


```

80  obj[gen-1] = 87.70  temp_best_value_gen = 87.70
81  No, maintain solution and obj[gen] = 87.70 , and the tolerance_counter = 5
82  solution chromosome =
83    first level: [ [ 3. 10. 18.5 4.5 2. 2.5 3. 4.5 3. 3. 1.5 3.5 25.5 2.5
84    3. ]
85    second level: [ 0. 3. 3. 19. 6. 2. 9. 11. 12. 5. 14. 17. 2. 21. 23.]
86    third level: [3. 2. 7. 2. 2. 2. 9. 2. 6. 2. 3. 4. 2. 2.] ]
87  The No. 5 iteration is finished!
88
89  Beging the No. 6 iteration:
90  obj[gen-1] = 87.70  temp_best_value_gen = 87.70
91  No, maintain solution and obj[gen] = 87.70 , and the tolerance_counter = 6
92  solution chromosome =
93    first level: [ [ 3. 10. 18.5 4.5 2. 2.5 3. 4.5 3. 3. 1.5 3.5 25.5 2.5
94    3. ]
95    second level: [ 0. 3. 3. 19. 6. 2. 9. 11. 12. 5. 14. 17. 2. 21. 23.]
96    third level: [3. 2. 7. 2. 2. 2. 9. 2. 6. 2. 3. 4. 2. 2.] ]
97  The No. 6 iteration is finished!
98
99  Beging the No. 7 iteration:
100 obj[gen-1] = 87.70  temp_best_value_gen = 87.70
101 No, maintain solution and obj[gen] = 87.70 , and the tolerance_counter = 7
102 solution chromosome =
103   first level: [ [ 3. 10. 18.5 4.5 2. 2.5 3. 4.5 3. 3. 1.5 3.5 25.5 2.5
104   3. ]
105   second level: [ 0. 3. 3. 19. 6. 2. 9. 11. 12. 5. 14. 17. 2. 21. 23.]
106   third level: [3. 2. 7. 2. 2. 2. 9. 2. 6. 2. 3. 4. 2. 2.] ]
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: [ [ 3. 10. 18.5 4.5 2. 2.5 3. 4.5 3. 3. 1.5 3.5 25.5 2.5
114   3. ]
115   second level: [ 0. 3. 3. 19. 6. 2. 9. 11. 12. 5. 14. 17. 2. 21. 23.]
116   third level: [3. 2. 7. 2. 2. 2. 9. 2. 6. 2. 3. 4. 2. 2.] ]
117 Objective function values and some other indicators:
118 Obj0 = 24.00      Obj1 = 421.00      Obj0 + Obj1 = 445.00
119 Total movement of crane: 21.00
120 Total waiting time in berth position: 147.00
121 Total index of q during berthing: 187.00
122 Specific arrangement for each vessel:
123   V_id: 0      li: 6.0      xi: 3.0      bow of i: 0.0      tail of i: 6.0      gama_i0: 0.0      gama_i1: 2.0
124     duration_time_i: 2.0      demand_i: 100.0      work load_i: 100.0      work load gap_i: 0
125   V_id: 1      li: 8.0      xi: 10.0      bow of i: 6.0      tail of i: 14.0      gama_i0: 3.0      gama_i1: 6
126     duration_time_i: 3.0      demand_i: 120.0      work load_i: 120.0      work load gap_i: 0
127   V_id: 2      li: 9.0      xi: 18.5      bow of i: 14.0      tail of i: 23.0      gama_i0: 3.0      gama_i1: 4
128     duration_time_i: 1.0      demand_i: 60.0      work load_i: 60.0      work load gap_i: 0
129   V_id: 3      li: 9.0      xi: 4.5      bow of i: 0.0      tail of i: 9.0      gama_i0: 19.0      gama_i1: 21.0
130     duration_time_i: 2.0      demand_i: 80.0      work load_i: 80.0      work load gap_i: 0
131   V_id: 4      li: 4.0      xi: 2.0      bow of i: 0.0      tail of i: 4.0      gama_i0: 6.0      gama_i1: 9.0
132     duration_time_i: 3.0      demand_i: 120.0      work load_i: 120.0      work load gap_i: 0
133   V_id: 5      li: 5.0      xi: 2.5      bow of i: 0.0      tail of i: 5.0      gama_i0: 2.0      gama_i1: 5.0
134     duration_time_i: 3.0      demand_i: 100.0      work load_i: 100.0      work load gap_i: 0
135   V_id: 6      li: 6.0      xi: 3.0      bow of i: 0.0      tail of i: 6.0      gama_i0: 9.0      gama_i1: 11.0
136     duration_time_i: 2.0      demand_i: 80.0      work load_i: 80.0      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: 11.0      gama_i1: 12.0
138     duration_time_i: 1.0      demand_i: 80.0      work load_i: 80.0      work load gap_i: 0
139   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
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: 6.0      xi: 3.0      bow of i: 0.0      tail of i: 6.0      gama_i0: 5.0      gama_i1: 6.0
142     duration_time_i: 1.0      demand_i: 100.0      work load_i: 100.0      work load gap_i: 0
143   V_id: 10     li: 3.0      xi: 1.5      bow of i: 0.0      tail of i: 3.0      gama_i0: 14.0      gama_i1: 17.
144     duration_time_i: 3.0      demand_i: 100.0      work load_i: 100.0      work load gap_i: 0
145   V_id: 11     li: 7.0      xi: 3.5      bow of i: 0.0      tail of i: 7.0      gama_i0: 17.0      gama_i1: 19.
146     duration_time_i: 2.0      demand_i: 100.0      work load_i: 100.0      work load gap_i: 0
147   V_id: 12     li: 4.0      xi: 25.5      bow of i: 23.5      tail of i: 27.5      gama_i0: 2.0      gama_i1
148     duration_time_i: 1.0      demand_i: 60.0      work load_i: 60.0      work load gap_i: 0
149   V_id: 13     li: 5.0      xi: 2.5      bow of i: 0.0      tail of i: 5.0      gama_i0: 21.0      gama_i1: 23.
150     duration_time_i: 2.0      demand_i: 80.0      work load_i: 80.0      work load gap_i: 0
151   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.
152     duration_time_i: 2.0      demand_i: 60.0      work load_i: 60.0      work load gap_i: 0
153
154 Algorithm finished and the total CPU time: 1270 s
155 End
156

```