


```

80     second level: [ 3.  2.  1.  0.  0.  8.  5.  1.  4. 10.]
81     third level: [5. 5. 3. 3. 3. 4. 2. 3. 3. 3.]
82     The No. 5 iteration is finished!
83
84 Beging the No. 6 iteration:
85     obj[gen-1] = 32.20   temp_best_value_gen = 32.20
86     No, maintain solution and obj[gen] = 32.20 , and the tolerance_counter = 6
87     solution chromosome =
88         first level: [ [ 3.  9.5 17. 23.5 28.  2.5  1.5  1.5 27.5  1.5]
89         second level: [ 3.  2.  1.  0.  0.  8.  5.  1.  4. 10.]
90         third level: [5. 5. 3. 3. 3. 4. 2. 3. 3. 3.]
91     The No. 6 iteration is finished!
92
93 Beging the No. 7 iteration:
94     obj[gen-1] = 32.20   temp_best_value_gen = 32.20
95     No, maintain solution and obj[gen] = 32.20 , and the tolerance_counter = 7
96     solution chromosome =
97         first level: [ [ 3.  9.5 17. 23.5 28.  2.5  1.5  1.5 27.5  1.5]
98         second level: [ 3.  2.  1.  0.  0.  8.  5.  1.  4. 10.]
99         third level: [5. 5. 3. 3. 3. 4. 2. 3. 3. 3.]
100    The No. 7 iteration is finished!
101
102 Beging the No. 8 iteration:
103     obj[gen-1] = 32.20   temp_best_value_gen = 32.20
104     No, maintain solution and obj[gen] = 32.20 , and the tolerance_counter = 8
105     solution chromosome =
106         first level: [ [ 3.  9.5 17. 23.5 28.  2.5  1.5  1.5 27.5  1.5]
107         second level: [ 3.  2.  1.  0.  0.  8.  5.  1.  4. 10.]
108         third level: [5. 5. 3. 3. 3. 4. 2. 3. 3. 3.]
109    The No. 8 iteration is finished!
110
111 Beging the No. 9 iteration:
112     obj[gen-1] = 32.20   temp_best_value_gen = 32.20
113     No, maintain solution and obj[gen] = 32.20 , and the tolerance_counter = 9
114     solution chromosome =
115         first level: [ [ 3.  9.5 17. 23.5 28.  2.5  1.5  1.5 27.5  1.5]
116         second level: [ 3.  2.  1.  0.  0.  8.  5.  1.  4. 10.]
117         third level: [5. 5. 3. 3. 3. 4. 2. 3. 3. 3.]
118    The No. 9 iteration is finished!
119
120 Beging the No. 10 iteration:
121     obj[gen-1] = 32.20   temp_best_value_gen = 32.20
122     No, maintain solution and obj[gen] = 32.20 , and the tolerance_counter = 10
123     solution chromosome =
124         first level: [ [ 3.  9.5 17. 23.5 28.  2.5  1.5  1.5 27.5  1.5]
125         second level: [ 3.  2.  1.  0.  0.  8.  5.  1.  4. 10.]
126         third level: [5. 5. 3. 3. 3. 4. 2. 3. 3. 3.]
127    The No. 10 iteration is finished!
128
129 -----
130
131 The iteration is terminated and then visulize the solution:
132     solution chromosome =
133         first level: [ [ 3.  9.5 17. 23.5 28.  2.5  1.5  1.5 27.5  1.5]
134         second level: [ 3.  2.  1.  0.  0.  8.  5.  1.  4. 10.]
135         third level: [5. 5. 3. 3. 3. 4. 2. 3. 3. 3.]
136     Objective function values and some other indicators:
137         Obj0 = 12.00      Obj1 = 94.00      Obj0 + Obj1 = 106.00
138         Total movement of crane: 60.00
139         Total waiting time in berth position: 34.00
140         Total index of q during berthing: 486.00
141     Specific arrangement for each vessel:
142         V_id: 0          li: 6.0          xi: 3.0          bow of i: 0.0          tail of i: 6.0          gama_i0: 3.0          gama_i1: 4.0
143             duration_time_i: 1.0          demand_i: 100.0          work load_i: 100.0          work load gap_i: 0
144         V_id: 1          li: 7.0          xi: 9.5          bow of i: 6.0          tail of i: 13.0          gama_i0: 2.0          gama_i1: 4.0
145             duration_time_i: 2.0          demand_i: 160.0          work load_i: 160.0          work load gap_i: 0
146         V_id: 2          li: 8.0          xi: 17.0          bow of i: 13.0          tail of i: 21.0          gama_i0: 1.0          gama_i1: 3
147             duration_time_i: 2.0          demand_i: 120.0          work load_i: 120.0          work load gap_i: 0
148         V_id: 3          li: 5.0          xi: 23.5          bow of i: 21.0          tail of i: 26.0          gama_i0: 0.0          gama_i1: 1
149             duration_time_i: 1.0          demand_i: 60.0          work load_i: 60.0          work load gap_i: 0
150         V_id: 4          li: 4.0          xi: 28.0          bow of i: 26.0          tail of i: 30.0          gama_i0: 0.0          gama_i1: 2
151             duration_time_i: 2.0          demand_i: 80.0          work load_i: 80.0          work load gap_i: 0
152         V_id: 5          li: 5.0          xi: 2.5          bow of i: 0.0          tail of i: 5.0          gama_i0: 8.0          gama_i1: 10.0
153             duration_time_i: 2.0          demand_i: 120.0          work load_i: 120.0          work load gap_i: 0
154         V_id: 6          li: 3.0          xi: 1.5          bow of i: 0.0          tail of i: 3.0          gama_i0: 5.0          gama_i1: 8.0
155             duration_time_i: 3.0          demand_i: 120.0          work load_i: 120.0          work load gap_i: 0
156         V_id: 7          li: 3.0          xi: 1.5          bow of i: 0.0          tail of i: 3.0          gama_i0: 1.0          gama_i1: 3.0
157             duration_time_i: 2.0          demand_i: 120.0          work load_i: 120.0          work load gap_i: 0
158         V_id: 8          li: 4.0          xi: 27.5          bow of i: 25.5          tail of i: 29.5          gama_i0: 4.0          gama_i1: 7
159             duration_time_i: 3.0          demand_i: 160.0          work load_i: 160.0          work load gap_i: 0
160         V_id: 9          li: 3.0          xi: 1.5          bow of i: 0.0          tail of i: 3.0          gama_i0: 10.0          gama_i1: 13.0
161             duration_time_i: 3.0          demand_i: 160.0          work load_i: 160.0          work load gap_i: 0
162
163 Algorithm finished and the total CPU time: 1176 s

```

154 End
155