



```

80     second level: [ 2. 0. 18. 6. 0. 4. 6. 8. 9. 12. 13. 15. 1. 20.]
81     third level: [5. 5. 2. 2. 4. 6. 3. 7. 2. 7. 3. 3. 5. 2.] ]
82     The No. 5 iteration is finished!
83
84 Beging the No. 6 iteration:
85     obj[gen-1] = 68.30   temp_best_value_gen = 68.30
86     No, maintain solution and obj[gen] = 68.30 , and the tolerance_counter = 3
87     solution chromosome =
88     first level: [ [ 3.5 11.5 4. 25.5 2.5 3.5 2.5 4.5 3.5 4. 2. 3.5 20. 2.5]
89     second level: [ 2. 0. 18. 6. 0. 4. 6. 8. 9. 12. 13. 15. 1. 20.]
90     third level: [5. 5. 2. 2. 4. 6. 3. 7. 2. 7. 3. 3. 5. 2.] ]
91     The No. 6 iteration is finished!
92
93 Beging the No. 7 iteration:
94     obj[gen-1] = 68.30   temp_best_value_gen = 68.30
95     No, maintain solution and obj[gen] = 68.30 , and the tolerance_counter = 4
96     solution chromosome =
97     first level: [ [ 3.5 11.5 4. 25.5 2.5 3.5 2.5 4.5 3.5 4. 2. 3.5 20. 2.5]
98     second level: [ 2. 0. 18. 6. 0. 4. 6. 8. 9. 12. 13. 15. 1. 20.]
99     third level: [5. 5. 2. 2. 4. 6. 3. 7. 2. 7. 3. 3. 5. 2.] ]
100    The No. 7 iteration is finished!
101
102 Beging the No. 8 iteration:
103     obj[gen-1] = 68.30   temp_best_value_gen = 68.30
104     No, maintain solution and obj[gen] = 68.30 , and the tolerance_counter = 5
105     solution chromosome =
106     first level: [ [ 3.5 11.5 4. 25.5 2.5 3.5 2.5 4.5 3.5 4. 2. 3.5 20. 2.5]
107     second level: [ 2. 0. 18. 6. 0. 4. 6. 8. 9. 12. 13. 15. 1. 20.]
108     third level: [5. 5. 2. 2. 4. 6. 3. 7. 2. 7. 3. 3. 5. 2.] ]
109    The No. 8 iteration is finished!
110
111
112 -----
113 The iteration is terminated and then visulize the solution:
114     solution chromosome =
115     first level: [ [ 3.5 11.5 4. 25.5 2.5 3.5 2.5 4.5 3.5 4. 2. 3.5 20. 2.5]
116     second level: [ 2. 0. 18. 6. 0. 4. 6. 8. 9. 12. 13. 15. 1. 20.]
117     third level: [5. 5. 2. 2. 4. 6. 3. 7. 2. 7. 3. 3. 5. 2.] ]
118     Objective function values and some other indicators:
119     Obj0 = 23.00      Obj1 = 246.00      Obj0 + Obj1 = 269.00
120     Total movement of crane: 6.00
121     Total waiting time in berth position: 114.00
122     Total index of q during berthing: 321.00
123     Specific arrangement for each vessel:
124     V_id: 0      li: 7.0      xi: 3.5      bow of i: 0.0      tail of i: 7.0      gama_i0: 2.0      gama_i1: 4.0
125     duration_time_i: 2.0      demand_i: 120.0      work load_i: 120.0      work load gap_i: 0
126     V_id: 1      li: 9.0      xi: 11.5      bow of i: 7.0      tail of i: 16.0      gama_i0: 0.0      gama_i1: 2
127     duration_time_i: 2.0      demand_i: 120.0      work load_i: 120.0      work load gap_i: 0
128     V_id: 2      li: 8.0      xi: 4.0      bow of i: 0.0      tail of i: 8.0      gama_i0: 18.0      gama_i1: 20.0
129     duration_time_i: 2.0      demand_i: 60.0      work load_i: 60.0      work load gap_i: 0
130     V_id: 3      li: 9.0      xi: 25.5      bow of i: 21.0      tail of i: 30.0      gama_i0: 6.0      gama_i1: 9
131     duration_time_i: 3.0      demand_i: 120.0      work load_i: 120.0      work load gap_i: 0
132     V_id: 4      li: 5.0      xi: 2.5      bow of i: 0.0      tail of i: 5.0      gama_i0: 0.0      gama_i1: 2.0
133     duration_time_i: 2.0      demand_i: 160.0      work load_i: 160.0      work load gap_i: 0
134     V_id: 5      li: 7.0      xi: 3.5      bow of i: 0.0      tail of i: 7.0      gama_i0: 4.0      gama_i1: 6.0
135     duration_time_i: 2.0      demand_i: 160.0      work load_i: 160.0      work load gap_i: 0
136     V_id: 6      li: 5.0      xi: 2.5      bow of i: 0.0      tail of i: 5.0      gama_i0: 6.0      gama_i1: 8.0
137     duration_time_i: 2.0      demand_i: 80.0      work load_i: 80.0      work load gap_i: 0
138     V_id: 7      li: 9.0      xi: 4.5      bow of i: 0.0      tail of i: 9.0      gama_i0: 8.0      gama_i1: 9.0
139     duration_time_i: 1.0      demand_i: 120.0      work load_i: 120.0      work load gap_i: 0
140     V_id: 8      li: 7.0      xi: 3.5      bow of i: 0.0      tail of i: 7.0      gama_i0: 9.0      gama_i1: 12.0
141     duration_time_i: 3.0      demand_i: 100.0      work load_i: 100.0      work load gap_i: 0
142     V_id: 9      li: 8.0      xi: 4.0      bow of i: 0.0      tail of i: 8.0      gama_i0: 12.0      gama_i1: 13.0
143     duration_time_i: 1.0      demand_i: 100.0      work load_i: 100.0      work load gap_i: 0
144     V_id: 10     li: 4.0      xi: 2.0      bow of i: 0.0      tail of i: 4.0      gama_i0: 13.0      gama_i1: 15.
145     duration_time_i: 2.0      demand_i: 120.0      work load_i: 120.0      work load gap_i: 0
146     V_id: 11     li: 7.0      xi: 3.5      bow of i: 0.0      tail of i: 7.0      gama_i0: 15.0      gama_i1: 18.
147     duration_time_i: 3.0      demand_i: 160.0      work load_i: 160.0      work load gap_i: 0
148     V_id: 12     li: 5.0      xi: 20.0      bow of i: 17.5      tail of i: 22.5      gama_i0: 1.0      gama_i1
149     : 2.0      duration_time_i: 1.0      demand_i: 60.0      work load_i: 60.0      work load gap_i: 0
150     V_id: 13     li: 5.0      xi: 2.5      bow of i: 0.0      tail of i: 5.0      gama_i0: 20.0      gama_i1: 24.
151     duration_time_i: 4.0      demand_i: 160.0      work load_i: 160.0      work load gap_i: 0
152
153 Algorithm finished and the total CPU time: 1282 s
154 End
155

```