


```

80  obj[gen-1] = 43.90  temp_best_value_gen = 43.90
81  No, maintain solution and obj[gen] = 43.90 , and the tolerance_counter = 5
82  solution chromosome =
83    first level: [ [ 2.5 9.5 17. 23. 27. 4.5 3.5 4.5 4. 2. 4.5 4. 3.5 2.
84  2. 2.5]
85    second level: [ 4. 0. 4. 0. 3. 1. 2. 6. 7. 9. 10. 12. 14. 15. 17. 0.]
86    third level: [2. 3. 3. 2. 2. 7. 2. 3. 2. 3. 6. 6. 5. 3. 4. 4.] ]
87  The No. 5 iteration is finished!
88
89  Beging the No. 6 iteration:
90  obj[gen-1] = 43.90  temp_best_value_gen = 43.90
91  No, maintain solution and obj[gen] = 43.90 , and the tolerance_counter = 6
92  solution chromosome =
93    first level: [ [ 2.5 9.5 17. 23. 27. 4.5 3.5 4.5 4. 2. 4.5 4. 3.5 2.
94  2. 2.5]
95    second level: [ 4. 0. 4. 0. 3. 1. 2. 6. 7. 9. 10. 12. 14. 15. 17. 0.]
96    third level: [2. 3. 3. 2. 2. 7. 2. 3. 2. 3. 6. 6. 5. 3. 4. 4.] ]
97  The No. 6 iteration is finished!
98
99  Beging the No. 7 iteration:
100 obj[gen-1] = 43.90  temp_best_value_gen = 43.90
101 No, maintain solution and obj[gen] = 43.90 , and the tolerance_counter = 7
102 solution chromosome =
103   first level: [ [ 2.5 9.5 17. 23. 27. 4.5 3.5 4.5 4. 2. 4.5 4. 3.5 2.
104  2. 2.5]
105   second level: [ 4. 0. 4. 0. 3. 1. 2. 6. 7. 9. 10. 12. 14. 15. 17. 0.]
106   third level: [2. 3. 3. 2. 2. 7. 2. 3. 2. 3. 6. 6. 5. 3. 4. 4.] ]
107 The No. 7 iteration is finished!
108
109 -----
110
111 The iteration is terminated and then visulize the solution:
112 solution chromosome =
113   first level: [ [ 2.5 9.5 17. 23. 27. 4.5 3.5 4.5 4. 2. 4.5 4. 3.5 2.
114  2. 2.5]
115   second level: [ 4. 0. 4. 0. 3. 1. 2. 6. 7. 9. 10. 12. 14. 15. 17. 0.]
116   third level: [2. 3. 3. 2. 2. 7. 2. 3. 2. 3. 6. 6. 5. 3. 4. 4.] ]
117 Objective function values and some other indicators:
118 Obj0 = 17.00      Obj1 = 116.00      Obj0 + Obj1 = 133.00
119 Total movement of crane: 12.00
120 Total waiting time in berth position: 104.00
121 Total index of q during berthing: 378.00
122 Specific arrangement for each vessel:
123   V_id: 0      li: 5.0      xi: 2.5      bow of i: 0.0      tail of i: 5.0      gama_i0: 4.0      gama_i1: 6.0
124   duration_time_i: 2.0      demand_i: 80.0      work load_i: 80.0      work load gap_i: 0
125   V_id: 1      li: 9.0      xi: 9.5      bow of i: 5.0      tail of i: 14.0      gama_i0: 0.0      gama_i1: 1.0
126   duration_time_i: 1.0      demand_i: 60.0      work load_i: 60.0      work load gap_i: 0
127   V_id: 2      li: 6.0      xi: 17.0      bow of i: 14.0      tail of i: 20.0      gama_i0: 4.0      gama_i1: 6
128   duration_time_i: 2.0      demand_i: 100.0      work load_i: 100.0      work load gap_i: 0
129   V_id: 3      li: 6.0      xi: 23.0      bow of i: 20.0      tail of i: 26.0      gama_i0: 0.0      gama_i1: 3
130   duration_time_i: 3.0      demand_i: 120.0      work load_i: 120.0      work load gap_i: 0
131   V_id: 4      li: 6.0      xi: 27.0      bow of i: 24.0      tail of i: 30.0      gama_i0: 3.0      gama_i1: 5
132   duration_time_i: 2.0      demand_i: 80.0      work load_i: 80.0      work load gap_i: 0
133   V_id: 5      li: 9.0      xi: 4.5      bow of i: 0.0      tail of i: 9.0      gama_i0: 1.0      gama_i1: 2.0
134   duration_time_i: 1.0      demand_i: 100.0      work load_i: 100.0      work load gap_i: 0
135   V_id: 6      li: 7.0      xi: 3.5      bow of i: 0.0      tail of i: 7.0      gama_i0: 2.0      gama_i1: 4.0
136   duration_time_i: 2.0      demand_i: 60.0      work load_i: 60.0      work load gap_i: 0
137   V_id: 7      li: 9.0      xi: 4.5      bow of i: 0.0      tail of i: 9.0      gama_i0: 6.0      gama_i1: 7.0
138   duration_time_i: 1.0      demand_i: 60.0      work load_i: 60.0      work load gap_i: 0
139   V_id: 8      li: 8.0      xi: 4.0      bow of i: 0.0      tail of i: 8.0      gama_i0: 7.0      gama_i1: 9.0
140   duration_time_i: 2.0      demand_i: 80.0      work load_i: 80.0      work load gap_i: 0
141   V_id: 9      li: 4.0      xi: 2.0      bow of i: 0.0      tail of i: 4.0      gama_i0: 9.0      gama_i1: 10.0
142   duration_time_i: 1.0      demand_i: 60.0      work load_i: 60.0      work load gap_i: 0
143   V_id: 10     li: 9.0      xi: 4.5      bow of i: 0.0      tail of i: 9.0      gama_i0: 10.0      gama_i1: 12.
144   duration_time_i: 2.0      demand_i: 140.0      work load_i: 140.0      work load gap_i: 0
145   V_id: 11     li: 8.0      xi: 4.0      bow of i: 0.0      tail of i: 8.0      gama_i0: 12.0      gama_i1: 14.
146   duration_time_i: 2.0      demand_i: 140.0      work load_i: 140.0      work load gap_i: 0
147   V_id: 12     li: 7.0      xi: 3.5      bow of i: 0.0      tail of i: 7.0      gama_i0: 14.0      gama_i1: 15.
148   duration_time_i: 1.0      demand_i: 100.0      work load_i: 100.0      work load gap_i: 0
149   V_id: 13     li: 4.0      xi: 2.0      bow of i: 0.0      tail of i: 4.0      gama_i0: 15.0      gama_i1: 17.
150   duration_time_i: 2.0      demand_i: 100.0      work load_i: 100.0      work load gap_i: 0
151   V_id: 14     li: 4.0      xi: 2.0      bow of i: 0.0      tail of i: 4.0      gama_i0: 17.0      gama_i1: 18.
152   duration_time_i: 1.0      demand_i: 80.0      work load_i: 80.0      work load gap_i: 0
153   V_id: 15     li: 5.0      xi: 2.5      bow of i: 0.0      tail of i: 5.0      gama_i0: 0.0      gama_i1: 1.0
154   duration_time_i: 1.0      demand_i: 80.0      work load_i: 80.0      work load gap_i: 0
155
156 Algorithm finished and the total CPU time: 1341 s
157 End
158

```