


```

80     second level: [0. 1. 2. 2. 4. 3. 5. 2. 7.]
81     third level: [2. 3. 3. 3. 4. 2. 3. 6. 3.]
82     The No. 5 iteration is finished!
83
84     Beging the No. 6 iteration:
85     obj[gen-1] = 19.40   temp_best_value_gen = 19.40
86     No, maintain solution and obj[gen] = 19.40 , and the tolerance_counter = 6
87     solution chromosome =
88     first level: [ [ 2.  7. 12. 18. 25.5 3.  1.5 3.5 3.5]
89     second level: [0. 1. 2. 2. 4. 3. 5. 2. 7.]
90     third level: [2. 3. 3. 3. 4. 2. 3. 6. 3.]
91     The No. 6 iteration is finished!
92
93     Beging the No. 7 iteration:
94     obj[gen-1] = 19.40   temp_best_value_gen = 19.40
95     No, maintain solution and obj[gen] = 19.40 , and the tolerance_counter = 7
96     solution chromosome =
97     first level: [ [ 2.  7. 12. 18. 25.5 3.  1.5 3.5 3.5]
98     second level: [0. 1. 2. 2. 4. 3. 5. 2. 7.]
99     third level: [2. 3. 3. 3. 4. 2. 3. 6. 3.]
100    The No. 7 iteration is finished!
101
102    Beging the No. 8 iteration:
103    obj[gen-1] = 19.40   temp_best_value_gen = 19.40
104    No, maintain solution and obj[gen] = 19.40 , and the tolerance_counter = 8
105    solution chromosome =
106    first level: [ [ 2.  7. 12. 18. 25.5 3.  1.5 3.5 3.5]
107    second level: [0. 1. 2. 2. 4. 3. 5. 2. 7.]
108    third level: [2. 3. 3. 3. 4. 2. 3. 6. 3.]
109    The No. 8 iteration is finished!
110
111    Beging the No. 9 iteration:
112    obj[gen-1] = 19.40   temp_best_value_gen = 19.40
113    No, maintain solution and obj[gen] = 19.40 , and the tolerance_counter = 9
114    solution chromosome =
115    first level: [ [ 2.  7. 12. 18. 25.5 3.  1.5 3.5 3.5]
116    second level: [0. 1. 2. 2. 4. 3. 5. 2. 7.]
117    third level: [2. 3. 3. 3. 4. 2. 3. 6. 3.]
118    The No. 9 iteration is finished!
119
120    Beging the No. 10 iteration:
121    obj[gen-1] = 19.40   temp_best_value_gen = 19.40
122    No, maintain solution and obj[gen] = 19.40 , and the tolerance_counter = 10
123    solution chromosome =
124    first level: [ [ 2.  7. 12. 18. 25.5 3.  1.5 3.5 3.5]
125    second level: [0. 1. 2. 2. 4. 3. 5. 2. 7.]
126    third level: [2. 3. 3. 3. 4. 2. 3. 6. 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: [ [ 2.  7. 12. 18. 25.5 3.  1.5 3.5 3.5]
134    second level: [0. 1. 2. 2. 4. 3. 5. 2. 7.]
135    third level: [2. 3. 3. 3. 4. 2. 3. 6. 3.]
136    Objective function values and some other indicators:
137    Obj0 = 8.00      Obj1 = 42.00      Obj0 + Obj1 = 50.00
138    Total movement of crane: 16.00
139    Total waiting time in berth position: 26.00
140    Total index of q during berthing: 285.00
141    Specific arrangement for each vessel:
142    V_id: 0          li: 4.0          xi: 2.0          bow of i: 0.0          tail of i: 4.0          gama_i0: 0.0          gama_i1: 2.0
143    duration_time_i: 2.0          demand_i: 80.0          work load_i: 80.0          work load gap_i: 0
144    V_id: 1          li: 6.0          xi: 7.0          bow of i: 4.0          tail of i: 10.0          gama_i0: 1.0          gama_i1: 2.0
145    duration_time_i: 1.0          demand_i: 60.0          work load_i: 60.0          work load gap_i: 0
146    V_id: 2          li: 4.0          xi: 12.0          bow of i: 10.0          tail of i: 14.0          gama_i0: 2.0          gama_i1: 4
147    duration_time_i: 2.0          demand_i: 80.0          work load_i: 80.0          work load gap_i: 0
148    V_id: 3          li: 8.0          xi: 18.0          bow of i: 14.0          tail of i: 22.0          gama_i0: 2.0          gama_i1: 4
149    duration_time_i: 2.0          demand_i: 100.0          work load_i: 100.0          work load gap_i: 0
150    V_id: 4          li: 9.0          xi: 25.5          bow of i: 21.0          tail of i: 30.0          gama_i0: 4.0          gama_i1: 6
151    duration_time_i: 2.0          demand_i: 120.0          work load_i: 120.0          work load gap_i: 0
152    V_id: 5          li: 6.0          xi: 3.0          bow of i: 0.0          tail of i: 6.0          gama_i0: 3.0          gama_i1: 5.0
153    duration_time_i: 2.0          demand_i: 80.0          work load_i: 80.0          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: 7.0
155    duration_time_i: 2.0          demand_i: 80.0          work load_i: 80.0          work load gap_i: 0
156    V_id: 7          li: 7.0          xi: 3.5          bow of i: 0.0          tail of i: 7.0          gama_i0: 2.0          gama_i1: 3.0
157    duration_time_i: 1.0          demand_i: 120.0          work load_i: 120.0          work load gap_i: 0
158    V_id: 8          li: 7.0          xi: 3.5          bow of i: 0.0          tail of i: 7.0          gama_i0: 7.0          gama_i1: 9.0
159    duration_time_i: 2.0          demand_i: 120.0          work load_i: 120.0          work load gap_i: 0
160
161    Algorithm finished and the total CPU time: 1074 s
162    End
163

```