gap_i: 0
135  V_id: 13         li: 7.0          xi: 3.5          bow of i: 0.0          tail of i: 7.0          gama_i0: 20.0          gama_i1: 22.
136          duration_time_i: 2.0          demand_i: 160.0          work load_i: 160.0          work load gap_i: 0
137  V_id: 14         li: 6.0          xi: 3.0          bow of i: 0.0          tail of i: 6.0          gama_i0: 23.0          gama_i1: 25.
138          duration_time_i: 2.0          demand_i: 80.0          work load_i: 80.0          work load gap_i: 0
139  V_id: 15         li: 8.0          xi: 4.0          bow of i: 0.0          tail of i: 8.0          gama_i0: 25.0          gama_i1: 27.
140          duration_time_i: 2.0          demand_i: 140.0          work load_i: 140.0          work load gap_i: 0
141  V_id: 16         li: 4.0          xi: 2.0          bow of i: 0.0          tail of i: 4.0          gama_i0: 27.0          gama_i1: 28.
142          duration_time_i: 1.0          demand_i: 80.0          work load_i: 80.0          work load gap_i: 0
143  V_id: 17         li: 5.0          xi: 2.5          bow of i: 0.0          tail of i: 5.0          gama_i0: 28.0          gama_i1: 30.
144          duration_time_i: 2.0          demand_i: 60.0          work load_i: 60.0          work load gap_i: 0
145  V_id: 18         li: 8.0          xi: 4.0          bow of i: 0.0          tail of i: 8.0          gama_i0: 30.0          gama_i1: 31.
146          duration_time_i: 1.0          demand_i: 60.0          work load_i: 60.0          work load gap_i: 0
147
148  Algorithm finished and the total CPU time: 1242 s
149  End
150

```