


```

80     second level: [0. 3. 1. 3. 0. 5.]
81     third level: [6. 3. 2. 5. 2. 4.]
82     The No. 5 iteration is finished!
83
84     Beging the No. 6 iteration:
85     obj[gen-1] = 15.00 temp_best_value_gen = 15.00
86     No, maintain solution and obj[gen] = 15.00 , and the tolerance_counter = 1
87     solution chromosome =
88     first level: [ [26. 9.5 15. 3.5 4. 22.5]
89     second level: [0. 3. 1. 3. 0. 5.]
90     third level: [6. 3. 2. 5. 2. 4.]
91     The No. 6 iteration is finished!
92
93     Beging the No. 7 iteration:
94     obj[gen-1] = 15.00 temp_best_value_gen = 15.00
95     No, maintain solution and obj[gen] = 15.00 , and the tolerance_counter = 2
96     solution chromosome =
97     first level: [ [26. 9.5 15. 3.5 4. 22.5]
98     second level: [0. 3. 1. 3. 0. 5.]
99     third level: [6. 3. 2. 5. 2. 4.]
100    The No. 7 iteration is finished!
101
102    Beging the No. 8 iteration:
103    obj[gen-1] = 15.00 temp_best_value_gen = 15.00
104    No, maintain solution and obj[gen] = 15.00 , and the tolerance_counter = 3
105    solution chromosome =
106    first level: [ [26. 9.5 15. 3.5 4. 22.5]
107    second level: [0. 3. 1. 3. 0. 5.]
108    third level: [6. 3. 2. 5. 2. 4.]
109    The No. 8 iteration is finished!
110
111    Beging the No. 9 iteration:
112    obj[gen-1] = 15.00 temp_best_value_gen = 15.00
113    No, maintain solution and obj[gen] = 15.00 , and the tolerance_counter = 4
114    solution chromosome =
115    first level: [ [26. 9.5 15. 3.5 4. 22.5]
116    second level: [0. 3. 1. 3. 0. 5.]
117    third level: [6. 3. 2. 5. 2. 4.]
118    The No. 9 iteration is finished!
119
120    Beging the No. 10 iteration:
121    obj[gen-1] = 15.00 temp_best_value_gen = 15.00
122    No, maintain solution and obj[gen] = 15.00 , and the tolerance_counter = 5
123    solution chromosome =
124    first level: [ [26. 9.5 15. 3.5 4. 22.5]
125    second level: [0. 3. 1. 3. 0. 5.]
126    third level: [6. 3. 2. 5. 2. 4.]
127    The No. 10 iteration is finished!
128
129    Beging the No. 11 iteration:
130    obj[gen-1] = 15.00 temp_best_value_gen = 15.00
131    No, maintain solution and obj[gen] = 15.00 , and the tolerance_counter = 6
132    solution chromosome =
133    first level: [ [26. 9.5 15. 3.5 4. 22.5]
134    second level: [0. 3. 1. 3. 0. 5.]
135    third level: [6. 3. 2. 5. 2. 4.]
136    The No. 11 iteration is finished!
137
138    Beging the No. 12 iteration:
139    obj[gen-1] = 15.00 temp_best_value_gen = 15.00
140    No, maintain solution and obj[gen] = 15.00 , and the tolerance_counter = 7
141    solution chromosome =
142    first level: [ [26. 9.5 15. 3.5 4. 22.5]
143    second level: [0. 3. 1. 3. 0. 5.]
144    third level: [6. 3. 2. 5. 2. 4.]
145    The No. 12 iteration is finished!
146
147    Beging the No. 13 iteration:
148    obj[gen-1] = 15.00 temp_best_value_gen = 15.00
149    No, maintain solution and obj[gen] = 15.00 , and the tolerance_counter = 8
150    solution chromosome =
151    first level: [ [26. 9.5 15. 3.5 4. 22.5]
152    second level: [0. 3. 1. 3. 0. 5.]
153    third level: [6. 3. 2. 5. 2. 4.]
154    The No. 13 iteration is finished!
155
156    Beging the No. 14 iteration:
157    obj[gen-1] = 15.00 temp_best_value_gen = 15.00
158    No, maintain solution and obj[gen] = 15.00 , and the tolerance_counter = 9
159    solution chromosome =
160    first level: [ [26. 9.5 15. 3.5 4. 22.5]
161    second level: [0. 3. 1. 3. 0. 5.]
162    third level: [6. 3. 2. 5. 2. 4.]
163    The No. 14 iteration is finished!

```

```

164
165 Beging the No. 15 iteration:
166 obj[gen-1] = 15.00 temp_best_value_gen = 15.00
167 No, maintain solution and obj[gen] = 15.00 , and the tolerance_counter = 10
168 solution chromosome =
169 first level: [ [26. 9.5 15. 3.5 4. 22.5]
170 second level: [0. 3. 1. 3. 0. 5.]
171 third level: [6. 3. 2. 5. 2. 4.] ]
172 The No. 15 iteration is finished!
173
174
175 -----
176 The iteration is terminated and then visulize the solution:
177 solution chromosome =
178 first level: [ [26. 9.5 15. 3.5 4. 22.5]
179 second level: [0. 3. 1. 3. 0. 5.]
180 third level: [6. 3. 2. 5. 2. 4.] ]
181 Objective function values and some other indicators:
182 Obj0 = 6.00 Obj1 = 36.00 Obj0 + Obj1 = 42.00
183 Total movement of crane: 24.00
184 Total waiting time in berth position: 12.00
185 Total index of q during berthing: 344.00
186 Specific arrangement for each vessel:
187 V_id: 0 li: 8.0 xi: 26.0 bow of i: 22.0 tail of i: 30.0 gama_i0: 0.0 gama_i1: 1
.0 duration_time_i: 1.0 demand_i: 80.0 work load_i: 80.0 work load gap_i: 0
188 V_id: 1 li: 3.0 xi: 9.5 bow of i: 8.0 tail of i: 11.0 gama_i0: 3.0 gama_i1: 5.0
duration_time_i: 2.0 demand_i: 100.0 work load_i: 100.0 work load gap_i: 0
189 V_id: 2 li: 8.0 xi: 15.0 bow of i: 11.0 tail of i: 19.0 gama_i0: 1.0 gama_i1: 3
.0 duration_time_i: 2.0 demand_i: 80.0 work load_i: 80.0 work load gap_i: 0
190 V_id: 3 li: 7.0 xi: 3.5 bow of i: 0.0 tail of i: 7.0 gama_i0: 3.0 gama_i1: 4.0
duration_time_i: 1.0 demand_i: 80.0 work load_i: 80.0 work load gap_i: 0
191 V_id: 4 li: 8.0 xi: 4.0 bow of i: 0.0 tail of i: 8.0 gama_i0: 0.0 gama_i1: 3.0
duration_time_i: 3.0 demand_i: 100.0 work load_i: 100.0 work load gap_i: 0
192 V_id: 5 li: 5.0 xi: 22.5 bow of i: 20.0 tail of i: 25.0 gama_i0: 5.0 gama_i1: 7
.0 duration_time_i: 2.0 demand_i: 160.0 work load_i: 160.0 work load gap_i: 0
193
194 Algorithm finished and the total CPU time: 1082 s
195 End
196

```