


```

80     second level: [ 4. 2. 3. 3. 1. 8. 1. 3. 5. 6. 11. 13. 15.]
81     third level: [9. 2. 2. 4. 6. 3. 2. 7. 5. 5. 2. 7. 3.]
82     The No. 5 iteration is finished!
83
84     Beging the No. 6 iteration:
85     obj[gen-1] = 52.80   temp_best_value_gen = 52.80
86     No, maintain solution and obj[gen] = 52.80 , and the tolerance_counter = 6
87     solution chromosome =
88     first level: [ [ 4.5 10.5 14. 19. 25.5 1.5 3.5 4. 4.5 2.5 4. 4. 3.5]
89     second level: [ 4. 2. 3. 3. 1. 8. 1. 3. 5. 6. 11. 13. 15.]
90     third level: [9. 2. 2. 4. 6. 3. 2. 7. 5. 5. 2. 7. 3.]
91     The No. 6 iteration is finished!
92
93     Beging the No. 7 iteration:
94     obj[gen-1] = 52.80   temp_best_value_gen = 52.80
95     No, maintain solution and obj[gen] = 52.80 , and the tolerance_counter = 7
96     solution chromosome =
97     first level: [ [ 4.5 10.5 14. 19. 25.5 1.5 3.5 4. 4.5 2.5 4. 4. 3.5]
98     second level: [ 4. 2. 3. 3. 1. 8. 1. 3. 5. 6. 11. 13. 15.]
99     third level: [9. 2. 2. 4. 6. 3. 2. 7. 5. 5. 2. 7. 3.]
100    The No. 7 iteration is finished!
101
102    Beging the No. 8 iteration:
103    obj[gen-1] = 52.80   temp_best_value_gen = 52.80
104    No, maintain solution and obj[gen] = 52.80 , and the tolerance_counter = 8
105    solution chromosome =
106    first level: [ [ 4.5 10.5 14. 19. 25.5 1.5 3.5 4. 4.5 2.5 4. 4. 3.5]
107    second level: [ 4. 2. 3. 3. 1. 8. 1. 3. 5. 6. 11. 13. 15.]
108    third level: [9. 2. 2. 4. 6. 3. 2. 7. 5. 5. 2. 7. 3.]
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: [ [ 4.5 10.5 14. 19. 25.5 1.5 3.5 4. 4.5 2.5 4. 4. 3.5]
116    second level: [ 4. 2. 3. 3. 1. 8. 1. 3. 5. 6. 11. 13. 15.]
117    third level: [9. 2. 2. 4. 6. 3. 2. 7. 5. 5. 2. 7. 3.]
118    Objective function values and some other indicators:
119    Obj0 = 17.00      Obj1 = 205.00      Obj0 + Obj1 = 222.00
120    Total movement of crane: 48.00
121    Total waiting time in berth position: 75.00
122    Total index of q during berthing: 387.00
123    Specific arrangement for each vessel:
124    V_id: 0      li: 9.0      xi: 4.5      bow of i: 0.0      tail of i: 9.0      gama_i0: 4.0      gama_i1: 5.0
125    duration_time_i: 1.0      demand_i: 80.0      work load_i: 80.0      work load gap_i: 0
126    V_id: 1      li: 3.0      xi: 10.5      bow of i: 9.0      tail of i: 12.0      gama_i0: 2.0      gama_i1: 5
127    duration_time_i: 3.0      demand_i: 120.0      work load_i: 120.0      work load gap_i: 0
128    V_id: 2      li: 4.0      xi: 14.0      bow of i: 12.0      tail of i: 16.0      gama_i0: 3.0      gama_i1: 6
129    duration_time_i: 3.0      demand_i: 100.0      work load_i: 100.0      work load gap_i: 0
130    V_id: 3      li: 6.0      xi: 19.0      bow of i: 16.0      tail of i: 22.0      gama_i0: 3.0      gama_i1: 4
131    duration_time_i: 1.0      demand_i: 60.0      work load_i: 60.0      work load gap_i: 0
132    V_id: 4      li: 9.0      xi: 25.5      bow of i: 21.0      tail of i: 30.0      gama_i0: 1.0      gama_i1: 3
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: 3.0      xi: 1.5      bow of i: 0.0      tail of i: 3.0      gama_i0: 8.0      gama_i1: 11.0
135    duration_time_i: 3.0      demand_i: 160.0      work load_i: 160.0      work load gap_i: 0
136    V_id: 6      li: 7.0      xi: 3.5      bow of i: 0.0      tail of i: 7.0      gama_i0: 1.0      gama_i1: 3.0
137    duration_time_i: 2.0      demand_i: 60.0      work load_i: 60.0      work load gap_i: 0
138    V_id: 7      li: 8.0      xi: 4.0      bow of i: 0.0      tail of i: 8.0      gama_i0: 3.0      gama_i1: 4.0
139    duration_time_i: 1.0      demand_i: 60.0      work load_i: 60.0      work load gap_i: 0
140    V_id: 8      li: 9.0      xi: 4.5      bow of i: 0.0      tail of i: 9.0      gama_i0: 5.0      gama_i1: 6.0
141    duration_time_i: 1.0      demand_i: 80.0      work load_i: 80.0      work load gap_i: 0
142    V_id: 9      li: 5.0      xi: 2.5      bow of i: 0.0      tail of i: 5.0      gama_i0: 6.0      gama_i1: 7.0
143    duration_time_i: 1.0      demand_i: 80.0      work load_i: 80.0      work load gap_i: 0
144    V_id: 10     li: 8.0      xi: 4.0      bow of i: 0.0      tail of i: 8.0      gama_i0: 11.0      gama_i1: 13.
145    duration_time_i: 2.0      demand_i: 60.0      work load_i: 60.0      work load gap_i: 0
146    V_id: 11     li: 8.0      xi: 4.0      bow of i: 0.0      tail of i: 8.0      gama_i0: 13.0      gama_i1: 15.
147    duration_time_i: 2.0      demand_i: 160.0      work load_i: 160.0      work load gap_i: 0
148    V_id: 12     li: 7.0      xi: 3.5      bow of i: 0.0      tail of i: 7.0      gama_i0: 15.0      gama_i1: 18.
149    duration_time_i: 3.0      demand_i: 140.0      work load_i: 140.0      work load gap_i: 0
150
151    137
152    138 Algorithm finished and the total CPU time: 1207 s
153    139 End
154    140

```