


```

80     second level: [3. 0. 7. 6. 6. 0. 2.]
81     third level: [1. 2. 2. 3. 3. 2. 5.] ]
82     The No. 5 iteration is finished!
83
84     Beging the No. 6 iteration:
85     obj[gen-1] = 23.20 temp_best_value_gen = 23.20
86     No, maintain solution and obj[gen] = 23.20 , and the tolerance_counter = 6
87     solution chromosome =
88     first level: [ [ 1.5 5. 8.5 11.5 16. 23.5 26.5]
89     second level: [3. 0. 7. 6. 6. 0. 2.]
90     third level: [1. 2. 2. 3. 3. 2. 5.] ]
91     The No. 6 iteration is finished!
92
93     Beging the No. 7 iteration:
94     obj[gen-1] = 23.20 temp_best_value_gen = 23.20
95     No, maintain solution and obj[gen] = 23.20 , and the tolerance_counter = 7
96     solution chromosome =
97     first level: [ [ 1.5 5. 8.5 11.5 16. 23.5 26.5]
98     second level: [3. 0. 7. 6. 6. 0. 2.]
99     third level: [1. 2. 2. 3. 3. 2. 5.] ]
100    The No. 7 iteration is finished!
101
102    Beging the No. 8 iteration:
103    obj[gen-1] = 23.20 temp_best_value_gen = 23.20
104    No, maintain solution and obj[gen] = 23.20 , and the tolerance_counter = 8
105    solution chromosome =
106    first level: [ [ 1.5 5. 8.5 11.5 16. 23.5 26.5]
107    second level: [3. 0. 7. 6. 6. 0. 2.]
108    third level: [1. 2. 2. 3. 3. 2. 5.] ]
109    The No. 8 iteration is finished!
110
111    Beging the No. 9 iteration:
112    obj[gen-1] = 23.20 temp_best_value_gen = 23.20
113    No, maintain solution and obj[gen] = 23.20 , and the tolerance_counter = 9
114    solution chromosome =
115    first level: [ [ 1.5 5. 8.5 11.5 16. 23.5 26.5]
116    second level: [3. 0. 7. 6. 6. 0. 2.]
117    third level: [1. 2. 2. 3. 3. 2. 5.] ]
118    The No. 9 iteration is finished!
119
120    Beging the No. 10 iteration:
121    obj[gen-1] = 23.20 temp_best_value_gen = 23.20
122    No, maintain solution and obj[gen] = 23.20 , and the tolerance_counter = 10
123    solution chromosome =
124    first level: [ [ 1.5 5. 8.5 11.5 16. 23.5 26.5]
125    second level: [3. 0. 7. 6. 6. 0. 2.]
126    third level: [1. 2. 2. 3. 3. 2. 5.] ]
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: [ [ 1.5 5. 8.5 11.5 16. 23.5 26.5]
134 second level: [3. 0. 7. 6. 6. 0. 2.]
135 third level: [1. 2. 2. 3. 3. 2. 5.] ]
136 Objective function values and some other indicators:
137 Obj0 = 10.00 Obj1 = 42.00 Obj0 + Obj1 = 52.00
138 Total movement of crane: 18.00
139 Total waiting time in berth position: 24.00
140 Total index of q during berthing: 362.00
141 Specific arrangement for each vessel:
142 V_id: 0 li: 3.0 xi: 1.5 bow of i: 0.0 tail of i: 3.0 gama_i0: 3.0 gama_i1: 7.0
143 duration_time_i: 4.0 demand_i: 80.0 work load_i: 80.0 work load gap_i: 0
144 V_id: 1 li: 4.0 xi: 5.0 bow of i: 3.0 tail of i: 7.0 gama_i0: 0.0 gama_i1: 3.0
145 duration_time_i: 3.0 demand_i: 120.0 work load_i: 120.0 work load gap_i: 0
146 V_id: 2 li: 3.0 xi: 8.5 bow of i: 7.0 tail of i: 10.0 gama_i0: 7.0 gama_i1: 11.
147 0 duration_time_i: 4.0 demand_i: 160.0 work load_i: 160.0 work load gap_i: 0
148 V_id: 3 li: 3.0 xi: 11.5 bow of i: 10.0 tail of i: 13.0 gama_i0: 6.0 gama_i1: 9
149 .0 duration_time_i: 3.0 demand_i: 140.0 work load_i: 140.0 work load gap_i: 0
150 V_id: 4 li: 6.0 xi: 16.0 bow of i: 13.0 tail of i: 19.0 gama_i0: 6.0 gama_i1: 8
151 .0 duration_time_i: 2.0 demand_i: 120.0 work load_i: 120.0 work load gap_i: 0
152 V_id: 5 li: 9.0 xi: 23.5 bow of i: 19.0 tail of i: 28.0 gama_i0: 0.0 gama_i1: 2
153 .0 duration_time_i: 2.0 demand_i: 60.0 work load_i: 60.0 work load gap_i: 0
154 V_id: 6 li: 7.0 xi: 26.5 bow of i: 23.0 tail of i: 30.0 gama_i0: 2.0 gama_i1: 3
155 .0 duration_time_i: 1.0 demand_i: 60.0 work load_i: 60.0 work load gap_i: 0
156
157 Algorithm finished and the total CPU time: 973 s
158 End
159

```