


```

80     second level: [ 3. 3. 1. 3. 0. 5. 1. 4. 6. 8. 10.]
81     third level: [7. 2. 3. 7. 3. 2. 2. 3. 3. 2. 3.] ]
82     The No. 5 iteration is finished!
83
84 Beging the No. 6 iteration:
85     obj[gen-1] = 32.80   temp_best_value_gen = 32.80
86     No, maintain solution and obj[gen] = 32.80 , and the tolerance_counter = 6
87     solution chromosome =
88         first level: [ [ 4.5 10.5 15. 21.5 26.5 28.5 2. 3. 4. 4.5 2. ]
89         second level: [ 3. 3. 1. 3. 0. 5. 1. 4. 6. 8. 10.]
90         third level: [7. 2. 3. 7. 3. 2. 2. 3. 3. 2. 3.] ]
91     The No. 6 iteration is finished!
92
93 Beging the No. 7 iteration:
94     obj[gen-1] = 32.80   temp_best_value_gen = 32.80
95     No, maintain solution and obj[gen] = 32.80 , and the tolerance_counter = 7
96     solution chromosome =
97         first level: [ [ 4.5 10.5 15. 21.5 26.5 28.5 2. 3. 4. 4.5 2. ]
98         second level: [ 3. 3. 1. 3. 0. 5. 1. 4. 6. 8. 10.]
99         third level: [7. 2. 3. 7. 3. 2. 2. 3. 3. 2. 3.] ]
100    The No. 7 iteration is finished!
101
102 Beging the No. 8 iteration:
103     obj[gen-1] = 32.80   temp_best_value_gen = 32.80
104     No, maintain solution and obj[gen] = 32.80 , and the tolerance_counter = 8
105     solution chromosome =
106         first level: [ [ 4.5 10.5 15. 21.5 26.5 28.5 2. 3. 4. 4.5 2. ]
107         second level: [ 3. 3. 1. 3. 0. 5. 1. 4. 6. 8. 10.]
108         third level: [7. 2. 3. 7. 3. 2. 2. 3. 3. 2. 3.] ]
109    The No. 8 iteration is finished!
110
111 Beging the No. 9 iteration:
112     obj[gen-1] = 32.80   temp_best_value_gen = 32.80
113     No, maintain solution and obj[gen] = 32.80 , and the tolerance_counter = 9
114     solution chromosome =
115         first level: [ [ 4.5 10.5 15. 21.5 26.5 28.5 2. 3. 4. 4.5 2. ]
116         second level: [ 3. 3. 1. 3. 0. 5. 1. 4. 6. 8. 10.]
117         third level: [7. 2. 3. 7. 3. 2. 2. 3. 3. 2. 3.] ]
118    The No. 9 iteration is finished!
119
120 Beging the No. 10 iteration:
121     obj[gen-1] = 32.80   temp_best_value_gen = 32.80
122     No, maintain solution and obj[gen] = 32.80 , and the tolerance_counter = 10
123     solution chromosome =
124         first level: [ [ 4.5 10.5 15. 21.5 26.5 28.5 2. 3. 4. 4.5 2. ]
125         second level: [ 3. 3. 1. 3. 0. 5. 1. 4. 6. 8. 10.]
126         third level: [7. 2. 3. 7. 3. 2. 2. 3. 3. 2. 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: [ [ 4.5 10.5 15. 21.5 26.5 28.5 2. 3. 4. 4.5 2. ]
134         second level: [ 3. 3. 1. 3. 0. 5. 1. 4. 6. 8. 10.]
135         third level: [7. 2. 3. 7. 3. 2. 2. 3. 3. 2. 3.] ]
136     Objective function values and some other indicators:
137     Obj0 = 12.00   Obj1 = 100.00   Obj0 + Obj1 = 112.00
138     Total movement of crane: 46.00
139     Total waiting time in berth position: 44.00
140     Total index of q during berthing: 475.00
141     Specific arrangement for each vessel:
142     V_id: 0      li: 9.0      xi: 4.5      bow of i: 0.0      tail of i: 9.0      gama_i0: 3.0      gama_i1: 4.0
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: 3.0      xi: 10.5     bow of i: 9.0      tail of i: 12.0     gama_i0: 3.0      gama_i1: 6
145     V_id: 2      li: 6.0      xi: 15.0     bow of i: 12.0     tail of i: 18.0     gama_i0: 1.0      gama_i1: 3
146     V_id: 3      li: 7.0      xi: 21.5     bow of i: 18.0     tail of i: 25.0     gama_i0: 3.0      gama_i1: 4
147     V_id: 4      li: 3.0      xi: 26.5     bow of i: 25.0     tail of i: 28.0     gama_i0: 0.0      gama_i1: 2
148     V_id: 5      li: 3.0      xi: 28.5     bow of i: 27.0     tail of i: 30.0     gama_i0: 5.0      gama_i1: 9
149     V_id: 6      li: 4.0      xi: 2.0      bow of i: 0.0      tail of i: 4.0      gama_i0: 1.0      gama_i1: 3.0
150     V_id: 7      li: 6.0      xi: 3.0      bow of i: 0.0      tail of i: 6.0      gama_i0: 4.0      gama_i1: 6.0
151     V_id: 8      li: 8.0      xi: 4.0      bow of i: 0.0      tail of i: 8.0      gama_i0: 6.0      gama_i1: 8.0
152     V_id: 9      li: 9.0      xi: 4.5      bow of i: 0.0      tail of i: 9.0      gama_i0: 8.0      gama_i1: 10.0
153     V_id: 10     li: 4.0      xi: 2.0      bow of i: 0.0      tail of i: 4.0      gama_i0: 10.0     gama_i1: 13.
154     0      duration_time_i: 3.0      demand_i: 140.0      work load_i: 140.0      work load gap_i: 0

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unknown

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153
154 Algorithm finished and the total CPU time: 1300 s
155 End
156
```