


```

80     second level: [0. 4. 1. 5. 7. 9.]
81     third level: [4. 9. 2. 4. 5. 8.]
82     The No. 5 iteration is finished!
83
84     Beging the No. 6 iteration:
85     obj[gen-1] = 23.73   temp_best_value_gen = 23.73
86     No, maintain solution and obj[gen] = 23.73 , and the tolerance_counter = 6
87     solution chromosome =
88     first level: [ [4.12 7.26 2.43 4.04 3.44 4.88]
89     second level: [0. 4. 1. 5. 7. 9.]
90     third level: [4. 9. 2. 4. 5. 8.]
91     The No. 6 iteration is finished!
92
93     Beging the No. 7 iteration:
94     obj[gen-1] = 23.73   temp_best_value_gen = 23.73
95     No, maintain solution and obj[gen] = 23.73 , and the tolerance_counter = 7
96     solution chromosome =
97     first level: [ [4.12 7.26 2.43 4.04 3.44 4.88]
98     second level: [0. 4. 1. 5. 7. 9.]
99     third level: [4. 9. 2. 4. 5. 8.]
100    The No. 7 iteration is finished!
101
102    Beging the No. 8 iteration:
103    obj[gen-1] = 23.73   temp_best_value_gen = 23.73
104    No, maintain solution and obj[gen] = 23.73 , and the tolerance_counter = 8
105    solution chromosome =
106    first level: [ [4.12 7.26 2.43 4.04 3.44 4.88]
107    second level: [0. 4. 1. 5. 7. 9.]
108    third level: [4. 9. 2. 4. 5. 8.]
109    The No. 8 iteration is finished!
110
111    Beging the No. 9 iteration:
112    obj[gen-1] = 23.73   temp_best_value_gen = 23.73
113    No, maintain solution and obj[gen] = 23.73 , and the tolerance_counter = 9
114    solution chromosome =
115    first level: [ [4.12 7.26 2.43 4.04 3.44 4.88]
116    second level: [0. 4. 1. 5. 7. 9.]
117    third level: [4. 9. 2. 4. 5. 8.]
118    The No. 9 iteration is finished!
119
120    Beging the No. 10 iteration:
121    obj[gen-1] = 23.73   temp_best_value_gen = 23.73
122    No, maintain solution and obj[gen] = 23.73 , and the tolerance_counter = 10
123    solution chromosome =
124    first level: [ [4.12 7.26 2.43 4.04 3.44 4.88]
125    second level: [0. 4. 1. 5. 7. 9.]
126    third level: [4. 9. 2. 4. 5. 8.]
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: [ [4.12 7.26 2.43 4.04 3.44 4.88]
134 second level: [0. 4. 1. 5. 7. 9.]
135 third level: [4. 9. 2. 4. 5. 8.]
136 Objective function values and some other indicators:
137 Obj0 = 9.00      Obj1 = 66.33      Obj0 + Obj1 = 75.33
138 Total movement of crane: 40.33
139 Total waiting time in berth position: 26.00
140 Total index of q during berthing: 90.00
141 Specific arrangement for each vessel:
142 V_id: 0          li: 8.0          xi: 4.1          bow of i: 0.1          tail of i: 8.1          gama_i0: 0.0          gama_i1: 1.0
143          duration_time_i: 1.0          demand_i: 60.0          work load_i: 60.0          work load gap_i: 0
144 V_id: 1          li: 9.0          xi: 7.3          bow of i: 2.8          tail of i: 11.8          gama_i0: 4.0          gama_i1: 5.0
145          duration_time_i: 1.0          demand_i: 140.0          work load_i: 140.0          work load gap_i: 0
146 V_id: 2          li: 3.0          xi: 2.4          bow of i: 0.9          tail of i: 3.9          gama_i0: 1.0          gama_i1: 4.0
147          duration_time_i: 3.0          demand_i: 100.0          work load_i: 100.0          work load gap_i: 0
148 V_id: 3          li: 5.0          xi: 4.0          bow of i: 1.5          tail of i: 6.5          gama_i0: 5.0          gama_i1: 7.0
149          duration_time_i: 2.0          demand_i: 140.0          work load_i: 140.0          work load gap_i: 0
150 V_id: 4          li: 6.0          xi: 3.4          bow of i: 0.4          tail of i: 6.4          gama_i0: 7.0          gama_i1: 9.0
151          duration_time_i: 2.0          demand_i: 160.0          work load_i: 160.0          work load gap_i: 0
152 V_id: 5          li: 8.0          xi: 4.9          bow of i: 0.9          tail of i: 8.9          gama_i0: 9.0          gama_i1: 10.0
153          duration_time_i: 1.0          demand_i: 140.0          work load_i: 140.0          work load gap_i: 0
154
155 Algorithm finished and the total CPU time: 753 s
156 End
157

```